

**BEFORE HEARINGS COMMISSIONERS APPOINTED
BY THE FAR NORTH DISTRICT COUNCIL**

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of the hearing of submissions on the Proposed Far North District Plan
SUBMITTER	Tapuaetahi Incorporation
HEARING TOPIC:	Hearing 17 – Sweep Up & Tangata Whenua Matters

STATEMENT OF SUPPLEMENTARY PLANNING EVIDENCE OF STEVEN REMANA SANSON

21 October 2025

INTRODUCTION

1. My name is Steven Remana Sanson. I am a Director / Consultant Planner at Sanson and Associates Limited and Bay of Islands Planning [2022] Limited.
2. I have been engaged by the Tapuaetahi Incorporation [**the Submitter**] to provide evidence in support of their original and further submissions to the Proposed Far North District Plan [**PDP**].
3. I note that while the Environment Court Code of Conduct does not apply to a Council hearing, I am familiar with the principles of the code and have followed these in preparing this evidence.

QUALIFICATIONS AND EXPERIENCE

4. I hold the qualification of Bachelor of Planning [Hons] from The University of Auckland, graduating in 2013 and I am an Intermediate Member of the New Zealand Planning Institute.
5. I have over 10 years' experience and have previously held planning positions in the Far North District. In my current role I regularly advise and assist corporate and private individuals with the preparation of resource consent applications including subdivision and land use consents and relevant regional council consents. I have also processed resource consent applications for councils, prepared submissions on district plan changes, and processed plan changes.

SCOPE OF EVIDENCE

6. The purpose of this evidence is to provide my opinion on the matters raised in the Council s42A Report and the technical reports relied upon.

EVALUATION OF SECTION 42A REPORT

7. The Tapuaetahi submission is considered in section 2.2.4 of the s42A Report.
8. I understood that the submitter had leave to re-present the zoning matters of concern in the submission from Hearing 10 to Hearing 15A. Hearing 15A was then shifted to Hearing 17.
9. On review of the submission points considered, it appears the s42A Report writer has only considered submission points in relation to provisions.
10. Provisions aside, a key point raised in my evidence in chief for Hearing 15A was the matter of appropriate zoning for land that is currently Coastal Residential under the Operative District Plan and it not fitting either definition of the Maori Purpose Rural or Maori Purpose Urban found in the Chapter. My evidence in chief remains relevant for this aspect.

Development Area

11. The intent of the development area is agreed in principle and I respond to the queries as followed which are raised in paragraph 120[a]-[e] of the s42A Report.

- The development will be owned by tangata whenua [the Incorporation] and will be used to advance their economic wellbeing. As a result, there is more potential for the submitter to provide for their shareholders cultural, social, and economic wellbeing.

The submitter proposes the development to be a mixture of the leasehold model currently shown in the Coastal Residential portion of the landholdings with dwellings set aside for the Incorporation to run and manage.

The evidence of Mr Hohaia outlines how shareholders receive a benefit from this approach and therefore how the proposal benefits tangata whenua residing in the Far North District as required by the definition of Papakainga. I also understand from his evidence that the overall mixture of could change subject to the cost of development.

From a planning perspective, I see no fundamental difference in effects of establishing a residential activity or a Papakainga [both have a housing outcome with benefits to the Incorporation].

- A resource consent will be applied for a 20 unit development. The details have been provided to Council officers and are attached as **Appendix 1**. The submitter is using the Councils adaptive consenting process so a timeline is hard to apply in terms of lodgement. As an estimate, a consent will be lodged prior to the end of the year. On the basis of approvals taking 48 hours, a decision is also assumed before the end of the year.
- Inclusion of the Development Area is sought regardless because of the potential to imbed the development into the Plan as a permitted activity may outweigh the life of a consent if Councils resource consent team do not approve an extended lapse term for the consent [i.e 10 years].

I have reviewed the transport evidence of Mr. Collins and, in the interest of progressing this development, the Incorporation accepts the intent of his recommendations which are focussed on ensuring safe vehicle access and pedestrian safety. The final design will incorporate safe sight lines at the vehicle crossing through benching or other measures. Appropriate provision for pedestrian safety and connectivity will also be confirmed during the resource consent and engineering approval stages.

Interestingly, the report writer considers the development to be 'more akin to an urban typology'. I agree with this planning characterisation and linking back to my evidence in chief, I ponder how the rezoning of the site to Maori Purpose Rural, reflects both existing and proposed development on the site.

The standard Māori Purpose Rural zoning is therefore a poor fit. It fails to recognise the existing and proposed density at Tapuaetahi and does not adequately provide for the social and economic aspirations of the Incorporation in this location. The recommended 'Tapuaetahi Papakāinga Development Area' is a much better planning tool, as it enables this urban-style development while ensuring that site-specific matters, such as those raised by the transport expert, are appropriately managed.

- An updated Concept Plan is provided in **Appendix 1** and the draft watermark can be removed when ready to be submitted into the PDP.

SECTION 32AA EVALUATION

12. I generally concur with the approach outlined by the s42A Report writer but I don't share the same opinion that a residential activity or Papakainga activity would result in a fundamentally different effects outcome for the Development Area.

CONCLUSION

13. I trust this supplementary evidence answers the queries of the s42A Report Writer.



SITE SUITABILITY REPORT

Tapuaetahi Development

Prepared for

Tapuaetahi Incorporation

25/09/2025

Report Information Summary

Job no.	J15724
Report Author	Harry Miller/Callum Smith
Report Reviewer	Ben Perry/Dan Simmonds
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1	05/09/2025	Draft issued to Client.
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Document Acceptance

Action	Name	Signed	Date
Author	Harry Miller	 Engineering Geologist, BSci (Geo)	25/09/2025
Author	Callum Smith	 Intermediate Engineer, BEng (Hons)	25/09/2025
Reviewer	Dan Simmonds	 Senior Geotechnical Engineer, MIEAust CPEng, CMEngNZ	25/09/2025
Reviewer	Ben Perry	 Managing Director, CMEngNZ CPEng	25/09/2025

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The nature and continuity of the subsurface materials are inferred and it must be appreciated that actual conditions could vary from that described herein.



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1 Introduction

Vision Consulting Engineers Limited (VISION) has been engaged by the Tapuaetahi Incorporation (the “Client”) to assess the suitability of their land for a proposed subdivision at Tapuaetahi. The Incorporation plans to create 20 proposed allotments on Lot 1 DP184896, each with a dwelling, services and associated amenities. The remaining land will include accessways and a boat yard with boat storage buildings.

VISION completed a Stage 1 high-level engineering assessment of the proposed development (reference J15724, dated 10/12/2024 and worked in collaboration with the project team (Client, landscape architect, engineering outcomes and planner) to enable the development of a final scheme plan for which a Resource Consent is to be sort.

The proposed final subdivision is shown on the Littoralis Site Plan. The site plan depicts that a right of way provides access to the new lots from Taronui Road, with 20 new dwellings proposed. From discussions with the Client and project team, it is understood that each new dwelling is to be on its own lot, with the right of way located on the balance lot, along with a centralized onsite wastewater system. In addition, a boat yard is proposed on the western side of Taronui Road.

This Stage 2 report presents the findings of the site suitability assessment, which includes;

- Working collaboratively with the Client, project team and the Far North District Council (FNDC) in an adaptive planning process.
- Provide a site suitability report that includes a feasibility geotechnical assessment to support the Resource Consent

1.1 Objective

The project objective of Stage 2 is to work collaboratively with the Client and project team and to provide a site suitability report that includes a geotechnical feasibility assessment, wastewater feasibility assessment and access feasibility design to support a Resource Consent application for the proposed subdivision.

It is understood that Engineering Outcomes Ltd is providing traffic specialist input regarding proposed and existing intersections and any recommendations for Taronui Road and the Internal Accessways.

2 Scope of Work

2.1 Scope and Exclusions

The following scope of work is proposed:

- Familiarisation with information regarding the proposed development provided by the Client and project team
- Site walkover assessment to assess the presence of engineering constraints identified as part of the high level assessment.
- Assess natural hazards in the requirements of Rule 13.7.3.2 of the Operative District Plan.
- Onsite Wastewater Feasibility Assessment
 - Desktop Study of the site, including an assessment of site constraints for onsite wastewater disposal and identify possible location of a treatment plant and disposal field.
 - Provide preliminary wastewater plan to Client and project team for comment/approval.
 - Site walkover and intrusive testing to assess soil type (5 hand auger boreholes to a maximum depth of 1.2m or refusal)
 - Assessment of environmental site constraints and applicable systems

- Concept design to demonstrate feasibility (analysis of field logs, calculations, design)
- Preparation of onsite wastewater feasibility plan
- Onsite wastewater disposal reporting
- Internal Access Feasibility Assessment
 - Assess requirements for internal access ways in accordance with the FNDC ES 2009 and the operative District Plan.
 - Assess stormwater management for internal access ways.
 - Carry out concept design of proposed internal access way using topographic survey data and NRC LiDAR.
 - Preparation of concept level drawings
- Boat Storage Feasibility Assessment
 - Assess requirements for boat storage area and manoeuvring in accordance with the FNDC ES 2009.
 - Assess stormwater management for boat storage area.
 - Carry out concept design of proposed boat storage using NRC LiDAR.
 - Preparation of concept level drawings:
- Geotechnical Feasibility Assessment
 - Familiarisation with information provided by the Client
 - Desk Study: Review published and unpublished information about the site
 - Geomorphologic assessment of the property, including a review of historic aerial images and LiDAR data.
 - Site walkover, visual inspection of the site and surrounding environs to assess geomorphology and any geotechnical hazards that may exist or have potential to exist.
 - Intrusive testing to assess ground conditions present at the site. This is to include 7 hand augered boreholes to a maximum depth of 5.0m bgl or refusal.
 - Geotechnical feasibility assessment reporting providing the findings of our visual assessment including site observations, subsurface conditions and preliminary geotechnical recommendations.
- Assess stormwater for individual residential lots and the boat yard
- Preparation of site suitability report presenting our assessment addressing stormwater, wastewater, vehicle access, earthworks, natural hazards, feasibility geotechnical assessment and water supply (including firefighting).

3 Industry Guidance

This report has been prepared, as agreed with our Client, in general accordance with the requirements of the FNDC ES 2009 and with reference to the District Plan; Section 106 of the Resource Management Act (RMA).

4 Property Description and Details

The property is legally described as Lot 2-3 Deposited Plan 176907, Lot 5 Deposited Plan 177923 and Lot 1 Deposited Plan 184896 and is 3,296,124 m² or 329 hectares (ha) in area.

The property is located on the Purerua Peninsula and extends from the Te Puna Inlet to the south-east and Tapuaetahi Beach to the north-west, with Tapuaetahi Creek located along part of the western property boundary. Purerua Road passes through the property along with Taronui Road that provides access to the existing dwellings that are located to the north-west of the subject property. The property contains the Kopupu Stream, Waiotai Stream and the Kuririki Stream. The location of the property is presented in Figure 1.

The property is currently undeveloped and is generally covered in pasture with bush present within gully features associated with the streams. The topography of the property varies from flat to gently sloping land to areas that are moderately to steeply sloping.

For the purpose of this assessment, the 'development site' is limited to the north-western portion of the property as shown by the yellow box in Figure 1. The 'boat storage site' is limited to the western portion of the site shown by the green box in Figure 1.

Basic details of the property are provided in Table 1.

Table 1. Property Details

Data relating to this site

Item	Details
<i>Territorial Authority</i>	Far North District Council
<i>Site Address</i>	N/A
<i>Legal Description</i>	Lot 2-3 Deposited Plan 176907, Lot 5 Deposited Plan 177923 and Lot 1 Deposited Plan 184896
<i>Area</i>	3,296,124 m ²
<i>Operative DP Zoning</i>	Coastal Living (Development Site), General Coastal (Boat Shed Site)
<i>Proposed DP Zoning</i>	Māori Purpose - Rural

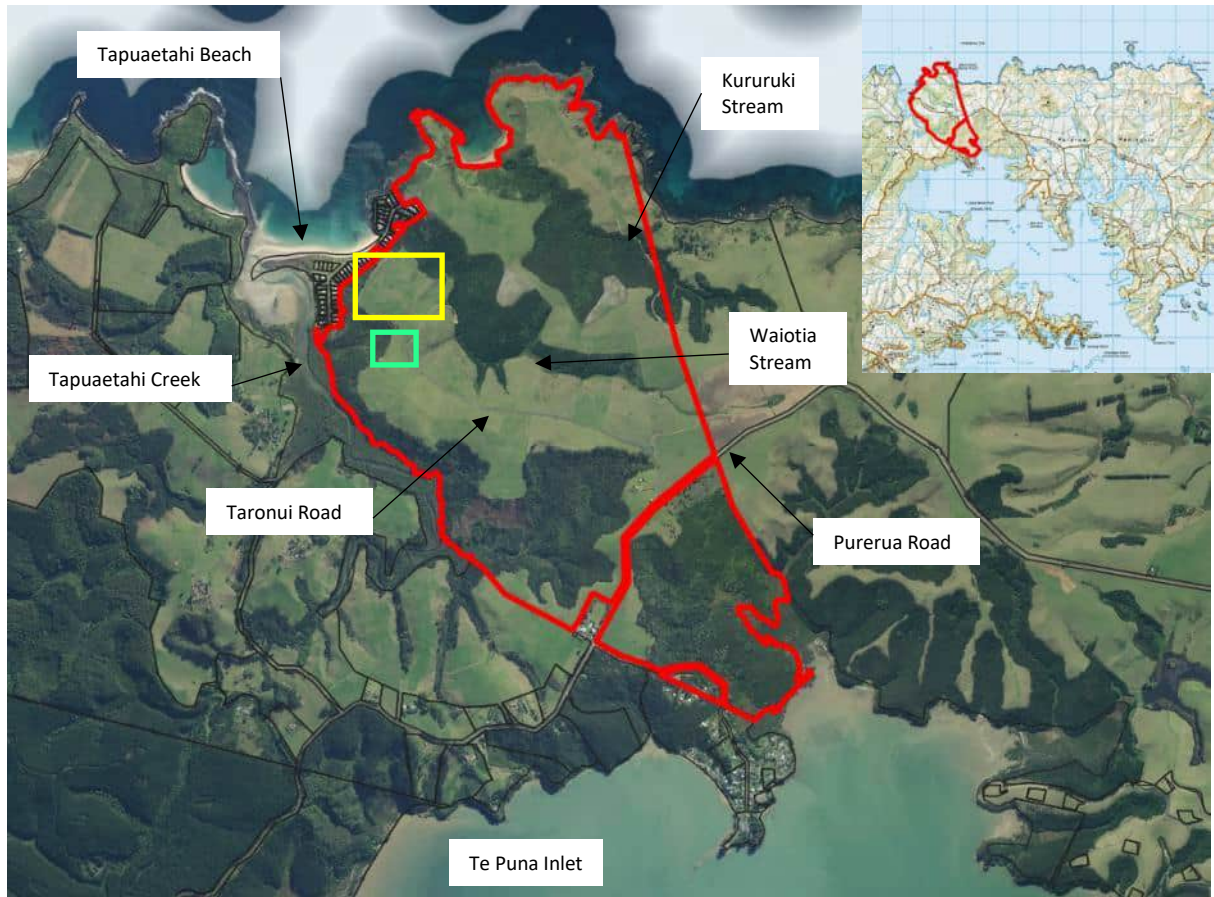


Figure 1. Property and site locations

The property is highlighted red, the 'development site' is outlined in yellow, the 'boat shed site' is outlined in green, north to top of page, boundary approximate only, image from LINZ.

4.1 Proposed Development

It is understood that the Client wishes to subdivide the property to create 20 lots, with each lot to contain a dwelling and amenities. The balance lot is to contain the right of way access to the new lots and a boat storage yard is also proposed.

The proposed development is to have a decentralised on-site wastewater management system that is being explored by the Incorporation at the time of preparing this report. This is discussed further in the Wastewater Section of this report.

The subdivision site plan is provided in Appendix A and is presented below in Figure 2.



Figure 2. Proposed Site Plan
Site Plan is provided by Littoralis

5 Desktop Study

5.1 Geology

The 1:250,000 geological map, Geology of the Whangarei Area (Ebrooke and Brook et al 2009) indicates that the property is underlain by the Waipapa Group comprising massive to thin bedded, lithic volcanoclastic metasandstone and argillite, with tectonically enclosed basalt, chert and siliceous argillite and the Kerikeri Volcanic Group comprising basalt lava, volcanic plugs and minor tuff.

Based on the geomorphology, the site is anticipated to be underlain by the Kerikeri Volcanic Group, which is in turn underlain by the Waipapa Group.

Landcare Research (Harmsworth, 1996) have mapped the property as being underlain by Okaihau gravelly friable clay being soils of the rolling and hilly land, well to moderately well drained, Otaha clay being soils of the rolling and hilly land, imperfectly to very poorly drained, Otaha gravelly clay loam being soils of the rolling and hilly land, imperfectly to very poorly drained, Rangiora clay, clay loam and silty clay loam being soils of the rolling and hilly land, imperfectly to very poorly drained, and Pungaere gravelly friable clay being soils of the rolling and hilly land, well to moderately well drained.

5.2 Historic Aerial Images

Historic aerial images of the property from 1950 and 1980 were obtained from Retrolens, and the 1950 images were reviewed as stereopairs.

The historic aerial image from 1950 is presented in Figure 3. In the image, the area surrounding the site is undeveloped, with some loosely formed access tracks present.

By 1980 (Figure 4), Taronui Road had been constructed, along with dwellings located to the north-west of the subject property. Trees/vegetation are also present on part of the property.

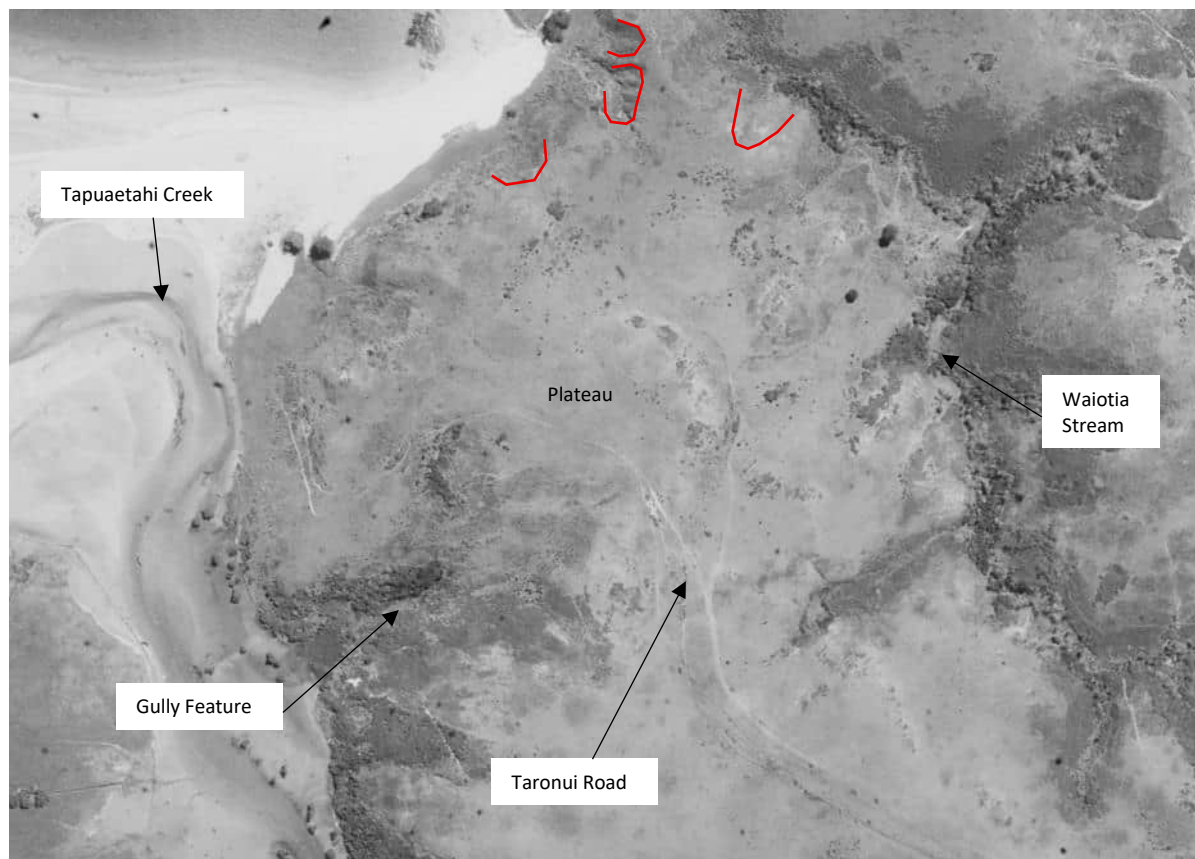


Figure 3. Retrolens 1950 Aerial Image

North at top of page, approximate location of historic headscarps marked in red, historic aerial image from Retrolens.



Figure 4. Retrolens 1980 Aerial Image
North at top of page, historic aerial image from Retrolens.

Historic landslips seen in the 1950's stereo pairs extend down from relatively flat plateau towards the Waiohia Stream, Tapuaetahi Beach and a gully feature extends down to the Tapuaetahi Creek. The historic landslip features observed in the 1950 aerial image show no signs of further movement when compared with the 1980 historic aerial image.

5.3 Geomorphology

The development site is generally located on a flat to gently sloping plateau that is present on a north-west trending spur ridge.

To the north and east of the plateau the land generally slopes between 5 and 10 degrees with slopes up to 22 degrees located to the east of the plateau. The central portion of the site slopes between 0 and 3 degrees with isolated hill features present with slopes ranging between 8 and 12 degrees. Slopes are present to the north-west and north of the site that slope between 20 and 35 degrees down towards Tapuaetahi beach and Waiohia Stream. To the south and west of the plateau, the land slopes between 20 and 35 degrees to a gully feature that extends to the Tapuaetahi Creek.

The boat storage site is located near the head of a gully feature that extends down to Tapuaetahi creek. The site generally slopes between 1 and 6 degrees to the south-east. The gully feature present to the north-west slopes between 20 and 35 degrees.

The geomorphology of the area is shown in Figure 5 below using a digital elevation model derived from the 2018 NRC LiDAR dataset and 1m contours.

The geomorphology of the development site observed in the historic aerial image from 1950 is considered to be relatively consistent with the geomorphology presented in Figure 5. Site observations are shown in Figure 6.

Earthworks associated with Taronui Road appear to include fill material pushed out downslope to form the road.

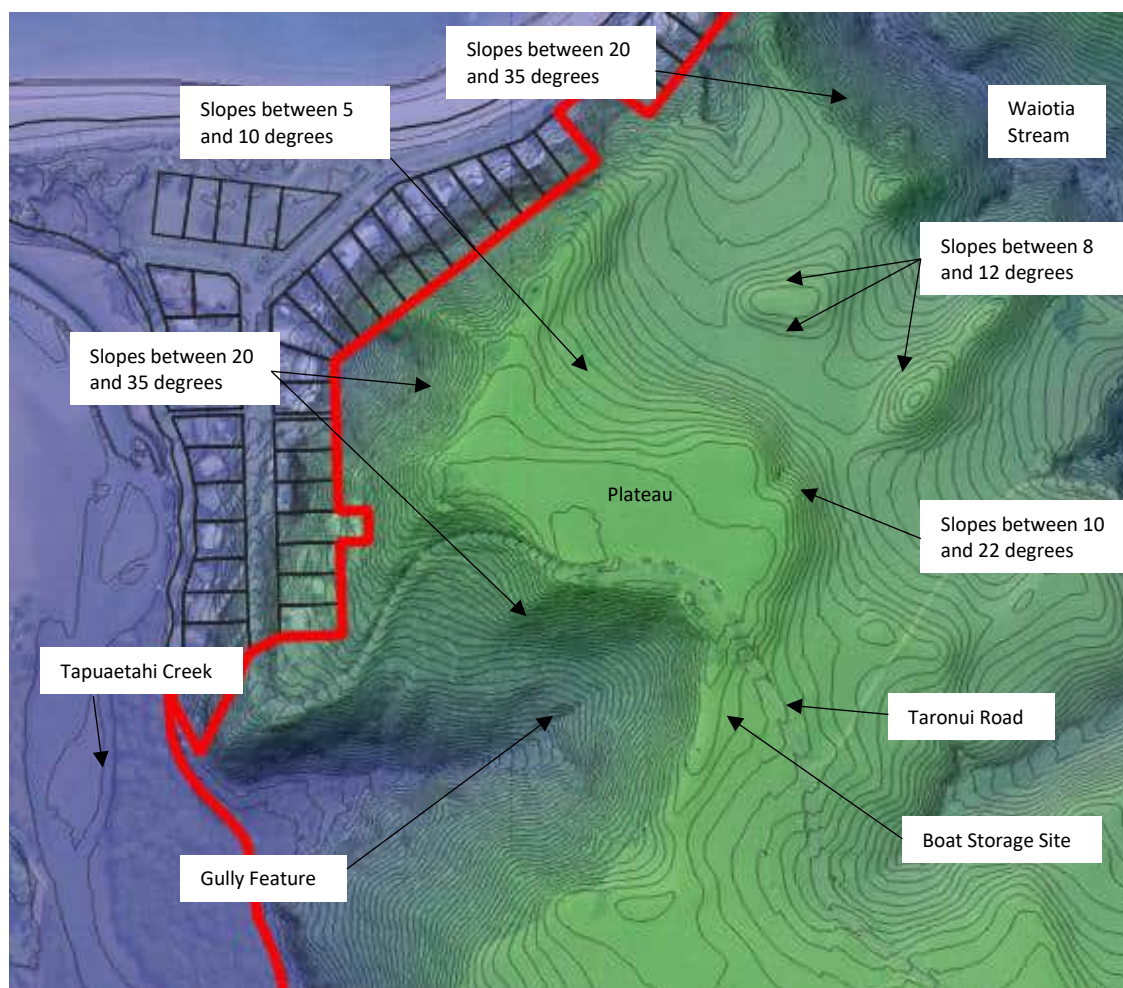


Figure 5. Site Geomorphology

Site boundaries indicative only, contours are shown at 1m intervals with blue shading lower elevations and green shading higher elevations, north is up the page. DEM courtesy of NRC.

5.4 Council Hazard Mapping

NRC and FNDC hazard layers have been reviewed and the development site is not located in an area susceptible to:

- Coastal erosion
- Erosion

5.4.1 FNDC Flooding

The development site is not mapped by the FNDC as being affected by flooding.

5.4.2 NRC Coastal Flooding

The development site is not mapped by the NRC as being affected by the predicted current, 50-year and 100-year coastal flooding events as shown in Figure 6. The predicted extent of flooding is limited to an area adjacent to the Tapuaetahi Creek near the base of a gully feature.



Figure 6. NRC Coastal Flood Extent
North at top of page, extract from NRC Maps

5.4.3 NRC River Flooding

The site is not mapped as being affected by flooding based on the NRC River Flood model, however the property is mapped as being affected by flooding on the NRC Region Wide Flood model for the 10-year, 50-year and 100-year flooding events as shown in Figure 7. The predicted extent of flooding is limited an area adjacent to the Waitotia Stream and a gully feature that leads to the stream.



Figure 7. NRC Region Wide Flood Model, Flood Extent
North at top of page, extract from NRC Maps

6 Site Observations

A site walkover was conducted by VISION on 20th and 21st May 2025. The following observations were made at the site and key site features are displayed on Figure 8 and 9 below.

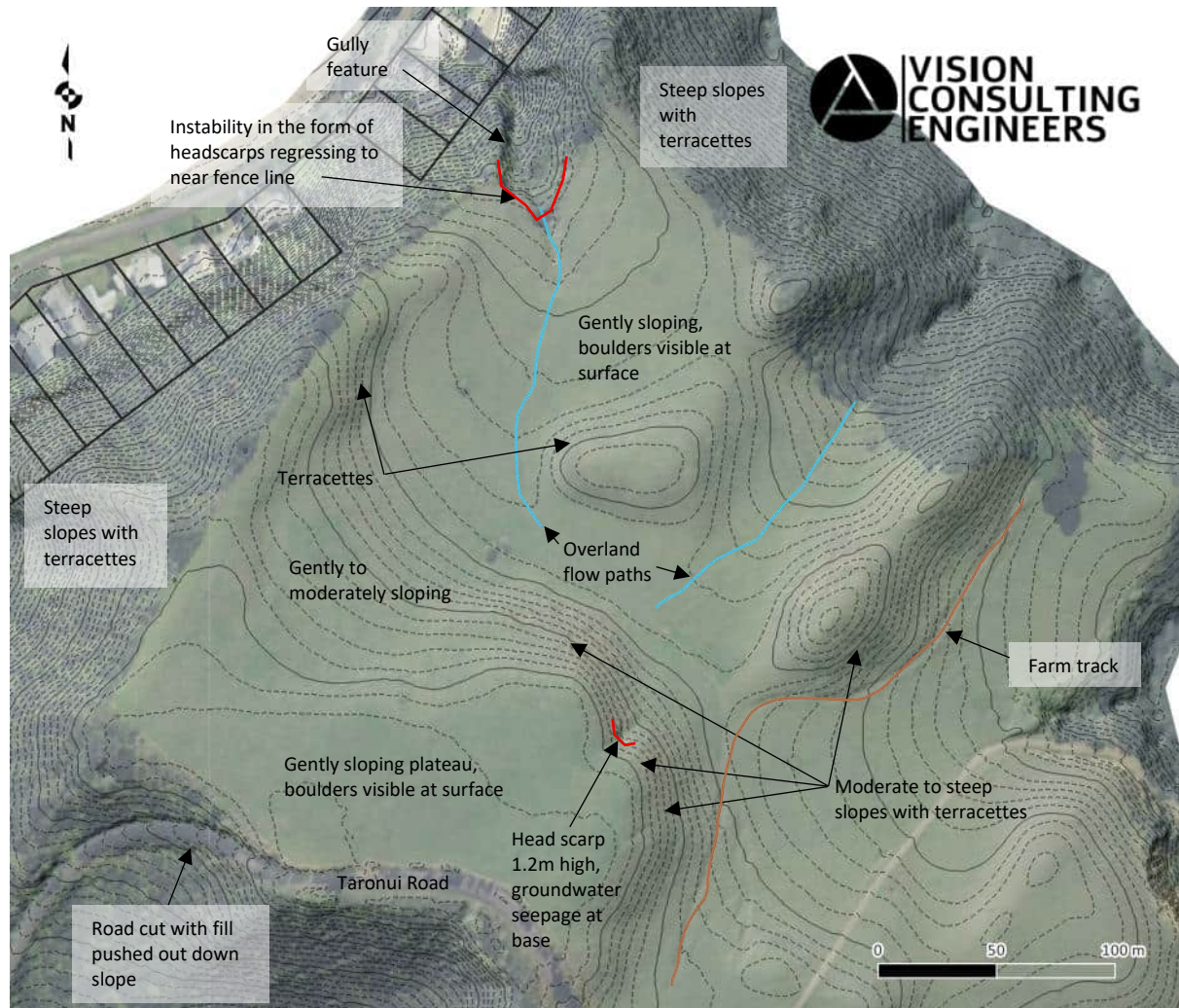


Figure 8. Site observations
Site observations made by VISION during the site walkover. 1.0m NRC Contours.

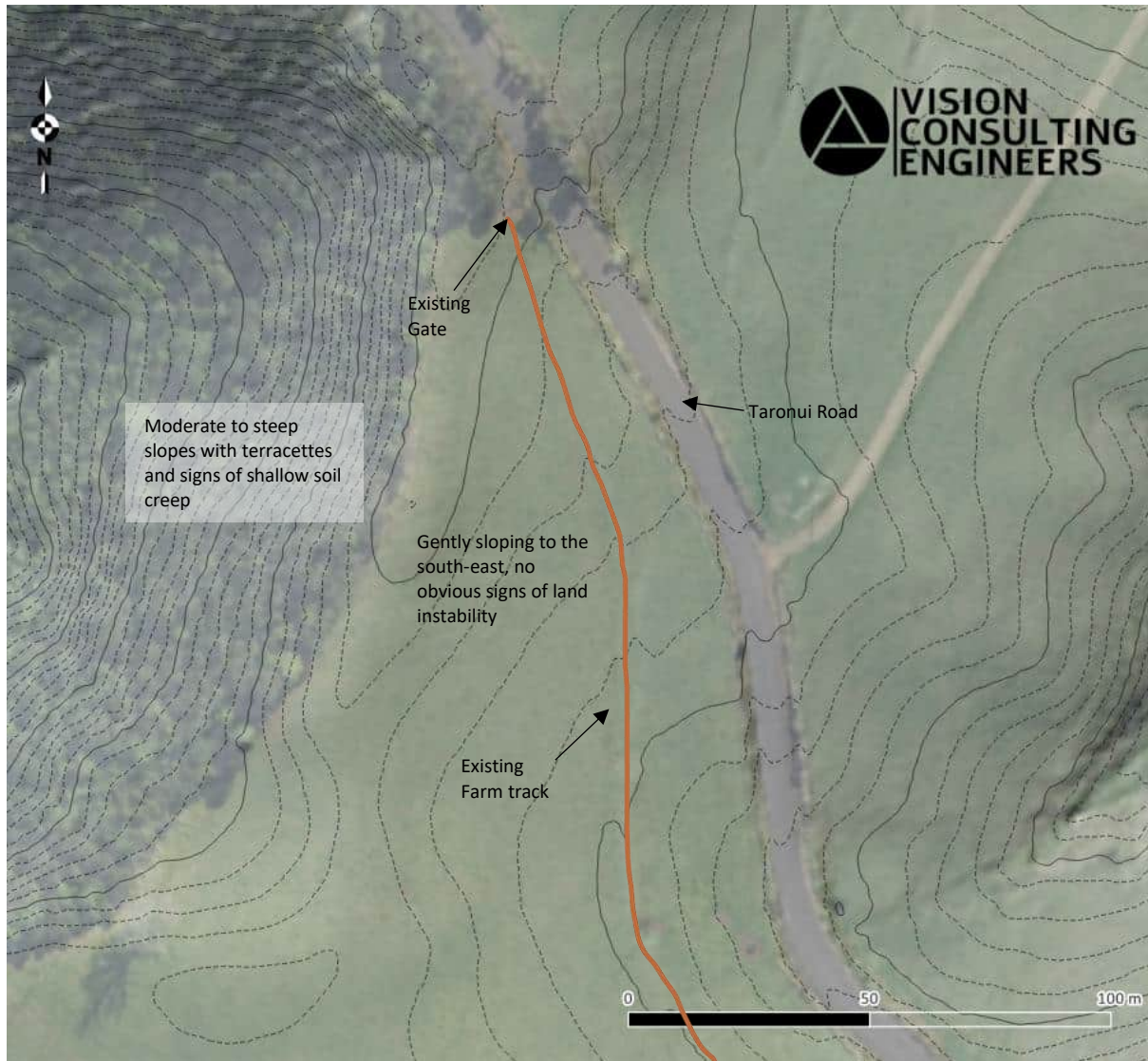


Figure 9. Boat shed site observations
Site observations made by VISION during the site walkover. 1.0m NRC Contours

7 Natural Hazards

Based on the assessments undertaken for this report and the requirements of Rule 13.7.3.2 of the Operative District Plan, we have summarised the findings in relation to the specific hazards identified in the rule within Table 2 below.

Table 2. Hazard Assessment

Hazard (Rule 13.7.3.2)	Addressed in Report?	Report Finding / Comment (Applicability)
(i) Erosion	Yes	No signs of erosion noted on the proposed building envelopes during site walkover (All lots). Minor signs noted on the grass slopes to the west of proposed lot 9 where terracettes are forming.
(ii) overland flow paths, flooding and inundation	Yes (Managed by process)	Overland flow paths noted; The internal road design is to take into consideration the overland flow paths and is intended to convey outside of lot boundaries using roadside drains. The road design may also act as a cutoff drain to divert surface flows. Inundation risk is considered low as overland flow paths are to be taken into consideration in the road design process. The site has a low risk of flooding due to the topography of the site (all lots) inundation risk for proposed house sites 20 and 15 have been addressed through the road design.

(iii) Landslip	Yes (Managed by process)	A desktop and site geomorphological assessment is included in the report. The site is categorised as having a Low to High Stability Hazard. To manage the risk on the steeper slopes, a geotechnical setback line has been established 10m from the crest of the moderately to steeply sloping land. This setback line helps define zones with different stability levels (low to high) and guides appropriate development within those zones. In addition to the geotechnical setback, areas of the site have been identified that show signs of shallow surface creep movement. The areas identified as potentially being susceptible to shallow soil movement are considered to be a medium hazard. Recommendation that all lots have a site-specific geotechnical assessment at the time of building consent prepared by a Chartered Professional Engineer. The recommendation is intended to mitigate the risk associated with building on or adjoining to moderate to steeply sloping land. (All lots, risk varies) Refer to Section 8.2 for further comment on land instability.
(iv) Rockfall	No	Not identified as a hazard in the report, i.e. not a relevant hazard for the lots.
(v) Alluvion	No	Not identified as a hazard in the report, i.e. not a relevant hazard for the lots.
(vi) Avulsion	No	Not identified as a hazard in the report, i.e. not a relevant hazard for the lots.
(vii) Unconsolidated Fill	Yes (Managed by process)	No obvious signs of unconsolidated fill noted on the proposed lots. Construction of new fills addressed by recommendation for a site-specific geotechnical assessment at the time of building consent prepared by a Chartered Professional Engineer. (All lots)
(viii) Soil contamination	No	Not mentioned or addressed in the report, it is outside the report's scope
(ix) Subsidence	Yes (Managed by process)	Near-surface soils exhibit expansive characteristics and typically fail to meet "good ground" requiring site-specific investigations and foundation design based on those investigations. This addresses the potential for settlement under load. (All Lots)
(x) Fire hazard	No	It is proposed that firefighting water supply is provided on individual lots in accordance with FNDC ES 2009. Refer to Section 13.2.
(xi) Sea level rise	Yes	Desktop review of coastal hazard mapping indicates proposed lots are not susceptible. (All Lots)

It is therefore assessed that natural hazards are avoided, remedied or mitigated in accordance with s106 of the RMA.

8 Geotechnical Feasibility Assessment

This geotechnical feasibility assessment is based on a desktop study, site visit observations and preliminary geotechnical investigations conducted on 20th and 21st May 2025. The weather was fine during the site visit and no rain events of note had occurred within the two weeks prior to the assessment.

8.1 Site conditions

The ground conditions encountered during the geotechnical investigations carried out at the site are considered to be consistent with those typically associated with the Kerikeri Volcanic Group.

8.1.1 Subsurface Conditions

Seven hand augured boreholes (BH1-BH7) were completed to depths ranging between 2.8 and 5.0 meters below ground level (m bgl) to understand the ground conditions at the site for the purpose of geotechnical feasibility. Logs of the boreholes are included in Appendix B. The locations of these boreholes are shown below on Figure 10.

The investigations indicate that the site is underlain by brown to dark brown clayey SILT (topsoil) to a depth of approximately 0.2 m bgl. Underlying the topsoil the investigations indicates that stiff to very

stiff silty CLAY and clayey SILT is present to depth of 5.0m bgl. Undrained shear strengths measured ranged from 83 kPa to greater than 165 kPa.

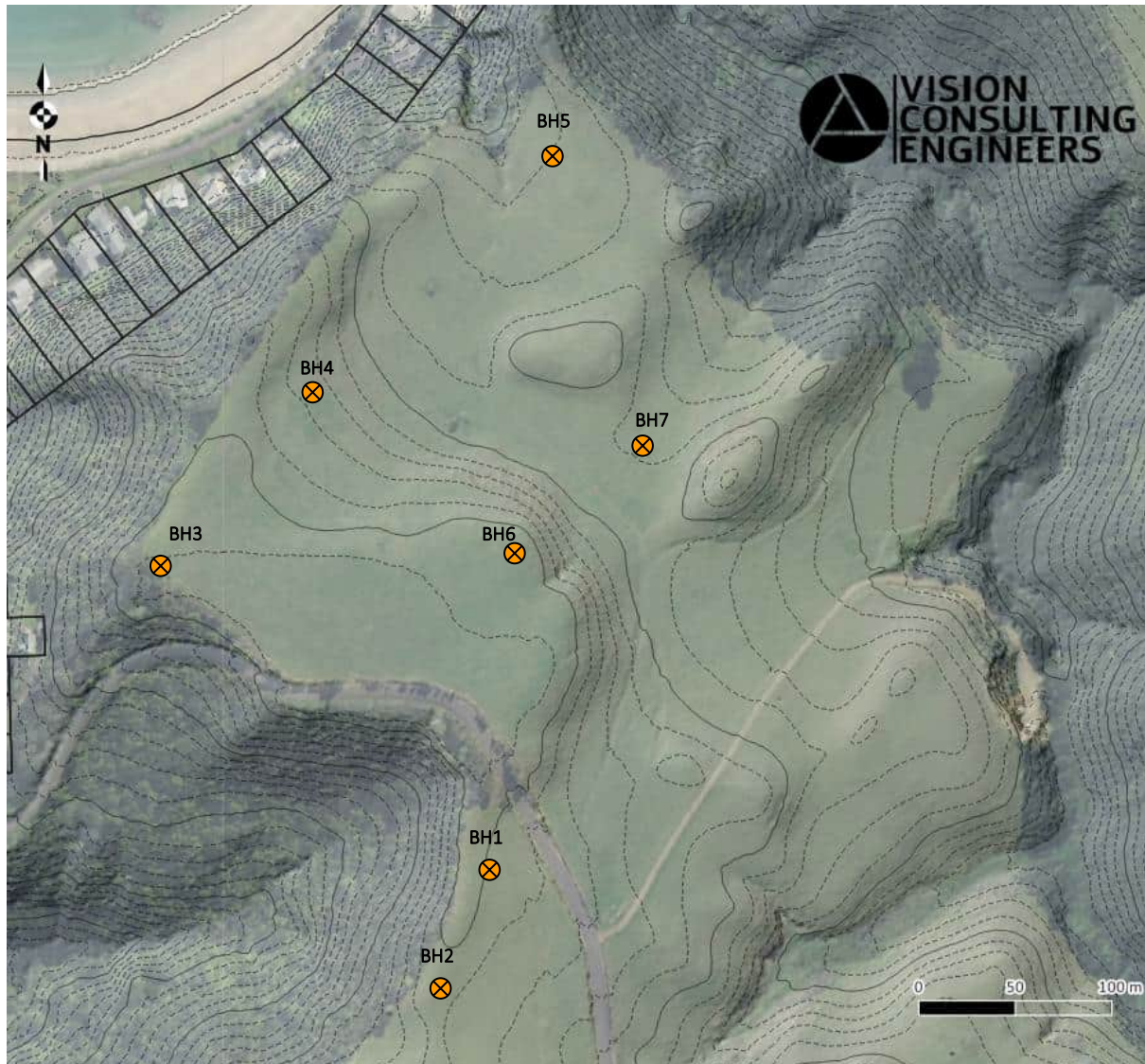


Figure 10. Geotechnical Testing Plan
Locations of geotechnical boreholes undertaken by VISION 20th and 21st May 2025. 1.0m NRC Contours

8.1.2 Groundwater

Groundwater was not encountered in the seven boreholes put down at the site (progressed up to depth of 5.0 m bgl). However groundwater seepage was observed at the base of the head scarp located on the grass slopes to the west of proposed Lot 9. Static groundwater level is expected to be at >5 m bgl. Perched groundwater table could be expected to rise during the winter months or extended periods of wet weather.

8.2 Stability Assessment

Based on the observed topography, evidence of shallow soil movement and historical ground movement, the site is categorised as having a Low to High Stability Hazard.

- **Low Hazard:** The relatively flat to gently sloping areas of the site are considered to have a low risk of instability.
- **Medium Hazard:** The moderately sloping areas that exhibit signs of shallow surface creep movement are categorised as having a medium hazard risk.

- **High Hazard:** The moderately to steeply sloping areas, particularly those showing signs of past ground movement, are categorised as having a high hazard risk.

To manage the risk on the steeper slopes, a geotechnical setback line has been established 10m from the crest of the moderately to steeply sloping land, as shown in Figure 11. This setback line helps define zones with different stability levels (low to high) and guides appropriate development within those zones. In addition to the geotechnical setback, areas of the site have been identified that show signs of shallow surface creep movement. The areas identified as being susceptible to shallow soil movement are considered to be a medium hazard and are shown in Figure 11.

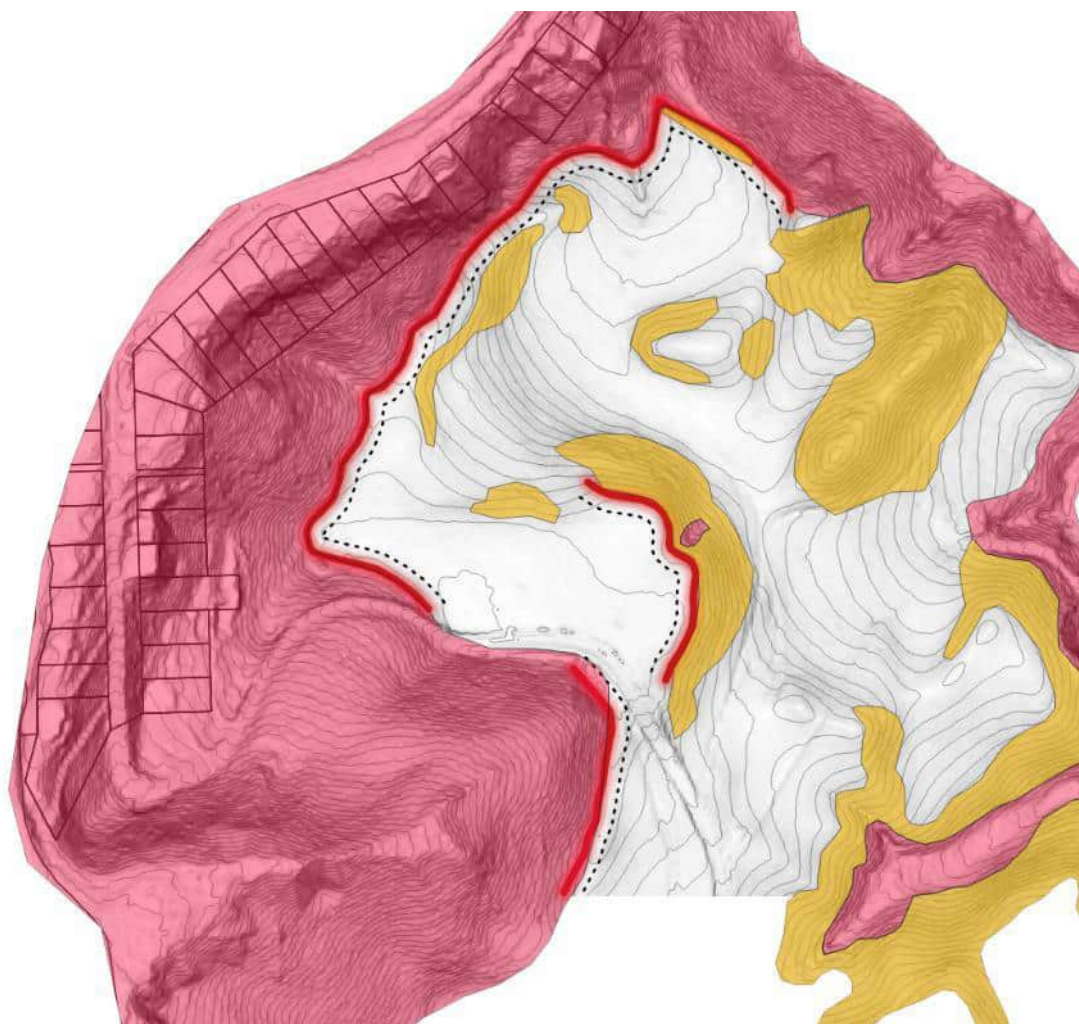


Figure 11. Stability Assessment

Contours are shown at 1m intervals with orange shading of 'Medium Hazard' area and red as 'High Hazard' area. The black dotted line is a 10m setback from the top-of-slope crest. The bold red lines are assessed as an indicative top-of-slope crest with the dashed-black line being a 10m geotechnical setback from the crest. The remaining area is considered low risk. North is up the page.

8.3 Key Geotechnical Considerations

The following geotechnical considerations are relevant to the proposed development (Figure 12):

- **Expansive Soils:**
 - **Observation:** The site is underlain by clay-rich soils derived from the Kerikeri Volcanic Group. These soils are known to have the potential to expand and shrink with changes in moisture content.

- **Risk:** Expansive soil movement can exert pressure on foundations, leading to cracking, distortion, and potential instability of structures.
- **Slope Stability:**
 - **Observation:** The site has varying topography, with the majority of the site being relatively flat and the remainder sloping moderately to steeply down from the plateau. There are also signs of past ground movement on the steeper slopes. In addition, some areas of moderately sloping land have been identified that show signs of shallow surface creep movement.
 - **Risk:** Steeper slopes are less stable and more susceptible to landslides or slippage, especially when there is evidence of previous ground movement; building on or near such slopes increases the risk of structural damage or instability.
- **Earthworks in Areas with Cobbles/Boulders:**
 - **Observation:** The site's geology suggests that basalt cobbles and boulders may be present within the soil.
 - **Risk:** These cobbles/boulders can pose challenges during excavation and construction, potentially hindering excavation, damaging equipment, and complicating foundation and service installation.
- **Infrastructure:**
 - **Observation:** The site's geology suggests that basalt cobbles and boulders may be present within the soil.
 - **Risk:** These cobbles/boulders can pose challenges during excavation and construction, potentially hindering excavation, damaging equipment, and complicating foundation and service installation.

This assessment highlights the key geotechnical considerations that need to be addressed during the detailed design and construction phases of future development at the site.

To mitigate these geotechnical risks, it is recommended that all lots have a site-specific geotechnical assessment at the time of building consent prepared by a Chartered Professional Engineer.

For any proposed dwellings that are to be located within a geotechnical hazard area, it is recommended that site specific slope stability assessment is carried out on the proposed building area by a Chartered Professional Engineer with experience in geotechnical engineering at the time of the Building Consent.



Figure 12. Oblique Aerial of Site
Courtesy Northland Regional Landscape Assessment Worksheet dated February 2014.

9 Feasibility Onsite Wastewater Assessment

The site is not serviced by a wastewater reticulation system and is not expected to have FNDC-based reticulation in the near future.

9.1 Soil Survey and Analysis

A soil survey was undertaken at the site to determine the suitability for application of treated effluent. The soil survey was carried out based on five hand auger boreholes (INV1-INV5) completed to a depth of 1.2 m bgl for the purpose of confirming the soil category to demonstrate the feasibility for on-site wastewater management. The borehole logs are included in Appendix B and the locations of these boreholes are shown below on Figure 13.

Hand augured boreholes INV1 to INV3 encountered soils considered to be consistent with those typically associated with the Kerikeri Volcanic Group. Boreholes INV1, INV4 and INV5 generally found dark brown clayey SILT (topsoil) to a depth of up to 0.2 m bgl. Underlying the topsoil, brown clayey SILT (residual soil) was encountered to a depth of 1.2 m bgl.

Hand augured borehole INV2 and INV3 encountered soils considered to be consistent with those typically associated with the Waipapa Group. Boreholes INV1 and INV2 found dark brown clayey SILT (topsoil) to a depth of up to 0.2 m bgl. Underlying the topsoil, pale orangish brown silty CLAY (residual soil) was encountered to a depth of 1.2 m bgl. In addition, the seven geotechnical boreholes (BH1-BH7) discussed in Section 8 of this report provide a broader overview of the soils across the site.

The ground investigations undertaken at the site indicated that the soil is Category 6 (slow draining) as defined by ARC TP58 with a design loading rate of 3 litres per square metre per day.



Figure 13. Wastewater Ground Investigations

9.2 Preliminary Onsite Wastewater Design

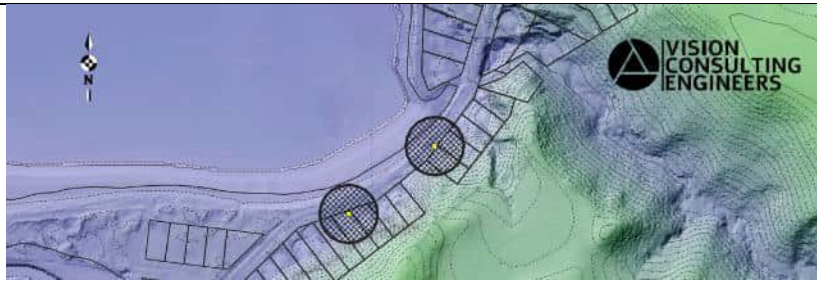
Based on the findings of this feasibility assessment, the following preliminary onsite wastewater assessment is provided. Vision's Wastewater Plan is included in Appendix C.

9.2.1 Site Evaluation

A range of site features were assessed in terms of the degree of limitation they present for an on-site wastewater management system. A summary of key features in relation to effluent management at the site are listed Table 3.

Table 3. Site Evaluation

Feature	Description
Climate	Northland is a sub-tropical climate zone, with warm humid summers and mild winters. Typical summer temperatures range from 22°C to 26°C (maximum daytime) but seldom exceed 30°C. In winter, high temperatures are between 14°C to 17°C. Annual sunshine hours average about 2000 in many areas. Mean annual rainfall is 1400mm for the site location.
Exposure	The proposed Lots are moderately exposed providing them with medium sun and wind exposure.
Vegetation	The site is covered in grass, with vegetation present on the moderately to steeply sloping land.
Slope	The site is generally located on a flat to gently sloping plateau. Moderate to steep slopes extend down from the plateau. Slopes are presented in Figure 14. Areas sloping at 10 to 25 degrees are shown at orange, areas sloping at greater than 25 degrees are shown as red. Special consideration and discharge consent would be needed to mitigate the potential environmental effects when discharging on slopes greater than 25 degrees.
Fill	No obvious signs of fill have been identified on the site, other than fill placed to form Taronui Road.
Erosion Potential	No obvious signs of erosion have been noted over the areas assessed for land application of partially treated effluent.
Surface Water	Surface water cutoff drains may be required to divert surface flows around the land application areas. The proposed internal access and roadside drains may be utilised as an effective surface water control. The proposed active areas are located outside of concentrated flow paths based on site geomorphology.
Flood Potential	The proposed system is not located in areas susceptible to flooding. Refer to Figure 6 and 7.
Stormwater run-on and upslope seepage	The proposed systems should include surface water cut-off drains where appropriate. The proposed private access ways may act as surface water cutoff drains.
Groundwater	Groundwater was not encountered in the geotechnical boreholes conducted at the site progressed to a maximum of 5.0 m bgl. Groundwater bores are present on properties to the north-east of the site at the base of the hillside. Groundwater is recorded as being at 1.8 to 2.3m below ground surface level within the bores. The image below shows the NRC GIS location of the bores (yellow dots) with a 30m buffer, indicating that the bores are well away from the proposed development.



Site Drainage and
Subsurface Drainage

Site drainage will need to be addressed at the time of Building Consent. At this stage, no subsurface drainage is recommended.

Recommended Buffer
Distances

All buffer distances recommended in Northland Regional Council's Regional Plan, the District Plan and ARC TP58:2004 are to be complied with. Setbacks required by TP58 are presented below.

Minimum Recommended Separation Distance	Wastewater Treatment Level				
	Primary (Septic tank plus effluent outlet filter)	Secondary (AWTS)	Advanced Secondary (Packed Bed Reactor)	Tertiary (Disinfection Note 9)	Advanced Tertiary ^o (Nutrient reduction & disinfection)
Buildings/Houses¹	3m	1.5 to 3m	1.5 to 3m	1.5 to 3m	1.5 to 3m
Property Boundary²	1.5m	1.5m	1.5m	1.5m	1.5m
Surface Water³					
Soil Category 1 ⁴	Note 4	10m	10m	10m	10m
Soil Category 2 - 3	20m	10m	10m	5 - 10m ¹¹	5m ¹¹
Soil Category 4 - 6	20m	15m	15m	5 - 10m ¹¹	5m ¹¹
Soil Category 7	Note 4	15m	15m	5 - 10m ¹¹	5m ¹¹
Water Supply bore⁵					
Soil Category 1	Note 4	20m	20m	10m	10m
Soil Category 2 - 3	20m	20m	20m	10m	10m
Soil Category 4 - 6	20m	20m	20m	10m	10m
Soil Category 7	Note 4	20m	20m	10m	10m
Groundwater^{6a,7}					
Soil Category 1	Note 4	1500mm	1200mm	1000mm	900mm
Soil Category 2 - 3	1500mm	1200mm	900mm	600mm	600mm
Soil Category 4 - 6	1200mm	900mm	600mm	600mm	600mm ⁸
Soil Category 7	Note 4	600mm	600mm	600mm	600mm
Floodplain⁷ (Return Period Storm)	One in 100 year	One in 20 year	One in 20 year	One in 20 year	One in 20 year
Embankments/ Retaining Walls⁸	3m from the drainage material/cut batter interface or 45° angle from toe of wall excavation (which ever is the greatest)				

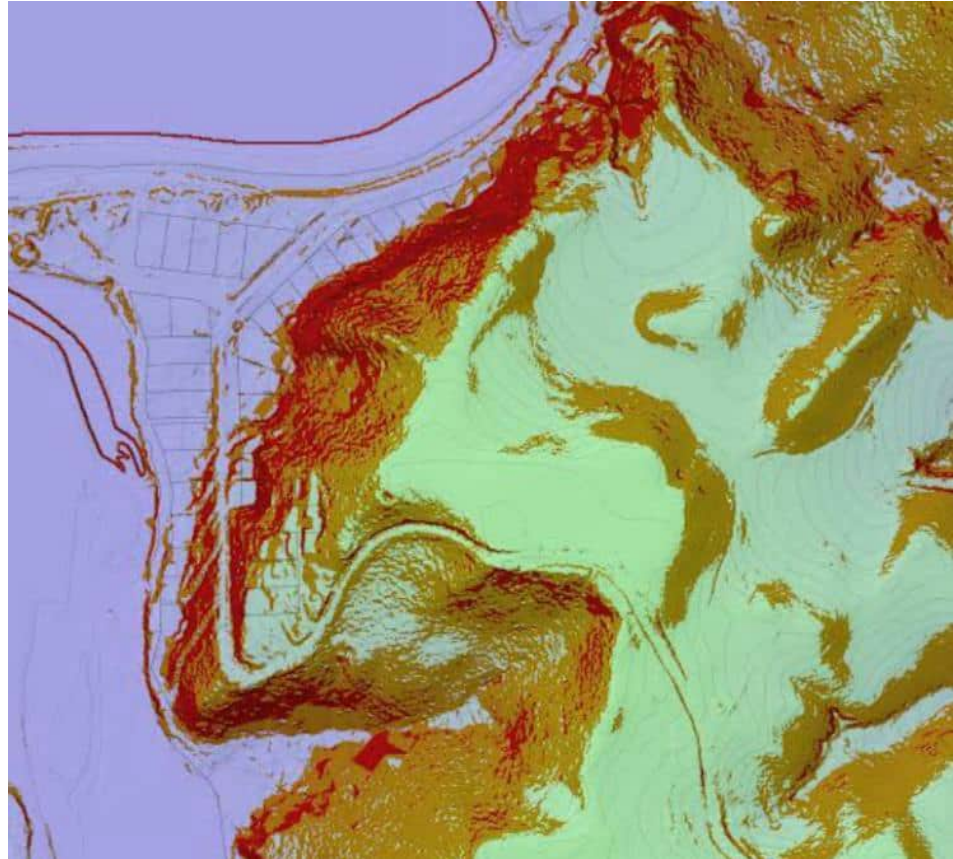


Figure 14. Slopes for Wastewater

Areas sloping at 10 to 25 degrees are shown at orange, areas sloping at greater than 25 degrees are shown as red. Special consideration and discharge consent would be needed to mitigate the potential environmental effects when discharging on slopes great than 25 degrees.

9.2.2 Modified STEP System

The Incorporation has chosen a modified Septic Tank with Effluent Pump (STEP) system for the proposed development, preferring a decentralised on-site wastewater solution. Each lot will provide its own advanced secondary on-site wastewater treatment system with UV disinfection. The treated wastewater from each lot will then be pumped via low pressure lines to a central storage tank with 24 hours of emergency storage. The treated wastewater is then pumped through a second stage of UV disinfection before being applied to the land application areas via pressure compensated drip irrigation lines.

Based on the proposed site plan the development is anticipated to have 20 lots with a future dwelling on each lot. It is anticipated that the wastewater load from a future dwelling is 1200 L/day (assuming a 4-bedroom dwelling, 6 people maximum design occupancy, high water usage flow allowance of 200 l/person/day.) Due to the slope angles at the site, it is anticipated that sub-surface mounted pressure compensating drip lines will be suitable for the proposed future activities. We have assumed a soil category of 6 with a design loading rate of 3 litres per square meter per day and a 33% reserve area.

Therefore, it is anticipated that each lot will require an active area of approximately 400m² for the disposal of tertiary treated effluent via pressure compensating dripper lines. The design incorporates 5 sequencing valves that dose 16 separate 500m² active areas. Figure 15 below outlines the process.

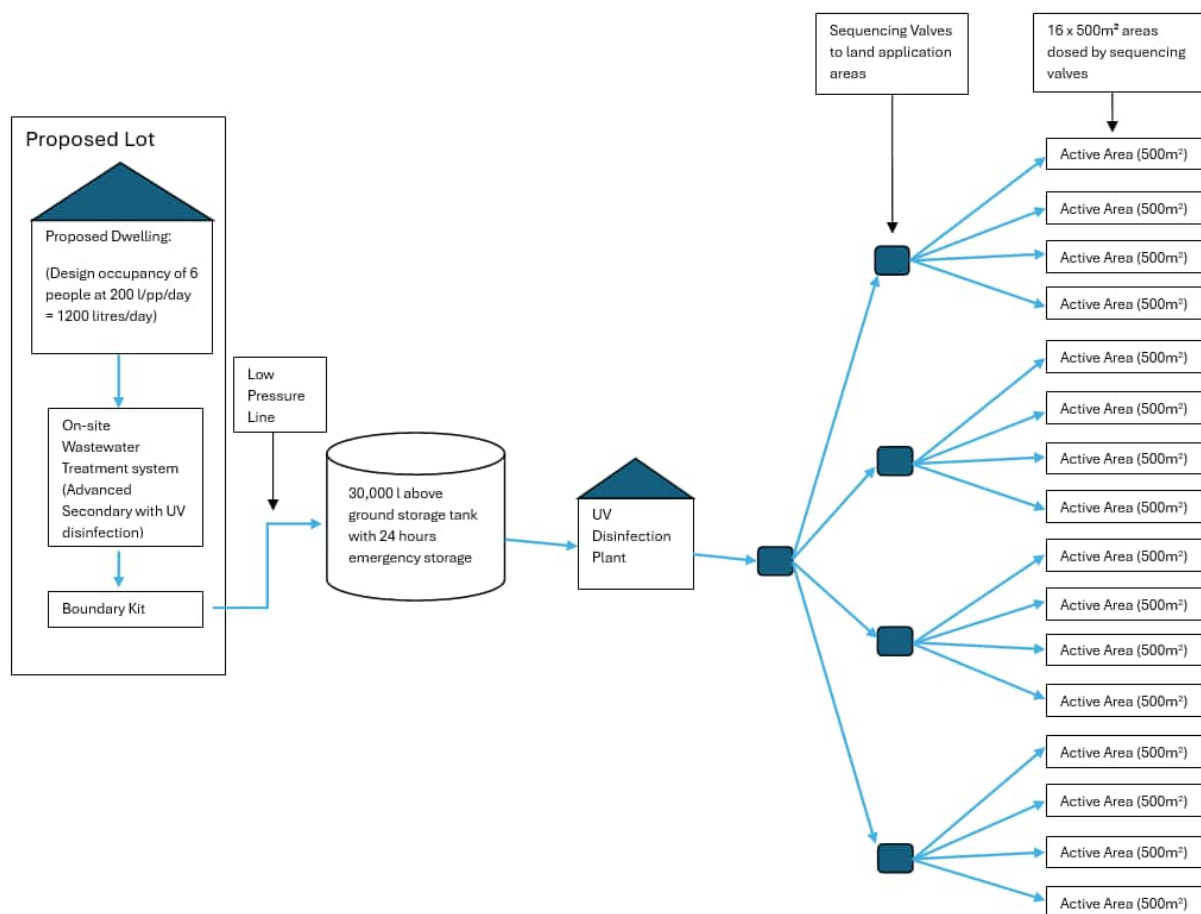


Figure 15. Process Flow Diagram
Indicative flow diagram of the proposed modified STEP SYSTEM

9.2.2.1 Land Application Areas

Figure 16 illustrates the potential 16x500m² land application areas for the treated wastewater totalling 8,000 m². These areas have been identified based on factors such as soil type, slope, and proximity to water bodies. The final selection of land application areas will be determined from on-site inspection in consultation with the Incorporation and relevant stakeholders, ensuring that the chosen approach aligns with the values and environmental goals. A potential 33% reserve area totalling 2640m² has been provided in the central portion of the site.

Table 4. Summary of land application area STEP System

Area Required for Disposal of Effluent (using a 33% Reserve)(m ²)
8,000m ² (active) + 2,640 m ² (reserve) = 10,640 m ²

9.2.2.2 Further Considerations

The Incorporation should develop a long-term asset management plan for the STEP system, including provisions for ongoing maintenance, monitoring, and eventual renewal of components. This will ensure the system's sustainability and protect the Incorporation's investment over time.

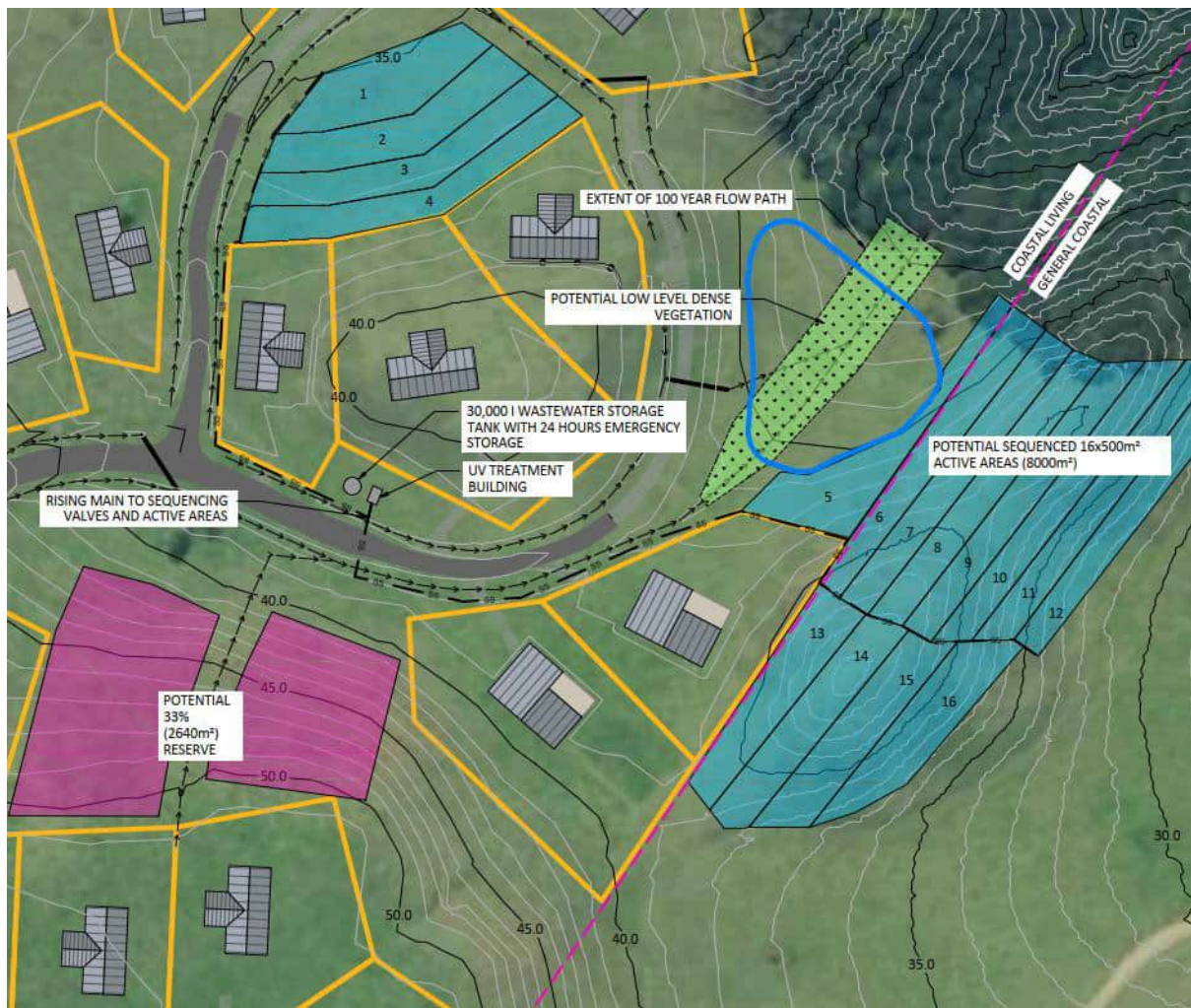


Figure 16. Concept Wastewater Plan

Potential land application areas are highlighted blue being 16x500m² areas totalling 8000m². Potential 33% reserve highlighted pink. The land application areas are set back from site constraints as per ARC TP58

Based on the findings of this feasibility assessment, it is recommended that the following specifications-based consent condition be included in the resource consent for the proposed development, aiming to ensure that the on-site wastewater system is designed, constructed, and operated in a manner that protects public health and the environment.

"Prior to Section S223 – Prior to the commencement of any physical works on the site, the Consent Holder shall provide necessary consent approvals from the Northland Regional Council for the development."

"Prior to Section S223 – The Consent Holder shall provide evidence that a building consent has been granted by the Far North District Council (or relevant authority) for the physical construction of the site wastewater treatment and/or disposal system."

10 Feasibility Internal Access and Boat Storage Yard

This section assesses the suitability of the proposed internal accessways and dedicated boat storage yard. The assessment is based on Concept Civil Design drawings included in Appendix D, which was developed from the Littoralis Landscape Architecture "Detailed Site Plan" (Ref. 1374, Appendix A) and incorporates recommendations from Engineering Outcomes "Assessment of Traffic Effects" report and "Access Preliminary Design" plans (Appendix E).

10.1 Internal Accessway Concept Design

10.1.1 Horizontal Alignments

The internal accessways comprise three distinct alignments: Roadway A, Roadway A1, and Roadway A2, detailed in Appendix D. Intersection crossings have been designed in accordance with FNDC/S/6B from the FNDC ES 2009. These designs ensure suitable access for rigid heavy vehicles into each accessway. The crossing between Taronui Road and Roadway A includes extended excavations to the west to achieve sight lines as recommended by the Engineering Outcomes report.

10.1.2 Vertical Alignments

The proposed internal accessways largely follow the existing ground contours, with specific modifications incorporated to manage secondary stormwater flows across designated road sections and along roadside drains. Additionally, Roadway A, between chainage 310 m and 390 m, includes up to 0.9 m of engineered fill. This fill is strategically designed to achieve the necessary gradients for a functional and safe private crossing for Lot 17.

10.1.3 Pavement Design

For simplicity, a single pavement design has been adopted for all internal accessways, using the AADT of 90 vehicle movements per day for the 20 households, as recommended in the Engineering Outcomes "*Assessment of Traffic Effects*" report on this development. The concept pavement detail in Sheet 21 consists of a 125 mm depth of subbase (GAP 65), a 100 mm depth of basecourse (GAP40), and a Grade 3/5 chipseal surface. This design is predicated for a minimum subgrade Californian Bearing Ratio (CBR) of 7. It is recommended that subgrade testing is carried out during detailed design and/or as part of construction to confirm the CBR value and validate the pavement design assumptions. Pavement Calculations are included in Appendix G.

10.1.4 Road Section Details

Five distinct road sections are proposed within the development site, detailed in the drawings in Appendix D (Sheets 14 and 15). Carriageway widths vary from a maximum of 5.5 m over the initial 252 m of Roadway A to a minimum of 3.0 m where accesses serve two or fewer lots. These access widths have been adopted from recommendations provided by Engineering Outcomes as part of the "Assessment of Traffic Effects" report.

Crossfalls are 3% from the centreline crown for Sections 1, 3, and 5 and there is a super-elevation of 3% for Sections 2 and 4, ensuring efficient surface water drainage. Road shoulders of 0.25 m width are proposed on all sections, with 1V:4H slopes. Open swale drains, incorporating low-level dense vegetation for stormwater conveyance, are proposed along both sides of all internal accesses, except for Roadway A chainage 310 m to 392 m (Section 4), where an open drain is provided on the upslope side only and engineered fill on the downslope side.

Cut slopes are proposed at 1V:2.5H where possible and fill batters at 1V:4H. While 1V:2H fill batters may be considered during detailed design, the proposed slopes are considered stable and suitable for the conceptual stage.

10.2 Boat Storage Yard Concept Design

The boat storage yard is designed as a large, paved area for the manoeuvring and parking of vehicles with boat trailers. Its single access point from Taronui Road is designed to allow safe entry from the south without requiring vehicles to cross the Taronui Road centreline. The current concept provides a trafficable entrance width of 10 m. Minor refinements may be undertaken during detailed design for

optimisation of the entrance width. The entrance section is shown with a superelevation of 5% to achieve sufficient surface water drainage.

The paved area incorporates a 3% crossfall from the northwestern to the southeastern side to allow surface water on the pavement to sheet flow away, and a 1% fall from the northwestern to the southwestern corner, allowing installation of a cut-off drain along the northwestern boundary (Open Drain 10, Sheet 16 of Appendix D).

10.2.1 Boat Storage Yard Pavement Design

The boat storage yard pavement design comprises a 110 mm depth of subbase (GAP 65), a 100 mm depth of basecourse (GAP40), and a Grade 3/5 chipseal. This design also assumes a subgrade CBR of greater than or equal to 7. As there is up to 1.4 m of engineered fill under the pavement, it is recommended that subgrade testing is carried out during detailed design and/or as part of construction to confirm the CBR values and validate the pavement design assumptions ($\text{CBR} \geq 7$).

11 Stormwater Management

This section details the proposed stormwater management strategy for the development, addressing both individual proposed lots and surface water flows from the internal accessways and boat storage yard. The design incorporates climate change allowances and adheres to relevant FNDC DP rules, FNDC ES 2009 and NZBC:E1 requirements.

11.1 FNDC District Plan Compliance

The development includes areas zoned Coastal Living and General Coastal. The FNDC DP stipulates maximum impervious surface areas for permitted activities:

- Rule 10.6.5.1.6 STORMWATER MANAGEMENT - Permitted (General Coastal): Maximum 10% of gross site area covered by impervious surfaces.
- Rule 10.7.5.1.6 STORMWATER MANAGEMENT - Permitted (Coastal Living): Maximum 10% of gross site area or 600 m², whichever is lesser.

11.1.1 Proposed Lots

All Proposed Lots are located within the Coastal Living Zone.

Based on indicative building areas (200 m² to 255 m²), proposed lot sizes ranging from 1120 m² to 2585 m² and additional requirements for driveway surfaces, individual lots in the Coastal Living zone will likely exceed the impervious area thresholds as per FNDC DP Rule 10.7.5.1.6.

Therefore, it is recommended that stormwater attenuation for each lot be designed by a Chartered Professional Engineer for a 10% Annual Exceedance Probability (AEP) storm event, including climate change allowances. The design should attenuate runoff from 150% of the building roof area to account for driveways and other hardstand surfaces.

11.1.2 Catchment Analysis & Redirection

The site has two primary discharge points, designated Point A and Point B (see Figure 17). Currently, Catchment A drains to an existing stormwater culvert inlet located southeast of Te Tii Tapuaetahi No 41 Block at Point A. A key design objective is to reduce peak flows to this inlet.

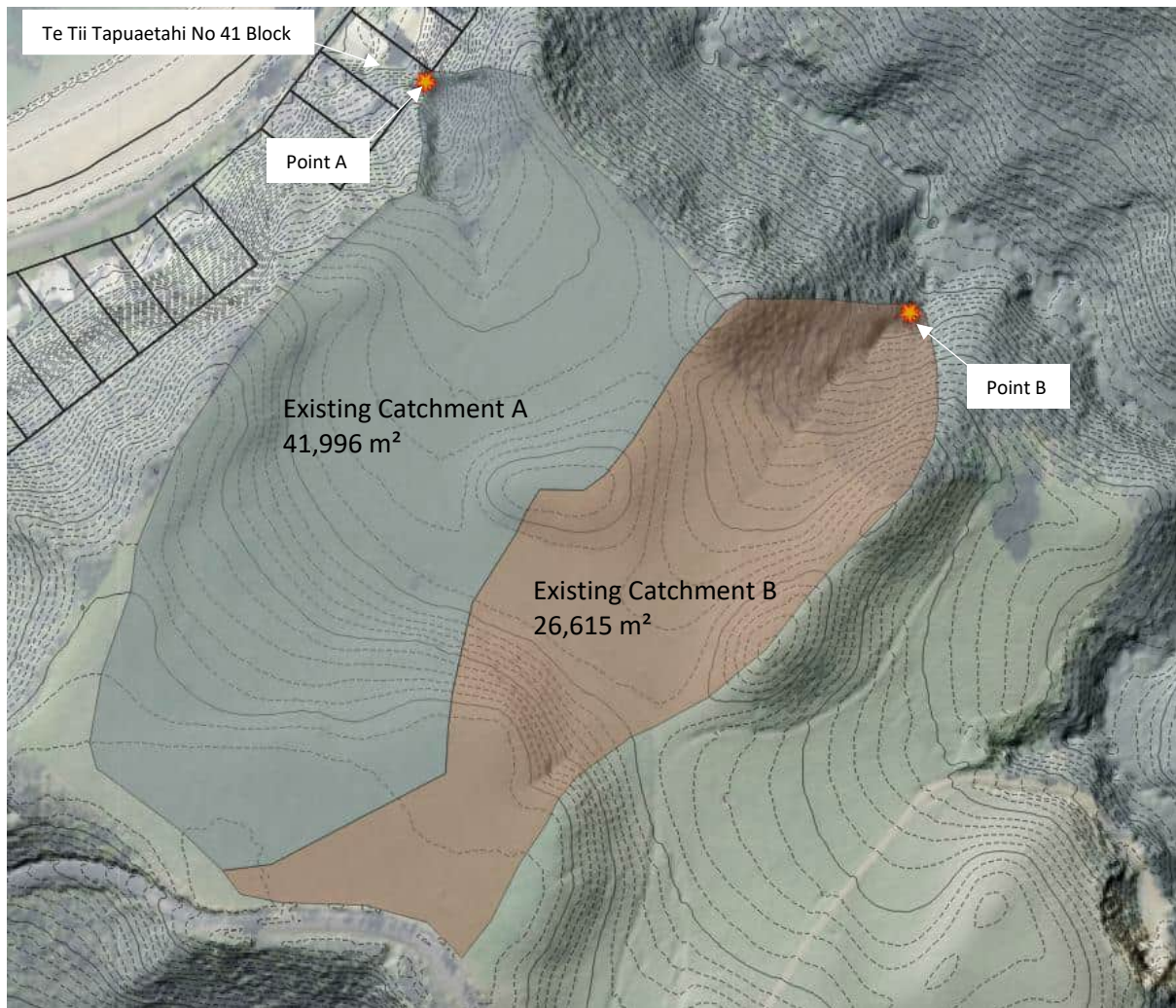


Figure 17. Existing Catchments and Discharge Points

This reduction is achieved by installing surface water cut-off drains that divert a portion of the runoff from Catchment A to the outlet at Point B. This action increases the catchment area and flow volume directed to Point B.

The post-development model (see Figure 18 and Appendix F Calculations) accounts for all proposed impervious surfaces and uses rainfall data adjusted for climate change. This analysis confirms that even with the new impervious areas, the diversion successfully reduces the peak flow at Point A 27% below its pre-development level.

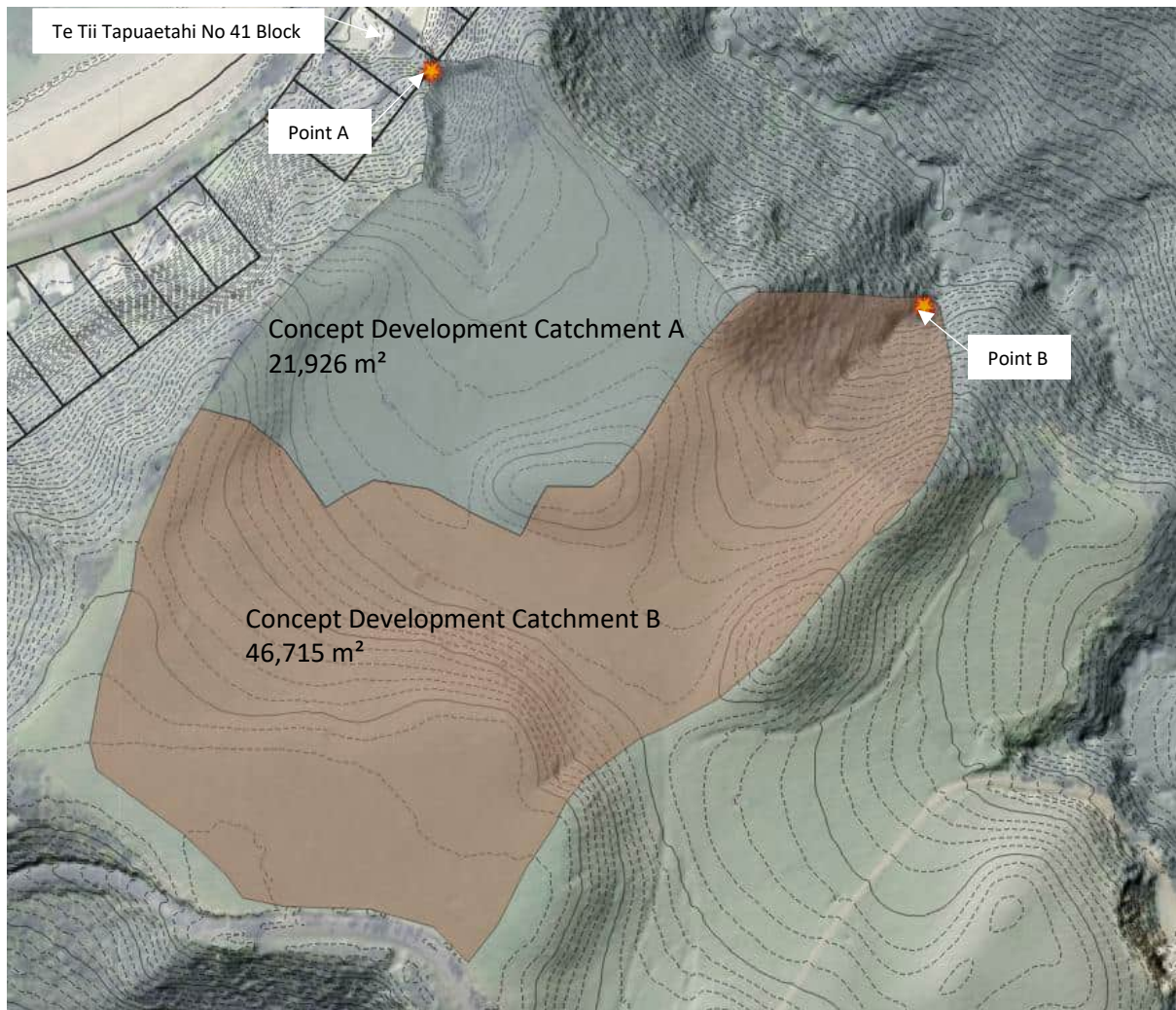


Figure 18. Concept Development Catchments and Discharge Points

11.1.3 Balance Lot Attenuation Recommendation

The internal accessway is located within the Coastal Living Zone of the balance lot. The combined effect of diverting flow from Catchment A and creating new impervious accessways (which exceed the 600 m² threshold) results in an increase in peak stormwater flows at Point B.

To mitigate downstream effects, it is recommended that the stormwater runoff from the property, shall be managed so that the post-development peak discharge rate does not exceed the maximum pre-development peak flow rate, including relevant climate change allowances. The design shall be submitted to the Far North District Council for review and written approval prior to the commencement of works and issue of a Section 223 Certificate. The works shall be constructed in accordance with the approved plans and specifications and certified by a Chartered Professional Engineer upon completion and prior to issue of a Section 224 Certificate.

A preliminary assessment indicates that a detention/attenuation pond is a feasible option. A potential location for this pond has been identified in the north-eastern portion of the development site (see Figure 16), which could effectively manage the runoff from these remaining areas before discharging from the site.

11.2 Internal Access and Boat Storage Yard Stormwater Management

Surface water from the internal accessways and boat storage yard will be managed through a combination of primary (culverts) and secondary (open drains, overland flow paths) stormwater management devices. All stormwater management devices have been designed using NIWA HIRDS v4

rainfall data and the Rational Method (NZBC:E1), including the RCP 6.0 climate change allowance for the year 2100. A Catchment Plan for the Proposed Development and Boat Storage Yard is provided in Appendix H, with supporting calculations in Appendix F.

11.3 Culvert Assessment

The concept design incorporates a total of six culverts for the internal accessways and one for the boat storage yard. These culverts have been designed for the 10 year ARI event. Design discharge velocities have been calculated, identifying locations where additional scour protection at culvert outlets may be required during detailed design.

Further culverts will be required for individual proposed lot crossings over open drains which will be confirmed during detailed design. It is recommended that where proposed driveways cross overland flow paths that culverts and secondary overland flow paths are designed to safely convey the flows.

11.4 Open Swale Drain Assessment

The proposed open swale drains have been sized for a 100-year Average Recurrence Interval (ARI) rainfall event to predict design flows. Manning's Equation was then applied to assess drain capacity and required depths. Where low-level dense vegetation is proposed in the open swale drain a Mannings n value of 0.1 was used to account for the anticipated roughness in the drains associated with the vegetation that is proposed. Open drain locations are depicted on Sheets 07 and 16 of Appendix D, with specific section details on Sheet 22. The assessment confirms the suitability of these drains to convey design flows with suitable measures to protect the open drains from scour and erosion.

11.5 Secondary Flow Assessment

Areas designated for secondary flow over the proposed accessways have been designed using flows derived for the 100-year ARI event. The trapezoidal weir equation (specified in TP10¹) has been used to assess headwater elevations, and velocities over these sections of road have been calculated using Manning's Equation.

Particular attention has been given to the secondary flow path at the intersection of Roadway A and A2, ensuring that secondary flow from Open Drain 5 is fully diverted over Roadway A and into Open Drain 7, preventing flow into Lot 12 and Open Drain 8 (See Sheets 07, and 09 of Appendix D). All secondary flow paths over accessways demonstrate velocity-depth products less than 0.4 m²/s, thereby complying with the requirements of the FNDC ES 2009.

The low-level, dense vegetation that is shown to protect Open Drain 7 needs to be extended beyond the drain's outlet and down the existing overland flow path to reduce water velocities to levels appropriate for the proposed ground cover. Sheet 07 of Appendix D illustrates the calculated width of this flow path, indicating the necessary extent of additional vegetation.

Where secondary flows re-enter open drains or concentrate down steeper fill batters (areas outside the accessway), velocities may exceed what grass protection can handle. It is recommended that surface water is collected and conveyed in a controlled manner and at the required setback from any wastewater disposal field. Stormwater disposal will require careful consideration so that it does not lead to land instability and erosion.

¹ Auckland Regional Council. (2003). Stormwater management devices: Design guidelines manual (Technical Publication 10). Auckland Regional Council.

12 Earthworks

The volumes and areas of earthworks associated with the concept design of the development site and boat storage yard site are summarised in the sections below.

12.1 Concept Design Earthworks

Earthworks will be required on the development site for accessways, open drains, house platforms, and private lot crossings, parking and a stormwater attenuation pond. At the boat storage yard, earthworks are required to form the entrance and create the paved parking and manoeuvring area.

To confirm the suitability of the proposed lots for building, concept earthworks have been included in the design. Minimal earthworks on Proposed Lots 1, 2, 7, 8, 9, and 10, therefore, concept building platforms have not been included for these lots.

We've specifically included earthworks for the crossing and internal manoeuvring for Lot 17, as it was identified as a potentially constrained site for private access.

Table 4 below highlights the total area, volume of cut and fill, and net volumes of earthworks for the concept design. These figures are indicative of the potential earthworks required for the proposed development and subject to refined during detailed design.

Table 5. Earthworks Data

Development Area	Cut Volume (m ³)	Fill Volume (m ³)	Net Volume (m ³) (+CUT/-FILL)
Internal Accessways	1609.1	818.3	+790.8
Private Lots	1390	1698	-308
Boat Storage Yard	787.6	1549.3	-761.7
Possible Attenuation Pond	1628	1452	+176
Total	5414.7	5517.6	-102.9

It is anticipated the closest distance earthworks are required to the Waitotia Stream is 50 m, based on the concept earthworks design and a potential location for an attenuation pond.

The above works will required NRC approval. Standard mitigation measures under GD-05 are anticipated to be acceptable to mitigate effects, however specific Sediment and Erosion Control Plan/Construction management Plan can be provided at the time of detailed design/prior to construction.

13 Water Supply

13.1 Potable Water Supply (Water Tanks)

Water supply for each site will be from water collected from building roofs and stored in water tanks.

13.2 Fire Fighting

FNDC ES 2009 require that a water supply is provided that is adequate for firefighting purposes. As discussed above the potable-water supply for the development will be via stored rainwater. The Urban and Rural Fire District maps are not formalised nor are the interim maps publicly available. Given the location of the site, it has been assumed that the site is within a Rural Fire District. This means that the provisions of the New Zealand Fire Service Fire Fighting Water Supplies code of practise SNZ PAS 4509:2008 (PAS4509) are not applicable and are only provided as guidance. The document

recommends that the dwellings be fitted with sprinkler systems in rural settings where it is likely that the response time will be greater than 10 minutes.

For a single family home without a sprinkler system, PAS4509 recommends a minimum water storage capacity of 45m³ within 90m of the dwelling for firefighting purposes where water supply is from a non-reticulated system.

FNDC may accept an alternative sprinkler system designed in accordance with BRANZ document 'Cost-Effective Domestic Fire Sprinkler Systems' (BRANZ, 2000) which provides an alternative to NZS4515:1995 where firefighting sprinkler systems are not required under the Building Code.

As the only requirement is that imposed by the rules within the FNDC's Engineering Standards, it is recommended that provision of water storage for firefighting purposes be assessed by council at the time of a new building consent on each site.

14 Summary of Recommendations

The following recommendations are provided for the proposed subdivision at Tapuaetahi.

14.1 Geotechnical and Earthworks

The site presents geotechnical challenges related to expansive soils, slope stability, and the presence of cobbles/boulders. By addressing these geotechnical constraints early in the design process, they can be effectively managed through appropriate design, earthworks practices, and slope stabilisation measures.

- It is recommended that earthworks undertaken at the site be carried out in accordance with Auckland Council Guidance Document 2016/005: Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05).
- It is recommended that cut slopes are constructed at a maximum slope angle of 1V:2.5H to a maximum height of 1.5m. All cut slopes greater than 1.5m in height are to be engineer assessed by a Chartered Professional Engineer experienced in geotechnical engineering.
- It is recommended that fill slopes are constructed on land sloping at less than 1V:4H at a maximum batter slope of 1V:2.5H to a maximum height of 1.0m. All fill greater than 1.0m in height and/or on land sloping at greater than 1V:4H is to be assessed by a Chartered Professional Engineer experienced in geotechnical engineering.
- It is recommended that further site-specific geotechnical investigations and assessment are undertaken at the time of building consent. This investigation should include (but not be limited to):
 - Low Hazard Area:
 - Subsurface testing (e.g., test pits, boreholes) to assess soil profiles, identify fill material, and evaluate ground conditions.
 - Assessment of soil samples to determine expansivity, bearing capacity, and other relevant properties.
 - Assessment of the presence of cobbles/boulders to inform earthworks and foundation design.
 - Medium Hazard Area:
 - All investigations listed for Low Hazard Areas.
 - Stability analysis of slopes to assess the risk of slippage and recommend appropriate mitigation measures (if required).

- High Hazard Area:
 - Subsurface testing (expected to comprise all investigations listed for a Low Hazard Area, plus machine boreholes and/or Cone Penetration Tests) to assess soil profiles, identify fill material and evaluate ground conditions.
 - Stability analysis of slopes to assess the risk of slippage and recommend appropriate mitigation measures (if required).
- It is recommended that any development, filling or construction of structures within the medium and high stability hazard extents will need to be subject to specific geotechnical assessment undertaken by a Chartered Professional Engineer experienced in geotechnical engineering.
 - Appropriate stabilisation measures, such as retaining walls, ground anchors, or other engineering solutions, may be required in areas with higher instability risk.

14.2 Wastewater

Based on the findings of this assessment, the proposed on-site wastewater management system is considered feasible for the development. A consenting pathway could include a process for the applicant while managing regulatory requirements.

It is recommended that the resource consent be granted with conditions that link its commencement to subsequent approvals from the Northland Regional Council (NRC) and the FNDC building consent authority. This report provides the technical justification for the following recommended consent conditions:

- **Commencement of Consent:** Refer to Section 9.2.2.2 for recommended consent conditions.
- **Council Right of Review:** A condition giving FNDC the right to review the consent conditions pursuant to Section 128 of the Resource Management Act 1991 should unforeseen issues arise from the related NRC consenting process.
- **Easements:** A condition requiring that, prior to the issue of a Section 223 certificate, all necessary easements be created and registered in favour of the proposed lots to grant them the right to convey and discharge wastewater via the communal system.
- **Consent Notice:** A condition requiring a consent notice to be registered on the titles of the proposed lots, specifying that each dwelling must connect to the communal wastewater system and that the on-lot treatment system must achieve a tertiary treatment standard.

14.3 Stormwater

- Stormwater attenuation for each lot be designed by a Chartered Professional Engineer for a 10% AEP storm event, including climate change allowances. The design should attenuate runoff from 150% of the building roof area to account for driveways and other hardstand surfaces
- Runoff from the modified Catchment B be attenuated. The attenuation system should be designed by a chartered professional engineer to reduce the peak discharge at Point B back to its calculated pre-development rate for a 1% AEP storm event, with allowance for climate change.
- Where proposed driveways cross overland flow paths that culverts and secondary overland flow paths are designed to safely convey the flows.
- Surface water is collected and conveyed in a controlled manner and at the required setback from any wastewater disposal fields. Stormwater disposal will require careful consideration so that it does not lead to land instability.

14.4 Internal Access and Boat Storage Yard

- It is recommended that subgrade testing is carried out during detailed design and/or as part of construction to confirm the CBR values and validate the pavement design assumptions ($\text{CBR} \geq 7$).

15 Conclusions

Provided the recommendations given in this report are adhered to, the subject site is considered to be suitable for the proposed subdivision depicted on the attached Littoralis overall site plan.

Appendix A
Littoralis Landscape Architecture
Overall Site Plan

Note: Design contours shown at 0.5m intervals, prepared by Vision Consulting Engineers Ltd. For geotechnical site analysis and storm/waste water design refer to documentation by Vision Consulting Engineers Ltd.

Margin of coastal flank vegetation, initiate long-term weed management. Progressively replace weed species with indigenous, coastal species.

Approx. position of existing tsunami siren

Indicative fence along northern edge of farm/quarry track

Legend

- Proposed new lot boundaries
- Proposed building envelope
- Indicative building shown 200m² Single storey Maximum height 5m
- Indicative building shown Two storey/stepped Maximum height 7m
- 10m off-set from crest of slope
- Land application areas
- Reserve land application areas
- 1 Secure boat yard 15 covered storage spaces 8 uncovered storage spaces
- 2 Automatic sliding gate
- 3 Secondary waste water treatment plant
- 4 Storage sheds for dinghys, kayaks and beach equipment
- 5 Indicative walking track route
- 6 Indicative retention pond

Proposed planting

- Indigenous coastal trees
- Indigenous coastal shrubs up to 5m high
- Indigenous coastal shrubs up to 2m high
- Low coastal planting up to 600mm high

Note: Only low flammability shrub and tree species within 10m of building areas.

Scale @A3
1 : 2000

Project No.
1374

Drawing No.
LLA002

Rev.
A

Client
TAPUAETAHI INCORPORATION

Project Title
TAPUAETAHI SUBDIVISION

Title
RC APPLICATION 2025

Sheet Title
OVERALL SITE PLAN

0 25 50 m

Date
2/09/2025

LITTORALIS
LANDSCAPE ARCHITECTURE

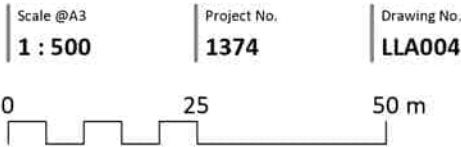


Legend

- Proposed building envelope
- Indicative building shown 200m²
Single storey
Maximum height 5m
- Indicative building shown
Two storey/stepped
Maximum height 7m
- 10m off-set from crest of slope
- Land application areas
- Reserve land application areas
- 1 Secure boat yard
15 covered storage spaces
8 uncovered storage spaces
- 2 Automatic sliding gate
- 3 Secondary waste water treatment plant
- 4 Storage sheds for dinghys, kayaks and beach equipment
- 5 Indicative walking track route
- 6 Indicative retention pond

Proposed planting

- Indigenous coastal trees
- Indigenous coastal shrubs up to 5m high
- Indigenous coastal shrubs up to 2m high
- Low coastal planting up to 600mm high



Rev.
A

Date
2/09/2025

Client
TAPUAETAHI INCORPORATION

Project Title
TAPUAETAHI SUBDIVISION

Title
RC APPLICATION 2025

Sheet Title
DETAILED SITE PLAN 2

Appendix B

VISION Field Logs

				BOREHOLE LOG		BOREHOLE No: BH1	
						VISION Project No.: J15724	
				Client: Tapuaetahi Development	Project: Feasibility Engineering Assessment	Hole started: 21/05/2025	
				Project Location: Tapuaetahi Development	Borehole Location: Refer to site plan	Hole completed: 21/05/2025	
				Drill method: 50mm Hand Auger		Drilled by: HM	
						Checked by: DS	
Depth (m)	Graphic	Strength	Moisture	Soil Description	GEOLOGY & additional observations	Undrained Shear Strength (kPa)	
0.0			M	Clayey SILT, trace fine to coarse sand; pale brown, trace rootlets	TOPSOIL	0	
0.1							
0.2		VSt	M	Clayey SILT, trace fine to coarse sand, trace fine subangular gravel; pale orange brown, high plasticity	KERIKERI VOLCANIC GROUP	120	UTP
0.3							
0.4						120	UTP
0.5				some fine to medium subangular gravel, becoming brownish orange, trace white			
0.6						120	UTP
0.7				trace fine subangular gravel, brownish orange			
0.8						120	UTP
0.9							
1.0						120	UTP
1.1							
1.2				brown		120	UTP
1.3							
1.4		VSt	M	Clayey SILT, trace fine to coarse sand; reddish brown, trace grey, medium plasticity		138	
1.5							
1.6						131	
1.7							
1.8						129	
1.9							
2.0						121	
2.1							
2.2						114	
2.3							
2.4		VSt	M	Clayey SILT; brown, trace orange, medium plasticity		120	UTP
2.5							
2.6				with some orange, trace grey		120	UTP
2.7							
2.8						120	UTP
2.9							
3.0						120	UTP
3.1							
3.2						120	UTP
3.3							
3.4						120	UTP
3.5							
3.6		St-VSt	VM	Clayey SILT; mottled brown with reddish orange and dark grey, trace white, medium plasticity		136	
3.7							
3.8						116	
3.9							
4.0						91	
4.1							
4.2						104	
4.3							
4.4		St				89	
4.5							
4.6				greyish brown, with some grey, trace pale orange		85	
4.7							
4.8						83	
4.9							
5.0				End of hole at 5.0 m bgl		85	
5.1				Target depth achieved			
5.2				Groundwater not encountered			
5.3							
5.4							
5.5							
5.6							
5.7							
5.8							
5.9							

Notes: Shear strength lines are indicative only.
Shear strength calibrated and adjusted for plasticity

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				BOREHOLE LOG		BOREHOLE No: BH2	
						VISION Project No.: J15724	
				Client: Tapuaetahi Development	Project: Feasibility Engineering Assessment	Hole started: 21/05/2025	
				Project Location: Tapuaetahi Development	Borehole Location: Refer to site plan	Hole completed: 21/05/2025	
				Drill method: 50mm Hand Auger		Drilled by: SW	
						Checked by: DS	
Depth (m)	Graphic	Strength	Moisture	Soil Description	GEOLOGY & additional observations	Undrained Shear Strength (kPa)	
0.0			M	Clayey SILT, trace fine to coarse sand; brown, trace rootlets	TOPSOIL	0	
0.1							
0.2							
0.3		VSt	M	Clayey SILT, trace fine to coarse sand, trace fine to coarse subangular gravel; pale brown, trace reddish orange	KERIKERI VOLCANIC GROUP	0.2	UTP
0.4						0.4	UTP
0.5						0.6	UTP
0.6						0.8	UTP
0.7						1	UTP
0.8				brownish orange, trace white		1.2	UTP
0.9						1.4	UTP
1.0				orange, trace pink, trace white		1.6	UTP
1.1						1.8	UTP
1.2						2	118
1.3						2.2	92
1.4						2.4	UTP
1.5						2.6	97
1.6						2.8	88
1.7						3	109
1.8						3.2	132
1.9						3.4	UTP
2.0						3.6	153
2.1						3.8	106
2.2	St-VSt	M		Clayey SILT, trace fine sand; mottled brownish orange with grey, trace white, moderate plasticity		4	151
2.3						4.2	146
2.4						4.4	153
2.5						4.6	132
2.6						4.8	97
2.7						5	UTP
2.8						5.2	
2.9						5.4	
3.0						5.6	
3.1						5.8	
3.2						6	
3.3							
3.4							
3.5							
3.6							
3.7							
3.8							
3.9							
4.0							
4.1							
4.2							
4.3							
4.4							
4.5							
4.6							
4.7							
4.8							
4.9							
5.0				End of hole at 5.0 m bgl			
5.1				Target depth achieved			
5.2				Groundwater not encountered			
5.3							
5.4							
5.5							
5.6							
5.7							
5.8							
5.9							

Notes: Shear strength lines are indicative only.
Shear strength calibrated and adjusted for plasticity

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				BOREHOLE LOG		BOREHOLE No: BH3	
						VISION Project No.: J15724	
				Client: Tapuaetahi Development	Project: Feasibility Engineering Assessment	Hole started: 21/05/2025	
				Project Location: Tapuaetahi Development	Borehole Location: Refer to site plan	Hole completed: 21/05/2025	
				Drill method: 50mm Hand Auger		Drilled by: HM	
						Checked by: DS	
Depth (m)	Graphic	Strength	Moisture	Soil Description	GEOLOGY & additional observations	Undrained Shear Strength (kPa)	
0.0			M	Clayey SILT, trace fine to coarse sand, with some fine to medium subangular gravel; brown, trace rootlets	TOPSOIL	0	
0.1							
0.2		VSt	M	Clayey SILT, trace fine to coarse sand, with some fine to medium subangular gravel; pale brown, trace orange	KERIKERI VOLCANIC GROUP	0.2	UTP
0.3							
0.4						0.4	UTP
0.5							
0.6						0.6	UTP
0.7							
0.8				trace white		0.8	>148
0.9							
1.0				becoming brownish orange		1	>148
1.1							
1.2				pale orangish brown with pale grey, trace orange		1.2	>148
1.3							
1.4						1.4	UTP
1.5			VM	orangish brown, trace white, trace reddish brown			
1.6						1.6	110
1.7							
1.8						1.8	UTP
1.9							
2.0						2	UTP
2.1							
2.2				reddish brown		2.2	UTP
2.3							
2.4						2.4	108
2.5							
2.6						2.6	106
2.7							
2.8				End of hole at 2.8 m bgl		2.8	UTP
2.9				Effective refusal at 2.8m bgl			
3.0				Target depth not achieved		3	
3.1				Groundwater not encountered			
3.2						3.2	
3.3							
3.4						3.4	
3.5							
3.6						3.6	
3.7							
3.8						3.8	
3.9							
4.0						4	
4.1							
4.2						4.2	
4.3							
4.4						4.4	
4.5							
4.6						4.6	
4.7							
4.8						4.8	
4.9							
5.0						5	
5.1							
5.2						5.2	
5.3							
5.4						5.4	
5.5							
5.6						5.6	
5.7							
5.8						5.8	
5.9							

Notes: Shear strength lines are indicative only.
Shear strength calibrated and adjusted for plasticity

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				BOREHOLE LOG		BOREHOLE No: BH4	
						VISION Project No.: J15724	
				Client: Tapuaetahi Development	Project: Feasibility Engineering Assessment	Hole started: 21/05/2025	
				Project Location: Tapuaetahi Development	Borehole Location: Refer to site plan	Hole completed: 21/05/2025	
				Drill method: 50mm Hand Auger		Drilled by: SW	
						Checked by: DS	
Depth (m)	Graphic	Strength	Moisture	Soil Description	GEOLOGY & additional observations	Undrained Shear Strength (kPa)	
0.0			M	Clayey SILT, trace fine sand, trace fine subrounded gravel; dark brown, trace rootlets	TOPSOIL	0	
0.1						0 40 80 120 160 200 240	
0.2		VSt	M	Silty CLAY, trace fine to coarse sand, trace fine subangular gravel; brown, trace reddish brown, high plasticity	KERIKERI VOLCANIC GROUP	0.2	UTP
0.3						0.4	UTP
0.4						0.6	UTP
0.5						0.8	UTP
0.6				becoming reddish brown		1	UTP
0.7				reddish brown		1.2	UTP
0.8				brown		1.4	UTP
0.9						1.6	UTP
1.0				with some pale orange, trace grey		1.8	132
1.1						2	99
1.2		St				2.2	134
1.3						2.4	118
1.4		VSt				2.6	132
1.5						2.8	116
1.6						3	132
1.7						3.2	132
1.8						3.4	142
1.9						3.6	139
2.0						3.8	UTP
2.1						4	163
2.2						4.2	139
2.3						4.4	158
2.4		VSt	M	Clayey SILT, trace fine to coarse sand, trace fine subangular gravel; reddish brown, trace white, grey and pale orange, medium to high plasticity		4.6	137
2.5						4.8	127
2.6						5	UTP
2.7						5.2	
2.8						5.4	
2.9						5.6	
3.0						5.8	
3.1						6	
3.2							
3.3							
3.4							
3.5							
3.6				with some greyish brown			
3.7							
3.8							
3.9							
4.0			VM	pale orangish brown, trace grey brown			
4.1							
4.2							
4.3							
4.4							
4.5							
4.6							
4.7							
4.8							
4.9							
5.0				End of hole at 5.0 m bgl			
5.1				Target depth achieved			
5.2				Groundwater not encountered			
5.3							
5.4							
5.5							
5.6							
5.7							
5.8							
5.9							

Notes: Shear strength lines are indicative only.
Shear strength calibrated and adjusted for plasticity

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				BOREHOLE LOG		BOREHOLE No: BH5	
						VISION Project No.: J15724	
				Client: Tapuaetahi Development	Project: Feasibility Engineering Assessment	Hole started: 21/05/2025	
				Project Location: Tapuaetahi Development	Borehole Location: Refer to site plan	Hole completed: 21/05/2025	
				Drill method: 50mm Hand Auger		Drilled by: HM	
						Checked by: DS	
Depth (m)	Graphic	Strength	Moisture	Soil Description	GEOLOGY & additional observations	Undrained Shear Strength (kPa)	
0.0			M	Clayey SILT, trace fine to coarse sand, trace fine subangular gravel; trace rootlets	TOPSOIL	0	
0.1							
0.2		VSt	M	Silty CLAY, trace fine to coarse sand, trace fine subangular gravel; brown, trace reddish brown, high plasticity	KERIKERI VOLCANIC GROUP	0.2	UTP
0.3						0.4	UTP
0.4						0.6	UTP
0.5						0.8	UTP
0.6						1	UTP
0.7				becoming orangish brown		1.2	UTP
0.8						1.4	UTP
0.9				orangish brown		1.6	UTP
1.0						1.8	UTP
1.1						2	UTP
1.2						2.2	UTP
1.3						2.4	UTP
1.4						2.6	UTP
1.5						2.8	UTP
1.6		VSt	M	Clayey SILT, trace fine to coarse sand, trace fine subangular gravel; orangish brown, with orange and some grey, medium plasticity		3	UTP
1.7						3.2	UTP
1.8						3.4	UTP
1.9						3.6	UTP
2.0						3.8	UTP
2.1						4	UTP
2.2						4.2	UTP
2.3						4.4	UTP
2.4				trace pink, trace black		4.6	UTP
2.5						4.8	UTP
2.6						5	UTP
2.7							
2.8							
2.9							
3.0							
3.1							
3.2							
3.3							
3.4							
3.5							
3.6							
3.7							
3.8							
3.9							
4.0							
4.1							
4.2			VM				
4.3							
4.4							
4.5							
4.6							
4.7							
4.8							
4.9							
5.0				End of hole at 5.0 m bgl			
5.1				Target depth achieved			
5.2				Groundwater not encountered			
5.3							
5.4							
5.5							
5.6							
5.7							
5.8							
5.9							

Notes: Shear strength lines are indicative only.
Shear strength calibrated and adjusted for plasticity

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BOREHOLE LOG

BOREHOLE No: BH6

Client: Tapuaetahi Development

Project: Feasibility Engineering Assessment

Project Location: Tapuaetahi Development

Borehole Location: Refer to site plan

VISION Project No.: J15724

Hole started: 21/05/2025

Hole completed: 21/05/2025

Drill method: 50mm Hand Auger

Drilled by: SW

Checked by: DS

Depth (m)	Graphic	Strength	Moisture	Soil Description	GEOLOGY & additional observations	Undrained Shear Strength (kPa)
0.0			M	Clayey SILT, trace fine sand, with some subangular gravel; dark brown, trace rootlets	TOPSOIL	
0.1						
0.2		VSt	M	Clayey SILT, trace fine sand, with some fine angular gravel; brown medium plasticity	KERIKERI VOLCANIC GROUP	150 UTP
0.3						
0.4						150 UTP
0.5						
0.6						150 UTP
0.7						
0.8				trace dark brown, high plasticity		150 UTP
0.9						
1.0						150 UTP
1.1						
1.2						150 UTP
1.3						
1.4						150 UTP
1.5						
1.6				reddish brown, trace grey		150 UTP
1.7						
1.8						125
1.9						
2.0						125
2.1						
2.2						136
2.3						
2.4						> 148
2.5						
2.6				trace subrounded gravel, trace grey and red, medium plasticity		150 UTP
2.7						
2.8						150 UTP
2.9						
3.0				End of hole at 3.0 m bgl		150 UTP
3.1				Target depth achieved		
3.2				Groundwater not encountered		
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						
5.1						
5.2						
5.3						
5.4						
5.5						
5.6						
5.7						
5.8						
5.9						

Notes: Shear strength lines are indicative only.
Shear strength calibrated and adjusted for plasticity

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				BOREHOLE LOG		BOREHOLE No: BH7	
						VISION Project No.: J15724	
				Client: Tapuaetahi Development	Project: Feasibility Engineering Assessment	Hole started: 21/05/2025	
				Project Location: Tapuaetahi Development	Borehole Location: Refer to site plan	Hole completed: 21/05/2025	
				Drill method: 50mm Hand Auger		Drilled by: SW	
						Checked by: DS	
Depth (m)	Graphic	Strength	Moisture	Soil Description	GEOLOGY & additional observations	Undrained Shear Strength (kPa)	
0.0				Clayey SILT, trace fine to coarse sand, with some angular gravel; dark brown, trace rootlets	TOPSOIL	0	
0.1							
0.2		VSt	M	Clayey SILT, with some fine sand, trace fine subangular gravel; orangish brown, trace brown, high plasticity	KERIKERI VOLCANIC GROUP	0.2	UTP
0.3						0.4	UTP
0.4						0.6	UTP
0.5						0.8	UTP
0.6						1	UTP
0.7						1.2	UTP
0.8						1.4	UTP
0.9						1.6	UTP
1.0						1.8	UTP
1.1						2	UTP
1.2				trace grey, trace reddish brown		2.2	UTP
1.3						2.4	UTP
1.4						2.6	151
1.5						2.8	UTP
1.6						3	UTP
1.7							
1.8		VSt	M	Clayey SILT, trace fine to coarse sand, trace subangular gravel; mottled grey brown, with reddish brown, high plasticity			
1.9				pale orangish brown, trace grey			
2.0							
2.1							
2.2		VM		ground water seepage			
2.3							
2.4							
2.5							
2.6							
2.7							
2.8				with some pale grey			
2.9							
3.0				End of hole at 3.0 m bgl			
3.1				Target depth achieved			
3.2				Groundwater seepage at 2.2 m bgl			
3.3				No ground water present in borehole prior to leaving site			
3.4							
3.5							
3.6							
3.7							
3.8							
3.9							
4.0							
4.1							
4.2							
4.3							
4.4							
4.5							
4.6							
4.7							
4.8							
4.9							
5.0							
5.1							
5.2							
5.3							
5.4							
5.5							
5.6							
5.7							
5.8							
5.9							

Notes: Shear strength lines are indicative only.
Shear strength calibrated and adjusted for plasticity

DRAFT



EXPOSURE LOG

BOREHOLE No: EXP 1

Client: Tapuaetahi Development

Project: Feasibility Engineering Assessment

Project Location: Tapuaetahi Development

Borehole Location: Refer to site plan

VISION Project No.: J15724

Hole started: 21/05/2025

Hole completed: 21/05/2025

Drill method: 50mm Hand Auger

Drilled by: HM

Checked by: DS

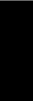
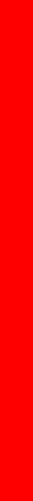
Depth (m)	Graphic	Strength	Moisture	Soil Description	GEOLOGY & additional observations	Undrained Shear Strength (kPa)
0.0			D-M	Clayey SILT, trace fine to coarse sand, with some fine to medium subangular trace rootlets, subrounded gravel; brown, trace rootlets	TOPSOIL	
0.1						
0.2		Vst	M	Clayey SILT, trace fine to coarse sand, trace fine subangular to subrounded gravel	KERIKERI VOLCANIC GROUP	160 UTP
0.3				high plasticity		
0.4				trace pale orange		160 UTP
0.5						
0.6				pale orange brown, trace reddish brown		160 UTP
0.7						
0.8						160 UTP
0.9						
1.0						160 UTP
1.1			VM	ground water seepage		160 UTP
1.2				End of exposure log at 1.2 m bgl		
1.3				Groundwater seepage at 1.1 m bgl		
1.4						
1.5						
1.6						
1.7						
1.8						
1.9						
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						
5.1						
5.2						
5.3						
5.4						
5.5						
5.6						
5.7						
5.8						
5.9						

Notes: Shear strength lines are indicative only.
Shear strength calibrated and adjusted for plasticity

DRAFT

BOREHOLE LOG - INV1						
Client: Tapuaetahi Incorporation		Tapuaetahi Development		Project No.: J15724		
Project Location: Tapuaetahi Development		Borehole Location: See Wastewater Plan		Drilled by: HM Logged by: HM		
Hole started:	21/05/2025	Drill method: 50mm handauger				
Hole completed:	21/05/2025					
Depth (m)	Graphic	Moisture	Soil Description		Geology & other notes	
0.00		M	Clayey SILT, trace fine sand, trace fine subangular gravel; dark brown, trace rootlets		TOPSOIL	
0.05						
0.10		M	Clayey SILT, trace fine sand, trace fine subangular gravel; brown		KERIKERI VOLCANIC GROUP	
0.15						
0.20						
0.25						
0.30						
0.35						
0.40						
0.45						
0.50						
0.55						
0.60						
0.65						
0.70						
0.75						
0.80						
0.85						
0.90						
0.95						
1.00						
1.05						
1.10						
1.15						
1.20			End of hole at 1.2m bgl			
1.25			Groundwater not encountered			
1.30			Target depth achieved			
1.35						
1.40						
1.45						
1.50						
1.55						
1.60						
1.65						
1.70						
1.75						
1.80						
1.85						
1.90						
1.95						
2.00						
2.05						
2.10						
2.15						
2.20						
2.25						
2.30						
2.35						
2.40						
2.45						
2.50						
2.55						
2.60						
2.65						
2.70						
2.75						
2.80						
2.85						
2.90						
2.95						

DRAFT

BOREHOLE LOG - INV2				 VISION CONSULTING ENGINEERS
Client: Tapuaetahi Incorporation		Tapuaetahi Development	Project No.: J15724	
Project Location: Tapuaetahi Development		Borehole Location: See Wastewater Plan	Drilled by: HM Logged by: HM	
Hole started:	21/05/2025	Drill method: 50mm handauger		
Hole completed:	21/05/2025			
Depth (m)	Graphic	Moisture	Soil Description	Geology & other notes
0.00		M	Clayey SILT, trace fine sand, trace fine subangular gravel; dark brown, trace rootlets	TOPSOIL
0.05				
0.10				
0.15				
0.20			Silty CLAY, trace fine sand; pale orange brown	KERIKERI VOLCANIC GROUP
0.25				
0.30				
0.35				
0.40				
0.45				
0.50				
0.55				
0.60				
0.65				
0.70				
0.75				
0.80				
0.85				
0.90				
0.95				
1.00		pale orange		
1.05				
1.10				
1.15				
1.20			End of hole at 1.2m bgl	
1.25			Groundwater not encountered	
1.30			Target depth achieved	
1.35				
1.40				
1.45				
1.50				
1.55				
1.60				
1.65				
1.70				
1.75				
1.80				
1.85				
1.90				
1.95				
2.00				
2.05				
2.10				
2.15				
2.20				
2.25				
2.30				
2.35				
2.40				
2.45				
2.50				
2.55				
2.60				
2.65				
2.70				
2.75				
2.80				
2.85				
2.90				
2.95				

DRAFT

BOREHOLE LOG - INV3					 VISION CONSULTING ENGINEERS
Client: Tapuaetahi Incorporation		Tapuaetahi Development		Project No.: J15724	
Project Location: Tapuaetahi Development		Borehole Location: See Wastewater Plan		Drilled by: HM Logged by: HM	
Hole started:	21/05/2025	Drill method: 50mm handauger			
Hole completed:	21/05/2025				
Depth (m)	Graphic	Moisture	Soil Description		Geology & other notes
0.00		M	Clayey SILT, trace fine to coarse sand, trace fine subangular gravel; dark brown, trace rootlets		TOPSOIL
0.05					
0.10		M	Silty CLAY, trace fine sand; pale orange brown		KERIKERI VOLCANIC GROUP
0.15					
0.20					
0.25					
0.30					
0.35					
0.40					
0.45					
0.50					
0.55					
0.60					
0.65					
0.70					
0.75					
0.80					
0.85					
0.90					
0.95					
1.00					
1.05					
1.10					
1.15					
1.20			End of hole at 1.2m bgl		
1.25			Groundwater not encountered		
1.30			Target depth achieved		
1.35					
1.40					
1.45					
1.50					
1.55					
1.60					
1.65					
1.70					
1.75					
1.80					
1.85					
1.90					
1.95					
2.00					
2.05					
2.10					
2.15					
2.20					
2.25					
2.30					
2.35					
2.40					
2.45					
2.50					
2.55					
2.60					
2.65					
2.70					
2.75					
2.80					
2.85					
2.90					
2.95					

DRAFT

BOREHOLE LOG - INV4				
Client: Tapuaetahi Incorporation		Tapuaetahi Development	Project No.: J15724	
Project Location: Tapuaetahi Development		Borehole Location: See Wastewater Plan	Drilled by: HM Logged by: HM	
Hole started:	21/05/2025	Drill method: 50mm handauger		
Hole completed:	21/05/2025			
Depth (m)	Graphic	Moisture	Soil Description	Geology & other notes
0.00		M	Clayey SILT, trace fine to coarse sand, trace fine subangular gravel; brown, trace rootlets	TOPSOIL
0.05				
0.10		M	Clayey SILT, trace fine to coarse sand, trace fine subrounded gravel; pale brown	KERIKERI VOLCANIC GROUP
0.15				
0.20				
0.25				
0.30				
0.35				
0.40				
0.45				
0.50				
0.55				
0.60			trace grey	
0.65				
0.70				
0.75				
0.80				
0.85				
0.90				
0.95				
1.00				
1.05				
1.10				
1.15				
1.20			End of hole at 1.2m bgl	
1.25			Groundwater not encountered	
1.30			Target depth achieved	
1.35				
1.40				
1.45				
1.50				
1.55				
1.60				
1.65				
1.70				
1.75				
1.80				
1.85				
1.90				
1.95				
2.00				
2.05				
2.10				
2.15				
2.20				
2.25				
2.30				
2.35				
2.40				
2.45				
2.50				
2.55				
2.60				
2.65				
2.70				
2.75				
2.80				
2.85				
2.90				
2.95				

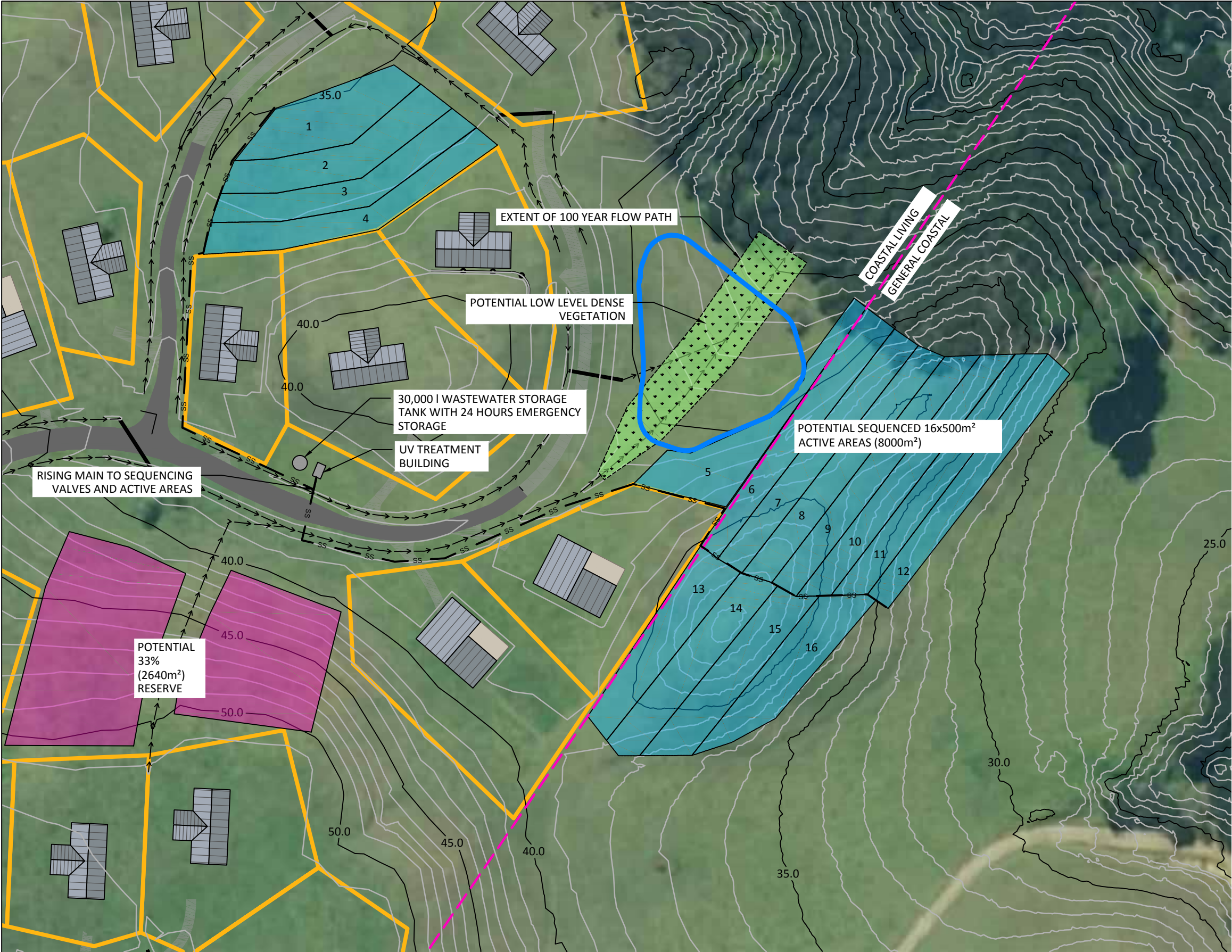
DRAFT

BOREHOLE LOG - INV5					 VISION CONSULTING ENGINEERS	
Client: Tapuaetahi Incorporation		Tapuaetahi Development		Project No.: J15724		
Project Location: Tapuaetahi Development		Borehole Location: See Wastewater Plan		Drilled by: HM Logged by: HM		
Hole started: 21/05/2025 Hole completed: 21/05/2025		Drill method: 50mm handauger				
Depth (m)	Graphic	Moisture	Soil Description		Geology & other notes	
0.00		M	Clayey SILT, trace fine to coarse sand, trace fine subangular gravel; dark brown, trace rootlets		TOPSOIL	
0.05						
0.10		M	Clayey SILT, trace fine sand, trace fine subrounded gravel; brown		KERIKERI VOLCANIC GROUP	
0.15						
0.20						
0.25						
0.30						
0.35						
0.40						
0.45						
0.50						
0.55						
0.60						
0.65						
0.70						
0.75						
0.80						
0.85						
0.90						
0.95						
1.00			orangish brown			
1.05						
1.10						
1.15						
1.20			End of hole at 1.2m bgl			
1.25			Groundwater not encountered			
1.30			Target depth achieved			
1.35						
1.40						
1.45						
1.50						
1.55						
1.60						
1.65						
1.70						
1.75						
1.80						
1.85						
1.90						
1.95						
2.00						
2.05						
2.10						
2.15						
2.20						
2.25						
2.30						
2.35						
2.40						
2.45						
2.50						
2.55						
2.60						
2.65						
2.70						
2.75						
2.80						
2.85						
2.90						
2.95						

DRAFT

Appendix C

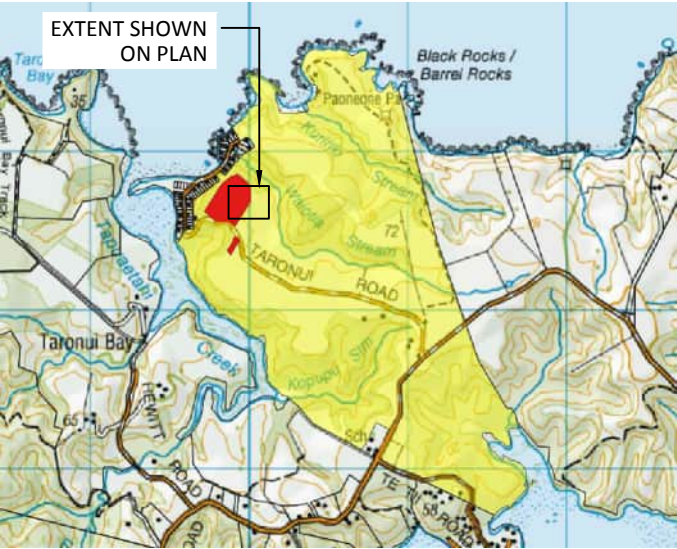
VISION Wastewater Plan



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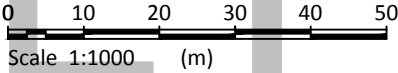
04/08/2025



LEGEND	
ACTIVE AREA 8000m ² (16x500m ²)	
33% RESERVE 2640m ²	
OPEN DRAINS	
100YR FLOW PATH EXTENT	
WASTEWATER RISING MAIN	
FNDC ZONE BOUNDARY	
PROPOSED LOT BOUNDARY	
POTENTIAL ATTENUATION POND EXTENT (1%AEP)	

NOTE:
1. SITE FEATURES ARE BASED ON VISIONS CONCEPT CIVIL DESIGN REF J15724.
2. 1.0m CONTOURS ARE A COMBINATION OF VISION'S CONCEPT FINISHED GROUND SURFACE BASED ON WILLIAMS AND KING TOPOGRAPHIC SURVEY DATED 08/2017 AND NRC 1.0 m LiDAR DEM FLOWN IN 2018 WITH REFERENCE TO OPT 1964 VERTICAL DATUM.
3. LINZ AERIAL IMAGE

DRAFT



	CLIENT TAPUAETAHI INCORPORATION	PROJECT TAPUAETAHI DEVELOPMENT LOT 1 DP 184896 TAPUAETAHI	DRAWING TITLE PROPOSED WASTEWATER PLAN	SURVEY		VALUE		FOR RC		SCALE	1:1000
				DESIGN	HM	17/07/2025		SHEET		1 OF 1	
				DRAWN	HM	17/07/2025		PROJECT		J15724	
				CHECKED	BCP	01/08/2025		THIS ARTWORK IS THE COPY RIGHT MATERIAL OF		VCE	
				APPROVED	BCP	01/08/2025	No	REVISION	BY	DATE	REV

Appendix D

VISION Concept Design Drawing

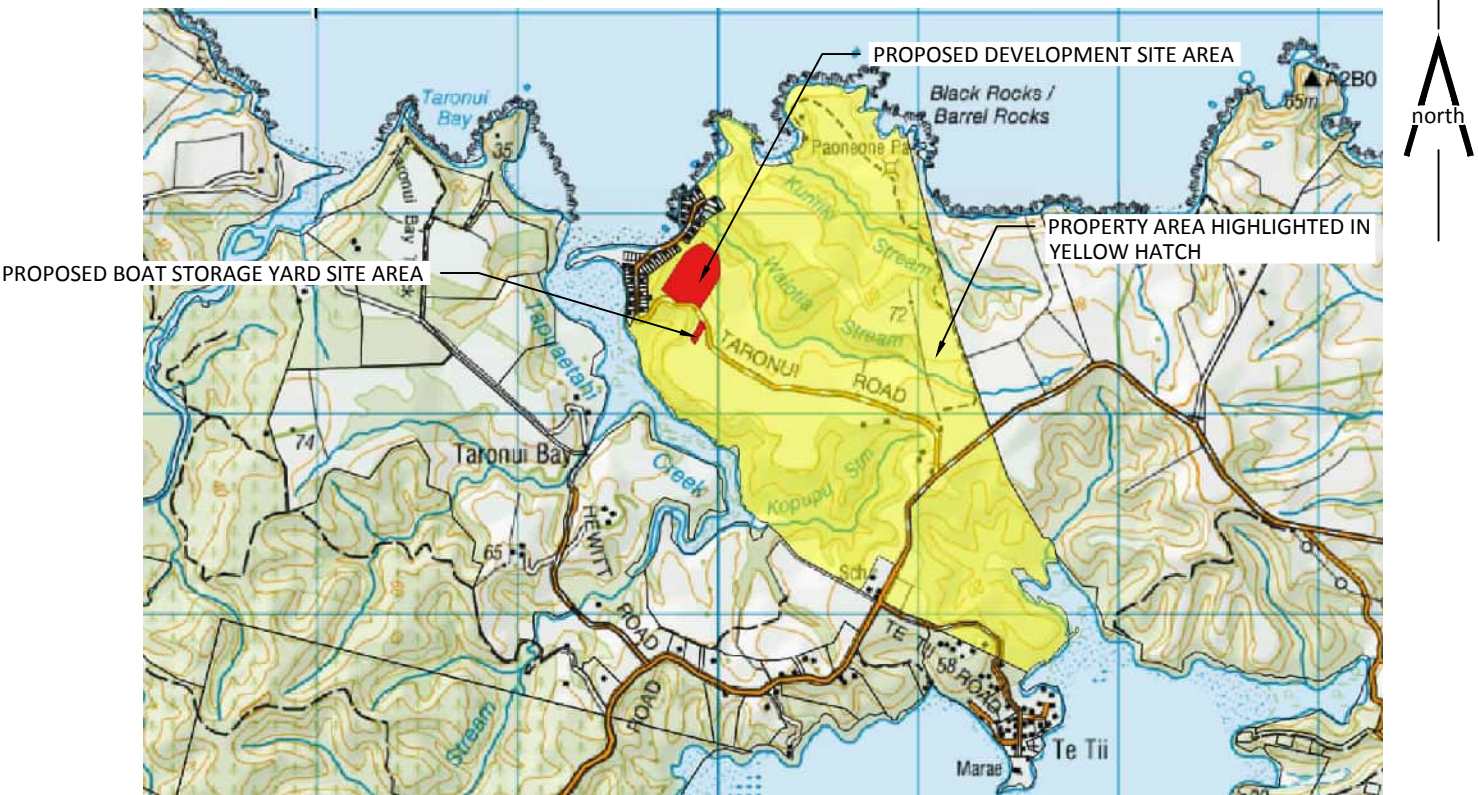


CONCEPT CIVIL DESIGN

LOT 1 DP 184896

TAPUAETAHI

Client: TAPUAETAHI INCORPORATION



LOCALITY

SCALE (A3) NTS

CONTENTS				
SHEET	DESCRIPTION	ISSUE DATE	STATUS	REVISION
1	COVER SHEET AND LOCALITY	16/07/2025	FOR RC	A
2	PROPOSED DEVELOPMENT AND BOAT STORAGE YARD OVERVIEW PLAN	16/07/2025	FOR RC	A
3	PROPOSED DEVELOPMENT OVERVIEW PLAN	16/07/2025	FOR RC	A
4	PROPOSED DEVELOPMENT EXISTING CONTOURS	16/07/2025	FOR RC	A
5	PROPOSED DEVELOPMENT FINISHED CONTOURS	16/07/2025	FOR RC	A
6	PROPOSED DEVELOPMENT EARTHWORKS	16/07/2025	FOR RC	A
7	PROPOSED DEVELOPMENT STORMWATER PLAN	16/07/2025	FOR RC	A
8	ROADWAY A - VIEW FRAME 1	16/07/2025	FOR RC	A
9	ROADWAY A - VIEW FRAME 2	16/07/2025	FOR RC	A
10	ROADWAY A - VIEW FRAME 3	16/07/2025	FOR RC	A

11	ROADWAY A1	16/07/2025	FOR RC	A
12	ROADWAY A2 - VIEW FRAME 1	16/07/2025	FOR RC	A
13	ROADWAY A2 - VIEW FRAME 2	16/07/2025	FOR RC	A
14	ROADWAY TYPICAL SECTIONS	16/07/2025	FOR RC	A
15	ROADWAY TYPICAL SECTIONS 2	16/07/2025	FOR RC	A
16	BOAT STORAGE YARD OVERVIEW AND STORMWATER PLAN	16/07/2025	FOR RC	A
17	BOAT STORAGE YARD EXISTING CONTOURS	16/07/2025	FOR RC	A
18	BOAT STORAGE YARD FINISHED CONTOURS	16/07/2025	FOR RC	A
19	BOAT STORAGE YARD EARTHWORKS	16/07/2025	FOR RC	A
20	BOAT STORAGE YARD TYPICAL SECTIONS	16/07/2025	FOR RC	A
21	PAVEMENT DETAILS	16/07/2025	FOR RC	A
22	OPEN DRAIN TYPICAL SECTIONS	16/07/2025	FOR RC	A

GENERAL NOTES:

1. THIS DRAWING SET HAS BEEN PRODUCED TO DEMONSTRATE INTERNAL ACCESS AND BOAT SHED FEASIBILITY TO SUPPORT A RESOURCE CONSENT. THESE DRAWINGS SHOULD NOT BE USED FOR CONSTRUCTION.
2. ALL ELEVATIONS AND CONTOURS ARE WITH RESPECT TO NZVD 2016 VERTICAL DATUM. COORDINATES ARE WITH REFERENCE TO NZTM 2000.
3. EXISTING TOPOGRAPHIC INFORMATION WITHIN THE LINE OF SURVEYED EXTENT HAS BEEN TAKEN FROM A TOPOGRAPHIC SURVEY BY WILLIAMS AND KING, REF 22043, DATED AUGUST 2017. ALL OTHER TOPOGRAPHIC DATA HAS BEEN TAKEN FROM NORTHLAND REGIONAL COUNCIL LIDAR (2018).
4. THIS DRAWING SET IS TO BE READ IN CONJUNCTION WITH THE VISION SITE SUITABILITY REPORT, REF J15724 AND THE LITTORALIS LANDSCAPE ARCHITECTURAL DRAWING SET, REF 1374, ISSUED AS PART OF THE RESOURCE CONSENT APPLICATION.

VISION JOB REFERENCE: J15724, VISION DRAWING STATUS: FOR RC, NUMBER OF SHEETS IN DRAWING SET 22, DRAWING SET APPROVED FOR RELEASE BY BCP ON 16/07/2025

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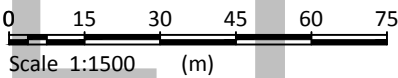


NRC LIDAR SHOWN OUTSIDE TOPOGRAPHIC SURVEY EXTENT

EXTENT OF TOPOGRAPHIC SURVEY

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LEGEND	
PROPOSED LOT BOUNDARY	



NOTE:
1. ALL ELEVATIONS AND 0.5 m FINISHED CONTOURS ARE WITH RESPECT TO NZVD 2016 VERTICAL DATUM.

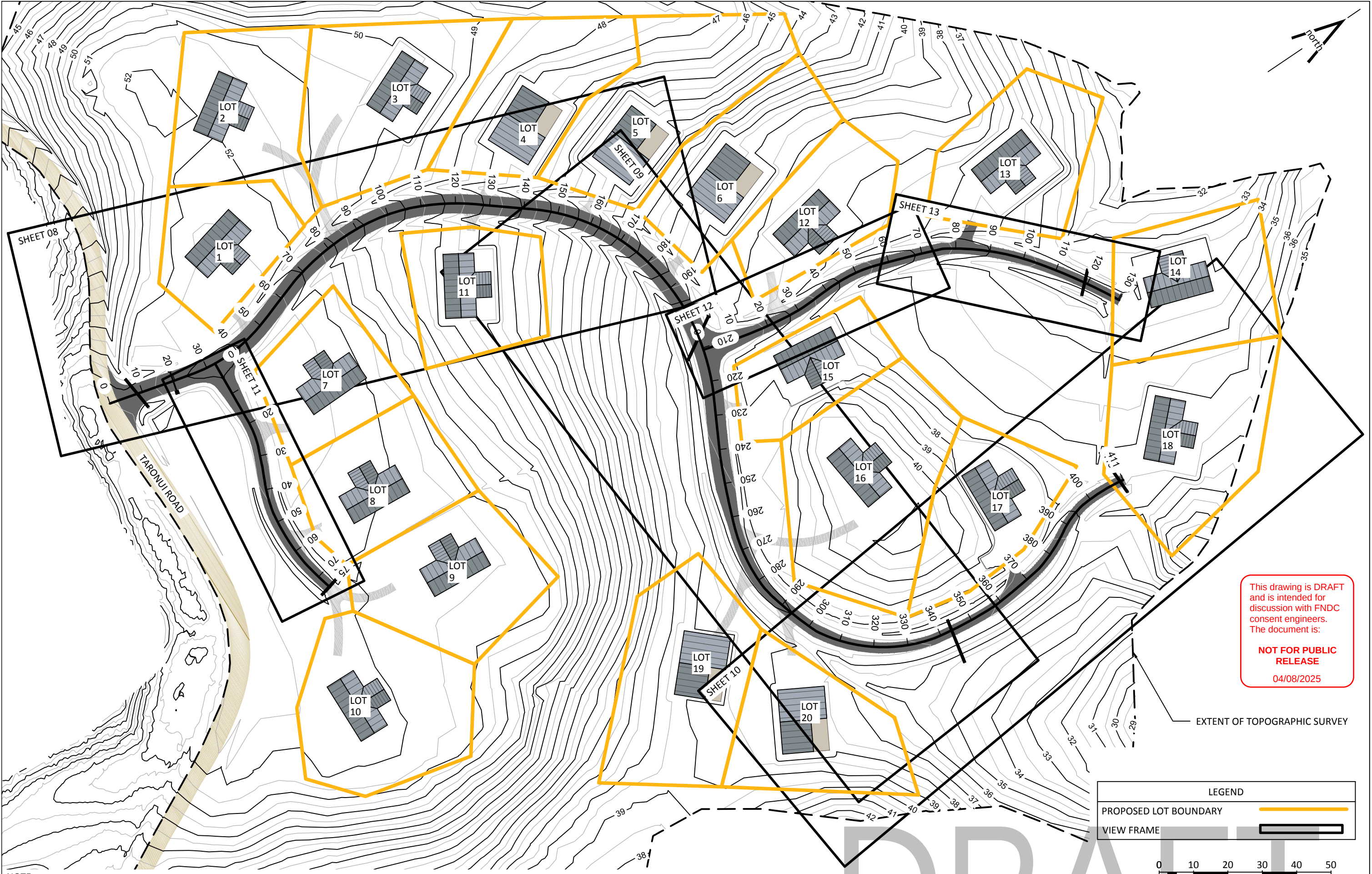


CLIENT
TAPUAETAHI INCORPORATION

PROJECT
CONCEPT CIVIL DESIGN
LOT 1 DP 184896
TAPUAETAHI

DRAWING TITLE
PROPOSED DEVELOPMENT AND
BOAT STORAGE YARD OVERVIEW
PLAN

FOR RC				SCALE	
SURVEY				16/07/2025	1:1500
DESIGN	CS	28/05/2025			SHEET 02 OF 22
DRAWN	CS	28/05/2025			PROJECT J15724
CHECKED	BCP	16/07/2025			THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE©
APPROVED	BCP	16/07/2025			REV A
REVISION		BY		DATE	



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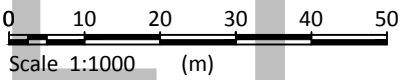
EXTENT OF TOPOGRAPHIC SURVEY

NOTE:
1. ALL ELEVATIONS AND 0.5 m FINISHED CONTOURS ARE WITH RESPECT TO NZVD 2016 VERTICAL DATUM.

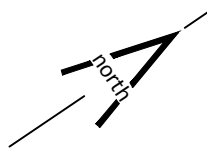
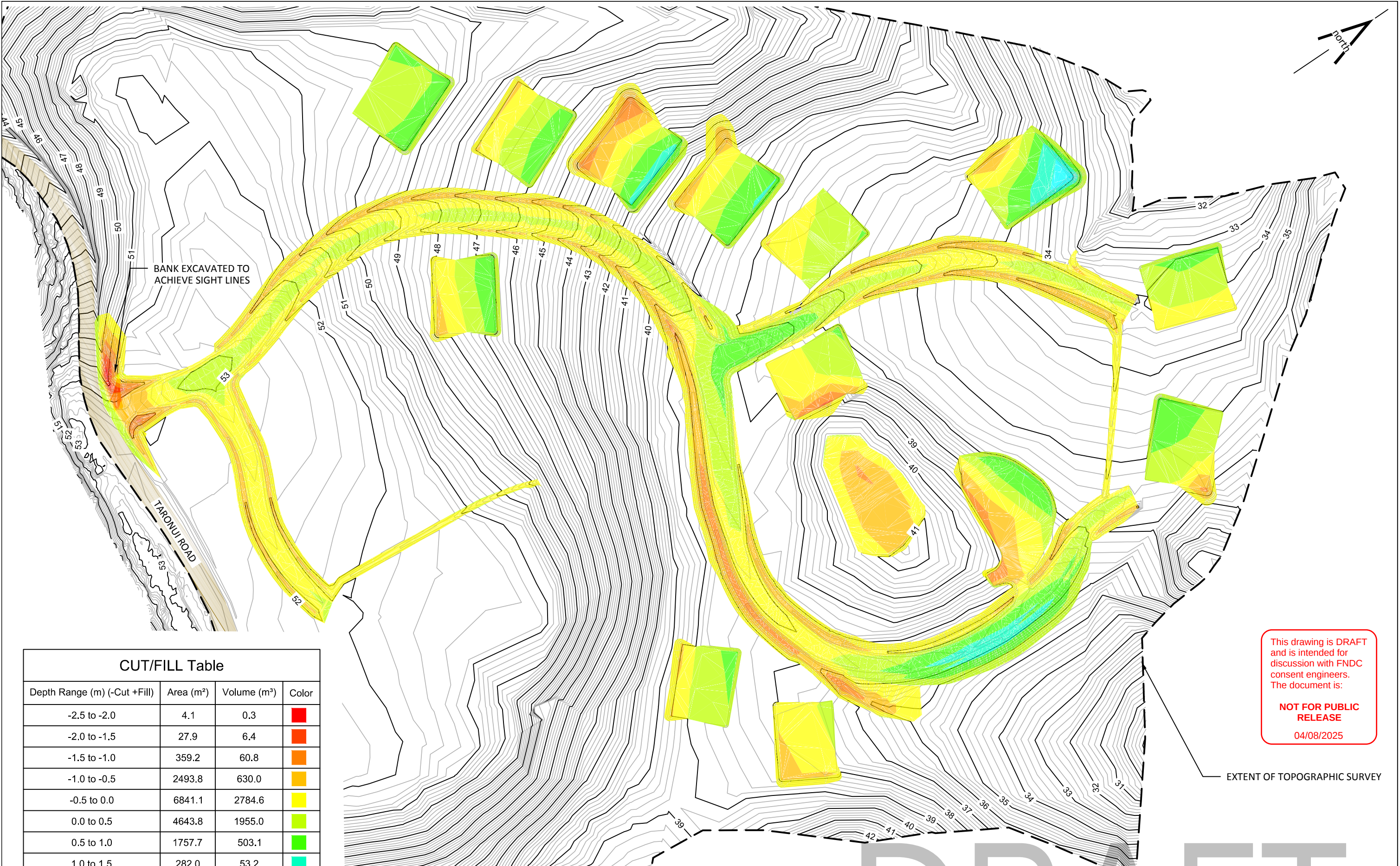
LEGEND

PROPOSED LOT BOUNDARY

VIEW FRAME



	CLIENT TAPUAETAHI INCORPORATION	PROJECT CONCEPT CIVIL DESIGN LOT 1 DP 184896 TAPUAETAHI	DRAWING TITLE PROPOSED DEVELOPMENT OVERVIEW PLAN	SURVEY			A	FOR RC		BCP	16/07/2025	SCALE	1:1000
				DESIGN	CS	28/05/2025						SHEET	03 OF 22
				DRAWN	CS	28/05/2025						PROJECT	J15724
				CHECKED	BCP	16/07/2025						THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE®	REV A
				APPROVED	BCP	16/07/2025	No	REVISION		BY	DATE		



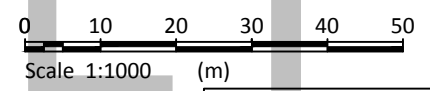
CUT/FILL Table

Depth Range (m) (-Cut +Fill)	Area (m²)	Volume (m³)	Color
-2.5 to -2.0	4.1	0.3	Red
-2.0 to -1.5	27.9	6.4	Orange
-1.5 to -1.0	359.2	60.8	Dark Orange
-1.0 to -0.5	2493.8	630.0	Yellow-Orange
-0.5 to 0.0	6841.1	2784.6	Yellow
0.0 to 0.5	4643.8	1955.0	Light Green
0.5 to 1.0	1757.7	503.1	Green
1.0 to 1.5	282.0	53.2	Teal
1.5 to 2.0	31.0	5.0	Cyan
2.0 to 2.5	0.0	0.0	Blue

NOTE:
1. ALL ELEVATIONS AND 0.2 m FINISHED CONTOURS ARE WITH RESPECT TO NZVD 2016 VERTICAL DATUM.
2. EARTHWORKS VOLUMES HAVE BEEN GENERATED FROM THE DIFFERENCE BETWEEN EXISTING GROUND SURFACE LEVELS AND PROPOSED FINISHED SURFACE LEVELS AND DO NOT ACCOUNT FOR THE VOLUME OF TOPSOIL, UNSUITABLE SOIL AND ROAD PAVEMENT MATERIALS.

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EXTENT OF TOPOGRAPHIC SURVEY



CLIENT
TAPUAETAHI INCORPORATION

PROJECT
CONCEPT CIVIL DESIGN
LOT 1 DP 184896
TAPUAETAHI

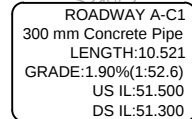
DRAWING TITLE
PROPOSED DEVELOPMENT
EARTHWORKS

SURVEY		
DESIGN	CS	28/05/2025
DRAWN	CS	28/05/2025
CHECKED	BCP	16/07/2025
APPROVED	BCP	16/07/2025

FOR RC	BCP	16/07/2025	SCALE	1:1000
			SHEET	06 OF 22
			PROJECT	J15724
			THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE	REV A
			REVISION	BY DATE

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POSSIBLE SECONDARY FLOW PATH

— PROPOSED HOUSE SITES AS PER
LITTORALIS LANDSCAPE
ARCHITECTURE DETAILED SITE PLAN

DATUM 40.0m

CHAINAGE	DEPTH	EXISTING LEVELS	DESIGN LEVELS
10.000	-0.794	53.044	52.250
20.000	-0.125	53.000	52.875
30.000	0.140	52.957	53.096
40.000	0.134	52.916	53.049
50.000	0.052	52.735	52.787
60.000	0.053	52.489	52.541
70.000	0.071	51.904	51.975
80.000	0.026	51.208	51.234
90.000	0.039	50.129	50.168
100.000	0.032	49.424	49.456
110.000	0.001	48.602	48.603
120.000	0.067	47.678	47.745
130.000	0.056	46.790	46.846
140.000	0.034	45.916	45.950
150.000	0.041	44.717	44.757
160.000	0.047	43.387	43.435
168.745	0.056	41.963	42.019

NOTES:

1. ALL ELEVATIONS AND 0.2 m FINISHED CONTOURS ARE WITH RESPECT TO NZVD 2016 VERTICAL DATUM.
2. STORMWATER OPEN DRAINS HAVE BEEN LEFT OFF THIS SHEET FOR CLARITY. SEE SHEET 07 AND 22 FOR STORMWATER DETAILS.
3. ALL CULVERTS ARE TO HAVE ROCK AND MORTAR TYPE HEADWALLS UNLESS OTHERWISE SPECIFIED.
4. ALL LOT ACCESS AND CROSSINGS SHOWN ARE INDICATIVE ONLY. CULVERTS REQUIRED UNDER PROPOSED LOT CROSSINGS AND

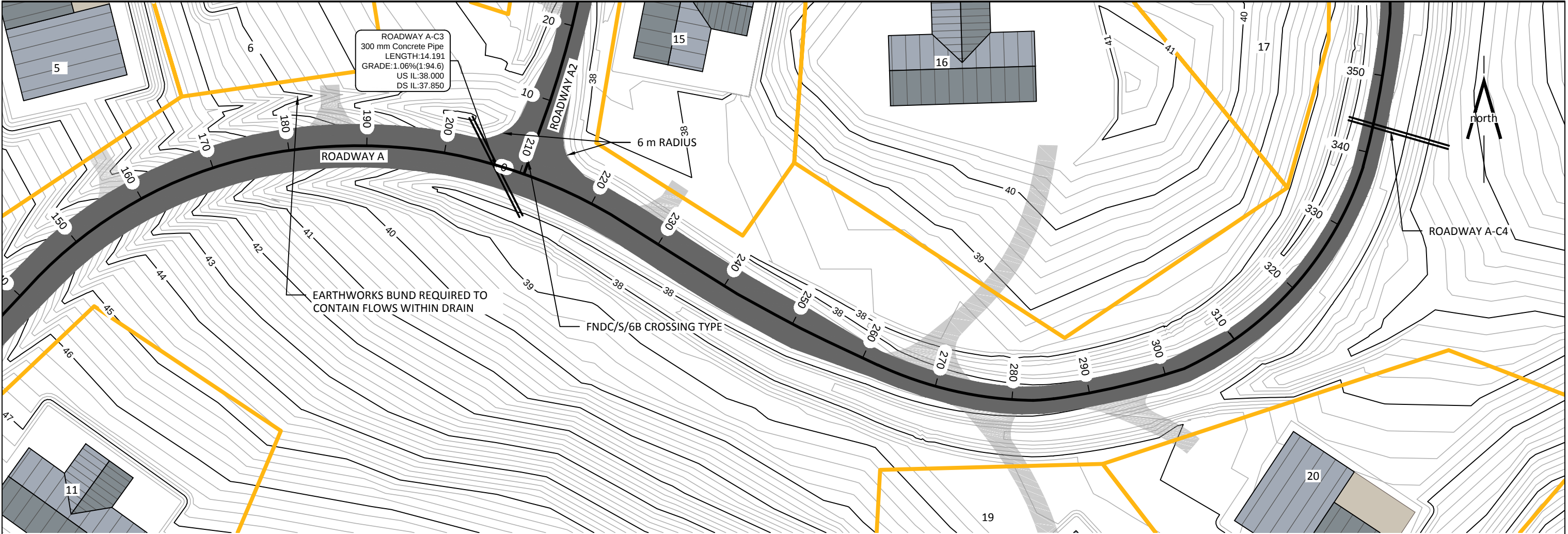


TAPUAETAHI INCORPORATION

CONCEPT CIVIL DESIGN
LOT 1 DP 184896
TAPUAETAHI

ROADWAY A - VIEW FRAME 1

SURVEY			A	FOR RE	BCP	16/07/2025	SCALE	1:500
DESIGN	CS	28/05/2025					SHEET	08 OF 22
DRAWN	CS	28/05/2025					PROJECT	J15724
CHECKED	BCP	16/07/2025					THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE®	REV
APPROVED	BCP	16/07/2025	No	REVISION	RY	DATE		A



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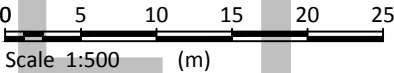
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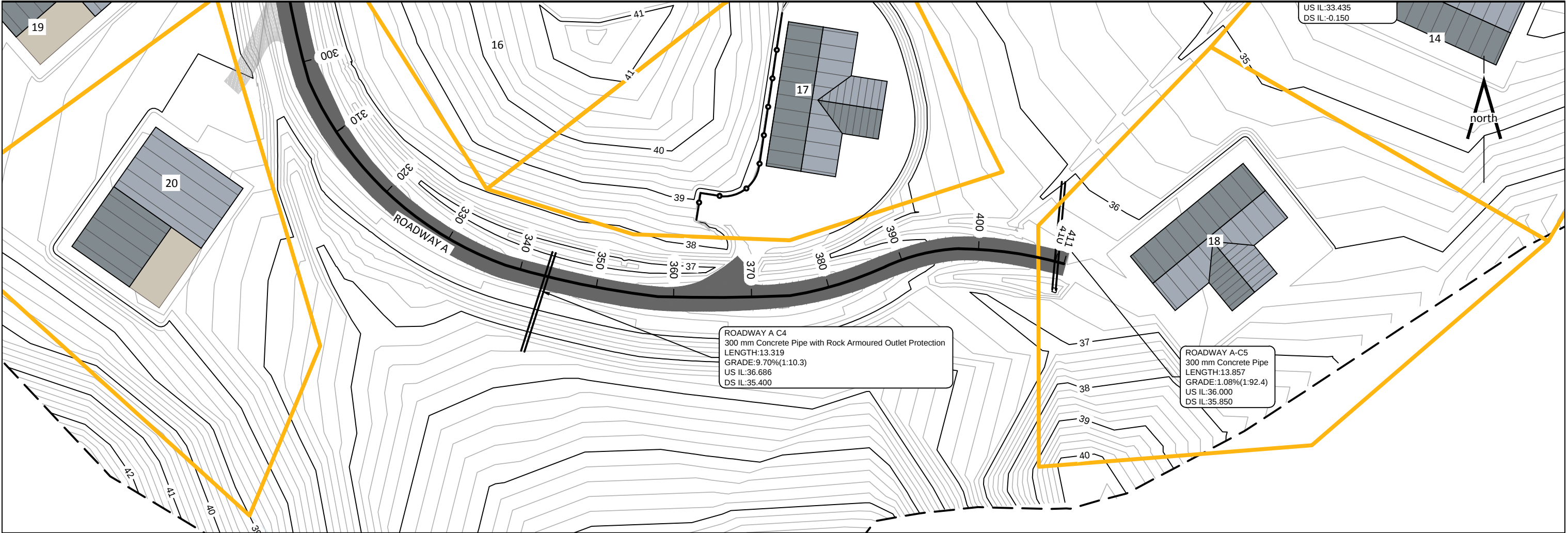
LEGEND	
PROPOSED LOT BOUNDARY	
PROPOSED ACCESS STORMWATER CULVERT	
INTERNAL ACCESS CENTRE LINE ALIGNMENT	
EXISTING GROUND SURFACE PROFILE	
PROPOSED FINISHED SURFACE PROFILE	

DATUM 35.0m																																				
DESIGN LEVELS	42.019	41.819		40.545		39.525		38.645		38.723		38.736		38.637		38.538		38.439		38.340		38.241		38.141		38.042		37.944		37.820		37.682		37.544		37.440
EXISTING LEVELS	41.963	41.763		40.428		39.418		38.773		38.417		38.319		38.349		38.355		38.368		38.370		38.371		38.308		38.180		38.107		37.744		37.306		36.894		36.560
DEPTH	0.056	0.056		0.117		0.107		-0.127		0.306		0.417		0.289		0.183		0.071		-0.030		-0.130		-0.167		-0.138		-0.163		0.076		0.376		0.649		0.880
CHAINAGE	168.745	170.000		180.000		190.000		200.000		210.000		220.000		230.000		240.000		250.000		260.000		270.000		280.000		290.000		300.000		310.000		320.000		330.000		337.490

- NOTES:
- ALL ELEVATIONS AND 0.2 m FINISHED CONTOURS ARE WITH RESPECT TO NZVD 2016 VERTICAL DATUM.
 - STORMWATER OPEN DRAINS HAVE BEEN LEFT OFF THIS SHEET FOR CLARITY. SEE SHEET 07 AND 22 FOR STORMWATER DETAILS.
 - ALL CULVERTS ARE TO HAVE ROCK AND MORTAR TYPE HEADWALLS UNLESS OTHERWISE SPECIFIED.
 - ALL LOT ACCESS AND CROSSINGS SHOWN ARE INDICATIVE ONLY. CULVERTS REQUIRED UNDER PROPOSED LOT CROSSINGS AND SECONDARY FLOW PATHS OVER CROSSINGS ARE TO BE SIZED DURING DETAILED DESIGN



	CLIENT TAPUAETAHI INCORPORATION	PROJECT CONCEPT CIVIL DESIGN LOT 1 DP 184896 TAPUAETAHI	DRAWING TITLE ROADWAY A - VIEW FRAME 2	SURVEY		FOR RC		BCP	16/07/2025	SCALE	1:500
				DESIGN	CS	28/05/2025				SHEET	09 OF 22
				DRAWN	CS	28/05/2025				PROJECT	J15724
				CHECKED	BCP	16/07/2025				THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE©	REV
				APPROVED	BCP	16/07/2025	No	REVISION	BY	DATE	A



LEGEND	
PROPOSED LOT BOUNDARY	
PROPOSED ACCESS STORMWATER CULVERT	
INTERNAL ACCESS CENTRE LINE ALIGNMENT	
EXISTING GROUND SURFACE PROFILE	
PROPOSED FINISHED SURFACE PROFILE	
POSSIBLE 1 m HIGH RETAINING WALL	

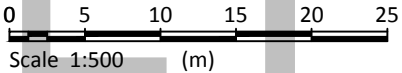
DATUM 35.0m									
DESIGN LEVELS	37.440	37.403	37.363	37.522	37.718	37.684	37.250	36.848	36.563
EXISTING LEVELS	36.560	36.506	36.505	36.805	37.125	37.409	37.145	36.762	36.550
DEPTH	0.880	0.898	0.858	0.716	0.593	0.274	0.105	0.086	0.013
CHAINAGE	337.490	340.000	350.000	360.000	370.000	380.000	390.000	400.000	410.000

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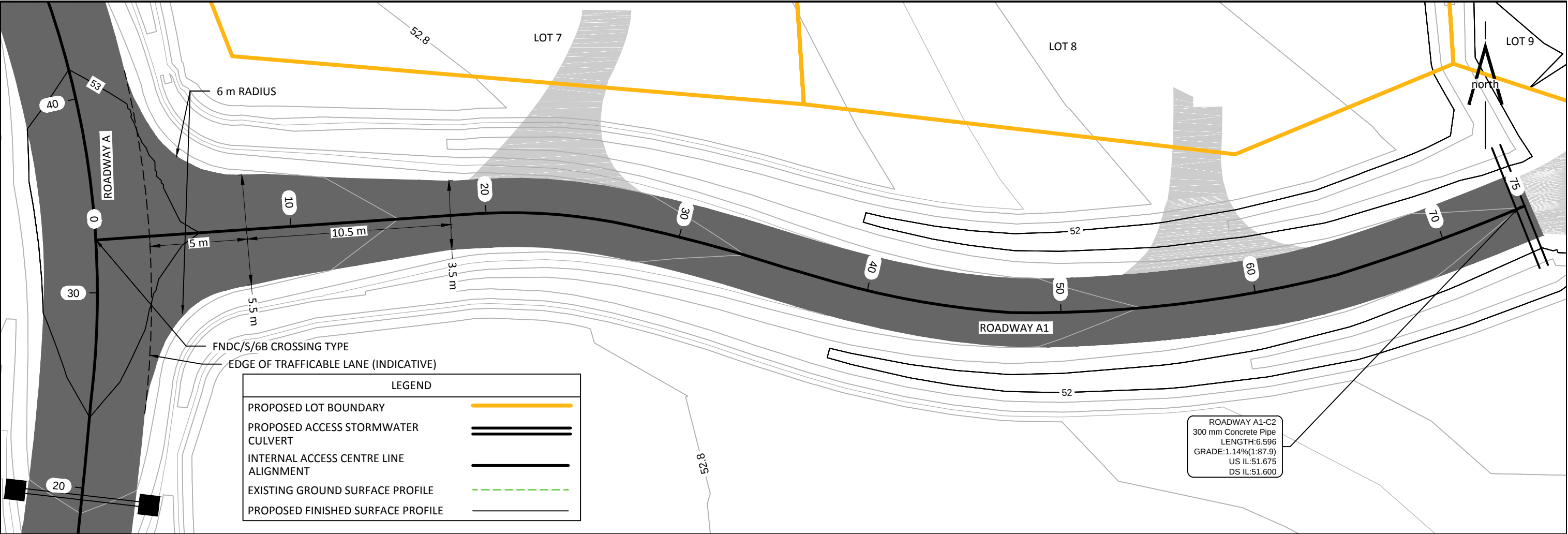
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- NOTES:
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	CLIENT TAPUAETAHI INCORPORATION	PROJECT CONCEPT CIVIL DESIGN LOT 1 DP 184896 TAPUAETAHI	DRAWING TITLE ROADWAY A - VIEW FRAME 3	SURVEY		A FOR RC		BCP	16/07/2025	SCALE	1:500
				DESIGN	CS	28/05/2025				SHEET	10 OF 22
				DRAWN	CS	28/05/2025				PROJECT	J15724
				CHECKED	BCP	16/07/2025				THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE©	REV A
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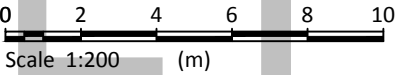
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DATUM 50.0m

DESIGN LEVELS	52.908	52.732	52.634	52.537	52.440	52.340
EXISTING LEVELS	52.905	52.835	52.754	52.680	52.536	52.382
DEPTH	0.003	-0.103	-0.119	-0.142	-0.096	-0.043
CHAINAGE	10.000	20.000	30.000	40.000	50.000	60.000

- NOTES:
- ALL ELEVATIONS AND 0.2 m FINISHED CONTOURS ARE WITH RESPECT TO NZVD 2016 VERTICAL DATUM.
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 - ALL LOT ACCESS AND CROSSINGS SHOWN ARE INDICATIVE ONLY. CULVERTS REQUIRED UNDER PROPOSED LOT CROSSINGS AND SECONDARY FLOW PATHS OVER CROSSINGS ARE TO BE SIZED DURING DETAILED DESIGN



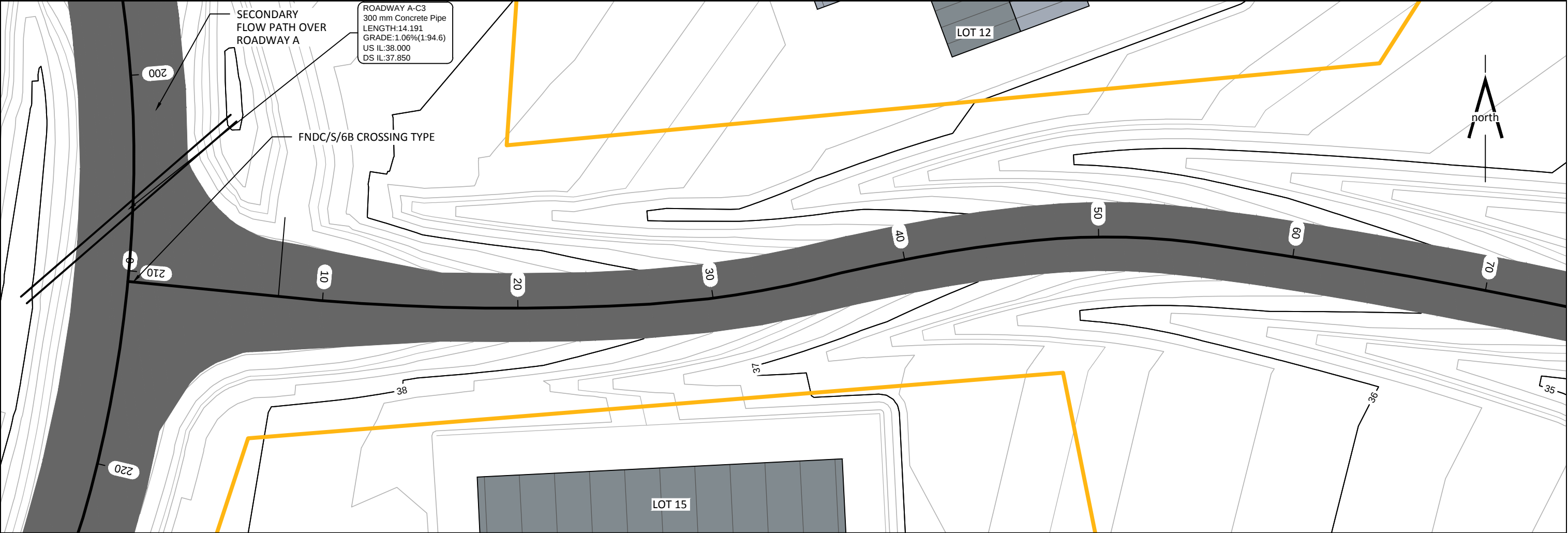
CLIENT
TAPUAETAHI INCORPORATION

PROJECT
CONCEPT CIVIL DESIGN
LOT 1 DP 184896
TAPUAETAHI

DRAWING TITLE
ROADWAY A1

SURVEY		
DESIGN	CS	28/05/2025
DRAWN	CS	28/05/2025
CHECKED	BCP	16/07/2025
APPROVED	BCP	16/07/2025

A	FOR RC	BCP	16/07/2025	SCALE	1:200
				SHEET	11 OF 22
				PROJECT	J15724
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LEGEND

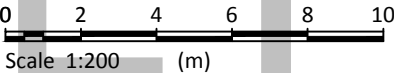
PROPOSED LOT BOUNDARY	
PROPOSED ACCESS STORMWATER CULVERT	
INTERNAL ACCESS CENTRE LINE ALIGNMENT	
EXISTING GROUND SURFACE PROFILE	
PROPOSED FINISHED SURFACE PROFILE	

DATUM 35.0m

DESIGN LEVELS	38.892	38.421	37.840	37.259	36.705	36.320
EXISTING LEVELS	38.015	37.638	37.223	36.928	36.640	36.290
DEPTH	0.878	0.783	0.617	0.332	0.066	0.030
CHAINAGE	10.000	20.000	30.000	40.000	50.000	60.000

NOTES:

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- ALL CULVERTS ARE TO HAVE ROCK AND MORTAR TYPE HEADWALLS UNLESS OTHERWISE SPECIFIED.
- ALL LOT ACCESS AND CROSSINGS SHOWN ARE INDICATIVE ONLY. CULVERTS REQUIRED UNDER PROPOSED LOT CROSSINGS AND SECONDARY FLOW PATHS OVER CROSSINGS ARE TO BE SIZED DURING DETAILED DESIGN



CLIENT
TAPUAETAHI INCORPORATION

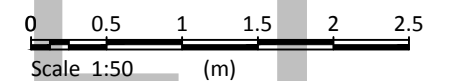
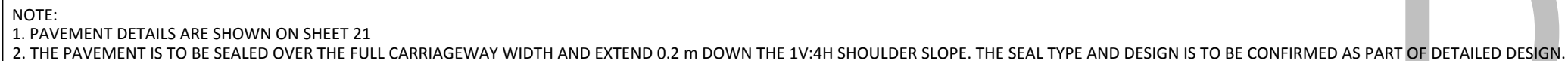
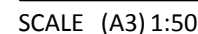
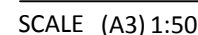
PROJECT
CONCEPT CIVIL DESIGN
LOT 1 DP 184896
TAPUAETAHI

DRAWING TITLE
ROADWAY A2 - VIEW FRAME 1

SURVEY	
DESIGN	CS 28/05/2025
DRAWN	CS 28/05/2025
CHECKED	BCP 16/07/2025
APPROVED	BCP 16/07/2025

A	FOR RC	BCP	16/07/2025	SCALE	1:200
				SHEET	12 OF 22
				PROJECT	J15724
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SCALE (A3) 1:50



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CLIENT	TAPUAETAHI INCORPORATION
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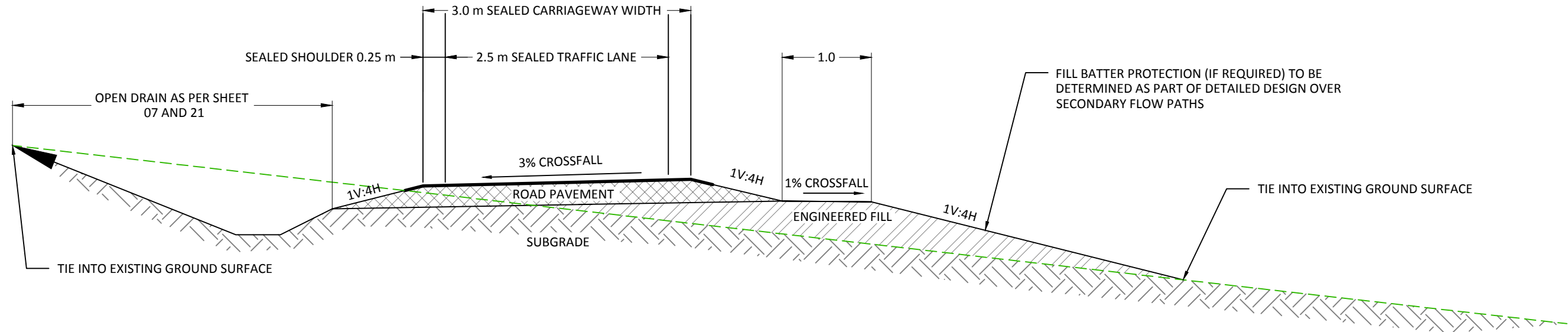
PROJECT	CONCEPT CIVIL DESIGN LOT 1 DP 184896 TAPUAETAHI
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DRAWING TITLE	
ROADWAY TYPICAL SECTIONS	

SURVEY			A	FOR RC		BCP	16/07/2025	SCALE	1:50
DESIGN	CS	28/05/2025						SHEET	14 OF 22
DRAWN	CS	08/07/2025						PROJECT	J15724
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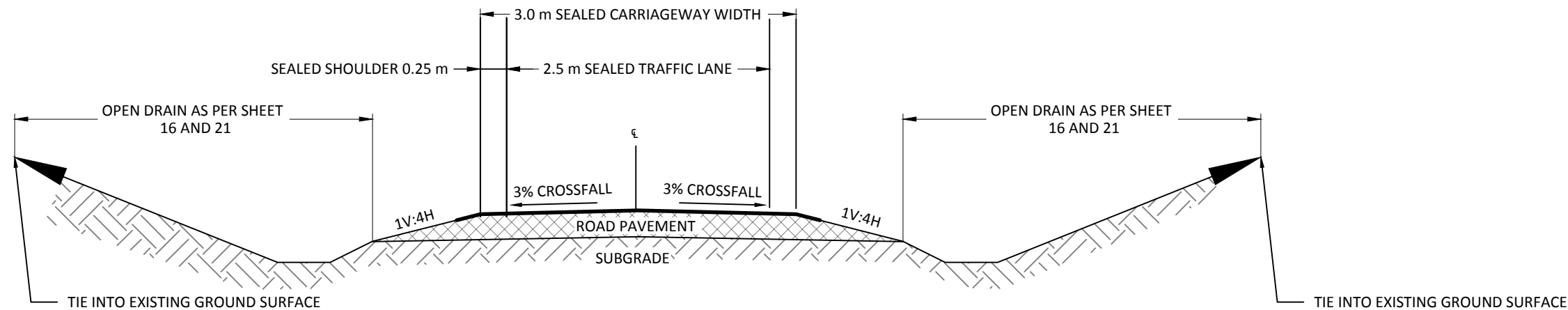
INTERNAL ACCESS A CHAINAGE 309 m TO 394 m
TYPICAL ROAD SECTION 4

SCALE (A3) 1:50



INTERNAL ACCESS A CHAINAGE 394 m TO 411 m (END) - INTERNAL ACCESS C CHAINAGE 75 m TO 130 m (END)
TYPICAL ROAD SECITON 5

SCALE (A3) 1:50



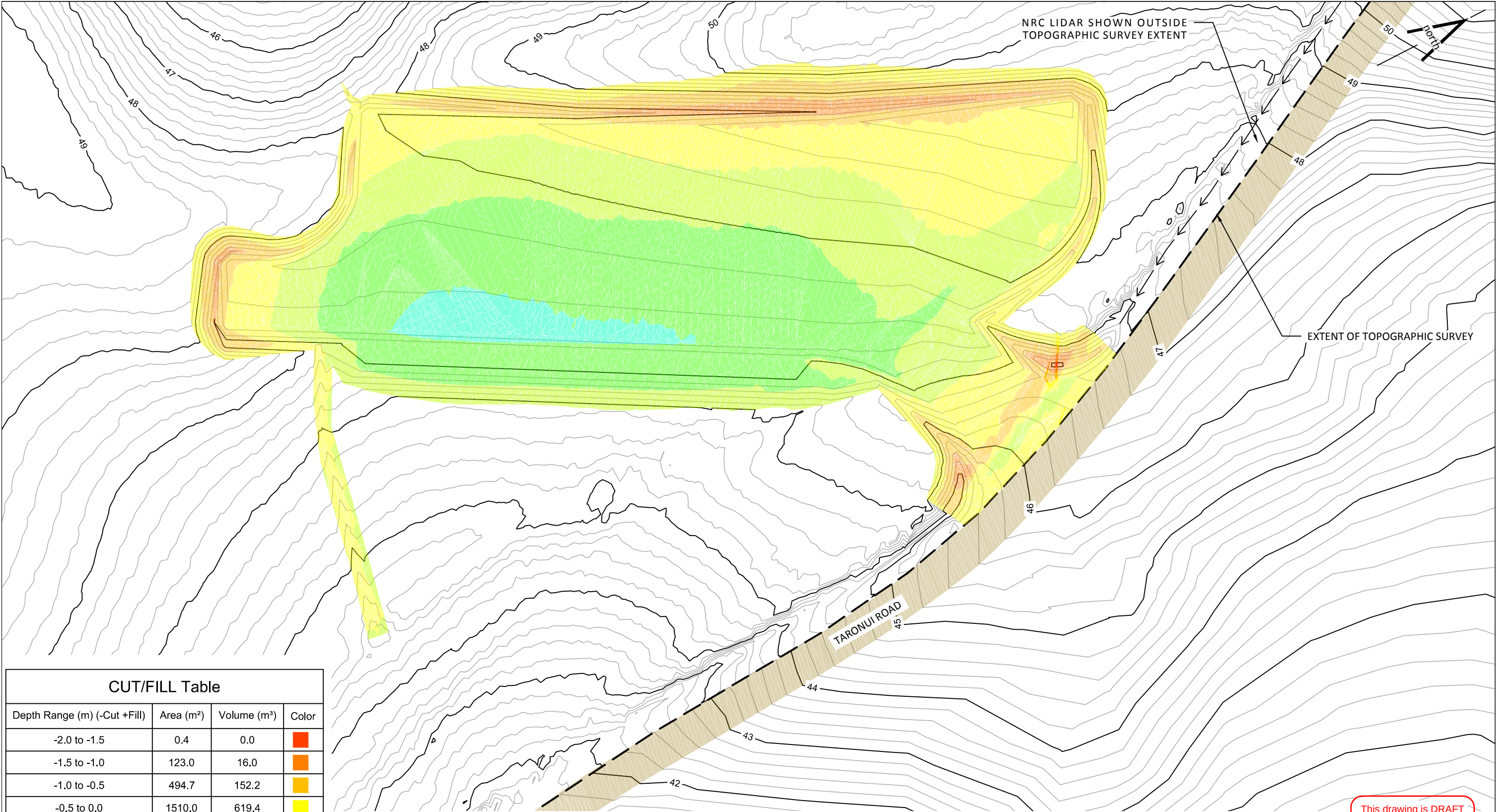
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NOTE:
1. PAVEMENT DETAILS ARE SHOWN ON SHEET 21
2. THE PAVEMENT IS TO BE SEALED OVER THE FULL CARRIAGEWAY WIDTH AND EXTEND 0.2 m DOWN THE 1V:4H SHOULDER SLOPE. THE SEAL TYPE AND DESIGN IS TO BE CONFIRMED AS PART OF DETAILED DESIGN.

	CLIENT TAPUAETAHI INCORPORATION	PROJECT CONCEPT CIVIL DESIGN LOT 1 DP 184896 TAPUAETAHI	DRAWING TITLE ROADWAY TYPICAL SECTIONS 2	LEGEND													
				SURVEY				A		FOR RC		BCP		16/07/2025		SCALE 1:50	
				DESIGN				CS		28/05/2025						SHEET 15 OF 22	
				DRAWN				CS		14/07/2025						PROJECT J15724	
				CHECKED				BCP		16/07/2025						THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE®	
APPROVED				BCP		16/07/2025		No		REVISION		BY		DATE		REV A	



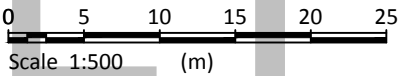
CUT/FILL Table			
Depth Range (m) (-Cut +Fill)	Area (m²)	Volume (m³)	Color
-2.0 to -1.5	0.4	0.0	Red
-1.5 to -1.0	123.0	16.0	Orange
-1.0 to -0.5	494.7	152.2	Yellow-Orange
-0.5 to 0.0	1510.0	619.4	Yellow
0.0 to 0.5	1356.5	1099.8	Light Green
0.5 to 1.0	1400.1	438.1	Green
1.0 to 1.5	176.2	11.4	Cyan

- NOTE:
- ALL ELEVATIONS AND 0.2 m FINISHED CONTOURS ARE WITH RESPECT TO NZVD 2016 VERTICAL DATUM.
 - EARTHWORKS VOLUMES HAVE BEEN GENERATED FROM THE DIFFERENCE BETWEEN EXISTING GROUND SURFACE LEVELS AND PROPOSED FINISHED SURFACE LEVELS AND DO NOT ACCOUNT FOR THE VOLUME OF TOPSOIL, UNSUITABLE SOIL AND ROAD PAVEMENT MATERIALS.

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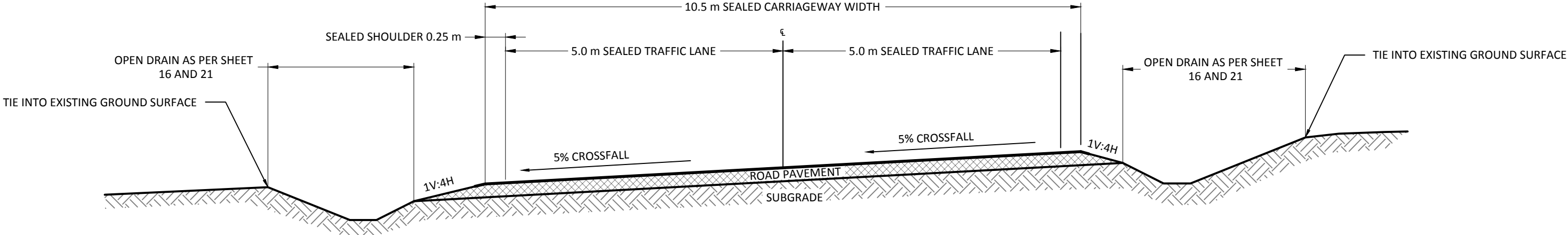
04/08/2025



	CLIENT TAPUAETAHI INCORPORATION	PROJECT CONCEPT CIVIL DESIGN LOT 1 DP 184896 TAPUAETAHI	DRAWING TITLE BOAT STORAGE YARD EARTHWORKS	SURVEY		A FOR RC	BCP 16/07/2025	SCALE 1:500				
				DESIGN	CS 28/05/2025						SHEET 19 OF 22	
				DRAWN	CS 08/07/2025						PROJECT J15724	
				CHECKED	BCP 16/07/2025						THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE©	REV A
				APPROVED	BCP 16/07/2025				No	REVISION		

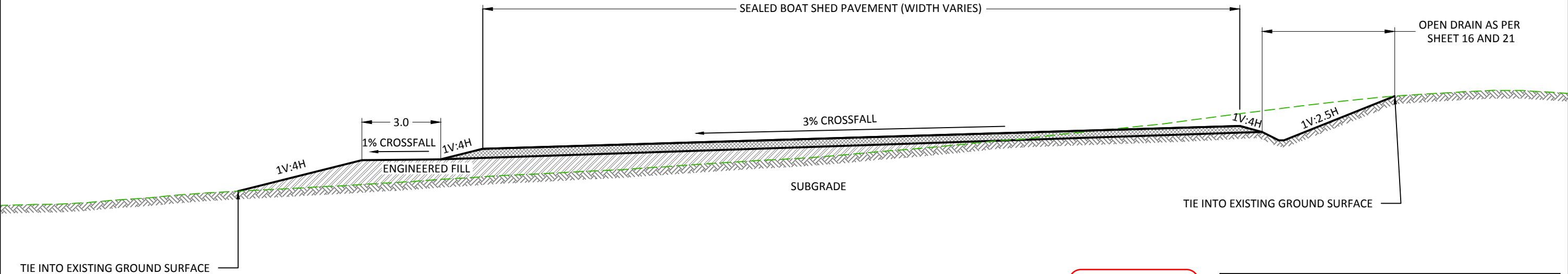
BOAT SHED ENTRANCE
BOAT SHED TYPICAL SECTION 1

SCALE (A3) 1:75



BOAT SHED PAVEMENT
BOAT SHED TYPICAL SECITON 2

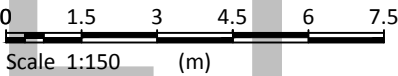
SCALE (A3) 1:150



NOTE:
1. PAVEMENT THICKNESS SHOWN IS INDICATIVE AND WILL NEED TO BE CONFIRMED AS PART OF DETAILED DESIGN
2. THE PAVEMENT IS TO BE SEALED OVER THE FULL CARRIAGEWAY WIDTH AND EXTEND 0.2 m DOWN THE 1V:4H SHOULDER SLOPE. THE SEAL TYPE AND DESIGN IS TO BE CONFIRMED AS PART OF DETAILED DESIGN.

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LEGEND	
EXTENT OF PAVEMENT SEAL	
EXISTING GROUND SURFACE PROFILE	
PROPOSED FINISHED SURFACE PROFILE	



CLIENT
TAPUAETAHI INCORPORATION

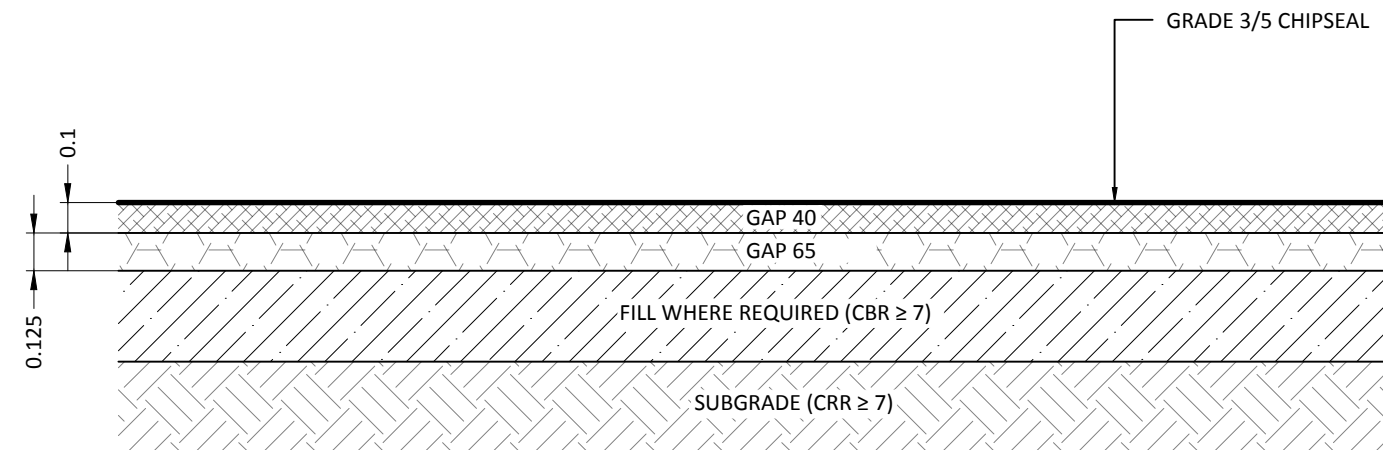
PROJECT
CONCEPT CIVIL DESIGN
LOT 1 DP 184896
TAPUAETAHI

DRAWING TITLE
BOAT STORAGE YARD TYPICAL
SECTIONS

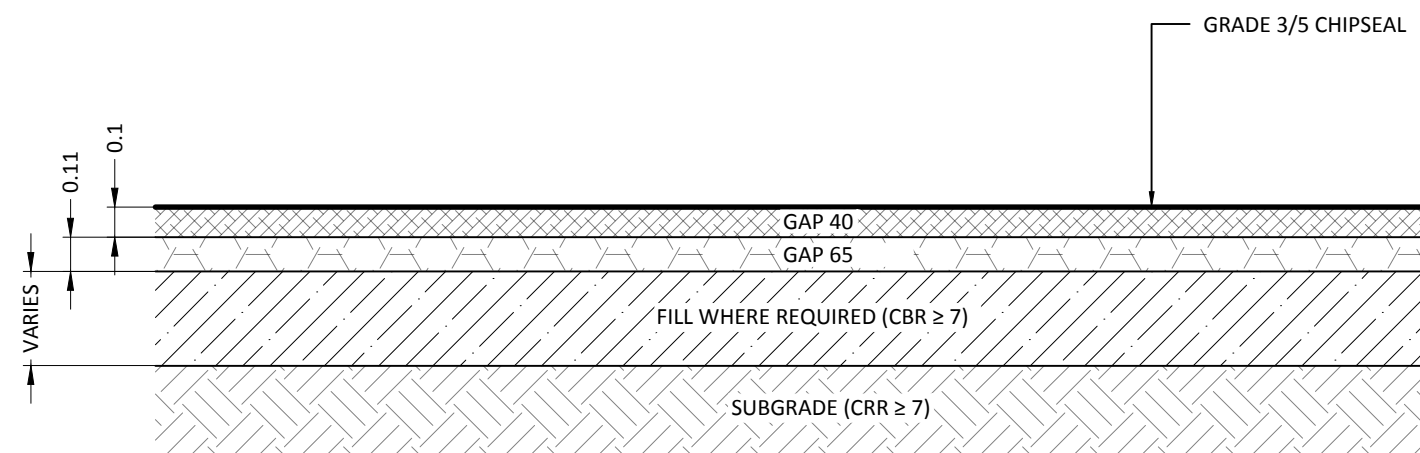
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DESIGN	CS	28/05/2025
DRAWN	CS	14/07/2025
CHECKED	BCP	16/07/2025
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				SHEET	20 OF 22
				PROJECT	J15724
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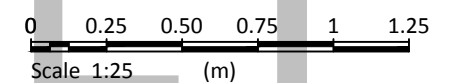
SCALE (A3) 1:25



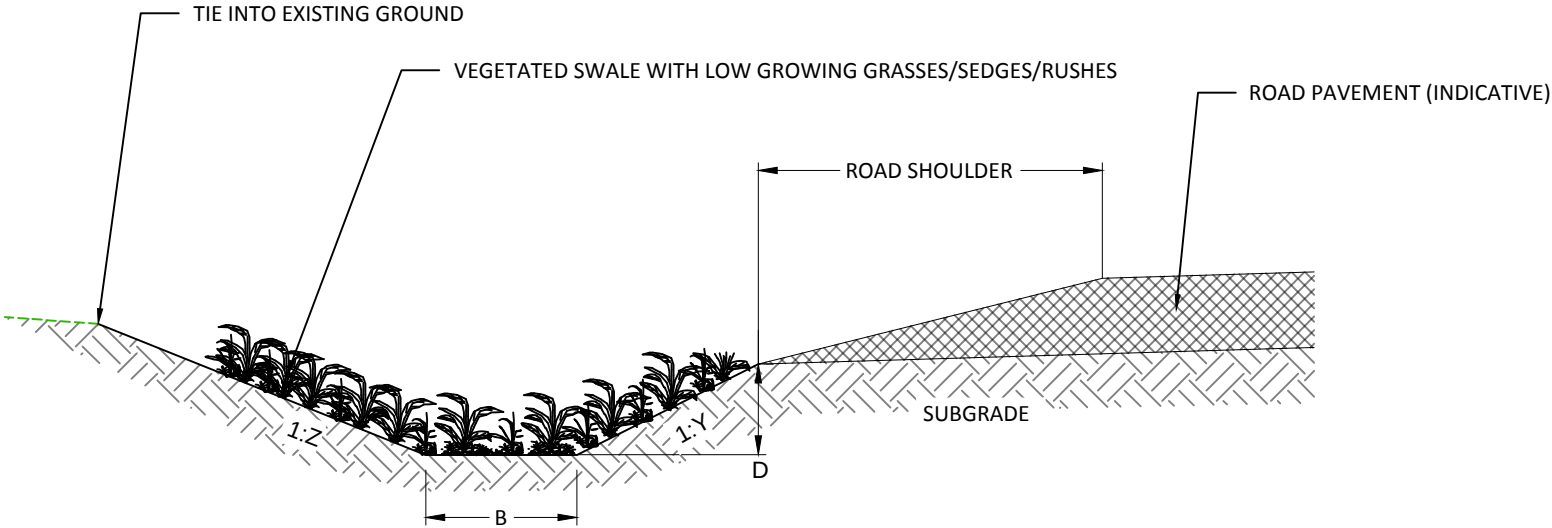
SCALE (A3) 1:25



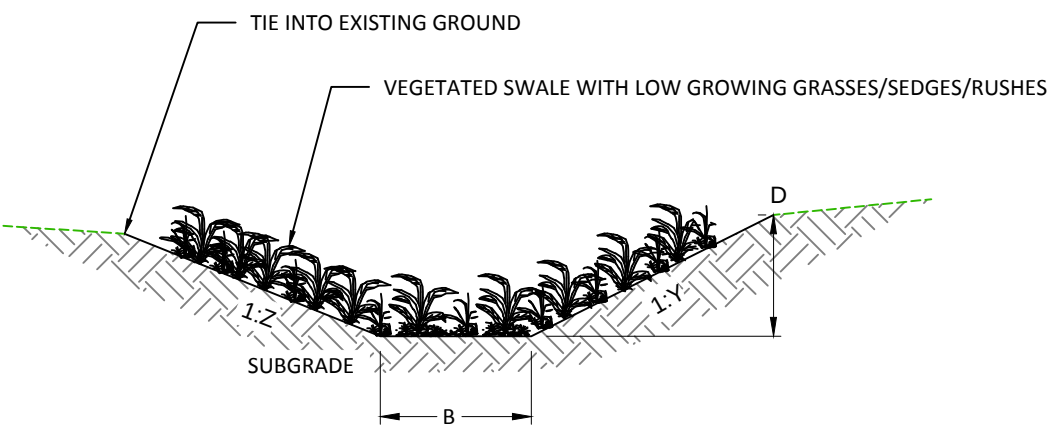
04/08/2025



 VISION CONSULTING ENGINEERS	CLIENT	PROJECT	DRAWING TITLE										
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				DRAWN	CS	28/05/2025					PROJECT	J15724	
				CHECKED	BCP	16/07/2025					THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VISION	REV A	
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OPEN DRAIN (ROAD) TYPICAL CROSS SECTION
SCALE (A3) NTS



OPEN DRAIN (OTHER) TYPICAL CROSS SECTION
SCALE (A3) NTS

OPEN DRAIN TABLE						
ID	B	D	Z	Y	OPEN DRAIN TYPE	PROTECTION
1	0.5m	0.1m	2.5	2	ROAD	LOW LEVEL VEGETATION
2	0.5m	0.2m	2.5	2	ROAD	LOW LEVEL VEGETATION
3	0.5m	0.3m	2.5	2	ROAD	LOW LEVEL VEGETATION
4	0.5m	0.2m	2.5	2.5	OTHER	LOW LEVEL VEGETATION
5	0.5m	0.25m	2.5	2	ROAD	LOW LEVEL VEGETATION
6	0.5m	0.3m	2.5	2	ROAD	LOW LEVEL VEGETATION
7	1.0m	0.65m	2.5	2	ROAD	LOW LEVEL VEGETATION
8	0.5m	0.35m	2.5	2	ROAD	LOW LEVEL VEGETATION
9	0.0m	0.3m	2.5	2.5	OTHER	LOW LEVEL VEGETATION
10	0.2m	0.3m	2.5	2	ROAD	LOW LEVEL VEGETATION
11	0.2m	0.2m	2.5	2	ROAD	LOW LEVEL VEGETATION
12	0.2m	0.2m	2.5	2.5	OTHER	LOW LEVEL VEGETATION

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Appendix E
ENGINEERING OUTCOMES “Access
Preliminary Design”

PROPOSED PAPAKĀINGA TAPUAETAHI BEACH TAI TOKERAU



ASSESSMENT OF TRAFFIC EFFECTS

*Prepared by Engineering Outcomes Ltd
Draft: 9 April 2025*

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No table of figures entries found.

1. THE PROPOSAL

This is a traffic report in relation to proposed papakāinga housing consisting of a total of twenty new dwellings, a boat storage and washing facility plus associated access and other services.

The proposal is located on Lot 1 DP 184896 on Taronui Road, Tapuaetahi Beach, Tai Tokerau/Northland. It is described in the plan reproduced in Appendix A.

All dwellings are proposed to lead to a single new access connection on the northern side of Taronui Road 1.76 kilometres from Purerua Road. No direct access or driveway connection points are proposed onto Taronui Road nor existing public roads – all dwellings initially lead to the new internal shared roadways.

2. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Overall, subject to the recommended work - a sight bench west of the new access connection to Taronui Road and advisory signage on it, it is concluded that the traffic effects and safety risks associated with the proposal will be well within acceptable limits and less than minor. More details of the proposed mitigation, and the proposed widths of internal access, are given in Figures 2 to 5 for which Figure 1 is a general location plan.

With the sight benching, the sight distances in relation to all access connection significantly exceeds the “safe stopping” standard along all vectors and are more than adequate. Widening of Taronui Road is not warranted through its Purerua Road connection point, especially with the expected low rate of traffic generation.

Some walking trips are expected, but to be only a very small proportion of the overall trip profile and safe because of the low speeds in the vicinity. The effects on the wider road network are expected to be negligible and no associated mitigation is warranted.

It is also recommended that a corridor investigation be carried out, by the council, into the safety of Purerua Road.

3. THE EXISTING ROAD NETWORK

Taronui Road is a private roadway that connects Tapuaetahi Beach to Purerua Road. It is sealed with a carriageway width between 4.8 and 5.5 metres and open side drains. Access to Taronui Road is controlled by a PIN-actuated electric gate that is 16 metres from the edge of Purerua Road, the PIN for which is known only to residents and changed monthly.

Taronui Road connects to the northern side of Purerua Road at RAMM 10.05 kilometres. Purerua Road is a public road that leads to the Purerua peninsular including large tracts of pastoral and rural-residential land and the Marsden Cross historical site.

In the vicinity of Taronui Road, Purerua Road is unsealed and 6.2 to 6.4 metres wide. The first 9.5 kilometres of Purerua Road is sealed, so only 0.5 kilometres is unsealed ahead of Taronui Road. There is no carriageway lighting in this vicinity.

There are two single-lane bridges on Purerua Road between Taronui Road and Kapiro Road and another on Landing Road, which is on the shortest route to/from the Kerikeri CBD.

Figure 1. General locality plan of the site and Taronui Road.

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Figure 2. Taronui Road to 700 metres including recommended signage

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Figure 3. Taronui Road, 700 to 1,300 metres including recommended signage

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Figure 4. Taronui Road, 1,300 to 2,060 metres including the site

DRAFT

Figure 5. The site including internal access, its connection to Taronui Road and available sight distance in the more restrictive direction.

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Purerua Road has the status of secondary collector road as far as Taronui Road beyond which it has “access” status. Kapiro Road has the status of primary collector road.¹ The speed limit both Purerua and Kapiro Roads is 100 kilometres per hour, although there is a 40 km/hr limit through Te Tii (starting 0.6 kilometres south of Taronui Road) when children are present.

Purerua Road connects to Kapiro Road in a Stop controlled tee intersection. There is no local widening associated with the intersection, but it is lit at night by a single lantern opposite Purerua Road.

Photo 1. A panorama from east (left) to west, centred at the proposed access connection to Taronui Road. A sight bench is recommended at right to open up this visibility from a point at least 3 metres behind the edge of Taronui Road.



Photo 2. A typical view of Taronui Road showing one of the existing speed humps. The rocks prevent the humps from being bypassed at excessive speed.



Photo 3. A panorama of Purerua Road from southwest (left) to northeast centred on Taronui Road. Sight distance exceeding the safe-intersection standard – the highest applicable to safety, is available from this point along all vectors.



¹ One Network Framework
Papakāinga, Tapuaetahi Beach,
Draft: 9 April 2025

4. COUNCIL RULES AND STANDARDS

The *Far North district plan* rule 15.1.6C.1.1c specifies that private access is permitted for access that leads to eight household equivalents and that access leading to nine or more household equivalents is to be a public road. Discretionary land-use consent is required for private access that leads to more than eight household equivalents. Taronui Road already leads to nearly sixty dwellings and most of Access A will lead to as many as twenty².

The width standards for public roads are given in Appendix 3B-2 of the Far North district council's operative district plan. For rural access leading more than fifteen household equivalents, those standards specify a carriageway width of 6.5 metres and a corridor width of 20 metres.

Section 3.3.7.4 of the council's engineering standard 2009, which is part of the district plan, specifies that:

Accesses that carry 60 vehicle [movements] per day or more and have access onto rural roads that are expected to carry fewer than 1,000 vehicles per day in 10 years shall be in accordance with drawing FNDC/S/6D.

That is, it is specified that such accesses are to have local widening on the priority route to separate vehicles that are turning off that route from others that are not turning. [It is suggested that this clause should read "... **more** than 1,000 vehicles per day..." because FNDC/S/6D specifies a higher standard of crossing than others do. Purerua Road does not carry more than 1,000 vehicle movements per day at Taronui Road.]

5. TRAFFIC

All vehicle movements are one-way movements whether an entry or exit or a movement in one direction along public roads.

5.1 Traffic generation

The traffic generation of the proposal has previously been estimated by video monitoring of the traffic at the Purerua Road/Rangihoua Road intersection and relating it to the numbers of houses in the catchment of the roads at the location of the monitoring. The monitoring was conducted in late 2021, very close to the start of the summer holiday season, and a full count of two days found traffic equivalent to no more than 4.7 movements per household per day. On this basis, annual average daily traffic generation is taken to be 4.5 vehicle movements per household or, say, 90 movements per day for the twenty dwellings proposed.

A large proportion all traffic is expected to travel to and from the south. Beyond Kapiro Road (which Purerua Road connects to), some 60% is expected to travel to/from the east. The exception will be a small number of movements of vehicles towing boats to/from Tapuaetahi Beach.

The traffic generation in this locality is expected to be seasonal, although the new dwellings are not likely to have absentee owners.

² The standards are based on a household equivalent generating 10 vehicle movements per day so, as will be seen, twenty dwellings in this location will only generate the traffic of fewer than ten typical household-equivalents.

5.2 Traffic on public roads

The current traffic on Taronui Road is estimated to be in the range 250 to 260 movements on an average day.

Based on the previous monitoring, current traffic on Purerua Road is estimated at 560 movements per day between the end of seal and Taronui Road, with 300 per day beyond Taronui Road. Known subdivision consents on the peninsular, including one of nearly seventy lots, are expected to enable additional traffic of at least 300 movements per day on this part of Purerua Road.

The traffic on both Taronui Road and Purerua Road is expected to as much as double during holiday periods.

5.3 Crashes

The CAS crash database has been searched for on all of Purerua Road, including intersections, since the start of 2020. A number of crashes have been reported, two of which resulted in serious injuries. However, every single crash resulted from either a loss of control of a single vehicle or a vehicle swinging wide on a bend.

Not a single crash was reported at any intersections including those of Purerua Road with both Taronui Road and Kapiro Road, nor at either of the single-lane bridges on Purerua Road. One of the crashes occurred on the unsealed section of Purerua Road south of Taronui Road but only resulted in minor injuries.

There is one location in which more than one injury-causing crash has been reported and in which all relevant factors were similar or identical. It is a bend on Purerua Road at 3.91 kilometres (35°10'09.0"S 173°57'45.5"E), on which two minor-injury causing crashes have been reported involving losses of control of northeast-bound vehicles. There is neither curve warning nor speed advisory on the northeast-bound approach to that bend.

6. ASSESSMENT OF TRAFFIC EFFECTS AND PROPOSED MITIGATION MEASURES

With the proposed sight distance improvements (sight benching west of the new access connection to Taronui Road), the key traffic effect of the proposal is the width of Taronui Road. The unsealed surface of 0.5 kilometres of Purerua Road south of Taronui Road, the single lane bridges and standards of the most affected intersections also warrant comment.

While advance curve and/or speed advisory warning(s) would be at least desirable on the bend on Purerua Road at 3.91 kilometres, on which two recent, near identical, injury-causing crashes have been reported, it is important that the measures associated with such warnings be part of a coordinated corridor strategy rather than provided ad hoc in response to particular incidents. [There are numerous other bends on Purerua Road that are at least as tight and/or out of context.]

In light of this, also given that the reported crashes only resulted in minor injuries and did not involve more than one vehicle (and, as such, additional traffic would not increase the associated risk for existing traffic), the only recommendation made is that a corridor investigation be carried out, by the council, into the safety of Purerua Road.

6.1 Access width and geometrics

While Taronui Road is narrower than the council standard for roadways leading to more than fifteen dwellings and Access A will also be narrower than specified, both are concluded to be acceptable with mitigation proposed and for the following reasons:

- As shown, the traffic generation is expected to be less than one-half of that given in the *Far North district plan*, Appendix 3A, for standard residential units³. In reality, the proposal will generate the equivalent traffic of no more than nine typical dwellings;
- Recent research into the influence of road width on harm found conclusively that the rate of harm increases with increased width, especially with roadways in the width range that includes Taronui Road. The dataset used in this research was all sealed public roads in entire north island⁴. Many of those roads are geometrically inferior to that of Taronui Road and Access A, so an even lower rate of harm is likely. That research included incidents involving vulnerable road users including pedestrians.

6.2 Other matters

There are no dwellings within 500 metres of the unsealed section of Purerua Road between Taronui Road and the end of seal, so dust nuisance will not arise from the proposal.

With the proposed sight benching, the sight distances associated with the connection point will be well above the safe-stopping sight distance (“SSSD”) standard as shown in Figure 5. While SSSD is not the highest standard applicable to safety, the available sight distance is considered at least adequate. In particular, the more restricted direction is to the right of exiting vehicles and a large proportion of exits will be towards the east – left turns. The potential collision angles associated with such turns are relatively acute and the operating speeds are nowhere near the “safe-system” threshold for such collisions.

The sight distances associated with the boat storage and washing facility will all be well above the safe-stopping standard and, as such, more than adequate.

Purerua Road will also be suitable at its current width even with the additional traffic. The remainder of the road routes between the site and all common destinations, including Te Tii, Kerikeri, Waipapa, Whangarei and Auckland, are sealed and of a standard that can easily cope with the relatively low level of additional traffic from this proposal.

There are 544 single-lane bridges in the Far North district alone (including a handful on the State highways). On the three single-lane bridges that the subdivision will increase traffic on, the current daily traffic ranges from 1,290 movements on the more northern Purerua Road structure⁵ to nearly 3,000 per day on the Landing Road bridge⁶.

³ Which is 10 movements per unit per day and compares with the estimated 3 movements per unit per day from this development, although the plan also specifies 5 movements per day per dwelling in papakainga.

⁴ While Taronui Road is not a public road, the risk profile of private roadways is virtually identical, so the research is entirely relevant.

⁵ Which is at 1.9 kilometres.

⁶ Which, now that the Kaero Bridge has been replaced, is now the single-busiest single-lane bridge in the district.

If known subdivisions on the Purerua peninsular reached full development immediately, the bridges on Purerua Road would be the tenth and twelfth busiest single-lane bridges in the district. The proposal has the potential to move them up by no more than one place again. This is highly conservative because future development is virtually certain in the catchments of all the busiest bridges and this proposal (and approved subdivisions in the catchment) will take time to develop fully. The increase in traffic on the Landing Road bridge will be only a tiny fraction of its total traffic and is unlikely to even be noticed.

No head-on crashes have been reported at either of the bridges on Purerua Road since at least the start of 2020. In fact, the rate of head-on crashes on bridges in the district is remarkably low. Only five such injury-causing crashes have been reported in a recent 5 calendar year period of which only one resulted in more than minor injuries and none resulted in fatalities. The only crash that resulted in serious injuries occurred on a long straight in which high speeds are enabled. A fourth occurred on the old Kaeo Bridge which, until recently replaced, was the single busiest single-lane bridge in the entire region.

The traffic will also remain well below levels that previous analyses, using SIDRA Intersection⁷ have concluded that single-lane bridges have capacity for.

No turn treatment is warranted at the Purerua Road/Taronui Road intersection including “Type 2” widening⁸ even if it was a public road. In particular, no Type GA crashes (rear-end involving a vehicle turning left into a side road or access) have been reported at any existing unsealed intersections anywhere in the Far North district in the most recent 5 calendar years and there are a very large number of such intersections. More than 98% of turns into Taronui Road are expected to be left turns.

A recent traffic assessment for a large (nearly 70 lot) subdivision on the Purerua peninsular concluded that turn treatment is also not warranted at the Purerua Road/Kapiro Road intersection, although a warning sign was recommended for eastbound traffic on Kapiro Road as it approached the intersection. Additional mitigation is not warranted in relation to this proposal.

The proposal will increase the traffic through the gate at the start of Taronui Road to some 20 to 21 movements during peak hours on typical days, or an average of one every 3 minutes. It takes less than 40 seconds for the PIN to be entered and the gate to open, so no congestion is expected as a result of the proposal⁹.

⁷ Including of the Landing Road bridge.

⁸ Engineering Standards 2023 s3.2.27.4. The intersection falls comfortably into the Type 1 crossing zone even for the dominant left turns into Taronui Road.

⁹ Certainly none that could result in vehicles queuing back into Purerua Road – there is space for three cars to queue between the gate and Purerua Road.

7. FAR NORTH DISTRICT PLAN – ASSESSMENT CRITERIA

There are three sets of criteria in the plan relevant to traffic management and access. No assessment is given against the parking criteria in Section 15.1.6B.5, because all parking demand can be accommodated on the lots in accordance with section 15.1.6B, as a permitted activity. Each of the other criteria is quoted here and the assessment is given with each one.

7.1 Rule 15.1.6A.4.1: Traffic Intensity Matters for Consideration

This is an assessment of the proposal against matters that the Council will restrict the exercise of its discretion to with respect to restricted-discretionary activities.

Criterion (a): The time of day when the extra vehicle movements will occur.

The proposal is expected to generate traffic at all times of the day, with typical weekday commuter peak and smaller peaks around midday on Saturdays.

Criterion (b): The distance between the location where the vehicle movements take place and any adjacent properties.

The nearest existing dwelling is more than 150 metres from the access.

Criterion (c): The width and capability of any street to be able to cope safely with the extra vehicle movements.

As shown in section 6.1, Taronui Road will be suitable at its current width even with the additional traffic.

Criterion (d): The location of any footpaths and the volume of pedestrian traffic on them.

There are no footpaths either Taronui Road nor Purerua Road. Foot traffic is expected to be low, especially on Purerua Road. The existing speed control devices and additional advisory signage, will ensure that speeds are generally below the safe-system threshold for vulnerable road users.

Criterion (e): The sight distances associated with the vehicle access onto the street.

Assessment of Criterion (e): This is addressed in section 6.2 and finds that all sight distances are at least adequate.

Criterion (f): The existing volume of traffic on the streets affected.

See section 5.2.

Criterion (g): Any existing congestion or safety problems on the streets affected.

There is no congestion in this locality and no evidence of unusual safety issues on either Taronui Road or Purerua Road.

Criterion (h): With respect to effects in local neighbourhoods, the ability to mitigate any adverse effects through the design of the access, or the screening of vehicle movements, or limiting the times when vehicle movements occur.

The main access is more than 150 metres clear of the nearest existing dwelling, so no targeted mitigation nor other restrictions are warranted.

Criterion (i): With respect to the effects on through traffic on roads with more than 1000 vehicle movements per day, the extent to which Council’s “Engineering Standards and Guidelines” (2004) are met.

No roads in this vicinity, including Purerua Road at Taronui Road, are in this category.

Criterion (j): Effects of the activity where it is located within 500m of reserve land administered by the Department of Conservation upon the ability of the Department to manage and administer that land.

The site is not located within 500 metres land administered by the Department of Conservation.

Criterion (k): The provision of safe access for pedestrians moving within or exiting the site

Footpaths are not specified for rural private access. Few people are likely to walk beyond the access because there are no suitable facilities on roadways beyond it. For those that do, the existing speed control devices and additional advisory signage, will ensure that speeds are generally below the safe-system threshold for vulnerable road users.

7.2 Section 15.1.6A.7: General Assessment Criteria, Traffic

This section includes eleven criteria. Criteria (a), (j), (k) and (l) are unique to this section of the plan. Criteria (b) to (i) are identical to criteria (a) to (h) of the assessment criteria in 15.1.6A.4.1, respectively, and have already been assessed in the previous section. This section is restricted to the criteria unique to 15.1.6A.7.

Criterion (a): The extent to which the expected traffic intensity exceeds the threshold set by the Traffic Intensity Factor contained in Appendix 3A in Part 4 of the district plan.

The permitted Traffic Intensity Factor (TIF) threshold for this site is 30 and while the proposal will exceed that TIF by 170 movements¹⁰, in reality as shown, the actual traffic generation will be below 100 movements per day and, as shown, the existing and proposed roadways will be able to cope with it at least adequately.

Criterion (j): With respect to the effects on through traffic on arterial roads, strategic roads and State Highways, any measures such as right-turn bays, flush medians, left-turn deceleration tapers, etc. proposed to be installed on the road as part of the development to accommodate traffic turning into and out of the site.

As shown, both Taronui Road and Purerua Road have more than adequate capacity for its existing traffic plus that from the proposal.

Criterion (k): The extent to which the activity may cause or exacerbate natural hazards or may be adversely affected by natural hazards, and therefore increase the risk to life, property and the environment.

The site access will not cause or exacerbate natural hazards provided its associated earthworks and/or retaining are fully engineered to mitigate all potential natural hazards. This is addressed in the reports of others.

¹⁰ When applying the rate of 10 per household as per the operative district plan Appendix 3A.

Criterion (l): Whether providing or having access to bicycle parking, shower/changing facilities or alternative transportation would reduce the number of vehicle movements associated with the proposed activity.

With the ability for individual occupants to store bicycles and provide associated facilities at their homes, there is little, probably nothing, to be gained by the provision of special facilities.

15.1.6C.4.1 Property Access

Criteria (a) and (b) of this repeat those in other sections and have already been addressed. Specific comment is given for all others.

Criterion (c): Any foreseeable future changes in traffic patterns in the area.

No significant projects or road links are planned that might significantly change the patterns of traffic in this vicinity.

Criterion (d): Possible measures or restrictions on vehicle movements in and out of the access.

With the relatively light traffic and sparse existing development in the locality, there is no need for restrictions on vehicle movements.

Criterion (e): The adequacy of the engineering standards proposed and the ease of access to and from, and within, the site.

This is addressed in detailed section 6 and finds that, subject to sight benching west of the connection of the site access to Taronui Road and advisory signage on Taronui Road, the proposed access widths and geometric standards will be adequate and fit-for-purpose.

Criterion (f): The provision of access for all persons and vehicles likely to need access to the site, including pedestrian, cycle, disabled, vehicular.

The proposed connection to Taronui Road will ensure adequate access to all lots for all transport modes. Pedestrian traffic is expected to be infrequent and cyclists will be able to enter the site safely by way of the access and vehicle crossing connection.

Criterion (g): The provision made to mitigate the effects of stormwater runoff, and any impact of roading and access on waterways, ecosystems, drainage patterns or the amenities of adjoining properties.

The site access will not cause or exacerbate natural hazards provided its associated earthworks and/or retaining are fully engineered to mitigate all potential natural hazards. This is addressed in the reports of others.

Criterion (h) relates to sites with a road frontage on Kerikeri Road so is not relevant.

Criterion (i) The provisions of the roading hierarchy, and any development plans of the roading network.

No significant projects or road links are planned that might significantly change the patterns of traffic in this vicinity.

Criterion (j) relates to alternative access for car parking and vehicle loading in business zones and is not relevant.

Criterion (k) Any need to require provision to be made in a subdivision for the vesting of reserves for the purpose of facilitating connections to future roading extensions to serve surrounding land; future connection of pedestrian accessways from street to street; future provision of service lanes; or planned road links that may need to pass through the subdivision; and the practicality of creating such easements at the time of subdivision application in order to facilitate later development, so is not relevant.

Also Criterion (l) Enter into agreements that will enable the Council to require the future owners to form and vest roads when other land becomes available (consent notices shall be registered on such Certificates of Title pursuant to Rule 13.6.7).

There is nothing to be gained by facilitating access to areas outside the site using the mechanisms described. No internal access has potential outlets to other locations and is private in any event.

Criterion (m) With respect to access to a State Highway that is a Limited Access Road, the effects on the safety and/or efficiency on any State Highway and its connection to the local road network and the provision of written approval from the New Zealand Transport Agency.

The proposal does not lead directly to any State highway.

APPENDIX A: SITE PLAN

Draft

Figure 1

Plan Overall Taronui Rd Site

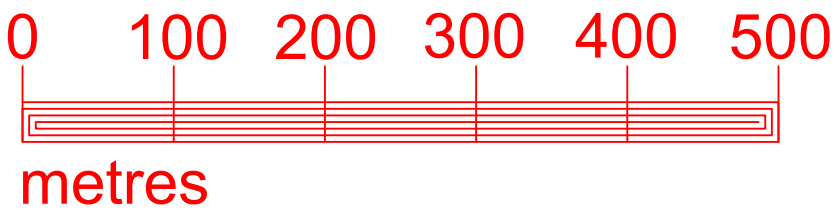


Figure 5

Site

Figure 4

Figure 3

Figure 2



PO Box 3048,
Onerahi
Whangarei 0142
Tel. 09 436 5534
info@e-outcomes.co.nz

Project
Papakāinga
Taronui Road
Te Tii

Client
**Tapuaetahi
Incorporation**

Surveyed by
LINZ
NRC

Amendments

Council ref.

Scale 1: 5000 at A4

Date 09-Apr-2025 11:45:28

DRAFT

Figure 2

Plan
Taronui Rd
0 to 700m


PO Box 3048,
Onerahi
Whangarei 0142
Tel. 09 436 5534
info@e-outcomes.co.nz

Project
Papakāinga
Taronui Road
Te Tii

Client
**Tapuaetahi
Incorporation**

Surveyed by
LINZ
NRC

Amendments

Council ref.

Scale 1: 1500 at A4

Date 09-Apr-2025 11:45:29

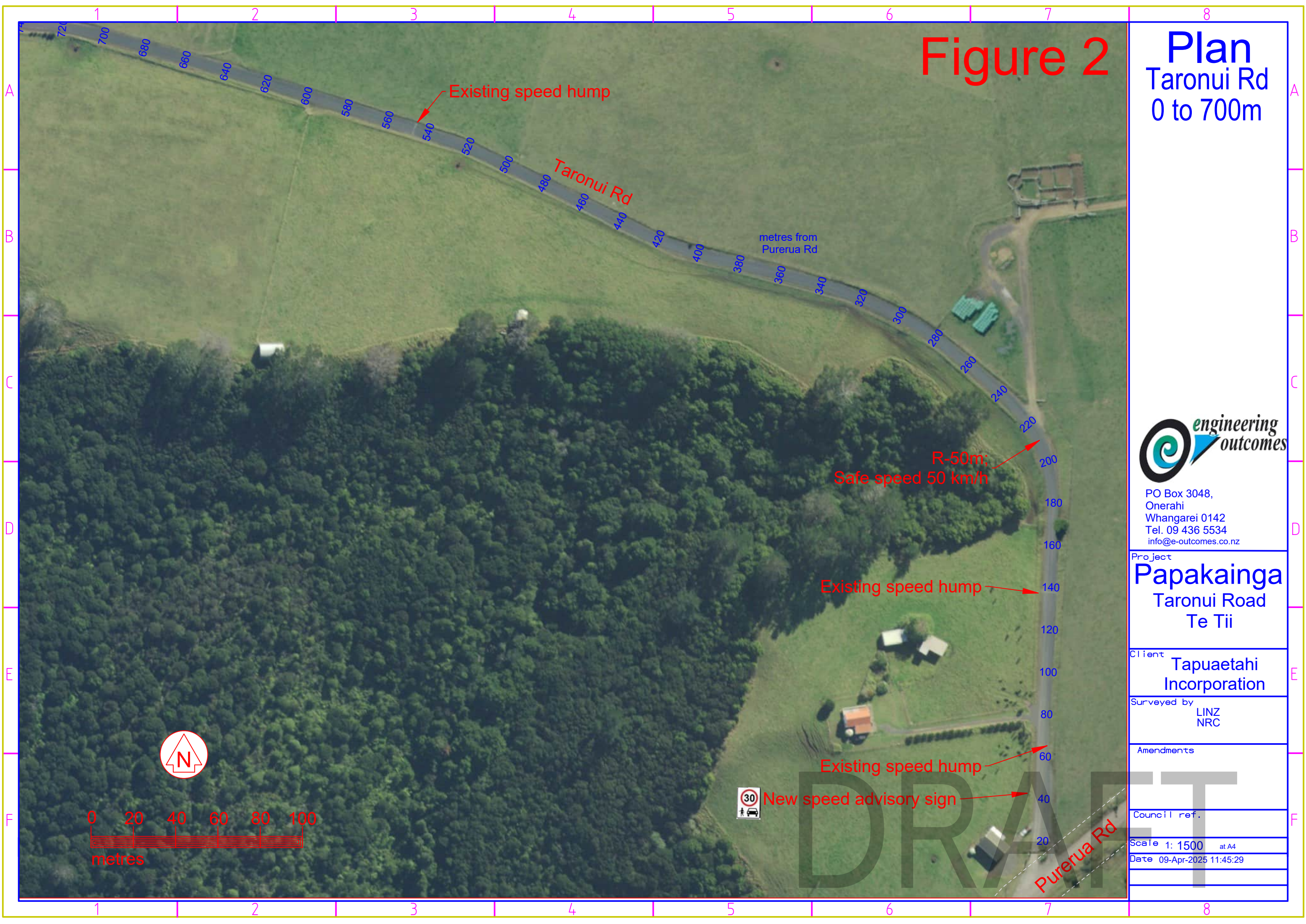


Figure 3

Plan
Taronui Rd
700 to 1340m



PO Box 3048,
Onerahi
Whangarei 0142
Tel. 09 436 5534
info@e-outcomes.co.nz

Project
Papakāinga
Taronui Road
Te Tii

Client
**Tapuaetahi
Incorporation**

Surveyed by
LINZ
NRC

Amendments

Council ref.

Scale 1: 1500 at A4
Date 09-Apr-2025 11:45:30

Existing speed hump

R60m;
Safe speed
54 km/h

New speed advisory signs
(both sides)



Existing speed hump



DRAFT

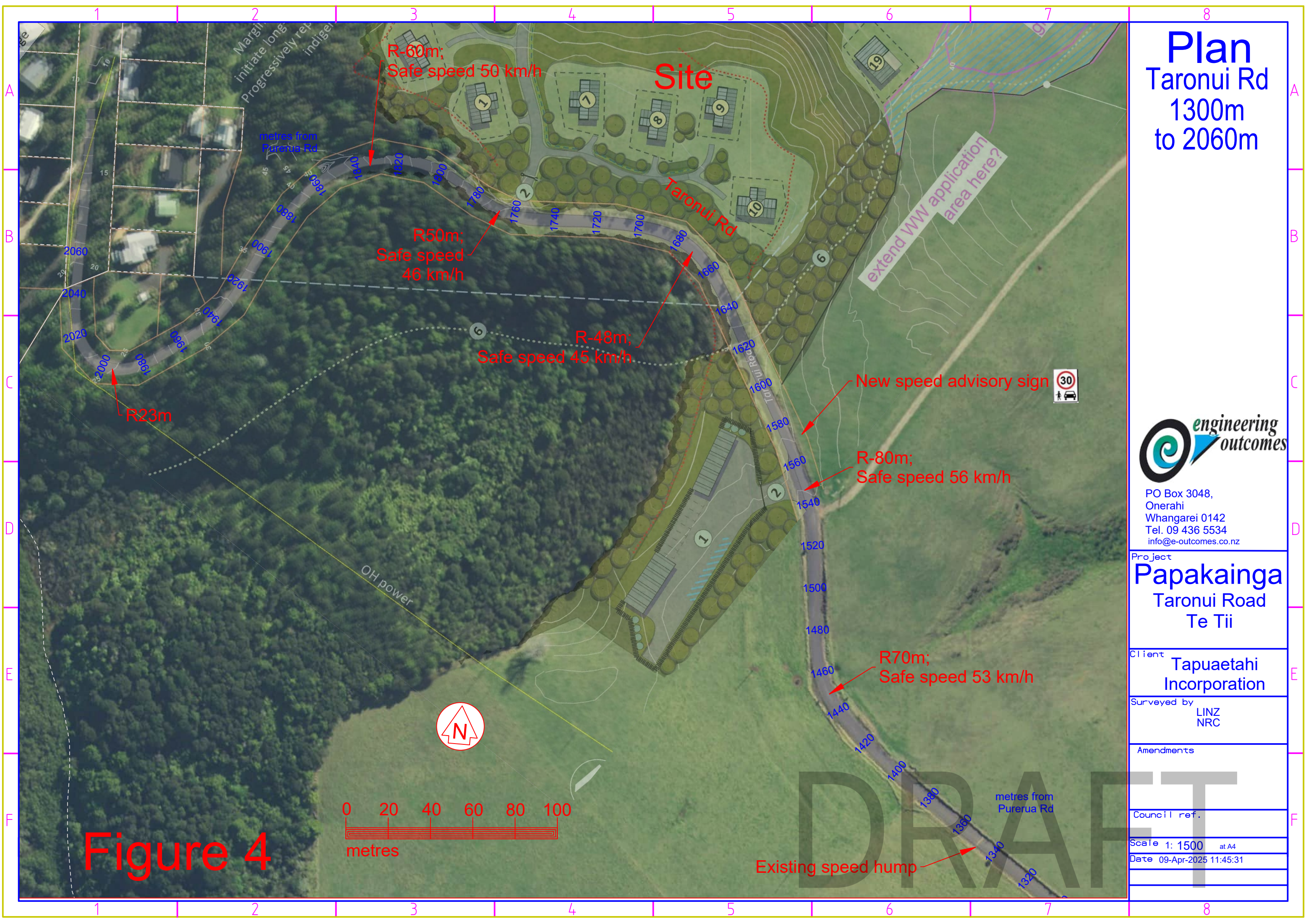


Figure 4

Plan Taronui Rd 1300m to 2060m

engineering outcomes

PO Box 3048,
Onerahi
Whangarei 0142
Tel. 09 436 5534
info@e-outcomes.co.nz

Project
Papakāinga
Taronui Road
Te Tii

Client
**Tapuaetahi
Incorporation**

Surveyed by
**LINZ
NRC**

Amendments

Council ref.

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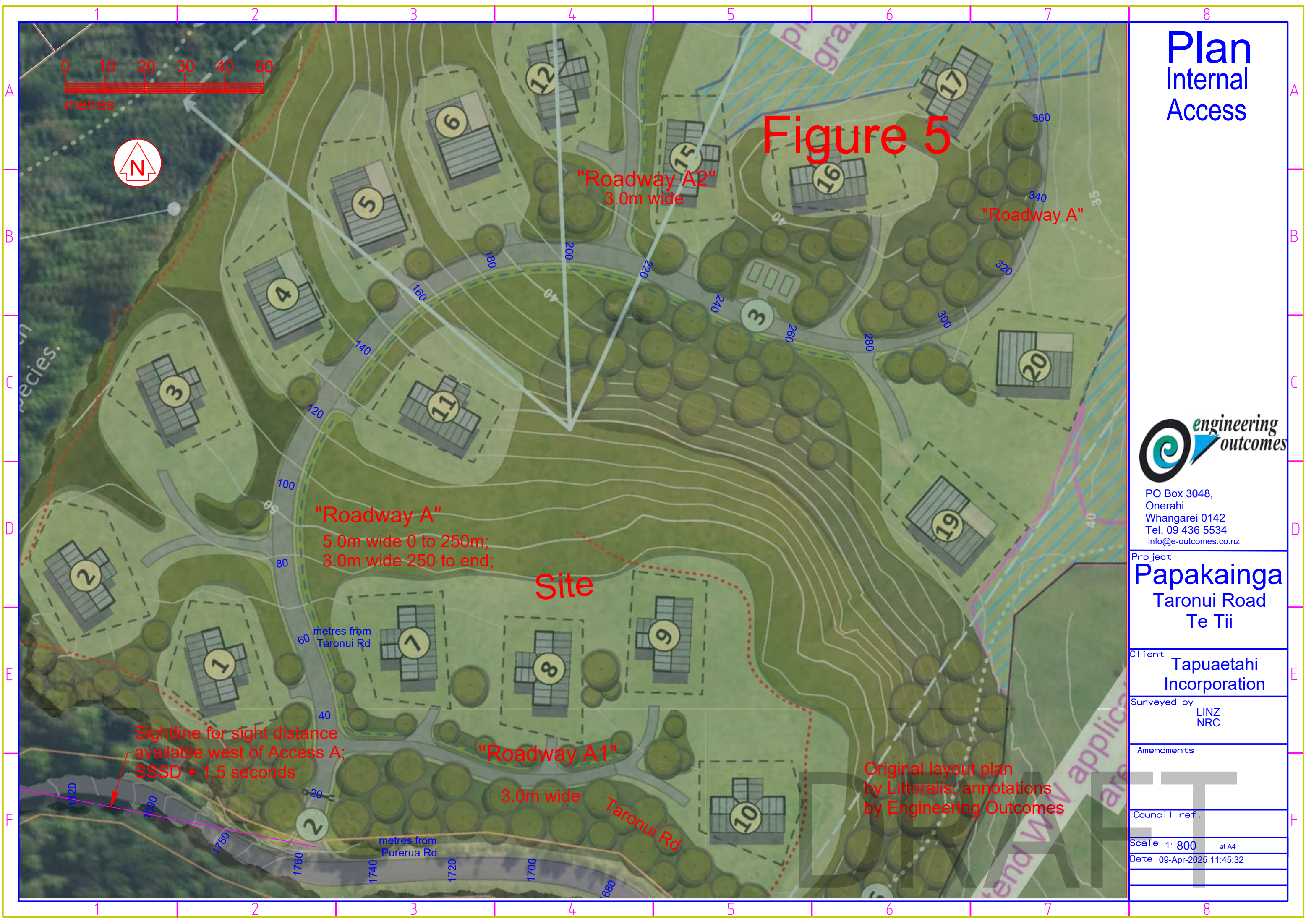


Figure 5

Plan Internal Access

**engineering
outcomes**
PO Box 3048,
Onerahi
Whangarei 0142
Tel. 09 436 5534
info@e-outcomes.co.nz

Project
Papakāinga
Taronui Road
Te Tii

Client
**Tapuaetahi
Incorporation**

Surveyed by
**LINZ
NRC**

Amendments

Council ref.

Scale 1: 800 at A4

Date 09-Apr-2025 11:45:32

Appendix F

VISION Stormwater Calculations

Stormwater Design Sheet

Weighted Runoff Coefficient

Site: Tapuaetahi Development
Date: 15/07/2025
Project: J15724
Client: Tapuaetahi Incorporation
By: CS
Reviewed: BCP
Method: NZ Building Code, E1 Surface Water



Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	1					
Grass		287	0.40	114.8	115	10
Road		173	0.90	155.7	156	10
Slope adjustment			0.00			
Total		460	0.59			

Decription	Drainage Area		C	C x A	Sum	Tc
	No	Area				
	2					
Grass		270	0.40	108	108	10
Road		150	0.90	135	135	10
Slope adjustment			0.00			
Total		420	0.58			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	3					
Grass		1330	0.40	532	532	10
Road		400	0.90	360	360	10
Slope adjustment			0.00			
Total		1730	0.52			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	4					
Grass		290	0.40	116	116	10
Road		150	0.90	135	135	10
Slope adjustment			0.05			
Total		440	0.62			

DRAFT

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	5A/B					
Grass		1144	0.40	457.6	458	10
Road		250	0.90	225	225	10
Slope adjustment			0.10			
Total		1394	0.59			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	6					
Grass		3430	0.40	1372	1372	10
Road		1050	0.90	945	945	10
Slope adjustment			0.05			
Total		4480	0.57			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	7					
Grass		6700	0.40	2680	2680	10
Road		1500	0.90	1350	1350	10
Slope adjustment			0.05			
Total		8200	0.54			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	8					
Grass		2920	0.40	1168	1168	10
Road		500	0.90	450	450	10
Slope adjustment			0.05			
Total		3420	0.52			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	9					
Grass		14109	0.40	5644	5644	10
Road		1000	0.90	900	900	10
Slope adjustment			0.05			
Total		15109	0.48			

DRAFT

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	10					
Grass		7478	0.40	2991	2991	10
Road		1200	0.90	1080	1080	10
Slope adjustment			0.05			
Total		8678	0.52			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	11					
Grass		5800	0.40	2320	2320	10
Road		1200	0.90	1080	1080	10
Slope adjustment			0.05			
Total		7000	0.54			

Decription	Drainage Area		C	C x A	C x A	(min)
	No	(m)				
Small cut of drains						
Grass		1445	0.40	578	578	10
Road		500	0.90	450	450	10
Slope adjustment			0.05			
Total		1945	0.58			

Decription	Drainage Area		C	C x A	C x A	(min)
	No	Area (m)				
	12					
Grass		1374	0.40	549.6	550	10
Road		800	0.90	720	720	10
Slope adjustment			0.05			
Total		2174	0.63			

Decription	Drainage Area		C	C x A	C x A	(min)
	No	Area (m)				
	13					
Grass		853	0.40	341.2	341	10
Road		731	0.90	657.9	658	10
Slope adjustment			0.05			
Total		1584	0.68			

DRAFT

Decription	Drainage Area No	Area (m)	C	C x A	C x A	(min)
	14					
Grass		330	0.40	132	132	10
Road		0	0.90	0	0	10
Slope adjustment			0.05			
Total		330	0.45			

Decription	Drainage Area No	Area (m)	C	C x A	Sum C x A	Tc (min)
	15					
Grass		6035	0.40	2414	2414	10
Road		2855	0.90	2570	2570	10
Slope adjustment			0.05			
Total		8890	0.61			

Decription	Drainage Area No	Area (m)	C	C x A	Sum C x A	Tc (min)
	16					
Grass		542	0.40	216.8	217	10
Road		48	0.90	43.2	43	10
Slope adjustment			0.05			
Total		590	0.49			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	A					
Grass		41996	0.40	16798	16798	10
Road		0	0.90	0	0	10
Slope adjustment			0.05			
Total		42885	0.44			

Decription	Drainage Area		C	C x A	Sum C x A	Tc (min)
	No	Area (m)				
	A'					
Grass		19466	0.40	7786	7786	10
Road		2500	0.90	2250	2250	10
Slope adjustment			0.05			
Total		21966	0.51			

Stormwater Design Sheet

Time of Concentration

Client Tapuaetahi Incorporation
Site Tapuaetahi Development
Designer CS
Date 15/07/2025

Rational Method (Equal Area)

Catchment	L (m)	h (m)	TOC (min)
9	165	16	2.4

Catchment with the longest flow path

Use 10 min for all catchments

DRAFT

Stormwater Design Sheet

HIRDS V4 Data

Client	Tapuaetahi Incorporation
Project	J15724
Site	Tapuaetahi Development
Designed by	CS
Approved by	BCP
Date	15/07/2025
Scenario	RCP6.0 for the period 2081-2100

HIRDS V4 Intensity-Duration-Frequency Results

Sitename: Custom Location

Coordinate system: WGS84

Longitude: 173.9864

Latitude: -35.1244

DDF Model	Parameters:	c	d	e	f	g	h	i
	Values:	0.001996	0.504315	-0.02238	-0.00269	0.255075	-0.01168	3.250212
	Example:	Duration (t	ARI (yrs)	x	y	Rainfall Rate (mm/hr)		
		24	100	3.178054	4.600149	10.15413		

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	59.2	43.4	36	25.8	18.1	9.72	6.29	3.9	2.31	1.67	1.3	1.07
2	0.5	64.9	47.6	39.5	28.3	19.8	10.7	6.91	4.29	2.55	1.83	1.43	1.18
5	0.2	84.2	61.8	51.3	36.8	25.9	14	9.05	5.63	3.35	2.41	1.89	1.55
10	0.1	98.4	72.3	60.1	43.2	30.4	16.4	10.6	6.63	3.94	2.84	2.23	1.83
20	0.05	113	83	69	49.6	34.9	18.9	12.3	7.66	4.56	3.29	2.58	2.12
30	0.033	121	89.4	74.3	53.5	37.7	20.4	13.3	8.28	4.93	3.56	2.79	2.29
40	0.025	128	94	78.2	56.3	39.6	21.5	14	8.72	5.2	3.75	2.94	2.42
50	0.02	132	97.5	81.1	58.4	41.2	22.3	14.5	9.07	5.41	3.9	3.06	2.52
60	0.017	136	100	83.6	60.2	42.4	23	15	9.35	5.58	4.03	3.16	2.6
80	0.013	142	105	87.4	63	44.4	24.1	15.7	9.8	5.85	4.22	3.31	2.73
100	0.01	147	109	90.4	65.1	46	25	16.2	10.2	6.06	4.38	3.43	2.83
250	0.004	166	123	102	73.9	52.2	28.4	18.5	11.6	6.92	5	3.93	3.23

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	70.7	51.8	43	30.8	21.4	11.2	7.11	4.35	2.53	1.8	1.4	1.15
2	0.5	77.8	57	47.3	33.9	23.6	12.4	7.87	4.8	2.8	2	1.55	1.27
5	0.2	102	74.7	62	44.5	31.1	16.4	10.4	6.35	3.71	2.65	2.06	1.69
10	0.1	119	87.8	72.9	52.4	36.6	19.3	12.3	7.51	4.39	3.14	2.45	2
20	0.05	137	101	84	60.4	42.2	22.3	14.2	8.68	5.1	3.64	2.84	2.32
30	0.033	148	109	90.6	65.2	45.6	24.1	15.4	9.4	5.52	3.95	3.08	2.52
40	0.025	155	115	95.2	68.6	48	25.5	16.2	9.91	5.82	4.17	3.24	2.66
50	0.02	161	119	99	71.3	49.9	26.4	16.9	10.3	6.06	4.33	3.38	2.76
60	0.017	166	123	102	73.4	51.4	27.3	17.4	10.6	6.25	4.48	3.49	2.85
80	0.013	174	128	107	76.9	53.9	28.6	18.3	11.2	6.56	4.7	3.66	3
100	0.01	180	133	110	79.6	55.8	29.6	18.9	11.6	6.8	4.87	3.8	3.11
250	0.004	203	150	125	90.2	63.3	33.7	21.6	13.2	7.77	5.56	4.34	3.56

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Stormwater Design Sheet

HIRDS V4 Data

Client	Tapuaetahi Incorporation
Project	J15724
Site	Tapuaetahi Development
Designed by	CS
Approved by	BCP
Date	15/07/2025
Scenario	RCP6.0 for the period 2081-2100

HIRDS V4 Depth-Duration-Frequency Results

Sitename: Custom Location

Coordinate system: WGS84

Longitude: 173.9864

Latitude: -35.1244

DDF Model	Parameters: c	d	e	f	g	h	i
Values:	0.001996	0.504315	-0.02238	-0.00269	0.255075	-0.01168	3.250212
Example:	Duration (t ARI (yrs)	x	y	Rainfall Depth (mm)			
	24	100	3.178054	4.600149	243.6992		

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.87	14.5	18	25.8	36.1	58.3	75.4	93.7	111	120	125	128
2	0.5	10.8	15.9	19.7	28.3	39.7	64.1	82.9	103	122	132	138	141
5	0.2	14	20.6	25.7	36.8	51.8	83.8	109	135	161	174	181	186
10	0.1	16.4	24.1	30	43.2	60.7	98.4	128	159	189	205	214	220
20	0.05	18.8	27.7	34.5	49.6	69.9	113	147	184	219	237	248	254
30	0.033	20.2	29.8	37.2	53.5	75.4	122	159	199	237	256	268	275
40	0.025	21.3	31.3	39.1	56.3	79.3	129	168	209	249	270	282	290
50	0.02	22.1	32.5	40.6	58.4	82.4	134	174	218	259	281	294	302
60	0.017	22.7	33.5	41.8	60.2	84.9	138	180	224	268	290	303	312
80	0.013	23.7	35	43.7	63	88.8	145	188	235	281	304	318	327
100	0.01	24.5	36.2	45.2	65.1	91.9	150	195	244	291	315	330	339
250	0.004	27.7	41	51.2	73.9	104	170	222	278	332	360	377	388

Rainfall depths (mm) :: RCP6.0 for the period 2081-2100

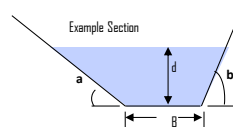
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	11.8	17.3	21.5	30.8	42.7	67.3	85.3	104	122	130	135	138
2	0.5	13	19	23.7	33.9	47.2	74.3	94.4	115	134	144	149	152
5	0.2	17	24.9	31	44.5	62.1	98.1	125	152	178	191	198	203
10	0.1	19.9	29.3	36.5	52.4	73.2	116	148	180	211	226	235	240
20	0.05	22.9	33.7	42	60.4	84.5	134	171	208	245	262	273	279
30	0.033	24.7	36.3	45.3	65.2	91.2	145	185	226	265	284	295	302
40	0.025	25.9	38.2	47.6	68.6	96	153	195	238	279	300	311	319
50	0.02	26.9	39.7	49.5	71.3	99.8	159	202	247	291	312	324	332
60	0.017	27.7	40.8	51	73.4	103	164	209	256	300	322	335	342
80	0.013	29	42.8	53.4	76.9	108	172	219	268	315	338	351	360
100	0.01	30	44.2	55.2	79.6	112	178	227	278	326	350	365	373
250	0.004	33.9	50	62.5	90.2	127	202	259	317	373	401	417	427

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Stormwater Design Sheet

Open Drain Design

Client Tapuaetahi Incorporation
Project J15724
Site Tapuaetahi Development
Designed by CS
Approved by BCP
Date 15/07/2025
Scenario RCP6.0 for the period 2081-2100



Decription	Drainage Area				C x A	Sum C x A	Total Drainage Area (m ²)	Tc (min)	I (mm/hr)	Flow Q(m ³ /s)	Open Drain Dimensions & Character							Drain Data				Checks		COMMENTS
	Open Drain ID	No	Area (m)	C							B (m)	a (°)	b (°)	Surface	n	S (%)	d (m)	A (m ²)	P (m)	R (m)	Provisional Flows Q (m ³ /s)	v (m/s)	v·d (m ² /s)	
Open Drains																								
Development Site																								
Roadway A RH at intersection	1	1	460	0.59	270.5	271	460	10	180.0	0.014	0.5	21.8	26.0	SWALE	0.100	4.8	0.069	0.05	0.84	0.05	0.014	0.31	0.02	
Roadway A LH at intersection	1	2	420	0.58	243	243	420	10	180.0	0.012	0.5	21.8	26.0	SWALE	0.100	4.8	0.065	0.04	0.82	0.05	0.013	0.30	0.02	
Roadway B RH	2	3	1730	0.52	892	892	1730	10	180.0	0.045	0.5	21.8	26.0	SWALE	0.100	1	0.192	0.18	1.46	0.12	0.045	0.25	0.05	
Roadway B LH	2	4	440	0.62	273	273	440	10	180.0	0.014	0.5	21.8	26.0	SWALE	0.100	1	0.107	0.08	1.03	0.08	0.014	0.18	0.02	
Combnined Roadway B outlet drain	3	3+ 4+ 5	3564	0.56	1987	1987	3564	10	180.0	0.099	0.5	21.8	21.8	SWALE	0.100	1	0.276	0.33	1.99	0.17	0.099	0.30	0.08	
Combnined Roadway B outlet drain steep	4	3+ 4+ 5	3564	0.56	1987	1987	3564	10	180.0	0.099	0.5	21.8	21.8	SWALE	0.100	9	0.162	0.15	1.37	0.11	0.099	0.68	0.11	
Roadway A (35-200) RH	2	6	4480	0.57	2541	2541	4480	10	180.0	0.127	0.5	26.0	21.8	SWALE	0.100	12	0.174	0.16	1.37	0.11	0.127	0.82	0.14	
Roadway A (35-210) LH	5	7	8200	0.54	4440	4440	8200	10	180.0	0.222	0.5	26.0	21.8	SWALE	0.100	12	0.229	0.23	1.64	0.14	0.222	0.95	0.22	
Roadway A (210-end) LH	6	8	3420	0.52	1789	1789	3420	10	180.0	0.089	0.5	26.0	21.8	SWALE	0.100	1	0.27	0.3	1.84	0.16	0.090	0.30	0.08	
Roadway A (200-outlet) RH	7	9+ 6+ 7+ 5+ 4+ 3	31353	0.52	16267.05	16267	31353	10	180.0	0.813	1	26.0	21.8	SWALE	0.100	1	0.638	1.56	4.17	0.37	0.813	0.52	0.33	
Roadway C RH	8	10	8678	0.52	4505.1	4505	8678	10	180.0	0.225	0.5	26.0	21.8	SWALE	0.100	2.5	0.335	0.42	2.17	0.2	0.225	0.53	0.18	
Roadway C LH	8	11	7000	0.54	3750	3750	7000	10	180.0	0.188	0.5	26.0	21.8	SWALE	0.100	2.5	0.319	0.39	2.09	0.19	0.203	0.52	0.17	
Small Cut off Drains	9	Varies	1900	0.58	1099.216	1099	1900	10	180.0	0.055	0	21.8	21.8	SWALE	0.100	1	0.29	0.21	1.56	0.13	0.055	0.26	0.08	
Culvert A/C4 Outlet	4	8	3420	0.52	1789	1789	3420	10	180.0	0.089	0.5	21.8	21.8	SWALE	0.100	8	0.158	0.14	1.35	0.1	0.089	0.63	0.10	
Boat Storage Yard																								
North of Entrance	2	12	2174	0.63	1378.3	1378	2174	10	180.0	0.069	0.5	26.0	21.8	SWALE	0.050	3	0.126	0.1	1.13	0.09	0.068	0.69	0.09	
Toronui Road south of entrance	8	12+ 13+ 14+ 15	12978	0.62	8033.1	8033	12978	10	180.0	0.402	0.5	26.0	21.8	SWALE	0.050	3	0.311	0.38	2.05	0.18	0.421	1.12	0.35	
Boat Storage Yaard Cut off Drain west	10	13	1584	0.68	1078.3	1078	1584	10	180.0	0.054	0.2	26.0	21.8	SWALE	0.100	1	0.26	0.21	1.49	0.14	0.055	0.27	0.07	
Boat Storage Yard Cut off Drain south	11	16	590	0.49	289.5	290	590	10	180.0	0.014	0.2	26.0	21.8	SWALE	0.100	1	0.145	0.08	0.92	0.08	0.015	0.19	0.03	
Boat Storage Yard Outlet Drain	12	14+ 16	920	0.48	438	438	920	10	180.0	0.022	0.2	21.8	21.8	SWALE	0.100	6.5	0.112	0.05	0.8	0.07	0.022	0.42	0.05	
Secondary Flow over roads																								
Toronui Road Crossing		1	460	0.59	270.5	271	460	10	180.0	0.014														
Roadway A and C Intersection		7	8200	0.54	4440	4440	8200	10	180.0	0.222														
Roadway B End		3	1730	0.52	892	892	1730	10	180.0	0.045	1.2	2.0	3.4	ROAD	0.020	5	0.015	0.02	1.91	0.01	0.015	0.61	0.01	
Roadway C End		10	8678	0.52	4505.1	4505	8678	10	180.0	0.225	2	0.6	1.2	ROAD	0.020	3	0.049	0.27	9.06	0.03	0.223	0.83	0.04	
Roadway A End		8	3420	0.52	1789	1789	3420	10	180.0	0.089	1	1.7	0.6	ROAD	0.020	3	0.028	0.08	4.61	0.02	0.045	0.57	0.02	
Over land flow path at exit of large swale		9+ 6+ 7+ 5+ 4+ 3	31353	0.52	16267.05	16267	31353	10	180.0	0.813	0	1.5	4.6	SWALE	0.100	7	0.228	1.31	11.5	0.11	0.814	0.62	0.14	
Over land flow path at exit of large swale	12	C+ 9+ 8+ 7+ 6+ 5+	37040	0.52	19189.55	19190	37040	10	180.0	0.959	0	4.9	2.9	SWALE	0.100	11.5	0.263	1.09	8.32	0.13	0.959	0.88	0.23	
Scruffy Dome																								
Existing Scruffy dome	A	A	41996	0.45	18898.2	18898	41996	10	147.0	0.772														
New to Scruffy Dome	A'	A'	21926	0.51	11182.26	11182	21926	10	180.0	0.559														

¹ The design flow is based on approximated calculations using Rational Method.

² It is assumed that there are no inlet losses.

³ Velocity is calculated based upon full-flow conditions for the 'Design Capacity'.

DRAFT

Site
Stormwater Design Sheet

Client	Tapuaetahi Incorporation
Project	J15724
Site	Tapuaetahi Development
Designed by	CS
Approvd by	BCP
Date	15/07/2025
Scenario	RCP6.0 for the period 2081-2100

Reference	U/S MH	D/S MH	Drainage Area		C	C x A	Sum C x A	Total Drainage Area (m²)	Tc (min)	I (mm/hr)	Flow Q(m³/s)	U/S Elevation (m)	D/S Elevation (m)	Pipe Length (m)	Conduit Characteristics						Velocity³ (m/s)	COMMENTS		
			No	Area (m)											Pipe Grade (%)	Shape (mm)	Pipe Span (mm)	Pipe Rise (mm)	Pipe Area (m²)	Hydraulic Radius (m)			Manning's n	Design Capacity (m³/s)
Roadway A-C1				460	0.59	270.5	271	460	10	119.0	0.009			10.500	1.9	Circular	300	300	0.071	0.075	0.013	0.133	0.1	
Roadway A1-C2				1730	0.52	892	892	1730	10	119.0	0.029			6.600	1.14	Circular	300	300	0.071	0.075	0.013	0.103	0.4	
Roadway A-C3				8200	0.54	4440	4440	8200	10	119.0	0.147			11.750	1.06	Circular	375	375	0.11	0.09375	0.013	0.181	1.3	
Roadway A-C4				3420	0.52	1789	1789	3420	10	119.0	0.059			13.300	9.7	Circular	300	300	0.071	0.075	0.013	0.301	0.8	
Roadway A-C5				200	0.90	180	180	200	10	119.0	0.006			13.900	1	Circular	300	300	0.071	0.075	0.013	0.097	0.1	
Roadway A2-C6				8678	0.52	4505	4505	8678	10	119.0	0.149			13.500	1	Circular	375	375	0.11	0.09375	0.013	0.175	1.3	
Boat Storage Yard-C1				1378.3	0.63	868.3	868	1378	10	119.0	0.029			13.500	1	Circular	300	300	0.071	0.075	0.013	0.097	0.4	

¹ The design flow is based on approximated calculations using Rational Method. Flows entering the pipe network may be significantly less than the design flow due to inlet efficiencies and blockages.

² It is assumed that there are no inlet losses.

³ Velocity is calculated based upon full-flow conditions for the 'Design Capacity'.

⁴ Hydraulic Grade is not assessed due to topography.

DRAFT

Site
Stormwater Design Sheet

Client

Project

Site

Designed by

Approved by

Date

Scenario

Tapuaetahi Incorporation

J15724

Tapuaetahi Development

CS

BCP

15/07/2025

RCP6.0 for the period 2081-2100

Reference	Drainage Area				Sum C x A	Total Drainage Area (m ²)	Tc (min)	I (mm/hr)	Design Pipe Flow Q(m ³ /s)	U/S Elevation (m)	D/S Elevation (m)	Conduit Characteristics							Pipe Part-full Design Outputs						COMMENTS
	No	Area (m)	C	C x A								Pipe Length (m)	Grade (%)	Pipe Span (mm)	Full Pipe Area (mm ²)	Full Hydraulic Radius (m)	Full Manning's n	Full-flow Pipe Capacity (m ³ /s)	Actual Flow Area (m ²)	Actual depth of flow in pipe (m)	Actual Hydraulic Radius (m)	Part-full Manning's n	Part-full Design Capacity (m ³ /s)	Actual Velocity ³ (m/s)	
Roadway A-C1	1	460	0.59	270.5	271	460	10	119.0	0.009			10.50	1.9	300	0.071	0.075	0.013	0.133	0.00989	0.05926	0.03578	0.016558	0.009	0.9	GRASSED OUTLET OK
Roadway A1-C2	3	1730	0.52	892	892	1730	10	119.0	0.029			6.60	1.14	300	0.071	0.075	0.013	0.103	0.0279	0.12507	0.06624	0.016555	0.029	1.1	GRASSED OUTLET OK
Roadway A-C3	7	8200	0.54	4440	4440	8200	10	119.0	0.147			11.75	1.06	375	0.11	0.09375	0.013	0.181	0.08689	0.27526	0.12247	0.015031	0.147	1.7	GRASSED OUTLET OK
Roadway A-C4	8	3420	0.52	1789	1789	3420	10	119.0	0.059			13.30	9.7	300	0.071	0.075	0.013	0.301	0.02138	0.10265	0.05703	0.016696	0.059	2.8	Rip Rap Protection Required
Roadway A-C5	-	200	0.90	180	180	200	10	119.0	0.006			13.90	1	300	0.071	0.075	0.013	0.097	0.00929	0.05674	0.03441	0.016527	0.006	0.6	GRASSED OUTLET OK
Roadway A2-C6	10	8678	0.52	4505	4505	8678	10	119.0	0.149			13.50	1	375	0.11	0.09375	0.013	0.175	0.10414	0.33504	0.08839	0.013877	0.149	1.4	GRASSED OUTLET OK
Boat Storage Yard-C1	12	2174	0.63	1370	1370	2174	10	119.0	0.045			19.20	5.22	300	0.071	0.075	0.013	0.221	0.02205	0.10502	0.05805	0.016686	0.045	2.1	Rip Rap Protection Required

¹ The design flow is based on approximated calculations using Rational Method. Flows entering the pipe network may be significantly less than the design flow due to inlet efficiencies and blockages.

² It is assumed that there are no inlet losses.

³ Velocity is calculated based upon part-full flow conditions for the 'Design Pipe Flow'.

⁴ Pipe elevations, grades, and lengths have been estiamted from LIDAR data and are considered indicative.

DRAFT

Taronui Road - Roadway A Road Overtopping

Chainage 6 m

Site: Tapuaetahi Development
Date: 15/07/2025
Project: J15724
Client: Tapuaetahi Incorporation
By: CS
Reviewed: BCP
Method: BROAD CRESTED WEIR - TP10, page 5-13

Design input:

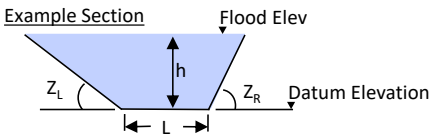
Design Q= 0.013525 m3/s
=0.57(2g)^{1/2}(2/3Lh^{3/2}+8/30Z_Lh^{5/2}+8/30Z_Rh^{5/2}), where g=9.81m/s²

Section 1
L= 1.6 m
Z_L= 20 m
Z_R= 20 m
Datum 0.000 m Elev

Calculation Output:

SECTION 1	
h (m)	Q (m3/s)
0.026	0.014

Flood Elev 0.026 m Elev



Boat Storage Yard Crossing - Road Overtopping

Site: Tapuaetahi Development
Date: 15/07/2025
Project: J15724
Client: Tapuaetahi Incorporation
By: CS
Reviewed: BCP
Method: BROAD CRESTED WEIR - TP10, page 5-13

Design input:

Design Q= 0.068915 m3/s
 $=0.57(2g)^{1/2}(2/3Lh^{3/2}+8/30Z_Lh^{5/2}+8/30Z_Rh^{5/2})$, where $g=9.81m/s^2$

Section 1

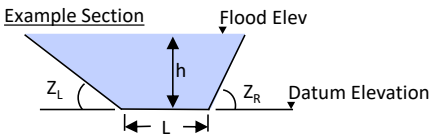
L=	0 m
Z _L =	77 m
Z _R =	77 m
Datum	0.000 m Elev

Calculation Output:

SECTION 1

h (m)	Q (m3/s)
0.054	0.070

Flood Elev	0.054 m Elev
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DRAFT

Roadway A - Roadway A2 Intersection Overtopping

Chainage 204 m

Site: Tapuaetahi Development
Date: 15/07/2025
Project: J15724
Client: Tapuaetahi Incorporation
By: CS
Reviewed: BCP
Method: BROAD CRESTED WEIR - TP10, page 5-13

Design input:

Design Q= 0.222 m3/s
=0.57(2g)^{1/2}(2/3Lh^{3/2}+8/30Z_Lh^{5/2}+8/30Z_Rh^{5/2}), where g=9.81m/s²

Section 1

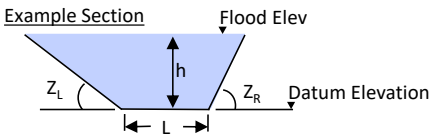
L=	3 m
Z _L =	20 m
Z _R =	24 m
Datum	0.000 m Elev

Calculation Output:

SECTION 1

h (m)	Q (m3/s)
0.093	0.222

Flood Elev	0.093 m Elev
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DRAFT

Roadway A1 End - Road Overtopping

Chainage 75 m

Site: Tapuaetahi Development
Date: 15/07/2025
Project: J15724
Client: Tapuaetahi Incorporation
By: CS
Reviewed: BCP
Method: BROAD CRESTED WEIR - TP10, page 5-13

Design input:

Design Q= 0.0446 m3/s
 $=0.57(2g)^{1/2}(2/3Lh^{3/2}+8/30Z_Lh^{5/2}+8/30Z_Rh^{5/2})$, where $g=9.81m/s^2$

Section 1

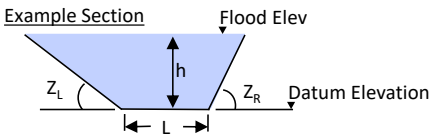
L=	1 m
Z _L =	20 m
Z _R =	24 m
Datum	0.000 m Elev

Calculation Output:

SECTION 1

h (m)	Q (m3/s)
0.056	0.045

Flood Elev	0.056 m Elev
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Roadway A2 End - Road Overtopping

Chainage 120 m

Site: Tapuaetahi Development
Date: 15/07/2025
Project: J15724
Client: Tapuaetahi Incorporation
By: CS
Reviewed: BCP
Method: BROAD CRESTED WEIR - TP10, page 5-13

Design input:

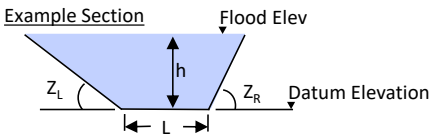
Design Q= 0.225255 m3/s
=0.57(2g)^{1/2}(2/3Lh^{3/2}+8/30Z_Lh^{5/2}+8/30Z_Rh^{5/2}), where g=9.81m/s²

Section 1
L= 3 m
Z_L= 20 m
Z_R= 24 m
Datum 0.000 m Elev

Calculation Output:

SECTION 1	
h (m)	Q (m3/s)
0.094	0.226

Flood Elev 0.094 m Elev



Roadway A End - Road Overtopping

Chainage 345 m

Site: Tapuaetahi Development
Date: 15/07/2025
Project: J15724
Client: Tapuaetahi Incorporation
By: CS
Reviewed: BCP
Method: BROAD CRESTED WEIR - TP10, page 5-13

Design input:

Design Q= 0.08945 m3/s
 $=0.57(2g)^{1/2}(2/3Lh^{3/2}+8/30Z_Lh^{5/2}+8/30Z_Rh^{5/2})$, where $g=9.81m/s^2$

Section 1

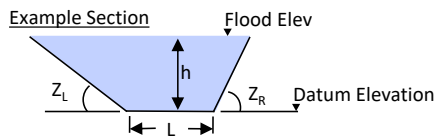
L=	4 m
Z _L =	100 m
Z _R =	80 m
Datum	0.000 m Elev

Calculation Output:

SECTION 1

h (m)	Q (m3/s)
0.039	0.090

Flood Elev	0.039 m Elev
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DRAFT

Appendix G

VISION Pavement Calculations

**Tapuaetahi Roadway A, A1 and A2
Pavement Design**

Tapuaetahi - Pavement Design

ROAD DESIGN

AADT = Annual Average Daily Traffic

$$DESA = \text{ESA}/H_{\text{VAG}} \times 365 \times \text{CGF} \times \text{AADT} \times \text{DF} \times \text{HV}\% \div 100 \times \text{LDF} \times N_{\text{HVAG}}$$

$\text{ESA}/H_{\text{VAG}} = 0.6$
 $\text{AADT} = 90$
 $\text{DF} = 0.5$ (50% of traffic in each lane)
 $\text{HV}\% = 10\%$
 $\text{CGF} = 20.2$ $R = 0.1\%$
 $P = 20$ yr
 $\text{LDF} = 1$
 $N_{\text{HVAG}} = 2$

 $\text{DESA} = 3.98\text{E}+04$
 $\text{CBR} = 7$

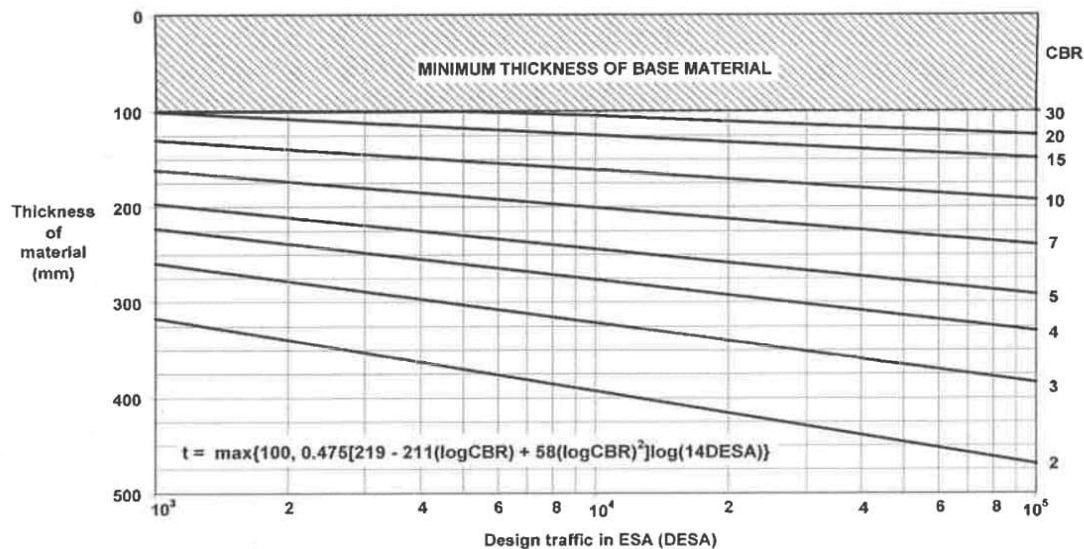
Numeric minimum thickness

100 mm, Minimum Thickness of Basecourse Material
 124 mm, Minimum Thickness of Sub-base Material (CBR=7)

DESIGN ROAD THICKNESS

100 mm, Minimum Thickness of Basecourse Material
 125 mm, Minimum Thickness of Sub-base Material

Note: Subgrade CBR to be checked prior to placement of Sub-base to confirm CBR is a minimum of 7.



Note:

1. Appropriate local conditions, environmental and drainage issues must be considered in using these design curves.
2. Thin asphalt surfacings may be included in total granular thickness. However, the minimum thickness of the granular base is 100 mm.

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**Tapuaetahi Boat Storage Yard
Pavement Design**

Tapuaetahi - Pavement Design

ROAD DESIGN

AADT = Annual Average Daily Traffic

$$DESA = \text{ESA}/H_{\text{VAG}} \times 365 \times \text{CGF} \times \text{AADT} \times \text{DF} \times \text{HV}\% \div 100 \times \text{LDF} \times N_{\text{HVAG}}$$

$$\text{ESA}/H_{\text{VAG}} = 0.6$$

$$\text{AADT} = 30 \text{ 15 units therefore 30 movements daily}$$

$$\text{DF} = 0.5 \text{ (50\% of traffic in each lane)}$$

$$\text{HV}\% = 10 \%$$

$$\text{CGF} = 20.2 \quad R = 0.1 \%$$

$$P = 20 \text{ yr}$$

$$\text{LDF} = 1$$

$$N_{\text{HVAG}} = 2$$

$$\text{DESA} = 1.33\text{E}+04$$

$$\text{CBR} = 7$$

Numeric minimum thickness

100 mm, Minimum Thickness of Basecourse Material

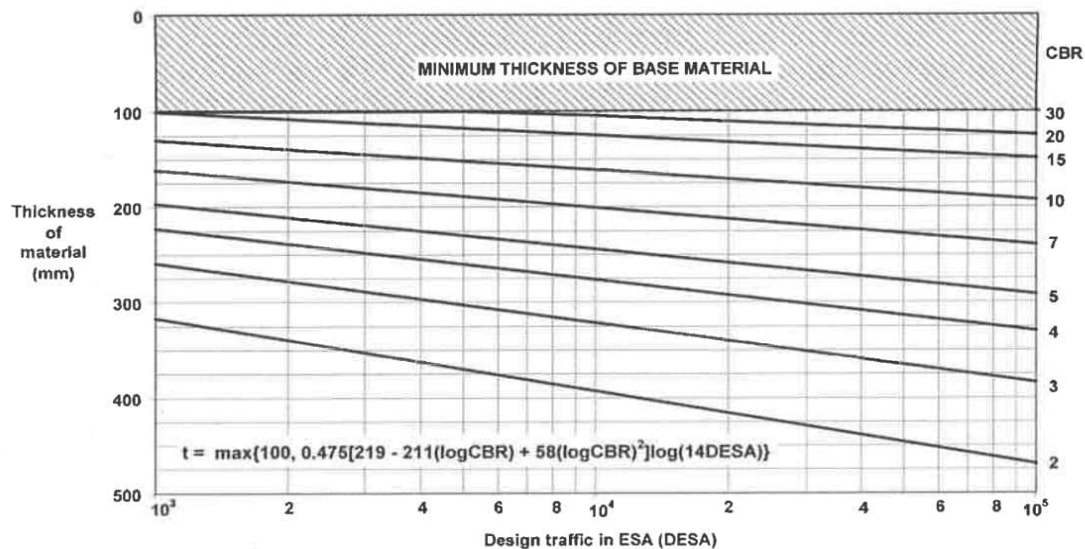
105 mm, Minimum Thickness of Sub-base Material

DESIGN ROAD THICKNESS

100 mm, Minimum Thickness of Basecourse Material

105 mm, Minimum Thickness of Sub-base Material

Note: Subgrade CBR to be checked prior to placement of Sub-base to confirm CBR is a minimum of 7.



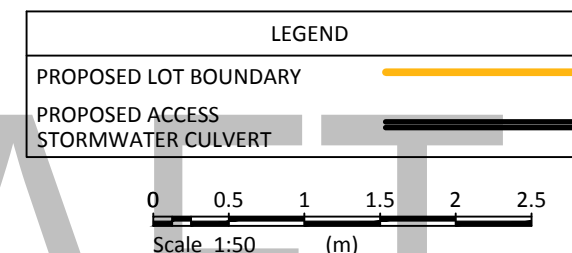
Note:

1. Appropriate local conditions, environmental and drainage issues must be considered in using these design curves.
2. Thin asphalt surfacings may be included in total granular thickness. However, the minimum thickness of the granular base is 100 mm.

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Appendix H VISION Catchment Plan

NOT FOR PUBLIC
RELEASE
04/08/2025



CLIENT	TAPUAETAHI INCORPORATION
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PROJECT	TAPUAETAHI DEVELOPMENT LOT 1 DP 184896 TAPUAETAHI
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DRAWING TITLE
INTERNAL ACCESS STORMWATER PLAN

SURVEY			DRAFT		03/06/2025	SCALE	1:1500
DESIGN	CS	28/05/2025				SHEET	---- OF -
DRAWN	CS	28/05/2025				PROJECT	J15724
CHECKED	BCP	03/06/2025				THIS ARTWORK IS THE COPY RIGHT MATERIAL OF	REV
APPROVED	BCP	03/05/2025	No	REVISION	BY	DATE	