Cultural Impact Assessment

95 Lot Subdivision and Land use

Dip Road, Kamo

Onoke Heights Limited

Report Prepared on Behalf of: Te Parawhau Hapū

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Disclaimer:

The views and perceptions expressed in this document are the perspectives of Te Parawhau and are not intended to represent or diminish the perspectives of others.

1 Introduction

1.1 Scope and Limitations

The assessment of cultural effects discussed in this report is limited to the information provided in the resource consent application prepared by B&A Urban and Environmental (B&A) on behalf of Ōnoke Heights Limited along with the set of specialist reports and plans contained within its appendices. A copy of these documents is provided at **Appendix A**. Accordingly, any change in the proposal as described by these documents will require this Cultural Impact Assessment (CIA) to be reviewed and amended, or a new CIA prepared.

Note 1: Hapū, Te Parawhau Hapū, Te Parawhau are used interchangeably throughout this report and refers to the wider group who whakapapa to a common tupuna.

1.2 Project Overview

1.2.1 Resource Consent(s) required

Resource consent is required under the Whangārei District Plan (WDP) including the Operative Regional Water Soil Plan for Northland (RWSP) and the Proposed Northland Regional Plan (PRP).

1.2.1.1 WDP

Critical Electricity Lines

Rule CEL.1.4.1 (Restricted discretionary activities – subdivision)

General Residential Zone

Rule GRZ-R4 (Building and Major Structure Setbacks)

Subdivision

Rule SUB-R2 (Subdivision)

Rule SUB-R5 (Subdivision in GRZ)

Three Waters Management

Rule TWM-R2 (Stormwater)

Rule TWM-R3 (Wastewater)

Rule TWM-R4 (Water Supply)

Rule TWM-R5 (Integrated Three Waters Assessment)

Transport

Rule TRA-R13 (Subdivision)

Rule TRA-R15 (Any Activity)

Rule TRA-R16 (Construction of Any New Public Road)

Rule TRA-R17 (Major Roading Alterations to an Existing Public Road)

Earthworks

Rule EARTH-R1 (Earthworks associated with subdivision)

Light

Rule LIGHT-R7 (Any subdivision)

1.2.1.2 RWSP

Rule 22.2.1 Diversion and discharge of stormwater

1.2.1.3 PRP

Rule C.6.4.3 Stormwater discharges

Rule C.8.3. Earthworks controlled activity

2 Cultural Impact Assessment

2.1 Purpose

The primary objective of this Cultural Impact Assessment (CIA) is to identify and assess the impact arising from the proposal upon the surrounding environment (taonga, whenua and wai). The activities associated with this proposal includes the construction of retaining walls, roads, intersection upgrade and infrastructure. An assessment upon Hapū uara ahurea (cultural values) is provided in this report to ensure any adverse effects on Hapū uara ahurea are avoided, remedied, or mitigated.

The purpose of the CIA can then be understood to:

1. Acknowledge Te Parawhau Hapū through their cultural obligations that connect them to the whenua, wai, project site and surrounding area.
2. Identify and document Hapū uara ahurea associated with their ancestral lands and waterways, in and around Ōnoke.
3. Identify the potential effects (positive and negative) on Hapū uara ahurea for current and future generations and tupuna arising from the proposal.
4. Provide an assessment of those matters outlined in Part II of the Resource Management Act (RMA) and other relevant legislation, in relation to Hapū uara ahurea.

2.2 Methodology

The following methodology was employed in the preparation of this CIA:

- An initial online hui was held with the Mark Holland (Ōnoke Heights Limited, the applicant) Dayle Widdup, and Melissa McGrath B&A, WDC Kaylee Kolkman, Roger Quinton, Yvonne Masefield and Mira Norris, Pari Walker and the author (Te Parawhau).
- An additional hui was held between Pari Walker and Mark Holland in Hamilton to discuss the kaupapa and Hapū request for a CIA.
- 2 Hapū hui were held to enable Hapū and whanau to share their whakaaro and kōrero in relation to the proposal. The relevant information is included in this CIA.

These hui were held at;

- Griffin Hall, Kamo, 21 July
- Ngāraratunua Marae, Ngāraratunua, 18 August

- Review the resource consent application (AEE) lodged with WDC and NRC to inform the CIA.
- A review of the provisions of the RMA, National Policy Statement FW, National Environmental Standards, and other relevant legislation.
- Research of previous reports prepared by Te Parawhau to aid in the understanding of the kōrero and pūrakāu specific to the site and surrounding area.
- A walk over of the whenua with B&A and Dale Windup on behalf of the applicant and Hapū members (Pari Walker, Taki Kingi, Sean Malcolm, Opania George and Georgina Olsen) as a part of the CIA preparation process was carried out on August 18, 2022.
- Distribution of a 'draft' CIA to Te Parawhau kaumatua for review to enable their feedback to be incorporated into the final version.
- CIA review hui with the Hapū Kaumatua to enable any necessary amendments to be made prior to CIA being finalised.

2.3 Engagement with Hapū

Te Parawhau Kaumatua listed above including the author have engaged with Ōnoke Heights Limited, their representatives Dale Windup, B&A over the past 8 months for this project.

3 Ōnoke Site Description

3.1 Location

Ōnoke is located at Dip Road, Kamo, Whangārei. The whenua subject to this application (Ōnoke) has a total area of 6.8 ha (B&A Urban and Environmental , 2022).

3.2 Te Taiao

Ōnoke is located immediately east of Hurupaki Maunga and forms a part of a wider pā complex at Ngāraratunua. These pā include Parakiore to the north, Te Rawhitiroa, Kaihau, and Ngāraratunua to the west. Te Rauponga Pā where the Kamo Village is now located is to the east of Ōnoke. Pukenui Ngāhere located to the southwest, Hikurangi Wairepo to the north and northwest, Ara Tapu Maunga to the north and Waikoropupū to the northeast all form a part of te taiao that surround and support Ōnoke.

3.3 Watercourses

The Waitāua Awa with its source to the east at Te Rawhitiroa flows along the whenua's southern boundary and eventually discharges into the Hoteo Awa and out into Whangārei Te Rerenga Parāoa.

3.4 Topography

The whenua subject to this application generally has a south facing aspect. From the southeast corner, the whenua rises approximately 40 m to the northern boundary. As described in the resource consent application, "the northern half of the site comprises of a converging south facing slope of up to 11 degrees. The southern part of the site comprises of waning slopes towards the Waitāua Stream on the southern end of the subject site" (B&A Urban and Environmental , 2022).

To the west and adjacent to Dip Road, the whenua rises approximately 180 m to the summit of Hurupaki Maunga. At the northern boundary, the whenua forms a northeast trending ridge at approximately 180 m asl. From this ridge, the whenua falls approximately 40 m south-southeast to the Waitāua at approximately 140 m asl. To the northeast, the whenua falls to approximately 100 m asl where it adjoins another unnamed tributary of the Waitāua near Pipiwai Road.

3.5 Vegetation

Vegetation within the subject whenua other than 1 mature Totara, *Totara Podocarpus* setback from Dip Road and six Puriri, *Vitex lucens*, within the middle of the whenua, and remnant bush species along the edge of the Waitāua Stream, the whenua is under pasture.

Native bush covers the summit and the upper slopes of Hurupaki Maunga and the adjacent Ōnoke Reserve.

The location plan at **Illustration 1** below shows the subject whenua at Ōnoke (blue outline) in the surrounding environment.

Illustration 1: Ōnoke Location Plan (blue outline)

Source: WDC GIS Maps. Download date 14/7/2022

4 The Proposal

4.1 Overview

The Resource Consent Application (RC) prepared by B&A details activities in the RC to NRC and WDC. Refer **Appendix A**. The main activities associated with this proposal are summarised below:

The applicant seeks to subdivide the whenua to create:

- 95 residential allotments – Lots 1 – 95,
- Public road – Lot 300,
- Jointly owned access lots (JOALs) – Lots 301 and 302,
- Drainage reserve – Lot 200,
- Recreation reserve – Lot 595.

Illustration 2 shows the proposed lot configuration.

Illustration 2: Subdivision Scheme Plan

Source: Excerpt from B&A RC. A full copy is provided at Appendix A

4.2 Access

The proposal seeks to decommission the existing vehicle crossing from Dip Road and create a new public road network to be vested with Council, comprising a link road between Tuatara Drive and Dip Road, an internal loop road and a cul-de-sac. A new give-way controlled 'T' intersection is proposed at the western end of the link road with Dip Road.

Two Jointly Owned Access Lots (JOALS – Lots 301 and 301) are proposed to provide access to Lots 26-28, and Lots 59-66. Proposed Lots 1 – 4 which will gain access directly from Dip Road.

Approximately 21 inset parking bays will also be provided within the road reserve (B&A Urban and Environmental , 2022).

4.3 Pedestrian access

A series of concrete footpaths are proposed across the whenua. These footpaths will be continued along Tuatara Drive and the eastern side of Dip Road. A footpath is also proposed to extend along the Waitāua Awa esplanade connecting to Dip Road.

4.4 Esplanade reserve

A 4992 m^2 recreation reserve will be created to extend along the southern boundary adjacent to the Waitāua Awa.

4.5 Landscaping

A few 'Street Trees' are indicated on the scheme plan submitted with the AEE. Existing Pūriri on the whenua are also shown on the revised scheme plan presented by B&A at the second hui held at Ngāraratunua Marae.

4.6 Services

All lots will be serviced by connections to public reticulated wastewater and water networks. An onsite stormwater pond (to be vested with Council) located in the south-eastern corner will be constructed to control stormwater.

4.7 Earthworks

A total of approximately 134,349 m^3 (52,799 m^3 cut and 81,550 m^3 fill) is proposed to enable the construction of the building platforms, site access and carparking areas. A maximum cut depth of 6 m and a maximum fill height of 4 m during earthworks is anticipated.

4.8 Retaining Walls

Significant retaining of the whenua is proposed, including walls up to 5 m in height. A plan showing the extent and location of retaining is provided at **Illustration 3**.

Illustration 3: Retaining Wall Plan

Source: Excerpt from B&A RC, Appendix 3. A full copy is provided at Appendix A

A suite of Regional and District Council consents is required for this proposal. Section 5.6 of the AEE states "overall, the proposal is restricted discretionary activity" (B&A Urban and Environmental , 2022). However, this activity status does not account for the whenua, 'Ōnoke', as a 'Site of Significance' to Hapū. As such, the overall activity status in the resource consent application may need to be reassessed.

5 Te Parawhau Hapū

5.1 History

The tribes of Whangārei descend from tupuna who migrated by waka from the central Pacific. Significant migratory patterns are evidenced by the arrival of tupuna waka landing at Whangārei Terenga Parāoa (Whangārei Harbour) which included Tū Nui ā Rangi, Ruakaramea, and Moekākara.

In earlier times, Whangārei was occupied by Ngai Tāhuhu who arrived on Tū Nui ā Rangi. For many generations Ngai Tāhuhu enjoyed a position of power and influence. They were one of the major tribes in a large area extending from Otahuhu Tamaki Makaurau in the south to Pouerua in the north. The other tribe was Ngāti Tū.

By the early 1700's, through inter-tribal warfare Ngai Tāhuhu were eventually displaced by Ngāti Ruangaio. Under protection of the Ngāti Ruangaio Rangatira, Ponaharakeke, the remaining Ngai Tāhuhu and Ngāti Tū descendants settled on the western shores of Whangārei Terenga Parāoa (Fletcher, Otaika Quarry – Proposed Overburden Disposal Area, Cultural Report Assessment of Effects on Māori, 2018).

Ngāti Ruangaio, led by Te Ponaharakeke through a confederation of other chiefs which included Waikere, Te Ngarokiteuru, Tawhiro and his sons Tirarau 1st and Te Tokaitawhio defeated Ngai Tahuhu and Ngāti Tu in a major battle from Pouerua through Whangārei Terenga Parāoa. The lands were divided among the Ruangaio victors. Some also took Ngai Tāhuhu wāhine as wives. Waikere took Pukenui and land to the north. Te Ngarokiteuru gaining land to the north at Ngāraratunua for his Ngāti Kahu people.

As the Paramount Chief, Ponaharakeke assumed status over the lands and settled in Whangārei at Pukawakawa Pā. Te Kahore settled at Toe Toe. Tawhiro and his sons settled further south at Motu Kiwi and Otaika.

After further inter-tribal warfare, following key events Ngāti Ruangaio adopted the tribal name 'Te Parawhau' whose leader Kukupa, the eldest son of Te Tokaitawhio, became Te Parawhau's first Paramount Chief.

Kukupa forged strong alliances with many other Hapū which included Ngāti Kahu O Torongare, those alliances remain in place today through eventual inter Hapū whanau relationships.

5.2 Te Parawhau's Association with Ōnoke and the Waitāua

Te Parawhau's Pou include Te Whara, Matariki, Manaia, Parihaka, Parakiore, Pukenui, Uma Pahaha, Whatatiri, Tutamoe, Maunga Tipa, Maunga Raho, Tangihua, Ruarangi, Piroa, Te Hurihanga a Kawharu, Taumata Tirotiro and Maunga Whati.

Ōnoke is located within the boundaries of these ancestral pou (maunga) and forms a part of Te Parawhau Hapu's Cultural and Archaeological Landscape where a multitude of wāhi tapu and taonga are located.

Te Parawhau are descendants of Ngai Tahuhu and Ruangaio. Their interest and kaitiakitanga obligations in this whenua is through Ngai Tahuhu and Ruangaio.

Ōnoke and the adjacent Waitāua are identified as an 'Area of Significance' to Te Parawhau and other hapū.

The historical use of the whenua and the awa renders Ōnoke and the Waitāua inappropriate for the living.

6 Legislative Framework

There is a wide body of legislation and statutory documents that provide for the recognition of tikanga Māori and cultural values. This legislative framework is not only important to the context of this report but also requires proper consideration as part of the decision-making process for any resource consent application being assessed. The relevant legislative documents are discussed below.

6.1 Te Tiriti o Waitangi

The articles contained within Te Tiriti o Waitangi (Te Tiriti) and its principles are referenced in legislation, including the Resource Management Act (RMA).

Te Tiriti is the underlying foundation for the Crown (which includes local authorities as representatives of the Crown) and iwi/hapū relations regarding resource management. Protecting the values and interests of tāngata whenua and enabling Māori to exercise their resource management are obligations under Te Tiriti.

The principles of Te Tiriti include:

- **Rangatiratanga** – the duty to recognise Māori rights of independence, autonomy and self-determination. This principle empowers Māori to determine and manage matters of significance to them.
- **Partnership** – the duty to interact in good faith and in the nature of a partnership. This includes a sense of shared enterprise and mutual benefits; where each partner must take into account the needs and interests of the other.
- **Active protection** – the duty of the Crown to proactively protect the rights and interests of Māori, including the need to build Māori capacity and capability.
- **Mutual benefit** – the need to recognise that benefits should accrue to both Māori and non-Māori, and that both must participate in the prosperity of Aotearoa.
- **The right of development** – recognising that Te Tiriti rights are not confined to customary uses or the state of knowledge as of 1840 but include an active duty to assist Māori in the development of their properties and taonga.

Comments:

Rangatiratanga – empowers Māori to determine and manage matters of significance to them. As documented above, the whenua, Ōnoke and surrounding areas are located within Te Parawhau's rohe.

Surrounding cultural landmarks at Hurupaki of which Ōnoke forms a part, including Parakiore, Pukenui Ngāhere, the Waitāua and Te Rauponga Pā are whenua and wai of great cultural significance to the Hapū.

Protecting Ōnoke, the Waitāua, surrounding waterways, whenua and the restoration of whanaungatanga that has been lost through the successive alienation of land and the erosion of tikanga Māori and history is of paramount importance to the Hapū.

In accordance with tino rangatiratanga Te Parawhau exercise their right to ensure works associated with the proposal as outlined in the resource consent application avoids any further degradation of their cultural values and taonga.

The recommendations at **Section 10** seek to empower Te Parawhau to exercise their right in accordance with the principle of rangatiratanga (First Article) under Te Tiriti.

Partnership – although the applicant (Ōnoke Heights Limited) is not the Crown or an agent to the Crown, the principles of partnership between both parties remains. As such, both parties have a duty to act toward each other reasonably and with the utmost good faith in accordance with principles of partnership.

In the decision-making process however, NRC and WDC in accordance with the principles of partnership, Te Parawhau needs, and interests must be taken into account to protect the whenua, surrounding lands, and Awa which are wāhi tapu, wāhi taonga and within Te Parawhau's ancestral lands and waterways[1].

Active protection – the Crown (in this case, and NRC and WDC as agents to the Crown) in the decision-making process have a duty to actively protect the whenua, Ōnoke, surrounding whenua

[1] Section 8, Resource Management Act 1991.

and waterways as taonga in keeping with the Hapū's rights and interests. Protecting Te Parawhau's values and interests and enabling them to exercise kaitiakitanga are also obligations under Te Tiriti (Gooder, 2018).

Right of development – Māori interests in resources cannot be constrained to traditional or pre-Tiriti technology but includes the right to develop resources for economic benefit (Hayward, 2012). No development interests are sought by Te Parawhau Hapū under this proposal.

6.2 Resource Management Act (RMA)

Part 2 of the RMA requires those exercising functions and powers under the Act to recognise and provide for Māori values.

As outlined in section 5, *the purpose* of the RMA is to promote the sustainable management of natural and physical resources. This means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety.

6.2.1 Section 6 Matters of National Importance

All persons exercising functions and powers under the RMA must, as a *matter of national importance*:

Section 6(e), recognise and provide for the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga;

Comment:

Ōnoke and surrounding whenua is Hapū ancestral land that is of great cultural and historical significance to them. The whenua and adjacent awa (Waitāua) are taonga of their tupuna, its history recounted to successive generations through pūrakāu (stories), waiata (song), kōrero (discussion) and place names.

As discussed in this report, Ōnoke, surrounding whenua and the Waitāua are wāhi tapu and taonga. The whenua subject to this proposal is a 'Site of Significance'. It is a place where traditional activities in accordance with tikanga Māori such as the cleansing tūpāpaku and other activities were carried out. Accordingly, provision must be made to enable Hapū to uphold their cultural traditions and

protect their taonga in accordance with tikanga and Mātauranga Māori (Section 6e) as a matter of national importance.

The protection extended to Māori cultural values (relationship of Māori, their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga) provided under the RMA is envisaged to be included in the conditions of consent and or a side agreement(s) with Ōnoke Heights Limited.

Section 6(f), recognise and provide for the protection of historic heritage from inappropriate subdivision, use and development;

Comment:

Ōnoke and indeed the wider surrounding area are deeply embedded in Māori history and occupation. Numerous archaeological sites are identified on Hurupaki Maunga. The AEE however states "no recorded archaeological sites are located within the site" (B&A Urban and Environmental , 2022). Nonetheless this does not mean that there are no cultural values associated with the whenua that qualify under the definition of a historic heritage site under the Heritage Pouhere Taonga Act. Should any such sites be identified by Hapū throughout the course of the project works, it must be protected as a matter of national importance under this section of the Act.

Under section 6(g), recognise and provide for the protection of recognised customary activities, as a matter of national importance;

Comment:

Hapū have a deep association with Ōnoke, the Waitāua and the surrounding Ngāraratunua and Kamo area. Historically, recognised customary activities were carried out on the whenua which included the few existing Puriri trees on the whenua and within the adjacent Waitāua Awa. These customary activities can no longer be carried out as the Hapū no longer have access to Ōnoke or the Waitāua. The whenua, native trees and the Waitāua are taonga and wāhi tapu. The protection of these taonga must be provided for as a matter of national importance.

6.2.2 Section 7 Other Matters:

All persons exercising functions and powers under the RMA shall have particular regard to:

Section 7(a), kaitiakitanga; and

Section 7(aa) the ethic of stewardship.

Comment:

Hapū are obligated to preserve and protect kaitiaki and taonga tuku iho while ensuring the mauri of te taiao (the environment) is healthy and strong. In performing the act of kaitiakitanga, it is behest upon Te Parawhau to actively protect the whenua, the waterway and surrounding whenua from harm (physically and spiritually). The Waitāua Awa and tributaries including Whangārei Terenga Parāoa to which the awa eventually discharges are wāhi taonga. Any activity that impacts upon Hapū taonga translates to an effect upon the Hapū.

Imparting knowledge (mātauranga Māori) and tino rangatiratanga (self-determination) are implicit in kaitiakitanga. The proposal has the potential to give rise to unacceptable and significant adverse uara ahurea effects. As such, it is requested that WDC and NRC shall have particular regard to kaitiakitanga, and the matters outlined in this report in the decision-making process.

6.2.3 Section 8 Te Tiriti o Waitangi:

Under section 8, all persons exercising functions and powers under the RMA shall take into account the principles of the Te Tiriti o Waitangi.

Comment:

Section 8 matters are discussed in **Section 6.1** above. It should however be noted that the RMA requires these matters to be 'taken into account' in the decision-making process.

6.3 Planning Policy Framework

The following planning and policy documents are of relevance to Māori cultural values in relation to the proposal:

6.3.1 National Policy Statement for Freshwater Management 2020 (NPS FM)

The updated National Policy Statement came into force on September 03, 2020 and includes a number of important new provisions. Crucially, Māori interests are now central to the new policy framework. The policy statement is underpinned by a fundamental concept - titled 'Te Mana o te Wai' which is derived from Te Ao Māori and reflects the recognition of freshwater as a natural resource whose health is integral to the social, cultural, economic, and environmental wellbeing of communities (New Zealand Government, 2021). Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community.

The NPS FM requires freshwater to be managed in a way that 'gives effect' to Te Mana o te Wai:

- through involving tāngata whenua.
- prioritising the health and wellbeing of water bodies, then the essential needs of people, followed by other uses.
- improve degraded water bodies and maintain or improve all others using bottom lines defined in the Freshwater NPS.

Three of the 6 new principles specifically relate to Tāngata Whenua, they are:

(a) ***Mana whakahaere*****:** the power, authority, and obligations of tāngata whenua to make decisions that maintain, protect, and sustain the health and well-being of, and their relationship with, freshwater

(b) ***Kaitiakitanga*****:** the obligation of tāngata whenua to preserve, restore, enhance, and sustainably use freshwater for the benefit of present and future generations

(c) ***Manaakitanga*****:** the process by which tāngata whenua show respect, generosity, and care for freshwater and for others (Ministry for the Envionment, 2020)

Objective

There is a hierarchy of obligations in Te Mana o te Wai that prioritises:

(a) first, the health and well-being of water bodies and freshwater ecosystems

(b) second, the health needs of people (such as drinking water)

(c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

Policies

Polices of relevance to Hapū include but are not limited to:

Policy 1: *Freshwater is managed in a way that gives effect to Te Mana o te Wai.*

Policy 2*: Tāngata whenua are actively involved in freshwater management (including decision making processes), and Māori freshwater values are identified and provided for.*

Policy 3*: Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments.*

Policy 5*: Freshwater is managed through a National Objectives Framework to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.*

Policy 7*: The loss of river extent and values is avoided to the extent practicable.*

Policy 9*: The habitats of indigenous freshwater species are protected.*

Policy 13*: The condition of water bodies and freshwater ecosystems is systematically monitored over time, and action is taken where freshwater is degraded, and to reverse deteriorating trends.*

Policy 15*: Communities are enabled to provide for their social, economic, and cultural wellbeing in a way that is consistent with this National Policy Statement.*

Implementation

The following sections outline those actions relevant to the Hapū that NRC must do to give effect to the objective and policies in the NPS FM.

3.2 Te Mana o te Wai –

(2) Every regional council must give effect to Te Mana o te Wai, and in doing so must:

(a) actively involve tāngata whenua in freshwater management (including decision making processes), as required by clause 3.4; and

(b) engage with communities and tāngata whenua to identify long-term visions, environmental outcomes, and other elements of the NOF

(d) enable the application of a diversity of systems of values and knowledge, such as mātauranga Māori, to the management of freshwater; and

Section 3.4 Tāngata whenua involvement sets out rules as to how local authorities must engage with tāngata whenua when exercising their obligations under the policy.

(1) Every local authority must actively involve tāngata whenua (to the extent they wish to be involved) in freshwater management (including decision-making processes), including in all the following:

(a) identifying the local approach to giving effect to Te Mana o te Wai

(b) making or changing regional policy statements and regional and district plans so far as they relate to freshwater management

and

(d) developing and implementing mātauranga Māori and other monitoring.

(2) In particular, and without limiting subclause (1), for the purpose of implementing the NOF, every regional council must work collaboratively with, and enable, tāngata whenua to:

(a) identify any Māori freshwater values (in addition to mahinga kai) that apply to any FMU or part of an FMU in the region; and

(b) be actively involved (to the extent they wish to be involved) in decision-making processes relating to Māori freshwater values at each subsequent step of the NOF process.

and

(4) To avoid doubt, nothing in the NPS permits or requires a local authority to act in a manner that is, or make decisions that are, inconsistent with any relevant iwi participation legislation or any directions or visions under that legislation.

Comment:

Protecting and restoring the health of Aotearoa's waterways is confirmed in the NPS FM as a matter of national importance. As outlined in this report, the Waitāua flows along Ōnoke's southern boundary. The Waitāua Awa which is a highly prized resource to hapū has suffered greatly over time due to the ingress of toxins, contaminants, and unwanted organisms arising from increased development and associated adverse effects.

The Waitāua and surrounding whenua within proximity of Ōnoke were traditionally mahinga kai and a place where traditional customary activities were carried out. All waterways are culturally significant to hapū. The Hapū support initiatives such as creating recreation reserves adjacent to

waterways. However overall, the proposal will give rise to an unacceptable level of adverse effects. It is of great importance that the Waitāua is afforded appropriate protection.

Accordingly, and as directed by the NPS FM, NRC as the decision-making authority must give effect to Te Mana o Te Wai and in doing so, actively involve the Hapū in the management of the Waitāua Awa and the decision-making process.

This management and proactive protection of Māori values is anticipated to be reflected in the decision to decline the proposal.

6.3.2 Regional Policy Documents

The Regional Policy Statement for Northland (RPS) and the Proposed Regional Plan for Northland (PRP) are relevant to this proposal.

A copy of the objectives and policies extracted from these documents relevant to this proposal is provided at **Appendix B**. A summary of each document is provided in the following sections.

6.3.2.1 RPS

The purpose of the RPS is to promote sustainable management of the region's natural and physical resources. Of importance to Māori and listed among the statement's guiding principles is:

> ***Partnership with tāngata whenua***
>
> *"In recognition of the partnership principles in Te Tiriti o Waitangi, and the benefits of working in partnership, tāngata whenua have a key role in resource management".*

Comment:

The principle of *Partnership with tāngata whenua* above recognises Te Parawhau Hapū as tāngata whenua and ensures the Hapū is provided the opportunity to exercise resource management (kaitiakitanga) and tino rangatiratanga in accordance with the partnership principles of Te Tiriti o Waitangi. Significant earthwork volumes are proposed to establish building platforms across the whenua. The extent and volume of earthworks coupled with the proposed increased impervious surface area and resultant stormwater discharge arising from the future development is substantial. Although a sediment retention pond is proposed to collect this stormwater and discharge the overflow into the awa, the effects on the Waitāua is unacceptable and does not constitute sustainable management of the regions natural and physical resources.

In recognising the Partnership Principles of Te Tiriti, it is requested that NRC uphold the Hapū's recommendation to decline the proposal for the reasons outlined in this report.

6.3.2.2 PRP

A definition of 'Places of Significance to tāngata whenua' is provided in **Section D.1.5** of the **PRP** and includes quality and quantity of water, values associated with ancestral lands, sites, water, wāhi tapu, and taonga.

Objectives and policies relating to water quality, indigenous ecosystems and tāngata whenua's role in decision-making over natural and physical resources are also outlined in the PRP.

A summary of the relevant matters are listed below:

> *2) is:*
>
> *a) a historic heritage resource, or*
>
> *b) ancestral land, water, site, wāhi tapu, or other taonga, and*
>
> *3) is either:*
>
> *a) a Site or Area of Significance to tāngata whenua, which is a single resource or set of resources identified, described and contained in a mapped location, or*
>
> *b) a Landscape of Significance to tāngata whenua, which is a collection of related resources identified and described within a mapped area, with the relationship between those component resources identified, and*
>
> *4) has one or more of the following attributes:*
>
> *a) historic associations, which include but are not limited to:*
>
> *ii. patterns of occupation, including permanent, temporary or seasonal occupation,*
>
> *iv. kinship and alliances built between areas and iwi or hapū, often in terms of significant events, or*
>
> *vi. recognition of notable tupuna, and sites associated with them, or*
>
> *b) traditional associations, which include but are not limited to:*
>
> *ii. traditional travel and communication linkages, both on land and sea, or*
>
> *c) cultural associations, which include but are not limited to:*
>
> *i. the web of whanaungatanga connecting across locations and generations, or*
>
> *ii. the implementation of concepts such as kaitiakitanga and manākitanga, with specific details for each whanau, hapū and iwi, or*

d) spiritual associations which pervade all environmental and social realities, and include but are not limited to:

i. the role of the atua Ranginui and Papatūānuku, and their offspring such as Tangaroa and Tāne, or

ii. the recognition of places with connection to the wairua of those with us and those who have passed away, or

iii. the need to maintain the mauri of all living things and their environment, and

5) must:

a) be based on traditions and tikanga, and

b) be endorsed for evidential purposes by the relevant tāngata whenua community, and

c) record the values of the place for which protection is required, and

d) record the relationship between the individual sites or resources (landscapes only), and

e) record the tāngata whenua groups determining and endorsing the assessment, and

f) geographically define the areas where values can be adversely affected.

Comment:

Ōnoke, the entire surrounding whenua, wai and the Waitāua are taonga of Te Parawhau tupuna. As repeated in this report, the area was traditionally where multiple Pā and kāinga were located and kaupapa and tikanga Māori carried out. Historically, these areas were mahinga kai, mataitai and trading places for Hapū which formed part of a wider resource network that supported surrounding kāinga and provided manaaki and whanaungatanga. In accordance with Hapū kaitiakitanga obligations, protecting and restoring the mauri of the whenua and awa is of utmost priority.

Like Hurupaki, Ōnoke was once covered in native bush. Vegetation across Ōnoke has been cleared for grazing of stock including residential development, and infrastructure such as water reservoirs and roads (noting Ōnoke extends beyond the subject whenua surveyed boundaries).

Over time, Hapū and their tupuna have witnessed the steady desecration and loss of their whenua and waterways (all of which are taonga) because of colonisation and with it, the erosion of their ability to exercise their traditional customary practices and inherited responsibilities and obligations. Consequently, Te Parawhau's mana (prestige, power) has been stripped and the mauri of their taonga severely degraded.

Connections with notable tupuna and ancestral sites associated with them are highlighted in this report. Te Parawhau are direct descendants to these tupuna. This report has been prepared with the guidance of Kaumatua (signatories to this document) who verify their uninterrupted occupation and association with their ancestral lands and waterways.

The protection and restoration of taonga outlined above must be reflected in Council's decision to decline this application to ensure any adverse effects arising from the proposal now and in the future upon places of significance to tāngata whenua and Hapū values as provided for in the PRP are avoided.

6.3.3 Hapū Environmental Management Plan

Te Parawhau have not yet prepared a Hapū Environmental Management Plan. This should not however preclude WDC and NRC in their decision-making process recognising their status as Tāngata Whenua and their ancestral connections to the whenua, the Waitāua and the wider Whangārei area.

7 Cultural Values

7.1 Kaitiaki and Kaitiakitanga

Te Parawhau have an obligation to all other hapū in the area which includes nurturing Mana Atua, Mana o Te Wai, Mana Whenua, Mana Ao Tūroa and Mana Tāngata.

Kaitiakitanga and manaakitanga, means more than mere guardianship or hospitality and support to others. It is the intergenerational responsibility inherited at birth, which is passed down from generation to generation to care for the environment and to uphold their spiritual (wairuatanga) obligations and to safeguard these from harm. Wairuatanga is as an essential requirement to health and therefore vital to Hapū wellbeing and identity.

Through whakapapa, Hapū are responsible for both mātauranga and tikanga māori in the management of their resources. Kaitiakitanga is not only about protecting and enhancing the life supporting capacity of resources, but also includes maintaining the deep relationship between the spirit realm (atua), tāngata (people) and the natural world.

Integral to kaitiakitanga is fulfilling spiritual (wairuatanga) and upholding the inherited responsibilities to te taiao. Maintaining tino rangatiratanga over those resources on which tāngata depend upon while ensuring the welfare of the people those resources support is fundamental to kaitiakitanga. This also means as part of their obligations, Hapū have a continuous and ongoing responsibility to protect and use their natural resources in a way that upholds their duties thus requiring interaction with their taonga and wāhi tapu.

Kaitiakitanga is concerned with maintaining a natural balance with all things. In this way, the legacy of kaitiakitanga and wairuatanga is passed from one generation to another.

7.2 Te Parawhau Hapū Cultural Values

Ōnoke, the Waitāua and surrounding area is of great cultural significance to the Hapū. Over time, these taonga have suffered incremental loss of mauri and mana.

The Hapū has expressed the deep and enduring relationship they have with the environment within and surrounding Ōnoke and the need to recognise this as a part of the decision-making process.

To Hapū, all living and non-living things are intrinsically connected (physically and spiritually) to Ao Turoa (the environment) through whakapapa, tātai and whanaungatanga. Spiritual values (wairuatanga) are as important as the physical.

Hapū responsibilities are not just focused on the physical realm but also include their customary activities, ancestral whenua, wai, wāhi tapu, effects on their taonga, mana, tapu and the mauri of resources.

All things animate and inanimate have a life force (mauri) and wairua. The whenua and waterways have a mauri that binds the current generation through, mana, tapu, whakapapa and tātai ki te tāngata including Te Ao Tūroa (the environment).

The following key concepts are fundamental for environmental management based on Mātauranga Māori (Māori knowledge). They cover both the tangible and intangible mai i te whenua ki te Rangi mai i te Rangi ki te whenua and govern the rules and regulations for the appropriate use and exploitation of natural and physical resources.

These concepts form a cultural value framework which Te Parawhau have adopted, that is expressed as:

1. **Mana atua** – (deity/spirit realm's mana) – effects (positive/negative) on the spiritual realm which includes tikanga (protocols/procedures).
2. **Mana o te wai** – (Tangaroa, Maru's (the water's) mana) – effects (positive/negative and benign) on the surrounding waterways and includes any contamination, physical change, discharge into the wai, mauri and wairua.
3. **Mana whenua** – (the land's/Papatūānuku's mana) – effects (positive/negative and benign) on the whenua arising from land use activities and includes earthworks/indigenous vegetation clearance/building coverage.

4. **Mana ao tūroa** – (the environment's mana) – effects (positive/negative) on the environment being the space in between Papatūānuku and Ranginui.
5. **Mana tāngata** – (peoples' mana) – effects (positive/negative) on people which includes why is the project being carried out, social benefits/non-benefits.

8 Assessment of Effects on Te Parawhau's Cultural Values

This section considers Hapū cultural values and the potential effects (adverse and positive) upon these values (kaitiaki/kaitiakitanga, manaakitanga, mana, taonga, tikanga, mauri and wairua) arising from the various activities associated with the proposal.

8.1 Mana Atua

Effects arising from the bulk earthworks can be more than tangible effects and include spiritual nontangible effects. Mana atua refers to the realm of the tupuna and deity (atua).

As cited by Mildon, "Māori are not joined to the land; we are an integral part of nature, with a relationship to every other living thing, defined by whakapapa … as guardians of nature … key to the health of both individual species and whole ecosystems" (Mildon, n.d). In this way, effects upon ngā atua (the gods) including the life supporting capacity provided by them must be respected and maintained.

8.1.1 Potential effects

As outlined in this report, Ōnoke and the Waitāua are wāhi tapu. Historical use of the whenua and the adjacent awa makes it such that Ōnoke is unsuitable for development and accommodating residential development.

Bulk earthworks and the construction of retaining walls up to 5 m high are proposed to create building platforms and to implement infrastructure such as roads and stormwater ponds across the whenua.

These works, volume and area of earthworks are significant and to a level that will give rise to significant adverse mana atua effects which coupled with the historical use briefly mentioned above, the proposal is not supported by Te Parawhau Hapū.

8.2 Mana o Te Wai

Mana o Te Wai considers effects on the waterways and includes any physical change or discharge. Waterways are the life force for Hapū, they provide physical and spiritual sustenance to Hapū.

8.2.1 Potential effects

Development within the surrounding area over the past 100 years has isolated Hapū from their ancestral pathways, whenua, wai/moana, and traditional resources, taonga etc. Adverse effects from these activities including those arising from the proposal on ngā awa (rivers) which includes Waitāua Awa, he tāngata and their ancestral whenua is profound.

At this locality, the Waitāua is a place where historically customary activities were carried out by hapū tupuna. The Waitāua is a taonga and wahi tapū. For the reasons outlined in this report, the proposal has the potential to cause significant adverse mana o te wai effects and cannot be supported by the Hapū.

8.3 Mana Whenua

Mana whenua refers to the mana, prestige held by the land or Papatūānuku. Papatūānuku provides sustenance for he tāngata and hospitality for manuhiri (guests). Supporting, maintaining, and enhancing Papatūānuku's ability to sustain and support all forms of life are obligations required by the Hapū.

8.3.1 Potential effects

The proposal will significantly modify the whenua and as such reduce, if not destroy Papatūānuku's mana to a level whereby sustaining he tāngata and te ao tūroa cannot be achieved or maintained.

Ōnoke is of great value to the Hapū and indeed other hapū. Environmental effects arising from the proposal directly conflict with the Hapū's uara ahurea, thus meaning the Hapū's obligations to the whenua, current and future generations and Tupuna cannot not be upheld. The Hapū do not support this kaupapa.

8.4 Mana Ao Tūroa

Mana Ao Tūroa refers to the space in between Ranginui and Papatūānuku, (the Environment). "People are part of the environment. The condition or health of the people (he tāngata) and the environment (ao tūroa) are intricately related. The saying 'Ko ahau te awa, ko te awa ko ahau' (I am the river, the river is me) depicts the relationship between people and the environment. Therefore, if an awa is polluted or the whenua degraded, there is something not right with the people (and vice versa)" (The University of Waikato Te Whare Wānanga o Waikato, 2017).

Ōnoke and surrounding whenua traditionally comprised fertile soils and mara (gardens). Similarly, the Waitāua was traditionally abundant with kai and harvested at appropriate locations.

This Waitāua is now highly degraded, polluted with sediment, chemicals, and other foreign organisms such as invasive exotic plants and fauna (fish species). Like most waterways across the Whangārei takiwā, the Waitāua is no longer safe to harvest kai and the extent of change is profound and to a degree that traditional fish species can no longer access the waterways and boat navigation is no longer possible.

It is of paramount importance that the mauri and wairua of the Waitāua and surrounding whenua are protected from further degradation and destruction. The Hapū do not support this application.

8.5 Mana Tāngata

Mana tāngata refers to the authority which comes from their people (Durie, 2001). Mana can also be acquired by a person according to their ability, their efforts to develop skills, knowledge, and achievements. Yet, it is generosity, cooperation and taking responsibility that are aspects that enhance the mana of others as well as enhancing one's own mana (M, 2016).

Examples of the Hapū's (specifically Ngāi Tāhuhu and Ruangaio) long history with Ōnoke, surrounding lands and waterways have been provided in this report. The holistic view of tāngata whenua and connections with nature, te ao tūroa is defined in the Māori culture as whanaungatanga.

From a Māori worldview, we are all connected to Papatūānuku and other atua who provide tāngata with resources. As already outlined in this report, an impact on the whenua, waterways etc is a direct impact on the people (te tāngata).

The Hapū have an obligation to uphold their uara ahurea which includes tikanga and kawa Māori which includes tino rangatiratanga, kaitiakitanga and wairuatanga. Ōnoke which extends beyond the subject whenua's boundaries is a place that is not safe or appropriate for the living. Should the application go to a Hearing, to ensure Hapū uara ahurea are understood, Hapū Commissioner who understands these values shall be appointed to the hearing panel.

The proposal conflicts with all of Te Parawhau Hapū cultural values. The Hapū do not support this kaupapa.

9 Conclusion

As Ngai Tahuhu and Ruangaio descendants, Te Parawhau Hapū have an interest in this whenua and the Waitāua Awa which flows along the whenua's southern boundary.

The whenua and surrounds have a mauri that binds the current generation through mana, tapu and whakapapa to the whenua and the waterways.

Ōnoke and the Waitāua are taonga and are identified as an 'Area of Significance'. The Hapū are obliged to fulfil their kaitiakitanga commitments which includes protecting the whenua, people, all waterways, and the environment from harm. The active protection of Ōnoke, surrounding whenua including all waterways is integral to Hapū wellbeing.

Historical customary cultural activities carried out on the whenua and within the Waitāua render the whenua and the awa as unsafe and inappropriate for the living.

The proposed 95 Lot residential subdivision associated development and future residential lots proposed by this application conflicts with Te Parawhau's uara ahurea. As outlined in this report the proposal will give rise to significant adverse effects.

Should the application go to a Hearing, to ensure Hapū uara ahurea outlined in this report are understood, a Hapū Commissioner who understands these values shall be appointed to the hearing panel.

Te Parawhau Hapū oppose this application in its entirety.

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Appendix A:
Resource Consent Application

Whangarei District Council
Private Bag 9023, Whangarei 0148, New Zealand
P +64 9 430 4200 | 0800 WDC INFO | 0800 932 463 F +64 9 438 7632
E mailroom@wdc.govt.nz www.wdc.govt.nz

Office use			
Planner:	Alister Hartstone	Date Received:	26-11-2021
Engineer:	Pat Sugrue / T+T	Time Received:	5:36pm
Due date:	15-12-2021/ 08-12-2021	Payment received:	29-11-2021
Tech1 app #:	SL2100055		
Property #:	3583	Land #:	35827

Resource Consent Application - Form 9 RMA

This application for resource consent is made pursuant to Section 88 or 139 of the Resource Management Act 1991 (RMA 1991). Please note that your application will be subject to all other relevant provisions contained within the RMA.

This form is designed to provide the required details, and must be submitted as part of your application. Please note that the public can view all information provided in your application.

District Plan rules & maps, application forms and land information are available on Council's website www.wdc.govt.nz

If you have attended a pre-application or duty planner meeting about your proposal, enter their name

1 Application Details – *It is important that you fully complete all sections*

Full Name of Applicant(s): Onoke Heights Limited

Postal address: Barker and Associates, P O Box 37, Whangarei 0112

Phone no: 027 231 9533 (Melissa McGrath) Email: MelissaM@barker.co.nz

I hereby apply to Whangarei District Council for

- ☐ Land Use Consent *(s88)*
- ☐ Subdivision Consent *(s88)*
- ☐ Certificate of Compliance *(s139)*
- ☑ Subdivision and Land Use Consent *(s88)*

This application also includes

- ☐ Right-of-way *(s348)*
- ☐ Easement Cancellation *(s243)*
- ☐ Consent Notice *(s221)*
- ☐ Amalgamation Covenant/Condition *(s240/s241)*
- ☐ Conservation Covenant *(s114)*
- ☐ Other

Description of activity

Subdivision to create 95 residential allotments, drainage and recreational reserves to vest and other associated works and land use to to establish and beverage activity. ~~retaining walls within boundary setbacks.~~

Additional consents *(i.e. NRC consents)*

- ☐ No additional resource consents are needed for the proposed activity
- ☑ The following additional resource consents are needed for the proposed activity, and have *(or have not)* been applied for *(give details)* *earthworks and stormwater discharge*

Have you applied for a BC or PIM ☐ Yes ☒ No If yes, state BC or PIM no

2 Site Detail

Property address: Dip Road, Kamo

Legal description: Lot 2 CT: 99045 Property ID: NA53D/1031

District Plan Environment: General Residential Zone

3 Site Visit Requirements

(A site visit is generally undertaken by staff processing the application)

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

3.2 Is there a dog on the property? ☐ Yes ✓

3.3 Provide details of any entry restriction or hazards that Council staff should be aware of, e.g. health and safety, organic farm, measures to inhibit the transfer of Psa-V etc.
Please note: Any additional time required due to access restrictions will incur costs charged to the application.

4 Ownership *(if different from applicant)*

Full legal name of owner: Onoke Heights Limited

Postal address of owner: PO Box 21100 Rototuna Hamilton 3256

Full legal name of occupier:

Postal address of occupier:

Phone no *(owner)*: Email *(owner)*:

5 Payer *(mandatory)*

Full legal name of payer: Mark Holland

Address of payer: PO Box 21100 Rototuna Hamilton 3256

Phone no: 0274 972 835 Email: mark@waibury.co.nz

pp Signature *(Mandatory)*

26 November 2021 Date

(NB By signing this form you undertake to pay Council's processing fees)

6 Address for Service/Correspondence (Agent)

Name: Melissa McGrath Ref no: WNG18541

Telephone Mobile: 027 231 9533 Landline:

Postal address: Barker and Associates, P O Box 37, Whangarei 0112

Email: MelissaM@barker.co.nz

7 Attachment checklist *(mandatory requirements are in bold)*

1. ☑ **Completed application form**
2. ☑ **Cover letter / description of the activity**
3. ☑ **Advance fee/deposit**
4. ☑ **Assessment of environmental effects (AEE)**
5. ☑ **Assessment against the operative and proposed District Plan rules, objectives and policies and assessment criteria**
6. ☑ **Assessment against Part 2 of RMA**
7. ☑ **Assessment against National Environmental Standards (NES) including contaminated soils**
8. ☑ **Assessment against National Policy Statement**
9. ☑ **Certificate of title dated within 6 months**
10. ☑ **Building activity or scheme plans**

Specialist Reports:

☑ Engineering ☑ Geotechnical ☐ Written Approval

☑ ✓ ✓

✓

8 Signature of the applicant(s) or agent

Payment of fees and charges

Please refer to Council's 'Schedule of Fees & Charges' at Fees-and-Charges

You are required to pay an advance fee deposit at time of lodgement.

Please quote type of application, name of applicant and see here - **WDC payment options**

You will be charged a processing fee when Council has reached a decision on your application. Interim billing may also occur on applications. The processing charge covers tasks such as site visits, report preparation, information searches, and input from other Council staff including engineers. Mileage is also charged.

Development Contributions

When granting consent to certain activities the council may levy a monetary contribution. Development contributions are levied under the Local Government Act 2002 in accordance with Council's Development Contributions Policy. When such contributions become due, the consent holder is responsible for their payment. Unless otherwise advised, the name and contact address of the person responsible for payment of any contributions will be taken as the applicant.

Privacy Information

The council requires the information you have provided on this form to process your application under the RMA and to collect statistics. The council will hold and store the information, including all associated reports and attachments, on a public register. The details may also be made available to the public on Council's website. These details are collected to inform the general public and community groups about all consents which have been processed or issued through the Council. If you would like to request access to, or correction of any details, please contact the Council.

Site visit

By signing this form, you confirm that the Council is permitted to undertake a site inspection.

Declaration for the applicant or authorised agent

I/we confirm that I/we have read and understood the notes above.

Applicant's Signature _____ Date _____

Declaration for the agent authorised to sign on behalf of the applicant.

As authorised agent for the applicant, I confirm that I have read and understood the above notes and confirm that I have fully informed the applicant of their/its liability under this document, including for fees and other charges, and that I have the applicant's authority to sign this application on its/their behalf.

Agent's Signature _____ Date 26 November 2021

95 lot subdivision and associated works

Dip Road, Kamo

Assessment of Environmental Effects and Statutory Analysis

26 November 2021

B&A
Urban & Environmental

Prepared for:
Onoke Heights Limited

B&A Urban & Environmental

B&A Reference:

WNG18541

Status:

Final

Date:

25 November 2021

Prepared by:

Melissa McGrath

Reviewed by:

Alisa Neal

Contents

Appendices

Appendix 1: Record of Title and Interests

Appendix 2: Pre-application meeting minutes

Appendix 3: Subdivision Scheme Plan and Engineering Plans – Blue Wallace

Appendix 4: Integrated Traffic Impact Assessment – Engineering Outcomes

Appendix 5: Integrated Three Waters Assessment - LDE

Appendix 6: Geotechnical Report - LDE

Appendix 7: Earthworks Geotechnical Letter - LDE

Appendix 8: Rules Assessment

Appendix 9: Assessment Criteria Assessment

Appendix 10: Potentially Contaminated Site Search

Appendix 11: Application to NRC

Appendix 12: Written approval Northpower

1.0 Applicant and Property Details

To:	Whangārei District Council
Site Address:	Dip Road, Kamo
Applicant Name:	Onoke Heights Limited
Address for Service:	Barker & Associates Ltd PO Box 37 Whangārei 0140 Attention: Melissa McGrath
Legal Description:	Section 1 SO Plan 65970 (refer to Record of Title as **Appendix 1**)
Site Area:	6.8700ha
Site Owner:	Onoke Heights Limited
District Plan:	Whangārei District Council District Plan (WDP)
WDP Zoning:	General Residential Zone
WDP Precinct:	N/A
WDP Overlays & Controls:	Flood Susceptible Critical Electricity Line
Designations:	N/A
Additional Limitations:	GIS – Low Instability
Locality Diagram:	Refer to **Figure 1**
Brief Description of Proposal:	**Subdivision**: to create 95 residential allotments, drainage and recreational reserves to vest and other associated works described in the application material. **Land use:** to establish retaining walls up to a maximum height of 5m within the setback of road and side boundaries.
Summary of Reasons for Consent:	WDP: **Controlled Activity** pursuant to SUB-R5 (Subdivision in GRZ), LIGHT-R7 (Any Subdivision) TRA-

R13 (Subdivision), SUB-R2 (Any subdivision), and EARTH-R1 (Earthworks).

Restricted Discretionary Activity pursuant to GRZ (Setbacks), TRA-R15 (Integrated Traffic Assessment), TRA-R16 (Construction of New Public Road), TRA-R17 (Major Roading Alterations to an Existing Public Road), TWM-R2 (Stormwater), TWM-R3 (Wastewater), TWM-R4 (Water), TWM-R5 (Integrated Three Waters Assessment), and CEL.1.4.1 (Subdivision).

2.0 Background

This report has been prepared in support of a resource consent application on behalf of Onoke Heights Limited to undertake a 95 residential lot subdivision, along with other associated works at Dip Road, Kamo.

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

2.1 Background – pre-application meeting

The proposal was discussed with Council at a pre-application meeting on 9 August 2021. At the meeting Council a number of matters were discussed in respect to roading, three waters servicing, landscape, site suitability/geotechnical reports/earthworks, urban design, iwi consultation and parks. Minutes from this pre-application meeting are included in **Appendix 2**.

The following is noted in response to the key matters raised:

- Roading comments provided post meeting outlining that WDC are supportive of pedestrian links, intersection treatment (class C), and ITA required. All matters have been addressed in the Integrated Traffic Assessment (**Appendix 4**).
- Wastewater comments – Capacity to be confirmed, age of pipe – need to check condition, connection to boundary required. All matters have been addressed in Integrated Three Waters Assessment (**Appendix 5**).
- Water comments – Need to be aware of overflow from water reservoir, sufficient water capacity, however water pressure is below acceptable level of service. All matters have been addressed in Integrated Three Waters Assessment (**Appendix 5**).

Discussions from the pre-app meeting have informed the development of the proposal and the preparation of this AEE.

3.0 Site Context

3.1 Site Description

The 6.8ha subject site is comprised of on a single allotment (legally defined as Section 1 SO 65970), fronting Dip Road, with access to Tuatara Drive (see **Figure 1** below).

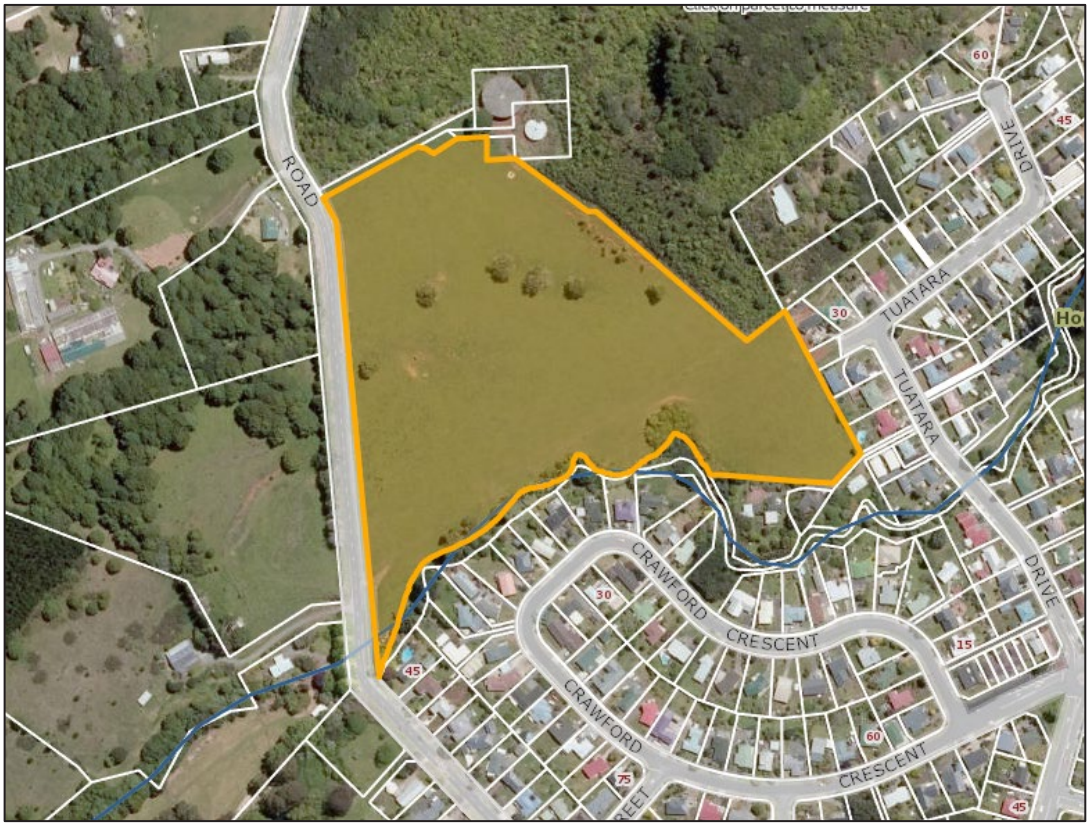


Figure 1: Locality plan.

The subject site is vacant, being grassed in pasture, with a scattering of trees within the centre of the site and along the edge of the Waitaua Stream. The northern half of the site comprises of a converging south facing slope of up to 11 degrees. The southern part of the site comprises of waning slopes towards the Waitaua Stream on the southern end of the subject site. Fragmented indigenous vegetation with broadleaf forest remnants encompassing the Waitaua Stream extending along the southern boundary of the site.

The site is situated at the north-western residential edge of the suburb of Kamo, located north of Three Mile Bush Road. The site is situated between the existing residential streets of Dip Road and Tuatara Drive. A Whangārei District Council water reservoir (Designation WDC-25) is located directly north of the subject site with water pipe lines from the reservoir extending south along the eastern site boundary (subject to 3m wide easement) to Tuatara Drive. Directly to the east of the subject site is Onoke Reserve comprised of a large area of native vegetation.

Dip Road is defined as a secondary collector road by the District Plan, with two sealed lanes and a carriageway width of approximately 6.4, Dip Road has a legal width of 20m including carriageway, berms and a footpath is located on the eastern side. Dip Road has a speed limit of 80 kilometres per hour along the site frontage, reducing to 50 kilometres per hour 100m south of the proposed new intersection. There are no street trees in the road reserve adjacent to the site. However, there are a number of power poles and light poles that the proposed design has responded to.

Tuatara Drive is defined as an access road by the District Plan, with two sealed lanes being 8.2m between kerb faces and a footpath along the eastern side. It has an internal tee intersection, one leg of which continues north eastwards to existing residential development, the other being a short stub that leads to two existing houses and currently ends only 25 metres west of the intersection. Tuatara Drive has a speed limit of 50 kilometres per hour.

A Northpower critical electricity line extends along the southern boundary of the site, traversing the south eastern corner. The District Plan identifies this line as being overhead.

The Operative District Plan Resource Area maps identify the northern portion of the site as Flood Susceptible and a Critical Electricity Line (overhead) which traverses the southern boundary and south-eastern corner of the site. The Proposed District Plan Zone maps identify the site as being zoned General Residential Zone.

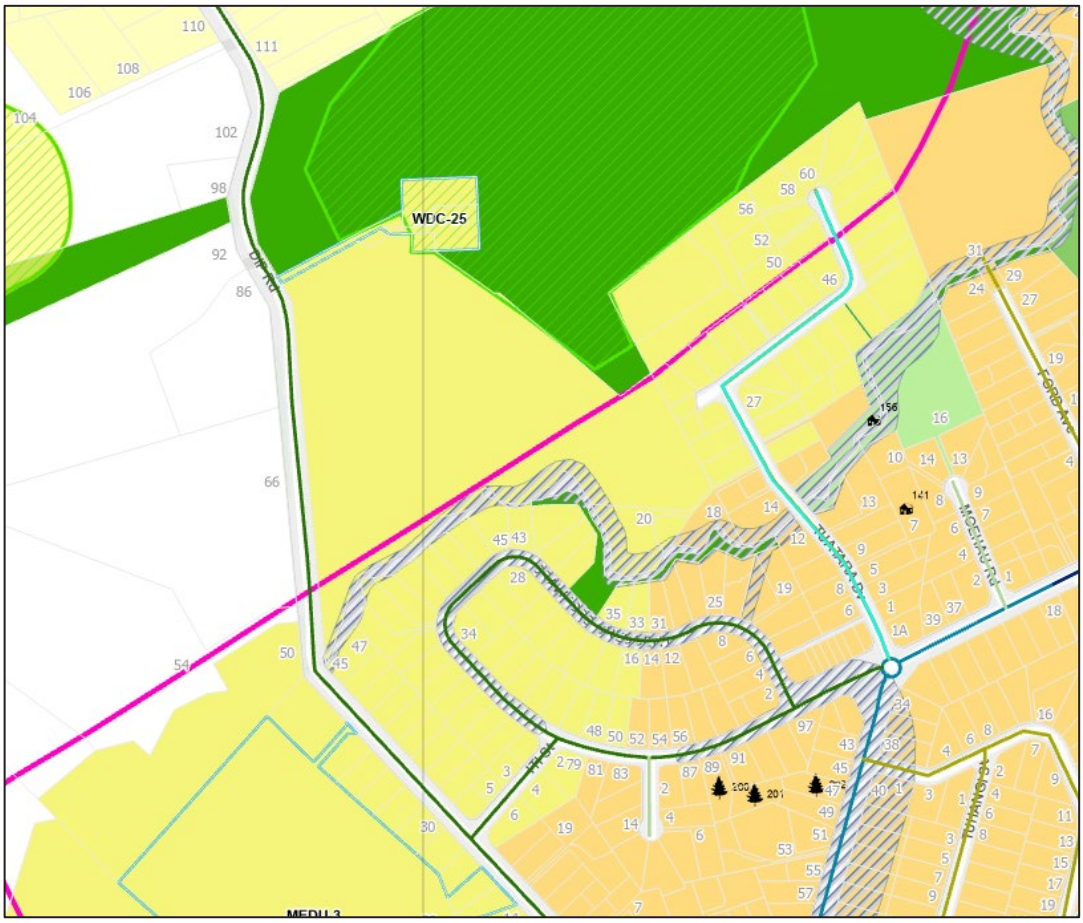


Figure 2: Proposed District Plan Extract.

3.2 Records of Title

The development site is contained in a single Record of Title, a copy of which is contained in Appendix 1. The only interest of relevance to the processing of this application is the water right easement. There are no other interests on these titles that are considered relevant to the consideration of this combined Land use and Subdivision application.

3.3 Surrounding Locality

The surrounding locality is predominantly residential in nature, featuring a mix of single-storey and two-storey dwellings. The existing built form comprises houses that are typically set back from the street by around 5-8m, with either fully open front yards or low fencing. Interconnected suburban streets of Crawford Crescent, Tuatara Drive and Dip Road feed into Three Mile Bush Road. Hurupaki Primary School and Kindergarten are located directly south west of the site within

walking distance along Dip Road. Rural residential development is located to the north west of the site along Dip Road.

With respect to schools and amenities, Hurupaki Primary School and Kindergarten are located immediately to the east, while Kamo Primary School is located less than 1km to the east. The Local Centre of Kamo approximately 1km east of the site providing community services, convenience shopping and Kamo High School. Neighbourhood shops are within approximately 400m of the site, including dairy and takeaway outlets.

The area is served by public transport and pedestrian infrastructure. The bus network includes services along Three Mile Bush Road within approximately 1000m walking distance from the site.

The area is well serviced by public open space networks with natural reserves within Hurupaki Cone to the west, Onoke Reserve and Hodges Park to the east. Kamo park has active open space located within Kamo Centre.

4.0 Proposal

A summary of the key elements of the proposal is set out below. More detailed descriptions on particular aspects of the proposal are set out in the specialist reports and plans accompanying the application.

Subdivision: It is proposed to carry out a subdivision to create:

- 95 residential allotments – lots 1 – 95
- Public road – lot 300
- Jointly owned access lots (JOALs) – lots 301 and 302
- Drainage reserve – lot 200
- Recreation reserve lot 595

The site layout, including the new road, JOAL's and reserves is shown in Figure 3 below. Further detail of the proposed development is provided on the scheme plan and engineering plans prepared by Blue Wallace Surveyors, included as Appendix 3.

Access and Parking: The site contains an existing vehicle crossing from Dip Road and an existing crossing from Tuatara Drive. The proposal seeks to decommission the existing vehicle crossing from Dip Road and create a new public road network, comprised of a link between Tuatara Drive and Dip Road, an internal loop road and a cul-de-sac. A new give-way controlled 'T' intersection is proposed at the western end of the link road with Dip Road.

Two Jointly Owned Access Lots (JOALS) are proposed to provide access to lots 26-28, and lots 59-66. Proposed lots 1 – 4 which will gain access directly from Dip Road.

The proposed JOAL's consist of the following:

- Lot 300 will be held in three undivided shares by the owners of lots 26 to 28.
- Lot 301 will be held in eight undivided shares by the owners of lots 59 - 66.

Approximately 21 inset parking bays will be provided within the road reserve.

The access and parking for the proposed development is further detailed in the Integrated Traffic Assessment Report by Engineering Solutions, included as **Appendix 4,** and the accompanying Engineering Drawings by Blue Wallace Surveyors, included as **Appendix 3**.

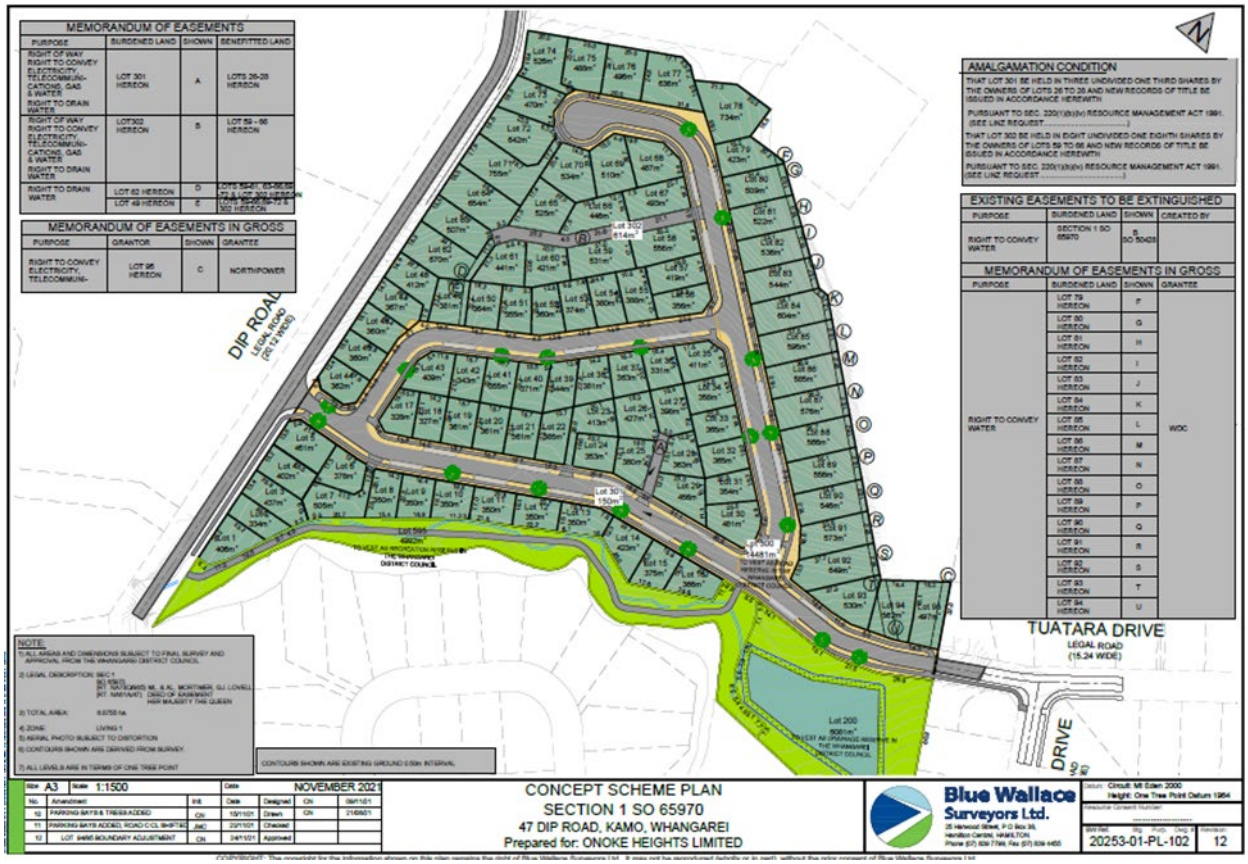


Figure 3: Proposed Scheme Plan.

Pedestrian Connectivity and Open Space Network: Concrete footpaths are proposed on both sides of the link road and the cul-de-sac road, with one on the northern side the loop road and lot 302 (the larger shared access), and one along the eastern side of Dip Road south of the new intersection. The link road footpath will be continued along Tuatara Drive as far as an existing pram crossing near the shoulder of the existing intersection. The footpath on Dip Road will upgrade an existing unsealed footpath and connect to an existing concrete footpath that currently ends near the culvert crossing 125 metres south of the new intersection.

A recreation reserve is proposed within lot 595 being 4992m^2 along the entire southern boundary of the subject site, adjacent to the Waitaua Stream. A pedestrian foot path is proposed to extend along the Waitaua Stream esplanade connecting to Dip Road, promoting a safe and pleasant pedestrian connection to Hurupaki School.

Servicing: The servicing strategy for the proposed development is set out in the Integrated Three Waters report by LDE, included as **Appendix 5**, and the accompanying Engineering Drawings by Blue Wallace Surveyors, included as **Appendix 3**.

In summary, it is proposed that all lots will be serviced by connections to public reticulated wastewater and water systems. The stormwater system has been designed to include an onsite stormwater pond located in the south eastern corner of the subject site to be vested with Council. The proposed stormwater pond will limit peak flows to predevelopment level for the 2, 10 and 100

year storm events, with a 20% allowance for climate change. It will include an extended detention volume to an extended detention volume of 34.5mm for the site to be released over a 24hr period the slow release volume will minimise stream erosion and increase water quality in the pond.

Geotechnical Investigation: Whangārei District Council GIS Land Instability Maps identify the site as predominantly low instability hazard. A Geotechnical Report prepared by LDE is included as **Appendix 6**, this report has been supplemented by a specific assessment by LDE of the earthworks proposed and is included as **Appendix 7.** The report and supplementary letter include a number of recommendations which have informed the proposed site works, retaining and the building foundations.

Site Works: A total of approximately 134,349m^3 (52,799m^3 cut and 81,550m^3 fill) is proposed, with a maximum cut depth of 6m and a maximum fill height of 4m during earthworks. Earthworks will involve modification of the site to enable the construction of the building platforms, site access and carparking areas. Significant retaining of the site is proposed, including walls up to 5m in height (refer to **Appendix 3**, retaining wall scheme plan 20253-01-RC-203). The Geotechnical Report and supplementary earthworks letter prepared by LDE, included as **Appendices 6** and **7** sets out recommendations for management of earthworks. Silt and sediment control measures are proposed to be implemented in accordance with the Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region (2016) for the duration of the activity.

Resource consent for the proposed earthworks has been sought concurrently under the proposed Regional Plan from Northland Regional Council – see a copy of this application in **Appendix 11**.

Contamination: Council property search (PSC180456) was completed in November 2018 which confirms that there is no indication of current or previous activities within the area of the site that are identified as Hazardous Activities and Industries. This report is included as **Appendix 10.** Use of the subject site has not changed since 2018.

5.0 Reasons for Consent

Under the Operative District Plan the site is split zoned Living 1 Environment (with Living Overlay). The subject site is zoned General Residential Zone under the Proposed District Plan (Appeals Version) for which all appeals have been resolved. The General Residential Zone, Subdivision Chapter, Three Waters Chapter and Transport Chapter are all not subject to appeal and must be treated as operative. As a result, the Living 1 Environment and Living Overlay provisions are no longer applicable to the site and therefore no assessment is required.

Under the Operative District Plan the site is identified as Flood Susceptible and Critical Electricity Line Resource Areas.

5.1 Operative District Plan

Critical Electricity Lines

- Rule CEL.1.4.1 (Restricted discretionary activities – subdivision) - The subdivision of the site will occur within 32m of the centre line of the CEL that runs through the north eastern corner of the site – Restricted Discretionary Activity.

5.2 Proposed Whangārei District Plan (Urban and Services Plan Changes Appeals Version)

General Residential Zone

- Rule GRZ-R4 (Building and Major Structure Setbacks) - Retaining walls due to height are considered to be major structures, and will be located within 3m of Dip Road along the western boundary of proposed lot 48 for a length of approximately 12m and a retaining wall ranging in height from 2m to 4m is proposed to be located within 1.5m of the northern site boundary.

Subdivision

- Rule SUB-R2 (Subdivision) – The proposed subdivision will comply with clauses 1 – 8 – Controlled Activity.
- Rule SUB-R5 (Subdivision in GRZ) – The parent site is greater than 1ha and every proposed lot has a net site area greater than 320m^2 and an average net site area greater than 400m^2 – Controlled Activity.

Three Waters Management

- Rule TWM-R2 (Stormwater) - The proposed subdivision will include the construction of onsite stormwater system to be vested with Council (including three ponds) which has been designed with capacity to mitigate post development flows – Restricted Discretionary Activity.
- Rule TWM-R3 (Wastewater) - The proposed allotments will have a new connection to the public reticulated wastewater system installed – Restricted Discretionary Activity.
- Rule TWM-R4 (Water Supply) - The proposed allotments will have connections to public reticulated water supply connections installed – Restricted Discretionary Activity.
- Rule TWM-R5 (Integrated Three Waters Assessment) – The proposed subdivision will result in 76 allotments; an integrated three waters assessment is included within this application see **Appendix 5** – Controlled Activity.

Transport

- Rule TRA-R13 (Subdivision) - The proposal will not comply with TRA-R5 (above), consent under this rule is required as a Restricted Discretionary Activity.
- Rule TRA-R15 (Any Activity) - The application includes an Integrated Traffic Assessment see **Appendix 4** – Restricted Discretionary Activity.
- Rule TRA-R16 (Construction of Any New Public Road) - The proposal includes the construction of a new public road to provide access throughout the proposed subdivision – Restricted Discretionary Activity.
- Rule TRA-R17 (Major Roading Alterations to an Existing Public Road) - The proposal includes the construction of a new T intersection with the proposed new public road and Three Mile Bush Road – Restricted Discretionary Activity.

Earthworks

- Rule EARTH-R1 (Earthworks associated with subdivision) The proposal includes earthworks associated with the proposed subdivision – Controlled Activity.

Light

Rule LIGHT-R7 (Any subdivision) – Development will include street lighting in accordance with clauses 1 and 2 – Controlled Activity.

5.3 Operative Regional Water and Soil Plan for Northland (RWSP)

Resource consent has been sought concurrently from Northland Regional Council for the following reasons:

- Rule 22.2.1 Diversion and discharge of stormwater: As highlighted above, controlled consent is required for a Land Disturbance Activity Rule, accordingly resource consent is also required as a controlled activity pursuant to 22.2.1 (1).

A copy of this application is included in **Appendix 11.**

5.4 Proposed Northland Regional Plan (PRP)

Resource consent has been sought concurrently from Northland Regional Council for the following reasons:

- Rule C.6.4.3 Stormwater discharges - The proposed stormwater system and discharge will be vested with Whangārei District Council as a public stormwater network within the urban area of Whangārei City the proposed stormwater discharge is therefore a controlled activity.
- C.8.3. Earthworks controlled activity - The proposed earthworks include the exposure of a total area of exposed earth being approximately 6.8ha at any one time. This exceeds the permitted standards in Rule C.8.3.1 –controlled activity.

A copy of this application is included in **Appendix 11.**

5.5 NES Contaminated Soils

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES Contaminated Soils) were gazetted on 13th October 2011 and took effect on 1st January 2012.

The standards are applicable if the land in question is, or has been, or is more likely than not to have been used for a hazardous activity or industry and the Applicant proposes to subdivide or change the use of the land, or disturb the soil, or remove or replace a fuel storage system.

Council property search has been completed (PSC180456) which confirms that there is no indication of current or previous activities within the area of the site that are identified as Hazardous Activities and Industries. Reports are included as **Appendix 10.**

As a result, the NES Contaminated Soils is not applicable and no resource consents are required pursuant to it.

5.6 Activity Status

Overall, this application is for a restricted discretionary activity.

6.0 Public Notification Assessment (Sections 95A, 95C and 95D)

6.1 Assessment of Steps 1 to 4 (Sections 95A)

Section 95A specifies the steps the council is to follow to determine whether an application is to be publicly notified. These are addressed in statutory order below.

6.1.1 Step 1: Mandatory public notification is required in certain circumstances

Step 1 requires public notification where this is requested by the applicant; or the application is made jointly with an application to exchange of recreation reserved land under section 15AA of the Reserves Act 1977.

The above does not apply to the proposal.

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

Step 2 describes that public notification is precluded where all applicable rules and national environmental standards preclude public notification; or where the application is for a controlled activity; or a restricted discretionary, discretionary or non-complying boundary activity.

In this case, the applicable rules do not preclude public notification, and the proposal is not a controlled activity or boundary activity. Therefore, public notification is not precluded.

6.1.3 Step 3: If not required by step 2, public notification required in certain circumstances.

Step 3 describes that where public notification is not precluded by step 2, it is required if the applicable rules or national environmental standards require public notification, or if the activity is likely to have adverse effects on the environment that are more than minor.

As noted under step 2 above, public notification is not precluded, and an assessment in accordance with section 95A is required, which is set out in the sections below. As described below, it is considered that any adverse effects will be less than minor.

6.1.4 Step 4: Public notification in special circumstances

If an application is not required to be publicly notified as a result of any of the previous steps, then the council is required to determine whether special circumstances exist that warrant it being publicly notified.

Special circumstances are those that are:

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

The development of the subject site for residential activities is anticipated by the District Plan, which provides for subdivision as a controlled activity under the PDP at a scale of 320m2 net site area and an average area of at least 400m2, subject to compliance with performance standards. Subdivision in this zone is provided for as a controlled activity.

It is considered that there is nothing noteworthy about the proposal. It is therefore considered that the application cannot be described as being out of the ordinary or giving rise to special circumstances.

6.2 Section 95D Statutory Matters

In determining whether to publicly notify an application, section 95D specifies a council must decide whether an activity will have, or is likely to have, adverse effects on the environment that are more than minor.

In determining whether adverse effects are more than minor:

- Adverse effects on persons who own or occupy the land within which the activity will occur, or any land adjacent to that land, must be disregarded.

  The land to be excluded from the assessment is listed in section 6.3 below.

- Adverse effects permitted by a rule in a plan or national environmental standard (the 'permitted baseline') may be disregarded.

  In this case the General Residential Zone anticipates and provides for residential activities. Rule GRZ-R15 (Residential Units) permits two residential units per site. Subdivision rule SUB-R5 (Subdivision in the General Residential Zone), provides for subdivision as a controlled activity where every allotment has a net site area of at least 320m^2 and an average net site area of 400m^2. It is acknowledged that the permitted baseline does not technically include this level of subdivision and development, however it is considered appropriate and relevant to have consideration of the level of development and residential intensity that could reasonably be anticipated on the site.

- As a restricted discretionary activity, only those effects on persons that fall within the matters of discretion restricted under the plan can be considered.

  The matters of discretion are listed is section 6.4 below.

- Trade competition must be disregarded.

  This is not considered to be a relevant matter in this case.

- The adverse effects on those persons who have provided their written approval must be disregarded.

  No persons have provided their written approval for this proposal.

The sections below set out an assessment in accordance with section 95D, including identification of adjacent properties, matters of discretion, and an assessment of adverse effects.

6.3 Land Excluded from the Assessment

In terms of the tests for public notification (but not for the purposes of limited notification or service of notice), the adjacent properties to be excluded from the assessment are shown in **Figure 4** below, and include:

- Onoke Reserve (North west);
- 28 Tuatara Drive (East);
- 26B Tuatara Drive (East);
- 24 Tuatara Drive (East);
- 22 Tuatara Drive (East);
- 20 Tuatara Drive (South);
- Waitaua Stream Esplanade (South);
- 50 Dip Road (West);
- 54 Dip Road (West);
- 66 Dip Road (West);
- 86 Dip Road (West); and
- WDC Water Reservoir (North).

Figure 4: Adjacent properties in relation to subject site. Source: Emaps.

6.4 Matters of Discretion

Under section 104C of the Act, as a restricted discretionary activity, the consent authority must consider only those matters over which it has restricted the exercise of its discretion in its plan.

These matters are considered within **Appendix 9**.

6.5 Assessment of Effects on the Wider Environment

The following sections set out an assessment of wider effects of the proposal, and it is considered that effects in relation to the following matters are relevant:

- Character and amenity;
- Transportation;
- Infrastructure and servicing;
- Construction activities;
- Noise effects;
- Geotechnical;
- Critical Electricity Lines;
- Cultural and Heritage;
- Hazards; and
- Flora and Fauna.

These matters are set out and discussed below:

6.5.1 Character and Amenity

As described in section 3 above, the surrounding locality is residential in nature and the immediate surrounding area. The proposal represents a residential density that is consistent the development outcomes sought by and provided for within the GRZ. The Proposed District Plan anticipates a density of 1 per 320m^2 (net) with an average net site area of 400m² for sites larger than 1ha in the General Residential Zone. In this case, the proposed development comprises 95 residential lots ranging in size from 327m^2 to 734m^2. The proposed allotments all comply with the controlled subdivision density standards and would provide sufficient area for residential development within each lot in accordance with the permitted activity rules of the General Residential Zone.

All proposed lots are of a sufficient size, shape and gradient to accommodate compliant residential development, exclusive of any required setbacks. This will ensure that appropriate levels of visual and aural privacy and open space for the wider residential area are maintained as a result of the separation and ability to plant effective landscaping around any future dwellings.

The proposed allotments are sufficiently large to accommodate future proposed residential units without resulting in over intensity or crowded appearance of development on the site from the wider environment. The streetscape amenity will be maintained via existing land use provisions including bulk and location controls.

With regard to traffic movements, the permitted baseline of one Residential Unit per lot in accordance with the density anticipated in the plan is an important consideration. The road and access have been designed and formed to safely accommodate the proposed allotments, and associated traffic movements will be readily absorbed into the roading network. This is detailed in the Engineering Solutions report in **Appendix 4.**

Based on the above, it is considered that the intensity of development is reasonable and the proposed subdivision will result in no more than minor character and amenity effects when viewed from the wider environment.

6.5.2 Transportation

Traffic, access and parking matters have been considered in the Integrated Traffic Impact Assessment prepared by Engineering Solutions (see **Appendix 4**).

A summary of the transportation effects is provided in the conclusion of their report as follows:

- The proposed new intersection and upgraded footpath on Dip Road, connection to Tuatara Drive road and footpath and the internal subdivision access are suitable, fit for their intended purpose and will meet the requirements of the Whangārei District Plan.
- A combination of carefully designed internal road alignment including the minimum suitable carriageway widths, a speed control device and other measures that will provide a calming effect on drivers, will ensure safe speeds and minimal exposure for pedestrians crossing the roads.
- 21 inset on street parking bays are proposed to minimise the risks associated with parking on the street.
- The design maximises opportunities for walking by providing safe linkages to the existing footpaths on Dip Road, Tuatara Drive, within the development and proposed stream reserve.
- At full subdivision development, traffic generation totalling 800 movements is expected on an average day. The road network the site leads to has adequate capacity to absorb the additional motor vehicle traffic from the proposal at full subdivision development, including subdivision development and construction traffic (which will be managed through an approved traffic management plan and temporary traffic management).
- The proposed accessways are of a design that will enable safe and efficient vehicle movements in and out of the site.

Based on the conclusions drawn in the ITA, it is considered that, subject to suitable conditions of consent that any adverse effects with respect to transportation will be acceptable.

6.5.3 Infrastructure and Servicing

Suitable power and telecommunications connections can be provided to service each allotment within the proposed development.

The provision of three waters infrastructure to service the development has been considered in the Integrated Three Waters report prepared by LDE. Their report and engineering plans are attached as **Appendix 5** and **Appendix 3** respectively. The following comments are made in summary of LDE's findings:

- Water supply will be an extension of the public water mains into the development. This will provide both water supply to the new residential units and firefighting water supply for the new residential units. Council have advised that the water reservoir to the north is due to be upgraded with design currently underway. The applicant has undertaken early engagement with Water Manager Andrew Venmore to understand potential

relationship between the two projects. Existing water main pipes run along the eastern boundary of the site; it is proposed that the easement applying to these be reapplied.

- A wastewater assessment has confirmed that there is sufficient capacity within the public reticulated network to service the proposed development.
- The proposed on-site stormwater system has been designed and comprises of:
  - A stormwater pond has been designed to collect the stormwater runoff from impervious and pervious areas of each lot and the road reserve. The pond has been designed with the necessary outlet configuration to mitigate the 2yr, 10yr and 100yr storm events to equal or less than pre-development rates, which ensures that it does not affect downstream areas with any increases in flow rates. The water will discharge from the pond into the Waitaua stream catchment into the headwaters of the catchment.
  - Additional to the 2yr ,10yr and 100yr storm event mitigation an extended detention volume has been allowed for in the pond with a 24hr drain down period designed in accordance with Auckland Council's GD01. The extended detention reduces the stream erosion and increases water quality in the pond for the runoff from all the individual lots and road reserve areas and will help improve the overall quality of the stream the pond discharges to.
  - The full water quality treatment volume for all areas of the development is provided within the ponds. A forebay is included in the pond designs aid maintenance of pond.

On the basis of the assessment from LDE, it is considered that the proposed development can be sufficiently serviced on site via the proposed mitigation and connection to Council services without resulting in any adverse effects on the surrounding environment.

It is considered to be feasible to design and construct all extensions and upgrades of three waters infrastructure to EES 2010 requirements;

Overall, it is considered that any adverse effects with respect to servicing related matters will be less than minor.

6.5.4 Construction Activities

Approximately 134,349m^3 (52,799m^3 cut and 81,550m^3 fill) of earthworks is proposed, with a maximum cut depth of 6m and a maximum fill height of 4m during earthworks of bulk earthworks are required to enable the construction of building platforms, site access, road network and stormwater infrastructure. This is outlined on the cut and fill plan prepared by Blue Wallace Surveyors (see **Appendix 3**).

Due to the area that the proposed earthworks are undertaken, resource consent under the proposed Northland Regional Plan is required and an application to NRC has been made concurrently with this application. This includes a comprehensive assessment of effects relating to the earthworks in accordance with the relevant requirements of the proposed Regional Plan (**Appendix 11**). An erosion and sediment control plan for the proposed earthworks will be provided, anticipated to be required by conditions of consent, which will details measures to minimise silt and sediment runoff during construction. Silt and sediment control measures are proposed to be

implemented in accordance with the Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region (2016) for the duration of the activity.

On the basis of the above, it is considered that any adverse effects associated with silt and sediment runoff (and resulting effects on water quality) will be less than minor.

When having regard to the nature of the construction activities it is expected that the works will comply with the District Plan construction noise limits which specifically reference New Zealand Standard NZS 6803: 1999 "Acoustics - Construction Noise". Any adverse construction noise effects would be temporary in nature.

There is sufficient space on the subject site to provide parking for construction vehicles. It is considered that traffic and parking capacity effects of the construction period will be less than minor and temporary in nature.

As with other similarly sized projects, it is expected that site works will be managed in accordance with a construction management plan that will set measures to manage potential adverse effects associated with the construction phase of the project. A condition to this effect is offered as part of the application.

Overall, it is considered that any adverse construction effects will be less than minor and acceptable.

6.5.5 Noise Effects

It is anticipated that noise generated by the proposed development will fall within the permitted limits established in the Noise and Vibration chapter. As a result, any adverse noise effects within the wider environment are considered to be less than minor.

6.5.6 Geotechnical

The Geotechnical Report prepared by LDE, included as Appendix 6 sets out recommendations for management of earthworks and associated geotechnical risk. Specifically, geotechnical ground conditions and specific foundation designs will be identified in the Geotechnical Completion report to be provided following earthworks to manage any geotechnical risk.

The report concludes in summary:

"From our assessment of the natural hazard and ground deformation risks presented to the proposed development we consider that a building can be safely located on the site, provided that the recommendations given in Section 5 are adhered".

On the basis of the assessment from LDE, it is considered that the subject site is suitable for the proposed development.

6.5.7 Critical Electricity Lines

Northpower Critical Electricity Lines traverse the southern portion of the site. The line is an overhead line, which the applicant proposes to convert to an underground line, redirecting to be located within the proposed link road. Consultation with Northpower has been undertaken and written approval obtained, refer to Appendix 12).

6.5.8 Impact on Sites of Significance to Maori and Historic Heritage

There are no sites of historic heritage including sites of significance to Maori identified on WDC's GIS system. The proposal will not have any adverse effects on cultural values, historic heritage or the surrounding environment. As such, it is considered that any cultural and historic heritage effects of the proposed subdivision will be less than minor.

6.5.9 Natural Hazards

A small area of the subject site is identified as Flood Susceptible in the Operative District Plan. The effects of the proposed subdivision including the proposed retaining walls being within a Flood Susceptible area have been assessed through the report prepared by LDE in **Appendix 5**. LDE confirms that all proposed lots will avoid the flood risk, concluding deem that the construction of the proposed retaining walls which will raise the platform levels up to approximately RL154 along the boundaries will have no impact on the flood levels. Furthermore, the report concludes that the proposed stormwater pond will improve downstream flood risk. For these reasons it is considered that the adverse effects on the wider environment to be less than minor.

6.5.10 Significant flora and fauna habitats

The application site is currently used for existing rural and residential purposes and does not contain any protected or significant vegetation within the part of the site that is subject to this application. No vegetation clearance is required as part of this subdivision consent, and it is unlikely that any existing trees within the subject site will be required to be cleared for future development. The site is not identified as providing habitat to any significant fauna.

6.6 Summary of Effects

Overall, it is considered that any adverse effects on the environment relating to this proposal will be less than minor.

6.7 Public Notification Conclusion

Having undertaken the section 95A public notification tests, the following conclusions are reached:

- Under step 1, public notification is not mandatory;
- Under step 2, public notification is not precluded;
- Under step 3, public notification is not required as it is considered that the activity will result in less than minor adverse effects; and
- Under step 4, there are no special circumstances.

Therefore, based on the conclusions reached under steps 3 and 4, it is recommended that this application be processed without public notification.

7.0 Limited Notification Assessment (Sections 95B, 95E to 95G)

7.1 Assessment of Steps 1 to 4 (Sections 95B)

If the application is not publicly notified under section 95A, the council must follow the steps set out in section 95B to determine whether to limited notify the application. These steps are addressed in the statutory order below.

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

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

The above does not apply to this proposal.

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

Step 2 describes that limited notification is precluded where all applicable rules and national environmental standards preclude limited notification; or the application is for a controlled activity (other than the subdivision of land).

In this case, the applicable rules do not preclude limited notification and the proposal is not a controlled activity. Therefore, limited notification is not precluded.

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

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

- In the case of a boundary activity, an owner of an allotment with an infringed boundary;
- In the case of any other activity, a person affected in accordance with s95E.

The application is not for a boundary activity, and therefore an assessment in accordance with section 95E is required and is set out below.

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

7.1.4 Step 4: Further notification in special circumstances

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

In this instance, having regard to the assessment in section 6.1.4 above, it is considered that special circumstances do not apply.

7.2 Section 95E Statutory Matters

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

In deciding who is an affected person under section 95E:

- Adverse effects permitted by a rule in a plan or national environmental standard (the 'permitted baseline') may be disregarded;
- Only those effects that relate to a matter of control or discretion can be considered (in the case of controlled or restricted discretionary activities); and
- The adverse effects on those persons who have provided their written approval must be disregarded.

These matters were addressed in section 6.2 above, and written approval obtained from Northpower.

Having regard to the above provisions, an assessment is provided below.

7.3 Assessment of Effects on Adjacent Properties

Adverse effects in relation to visual dominance, shading, and privacy on adjacent properties are considered below.

Wider effects, such as neighbourhood character, construction, and transportation were considered in section 6.5 above, and considered to be less than minor.

The adjacent properties to be considered in the limited notification assessment under section 95B and 95E are shown in Figure 4 above.

7.3.1 Character and Amenity

Any adverse effects on persons at adjacent properties are considered to be less than minor for the following reasons:

- The proposed development will increase the density via subdivision of the land beyond what currently exists for the site, however, this is contemplated and expected by the Plan. Further, the development can be adequately serviced (as anticipated by Council capacity and infrastructure) in terms of stormwater, wastewater, water and other utilities without compromising the infrastructure network as discussed in the infrastructure report.
- The District Plan anticipates a density of 1 per 320m² with an average density of 1 per 400m^2(net) for sites in the General Residential Zone. In this case, the proposal does not create any additional development potential for the site over and above what currently exists when taking into account the permitted baseline. The proposed development comprises lots fall within the 327m^2 to 734m^2 in size.
- All proposed lots are of a sufficient size, shape and gradient to accommodate compliant residential development, exclusive of any required setbacks. This will ensure that appropriate levels of visual and aural privacy and open space for the immediate Residential area are maintained to adjacent and adjoining properties as a result of the separation and ability to plant effective landscaping around any future dwellings. For

these reasons, the effects on the owners and occupiers of adjacent properties when considering residential character and amenity are considered to be less than minor.

For the same reasons outlined in the assessment above, the proposal has been designed to ensure the proposed visual scale of future residential activities provided for by the proposed subdivision will not dominate the 'General Residential' character of the adjoining and adjacent properties.

7.3.2 Other effects

For reasons identified above no persons will be adversely affected by:

- The proposal in terms of traffic or pedestrian safety, infrastructure capacity or servicing, in terms of noise, cultural and heritage effects, hazards, ecological effects;
- The proposed construction works for the reasons identified above. The effects on adjacent properties during construction will be temporary and less than minor.

Overall, any adverse effects on these properties are considered to be less than minor.

7.4 Summary of Effects

Taking the above into account, it is considered that any adverse effects on persons at the aforementioned properties will be less than minor in relation to character and amenity, visual dominance, shading, privacy, and residential intensity effects.

It is considered, therefore, that there are no adversely affected persons in relation to this proposal.

7.5 Limited Notification Conclusion

Having undertaken the section 95B limited notification tests, the following conclusions are reached:

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

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

8.0 Consideration of Applications (Section 104)

8.1 Statutory Matters

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

- Any actual and potential effects on the environment of allowing the activity;

- Any relevant provisions of a national environmental standard, other regulations, national policy statement, a New Zealand coastal policy statement, a regional policy statement or proposed regional policy statement; a plan or proposed plan; and
- Any other matter a council considers relevant and reasonably necessary to determine the application.

As a restricted discretionary activity, section 104C of the Act states that a council:

(1) may grant or refuse the application;

(2) must only consider matters over which a discretion is restricted; and

(3) if it grants the application, may impose conditions under section 108 only for those matters which it has restricted the exercise of its discretion in its plan.

8.2 Weighting of Proposed Plan Changes: Whangārei `District Council - Urban and Services

The Act requires that before a Plan change becomes operative, any resource consent application be considered in terms of the provisions of both the Operative Plan and a Proposed Plan/Plan Change. In this case, the provisions of the Operative Whangārei District Plan do not require consideration because there are no appeals outstanding relating to the General Residential Zone of the Proposed District Plan (Urban and Services Plan Changes). On this basis, weight has been applied solely to the Proposed District Plan.

9.0 Effects on the Environment (Section 104(1)(A))

In addition to the above, the following is noted in respect to positive effects and on-site amenity effects:

- Positive Effects; and
- On-site amenity.

9.1 Positive Effects

The proposal will result in the subdivision and creation of 95 new fee simple residential allotments that will allow for future residential development in an established residential area that will give effect to the environmental quality and amenity value outcomes sought by the Proposed Whangārei District Plan. The allotments will allow for the construction of housing and will ultimately provide living opportunities that are in close proximity to a range of local amenities and recreational activities.

9.2 On-Site Amenity

Consideration has been given to lot layout and design to ensure that future site planning and building design will provide for a good level of internal and external amenity for the residential units. It is considered that future residents will experience a good level of amenity and liveability, relative to their needs. Furthermore, the receiving environment has sufficient capacity to accommodate the effects of the proposal without loss of levels of amenity anticipated by the zone.

Overall, the size and layout of the proposed allotments will provide quality living environments for future residents. The lots are sufficiently designed to accommodate future landscaping treatment which will also provide positive benefits for the residents.

When taking the above into account it is considered that the development will feature an appropriate level of residential amenity.

9.3 Summary of Effects

Having regard to the actual and potential effects on the environment of the activity resulting from the proposal, it is concluded in the assessment above that any adverse effects relating to the proposal will be less than minor.

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

10.0 District Plan and Statutory Documents (Section 104(1)(B))

10.1 National Policy Statement – Urban Development

The NPS-UD 2020 requires councils to plan well for growth and ensure a well-functioning urban environment for all people, communities and future generations. The NPS-UD also provides Councils the necessary policy direction to allow further urbanisation where it may not have previously been anticipated or supported by operative planning frameworks.

The NPS-UD 2020 recognises the national significance of:

- Having well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future.
- Providing sufficient development capacity to meet the different needs of people and communities.

Comment: For the purpose of the NPS-UD, Objectives 1 to 4 and Policies 1, 5 and 6 are relevant. Whangārei is a Tier 2 urban environment and the site is an area of land that is, or is intended to be, predominantly urban in character. This proposal gives effect to the NPS-UD by supporting the appropriate urbanisation and intensification of land zoned residential land which has high accessibility to open space, schools and commercial centres (as outlined in section 3.1). The density proposed will meet the minimum requirements of the General Residential Zone, the NPS-UD further supports the proposed land use and subdivision. In particular, the proposal:

Provides for the construction of additional household units which will result in a more efficient use of the site, as anticipated and required by the NPS-UD;

- Allows for greater intensification of residential activities in an area that is already zoned for residential development and that is serviced by existing infrastructure and a public transport network;
- Provides an opportunity for an urban environment, including its amenity value, to develop and change over time; and

- Is generally consistent with Central Governments expectations for forthcoming urban infill developments for tier 2 urban environments.

For these reasons the proposal is considered consistent with the relevant provisions of the NPS-UD.

10.2 National Policy Statement for freshwater management

The fundamental concept of the National Policy Statement for Freshwater Management (NPS-FM) is "Te Mana o te Wai" the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. It protects the mauri of the wai. Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community. The only objective of the NPS-FM is:

2.1 Objective

(1) The objective of this National Policy Statement is to ensure that natural and physical resources are managed in a way that prioritises:

(a) first, the health and well-being of water bodies and freshwater ecosystems

(b) second, the health needs of people (such as drinking water)

(c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

Policies of the NPS-FM focuses upon the management of freshwater in an integrated way to ensure that the health and well-being of water bodies and freshwater ecosystems is maintained and improved.

While the subject site does not contain any wetlands, the Waitaua Stream traverses the southern boundary of the subject site. Policies 2, 3, 5, and 9 are considered relevant to the proposed development. Sediment and erosion control will be in place to mitigate potential affects to the Waiaua Stream. The proposal will result in residential development being located north of the Waiaua Stream, any future built development within the proposed residential allotments will be appropriately setback from site boundaries. Any stormwater runoff from built form and impervious areas will be directed into the proposed stormwater system.

The proposal includes a comprehensive stormwater system which will result in an onsite stormwater pond (designed to accommodate 2yr, 10yr and 100yr storm events). The water will discharge from this pond into the Waitaua Stream catchment. The full water quality treatment volume for all areas of the development is provided within each of the ponds. The ponds are also likely to drain completely through soakage during the drier periods, as the stream only flows during heavier rainfall events, remaining dry for a lot of the drier summer period.

The proposal will result in the entire area of the Waitaua Stream being protected by way of reserve including the surrounding native vegetation. This will ensure on-going protection of native vegetation and the habitat of the Waitaua Stream.

For these reasons, it is considered that the proposal is consistent with the relevant NPS-FM policies and achieves objective 1.

10.3 National environmental standard for freshwater management

The proposal is assessed as a permitted activity under the NES-FM, therefore no further assessment is necessary.

10.4 Northland Regional Policy Statement

The Northland Regional Policy Statement (RPS) covers the management of natural and physical resources across the Northland Region. The provisions within the RPS give guidance at a higher planning level in terms of the significant regional issues. As such it does not contain specific rules that trigger the requirement for consent but rather give guidance to consent applications and the development of Plans on a regional level.

Objectives range from integrated catchment management, improvement of overall quality of Northland's water quality, maintaining ecological flows, protecting areas of significant indigenous ecosystems and biodiversity, sustainable management of natural and physical resources in a way that is attractive for business and investment that will improve the economic wellbeing. enabling economic wellbeing, regional form, the role of tangata whenua kaitiaki role is recognised and provided for in decision making, risks and impacts of natural hazards are minimised, outstanding natural landscapes and features and historic heritage are protected from inappropriate subdivision, use and development.

Relevant policy has been identified and summarised as follows:

- Policy 4.2.1 seeks to improve the overall quality of Northland's water resources by, establishing freshwater objectives, reducing loads of sediment, nutrients and faecal matter to water and promoting and supporting the active management, enhancement and creation of vegetated riparian margins. The proposed development will have a positive effect on the fresh water of the Waitaua Stream, as sediment and nutrient run off will be reduced by the proposed stormwater management system. The stream and surrounding area will be protected by proposed reserve and protection of the indigenous vegetation.
- Outside of the coastal environment policy 4.4.1 seeks to avoid, remedy or mitigate adverse effects and of subdivision, use and development so they are no more than minor on indigenous taxa, indigenous vegetations and habitats of indigenous fauna that are significant using Appendix 5, and avoid, remedy or mitigate adverse effects of subdivision, use and development. The proposed development will result in the protection of indigenous vegetation within the site, particularly the indigenous vegetation along the the Waitaua stream.
- Policy 5.1.1 seeks to provide for subdivision, use and development that is located, designed and built in a planned and co-ordinated matter. It is considered that the proposal is in accordance with the Regional Form Development Guidelines and the Regional Urban Design Guidelines. In particular, the proposed development incorporates quality urban design principles including context, character, choice, connections, creativity custodianship and collaboration. With specific reference to 5.1.1(d) and (h), the proposal can be adequately serviced in terms of transportation, water, wastewater, and stormwater by existing and proposed infrastructure.
- According to Policy 7.1.1 subdivision, use and development of land will be managed to minimise risks of natural hazards. The proposed subdivision and residential use of the site,

will be managed to minimise the risk of natural hazards by way of comprehensive design of onsite stormwater management, avoidance of areas high instability hazards.

- Policy 8.1.2 requires district council to recognise and provide for the relationship of tangata whenua and their culture and traditions, have particular regard to kaitiakitanga and take into account the principles of the Treaty of Waitangi including partnership when processing resource consents. No sites of cultural significance or heritage are identified within the subject site.

For these reasons, it is considered that the proposal is consistent with the relevant RPS provisions.

10.5 Operative Regional Water and Soil Plan for Northland (RWSP)

A comprehensive assessment of objectives and policies of the RWSP is undertaken in the NRC application in **Appendix 11**.

10.6 Proposed Northland Regional Plan (PRP)

A comprehensive assessment of objectives and policies of the PRP is undertaken in the NRC application in **Appendix 11**.

10.7 Objectives and Policies of the Whangārei District Plan

10.7.1 District Growth and Development

The District Growth and Development Chapter guides decision making at the strategic level. The objectives and policies relevant to this proposal, seek to provide for differing character and amenity values in a range of zones, to accommodate the managed growth of rural villages, ensure that the scale and nature of new land use activities are commensurate with the anticipated level of amenity and stated issues and objectives for the relevant zone.

The proposal accords with this policy direction, as it is proposing consolidated development within the General Residential Zone in a manner that is consistent with the growth and level of amenity anticipated within this Zone.

10.7.2 Urban Form and Development

The Urban Form and Development Chapter, sets out the policy direction for the urban area and guides decision making at the strategic level. The objectives and policies generally seek to ensure sufficient residential capacity, and to manage change to urban character and amenity values by applying high quality urban design. Policy UFD-P13 Residential Zones specifies where General Residential Zone will be located.

The proposal accords with this policy direction, proposing to develop within the General Residential Zone, seeking to intensify at a level that will comply with urban character and amenity values of the General Residential Zone.

10.7.3 Transport

The Transport Chapter sets out the policy direction for the establishment, maintenance and use of the transport network. The chapter states that Whangārei's future growth expectation is for consolidated urban development. Objectives and policies generally seek to integrate land use and

transport planning to ensure that land use activities, development and subdivision maintain the safety and efficiency of the transport network.

The proposal accords with the relevant objectives and policies within the Transport Chapter as the level of development is consistent with that anticipated for the General Residential Zone and access to and from the site has been designed in a manner that will maintain the safety and efficiency of the localised and wider transport network.

10.7.4 Three Waters Management

The Three Waters Management chapter implements provisions to manage the impact of land use and subdivision on water resources and services. The objectives and policies seek to sustainably and efficiently manage three waters resources. The application seeks to carry out development on the subject site with connections to Council reticulated three water services within a level of development that could occur as of right on the General Residential Zoned land. New connections are proposed for new allotments in accordance with the Three Waters Management requirements of the District Plan. Further details are outlined in the LDE Three Waters Report (Appendix 5) which has concluded that all lots can be adequately serviced by existing reticulated infrastructure without any issues arising.

On this basis, it is considered that the proposal accords with the Three Waters Management objectives and policies.

10.7.5 Network Utilities (NTW) Chapter

The objectives and policies of the Network Utilities Chapter seek to protect and restrict certain activities around network utilities.

The "Critical Electricity line" located within the southern edge of the subject site is currently owned by Northpower, any development is required to meet the minimum safe separation distances for buildings/structures, earthworks, mobile plant and people from transmission lines and support structures as set out in the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34:2001) regulation.

The proposed development will adhere to the minimum safe distances ensuring that the proposed development will be established in a way that will protect persons, property and vehicles from harm or damage from electrical hazards. This will ensure the proposed development will not result in any reverse sensitivity effects and as such is considered to be consistent with the relevant provisions.

10.7.6 Natural Hazards Chapter

The objectives and policies of the Natural Hazards Chapter seek to avoid as far as practicable or otherwise remedy of mitigate the adverse effects of natural hazards on people, property and the environment. Policies seek to ensure that subdivision, use and development does not increase the risk from adverse effects of natural hazards.

The proposed subdivision and residential use of the site, will be managed to mitigate and minimise the risk of natural hazards by way of comprehensive design of onsite stormwater management to reduce flooding risk downstream and avoidance of significant earthworks within areas high instability hazards as detailed in the Three Waters Report (Appendix 5) and the Geotechnical

Report (Appendix 6). It is considered that the proposal will give effect to the relevant natural hazards objectives and policies.

10.7.7 Subdivision

The Subdivision Chapter provides direction for the consideration of subdivision of land. Objectives and policies are process oriented seeking to protect and enhance the district's valued features and resources, to subdivide land in a manner that provides for the changing needs of people and communities.

SUB-P1 seeks to

To enable subdivision where it meets the relevant zone, overlay and districtwide policies, where subdivision and development is designed to:

1. Reflect patterns of development that are compatible with the role, function, amenity values and predominant character of the zone.

2. Maintain the integrity of the zone with lot sizes sufficient to accommodate intended land uses.

3. Respond positively to and integrate with the surrounding context.

4. Appropriately avoid, remedy or mitigate adverse effects on:

a. Outstanding Natural Features.

b. Outstanding Natural Landscapes.

c. Coastal Areas.

d. Areas of High Natural Character.

e. Areas of Outstanding Natural Character.

f. Sites of Significance to Māori.

g. Historic Heritage.

h. Significant Natural Areas.

i. Highly versatile soils.

The subject site does not contain any valued features and resources, the proposed subdivision will reflect the development patterns and amenity values of the General Residential Zone. The proposal includes a range of lot sizes that will enable residential development consistent with what is anticipated in the Zone.

For these reasons, it is considered that the proposal accords with the Subdivision objectives and policies.

10.7.8 Earthworks

The Earthworks Chapter manages earthworks associated with subdivision to ensure that sites are suitable for development, and that instability hazards and adverse effects on heritage values and New Zealand kauri trees are managed. Objectives and policies generally seek to minimise potential risks to people, property and environment from land instability and to avoid where practicable, or otherwise remedy or mitigate adverse effects associate with land instability through the management of earthworks.

The proposal accords with the policy direction of the Earthworks Chapter, earthworks, retaining and stormwater management have been carefully designed by LDE (Appendix 6 and 7) to mitigate effects from the establishment level finished building platforms within each lot.

10.7.9 Lighting, Noise and Vibration and Signage

The objectives and policies of these chapters seek to ensure subdivision and development provide lighting and signage to support the safety and security of people and property, maintaining pedestrian and traffic safety, maintaining and where appropriate enhancing amenity and character of each zone. The proposed development will give effect to the policy direction, complying with the permitted standards for lighting, noise and vibration and signage.

10.7.10 General Residential Zone

The General Residential Zone provides for traditional suburban densities and housing forms, and is characterised by one to two-storey stand alone residential units. Objectives and policies seek to provide for subdivision and development that is consistent with the planned suburban built environment and are compatible with the amenity levels of existing residential development. Of particular relevance to this proposal is:

GRZ-P1 Density and Character

To achieve the planned suburban built character by:

1. Managing the number of residential units that can be accommodated on each site.

2. Managing the height, bulk and form of development.

3. Requiring sufficient outdoor living space and landscaping within each site.

4. Enabling residential development on sites of an appropriate size and shape.

The application proposes to create a range of residential allotments of appropriate size and shape which will easily accommodate residential units in accordance with permitted activity standards for the General Residential Zone. It is considered that the proposal achieves a suburban built character that is anticipated and provided for in the General Residential Zone.

GRZ-P2 Onsite Amenity and GRZ-P3 Adjacent Properties policies both seek to achieve appropriate levels of amenity and to sensitively design development to mitigate intrusion on adjacent properties. The proposed subdivision has been carefully designed to ensure that each site has sufficient area to enable future residential development to comply with all General Residential Zone permitted activity standards for setback from boundary and outdoor living courts. A high level of onsite amenity is achieved throughout the development due to the communal open space areas, recreation reserves, landscape planting and road treatments. It is considered that the proposal accords with policies GRZ-P2 and GRZ-3.

GRZ-P4 Residential Amenity and Character seeks:

To manage adverse effects on residential amenity and character by requiring developments to have regard to the way the development:

1. Provides street activation through connection between front doors and the street.

2. Provides landscaping that enhances on-site and local residential amenity, with particular regard to site frontage.

3. Minimises large monotonous building façades and walls that do not include design variation or are not broken down into smaller elements.

4. Relates to neighbouring properties by employing setbacks, sensitive building orientation and design, and landscaping to mitigate dominance and privacy impacts.

5. Provides an active interface to Open Space and Recreation Zones onto which it fronts.

6. Is sympathetic to the amenity and character of the locality and other buildings in the vicinity, having regard to:

a. Building bulk, scale and symmetry.

b. Site sizes and providing for a more spacious form of development.

It is considered that the proposal accords with policy GRZ-P4, while residential units have yet to be designed the proposed residential allotments have been designed to provide sufficient space to allow future development enhance street amenity and internal site amenity. A high level on onsite amenity is achieved throughout the development due to the communal open space areas, recreation reserves, landscape planting and road treatments.

GRZ-P10 Density seeks to:

To provide for a range of site sizes and densities by considering increased residential density where:

1. A mixture of allotment sizes and housing typologies, including low-cost options, are provided.

2. The location is supportive of pedestrians, cyclists and public transport.

3. The area is in proximity to Open Space and Recreation Zones and the City Centre, Mixed Use, Local Centre or Neighbourhood Centre Zones.

4. There is sufficient infrastructure to accommodate the development.

5. The development is sympathetic to the surrounding environment and adverse effects on adjoining sites are minimised.

6. The parent allotment size and site frontage are sufficient to enable comprehensive development and provide quality on-site amenity.

The proposed development will achieve the anticipated residential density of 320m2 net site area per residential allotment and average net site area of 400m2. The residential density proposed is considered to be in accord with GRZ-P10 because:

- A mixture of allotment sizes and shapes are proposed;
- The development layout includes sufficient access widths;
- LDE (Appendix 5) confirm that there is sufficient capacity within the reticulated three waters system and the existing connections;
- The site is in close walking distance of open space and community services; and
- The site has been comprehensively designed, earthworks, retaining and landscaping have been designed across the entire site and each individual lot to ensure that adverse effects on adjoining sites have been minimised.

10.8 Summary

It is considered that the proposed development is generally in accordance with the objectives and policies of the Northland Regional Policy Statement, Northland Regional Plan and Whangārei District Plan (Appeals Version).

11.0 Relevant Rules and Assessment Criteria

The Proposed District Plan specifies the relevant assessment criteria to be considered in assessing this application for each of the consent matters in the following sections:

General Residential Zone

- Rule GRZ-R4 (Building and Major Structure Setbacks)
- Rule SUB-R2 (Subdivision);
- Rule SUB-R5 (Subdivision in GRZ);
- Rule TWM-R2 (Stormwater);
- Rule TWM-R3 (Wastewater);
- Rule TWM-R4 (Water Supply);
- Rule TWM-R5 (Integrated Three Waters Assessment);
- Rule TRA-R13 (Subdivision);
- Rule TRA-R15 (Any Activity);
- Rule TRA-R16 (Construction of Any New Public Road);
- Rule TRA-R17 (Major Roading Alterations to an Existing Public Road);
- Rule EARTH-R1 (Earthworks associated with subdivision); and
- Rule LIGHT-R7 (Any subdivision).

These criteria largely cover the same matters that have been discussed and assessed in the above report, pertaining to environmental effects and the objectives and policies of the Proposed District Plan. Further detail has been included in Appendix 9.

Overall, it is considered that the proposal meets the assessment criteria of the Whangārei District Plan for the reasons described in sections 6, 7, 9, and 10 above.

12.0 Part 2 Matters

Section 5 of Part 2 identifies the purpose of the RMA as being the sustainable management of natural and physical resources. This means managing the use, development and protection of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being and health and safety while sustaining those resources for

future generations, protecting the life supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

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

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

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

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

13.0 Other Matters (Section 104(1)(C))

No other matters are considered relevant to this application.

14.0 Conclusion

Onoke Heights Ltd applies for a land use and subdivision consent from the Whangārei District Council for the subdivision, residential development and associated services of 95 residential allotments, at Dip Road, Kamo. A separate land use application is being sought concurrently from Northland Regional Council.

Based on the above report it is considered that:

- The application is a restricted discretionary activity and is not precluded from public notification;
- Public notification has not been requested by the Applicant.
- Any adverse effects in relation to the proposed activity are considered to be less than minor, and acceptable when considering the significant positive effects of the proposal;
- The proposal is considered to accord with the Regional Policy Statement;
- The proposal is considered to generally accord and is not contrary with the operative and proposed District Plans; and
- The proposal is considered to be consistent with Part 2 of the Act.

It is therefore concluded that the proposal satisfies all matters the consent authority is required to assess, and that it can be granted.

Appendix 1

Record of Title

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**NA78D/985**
Land Registration District	**North Auckland**
Date Issued	23 May 1991

Estate	Fee Simple
Area	6.8700 hectares more or less
Legal Description	Section 1 Survey Office Plan 65970
Registered Owners	

Onoke Heights Limited

Interests

Subject to a water pipeline right created by Deed of Easement 61A/47 - 2.8.1985 at 2.35 pm

Subject to Section 27B State-Owned Enterprises Act 1986 (which provides for the resumption of land on the recommendation of the Waitangi Tribunal and which does not provide for third parties, such as the owner of the land, to be heard in relation to the making of any such recommendation)

Subject to Part IV A Conservation Act 1987

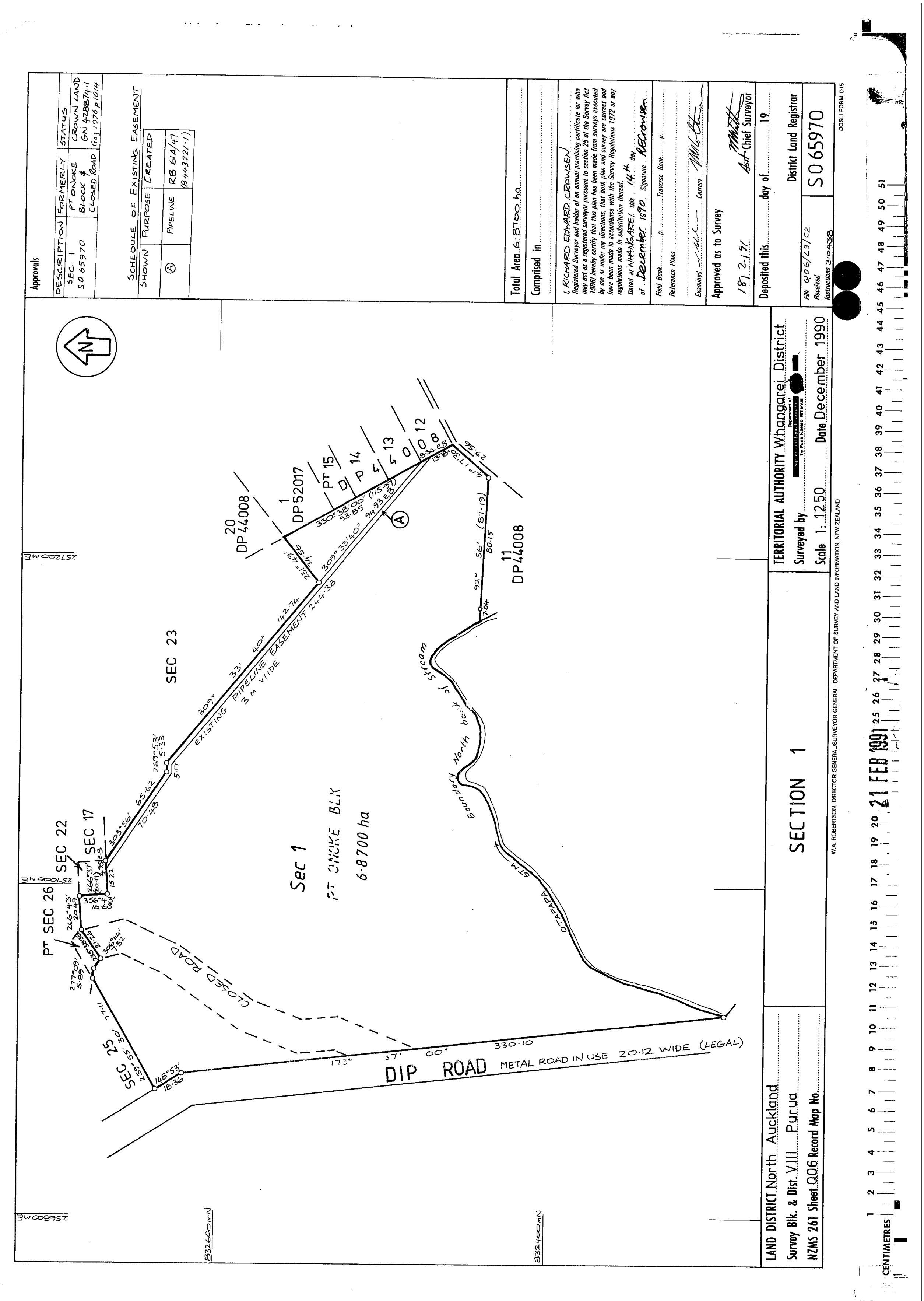
Subject to Section 3 Petroleum Act 1937

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Sections 6 and 8 Mining Act 1971

Subject to Sections 5 and 261 Coal Mines Act 1979


Approvals
DESCRIPTION | FORMERLY | STATUS
SEC 1 SO 65970 | PT ONOKE BLOCK 4 CLOSED ROAD | CROWN LAND GN 428874.1 Gaz 1976 p1014
SCHEDULE OF EXISTING EASEMENT
SHOWN | PURPOSE | CREATED
A | PIPELINE | RB 6A/47 (B443721.1)
Total Area 6·8700 ha
Comprised in
I, RICHARD EDWARD CROWSEN, Registered Surveyor and holder of an annual practising certificate for who may act as a registered surveyor pursuant to section 26 of the Survey Act 1986) hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof.
Dated at WHANGAREI this 14th day of December 1990. Signature R.E.Crowsen
Field Book p. Traverse Book p.
Reference Plans
Examined Correct
Approved as to Survey
18/2/91
Asst Chief Surveyor
Deposited this day of 19
District Land Registrar
S O 65970
File Q06/L3/C2
Received
Instructions 31043B
DOSLI FORM D15
TERRITORIAL AUTHORITY Whangarei District
Surveyed by
Scale 1: 1250 Date December 1990
SECTION 1
LAND DISTRICT North Auckland
Survey Blk. & Dist. VIII Purua
NZMS 261 Sheet Q06 Record Map No.
W.A. ROBERTSON, DIRECTOR GENERAL/SURVEYOR GENERAL, DEPARTMENT OF SURVEY AND LAND INFORMATION, NEW ZEALAND
21 FEB 1991
CENTIMETRES
Sec 1
PT ONOKE BLK
6·8700 ha
SEC 23
SEC 22
SEC 17
PT SEC 26
SEC 25
20 DP 44008
1 DP 52017
PT 15 DP 14 40012 13
11 DP 44008
EXISTING PIPELINE EASEMENT 3 M WIDE
309° 33' 40" 142·74
309° 33' 40" 244·38
330° 38' 00" (115·5) 93·85
94·93 EB
CLOSED ROAD
DIP ROAD
METAL ROAD IN USE 20·12 WIDE (LEGAL)
173° 37' 00" 330·10
92° 56' (87·19) 80·15
Boundary North bank of Stream
OTAPAPA STM
2572000mE
2570000mE
2568000mE
832600mN
832400mN

Appendix 2

Pre-application Meeting Minutes

Minutes of Pre-Application Meeting PRL2100039 held at Council offices 09 August 2021 at 2:00pm.

PRL Number:	PRL2100039
Development/ Applicant:	Hurupaki Heights Limited
Date & Time:	09 August 2021 2:00pm
Site Location:	131 Three Mil Bush Rd & 189 Three Mile Bush Rd, Kamo (Lot 2 & 3 DP 99045) Dip Road, Kamo (SEC 1 SO 65970)
Proposal:	Three Mile Bush Rd: Combined SL - 77 residential lots, 6 reserve lots, new road, relocate stone walls, cafe, earthworks, 3 waters & transport *Issues from applicant's perspective: Split zoning of the site GRZ/RPZ, integrated three waters assessment, integrated transport assessment, vesting of reserves, consultation with hapu, development contributions* Dip Rd: Combined SL - 85 residential lots, access and servicing *Issues from applicant's perspective: GRZ/RPZ, integrated three waters assessment, integrated transport assessment.*
Present	Council: Alister Hartstone (Consultant Planner), Mary Willson (Scribe), Murray McDonald (Manager – RMA Consents), Pat Sugrue (Development Engineer), Nadia de la Guerre (Team Leader – Development Engineering), Pat Sagrue (Development Engineer), Lynne Dahl (Team Leader – Development Contributions), Casper Kandori (Waste & Drainage Engineer), Mazza Aziz (Stormwater Engineer), David Drummond (Distribution Engineer – Water Services), Nick Marshall (Team Leader – Road Safety & Traffic Engineer), Sarah Brownie (Infrastructure Planning), Alicia Lawrie (Strategic Urban Design) Applicant: Melissa McGrath (Agent – Barker and Associates), Mark Holland (Applicant), Dayle Widdup (Project Manager/Civil Engineer – Project Civil Ltd), Dean Scanlan (Traffic Engineer – Engineering Outcomes Ltd), Mike Farrow (Landscape Architect – Littoralis), Charlotte Nijssen (Surveyor – Blue Wallace), Aaron Holland (Geotech & Three Waters Engineer – LDE)

Main discussion on Three Mile Bush Rd below:

No	Topic	Information
1	**Background/Overview**	
• Non-complying rural production zone • Will be lodged as SL application • Refer to the plan provided • 400+ sections at totara parklands – almost complete • 'The James' – 115 TMB – finalised in Jan – 66 lots • Site covers 5hc to the west of The James – another 9hc adjoining also purchased • 600m sites on average – flat contour and sloping • Discussion on the zoning – copy the map • Stonewalls to be relocated – discretionary activity • Lot sizes compliant • Ponds x3 • Stream through the middle – reserve to vest including the ponds. Walking track through the middle. Propose small café for the residents at the top of the reserve (to be included in the proposal). Pedestrian access to The James only. • Also vesting all up the hill to the north as well and planting this.		

- Stone walls on the road will be staying
- Will be notice on the large lots that they can't be subdivided in future. Different living opportunities for people is the intent of the design
- Non-complying section up the slope as rural zone.
- Environmental benefit – pathway planned, should not have stock on the slope.
- Ecologist report – all good – Mel – already pest/weed management under way.

2	Roading

Comments summary supplied by Nick M post meeting:

- In favour of pedestrian link to James subdivision
  - Concrete walkway to parks section 7 standard 2.2m wide path 6m reserve and lit as a road to road walkway. Will need to tie into The James development path, whatever that was.
- Intersection treatment? Like a right turn bay required due to predominance of flow direction. May want a roundabout instead.
- Downstream impacts? TIA…
  - 3 mile bush / Kamo Rd
  - Kamo Rd / Whau Valley
- Parking bays
  - In favour as long as designed to in take into account driveways and tree pits
- Need for guidance from Musheer on lighting standards, but likely P3 for roads and walkway lighting for path
- ROW standard – non-compliance to be covered in ITA, I believe a good mitigation would be wider reserve width and wider footpath
- Road standards – agree loop road would be class B, cul-de-sac is borderline class C, given the ROW coming off the end request footpaths both sides, but same road and reserve width as class A. main road connection may be a higher standard, but Class B is acceptable.
- Want to understand what walkways/shared paths/cycle trails will be provided to support active transport to shops, school and community
- How pedestrians managed
  - Speed limit – 30km/h or 40km/h
  - Raised table crossing at main intersection
  - Traffic calming
- Road frontage – upgrade to Class D standard for 3 mile bush road as per The James
- Connectivity to northern block?
  - LOT 203 drainage reserve
  - Future road or pathway link?
- **Public Transport**
  - If/when PT is extended can the busses make the loop road as a convenient turn around. Make NRC an affected party please. **Dean**

I expect that the ITA should cover most of these elements.

3	Water/Wastewater/Stormwater

Wastewater:

- Casper - good to come from the James. Largely gravity system but may require pump ups on some individual lots (approx. 12 of the 70 lots). Could look at pressure system, vesting to council will depend on number and configuration. Casper will send council pressure sewer policy to Charlotte. Casper to check if this site has been allowed for in the wastewater model and any capacity concern on the downstream 150mm section of gravity sewer line. May require capacity assessment of the 150mm network from the school.
- Additional discussion after the meeting: Shift sewer manhole from lot 55 into the drainage reserve lot 203 for easy access to extend the network if required in future.

Stormwater:

- Nadia – will need access to the SW ponds – need to comply with standards and David – good idea to split out the lots to reserve (recreation) and stormwater pond (with access) – potentially with easement. Sarah can review this and get back to. Lots and easements dependant on the size of the lot – get back to them.

Water:

- David – plenty of water but issue re pressure. In the process of building new reservoir – complete in 2 years? Still in design stage – 1km up the road approx. Provisional only and will then give adequate supply. Mark – timeframe should work. As it stands will not be adequate to standards – 10 metres can run but standard is 25ms (agreed standard) – would have to model and consider fire fighting – David – could give pressure at the takeoff of the development at the point and developer can model. Based on the contour levels of the development and the reservoir (David). Do some modelling and think it could work – not a showstopper (David) – adding 30ms so would need to reduce.

4	Landscape

- Landscape plan – paper one in meeting– need a copy (not received as yet)
- Connections from the natural landscape forest and further down the catchment
- Non-compliant activity – rural character – strip between the two areas that is currently clear – community space potential. Will be refined as part of the application, linkage between.
- Streetscape – low speed and pedestrianised and feature of stream. Stormwater ponds – ways they can bring some amenity value as well as functional. Community and connection with the James.
- Contours – starting to elevate over lots 62-70. Won't see a lot from the road.
- Water flow from the hill? Alister? How will manage – to be planted out and diverted around the reserve at the bottom. Cat B soil for drainage. No sign over overland flow paths. Mel – Ecologist involved – no wetlands on site. And will have report as part of application
- No quarry set back applies

5	Site Suitability/ Geotechnical Reports/Earthworks

- Earthworks – 4000 excess cut lots 6-13 area. Aaron – Stormwater – 3 ponds. Sewer line and water from the James
- Attenuation – manage it through the 3 ponds if possible -preferred rather than putting on to some lots (avoid the cost on the owners).
- Platform levels on 90% of sites
- 14m wide roading
- NRC – earthworks and culverts – discussed and no contaminates – archaeological report all good.

6	Development Contributions

Copy as attachment

Comment re offset for the reserve – need to be aware can't double-dip

7	Other Planning Considerations:

Urban Design

- Alicia – scheme is pretty good from UD aspect, considerations to visual and physical connections to surrounding context - will be interested in the development and design of individual lots.
- Fencing - there will be no front fencing (must be open) and developer needs to approve designs. No high fencing or close boarding (Mark).
- Refer to the design guidelines on the website as a useful resource.
- Pedestrian access to the James – just the one? - Yes, just the one (Mark).
- Link to Urban Design guidelines on WDC website - Urban Design Guidelines – Residential Development – Chapters 1-3 particularly relevant with guidance on fitting in to the local context and subdivision design.

Iwi consultation:

- Consultation and liaising back and forth – doing as much as can (Dick and Georgina) – taken onboard feedback and they will only consider once application lodged. Formal consultant document after that – 6 weeks to complete. Will keep trying to work with them. May opt to public notify.

Parks:

- Sarah – on balance pretty happy – interested in fencing and how the reserves will be treated – what will be in them – footpaths, playgrounds and the intent of use. Lighting etc. Any standards by council on fencing against council reserves? No. safety appropriately addressed. 2.5m contained path (like Totara)

<table>
<tr><td colspan="2">

- Fencing on the back of the lots – want to have the enjoyment of the outlook of the trees etc – don't want a big wall.(Mark)

Ongoing: - water/traffic assessment
Could vest land should the stonewall on road be part on road/property – Murray – preference is not to have on both and council own
Café will be on residential lot (part of the LU) – DC considered as residential
Re parking requirements changing in Jan

</td></tr>
<tr><td>8</td><td>Onoke – Tip Road comments:</td></tr>
<tr><td></td><td>

General residential zone – no infringements etc
Building companies are asking for smaller sites. Potentially over 55s community - Private access (gated) and freehold access – 410m2 average size
Covenants over significant trees
Traffic report – best location for site access (visibility)
Bury the power lines (high tension)
Alister – road capacity? Mel – needs ITA (Nick – comment could become through road) – pedestrian path access.
Overland flow path in vacant areas –
Timeline – asap – end of this month to lodge aim
Water – David – no need to move connection and potential to run up the new road? Is an overflow for the reservoir need to be aware of. Reservoir expansion – will be a second one, may need more land and not confirmed yet and can let know as soon as poss. Needs to stay on level with existing one, may not fit in current property owned.
Casper – connection at the boundary and anything in the private area can't be vested but can have easement for access. Older lines – 150mm – need to check condition – camera check?

Additional comments provided by Nick M – post meeting:

Comments for this development:

- In favour of walkway connecting Tuatara to Dip Rd, noting this is part of the Hodges Walkway from Kamo Village
- Upgrade of Dip Rd frontage to Class C at least including lighting V-cat
- Tuatara Rd extension would likely be Class C, but minimum match Tuatara Drive
- Walkway should be concrete 2.2m wide given flooding issues.
- ITA needed; new intersection with Dip Rd, impact to Tuatara Drive and onto 3 mile bush road, impact on 3 mile bush / Dip intersection (needs to be aroundabout).

</td></tr>
</table>

Closed 3.40pm

Appendix 3

Scheme Plan and Engineering Plans

MEMORANDUM OF EASEMENTS

PURPOSE	BURDENED LAND	SHOWN	BENEFITTED LAND
RIGHT OF WAY RIGHT TO CONVEY ELECTRICITY, TELECOMMUNI-CATIONS, GAS & WATER RIGHT TO DRAIN WATER	LOT 301 HEREON	A	LOTS 26-28 HEREON
RIGHT OF WAY RIGHT TO CONVEY ELECTRICITY, TELECOMMUNI-CATIONS, GAS & WATER RIGHT TO DRAIN WATER	LOT302 HEREON	B	LOT 59 - 66 HEREON
RIGHT TO DRAIN WATER	LOT 62 HEREON	D	LOTS 59-61, 63-66,69 -72 & LOT 302 HEREON
	LOT 49 HEREON	E	LOTS 59-66,69-72 & 302 HEREON

MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	GRANTOR	SHOWN	GRANTEE
RIGHT TO CONVEY ELECTRICITY, TELECOMMUNI-	LOT 95 HEREON	C	NORTHPOWER

AMALGAMATION CONDITION

THAT LOT 301 BE HELD IN THREE UNDIVIDED ONE THIRD SHARES BY THE OWNERS OF LOTS 26 TO 28 AND NEW RECORDS OF TITLE BE ISSUED IN ACCORDANCE HEREWITH

PURSUANT TO SEC. 220(1)(b)(iv) RESOURCE MANAGEMENT ACT 1991. (SEE LINZ REQUEST.....)

THAT LOT 302 BE HELD IN EIGHT UNDIVIDED ONE EIGHTH SHARES BY THE OWNERS OF LOTS 59 TO 66 AND NEW RECORDS OF TITLE BE ISSUED IN ACCORDANCE HEREWITH

PURSUANT TO SEC. 220(1)(b)(iv) RESOURCE MANAGEMENT ACT 1991. (SEE LINZ REQUEST.....)

EXISTING EASEMENTS TO BE EXTINGUISHED

PURPOSE	BURDENED LAND	SHOWN	CREATED BY
RIGHT TO CONVEY WATER	SECTION 1 SO 65970	B SO 50428	

MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	BURDENED LAND	SHOWN	GRANTEE
RIGHT TO CONVEY WATER	LOT 79 HEREON	F	WDC
	LOT 80 HEREON	G	
	LOT 81 HEREON	H	
	LOT 82 HEREON	I	
	LOT 83 HEREON	J	
	LOT 84 HEREON	K	
	LOT 85 HEREON	L	
	LOT 86 HEREON	M	
	LOT 87 HEREON	N	
	LOT 88 HEREON	O	
	LOT 89 HEREON	P	
	LOT 90 HEREON	Q	
	LOT 91 HEREON	R	
	LOT 92 HEREON	S	
	LOT 93 HEREON	T	
	LOT 94 HEREON	U	

DIP ROAD
LEGAL ROAD
(20.12 WIDE)

TUATARA DRIVE
LEGAL ROAD
(15.24 WIDE)

Lot 595
4992m²
TO VEST AS RECREATION RESERVE IN THE WHANGAREI DISTRICT COUNCIL

Lot 300
14481m²
TO VEST AS ROAD RESERVE IN THE WHANGAREI DISTRICT COUNCIL

Lot 200
6081m²
TO VEST AS DRAINAGE RESERVE IN THE WHANGAREI DISTRICT COUNCIL

Lot 302
614m²

Lot 30
150m²

NOTE:

1) ALL AREAS AND DIMENSIONS SUBJECT TO FINAL SURVEY AND APPROVAL FROM THE WHANGAREI DISTRICT COUNCIL

2) LEGAL DESCRIPTION: SEC 1
SO 65970
(RT. NA78D/985) ML. & AL. MORTIMER, GJ. LOVELL
(RT. NA61A/47) DEED OF EASEMENT
HER MAJESTY THE QUEEN

3) TOTAL AREA: 6.8755 ha.

4) ZONE: LIVING 1

5) AERIAL PHOTO SUBJECT TO DISTORTION

6) CONTOURS SHOWN ARE DERIVED FROM SURVEY.

7) ALL LEVELS ARE IN TERMS OF ONE TREE POINT

CONTOURS SHOWN ARE EXISTING GROUND 0.50m INTERVAL

Size	Scale	Date
A3	1:1500	NOVEMBER 2021

No.	Amendment	Init.	Date
10	PARKING BAYS & TREES ADDED	CN	15/11/21
11	PARKING BAYS ADDED, ROAD C CL SHIFTED	JMC	22/11/21
12	LOT 94/95 BOUNDARY ADJUSTMENT	CN	24/11/21

Designed		
CN		09/11/21
Drawn		
CN		21/08/21
Checked		
Approved		

CONCEPT SCHEME PLAN
SECTION 1 SO 65970
47 DIP ROAD, KAMO, WHANGAREI
Prepared for: ONOKE HEIGHTS LIMITED

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: One Tree Point Datum 1964

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-PL-102				12

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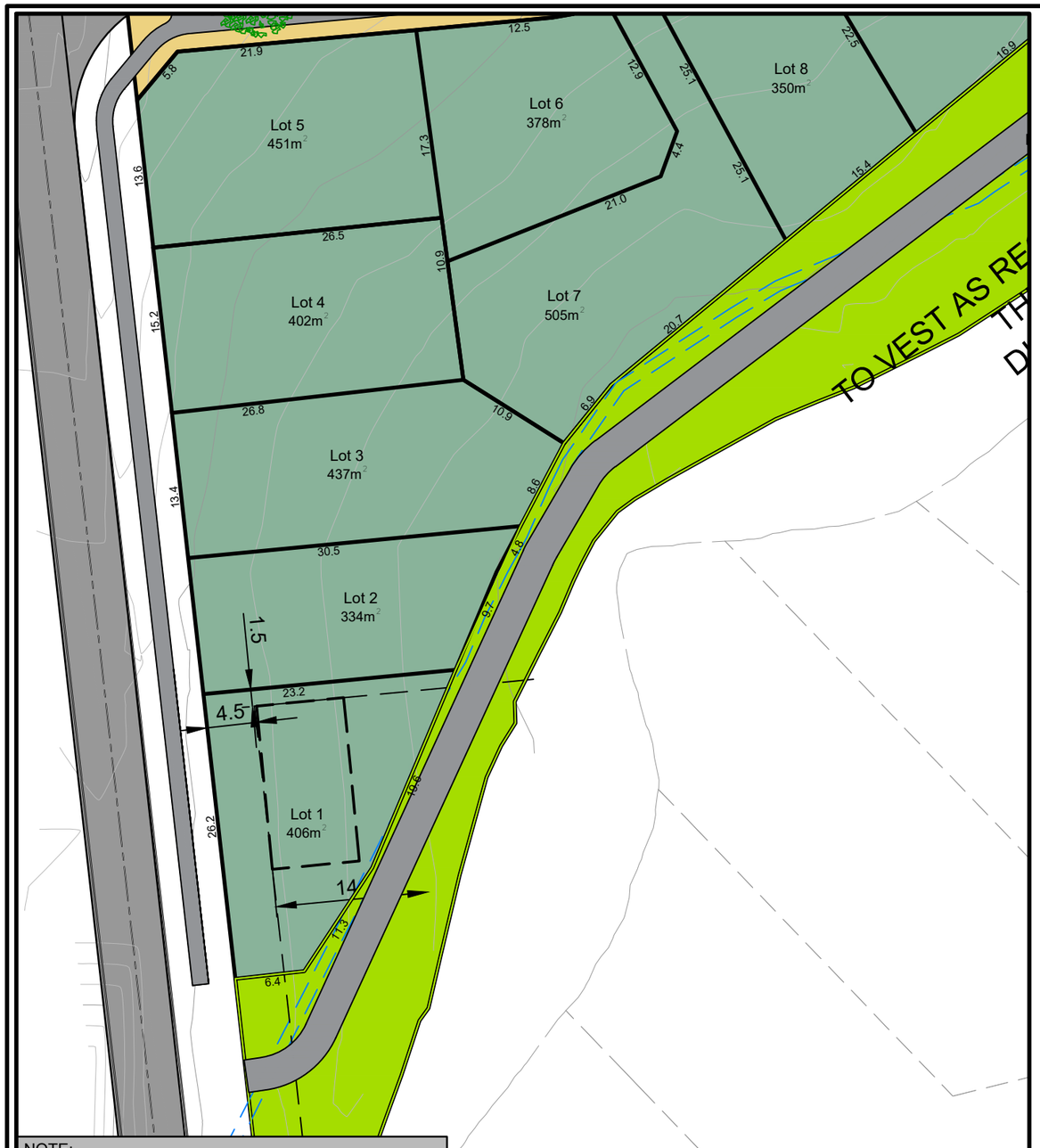

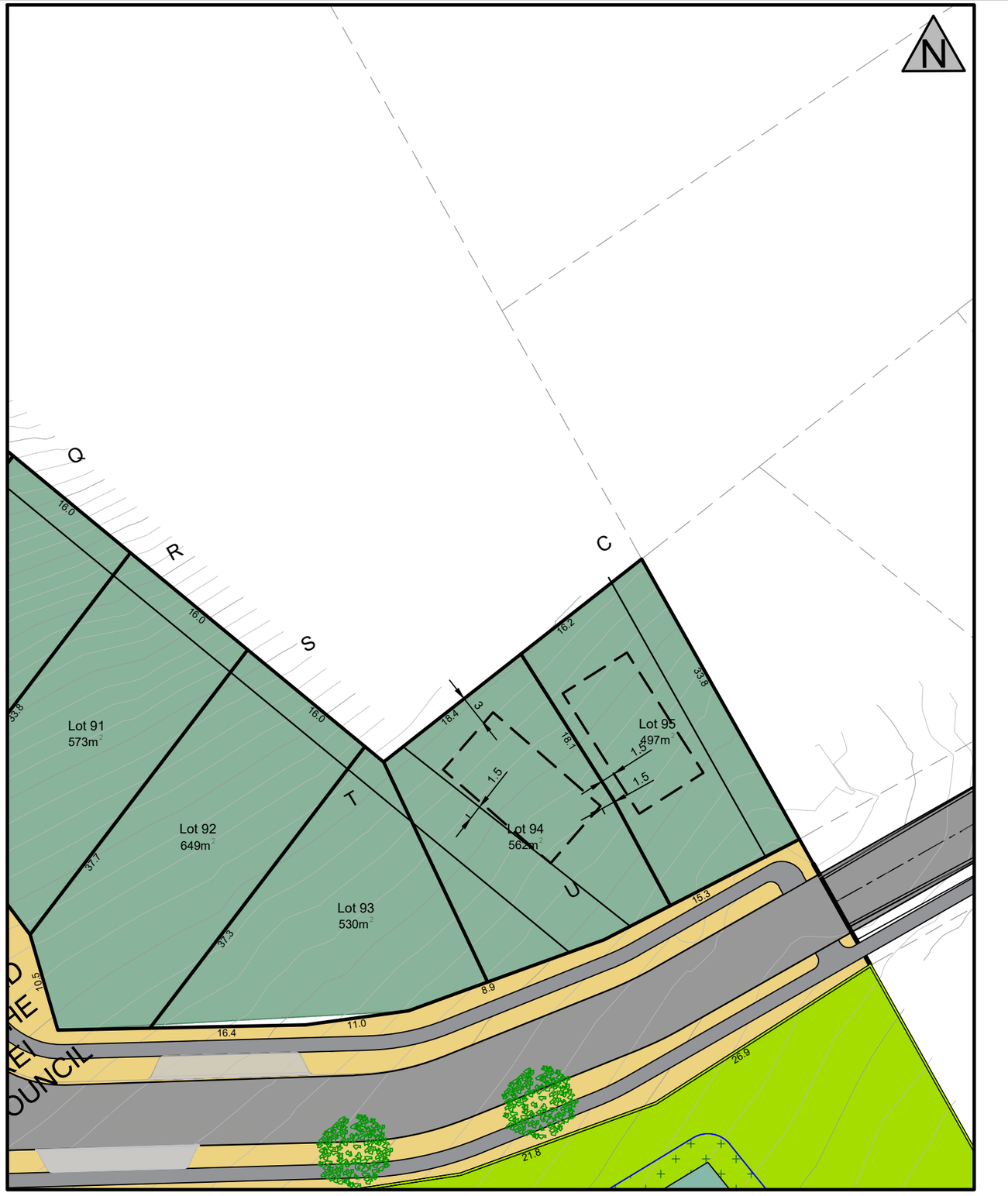

NOTE:

1) ALL AREAS AND DIMENSIONS SUBJECT TO FINAL SURVEY AND APPROVAL FROM THE WHANGAREI DISTRICT COUNCIL

2) LEGAL DESCRIPTION: SEC 1
SO 65970
(RT. NA78D/985) ML. & AL. MORTIMER, GJ. LOVELL
(RT. NA61A/47) DEED OF EASEMENT
HER MAJESTY THE QUEEN

3) TOTAL AREA: 6.8755 ha.

4) ZONE: LIVING 1

5) AERIAL PHOTO SUBJECT TO DISTORTION

6) CONTOURS SHOWN ARE DERIVED FROM SURVEY.

7) ALL LEVELS ARE IN TERMS OF ONE TREE POINT

CONTOURS SHOWN ARE EXISTING GROUND 0.50m INTERVAL

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Size	A3	Scale	1:500	Date	NOVEMBER 2021		
No.	Amendment	Init.	Date	Designed	CN	09/11/21	
1	ISSUED FOR INFORMATION	CN	09/11/21	Drawn	CN	09/11/21	
2	LOT 94/95 UPDATED	CN	24/11/21	Checked			
3				Approved			

BUILDING ENVELOPE DETAIL
SECTION 1 SO 65970
47 DIP ROAD, KAMO, WHANGAREI
Prepared for: ONOKE HEIGHTS LIMITED

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: One Tree Point Datum 1964

Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-PL-103				2

Legend	
Major Contour (2.0m)	
Minor Contour (0.5m)	

Size	A3	Scale	1:1500	Date	September 2021		
No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	09/09/21	Drawn	JMC		
2	Lifted Cul De Sac Head, Updated Volumes	JMC	11/10/21	Checked	CN		
3				Approved			

Resource Consent Plan
Existing Contours
47 Dip Road, Kamo, Whangarei
Prepared for: Onoke Heights Limited

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-RC-200				2

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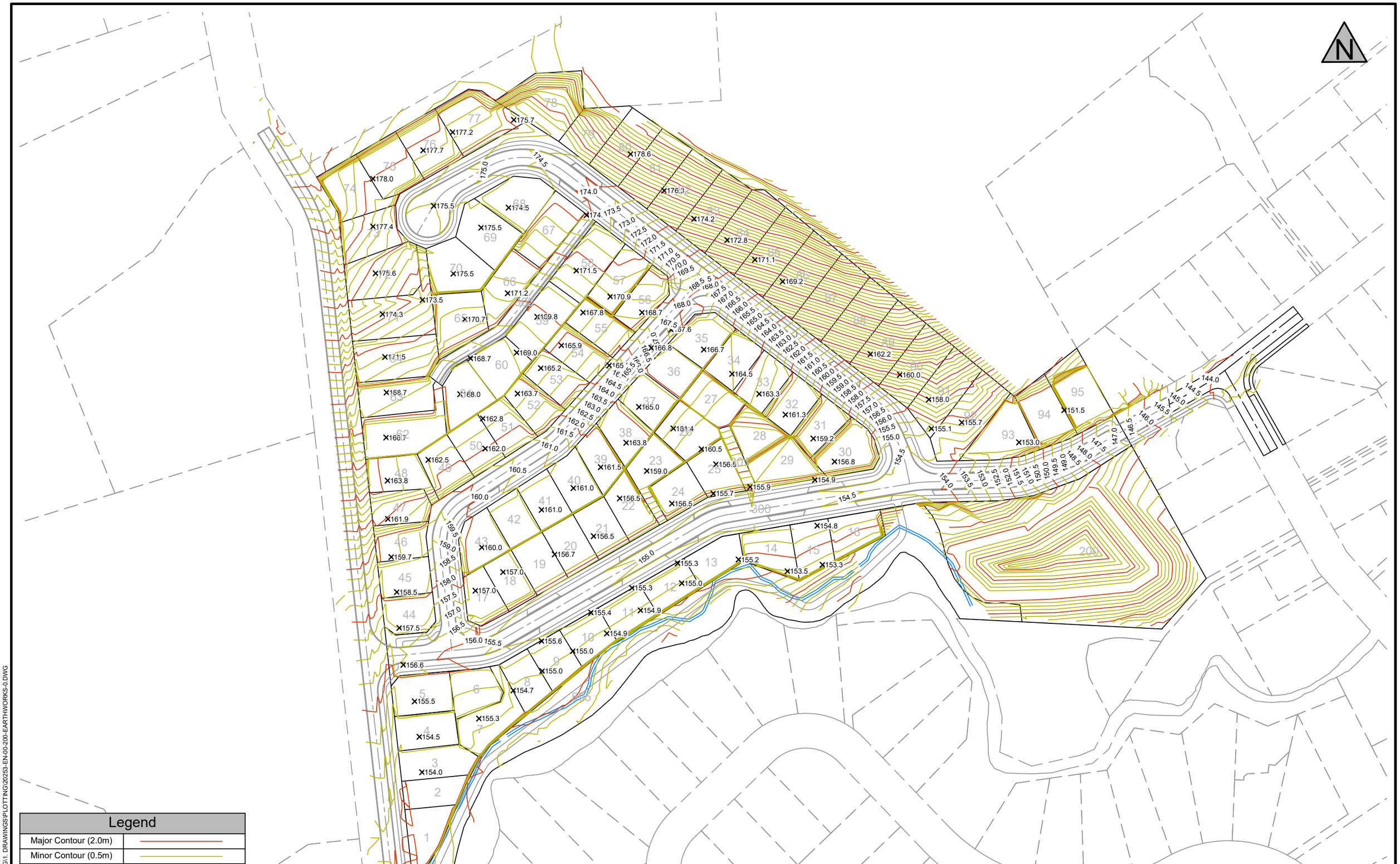

Size	A3	Scale	1:1500	Date	September 2021		
No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	09/09/21	Drawn	JMC		
2	Lifted Cul De Sac Head, Updated Volumes	JMC	11/10/21	Checked	CN		
3				Approved			

Resource Consent Plan
Design Contours
47 Dip Road, Kamo, Whangarei
Prepared for: Onoke Heights Limited

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number:
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BW Ref.	Stg.	Purp.	Dwg. #	Revision:
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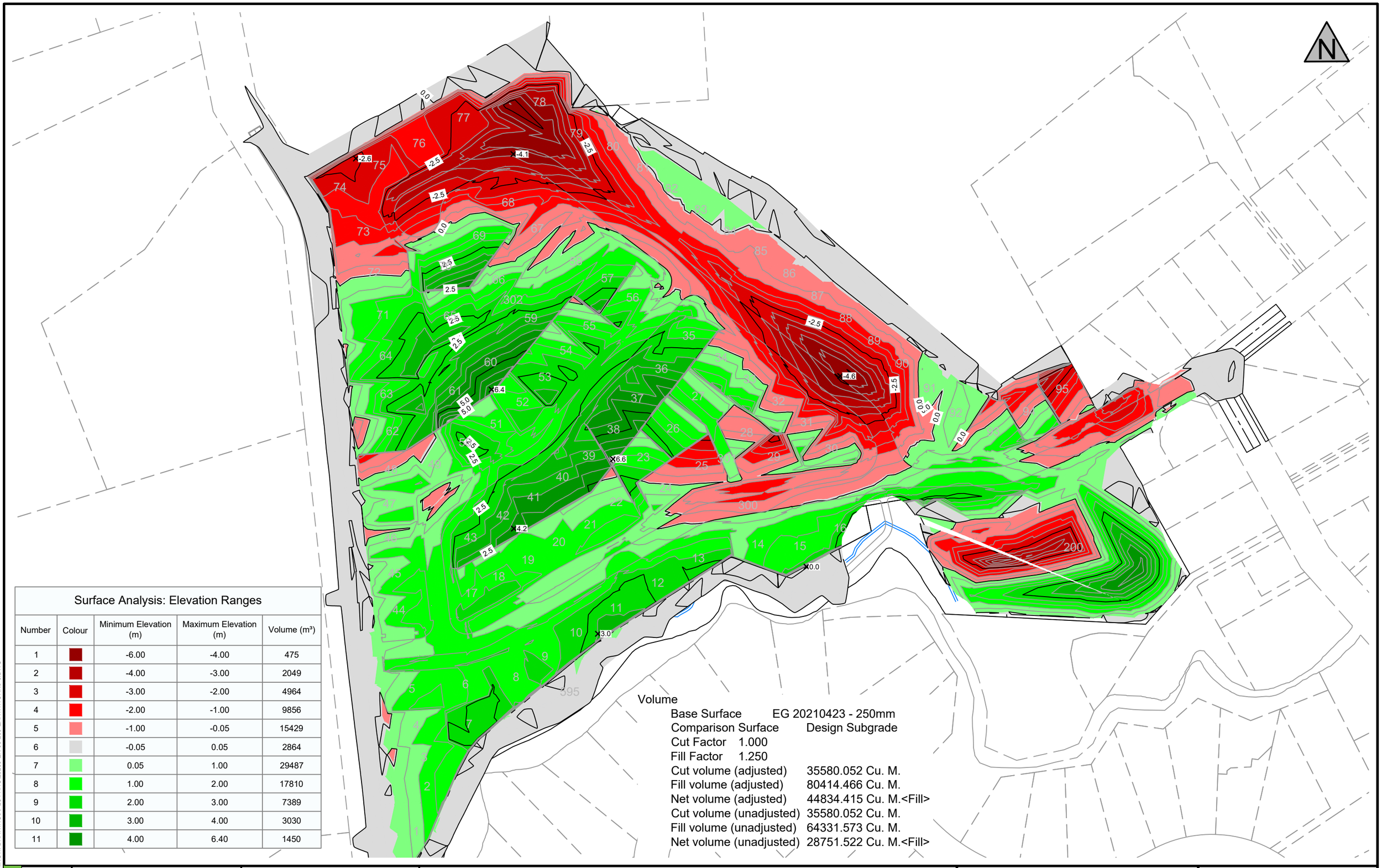

Surface Analysis: Elevation Ranges

Number	Colour	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m³)
1		-6.00	-4.00	475
2		-4.00	-3.00	2049
3		-3.00	-2.00	4964
4		-2.00	-1.00	9856
5		-1.00	-0.05	15429
6		-0.05	0.05	2864
7		0.05	1.00	29487
8		1.00	2.00	17810
9		2.00	3.00	7389
10		3.00	4.00	3030
11		4.00	6.40	1450

Volume

Base Surface	EG 20210423 - 250mm
Comparison Surface	Design Subgrade
Cut Factor	1.000
Fill Factor	1.250
Cut volume (adjusted)	35580.052 Cu. M.
Fill volume (adjusted)	80414.466 Cu. M.
Net volume (adjusted)	44834.415 Cu. M.<Fill>
Cut volume (unadjusted)	35580.052 Cu. M.
Fill volume (unadjusted)	64331.573 Cu. M.
Net volume (unadjusted)	28751.522 Cu. M.<Fill>

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Size A3 | Scale 1:1500 | Date September 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	09/09/21
2	Lifted Cul De Sac Head, Updated Volumes	JMC	11/10/21
3			

Designed JMC | Drawn JMC | Checked CN | Approved

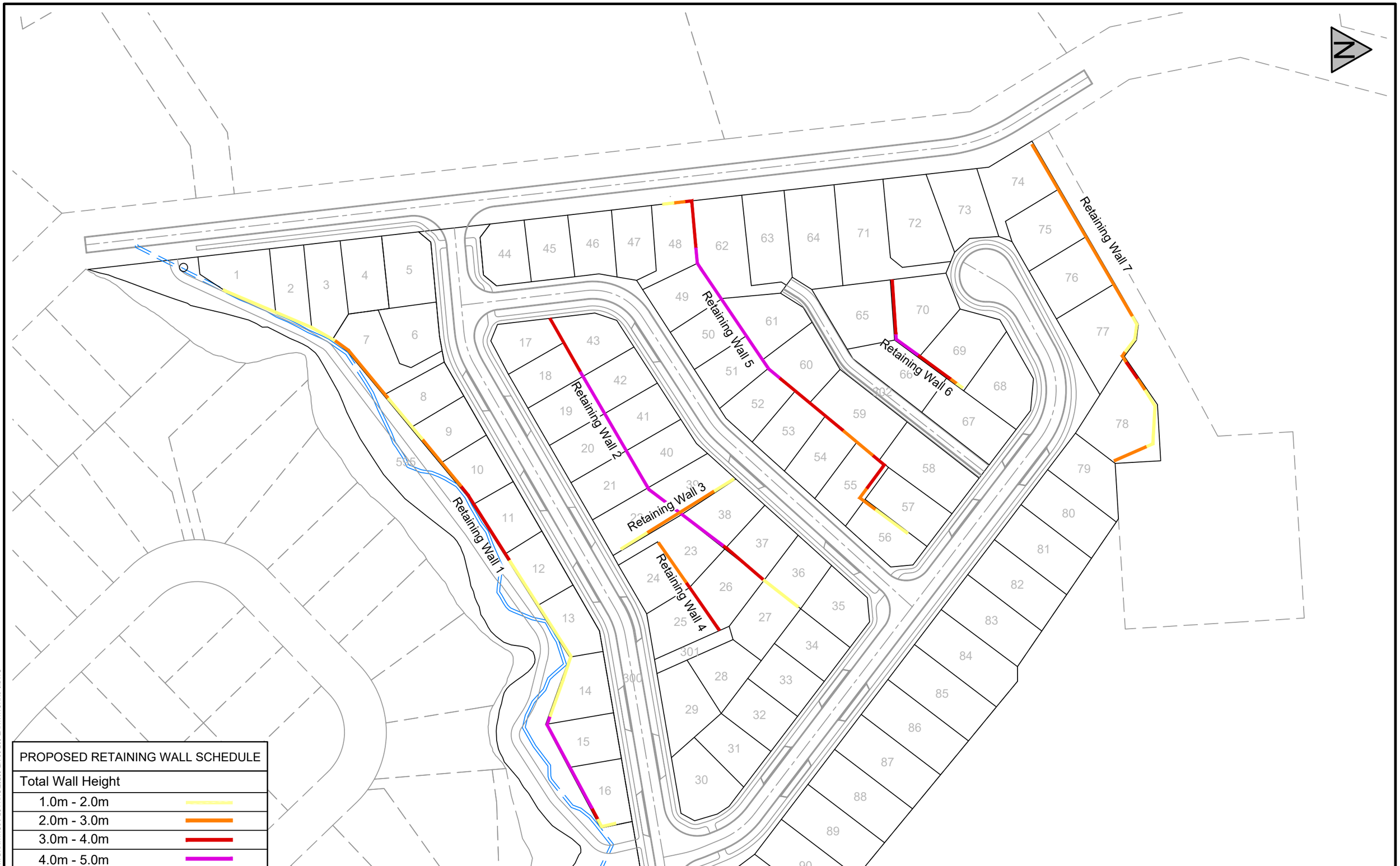
Resource Consent Plan
Cutfill Volume
47 Dip Road, Kamo, Whangarei
Prepared for: Onoke Heights Limited

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref. 20253-01-RC-202 | Stg. | Purp. | Dwg. # | Revision: 2



PROPOSED RETAINING WALL SCHEDULE	
Total Wall Height	
1.0m - 2.0m	
2.0m - 3.0m	
3.0m - 4.0m	
4.0m - 5.0m	

Size	A3	Scale	1:1250	Date	September 2021		
No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	09/09/21	Drawn	JMC		
2	Lifted Cul De Sac Head, Updated Volumes	JMC	11/10/21	Checked	CN		
3	Upated Retaining Wall Schedule	JMC	19/10/21	Approved			

Resource Consent Plan
Retaining Wall Scheme
47 Dip Road, Kamo, Whangarei
Prepared for: Onoke Heights Limited

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number:
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BW Ref.	Stg.	Purp.	Dwg. #	Revision:
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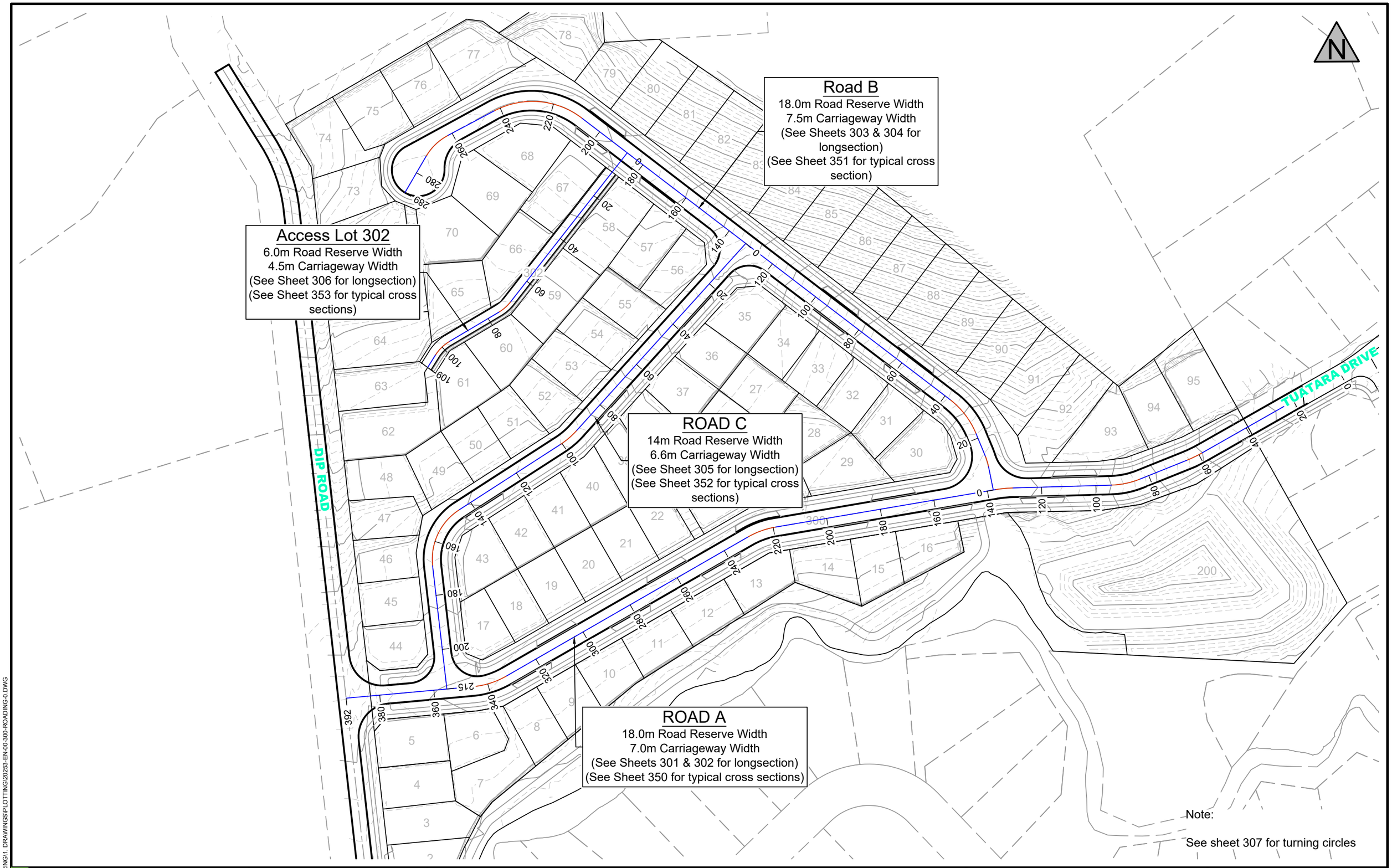

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Size	A3	Scale	1:1250	Date	November 2021		
No.	Amendment	Init.	Date	Designed			
1	Issued For Resource Consent	JMC	15/11/21	Drawn			
2				Checked			
3				Approved			

Resource Consent Plan
Roading Overview
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
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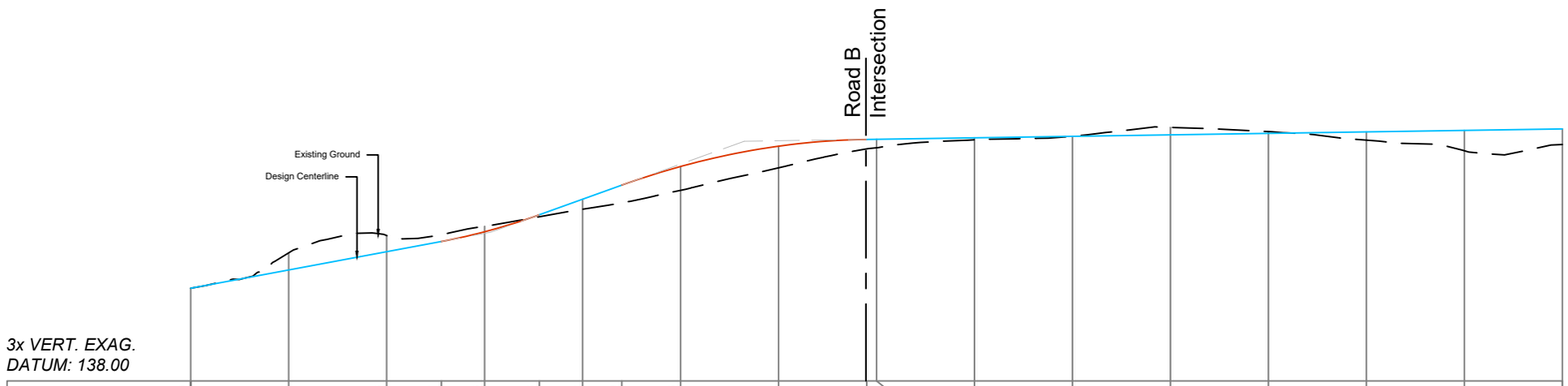
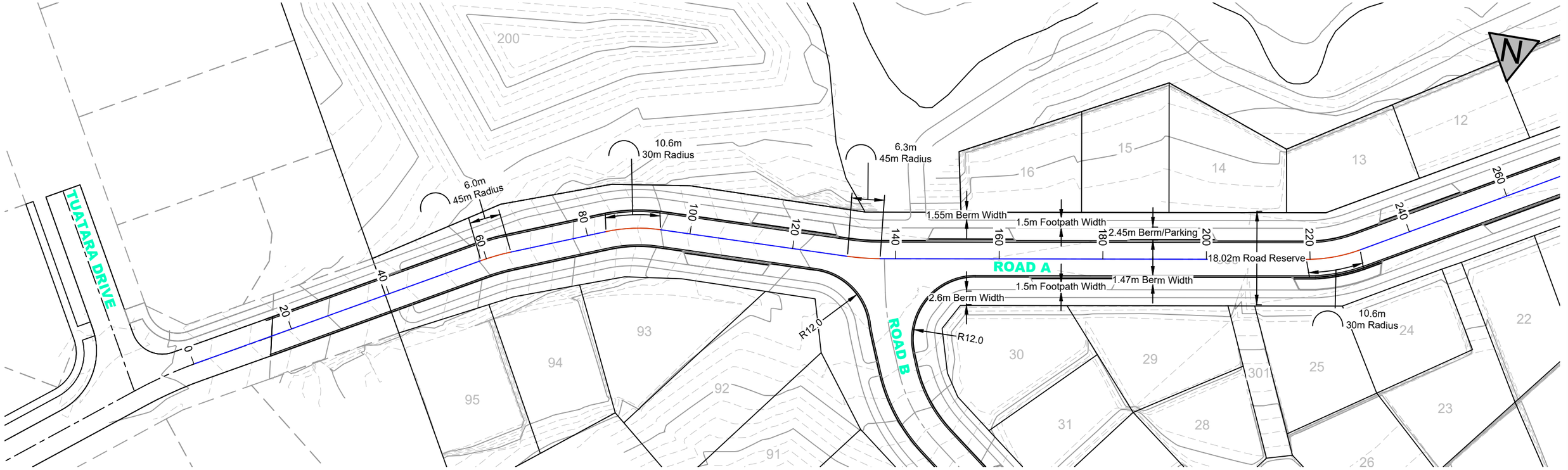


3x VERT. EXAG.
DATUM: 138.00

DESIGN LEVELS	144.30	145.54	146.78	147.47	148.13	149.28	150.34	151.29	152.56	153.94	154.40	154.41	154.51	154.61	154.71	154.81	154.91	155.01	155.11
EXISTING LEVELS	144.30	146.70	147.87	147.92	148.50	149.15	149.66	150.09	150.94	152.47	153.76	153.83	154.37	154.61	155.22	154.93	154.35	153.63	154.05
CUT/FILL DEPTH	0.00	-1.16	-1.10	-0.46	-0.37	0.14	0.68	1.20	1.62	1.47	0.64	0.58	0.14	0.00	-0.51	-0.12	0.56	1.38	1.06
CHAINAGE	0.0	20	40	51.2	60	71.2	80	88.0	100	120	138.0	140	160	180	200	220	240	260	280.0
VERTICAL GEOMETRY		6.2% 51.18			VC L: 20.00 IP CH: 61.18/RL: 148.09		11.9% 16.82		VC L: 50.00 IP CH: 113.00/RL: 154.28			0.5% 177.31							

ROAD A LONG SECTION



Size	A3	Scale	1:750	Date	November 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	15/11/21
2			
3			

Designed		
Drawn		
Checked		
Approved		

Resource Consent Plan
Road A Longsection CH 0.00 - 280.00
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

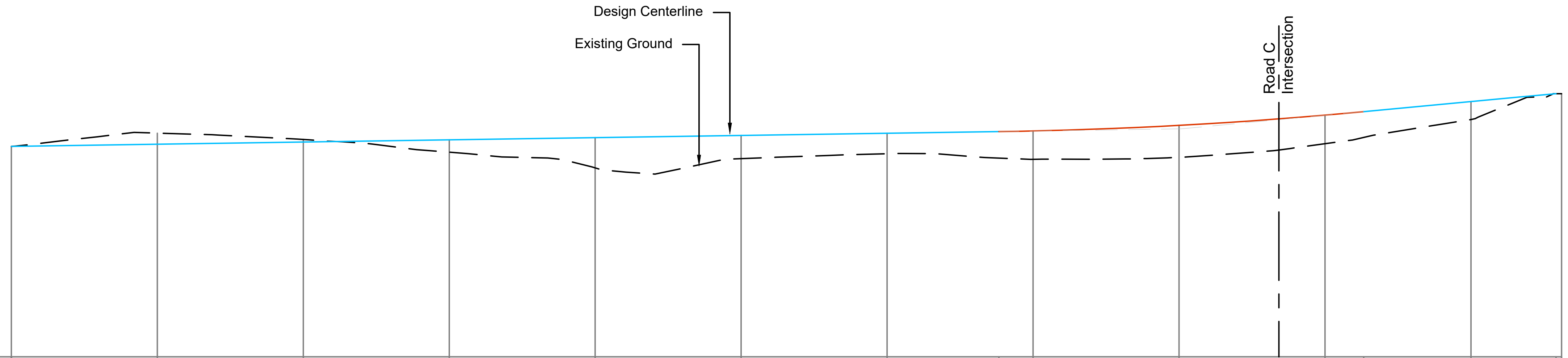
Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-EN-301				1

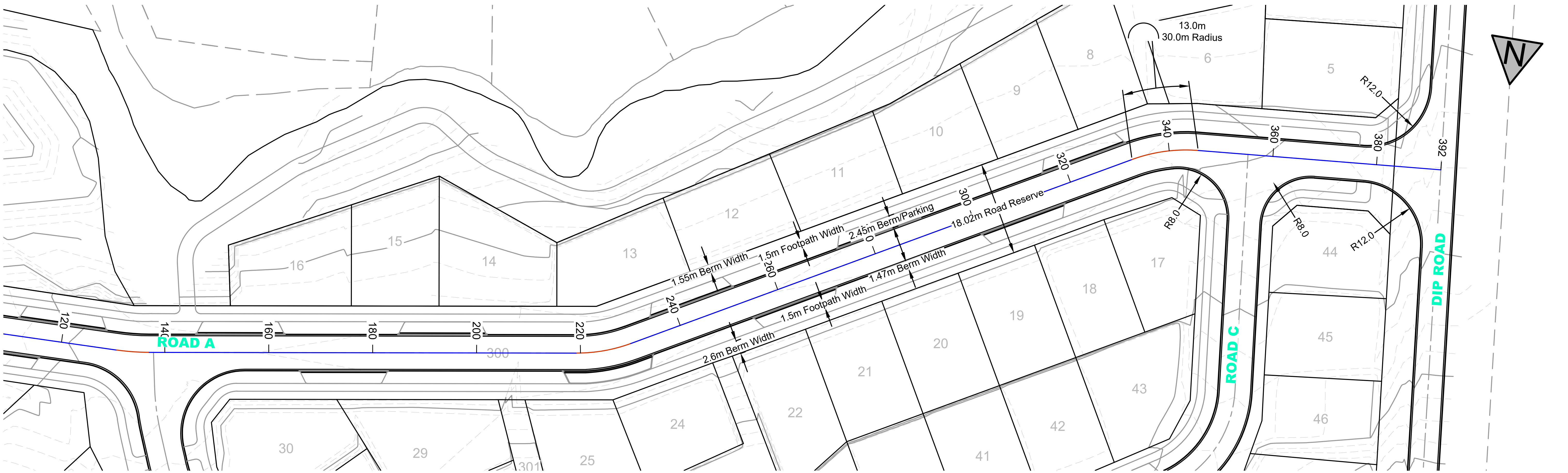
S:\2020\20253\2_ENGINEERING\1_DRAWINGS\PLOTTING\20253-EN-00-300-ROADING-0.DWG



3x VERT. EXAG.
DATUM: 145.00

DESIGN LEVELS	154.61	154.71	154.81	154.91	155.01	155.11	155.21	155.29	155.32	155.57	156.04	156.20	156.66	157.02	
EXISTING LEVELS	154.61	155.22	154.93	154.35	153.63	154.05	154.28	154.08	154.02	154.11	154.73	155.02	155.84	157.02	157.02
CUT/FILL DEPTH	0.00	-0.51	-0.12	0.56	1.38	1.06	0.94	1.21	1.29	1.46	1.31	1.18	0.82	0.00	
CHAINAGE	180.0	200	220	240	260	280	300	315.3	320	340	360	365.3	380	391.7	392
VERTICAL GEOMETRY					0.5% 177.31					VC L: 50.00 IP CH: 340.31/RL: 155.41			3.1% 21.41	3.0% 4.94	

ROAD A LONG SECTION



Size A3	Scale 1:750		Date November 2021		
No.	Amendment	Init.	Date	Designed	
1	Issued For Resource Consent	JMC	15/11/21	Drawn	
2				Checked	
3				Approved	

Resource Consent Plan
Road A Longsection CH 180.00 - 392.00
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

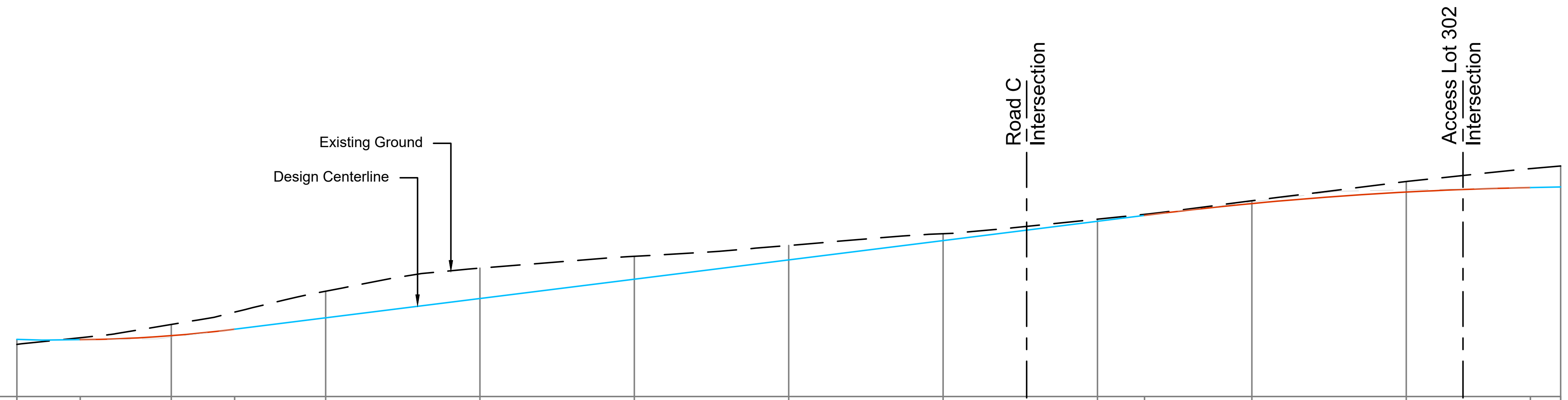
Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: ....

BW Ref. Stg. Purp. Dwg. # 20253-01-EN-302
Revision: 1

S:\2020\20253\2. ENGINEERING\1. DRAWINGS\PLOTTING\20253-EN-00-300-ROADING-0.DWG

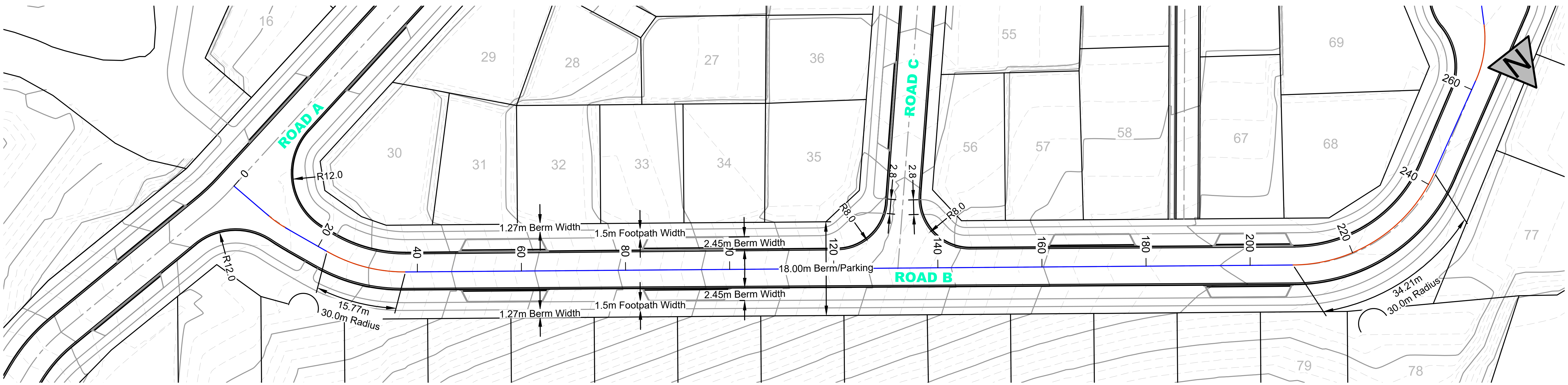


1x VERT. EXAG.
DATUM: 147.00

DESIGN LEVELS	154.40	154.35	154.87	155.70	157.18	159.68	162.18	164.68	167.18	169.68	170.44	171.97	173.46	174.04	174.12
EXISTING LEVELS	153.75	154.60	156.33	157.92	160.63	163.62	165.15	166.55	168.07	169.95	170.57	172.34	174.83	176.50	176.83
CUT/FILL DEPTH	0.65	-0.25	-1.45	-2.21	-3.45	-3.94	-2.97	-1.87	-0.89	-0.27	-0.13	-0.36	-1.36	-2.46	-2.72
CHAINAGE	0.0	8.2	20	28.2	40	60	80	100	120	140	146.1	160	180	196.1	200.0

VERTICAL GEOMETRY: 0.0% 0.50; 3.0% 0.80; 1.0% 4.96; VC L: 20.00 IP CH: 18.21/RL: 154.45; 12.5% 117.88; VC L: 50.00 IP CH: 171.09/RL: 173.56; 1.9% 92.54

ROAD B LONG SECTION



Size A3	Scale 1:750		Date November 2021		
No.	Amendment	Init.	Date	Designed	
1	Issued For Resource Consent	JMC	15/11/21	Drawn	
2				Checked	
3				Approved	

Resource Consent Plan
Road B Longsection CH 0.00 - 200.00
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

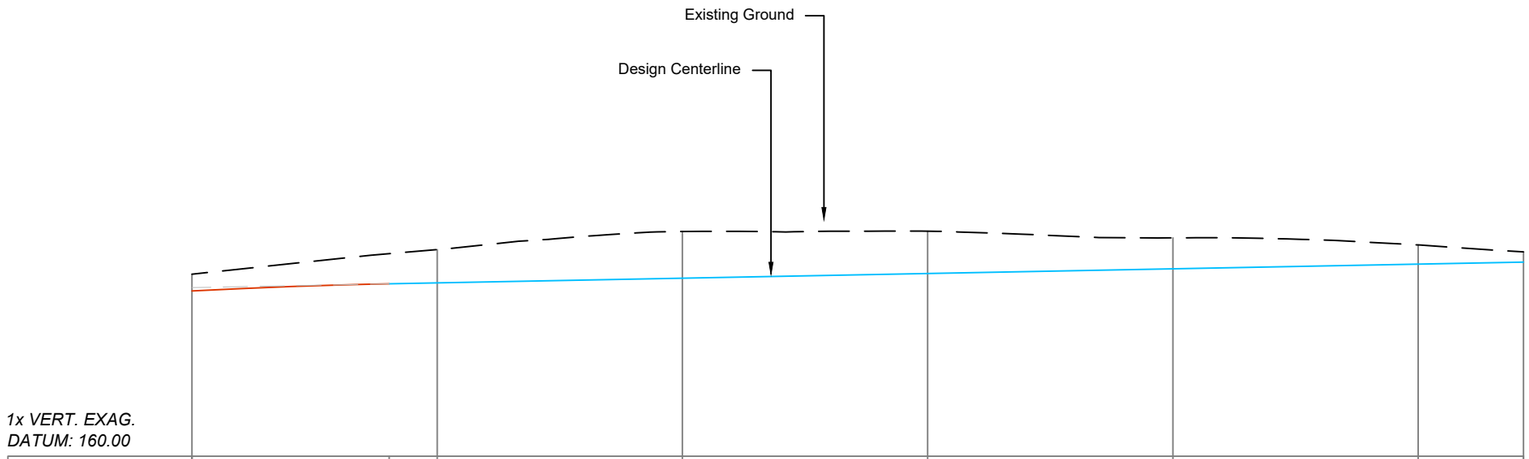
Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: ....

BW Ref. Stg. Purp. Dwg. #: 20253-01-EN-303

Revision: 1

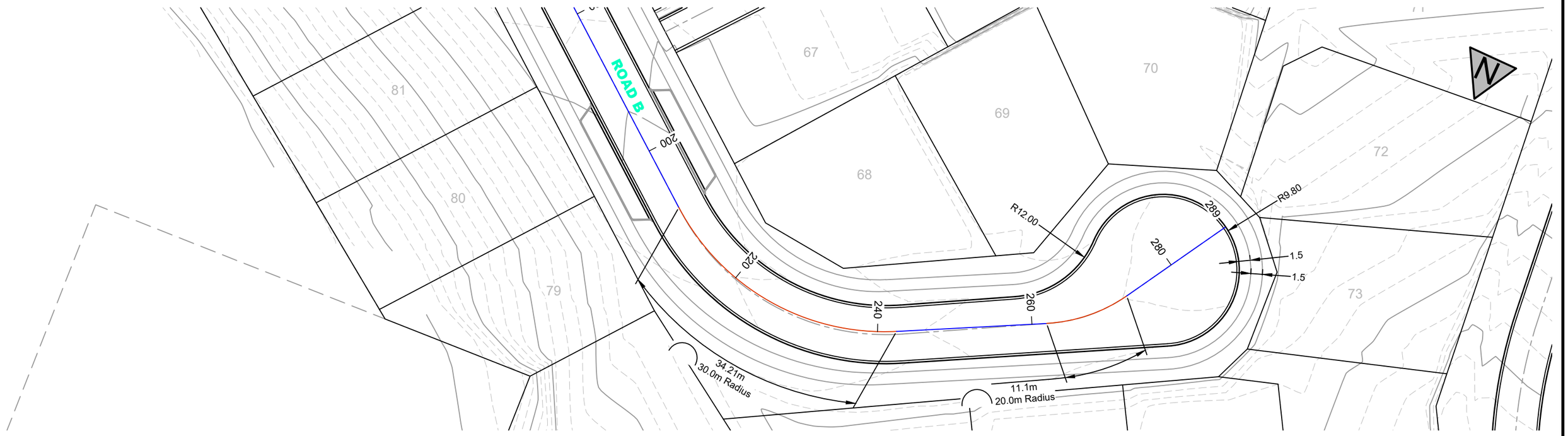
S:\2020\20253\2. ENGINEERING\1. DRAWINGS\PLOTTING\20253-EN-00-300-ROADING-0.DWG



1x VERT. EXAG.
DATUM: 160.00

DESIGN LEVELS	173.46	174.04	174.12	174.50	174.88	175.26	175.65	175.81
EXISTING LEVELS	174.83	176.50	176.83	178.31	178.33	177.79	177.21	176.65
CUT/FILL DEPTH	-1.38	-2.46	-2.72	-3.81	-3.45	-2.53	-1.57	-0.84
CHAINAGE	180.0	196.1	200	220	240	260	280	288.6
VERTICAL GEOMETRY		VC L: 50.00 IP CH: 171.09/RL: 173.56		1.9% 92.54				

ROAD B LONG SECTION



Size	A3	Scale	1:500	Date	November 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	15/11/21
2			
3			

Designed			
Drawn			
Checked			
Approved			

Resource Consent Plan
Road B Longsection - CH 120.0 - 289.0
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

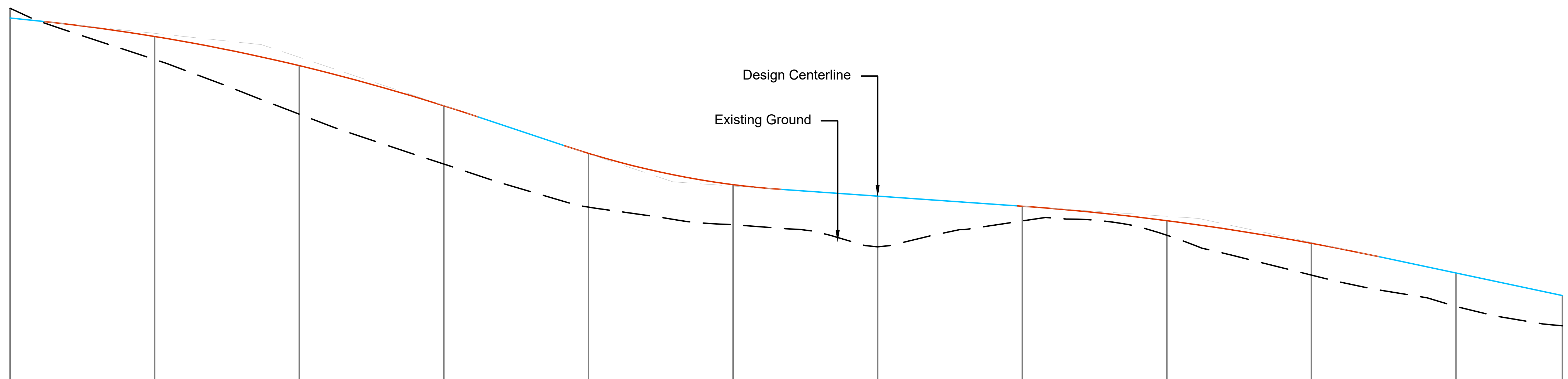
Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-EN-304				1

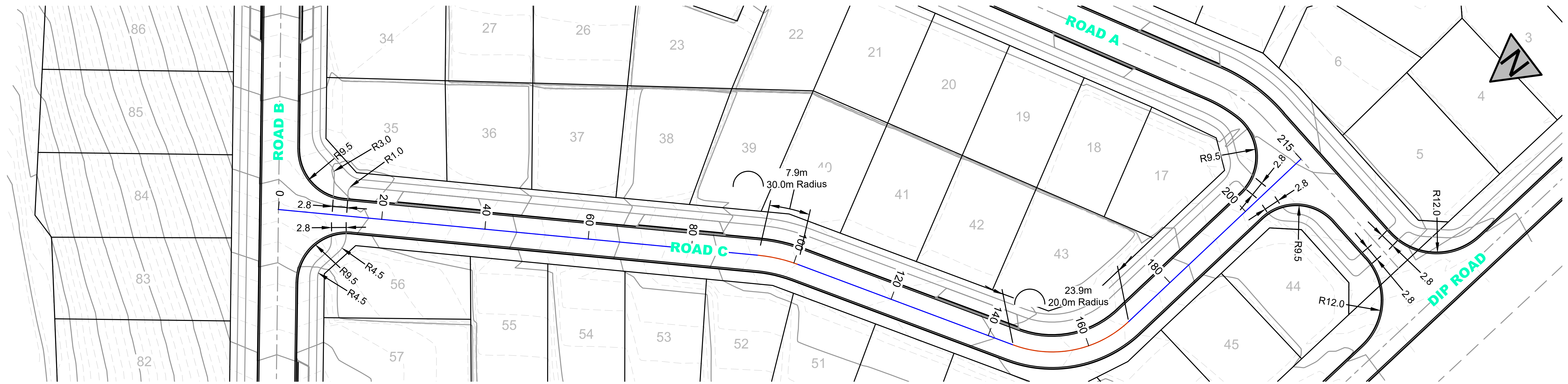
S:\2020\20253\2. ENGINEERING\1. DRAWINGS\PLOTTING\20253-EN-00-300-ROADING-0.DWG



3x VERT. EXAG.
DATUM: 152.00

DESIGN LEVELS	168.72	168.55	167.87	166.52	164.67	164.15	162.82	162.47	161.03	160.81	160.50	160.05	160.03	159.37	158.32	157.70	156.95	155.91
EXISTING LEVELS	169.17	168.48	166.80	164.28	161.98	161.45	160.25	159.99	159.18	159.01	158.16	159.32	159.35	158.69	156.85	156.17	155.40	154.51
CUT/FILL DEPTH	-0.45	0.07	1.06	2.24	2.69	2.70	2.58	2.48	1.85	1.80	2.34	0.73	0.68	0.67	1.47	1.53	1.54	1.39
CHAINAGE	0.0	4.7	20	40	60	64.7	76.7	80	100	106.7	120	139.4	140	160	180	189.4	200	214.7
VERTICAL GEOMETRY		-3.5% 4.75		VC L: 60.00 IP CH: 34.75/RL: 167.49			-11.1% 11.93		VC L: 30.00 IP CH: 91.68/RL: 161.16		-2.3% 32.67			VC L: 50.00 IP CH: 164.35/RL: 159.47			-7.1% 25.36	10.7% 20.56

ROAD C LONG SECTION



Size A3	Scale 1:750		Date November 2021		
No.	Amendment	Init.	Date	Designed	
1	Issued For Resource Consent	JMC	15/11/21	Drawn	
2				Checked	
3				Approved	

Resource Consent Plan
Road C Longsection
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

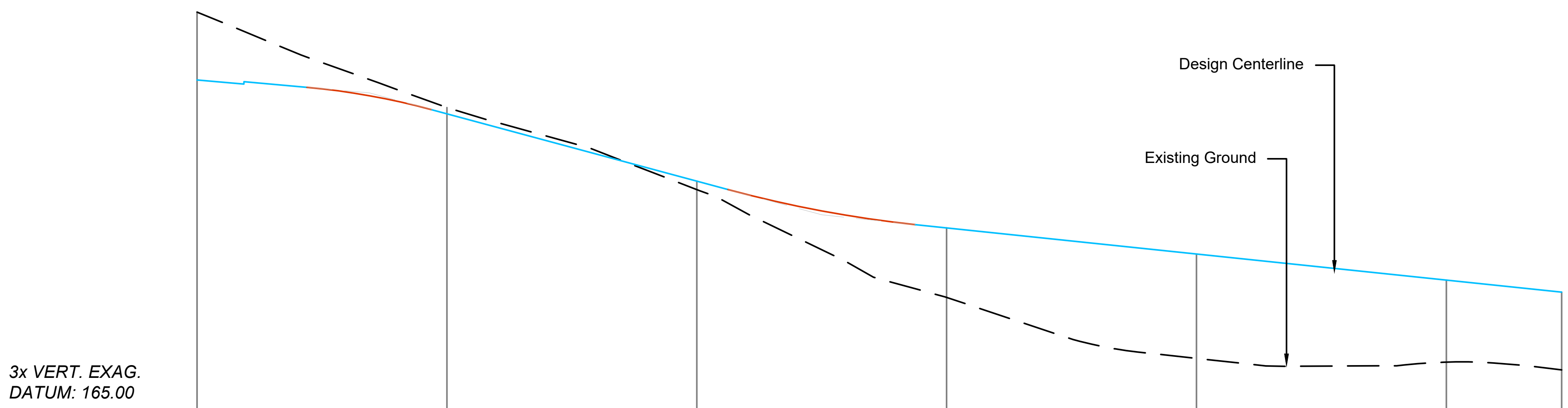
Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: ....

BW Ref. Stg. Purp. Dwg. # 20253-01-EN-305
Revision: 1

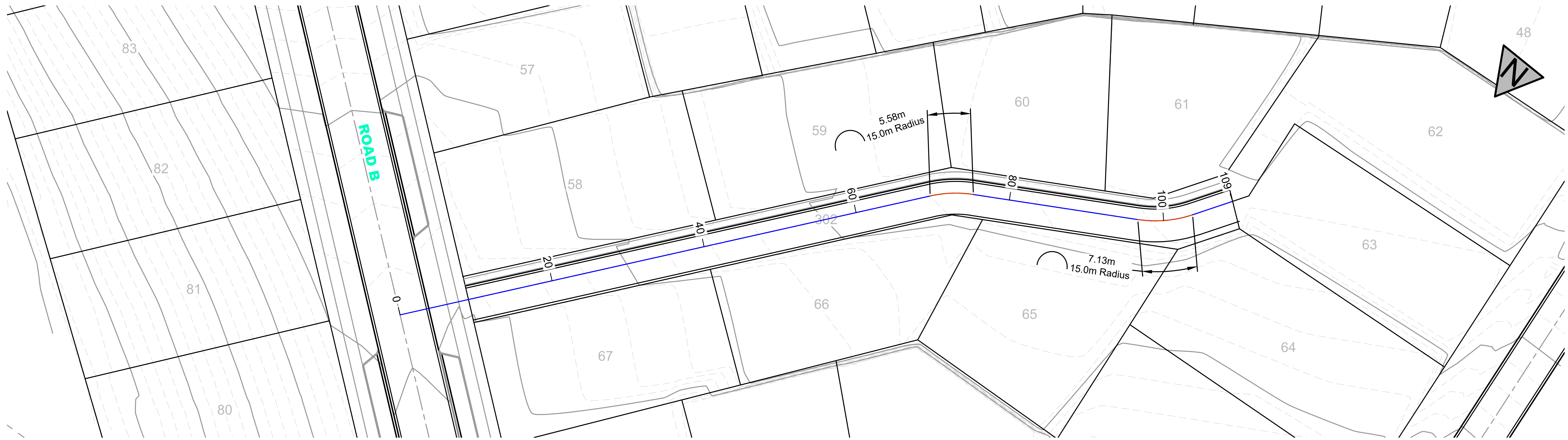
S:\2020\20253\2. ENGINEERING\1. DRAWINGS\PLOTTING\20253-EN-00-300-ROADING-0.DWG



DESIGN LEVELS	173.78	173.59	172.99	172.88	171.08	170.86	169.92	169.83	169.14	168.44	168.12
EXISTING LEVELS	175.60	174.39	173.19	173.05	170.85	170.49	168.21	167.98	166.35	166.25	166.04
CUT/FILL DEPTH	-1.82	-0.80	-0.20	-0.17	0.23	0.36	1.71	1.86	2.79	2.19	2.08
CHAINAGE	0.0	8.8	18.8	20	40	42.5	57.5	60	80	100	109.2

VERTICAL GEOMETRY: -2.9% 3.75 | 600.0% 0.01 | -3.0% 5.05 | VC L: 10.00 IP CH: 13.81/RL: 173.44 | -9.0% 23.69 | VC L: 15.00 IP CH: 50.00/RL: 170.18 | -3.5% 51.73

ACCESS LOT 302 LONG SECTION



Size	A3	Scale	1:500	Date	November 2021

No.	Amendment	Init.	Date		
1	Issued For Resource Consent	JMC	15/11/21	Designed	
2				Drawn	
3				Checked	
				Approved	

Resource Consent Plan
Access Lot 302 Longsection
47 Dip Road, Kamo, Whangarei

Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

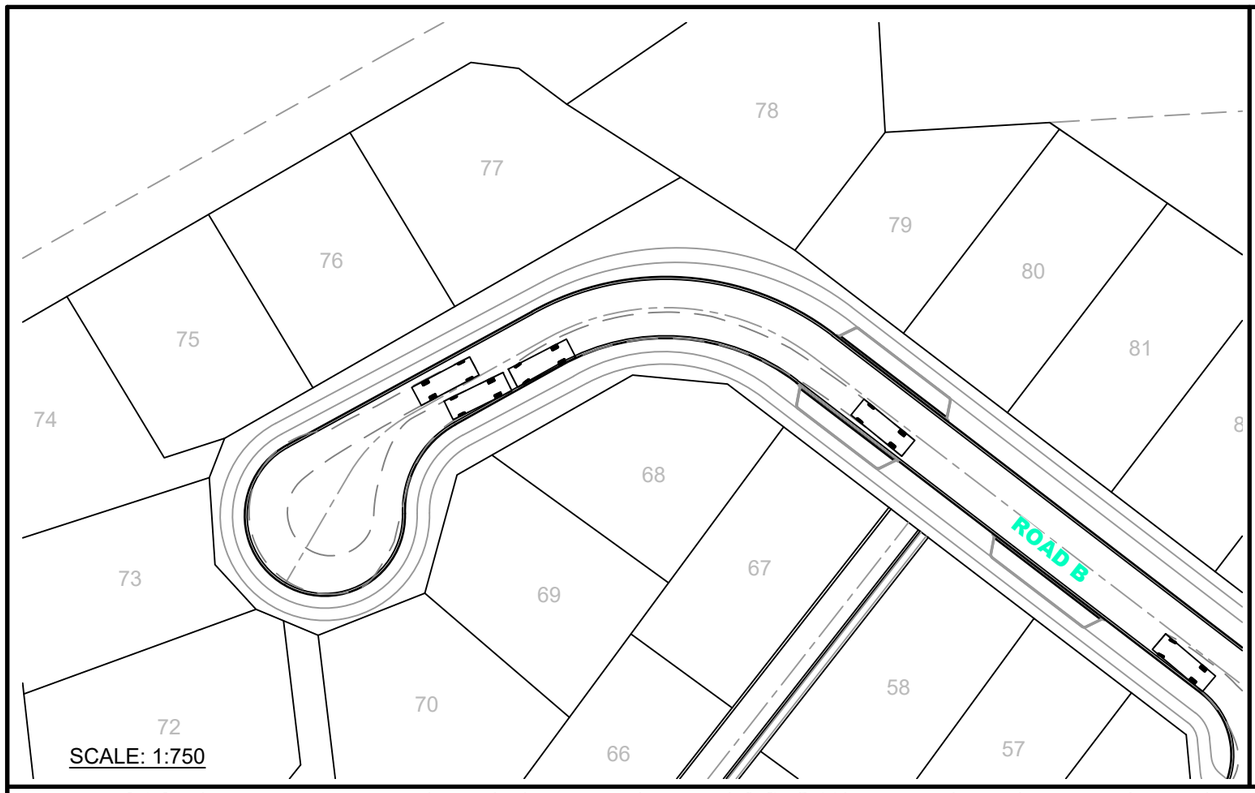
Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: ....

BW Ref. Stg. Purp. Dwg. # 20253-01-EN-306

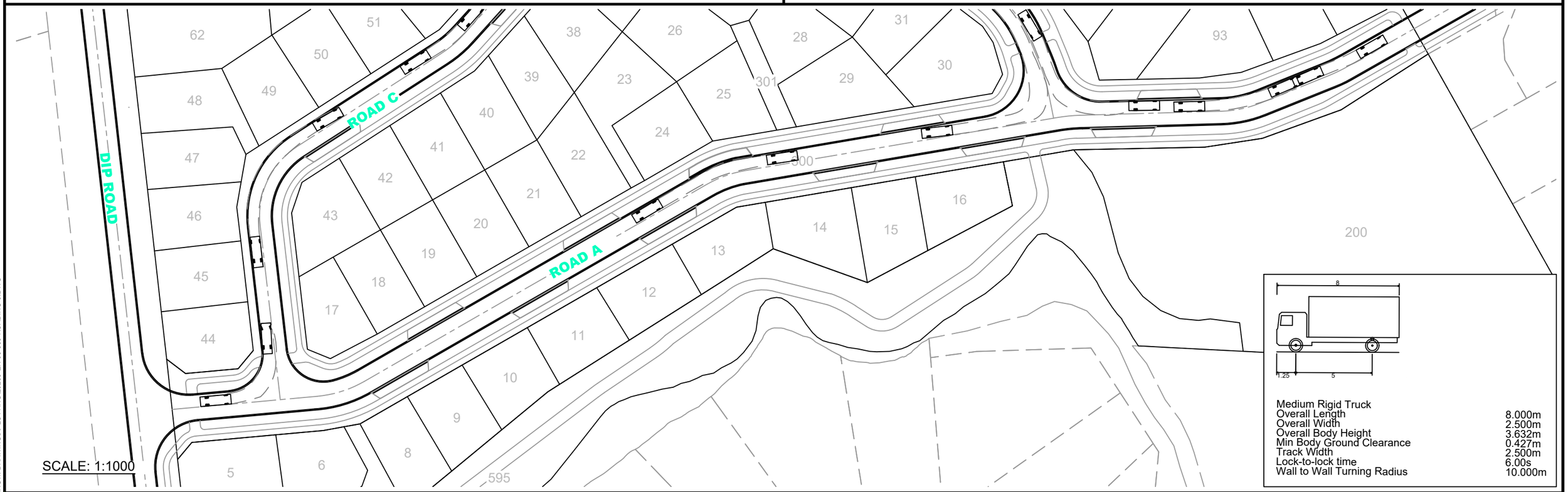
Revision: 1

S:\2020\20253\2. ENGINEERING\1. DRAWINGS\PLOTTING\20253-EN-00-300-ROADING-0.DWG



SCALE: 1:750

SCALE: 1:750



SCALE: 1:1000

Medium Rigid Truck

Overall Length	8.000m
Overall Width	2.500m
Overall Body Height	3.632m
Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock-to-lock time	6.00s
Wall to Wall Turning Radius	10.000m

S:\2020\20253\2. ENGINEERING\1. DRAWINGS\PLOTTING\20253-EN-00-300-ROADING-0.DWG

Size	A3	Scale	AS SPECIFIED	Date	November 2021		
No.	Amendment	Init.	Date	Designed			
1	Issued For Resource Consent	JMC	15/11/21	Drawn			
2				Checked			
3				Approved			

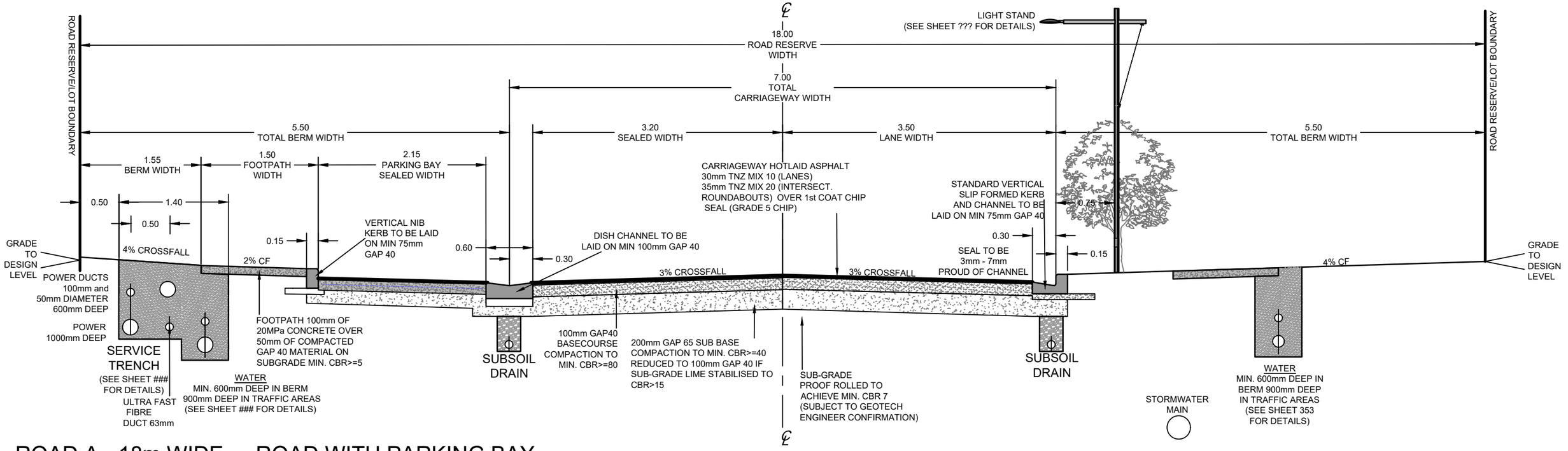
Resource Consent Plan
Vehicle Tracking Curves
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

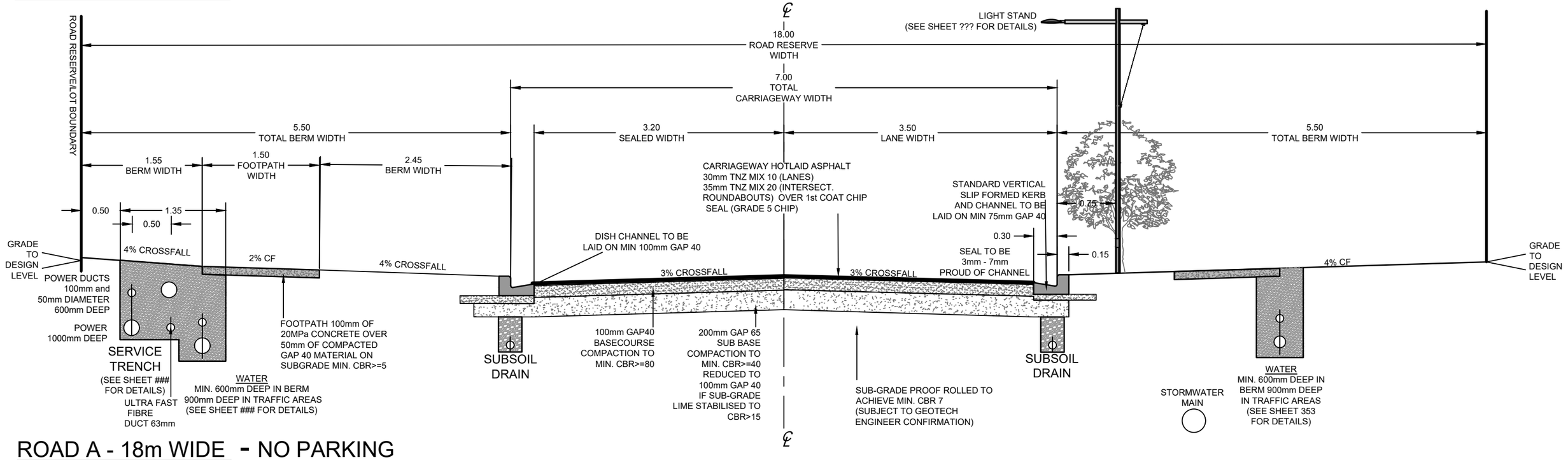
Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-EN-307				1



ROAD A - 18m WIDE - ROAD WITH PARKING BAY



ROAD A - 18m WIDE - NO PARKING

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Size	A3	Scale	1:50	Date	November 2021		
No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	17/11/21	Drawn	JMC		
2				Checked	CN		
3				Approved			

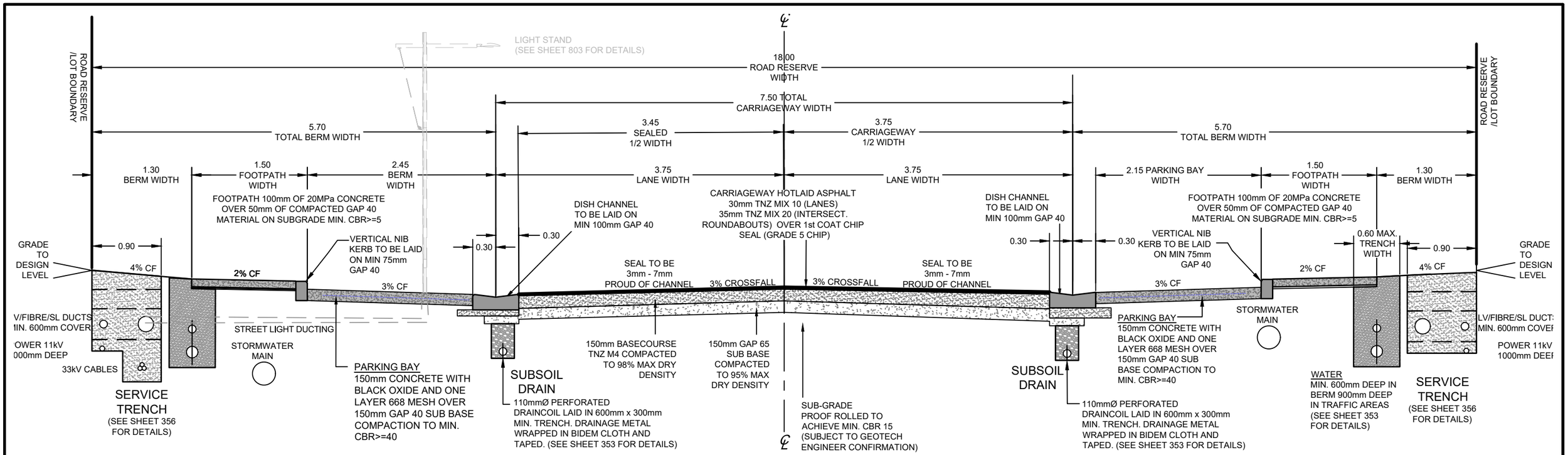
Resource Consent Plan
Road A Typical Cross Section
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

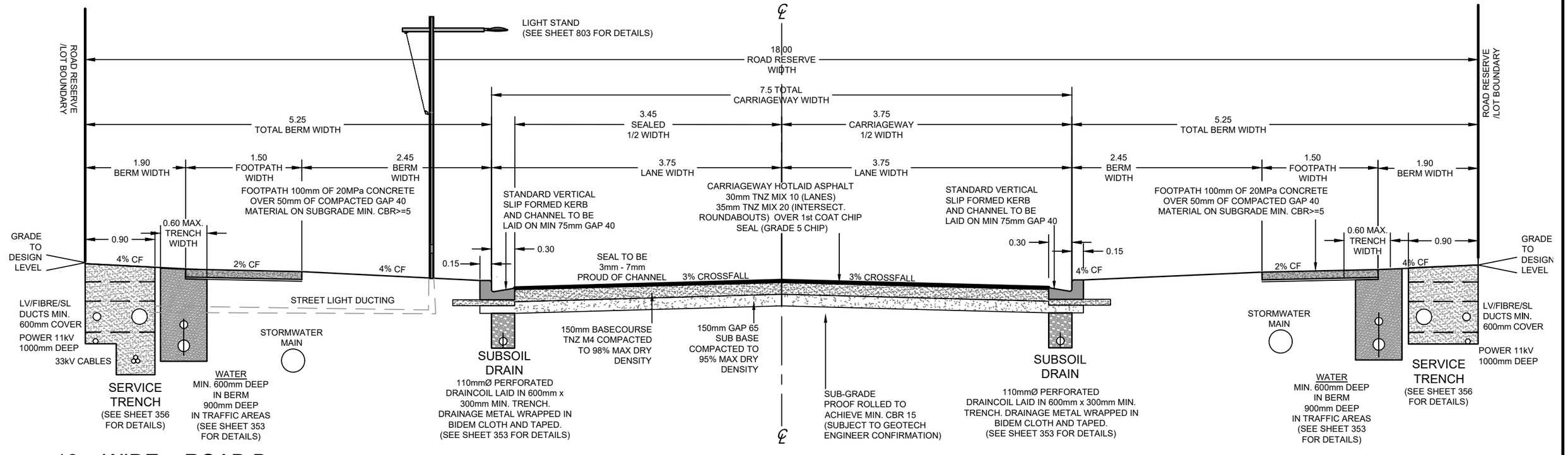
Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-RC-350				1



18m WIDE - ROAD B WITH PARKING BAYS



18m WIDE - ROAD B

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Size A3	Scale 1:50		Date November 2021			
No.	Amendment	Init.	Date	Designed	JMC	
1	Issued For Resource Consent	JMC	17/11/21	Drawn	JMC	
2				Checked	CN	
3				Approved		

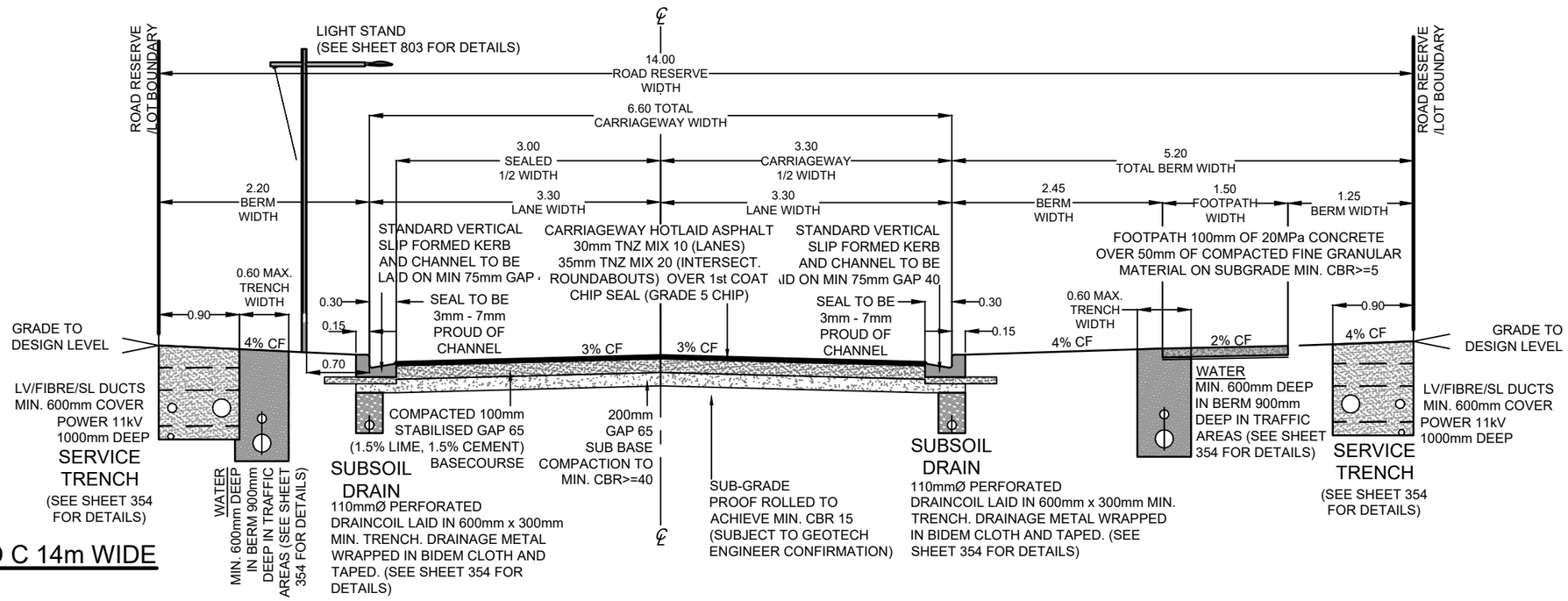
Resource Consent Plan
Road B Typical Cross Section
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

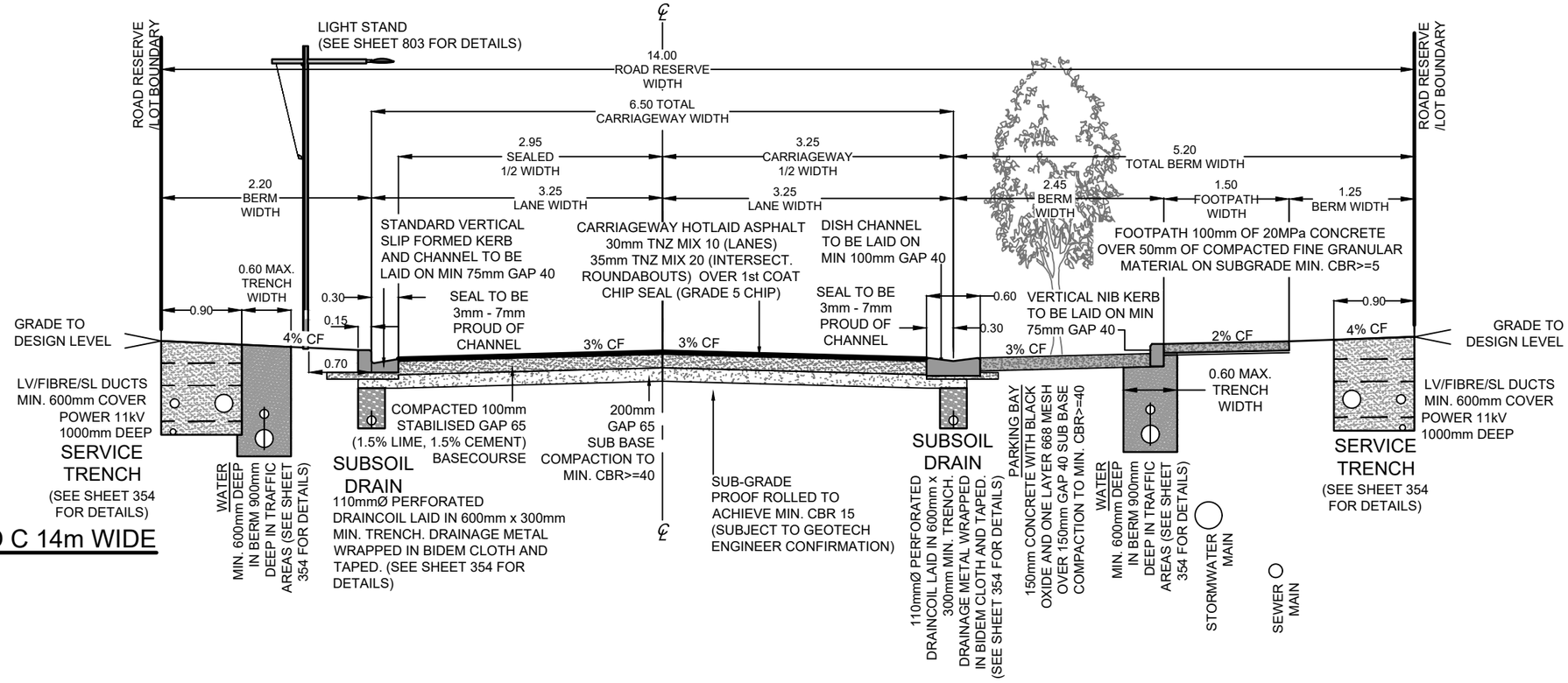
Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-RC-351				1



ROAD C 14m WIDE



ROAD C 14m WIDE

S:\2020\20253\2. ENGINEERING\1. DRAWINGS\PLOTTING\20253-EN-00-350-0-ROADING XS.DWG

Size	A3	Scale	1:60	Date	November 2021		
No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	17/11/21	Drawn	JMC		
2				Checked	CN		
3				Approved			

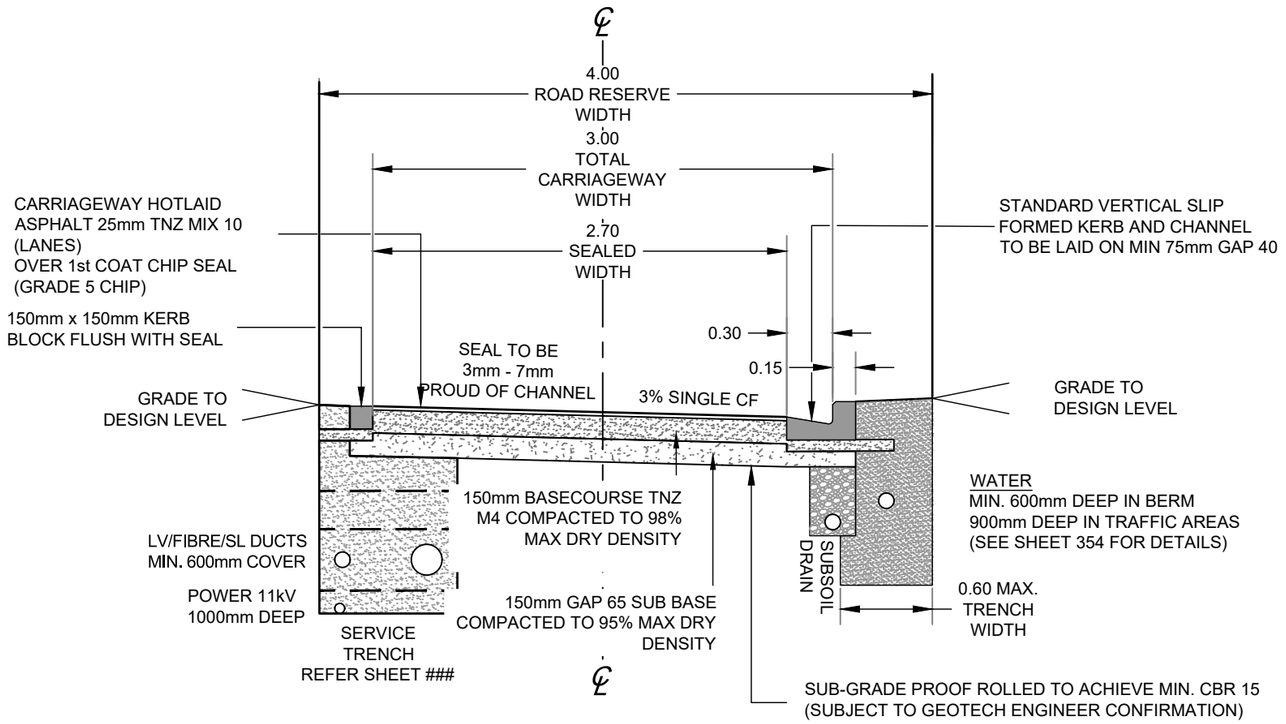
Resource Consent Plan
Road C Typical Cross Section
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

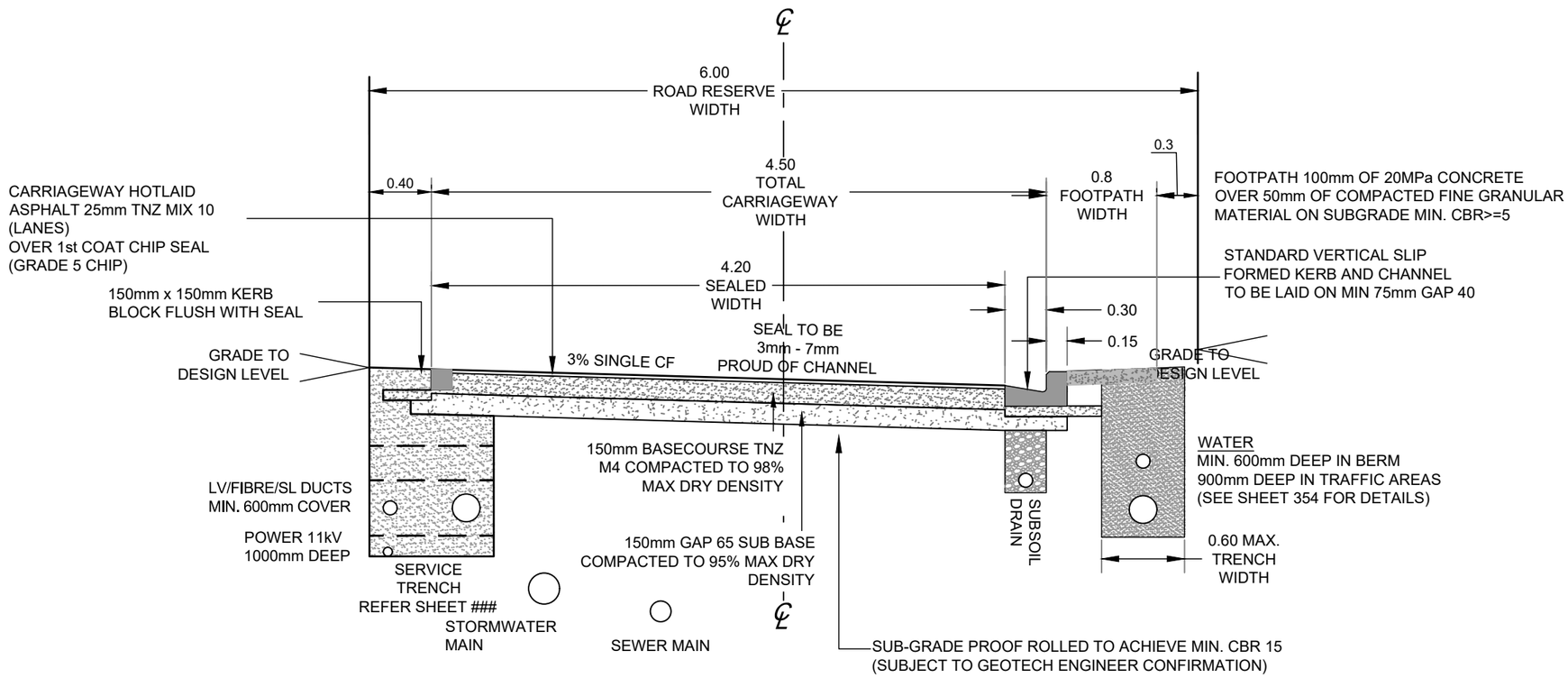
Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-RC-352				1



R.O.W. - 4.0m WIDE



R.O.W. - 6.0m WIDE

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Size	A3	Scale	1:40_XREF	Date	November 2021		
No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	17/11/21	Drawn	JMC		
2				Checked	CN		
3				Approved			

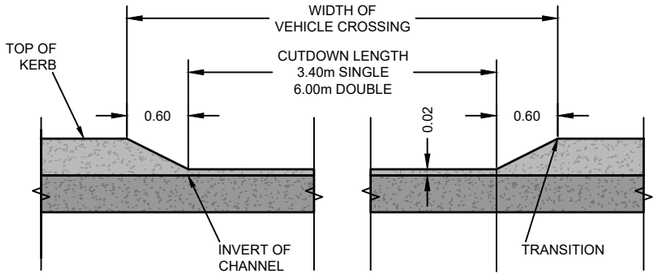
Resource Consent Plan
Road A Typical Cross Section
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

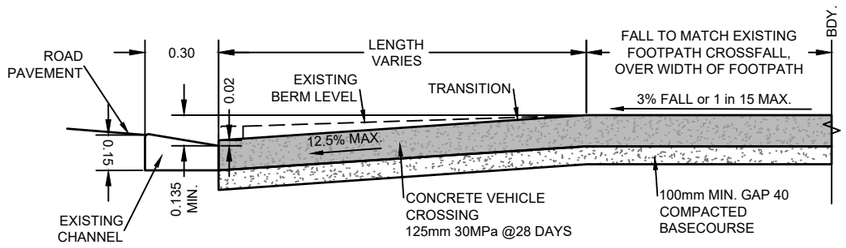
Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

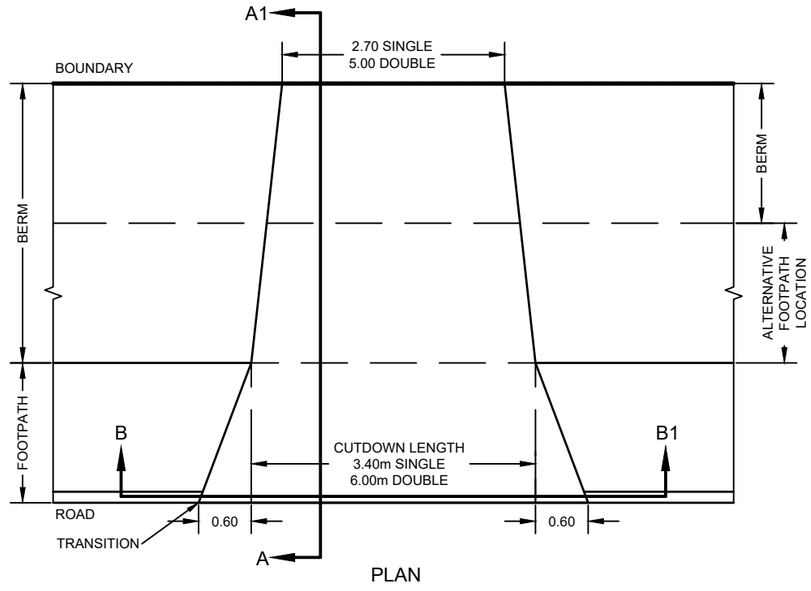
BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-RC-353				1



SECTION B - B1



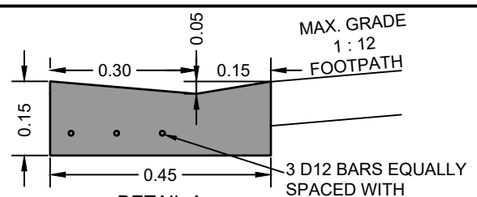
SECTION A - A1



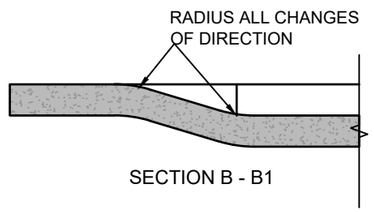
PLAN

TYPICAL CROSS SECTION

VEHICLE CROSSING DETAIL



DETAIL A
PRAM & PEDESTRIAN
CHANNEL CROSSING
ON ALL ROADS



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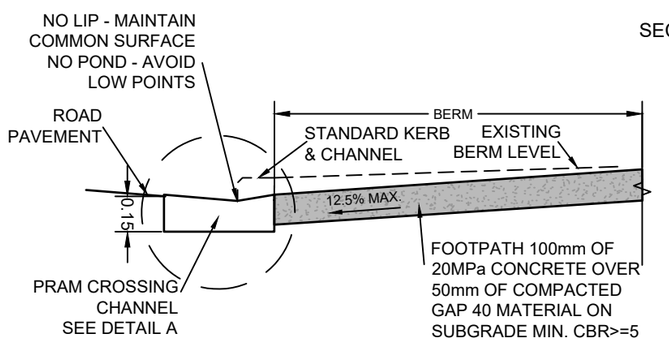

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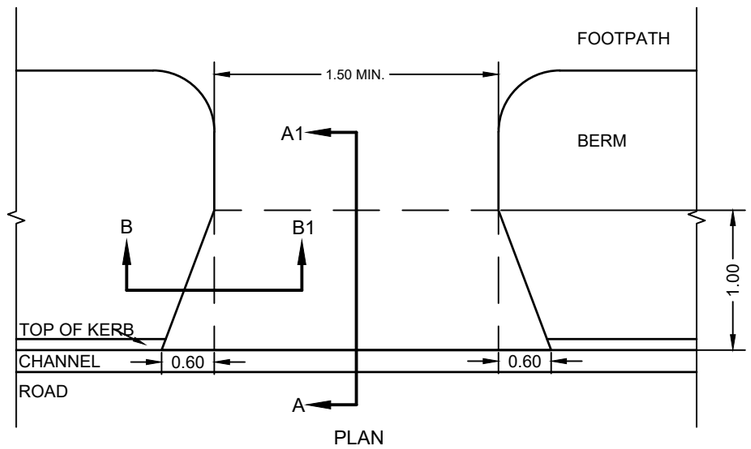

PLAN

TYPICAL CROSS SECTION

PRAM CROSSING DETAIL

Size	A3	Scale	####	Date	November 2021			
No.	Amendment		Init.	Date	Designed	JMC		
1	Issued For Resource Consent		JMC	17/11/21	Drawn	JMC		
2					Checked	CN		
3					Approved			

Resource Consent Plan
Road A Typical Cross Section
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-RC-354				1

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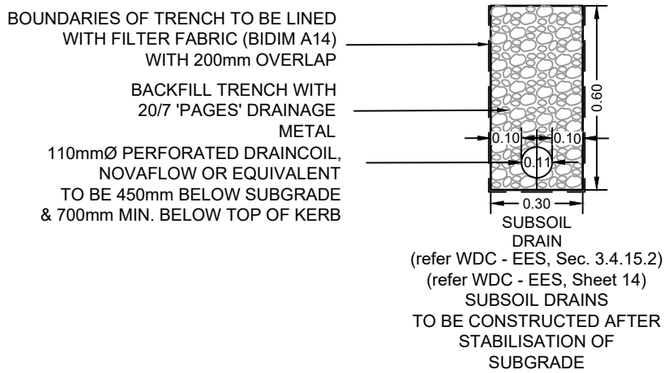
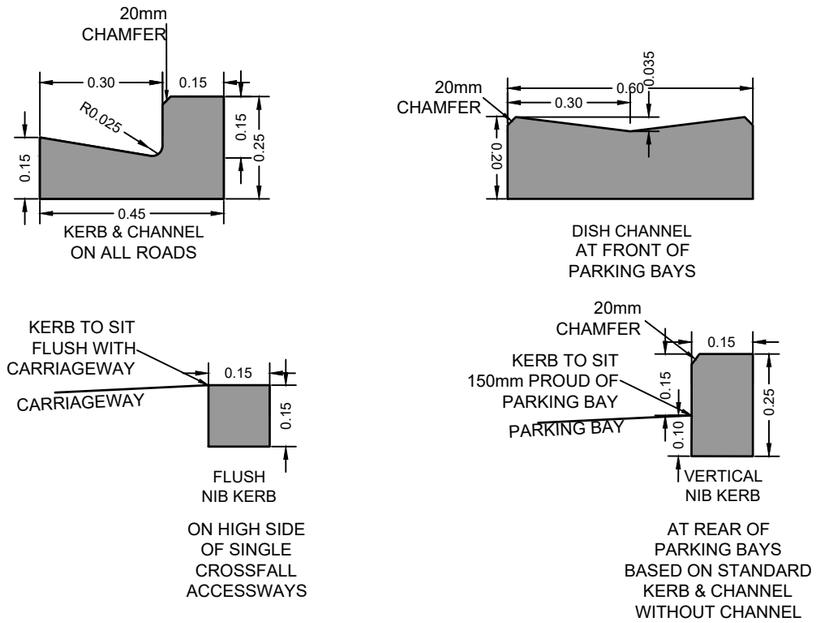


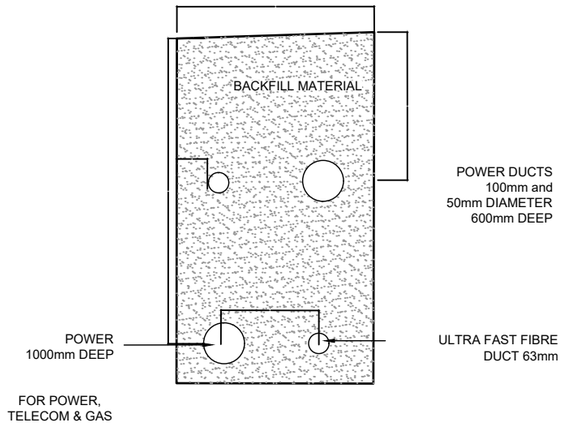
RESIDENTIAL ROAD

SUB SOIL DRAIN DETAIL



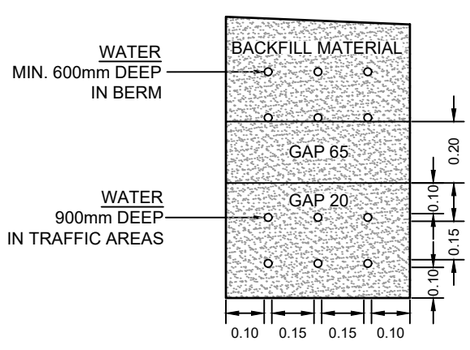
RESIDENTIAL ROAD

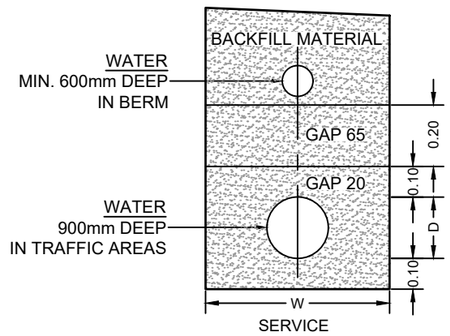
KERB DETAIL DIAGRAMS



RESIDENTIAL ROAD

UNDERGROUND SERVICES





W	TYPE OF PIPE
D + 400	PE

RESIDENTIAL ROAD

WATER RETICULATION

S:\2020\20253\2. ENGINEERING\1. DRAWINGS\PLOTTING\20253-EN-00-350-0-ROADING XS.DWG

Size	A3	Scale	1:60	Date	November 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	17/11/21
2			
3			

Designed	JMC		
Drawn	JMC		
Checked	CN		
Approved			

Resource Consent Plan

Road A Typical Cross Section

47 Dip Road, Kamo, Whangarei

Prepared for: CC Developments

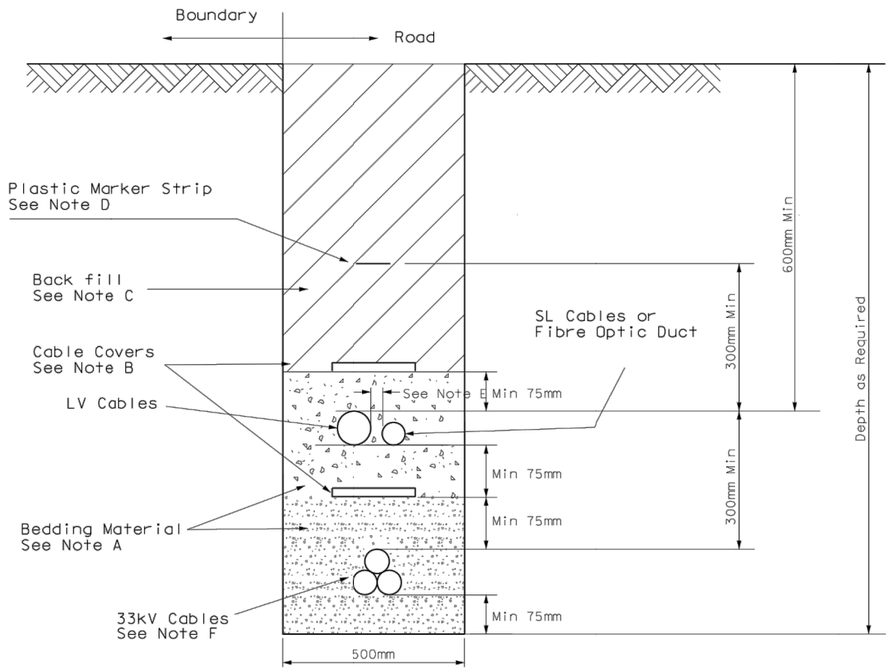
Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-RC-355				1

Power Cabling Only



Directly Laid HV & LV Cable
with Fibre Optic Duct

NOTES:

A. Bedding material either sand or 'clean' soil.
Thermal backfill to be used for 33kV Cable (Pap 7)

B. Covers to comply with AS/NZS 3000:2007 3.11.3 and 3.11.4 and AS4702-2000 and shall be located 75mm above cables and ducts. Cable covers shall be at least 150mm in width and overlap at least 40mm each side of the cable.

C. Back Fill, generally use fill from trench but ensure no large stones or sharp objects are placed back in the trench.

D. Marker strip to comply with AS/NZS 3000:2007 3.11.4.5 and be 100mm wide, coloured orange, with words 'Electrical Cable Below'.

E. Where practical provide some separation (75mm or greater) between direct laid LV and SL cable / fibre optic duct.

F. HV 11kV Cable to be minimum 450mm from boundary
(refer ENS 3.3.85 and 2F173s1)

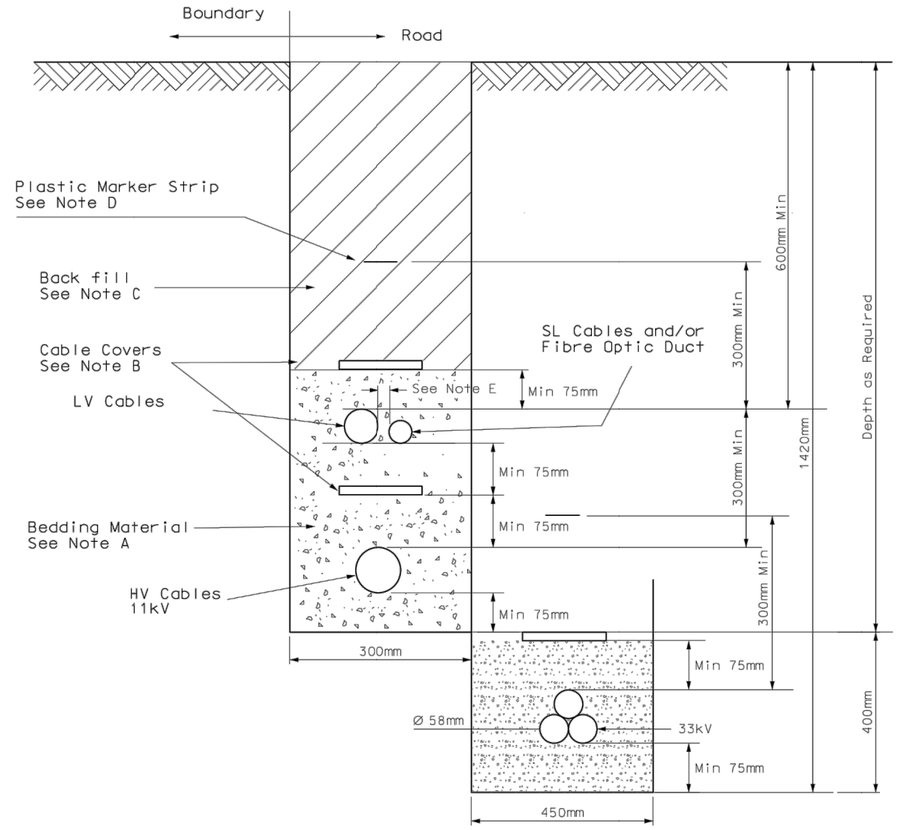
Northpower M.R. Gaillard BE M.I.P.E.N.Z. Chief Executive
Head Office
28 Mt Pleasant Road
Private Bag 9018
Telephone 0-9-430 1803
Facsimile 0-9-430 1804
http://www.northpower.co.nz

Rev	Amendments	By	Checked	Date
A.1	Initial Design	CP		
A.2	Remove Telecom	CP		

Title: 33kV Trench Profile Three Mile Bush Rd

Drawn C. Parkes Date 7/10/19
Checked Date
Approved Date
Issue A.2 Date
Plan Number 2F375s2
Scale NTS Sheet size A4

Power Cabling Only



Directly Laid HV & LV Cable
with Fibre Optic Duct

NOTES:

A. Bedding material either sand or 'clean' soil.
Thermal backfill to be used for 33kV Cable (Pap 7)

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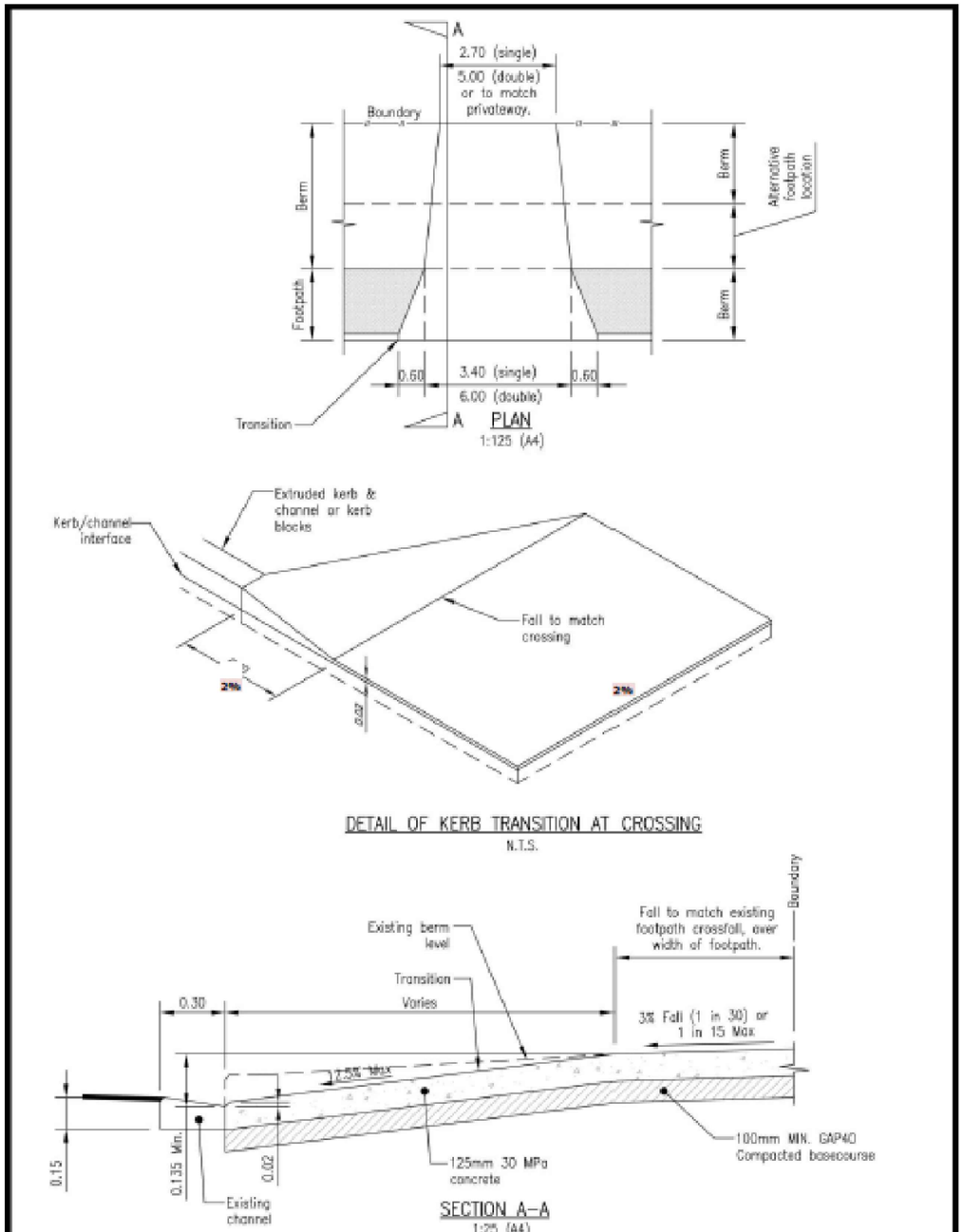
Rev	Amendments	By	Checked	Date
A.1	Initial Design	CP		
A.2	Remove Telecom	CP		

Title: 33/11kV Trench Profile Three Mile Bush Rd

Drawn C. Parkes Date 4/10/19
Checked Date
Approved Date
Issue A.2 Date
Plan Number 2F375s1
Scale NTS Sheet size A4

Sheet 18 Vehicle Crossing - Residential



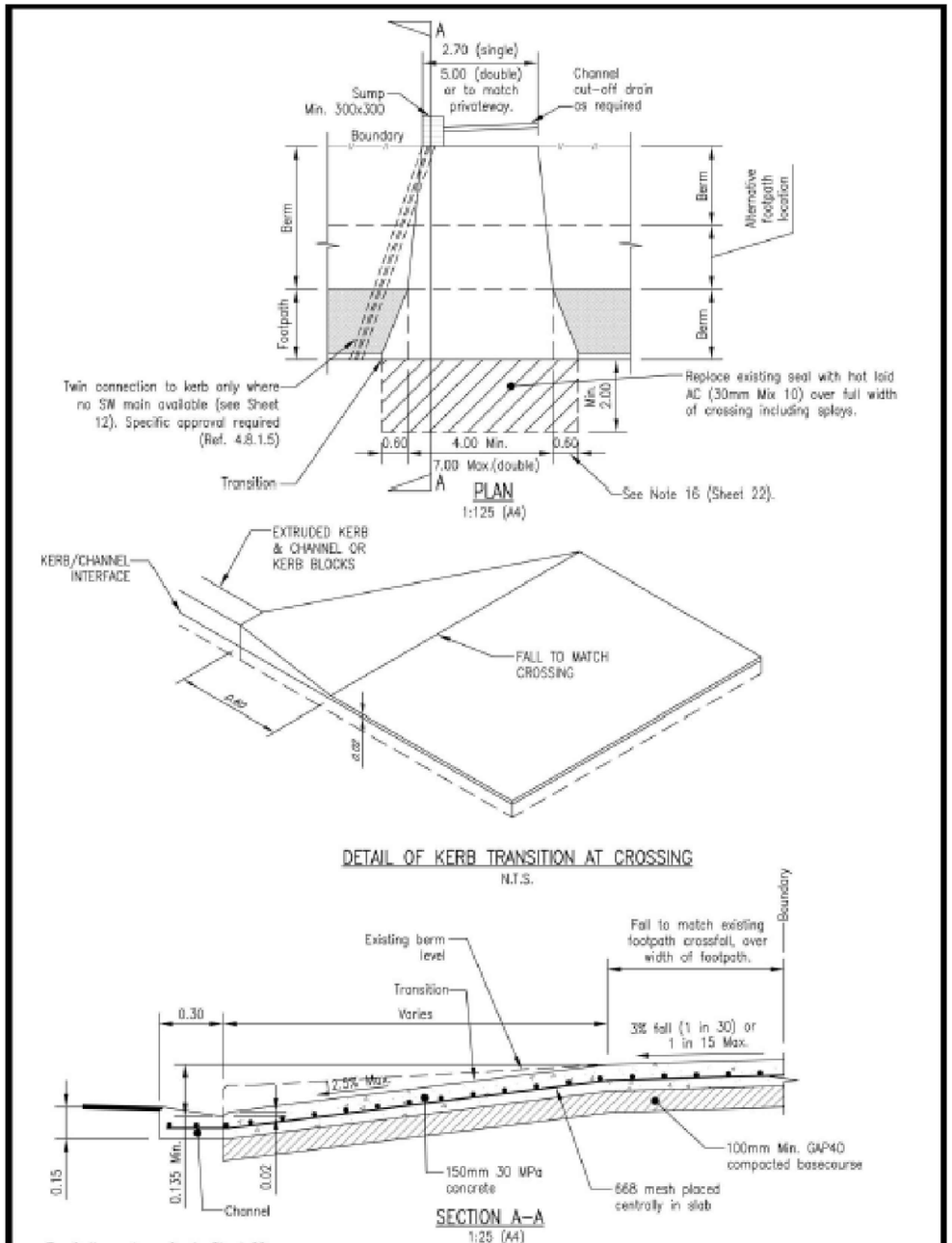
For further notes refer to Sheet 22

VEHICLE CROSSING – RESIDENTIAL	Date: APRIL 2010
	Revision: R0
WHANGAREI DISTRICT COUNCIL ENVIRONMENTAL ENGINEERING STANDARDS	Scale: AS SHOWN
	SHEET No. 18

WDC 80.36

Vehicle Crossings for Lots 9 & 10, 21, 33, 45 & 46, & 200.

Sheet 19 Vehicle Crossing – Commercial/Industrial



For further notes refer to Sheet 22

VEHICLE CROSSING – COMMERCIAL/ INDUSTRIAL	Date: APRIL 2010
	Revision: R0
WHANGAREI DISTRICT COUNCIL ENVIRONMENTAL ENGINEERING STANDARDS	Scale: AS SHOWN
	SHEET No. 19

WDC 80.36

Vehicle Crossings for Lots 53-55 & 35-39

Sheet 22 Vehicle Crossing Notes

RESIDENTIAL, COMMERCIAL AND INDUSTRIAL CROSSINGS

1. All concrete to be 30 MPa strength at 28 days.
2. Crossings to be constructed to match existing footpath and channel levels and be graded to give sufficient clearance to the underside of all vehicles.
3. The alternative channel crossing detailed on Sheet 20 may only be used with specific approval. It is for use only where thick overlay of existing seal precludes the standard option.
4. If no footpath, allowance shall be made for such with a 3% crossfall to the kerb.
5. Kerb transitions to be constructed of similar materials to the adjacent kerb or cast insitu concrete. See Sheet 12 for details.
6. Where the footpath or adjacent property level is below the channel level, ramp the crossing up from the channel to control surface water while maintaining vehicle clearance. A freeboard of 200mm above the channel is required to contain stormwater within the road.
7. Gradient of crossing not to exceed 12.5% (1 in 8)
8. Crossings for all private ways shall be commercial grade to Sheet 19.
9. Edges of footpath and back of channel to be saw cut.
10. All crossings require council inspection prior to pouring concrete.
11. If the edge of the crossing is within 1m of a crack or joint in an existing footpath then that section of footpath shall be replaced.
12. Commercial and industrial channels to be reinforced with an extension of the 668 mesh.
13. Where a street sump is located within the proposed crossing, the sump shall be relocated to the side of the crossing and reconnected to the council storm water system.
14. Refer to Sheet 16 for vehicle crossing over a drainage swale.
15. Stormwater kerb connections generally not permitted. (See Section 4.8.1.5).
16. Splay width may need to be increased in some circumstances to accommodate an 11.5m rigid truck.
17. For commercial crossings provide a 2m strip of hot laid AC over full width including splays.

RURAL CROSSINGS

1. Pipes are to be RCRRJ Class "4" (formally Class "2").
2. Pipes are to be adequate for the upstream catchment, but not less than 300mm dia or the downstream culvert and shall be constructed to the correct line and level to maintain drainage paths.
3. Provide concrete or stonework headwalls and/or concrete aprons. Pipe ends are to extend beyond the edge of the crossing a distance that allows the gradient to invert to be no steeper than IV:3H
4. Gateways shall be located to allow vehicle parking clear of the road shoulder.
5. Minimum sight distance requirements for entrance crossings are to comply with Sheet 14.
6. All crossings adjoining sealed public roads are to be sealed or concrete, to the property boundary.
7. Concrete access ways shall start at least 0.5m outside of the existing edge of seal or 0.5m outside of the carriageway width required by the standard whichever is the further.
8. Concrete entrance crossings are to be 125mm of 30MPa concrete for light vehicle access. Heavy vehicle crossings shall be 150mm thick of 30MPa concrete reinforced with 665 mesh unless specifically designed.
9. Unsealed crossings shall comprise not less than 125mm GAP 65 and 75mm GAP40 or 200mm GAP 40 (compacted depths).
10. For application of Type 2 crossing refer to Section 3.4.10.3.
11. Where local widening is required (Types 2 and 3) the tapers shall be sealed.

VEHICLE CROSSING NOTES (FOR RESIDENTIAL, COMMERCIAL, INDUSTRIAL AND RURAL USE)	Date: APRIL 2010
	Revision: R0
WHANGAREI DISTRICT COUNCIL ENVIRONMENTAL ENGINEERING STANDARDS	Scale: AS SHOWN
	SHEET No. 22

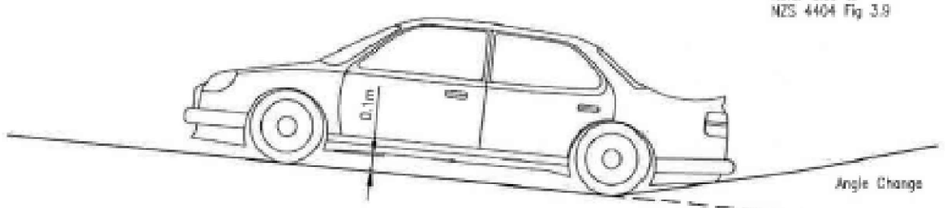
WDC 8036

Sheet 23 Vehicle Crossing – Max Graded Profiles For Urban/Rural

BREAKOVER ANGLE

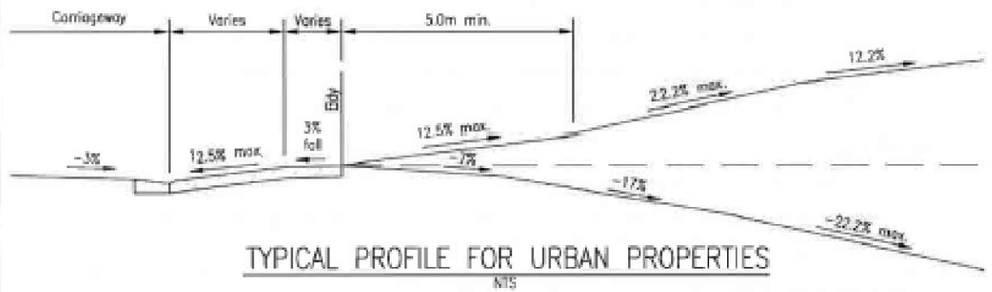
Maximum change of grade 10% (algebraic)
(5.7 degrees)

Refer also to NZS 4404 Fig 3.9

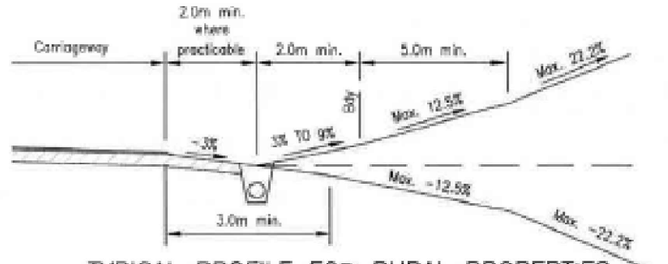


DEPARTURE ANGLE

Maximum change of grade 17% (algebraic)
(9.65 degrees)



TYPICAL PROFILE FOR URBAN PROPERTIES
NTS

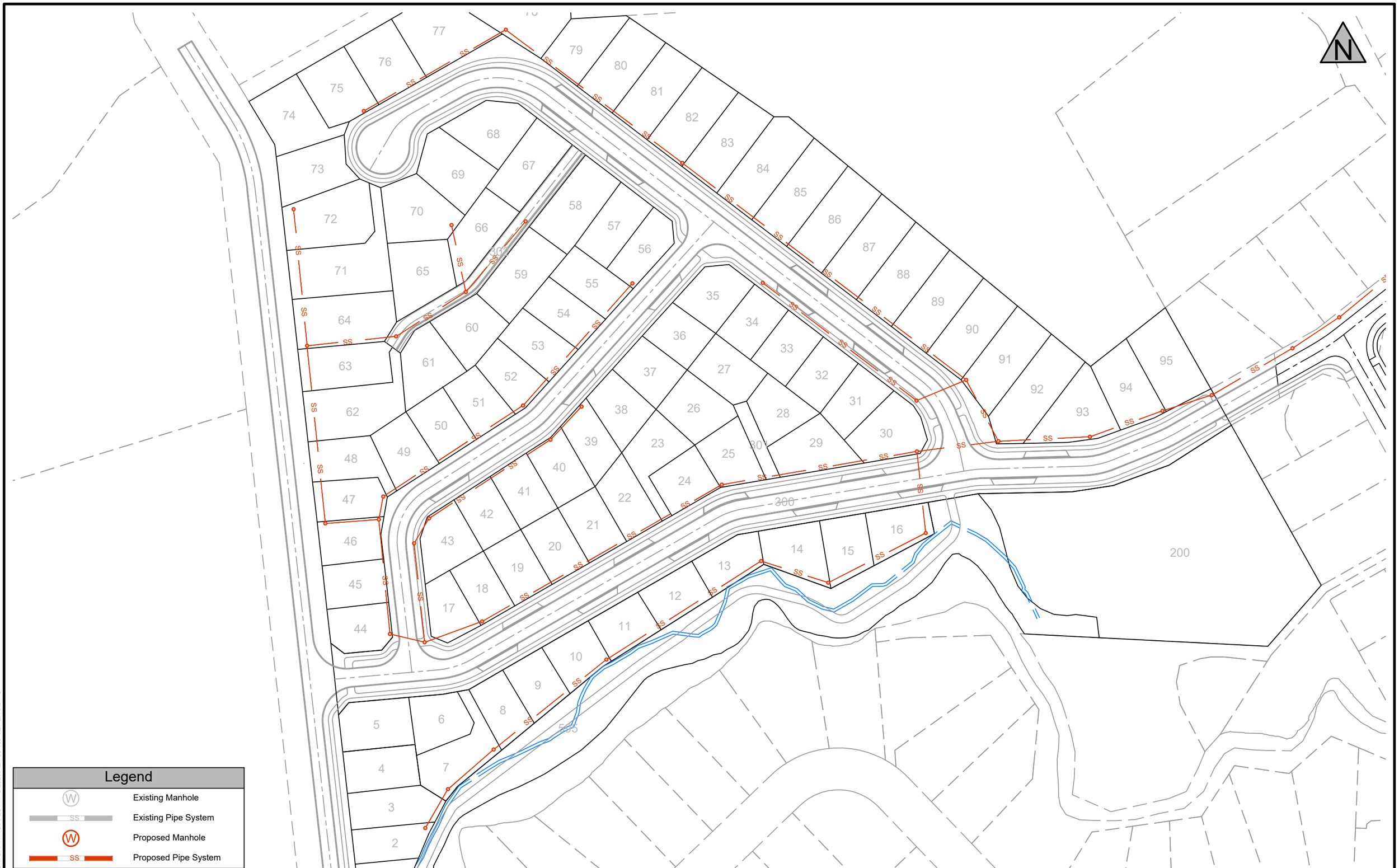


TYPICAL PROFILE FOR RURAL PROPERTIES
NTS

NOTES:
1. Maximum grade changes to occur at not less than 2.0m intervals.
2. Based on 90 percentile car as at 1990 with minimum ground clearance of 100mm.

VEHICLE CROSSING – MAXIMUM GRADED PROFILES FOR URBAN/ RURAL PROPERTIES	Date: APRIL 2010
	Revision: R0
WHANGAREI DISTRICT COUNCIL ENVIRONMENTAL ENGINEERING STANDARDS	Scale: NTS
	SHEET No. 23

WDC 8036



Legend

- Existing Manhole
- Existing Pipe System
- Proposed Manhole
- Proposed Pipe System

Size	Scale	Date
A3	1:1250	November 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	10/05/21
2			
3			

Designed	JMC		
Drawn	JMC		
Checked	CN		
Approved			

Resource Consent
Sanitary Sewer Overview
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-EN-400				1

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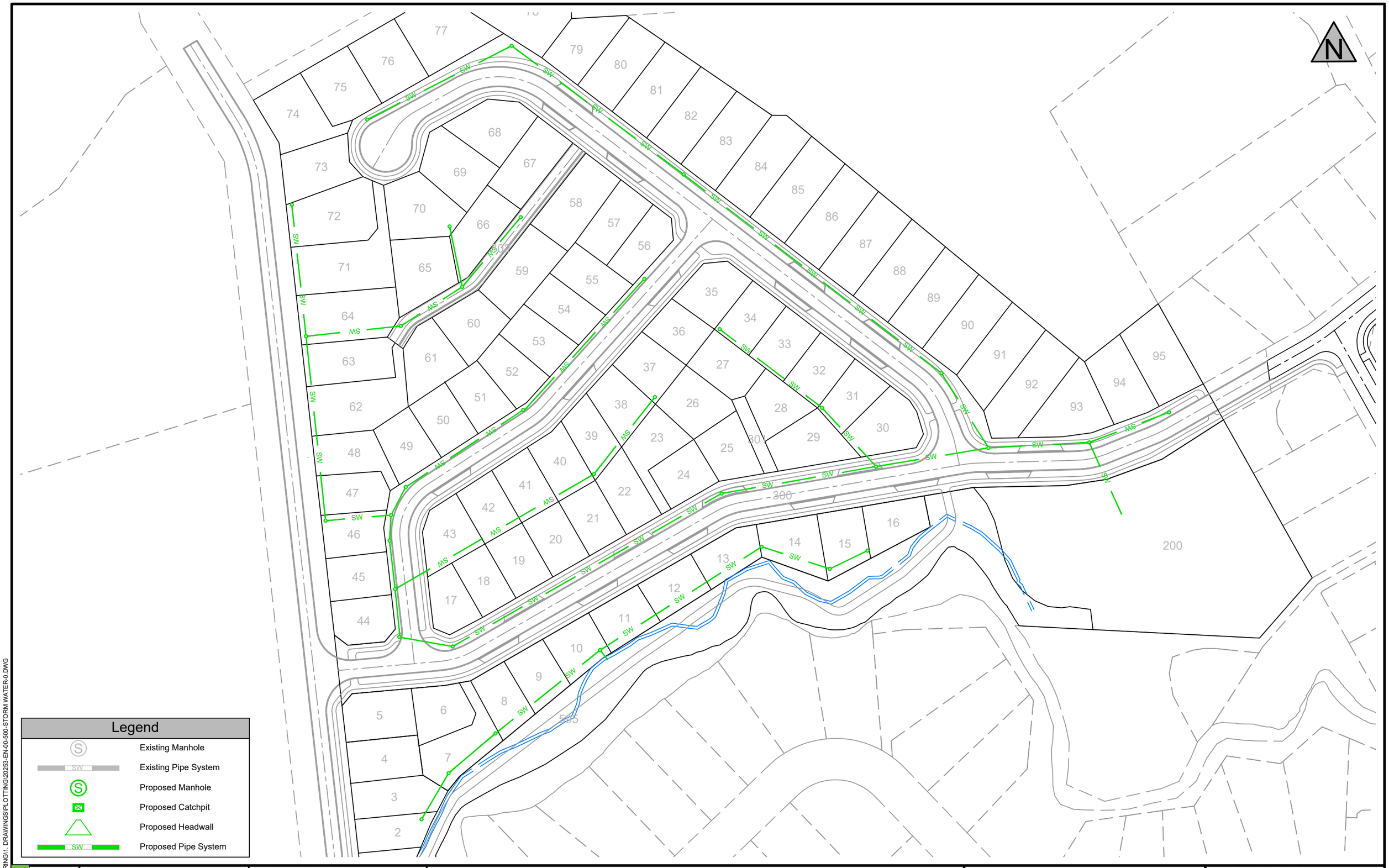

Size	A3	Scale	1:1250	Date	November 2021		
No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	10/05/21	Drawn	JMC		
2				Checked	CN		
3				Approved			

Resource Consent
Storm water Overview
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-EN-500				1

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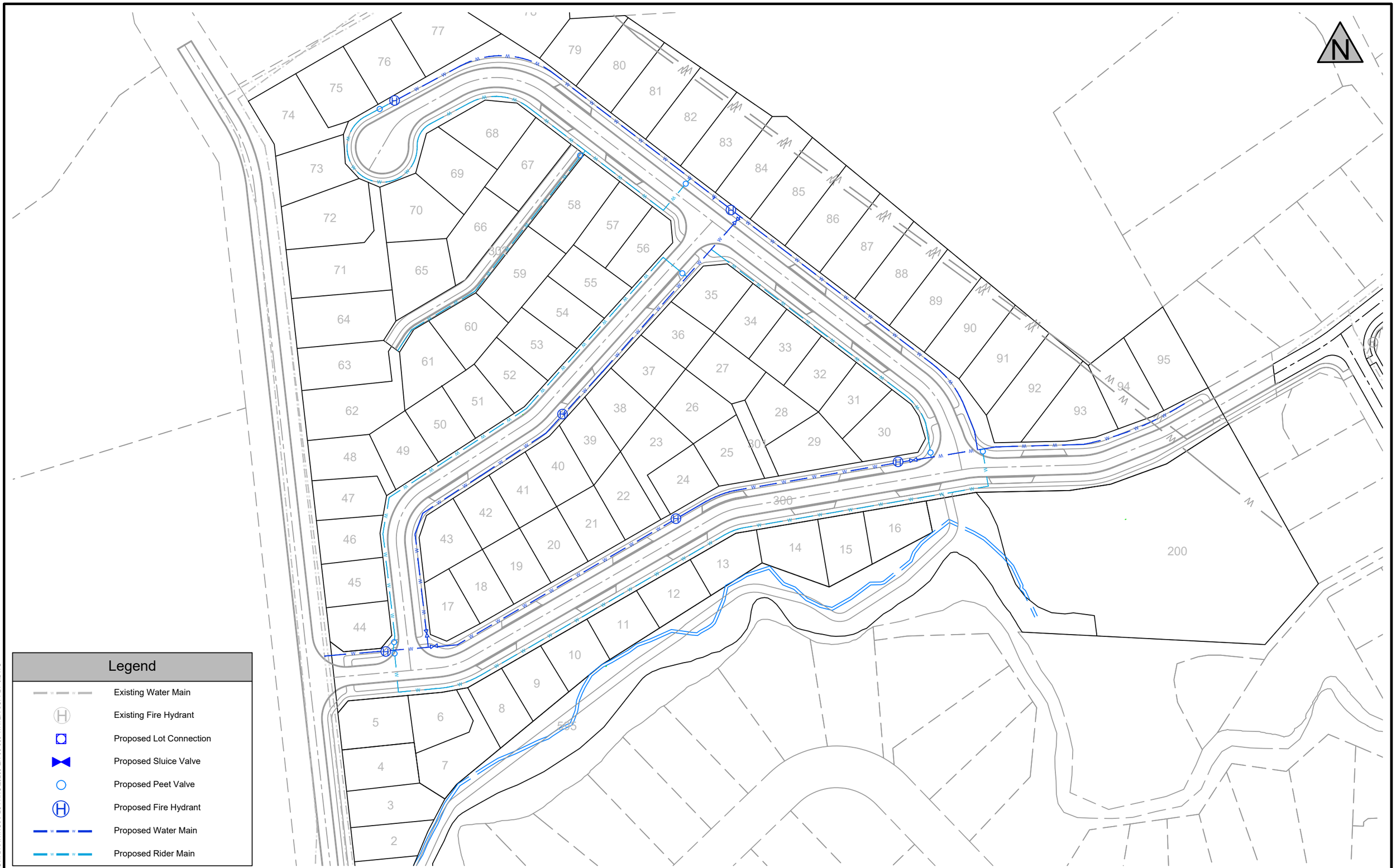

Legend

- Existing Water Main
- Existing Fire Hydrant
- Proposed Lot Connection
- Proposed Sluice Valve
- Proposed Peet Valve
- Proposed Fire Hydrant
- Proposed Water Main
- Proposed Rider Main

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Size	Scale	Date
A3	1:1250	November 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	10/05/21
2			
3			

Designed	JMC		
Drawn	JMC		
Checked	CN		
Approved			

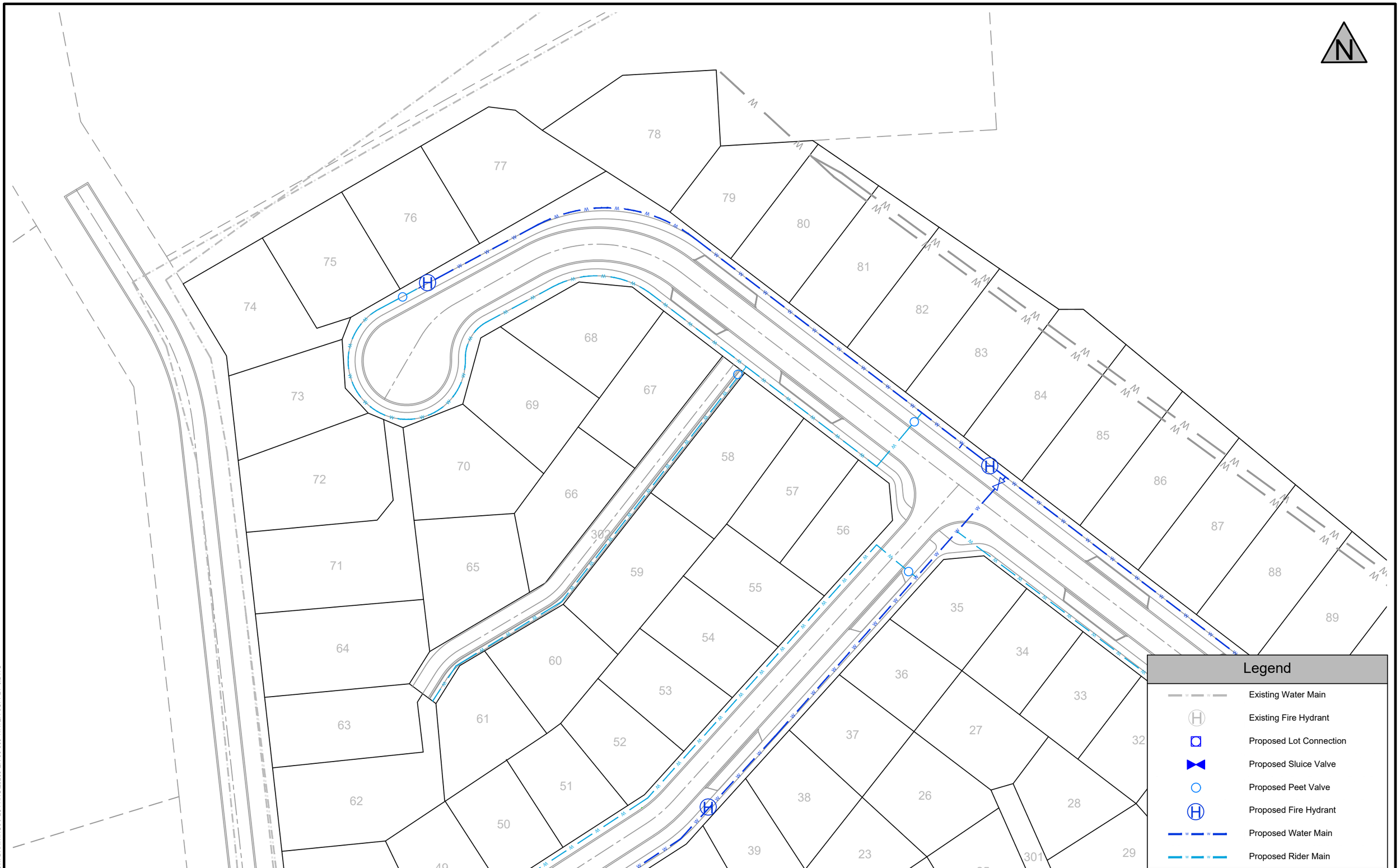
Resource Consent
Water Reticulation Overview
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-EN-600				DRAFT



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No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	10/05/21	Drawn	JMC		
2				Checked	CN		
3				Approved			

Resource Consent
Water Reticulation Overview
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
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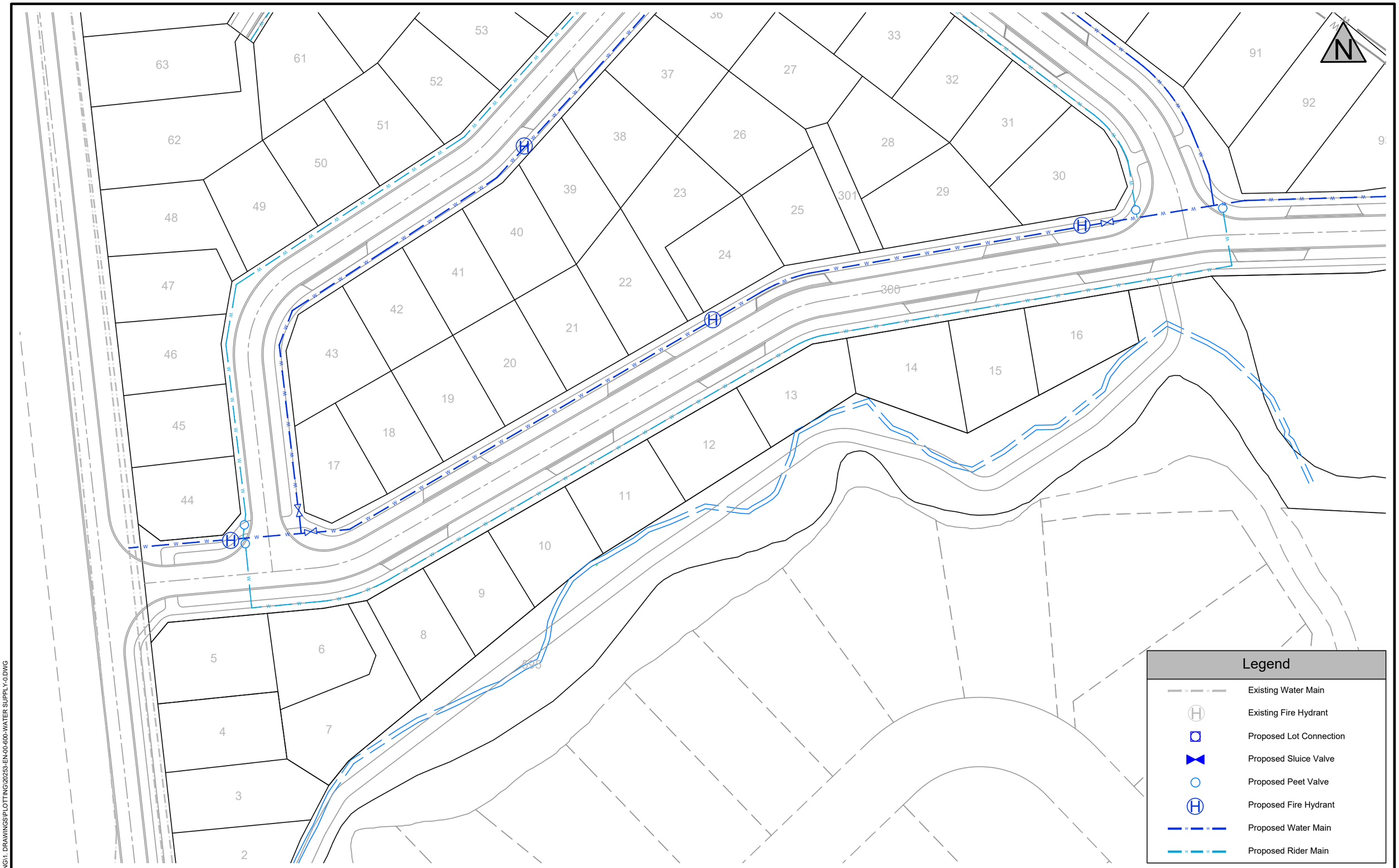

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Size	A3	Scale	1:750	Date	November 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	10/05/21
2			
3			

Designed	JMC		
Drawn	JMC		
Checked	CN		
Approved			

Resource Consent
Water Reticulation Overview
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-EN-602				DRAFT

Legend

- Existing Water Main
- Existing Fire Hydrant
- Proposed Lot Connection
- Proposed Sluice Valve
- Proposed Peet Valve
- Proposed Fire Hydrant
- Proposed Water Main
- Proposed Rider Main
- Existing Stormwater Manhole
- Existing Stormwater Pipe
- Proposed Stormwater Manhole
- Proposed Catchpit
- Proposed Headwall
- Proposed Stormwater Pipe
- Existing Wastewater Manhole
- Existing Wastewater Pipe
- Proposed Wastewater Manhole
- Proposed Wastewater Line

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Size	Scale	Date
A3	1:1250	November 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	10/05/21
2			
3			

Designed	JMC		
Drawn	JMC		
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Approved			

Resource Consent
Water Reticulation Overview
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

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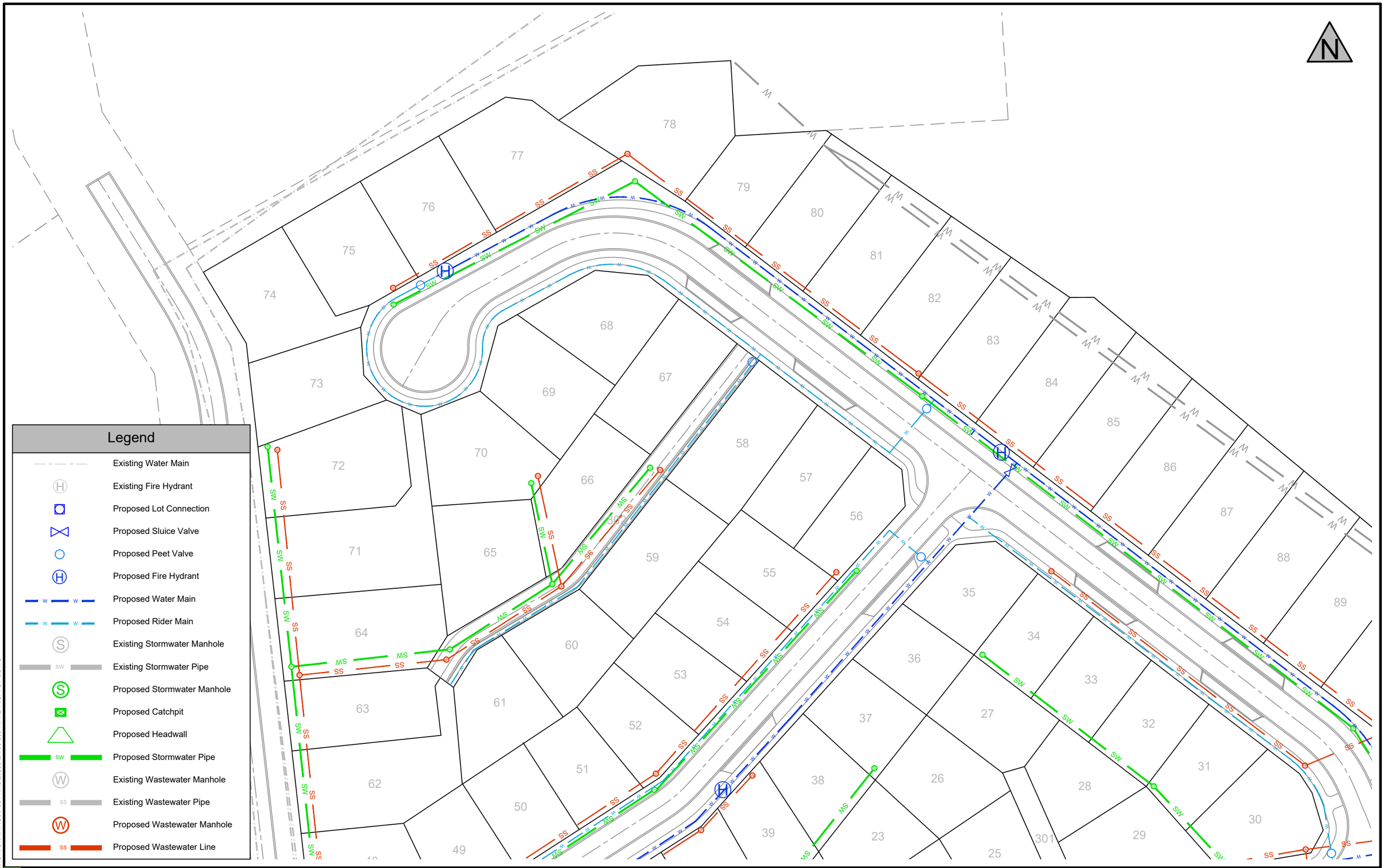

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Size	A3	Scale	1:750	Date	November 2021

No.	Amendment	Init.	Date
1	Issued For Resource Consent	JMC	10/05/21
2			
3			

Designed	JMC		
Drawn	JMC		
Checked	CN		
Approved			

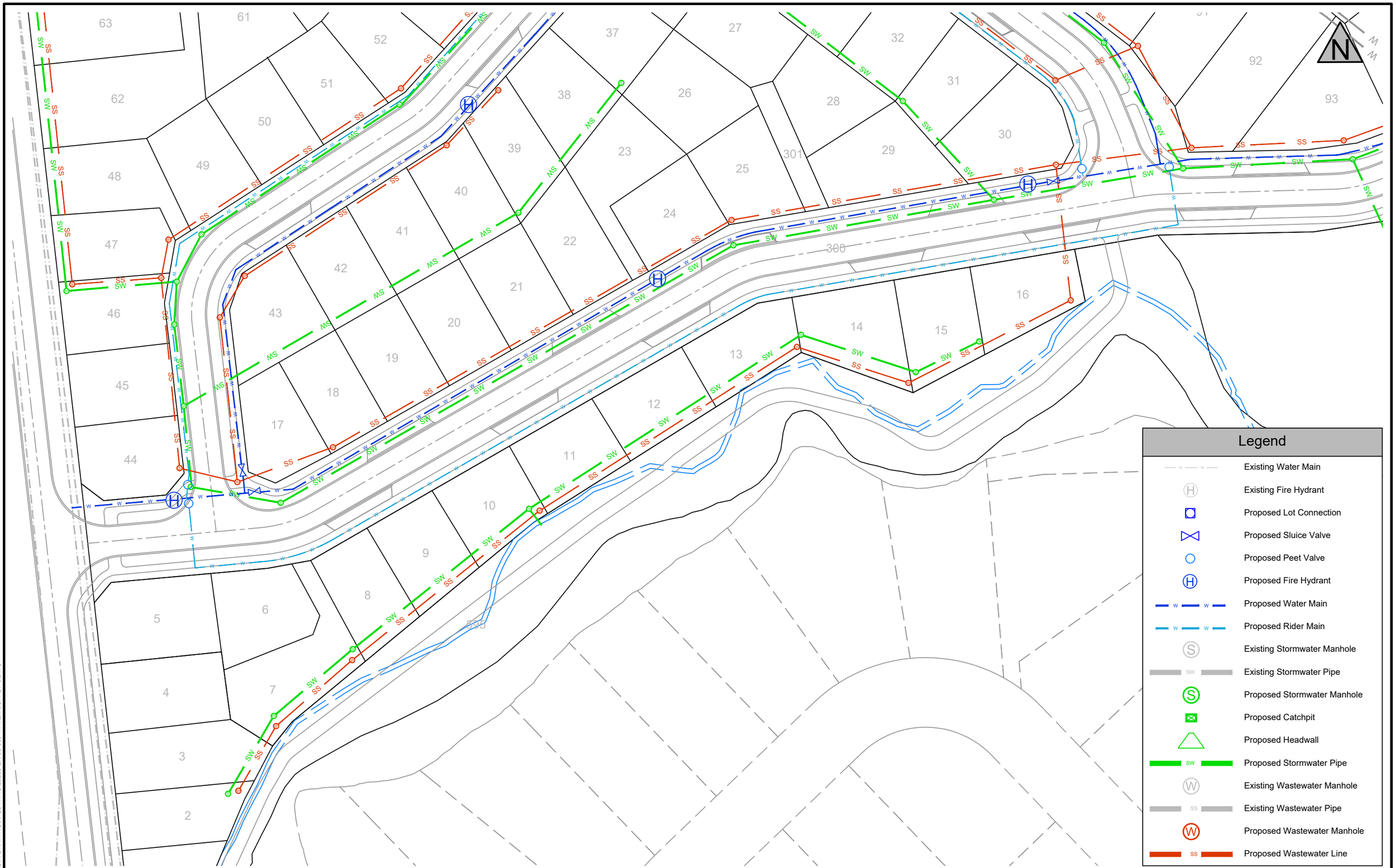
Resource Consent
Water Reticulation Overview
47 Dip Road, Kamo, Whangarei
Prepared for: CC Developments

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
20253-01-EN-701				DRAFT



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Size	A3	Scale	1:750	Date	November 2021		
No.	Amendment	Init.	Date	Designed	JMC		
1	Issued For Resource Consent	JMC	10/05/21	Drawn	JMC		
2				Checked	CN		
3				Approved			

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Appendix 4

Integrated Transport Assessment

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SUBDIVISION

47 DIP ROAD, WHANGAREI

INTEGRATED TRANSPORT ASSESSMENT

Prepared by Dean Scanlen
Engineering Outcomes Ltd
24 November 2021

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1. PURPOSE, DESCRIPTION OF THE PROPOSAL AND SITE

This report is an integrated traffic assessment of a proposed subdivision at 47 Dip Road, Whangarei, Section 1 SO 65970. It is provided in accordance with the Whangarei District Plan including Rules TRA-R15, TRA-R16 and TRA-R17 and information requirements TRA-REQ2 and TRA-REQ3.

The proposal is a subdivision of the parent lots into ninety-five lots. Access is proposed by way of new roads including a new link road between Dip Road and Tuatara Drive (Road A), an internal loop road (Road B), a cul-de-sac (Road C) plus two shared private accesses. Roads A to C are all proposed to be vested as public road.

The site is situated at the north-western residential edge of the suburb of Kamo. It is on the eastern side of Dip Road and also has a connection to Tuatara Drive by way of existing road reserves.

The subdivision is described in plans by Blue Wallace Surveyors Ltd entitled "Concept Scheme Plan; Section 1 SO 65970; 47 Dip Road, Kamo, Whangarei; – Whangarei. Prepared For: Onoke Heights Ltd", referenced 20253-01-PL-102 Revision 12 and dated 24 November 2021. The access and road designs are described in plans by Blue Wallace Surveyors Ltd referenced (20253-01-EN-300-307, dated 15 November 2021 and 20253-01-RC-350-353 dated 17 November 2021).

2. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the proposed new links, including footpath and pedestrian links and the internal subdivision access are suitable, fit for their intended purpose and will meet all relevant provisions of the *Whangarei District Plan.*

At full subdivision development, traffic generation totaling 800 movements is expected on an average day. Walking trips are expected to be frequent and a significant proportion of all trips. The use of bicycles will remain well below that of private cars for many years at least, but is expected to increase significantly with the advent of affordable e-bikes and ongoing future improvements to public offroad cycling and shared paths.

The design maximises opportunities for walking by providing safe linkages to the existing footpath on Dip Rd, Hurupaki school and other local attractions. In particular, there is an existing footpath along the site (eastern) side of Dip Road, of which the section south of the new intersection is proposed to be upgraded to a concrete path and connected to the existing concrete footpath[1]. A continuation of the footpath along the southern side of Road A will link to the existing footpath on the eastern side of Tuatara Drive. It is less than a 1 kilometre walk to the nearest public bus stop and the design provides a continuous link to that and all other walkable local attractions.

A combination of carefully designed internal road alignment including the minimum suitable carriageway widths and other measures that will provide a calming effect on drivers, will ensure safe speeds and minimal exposure for pedestrians crossing the roads. Inset parking bays are proposed, at a rate of one parking space for each 2.3 lots, to minimise the risks associated with parking spillover into locations in which there is insufficient space for parking and/or other streets.

[1] Which is ends at the culvert crossing near the southern corner of the site - at RAMM 420 metres.

Even with the design maximising opportunities for walking, in particular, private cars will be the dominant mode of travel to and from this site. The road network the site leads to has more than adequate capacity to absorb the additional motor vehicle traffic from the proposal at full subdivision development, including construction traffic (which will be managed through restrictions on most truck movements to the most rural routes, an approved traffic management plan and temporary traffic management). Sight distances are at least adequate and the connections will be of a standard suitable for the level of traffic expected through them.

Existing key intersections beyond the site, including that at Three Mile Bush Road/Tuatara Drive/Crawford Crescent (a roundabout) and Three Mile Bush Road with Kamo Road and Station Road (traffic signals), are assessed to be adequate in their current form and layout. A simple change of lane discipline[2] and associated phasing would slightly improve the level of service at the Kamo Road traffic signals despite the additional traffic, but is also a likely design fault and existing deficiency with the intersection.

No work, other than the road and footpath connections and some vegetation trimming within the Dip Road road-reserve south of the site, is considered warranted to address the effects of the additional traffic at any locations. In general, the standard development contribution framework will address the effects on the existing road network adequately.

As such, it is concluded that the traffic generated by the proposal will be well managed such that its effects are less than minor.

3. SUBDIVISION ACCESS

All but four lots are proposed to lead to proposed new public roads either directly or by way of two shared access easements. Lots 1 to 4 will access Dip Road directly.

Road A is proposed to connect to Dip Road at its western end, in a give-way controlled tee intersection at RAMM distance 560 metres, and Tuatara Drive at its eastern end.

Sight distances in relation to the new connection with Dip Road are as follows:

- 212 metres towards the north; and
- 155 metres towards the south.

The minimum sight distance associated with the direct entrances onto Dip Road are in relation to lot 1 and are 85 metres within the road reserve[3].

The new roads are proposed to be kerbed and formed to carriageway widths ranging between of 6.6 and 7.5 metres and with a footpath on at least one side. The relatively narrow roads and regular bends[4] will provide a natural calming effect on the traffic.

Concrete footpaths are proposed on both sides of new Roads A and C and one side of both Road B and Lot 302 (the larger shared access), plus along the eastern side of Dip Road south of the new intersection with Road A. The footpath on Road A will be continued along Tuatara Drive as far as an existing pram crossing near the shoulder of the existing intersection. That crossing is opposite another pram crossing that connects to the existing footpath on Tuatara Drive.

[2] Inclusion of through movements from Three Mile Bush Road in both lanes.
[3] Provided some vegetation is trimmed or removed to achieve this.
[4] Most with a radius of 30 metres for which the safe design speed is close to 40 km/hr.

The footpath on Dip Road will upgrade an existing unsealed footpath and connect to an existing concrete footpath that currently ends near the culvert crossing 125 metres south of the new intersection.

A walkway is also proposed through Lot 595 – the new recreational reserve. It connects to the footpaths on both Dip Road and Road A.

Parking bays are proposed on all internal roads such that there is ample space for driveway crossings into each lot, clear of the parking bays. A total on-street parking capacity for forty-two cars is proposed, which is a rate of at least one parking space for each 2.3 lots.

With the exception of lots 62 to 64, at least one on-street parking bay is provided within 100 metres walking distance of each lot. The nearest bays are only 110 metres walking distance from lots 62 to 64.

The shared accesses are proposed to meet the council standards for shared private access[5].

4. DESCRIPTION OF EXISTING ROADS AND PROPOSED CONNECTIONS

Tuatara Drive, which has the status of "access" road[6] in the Whangarei district hierarchy, is sealed and kerbed with 8.2 metres between kerb faces and a footpath along its eastern side. It has an internal tee intersection, one leg of which continues northeastwards to existing residential development, the other being a short stub that leads to two existing houses and currently ends only 25 metres west of the intersection. Road 1 will link to the stub section of the road and the intersection will be marked with give way control. This is as shown in Figure 1, which also shows how the footpaths will be linked.

Figure 1. Connection of Road 1 and footpath to Tuatara Drive

[5] *Whangarei District Plan* Table TRA 9.

[6] *Whangarei District Plan* interactive maps, appeals version.

The connection with Dip Road is proposed to be a give-way controlled tee intersection. No facilities are warranted to separate vehicles turning into the new intersection from those that are not turning. This is mainly due to the prediction, as detailed in Appendix A, that most traffic will enter the subdivision by way of Tuatara Drive.

Dip Road is also sealed with two lanes and sealed width of 6.4 metres. It has an unsealed footpath on its eastern side. The speed limit is 80 km/hr along the site frontage, reducing to 50 km/hr close to 100 metres south of the new intersection location. Dip road is on a steep gradient – 14%, on the northern approach to the intersection location. It is defined as a secondary collector road[7].

There are a number of power poles and light poles along the Dip Road frontage. There is one existing vehicle crossing on Dip Road for the site – near the southern end of its frontage. This will be closed if not used by one of Lots 1 to 4.

The roundabout that Tuatara Drive connects to has four legs, the other three being Three Mile Bush Road (both east and south) and Crawford Crescent (west). Figure 5 (Appendix B) is an aerial photo of the roundabout and also shows turning traffic frequencies – both existing and estimated subdivision traffic.

Three Mile Bush Road is also sealed and kerbed with two lanes and links to Kamo Road in the Kamo CBD at its eastern end. There is extensive residential and rural-residential development along Three Mile Bush Road as well as zoning that potentially enables extensive further development.

The intersection with Kamo Road has traffic signals and also includes Station Road – part of the route between Kamo and the suburb of Tikipunga.

The current speed limit on all roads in the vicinity of the site, other than Dip Road along the site frontage, is 50 kilometres per hour.

The new intersection is 400 metres from Hurupaki School entrance and 800 metres walking distance from the nearest bus stop[8]

[7] Whangarei district plan interactive maps, appeals version.
[8] Which is outside 63 Three Mile Bush Road.

Photo 1. Looking south along Dip Road from close to the proposed intersection location. The site is at far left.

Photo 2. Looking north along Dip Road from close to the proposed intersection location.

Photo 3. Tuatara Drive looking westwards towards the site. Photo from Google Streetview.

5. TRAFFIC

All traffic movements referred to here are one-way movements whether an entry, exit or a movement along a road, during a specified time period, vmpd = vehicle movements per day.

5.1 Motor vehicle traffic generation, origins, destinations and route usage

The subdivision is expected to generate between 8 and 9 vehicle movements per developed lot per day. At full development, that is a total of some 800 movements on an average day. A high proportion – at least 98% will be cars and light vehicles, especially once the subdivision is fully developed[9].

There is potential for future growth in traffic on Dip Road because of land zoned "low-density residential" near its northern end. The potential diversion of existing traffic from Dip Road onto Road A, and its expected effects, are assessed in Appendix A. The outcomes are summarised here:

- It is estimated that 260 to 270 existing traffic movements per day will travel by way of Road A.
- On this basis, at full subdivision development but existing levels of development otherwise, the estimated total additional traffic on the eastern end of Road A and Tuatara Drive, as a result of the subdivision, is 860 to 870 movements per day.
- The future development of vacant land zoned low-density residential, around the northern end of Dip Road, has the potential to add another 400 vehicle movements per day onto Road A and Tuatara Drive.
- It is estimated that only about 20% of subdivision traffic, or some 160 movements per day, will use the Dip Road intersection. Of those, an estimated 120 will travel to/from the south each day, so right-turn entries are estimated to occur at a rate of some 60 movements per day or only 4 to 5 during an average hour.

[9] After which only occasional trips by delivery, rubbish, furniture and occasional service trucks are expected – rarely more than 4 visits (8 trips) per day and only on rubbish pickup days, usually significantly fewer and often nil.

5.2 Other transport modes

Hurupaki School and kindergarten, plus Kamo Primary school, are both within easy walking distance of the site and are expected to result in a significant number of walking trips – mainly by children but also some adults. The nearest bus stop, which is outside number 63 Three Mile Bush Road, and shop, which is on Crawford Crescent near the roundabout, are also within easy walking distance – significantly less than one kilometre for almost all lots. Most of the site is also less than one kilometre from Kamo CBD, so walking will comprise a significant proportion of trips – potentially as high as 25%.

Bicycle use is expected to comprise some 2% of trips for transport purposes. The high recent uptake of e-bikes should improve this and some recreational cycling is also likely, especially with future improvements planned by the council in the area[10].

5.3 Traffic on Existing Roads

Mobile Road estimates average daily traffic of 650 movements on Tuatara Drive, a little under 1,000 vehicle movements per day on Dip Road along the site frontage, nearly 7,000 movements per day at the eastern end of Three Mile Bush Road, nearly 14,000 movements per day on Kamo Road south of Three Mile Bush Road and 10,500 movements per day on Kamo Road north of Three Mile Bush Road. The tee intersection on Tuatara Drive is approximately half way along the road and beyond Hodges Park, so the count at the tee intersection is more likely in the order of 300 movements per day.

Monitoring has been carried out of both the roundabout and Kamo Road intersection during both the morning and afternoon peak periods. The results of this, and associated computer modelling and analysis of the intersections, is given in Appendix B.

There is also potential for significant future growth in traffic on Three Mile Bush Road because of a large area of land in its catchment zoned "rural urban expansion zone" (RUEZ) – nearly 90 hectares and all west of Dip Road, rural living (140 hectares), large-lot residential (180 hectares) and low-density residential (2.9 hectares).

With servicing by the three community waters, the district plan provides for subdivision of RUEZ zoned land down to 500 square metre lots. With full servicing, this and the other zones have the potential to create some 1,700 additional lots at least 10,000 additional traffic movements each day from west of the roundabout, at least half of which are expected to continue through the intersection with Kamo Road. Future development of other land in the catchment of Three Mile Bush Road will add even more traffic at this location.

The westbound operating speed of traffic on Dip Road approaching the new intersection from the north has been measured at 61 km/hr at the limit of visibility north of the intersection location.

[10] Including the Three Mile Bush Rd shared walking/cycling path which links Kamo Road to Dip Road and is shown in the council's Walking and Cycling strategy as a future route. Nick Marshall, senior traffic engineer with the Northland Transport Alliance, states that this path was originally (2016) programmed outside the 10-year planning horizon, but that "We are looking at updating the strategy in the next few years, and the 3 Mile Bush trail/path is one of the routes we anticipate gaining emphasis."

5.4 Crashes

The New Zealand Transport Agency's *CAS* database of crashes reported to the Police has been searched for all crashes on the key road routes that the proposal will increase traffic on, since the start of 2016.

A number of crashes have been reported, but none resulted in more than minor injuries. In particular, only one injury-causing crash has been reported involving turning vehicles at the roundabout – a car failed to give way to a cyclist when entering the roundabout. Only one crash is reported on Tuatara Drive in which a vehicle reversed out of a driveway and collided with a parked vehicle with no injuries resulting. The only reported crash on Dip Road was a loss of control of a single vehicle, with no injuries resulting. No crashes are reported at the intersection of Dip Road with Three Mile Bush Road.

Another six crashes involved various turns at side roads or private crossings. There were no obvious road factors involved in the crashes. Most occurred in locations in which Three Mile Bush Road is at least 11 metres wide and/or were caused by inattention on the part of the driver at fault and/or excessive speed.

Only two injury-causing crashes have been reported at the Kamo Road/Three Mile Bush Road intersection. One involved a pedestrian crossing at the intersection, the other involved vehicles diverging on the southern approach to the intersection. Only minor injuries resulted from both incidents.

6. ASSESSMENT OF TRAFFIC EFFECTS AND PROPOSED MITIGATION MEASURES

The most significant traffic issue in relation to the proposal is considered to be the effect on Tuatara Drive and its intersection with Three Mile Bush Road. The potential effect on the Three Mile Bush Road/Kamo Road intersection and sight distances in relation to the connections to Dip Road also warrant attention.

6.1 Existing road network

Tuatara Drive, with occasional parked vehicles, has capacity for at least 6,000 movements per day. The subdivision and new link Road A are expected to increase the traffic on it to no more than 1,500 movements per day at full development, and no more than 2,000 with full development of all of the land that leads to Dip Road. Such traffic, while a significant increase on the existing traffic, only increases the usage to less than one-third of the capacity of the road.

Three Mile Bush Road is wider and, while significantly busier than Tuatara Drive, will be able to accommodate the additional traffic without problems occurring. The main challenge created by the additional traffic is as the busiest intersections that the highest proportion of it will travel through.

The intersections that the proposal will increase turning traffic through are three on Three Mile Bush Road (those with Dip Road, Tuatara Drive/Crawford Crescent and Kamo Road), Whau Valley Road with Kamo Road and SH1N with Kamo Road. The increase in traffic through the Three Mile Bush Road/Dip Road intersection will be minimal – only one additional movement every 7 minutes during an average hour. That intersection is also nowhere near its capacity, so the additional traffic is unlikely to even be noticed by existing users and the effect on that intersection will also be minimal and less than minor. The other intersections are addressed in more detail in turn.

6.1.1 Three Mile Bush Road/Tuatara Drive/Crawford Crescent Roundabout

A detailed assessment of the capacity of this intersection is given in Appendix B. In summary, the proposal is expected to add some 85 movements to Tuatara Drive at this intersection during peak hours, but not reduce any movements to less than Level of Service A.

The combination of new link Road A and potential future development around the northwestern end of Dip Road is expected to increase the traffic on Tuatara Drive further, but not enough to create congestion at the roundabout. Potential future development that leads to Three Mile Bush Road west of the roundabout, as enabled by current district plan provisions, does have the potential to exert significant stress on the roundabout, but is not expected to do so for a timeframe well into the decades.

6.1.2 Three Mile Bush Road/Kamo Road intersection

A detailed assessment of the capacity of this intersection is also given in Appendix B. In summary, the intersection is already experiencing congestion during peak hours, during which it is close to capacity on both its Three Mile Bush Road and Kamo Road north legs. All development that leads to Three Mile Bush Road can only increase this.

The analysis shows that the effect of the traffic generated by this subdivision will be more than accommodated with a simple change of lane discipline and phasing on the Three Mile Bush Road approach. That is, allowing for through movements in the left lane, which are currently only permitted in the right lane. The improvement would occur because there is currently a very big imbalance in the flows permitted in either lane and allowing through movements in both lanes will significantly improve the balance. This is an existing deficiency that should be addressed irrespective of further development in the catchment of Three Mile Bush Road.

Potential future development that leads to Three Mile Bush Road, as enabled by current district plan provisions, has the potential to completely overwhelm this intersection and trigger a major upgrade. This subdivision will generate only a tiny proportion of the ultimate traffic through the intersection, so the standard development contributions framework is the appropriate means for addressing its contribution to the upgrade necessary for the ultimate development.

6.1.3 Other locations

The Whau Valley Road/Kamo Road and SH1N/Kamo Road intersections are both major intersection with traffic signals and one has recently been upgraded. The Whangarei transportation model shows one, or both intersections operating at Level of Service F during the afternoon peak hour even by 2023. Congestion is already regularly occurring at the intersection during peak hours. Any additional traffic can only exacerbate this existing situation.

This said, the proposal will generate only a tiny percentage increase in the traffic those intersections. A single development that generates such a small increment in the traffic cannot be responsible for problems on a major route that it leads onto, even if congestion is already being experienced on that route. Development contributions, which are related to effects on the overall road network in Whangarei district including, in fact especially, the Whangarei urban network, are the appropriate means of addressing effects on such routes and their intersections. The subdivision will be liable for development significant contributions.

Beyond Three Mile Bush Road and Whau Valley, the subdivision will only add a tiny proportion to the traffic, which will also be well dispersed. Any effects on those locations are also appropriately addressed by way of the standard transport development contribution.

6.2 Safety

In terms of safety, the crash history on the routes between the site and Kamo CBD does not indicate anything of particular concern with the routes that the proposal will increase traffic on. In particular, no serious-injury causing crashes are reported and most, possibly all, other injury-causing crashes are due to driver inattention and/or excessive speed – factors that the subdivision cannot be expected to address.

6.2.1 Pedestrian and cyclist safety and accessibility, other modes

The proposed footpaths and walkway, which will be linked to the existing footpaths along the eastern sides of both Tuatara Drive and Dip Road which, in turn lead or link to all attractions within walkable distance, will ensure safe pathways for pedestrians to/from all of the most common local destinations[11].

6.2.2 Safety of the new connections to Dip Road

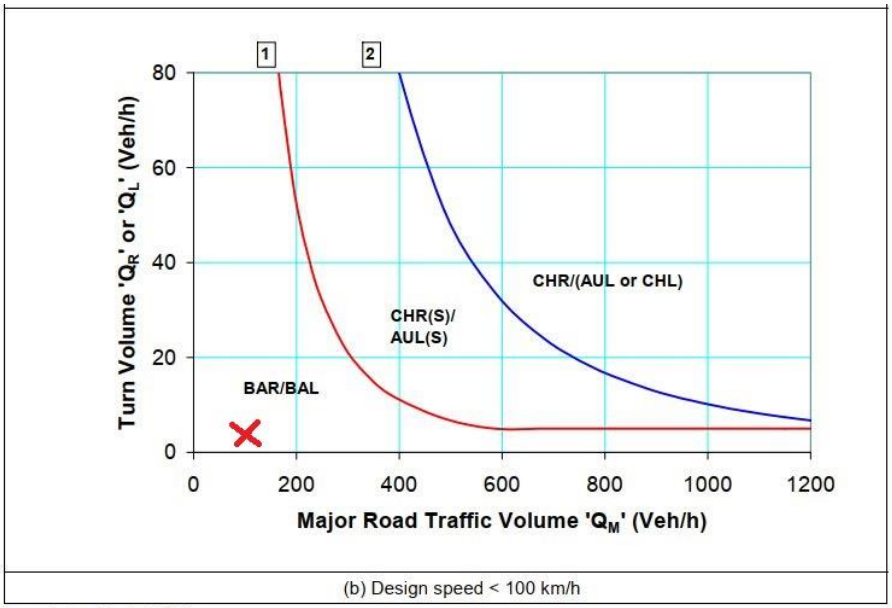
With a southbound operating speed of 61 km/hr, the safe-intersection sight distance (SISD) on a 14% downhill gradient is 151 metres[12]. The available sight distance of 212 metres significantly exceeds this.

The northbound operating speed approaching the direct connections on Dip Road (Lots 1 to 4) is 54 km/hr[13]. At that operating speed, the safe-stopping sight distance (SSSD) on the 2% uphill gradient is 68 metres[14]. The available sight distance of 85 metres significantly exceeds this provided the necessary vegetation trimming is carried out.

With the expected relatively low use of the new Dip Road intersection, as assessed in Appendix A, a standard tee intersection without local widening is acceptable. The warrant for such widening[15] has the intersection well below the trigger for "CHR" which is the Australian version of our right-turn bay. The warrant unhelpfully specifies "BAR" widening for <u>all</u> combinations of turning and through traffic but, as shown in Figure 2 in which the red cross marks where this intersection falls, the intersection is at a very low end in terms of its combination of traffic movements.

[11] Including the store and takeaway outlet near the Three Mile Bush Road roundabout, Onoke scenic reserve and a park and playground on Tuhangi Street. The intersection is also 600 metres from the entrance to Hurupaki school.
[12] Calculated with friction coefficient of 0.36, 2.0 second reaction time and 3 second "observation" time at the full operating speed.
[13] There is a bend in Dip Road a short distance south of the speed-limit transition. Its radius is only 40 metres for which the safe operating speed is 45 km/hr.
[14] Calculated with friction coefficient of 0.36, 2.0 second reaction time and 3 second "observation" time at the full operating speed.
[15] AUSTROADS Guide to Road Design Part 4A Unsignalised and Signalised Intersections. Figure 4.9(b).

Figure 2. Location of the Dip Road/Road 1 intersection on the AUSTROADS warrants chart for turn treatments.



Source: Arndt and Troutbeck (2006).

Figure 4.9: Warrants for turn treatments on the major road at unsignalised intersections

In fact, the intersection also falls in the "Type 1" warrant in section 3.4.10.3 of the Whangarei district council's *Environmental Engineering Standards* 2010. That is, radiused shoulders but no widening.

Overall, it is concluded that the new connections will be fit-for-purpose and the risks associated with them will be well within acceptable limits.

6.2.3 Safety of internal roads and shared access

The safety of internal roads and access is assured through a combination of carefully designed internal road alignment[16], carriageway width, footpaths and on-street parking bays. This will ensure safe speeds, minimal exposure for pedestrians crossing the roads and minimal risk associated with parking on the street.

In general, the carriageways provide comfortable two-way travel while moderating speeds below levels that are a potential hazard for people on foot. This is supported by previous analysis of rural roads of various widths, which have always found that the "social cost" of crashes in which the widths of roads is relevant, consistently increases with the widths of roads.

The shared private accesses all meet the council's standards for the numbers of lots they lead to.

6.3 Heavy traffic

With no more than 2% of generated motor vehicle traffic expected to be heavy vehicles, the proposed facilities will also be fit for the small number of large vehicle movements. Heavy traffic movements associated with construction will be managed through restrictions on most trips to the most rural routes and suitable temporary traffic management.

[16] Including a minimum safe design speed of slightly more than 30 km/hr on the tightest bends – curve radii 20 metres. The approaches to all but one of those bends is less than 40 metres long and that is a higher radius bend.

7. ASSESSMENTS AGAINST THE WHANGAREI DISTRICT PLAN TRANSPORT (TRA) PROVISIONS

7.1 Required information and assessments

In accordance with the *Whangarei district plan*, an integrated transport assessment (ITA) is required of the subdivision in accordance with information requirement TRA-REQ2. With the new roads vesting in the council, assessment and information is also required in accordance with information requirement TRA-REQ3.

In both cases, much of the information is contained within sections 2 to 6 of this report, in which case the location is simply cross-referenced. Additional information and/or assessment is provided as necessary and/or in reports and plan sets produced by others (also forming part of the application and referenced here as necessary). The information requirements are reproduced in black text and the information and/or assessment and/or a reference to this in the main body of this report, is given in green.

7.2 TRA-REQ2 information and assessment

a. A description of the site characteristics, existing development, existing traffic conditions and trip generation, surrounding land uses, proposed activity and its intensity, and future development potential of the site.

A full description of the site characteristics, existing development, surrounding land uses, proposed activity and its intensity is given in the application report and summarised here along with answers to the other questions.

The subject site covers 6.9 hectares and is situated at the north-western residential edge of the suburb of Kamo, located east of Dip Road. Most of the parent lot is in pasture with scattered trees but no buildings.

The Operative District Plan Environment maps identify the site as being zoned Living 1 Environment, with a Living Overlay. The Proposed District Plan (Urban and Services plan changes) zone maps identify the site as zoned General Residential.

With these zones and the intensity of the proposed subdivision, there is little or no potential for further development beyond what is already proposed.

The locality south of the site is predominantly residential in nature, featuring a mix of single-storey and two-storey dwellings. The existing built form comprises houses that are typically set back from the street by around 5 to 8 metres, with either fully open front yards or low fencing. To the north and east, the site adjoins the Onoke scenic reserve and a water supply reserve on which two storage tanks are located. Rural-residential development is located to the west on the opposite side of Dip Road.

Dip Road is defined by the District Plan as a secondary collector road, with two sealed lanes and a carriageway width of approximately 6.4 metres. Dip Road has a legal width of 20m including carriageway, berms and a footpath on the eastern side. Dip Road has a speed limit of 80 kilometres per hour along the site frontage, reducing to 50 kilometres per hour 100m south of the proposed new intersection. There are no street trees in the road reserve adjacent to the site. However, there are a number of power poles and light poles that the proposed design has responded to.

Tuatara Drive is defined as an access road by the District Plan, with two sealed lanes being 8.2m between kerb faces and a footpath along the eastern side. It has an internal tee intersection, one leg of which continues north eastwards to existing residential development, the other being a short stub that leads to two existing houses and currently ends only 25 metres west of the intersection. Tuatara Drive has a speed limit of 50 kilometres per hour.

With respect to schools and amenities, Hurupaki Primary School and Kindergarten are located a short distance to the south, while Kamo Primary School is located less than 1 km to the east. The Local Centre of Kamo is also less than 1 km east of the site providing community services, convenience shopping and Kamo High School. Neighbourhood shops are within approximately 300m of the site, including a dairy and takeaway outlet.

The area is served by public transport and pedestrian infrastructure. The bus network includes services along Three Mile Bush Road within less than 1 kilometre walking distance from the site.

The area is well serviced by public open space networks with natural reserves within Onoke reserve to the north and Hodges Park a short distance to the east. A new recreation reserve with walkway is proposed along the southern edge of the site. Kamo park has active open space located within Kamo Centre.

b. An assessment of the features of the existing transport network, including the following (where relevant to the proposal):

i. Existing access arrangements, on-site car parking and crossing locations.
ii. Existing internal vehicle and pedestrian circulation.
iii. Existing walking and cycling networks.
iv. Existing public transport service routes and frequencies including bus stops and lanes. v. Hours of operation for non-residential activities.
vi. The adjacent transport network road hierarchy and the safety of the transport network in the vicinity including crash history if relevant.
vii. The location and type of any existing level crossings in the locality.

For items i to iv and the road's place in the hierarchy, see sections 3 and 4. The crash history is described in section 5.4. There are no level rail crossings in the vicinity of the site.

c. Description of the estimated number of trips which will be generated by each transport mode (public transport, walking, cycling and private vehicles, including heavy vehicles).
This is given in section 5.1.

d. An assessment of the suitability of the proposal for all users within the development and connecting to the adjacent transport network. This shall include assessments of:

i. The accessibility of the development for public transport and how the design of the development will encourage public transport use by considering the attractiveness, safety, distance and suitability of the walking routes to the nearest bus stop.
See section 6.2.1.

ii. The accessibility of the development for pedestrians and cyclists and how the design of the development will encourage walking and cycling, particularly to nearby destinations such as reserves, other public spaces and commercial or community facilities.
iii. Any safety implications that may detract from walking or cycling to/from the development.

With the proposed pedestrian linkages including an upgraded footpath on Dip Road south of the new intersection and links to existing footpaths, there are no particular features that will detract from walking to/from the development. There are also no particular barriers to cycling and the increasing use of e-bikes and likely future upgrades due to future development will largely remove even this minor barrier.

iv. The accessibility of the development by private motor vehicles and the suitability of the proposed access and use of the site with respect to the safe, efficient and effective functioning of the transport network.

See section 6. This shows that, provided the change is made to one exit lane on Three Mile Bush Road, the components of the road network that the subdivision will add significant traffic to have more than adequate surplus capacity and that the design of the vehicle access and pedestrian facilities will ensure that the traffic is well managed and the associated risks well within acceptable limits.

e. An evaluation of the effects of the development on the surrounding transport network, including:

i. Impacts on the operation of public transport infrastructure, and any vehicle and pedestrian/cyclist conflicts likely to arise from vehicle movements to and from the development. The nearest public transport infrastructure on Three Mile Bush Road is more than 0.6 kilometres from the site so, apart from increasing the usage of the public bus service, the subdivision will not have material effects on it. No unusual pedestrian/cyclist conflicts will arise from vehicle movements to and from the development. While the existing footpath on Dip Road is on the site side, the intersection will be entirely conventional in layout, so will not present unusual barriers to people walking across it. No left-turn lane is proposed as a potential hazard for cyclists (and neither is one warranted).

With a public bus service available within a relatively easy walking distance of this locality and the good pedestrian linkage to the nearest bus stop, the usage of public buses is expected to be close to average for Whangarei.

ii. The impacts that any additional vehicle movements are likely to have on the capacity and operation of adjacent road and rail networks, including any intersections and level crossings. See Appendix A. There is no rail network in this vicinity.

iii. For heavy vehicle trips per day, whether there are any effects from these trips on roading infrastructure. See section 6.3. No likely impact, especially once development is complete.

iv. Where the development will directly impact the State highway, a summary of consultation with the New Zealand Transport Agency. The proposal will have only negligible impact on roads managed by the NZTA, the nearest of which is SH1N more than kilometres from the site by road by which point the generated traffic will only be a tiny proportion of all traffic.

v. The impacts of construction traffic where a development will require a significant amount of construction work. The development of the subdivision will require a net volume of more than 30,000 cubic metres of imported fill (in the solid after placement and compaction). Fill will be carted to the site by way of Pipiwai Road and Dip Road only and under an approved traffic management plan and temporary traffic control suited to the levels of both construction traffic and that on Dip Road.

vi. Where the development will directly impact the railway corridor, a summary of consultation with the railway operator. No impact.

f. An assessment of how the transport network will be designed to accommodate infrastructure and services, stormwater, lighting, landscaping and street trees. For internal roads, this is shown in the plan set attached to the application. For larger scale non-residential developments this shall include consideration of underground electrical supply system for electric vehicle charging stations. No electric-vehicle charging stations are proposed at this stage.

g. Identification of any necessary mitigation measures that will be required to address any impacts on the transport network, including:

i. Potential mitigation measures needed both within the proposed development and on the transport network surrounding the development including any improvements, upgrades, alterations or extensions to the transport network (including at level crossings).

ii. Any mitigation required to achieve convenient and safe operation of access points and loading areas for all users.

The key traffic management and mitigation measures are described in section 3 and shown on the subdivision plan and Figure 1 of this report. Details of internal road design and on-street parking are given in the road design plan set. The key measures are:

- Internal footpaths, a walkway through the recreational reserve and linkages to the existing external footpaths including that on Dip Road south of the site;
- the installation of give-way control at the tee intersection on Tuatara Drive;
- a combination of internal road alignment and width that moderates traffic speed, footpaths, a walkway and connections to existing footpaths. Inset parking bays minimise the risks associated with parking on the street.

iii. How the design and layout of the proposed activity maximises opportunities, to the extent practical, for travel other than by private car. The internal footpaths and walkway with linkages to the existing external footpaths, including that on Dip Road south of the site, will ensure safe linkages to the existing footpath network.

iv. Where appropriate, the use of Crime Prevention Through Environmental Design principles and techniques to mitigate any safety issues for pedestrians or cyclists.

The proposal will be addressing CPTED matters in the road spaces and immediately related pedestrian routes by:

- Ensuring good sightlines and visibility;
- Encouraging passive surveillance from adjacent homes by ensuring that houses address the street and neighbouring open space;
- Promoting heightened community use of public areas, including road corridors, by developing them as appealing places to move through and occupy. Encouraging moderate speeds of motor vehicles is another key to this;
- Designing the project in a way that fosters regular engagement between people and a growing sense of neighbourhood and community in which people know and regularly engage with each other; and
- Providing suitable levels of lighting to streets; and

A description of measures that will be put in place to mitigate against the effects of the construction process. See item e(v). Fill will be carted to the site by way of Pipiwai Road and Dip Road only and under an approved traffic management plan and temporary traffic control suited to the levels of both construction traffic and that on Dip Road. Temporary traffic management under an approved TMP will manage construction traffic that must move onto and off the site.

vi. A summary of the Integrated Transport Assessment including key findings and implications that the development will have for transport including any proposed mitigation measures. See section 2.

h. An overview of the transport implications of existing land uses and any land use characteristics that affect the proposal, including in the wider surrounding area those that will affect assessment of the proposal. This shall consider projected growth predictions and predicted annual average daily traffic.

Apart from the traffic enabled directly by the proposal, the new link road to Tuatara Drive is expected to divert some traffic from Dip Road to the new link road and Tuatara Drive. An assessment of this is given in Appendix A and summarised in section 5.3.

The catchment of Three Mile Bush Road west of the site includes the following zones:

- Rural urban expansion zone (RUEZ): 82 hectares in 45 lots, all west of the site;
- Rural Living zone: 140 hectares in 50 lots;
- Large-lot residential zone: 180 hectares in 220 lots;
- Rural production: 1,730 hectares in 333 lots; and
- Low-density residential zone: 2.9 hectares in part of one lot.

There are also significant tracts of land zoned Open Space in the catchment including part of the Pukenui Forest. No development potential is assumed for those areas.

These zones provide for development as follows (in all cases, it is assumed that up to 30% of the area is used for access infrastructure and/or cannot be developed at the maximum density because of terrain and/or engineering - geotechnical or flood susceptibility, considerations. Some allowance is also made for subdivision applications that are more restrictive than controlled):

- The RUEZ provides for subdivision development down to 1 hectare lots before reticulated services are available and 500m² once reticulated. Of the 45 lots in this area, 15, totalling 60 hectares, are larger than 2 hectares. So the estimated development potential of this, over and above the existing 140 lots, is estimated at some 35 to 40 lots prior to reticulated servicing and at least 1,100 lots post-servicing;
- The Rural Living zone provides for an average lot size of 2 hectares. Five lots, totalling 84 hectares are larger than 4 hectares, so the estimated development potential, over and above the existing 50 lots, is estimated at some 30 to 35 lots over and above those already within this area;
- The large-lot residential zone provides for 5000m² lots. Only 30 lots totalling 122 hectares are larger than 5000m², the estimated development potential is estimated at 150 to 160 additional lots;
- The low-density residential zone provides for 2000m² lots, so there is potential for another 10 to 11 lots in this zone; and
- The RPZ provides for an average lot size of 20 hectares. Only two lots, totalling 211 hectares, are more than 40 hectares. The development potential should be more than the 9 to 10 additional lots this indicates. Under more restrictive consent applications – say another 20 to 25 should be realistic.

That is, in the catchment of Three Mile Bush Road, a total of 240 to 250 additional lots prior to servicing and more than 1,300 lots with full servicing. This compares with a little more than 660 existing lots within that catchment.

Much of the catchment of Three Mile Bush Road between the site and Kamo Road is developed at full urban intensity and/or at the intensity anticipated by the zone. However, some is rural-residential but zoned either General Residential or RUEZ and a few large blocks are zoned General Residential which provides for 400m² lots. In that area, there is estimated potential for another 150 to 160 lots in the General Residential zone and some 220 in the RUEZ once it is serviced.

On this basis, the overall development potential of the catchment of Three Mile Bush Road is an additional 680 to 690 lots prior to servicing of the RUEZ and some 1,700 after full servicing.

With full servicing, there is potential for at least 10,000 additional traffic movements each day from west of the roundabout, at least half of which are expected to continue through the intersection with Kamo Road. Future development of other land in the catchment of Three Mile Bush Road will add even more traffic at this location.

The Council has no known plans to reticulate this RUEZ area in the immediate future, but it is reasonable to expect the area to be reticulated in response to significant future subdivision and development pressure within it. The timeframe associated with this is unpredictable.

Three Mile Bush Road and its intersection with Kamo Road will very likely need upgrading prior to the time of ultimate development with council servicing of the RUEZ, possibly even without it. With the uncertainty associated with servicing and the significantly development contributions that are intended for wider network upgrades that cannot be attributed to a single development, no additional measures are considered warranted in response to potential future development.

i. An assessment of the traffic volumes on the wider transport network serving the development and any intersections that will be affected by the proposal. Include consideration of the existing peak-hour congestion near the site, level of service, turning volumes, and comparisons between peak and interpeak conditions. See the previous discussion (for h.) and Appendix A. The proposal will not create congestion at the Tuatara Drive/Three Mile Bush Road and, with the addition of through movements to the left lane on the Three Mile Bush Road to its intersection with Kamo Road, will not increase congestion at that intersection. Both intersections will almost certainly need to be upgraded when the catchment of Three Mile Bush Road is fully developed. However, as shown, the subdivision adds only a very small proportion to the traffic at those intersections. Once it reaches all locations remote from the site, the generated traffic will be significantly dispersed and only a very small proportion of existing traffic, especially with significantly more development in the catchment of Three Mile Bush Road. This development cannot be expected to mitigate existing or future congestion at those locations.

j. A description of any proposed transport upgrades or changes within the vicinity of the proposed development such as known intersection or road upgrades, cycle infrastructure, parking restrictions or public transport upgrades or changes. If the proposed development is to be staged this description shall consider how the proposal will correspond with planned transport upgrades. The only known future upgrade is a possible shared walking and cycling path along part of Three Mile Bush Road that will connect to and cross Kamo Road. This is expected to create only a relatively small, but not insignificant, reduction in traffic generation from the site, but is also not expected for at least 10 years.

k. An assessment of the proposal's consistency with relevant strategic documents including the Blue/Green Network Strategy for Whangārei City, the Walking and Cycling Strategy and the Whangārei Transport Strategy.

The Blue/Green Network Strategy for Whangārei City provides a vision and action plan for planning around waterways (the "blue") and "green" spaces, combining elements of recreation, amenity, infrastructure and natural features to enhance a sense of place and wellbeing. The proposals will contribute to at least some of the key tenets of the blue/green strategy with its footpaths and footpath connections to important destinations including Hurupaki school, Kamo Primary school and local shops, playgrounds and recreational reserves.

The proposal will be consistent with the Walking and Cycling Strategy with its safe connections to the existing footpath network and which link to important destinations within easy walking distance, including Hurupaki school, Kamo Primary school, a bus stop outside #63 Three Mile Bush Road, a general store and takeaway on Crawford Crescent, Onoke scenic reserve, Hodges Park and a park and playground at nearby Tuhangi Street. The facilities will provide direct links to a future shared path between Kamo Road and Dip Road.

The Whangārei Transport Strategy (2019) covers the Whangārei urban area and is intended to address three problems: 1) Excessive concentration of traffic on State highways; 2) Severance created by those roads (with a particular issue being difficulties in crossing them on either foot or on bikes); and 3) a high or medium-high overall risk profile on Whangarei's main road routes.

The proposal will have some effect on the concentration of traffic on State highways. The nearest connection is southeast of the site in Whau Valley at a major signalized intersection that was upgraded relatively recently. The other connection is to SH1N at Great North Road, Springs Flat. It is several kilometres from the site, not in the dominant direction of travel and the generated traffic will be well dispersed by the time it reaches that location. The proposal is not inconsistent with the other problems the transport strategy attempts to address. In particular, the footpaths and linkages to the existing footpath network. In terms of general safety, Dip Road, Tuatara Drive, Three Mile Bush Road and Kamo Road are considered to be a suitable standard for the traffic they will carry with the subdivision at full development.

l. An assessment of the overall suitability of the site to accommodate the proposed activity and its transportation effects in a manner that is consistent with relevant District and Regional transport policies and objectives.

The Transport Chapter sets out the policy direction for the establishment, maintenance and use of the transport network. The chapter states that the future growth expectation for Whangārei is consolidated urban development. Its objectives and policies generally seek to integrate land use and transport planning to ensure that land use activities, development and subdivision maintain the safety and efficiency of the transport network. The proposal will give effect to the relevant objectives and policies as detailed in the analysis that follows.

Objective TRA-O1 Transport Network

Provide and maintain a safe, efficient, accessible and sustainable transport network while avoiding, remedying or mitigating adverse effects on the environment, adjoining land users and the surrounding amenity and character.

The proposed subdivision will be accessed by way of new public roads and intersections with Dip Road and Tuatara Drive, all of which have been designed to ensure safe and efficient access.

The proposal includes footpaths and links to the existing footpath network, which will provide safe foot access to two local schools, shops, Onoke scenic reserve, Hodges Park and a park and playground at nearby Tuhangi Street. The facilities will provide direct links to a future shared path between Kamo Road and Dip Road.

Objective TRA-O2 Integrate Transport and Land Use Planning

Integrate land use and transport planning to ensure that land use activities, development and subdivision maintain the safety and efficiency of the transport network.

The proposal has been designed to establish an integrated development, to provide a safe, efficient, accessible, sustainable and integrated transport network including suitable vehicle access to the proposed residential allotments, onsite walkability and connectivity to adjoining residential developments and the open space network. Accessibility and safety of the community have been taken into account within the proposed development, the proposed intersection with Dip Road and connection to Tuatara Drive, new footpaths and walkways and safe connections to the existing footpath network. This report is an integrated traffic assessment of the proposal. It includes an assessment of the transport effects of the proposal on the transport network including the wider network and concludes that those effects are adequately mitigated by the transport-related measures proposed.

Objective TRA-O3 Active and Public Transport

Encourage and facilitate active transport and public transportation.

Active transport is promoted through the creation of new footpaths and linkages to the wider footpath network, including the safe linkage to the footpath along the eastern sides of both Dip Road and Tuatara Drive. The site is within easy walking distance of two local schools and shops, the nearest public bus stop, parks and reserves. The proposal provides linkages that result in continuous footpaths for the entire distance to those facilities.

Objective TRA-O4 Safety and Efficiency

Provide suitable and sufficient vehicle crossings, access, parking, loading and manoeuvring areas that minimise adverse effects on the safe, effective and efficient functioning of the transport network.

The proposed new internal roads and linkages to existing roads are suitable for the level of traffic they will be subject to. In particular, they have ample capacity and will ensure safe entry and egress to/from the site.

Two shared private accesses are proposed as part of the residential subdivision, each has been designed to ensure safe and efficient access to the proposed residential allotments.

Vehicle crossings to each allotment have been carefully considered and, where necessary, their location has been specified to ensure safe and effective access to the allotments while ensuring the new road, parking bays, lighting and street trees are unimpeded.

The on-street parking is in bays outside the live lanes, so will not impede the flow of traffic and also provides for safe entry and egress.

Objective TRA-O5 Urban Design

Design and locate transport infrastructure in a manner that is consistent with the amenity and urban design outcomes anticipated for the zone.

The urban design and amenity of the proposed road has been a key consideration for the proposal. Amenity within the road reserve has been addressed through street trees and carriageway widths that ensure the moderation of vehicle speeds. The carriageways will be suitably lit at night.

Objective TRA-O6 Future Growth

Ensure that future growth can be supported by appropriate transport infrastructure.

The new roads and intersections will not be subject to significant, if any, future growth in traffic because of the intensity of the development and the zonings applicable to the site. Some of the intersections that the proposal will increase traffic on are already experiencing some congestion. Those are considered sufficiently isolated from the site, and the generated traffic such a small addition to the traffic through them, that the standard development contribution framework is considered the appropriate means of addressing any effects on them. This also applies to future growth external to this site.

Policy TRA-P1 Design, Construction and Maintenance

To design, construct and maintain roads, cycleways, walkways, public transport infrastructure, car parks and pedestrian access in a manner that:
1. Provides a safe and efficient transport network.
2. Enables the efficient provision of network utility infrastructure while providing for suitable streetscape amenity including lighting and landscaping.
3. Has regard to the future capacity and growth of the transport network.
4. Is multi-modal and provides for the needs of all users, as appropriate for the surrounding environment and the function of the road within the transport network hierarchy.
5. Avoids no exit roads where through roads and connected networks can be designed, particularly in commercial and industrial areas.
6. Provides pedestrian and cyclist access to connect roads and public spaces where they would offer a shorter route.
7. Ensures access to multiple allotments is constructed to an acceptable standard and vested as a public road where appropriate.
8. Appropriately manages stormwater to ensure the risk of flooding is not increased and water quality is maintained.

The proposal is compatible with sub-policies 1, 3, and 4 for the reasons already given in multiple locations in this report.

The proposed road has been designed to provide suitable and sufficient accommodation of network utility and infrastructure services, parking bays, street trees and lighting within the road reserve.

The proposed road will result in a through-road between Dip Road and Tuatara Drive.

Pedestrian connectivity has been provided to other locations as already described. The proposal will not compromise the use of the road network by cyclists in any way.

The shared private accesses, which lead to no more than eight lots, will be formed to the standards specified in the district plan.

It is proposed that stormwater be managed through carefully designed onsite stormwater ponds.

Policy TRA-P2 Roads

Allow new public roads or major roading upgrades to public roads where the location and design of the road:
1. Provides for the needs of all users, as appropriate for the surrounding environment and the function of the road within the transport network hierarchy.
2. Minimises adverse effects on surrounding sensitive activities, including severance effects and streetscape amenity.
3. Maintains or enhances the safety and efficiency of the transport network.
4. Does not compromise, and where possible provides, connections to surrounding areas, particularly for buses, pedestrians, and cyclists.
5. Provides sufficient area for landscaping and tree planting in appropriate areas while balancing the need to maintain safety and provide underground services and footpaths.
6. Contributes to positive urban design outcomes within the Urban Area

The proposal achieves sub-policy 1 with the internal road design as already described, on-street parking and the pedestrian linkages to key locations. This also achieves part of sub-policy 4.

The proposal minimises adverse effects on surrounding sensitive activities through the careful stormwater management. This also meets or exceeds the intent of sub-policy 6. It minimises severance with the road and footpath linkages. Overall, the proposal is considered to enhance the safety and efficiency of the transport network despite the traffic it will generate.

The proposal includes tree planting that is consistent with the safety of the roads and underground services.

Policy TRA-P3 Transport Network Capacity

To manage the scale and design of subdivision and development by:
1. Ensuring that there is sufficient capacity within the transport network to cater for the proposal.
2. Requiring subdividers and developers to meet the costs of any upgrades and/or extensions to the transport network which are directly attributed to measurable impacts of the subdivision or development.

Some of the intersections that the proposal will increase traffic on are already experiencing some congestion. Those are considered sufficiently isolated from the site, and the generated traffic such a small addition to the traffic through them, that the standard development contribution framework is considered the appropriate means of addressing any effects on them.

The applicant will fund the proposed footpaths and linkages to the existing footpath network.

Policy TRA-P4 Integrated Transport Assessments

To avoid remedy or mitigate adverse effects on the adjacent and wider transport network by requiring Integrated Transport Assessments for large scale developments and subdivisions.

This report is an integrated traffic assessment of the proposal and has been prepared in accordance with the accepted principles and content of such assessments.

Policy TRA-P5 Active Transport

To promote active transport by facilitating cycle and pedestrian connectivity within new subdivisions and developments and, where appropriate, to existing developments, reserves and other public spaces.

The proposal achieves this policy with the internal footpaths and linkages to the existing footpath network plus relatively narrow live carriageway lanes that have the dual benefit of speed moderation and minimisation of exposure of people crossing the roads. The proposal will not reduce the safety or level of service of the existing road network for cyclists.

Policy TRA-P6 Dust Nuisance

To avoid dust nuisances in the Urban Area and improve amenity and accessibility by implementing formation standards for access and parking whilst managing stormwater.

Potential dust nuisance during construction will be managed by way of conditions of consent and the onsite construction management plan. The proposed new road, shared private accesses, parking bays and vehicle crossings will be sealed to avoid ongoing dust nuisance.

Policy TRA-P7 Access and Intersections

To ensure that access and intersections are designed and located so that:
1. Good visibility is provided.
2. Vehicle manoeuvres and public and active transport modes are appropriately accommodated.
3. They are sufficiently separated so as not to adversely affect the free flow of traffic.

The sight distances in relation to the new intersection on Dip Road are at least adequate for the reasons given in section 6.2.2. The intersections have been designed to accommodate the turning path of a medium rigid truck. The lot layout ensures that all new driveway crossings achieve the specifications in the Whangarei district plan for separation from each other and the new road intersections.

Policy TRA-P8 Vehicle Crossings and Access

To require vehicle crossings and associated access to be designed and located to ensure safe and efficient movement to and from sites for vehicles, pedestrians and cyclists by managing:
1. Separation distances between vehicle crossings.
2. Separation distances from intersections, railway crossings and pedestrian crossing facilities.
3. Vehicle crossing sight distances.
4. The number of vehicle crossings per site.
5. The design, formation and construction standards of crossings and access.

The lot layout ensures that all new driveway crossings achieve the specifications in the Whangarei district plan for separation from each other and the new road intersections.

Driveway crossing locations are drawn on the subdivision plan for lots in which it is necessary that this be specified. For other lots, there is more than one possible location for a complying crossing and its location is best left to the ultimate owner of those lots. In this regard, the numbers of crossings and their design and formation can safely be left to the building consent stage of development.

Policy TRA-P9 Car Parking

To specify minimum on-site car parking space requirements while allowing for reduced on-site parking spaces where appropriate based on:
1. Surrounding transport infrastructure.
2. Proximity to the City Centre, Local Centre or Neighbourhood Centre Zones.
3. The provision of additional amenities on-site.
4. The ability to mitigate car parking spillover effects.

The proposed allotments are all of sufficient size to accommodate onsite car parking as necessary to support the future residential development. The proposed new road will accommodate 2.3 on-street parking bays to service the development. This will cater for any and all spillover from individual lots, noting that previous surveys of Totara Parklands, at which there is a café, never found more than one car parked on the street for each five lots, even during likely peak periods for such parking.

Overall, all parking demand will be catered for more than adequately.

Policy TRA-P10 Parking and Loading

To require parking and loading areas and access to be designed and located to ensure safe movement on-site and safe ingress and egress of vehicles, pedestrians and cyclists by managing:
1. Parking and loading space dimensions and gradient.
2. The location and identification of car parking and loading spaces.
3. Manoeuvring space within the site.
4. The formation and construction standards of parking areas.
5. The design and layout of parking areas.

The proposed residential allotments are all of sufficient size to accommodate onsite manoeuvring for car parking as necessary to support the future development.

Policy TRA-P11 [Electric vehicle] charge stations.

Not applicable to residential developments.

Policy TRA-P12 Landscaping

To require landscape planting where uncovered on-site car parking is provided to improve visual amenity, navigability and stormwater management.

Not applicable to residential developments.

Policy TRA-P13 Indicative roads and strategic road protection areas

To identify indicative roads and strategic road protection areas based on long term growth projections, and to require development and subdivision to have regard to effects on any indicative road or strategic road protection area.

Not applicable to this site or proposal.

Policy TRA-P14 Transport network hierarchy

To identify and apply a transport network hierarchy to ensure that the functions of transport network assets are recognised and protected in the management of land use and subdivision.

Dip Road Mile Bush Road has a status of secondary collector road. With the traffic management proposed, the proposal will not compromise the function of the road nor its place in the road hierarchy.

Policy TRA-P15 Rail infrastructure

Not applicable to this locality or proposal.

7.3 TRA-R15 Matters of discretion

The matters listed in the *Whangarei district plan* are reproduced in bold and discussion then follows.

1. Effects on the sustainability, safety, efficiency, effectiveness and accessibility of the affected transport network, including cumulative effects from incremental changes to the activity on the site or sites.

   This is assessed in section 6 and Appendix A, which finds that the effects of the proposal on the transport network will be less than minor and/or is appropriately managed through the standard development contributions framework. With the intensity of the subdivision and the zoning of the lane, there is little or no scope for future incremental changes such as further subdivision.

2. Required improvements, alternations or extensions to the affected transport network to mitigate adverse effects (including at level crossings).

   The key proposed measures are the marking of give-way control at the tee intersection on Tuatara Drive and vegetation trimming on Dip Road south of the Road A connection. There are no level crossings in the vicinity of the site.

3. The need for pedestrian and cyclist connections to nearby destinations.

   Pedestrian connections are proposed – to the footpaths on both Dip Road and Tuatara Drive. Those connect to existing footpaths that lead to the Onoke scenic reserve, local schools and kindergarten and all other attractions in Kamo. No particular facilities are considered necessary for cyclists at this stage. With the urban speed limit from and including Tuatara drive, the road network in which vicinity is relatively safe for cyclists.

4. Adverse effects on streetscape and amenity.

   These effects are being avoided or mitigated through the provision of street trees and strong walking linkages.

5. The location, design, scale and intensity of the proposed activity in relation to its effect on the affected transport network.

   The proposal is no more intense than provided for by the underlying zoning and, as such, its effect on the transport network is also no greater than anticipated by the district plan.

6. Demonstrated characteristics of the activity or proposal which result in low traffic generation relative to the size of scale of the activity.

   The proposed pedestrian linkages and proximity to public bus services will minimise the generation of motor traffic.

7. Recommendations and proposed mitigation measures of the Integrated Transport Assessment….

   See section 2

7.4 TRA-REQ3 information and assessment

This requirement arises from section TRA-R17, which is triggered with the construction of any new public road and is as follows:

Any application pursuant to TRA-R17 shall include a detailed assessment including the following:
a. The details required under TRA-REQ2.

b. A roading layout plan, including:
   i. The provision of landscaping and street trees.
   ii. The provision of on-street parking.
   iii. The provision of street lighting and amenities (e.g. benches, bus shelters, etc.).
   iv. Geometric design.
   v. Drainage design.
   vi. Road marking and signage. Transport (TRA) Whangarei District Plan March 2019 Page 19
   vii. Traffic calming devices.
   viii. Utility service locations.
   ix. Sight distance plans.
   x. Clear distinction between public and private assets.

c. Consideration of the sufficiency of space within the legal road reserve for proposed and potential future street trees, landscaping and/or underground and overhead services and structures.

This information is given in engineering plans provided by others and included with the application. No overhead services are proposed and the road reserves will be designed to accommodate all services without problematic conflict.

d. An assessment of traffic volumes and vehicle operating speeds.

Refer to section 5.1 for traffic volumes and 5.3 regarding operating speeds.

e. An assessment of how the road design is compatible with the character and amenity of the surrounding environment taking into account urban design and Crime Prevention Through Environmental Design principles.

The proposal will be addressing CPTED matters in the road spaces and immediately related pedestrian routes by:

- Ensuring good sightlines and visibility;
- Encouraging passive surveillance from adjacent homes by ensuring that houses address the street and neighbouring open space;
- Promoting heightened community use of public areas, including road corridors, by developing them as appealing places to move through and occupy. Encouragement of moderate speeds of motor vehicles is another key to this;
- Designing the project in a way that fosters regular engagement between people and a growing sense of neighbourhood and community in which people know and regularly engage with each other; and
- Providing suitable levels of lighting to streets.

7.5 TRA-R16 and R17 Matters of discretion

These provisions are triggered because it is proposed that the internal roads be vested in the council (which triggers R16 – new roads) and alterations are proposed on Three Mile Bush Road at the location of the new intersection (R17- alterations to an existing road).

The matters are reproduced in bold and discussion then follows.

1. The … design … of the road….

The design of the internal roads is of a high standard, will ensure the safe passage of all vehicles while moderating speeds at safe levels. They also cater well for pedestrians by including footpaths and links to other locations and minimising their exposure to live lanes while crossing the roads.

The connections to existing roads have ample capacity for the proposal.

The internal footpaths and linkages to the existing footpath network will ensure safe linkages to all local amenities for people on foot.

2. Effects on the sustainability, safety, efficiency, effectiveness and accessibility of the transport network.

3. This is assessed in section 6 and Appendix A, which finds that the effects of the proposal on the transport network will be less than minor and/or is appropriately managed through the standard development contributions framework.

4. Streetscape, urban design and amenity effects of the transport infrastructure.

   These effects are being avoided or mitigated through street trees, strong walking linkages and the provision of a new recreational reserve along the south side of the site.

5. Provision and encouragement of active and public modes of transport.

   The new roads will cater well for pedestrians and encourage walking with the inclusion of footpaths and links to other locations including local schools and a kindergarten, Onoke scenic reserve and local shops and parks. The relatively narrow live lanes minimise the exposure of people when they are crossing the roads.

6. Integration with surrounding land uses and transport infrastructure.

   Active walking links are proposed to local schools and a kindergarten, Onoke scenic reserve and local shops and parks.

   The new road link between Dip Road and Tuatara Drive will provide a shorter route between some of Dip Road and the Kamo CBD in particular.

7. Recommendations and proposed mitigation measures of the Integrated Transport Assessment….

   This is given in Section 2. Key measures include the footpaths and linkages, relatively narrow internal carriageways, street trees, internal on-street parking and the road linkage between Dip Road and Tuatara Drive.

APPENDIX A: EFFECTS OF THE PROPOSAL ON THE EXISTING ROAD NETWORK

Apart from the traffic enabled directly by the proposal, the new link road to Tuatara Drive has the potential to divert traffic from Dip Road to the new link road (Road A) and Tuatara Drive. This is an estimate of the likely quantum of such a diversion, at key times, and the effects on the two intersections on which the most significant effect will be felt.

The analysis begins with an assessment of how much existing traffic travels between Pipiwai Road and Dip Road. This is relevant because there are significant areas of land along Pipiwai Road that is zoned for development of various intensities.

The traffic on Dip Road is currently a shade under 1,000 movements per day. That on Pipiwai Road northwest of Dip Road is 3,520 movements per day and that on Pipiwai Road northeast of Dip Road is 4,070 movements per day[17]. On this basis, 6% of traffic on Pipiwai Road northwest of Dip Road travels between that location and Dip Road and 19% of traffic on Pipiwai Road northeast of Dip Road travels between that location and Dip Road.

Next, it is necessary to estimate what effect the new road link will have on route choice. There are two key destinations[18] for traffic generated in this locality. One is everywhere south of the SH1/Kamo Road intersection at Whau Valley, including Whangarei CBD and Auckland; the other is the Kamo CBD. Common node points for each of those destinations are as follows:

- SH1/Kamo Road intersection at Whau Valley (Node 2); and
- The Kamo Road/Three Mile Bush Road intersection and traffic signals (Node 3).

Node 1 is taken to be the point on the road network at which the route choices are relatively equal in terms of the time required to travel between the nodes. The location of Node 1 varies with both the destination and the time of day in which the travel occurs (because some of the intersections on the routes experience congestion during peak hours). There are several potential routes between those destinations and the subdivision and other development, and land zoned for development, in this locality. Each destination is addressed separately.

Destination 1: Everywhere south of the SH1/Kamo Road intersection at Whau Valley

There are three nearly equivalent route choices between this destination and the site locality. Those are:

Route 1: via Dip Road (south), Te Puia Street, Fairway Drive, Whau Valley Road and Kamo Road between Whau Valley Road and SH1.

Route 2: via Dip Road (south), subdivision Road A, Three Mile Bush Road and, Kamo Road; and

Route 3: via Dip Road (north), Pipiwai Rd, Great North Road and SH1/Te Rauponga/Kamo Bypass.

Network Analysis 1, Table 1, is a comparison of all three routes during a peak weekday commuter hour and with Node 1 located to give equivalence to the two quickest routes. Network Analysis 2, Table 2, is the same analysis for an average hour. In each case, the point of equivalence for the two quickest routes is on different points in Dip Road and explains why the distance along Dip Road is different for the two analyses.

[17] Mobile Road and RAMM. These estimates are considered reasonable.
[18] Which are origins for return trips, but the term "destination" is used to cover trips in both directions unless otherwise stated.

Table 1. Network analysis 1: Peak hours

	Distance (km)	Operating speed (km/hr)	Intersections		Travel Time (min)		
			Non-signalised	Signalised	Midblock	Intersections	Total
Route 1; via Dip Rd, Te Puia St, Fairway Dr, Whau Valley Rd, Kamo Rd							
Dip Rd	0.93	65	1		0.86	0.20	1.06
Three Mile Bush Rd	0.05	50	1		0.06	0.20	0.26
Te Puia Street	0.37	55	1		0.40	0.20	0.60
Fairway Drive	2.00	45	1		2.67	0.20	2.87
Whau Valley Rd	0.72	55		1	0.79	1.50	2.29
Kamo Rd	0.18	50			0.22		0.22
Totals:	**4.25**						**7.29**
Route 2; via Dip Rd, Subdivision Rd, Three Mile Bush Rd, Kamo Rd							
Dip Rd	0.37	65	1		0.34	0.20	0.54
Subdivision road	0.40	55	1		0.44	0.20	0.64
Tuatara Drive	0.29	55	1		0.32	0.25	0.57
Three Mile Bush Rd	0.62	50		1	0.74	1.00	1.74
Kamo Rd	2.44	50		1	2.93	1.50	4.43
Totals:	**4.12**						**7.92**
Route 3; via Pipiwai Rd, Great North Road, SH1							
Dip Rd	0.82	65	1		0.76	0.20	0.96
Pipiwai Rd	1.69	70	1		1.45	0.25	1.70
Great North Rd	0.63	65	1		0.58	0.40	0.98
SH1N, Pipiwai Rd to Puna Rere Dr	3.09	85		1	2.18	0.70	2.88
SH1N, Puna Rere Dr to Node 2	0.72	55			0.79		0.79
Totals:	**6.95**						**7.30**

Table 2. Network analysis 2: Average hours

	Distance (km)	Operating speed (km/hr)	Intersections		Travel Time (min)		
			Non-signalised	Signalised	Midblock	Intersections	Total
Route 1; via Dip Rd, Te Puia St, Fairway Dr, Whau Valley Rd, Kamo Rd							
Dip Rd	1.37	65	1		1.26	0.15	1.41
Three Mile Bush Rd	0.05	50	1		0.06	0.15	0.21
Te Puia Street	0.37	55	1		0.40	0.15	0.55
Fairway Drive	2.00	45	1		2.67	0.15	2.82
Whau Valley Rd	0.72	55		1	0.79	0.50	1.29
Kamo Rd	0.18	50			0.22		0.22
Totals:	**4.69**						**6.50**
Route 2; via Dip Rd, Subdivision Rd, Three Mile Bush Rd, Kamo Rd							
Dip Rd	0.81	65	1		0.75	0.15	0.90
Subdivision road	0.40	55	1		0.44	0.15	0.59
Tuatara Drive	0.29	55	1		0.32	0.20	0.52
Three Mile Bush Rd	0.62	50		1	0.74	0.50	1.24
Kamo Rd	2.44	50		1	2.93	0.50	3.43
Totals:	**4.56**						**6.67**
Route 3; via Pipiwai Rd, Great North Road, SH1							
Dip Rd	0.38	65	1		0.35	0.15	0.50
Pipiwai Rd	1.69	70	1		1.45	0.20	1.65
Great North Rd	0.63	65	1		0.58	0.30	0.88
SH1N, Pipiwai Rd to Puna Rere Dr	3.09	85		1	2.18	0.50	2.68
SH1N, Puna Rere Dr to Node 2	0.72	55			0.79		0.79
Totals:	**6.51**						**6.50**

These analyses show that Routes 1 and 3 are the quickest routes to/from Node 2 at all times of the day. What this means is that the new subdivision link will not provide a superior route for trips between Dip Road and locations south of Node 1 (including Whangarei CBD). Despite this, some vehicles are still likely to use the subdivision link road for these trips because, as shown later, the new link is the quickest route to/from Kamo CBD from some parts of Dip Road and some vehicle occupants will at least sometimes divert through Kamo CBD enroute to/from Node 2.

The analyses also show that Route 1 is significantly superior for all locations on Pipiwai Road and also for some locations at the northwestern end of Dip Road. This means that virtually all of the traffic travelling between Pipiwai Road and Dip Road is travelling between local destinations including Hurupaki School on Dip Road and the Northland golf club on Pipiwai Road.

Destination 2: Kamo CBD

There are also three nearly-equivalent route choices between this destination and the site locality. Those are:

Route 1: via Dip Road, subdivision Road A, Tuatara Drive and Three Mile Bush Road.

Route 2: via Dip Road and Three Mile Bush Road; and

Route 3: via Dip Road, Pipiwai Rd and Kamo Road.

Route 1 is quicker, and shorter, than route 2 for all lots north of subdivision Road A and those that lead directly to Road A. As such, the comparison is limited to routes 1 and 3.

Network Analysis 3, Table 3, is a comparison of both routes during a peak weekday commuter hour and with Node 1 located to give equivalence to the two quickest routes. Network Analysis 4, Table 4 is the same analysis for an average hour.

Table 3. Network analysis 3: Peak hours

via Dip Rd, Subdivision Rd, Three Mile Bush Rd							
	Distance (km)	**Operating speed (km/hr)**	**Intersections**		**Travel Time (min)**		
			Non-signalised	Signalised	Midblock	Intersections	Total
Dip Rd	1.08	65	1		1.00	0.20	1.20
Subdivision road	0.40	55	1		0.44	0.20	0.64
Tuatara Drive	0.29	55	1		0.32	0.25	0.57
TMB Rd	0.62	50		1	0.74	1.00	1.74
Totals:	**2.39**						**4.14**
via Pipiwai Rd, Kamo Rd							
Dip Rd	0.11	65	1		0.10	0.20	0.30
Pipiwai Rd	1.69	70	1		1.45	0.30	1.75
Kamo Rd, Pipiwai Rd to TMB Dr	0.83	85		1	0.59	1.50	2.09
Totals:	**2.63**						**4.14**

Table 4. Network analysis 4: Average hours

via Dip Rd, Subdivision Rd, Three Mile Bush Rd							
	Distance (km)	**Operating speed (km/hr)**	**Intersections**		**Travel Time (min)**		
			Non-signalised	Signalised	Midblock	Intersections	Total
Dip Rd	0.80	65	1		0.74	0.15	0.89
Subdivision road	0.40	55	1		0.44	0.15	0.59
Tuatara Drive	0.29	55	1		0.32	0.15	0.47
TMB Rd	0.62	50		1	0.74	0.50	1.24
Totals:	**2.11**						**3.19**
via Pipiwai Rd, Kamo Rd							
Dip Rd/Subdivision road	0.39	65	1		0.36	0.15	0.51
Pipiwai Rd	1.69	70	1		1.45	0.15	1.60
Kamo Rd, Pipiwai Rd to TMB Dr	0.83	85		1	0.59	0.50	1.09
Totals:	**2.91**						**3.19**

Figure 3 is a map that shows the locations, route options and points of equivalence that arise from these analyses.

There is yet another potential link between Dip Road and Three Mile Bush Road by way of Iti Street and Crawford Crescent. This route has speed humps along it at regular intervals. Those will discourage the use of the route, so this route has not been considered as a viable alternative.

Figure 3. Locations, route options and points of equivalence on the road network affected by the subdivision Road A link.

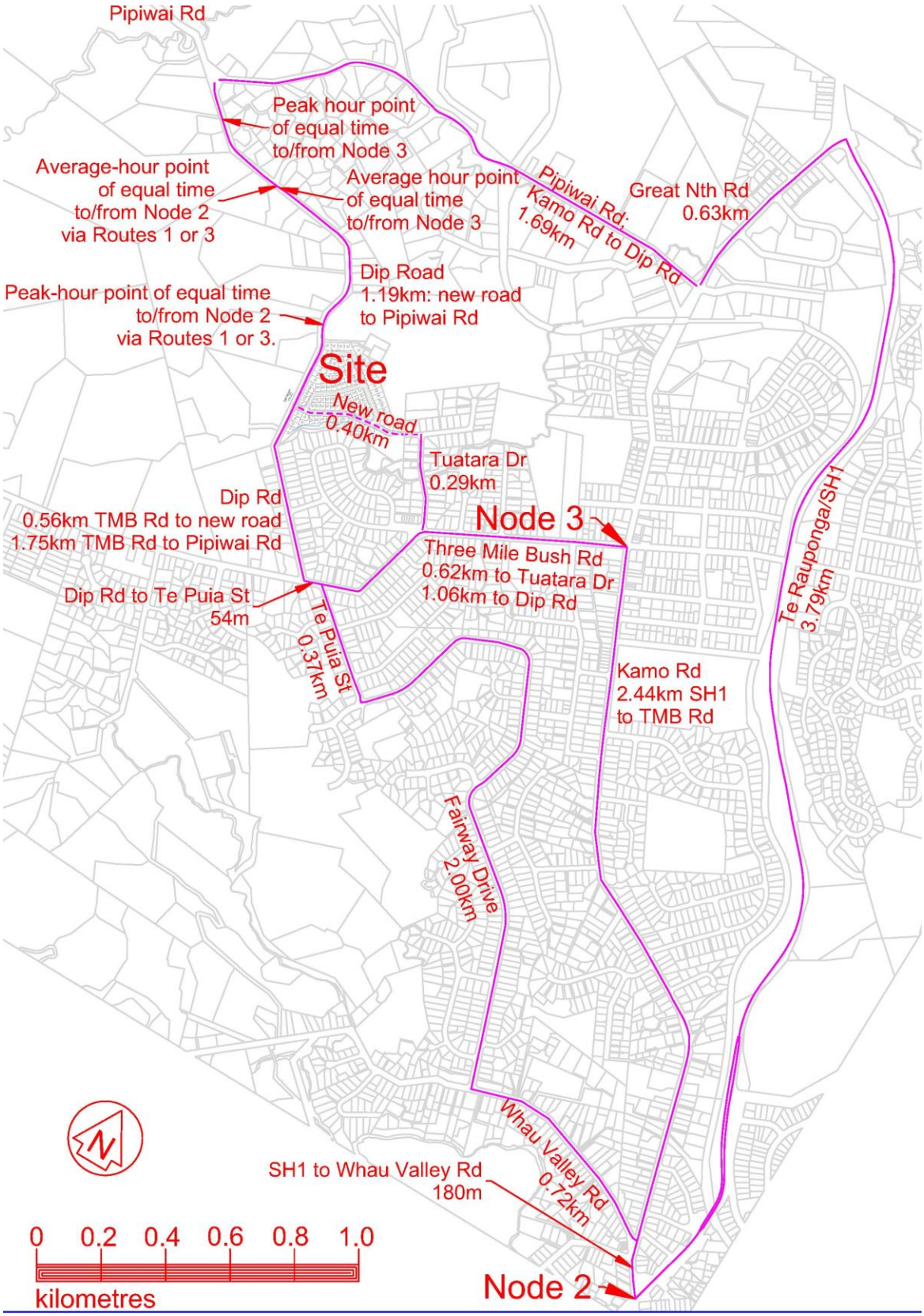
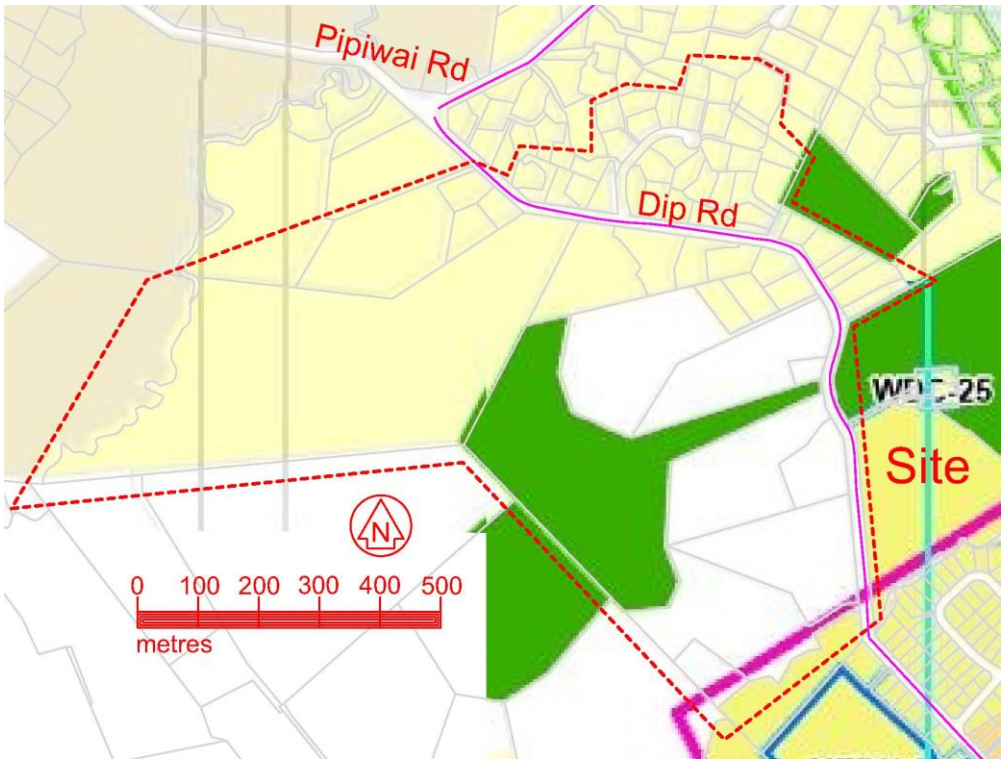


Figure 4 is a map showing the existing lots for which the new link will usually provide a quicker route to/from Kamo CBD. It is overlaid on a map from the *Whangarei District Plan* appeals version. The lots shaded yellow are in the low-density residential zone, those shaded green are open space and the white lots are in Rural production.

Figure 4. Map showing the existing lots for which the new link will usually provide a quicker route to/from Kamo CBD.



There are a total of 61 existing lots in that area. Of those, ten, covering 27.0 hectares, are in the low-density residential zone and are 4,000 square metres in area or larger. There is at least one existing house on each lot in the catchment except the one zoned open space.

Another key issue is the likely directional bias in traffic generated in this locality. A high proportion – estimated at between 75% and 80%, will travel to/from the southeast. The only attractions in the other direction include the Northland golf club and course (on Pipiwai Road a short distance east of Dip Road), industrial development and a childcare centre along Great North Road and Springs Flat Road, Excellere College – a special-character Christian school, the Arise church and most other destinations north of Whangarei (but almost all too distant to be visited regularly from this location). As shown in Figure 1, all but one of the points of equal time by way of the two quickest routes are relatively close to Pipiwai Road. The exception is only during peak commuter hours, so is relevant to only a relatively small proportion of traffic. As such, the catchment of Dip Road for trips to/from Pipiwai Road is relatively small for the majority of trips.

The route by way of the subdivision Road A will not be shorter or quicker for any trips to/from lots south of its Dip Road connection.

A survey of turning traffic at the Three Mile Bush Road/Te Puia Street intersection, over 45 minutes during an afternoon commuter peak hour, determined that 55% of traffic travelling to and from locations west of Te Puia Street[19] travels to/from Kamo and Tikipunga by way of Three Mile Bush Road. The other 45% uses Te Puia Street and most will continue along Fairway Drive. This indicates the split of traffic generated in this area between the main destinations. Some of the traffic recorded as travelling to/from Kamo and Tikipunga will actually be travelling to/from the north because Three Mile Bush Road, Kamo Road and Great North Road is the shortest and quickest route between the survey point and the north. It is estimated that 12 to 15% of that traffic will be travelling to/from the north or 5 to 6% of all traffic generated in this area.

It is estimated that the 95 lots in the subdivision will generate as much as 800 movements per day when fully developed. Of those, it is estimated that some 75%, or say 600 movements per day, will travel to/from the east, south and north by way of the new Road A, Tuatara Drive and Three Mile Bush Road. It is estimated that another 15%, or say 120 movements per day, will travel to/from the south and west by way of the southern end of Dip Road and the remaining 5% will travel to/from the north and west via Dip Road and Pipiwai Road.

The key conclusions from these analyses are as follows:

- The new link road will only divert some of the traffic from lots that lead to Dip Road. It will not change the preferred routes for any traffic on Pipiwai Road.
- Most of the traffic on the northwestern end of Dip Road will be using Dip Road as a link to other destinations. From that location, Dip Road provides the shortest route to Onoke scenic reserve, Hurupaki School, Jane Mander retirement village and rest home and various attractions west of Dip Road including Hurupaki scenic reserve, the Pukenui Forest walkway and several small businesses including a golf practice range and beauty clinic. It is estimated that only 25% to 30% of traffic Dip Road is residents of Dip Road.
- In the catchment shown in Figure 4, it is estimated that a daily average of 500 vehicle movements per day will be generated. Of those, it is estimated that 40 to 45% – 200 to 220 movements per day, will travel to/from Kamo and Tikipunga by way of new link Road A. Another 35 to 40% - will travel to/from the Whangarei CBD or further south, some 30% of which - another 55 to 60 movements per day, will use new link Road A. The remainder - 100 to 110 movements per day, will travel to/from the north and not use the new link road. That is an estimated total diversion of existing traffic to the new link road of 260 to 270 movements per day.
- The vacant land zoned low-density residential, which provides for 2,000 square metre lots, has the potential to create another 85 to 90 lots[20] and some 700 additional vehicle movements per day, so approaching another 400 diverted onto the link road.
- On this basis, as a result of the proposal with the subdivision fully developed and existing levels of development elsewhere, the estimated total additional traffic on Tuatara Drive close to 900 movements per day. Of those, 80 to 85 will occur during commuter peak hours of which some 60 will be outbound in the morning and a similar number will be inbound in the afternoon. The vacant land along Dip Road, especially that zoned low-density residential, has the potential to eventually increase this by a factor of as much as 1.4.

[19] Including Three Mile Bush Road and side roads including Dip Road

[20] Allowing 30% of the area for access and unsuitable ground and almost entirely considering lots greater than 4,000 sq.m in area, because anything smaller will be significantly more challenging to subdivide.

(analysis conclusions contd)

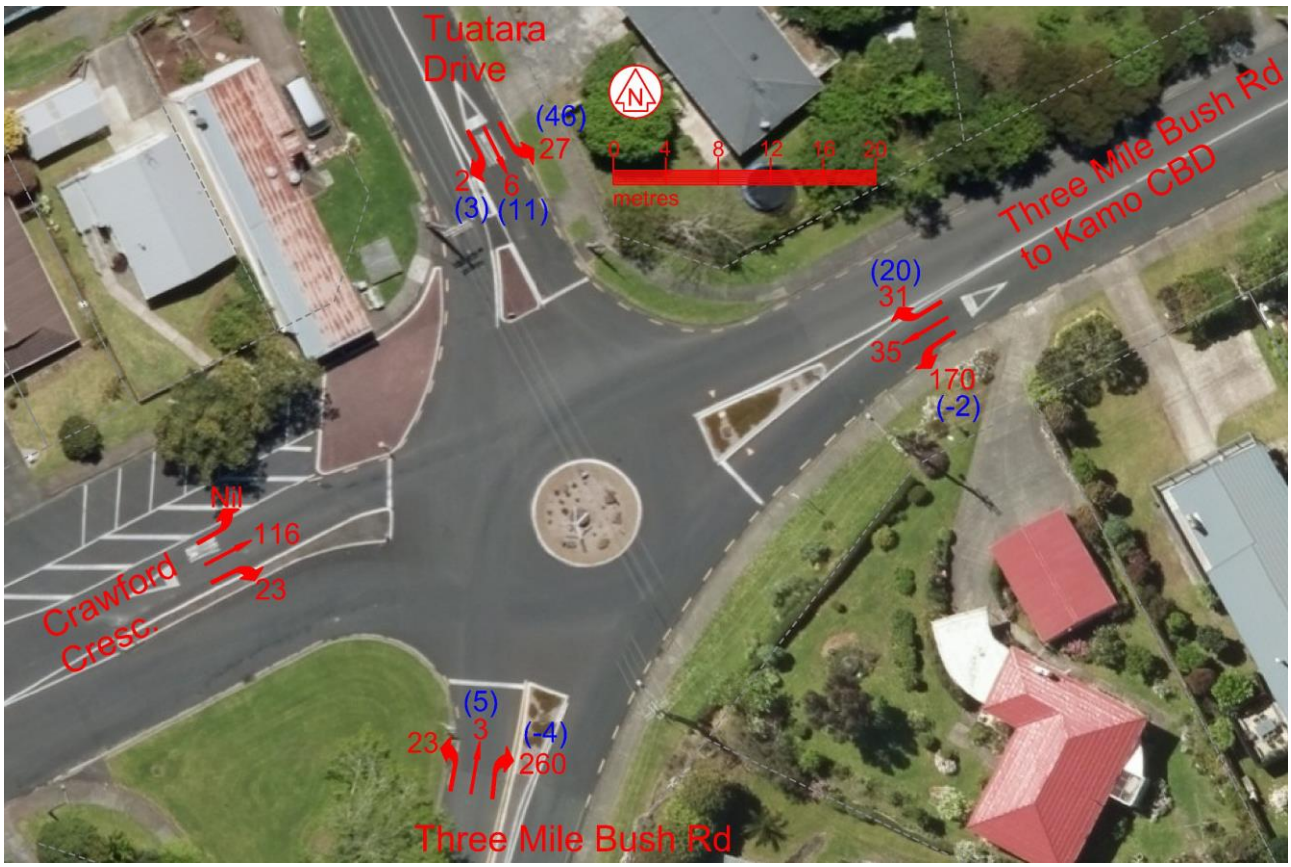
- Only some 20% of subdivision traffic, or 160 movements per day, will use the new Dip Road intersection. Of those, an estimated 120 will travel to/from the south each day, so right-turn entries are estimated to occur at a rate of 60 per day.
- Only generated (subdivision) traffic will be added to Three Mile Bush Road east of Tuatara Drive because virtually all of the traffic diverted onto new Road A would have used that part of Three Mile Bush Road anyway. So, an estimated additional 600 per day/55 in the peak hour of which some 500 per day/45 to 50 in the peak hour is estimated to continue through the intersection with Kamo Road, again with 70% outbound in the morning and inbound in the afternoon.
- The other location in which the proposal will significantly increase that traffic is at the Kamo Road/Whau Valley Road intersection and traffic signals. It is estimated that 40% of the generated traffic, or 300 movements per day/28 during the peak hour, will travel through that location. The diversions as a result of the new link will not have any effect at that location.
- The traffic will have no more than minimal effect at other locations because it will be both significantly dispersed and only a small proportion of the traffic at them.

8. APPENDIX B: INTERSECTION ANALYSES USING SIDRA

8.1 Tuatara Drive/Three Mile Bush Road/Crawford Crescent roundabout

The turning traffic through this intersection has been surveyed on two occasions in mid-August 2021[21]. The level of morning peak hour traffic is similar to that in the afternoon, but will put more pressure on the intersection because the dominant flow is a right turn in the morning. Figure 5 shows the turning counts obtained from the morning survey (in red), with predicted subdivision traffic in parentheses in blue. The small negative numbers in the subdivision traffic are due to expected diversion onto the subdivision road and Tuatara Drive.

Figure 5. The Three Mile Bush Rd/Tuatara Drive/Crawford Crescent roundabout and current and expected turning traffic.



The intersection has been modelled and analysed using SIDRA intersection software. With both the existing and subdivision traffic, the model finds that all movements would have Level of Service A and an average delay of less than 7 seconds.

[21] Once during a morning commuter peak hour and once in the afternoon, both in early August 2021.

Figure 6. SIDRA Intersection model of the Three Mile Bush Road/Tuatara Drive/Crawford crescent intersection (roundabout) with the subdivision at full development

Vehicle Movement Performance

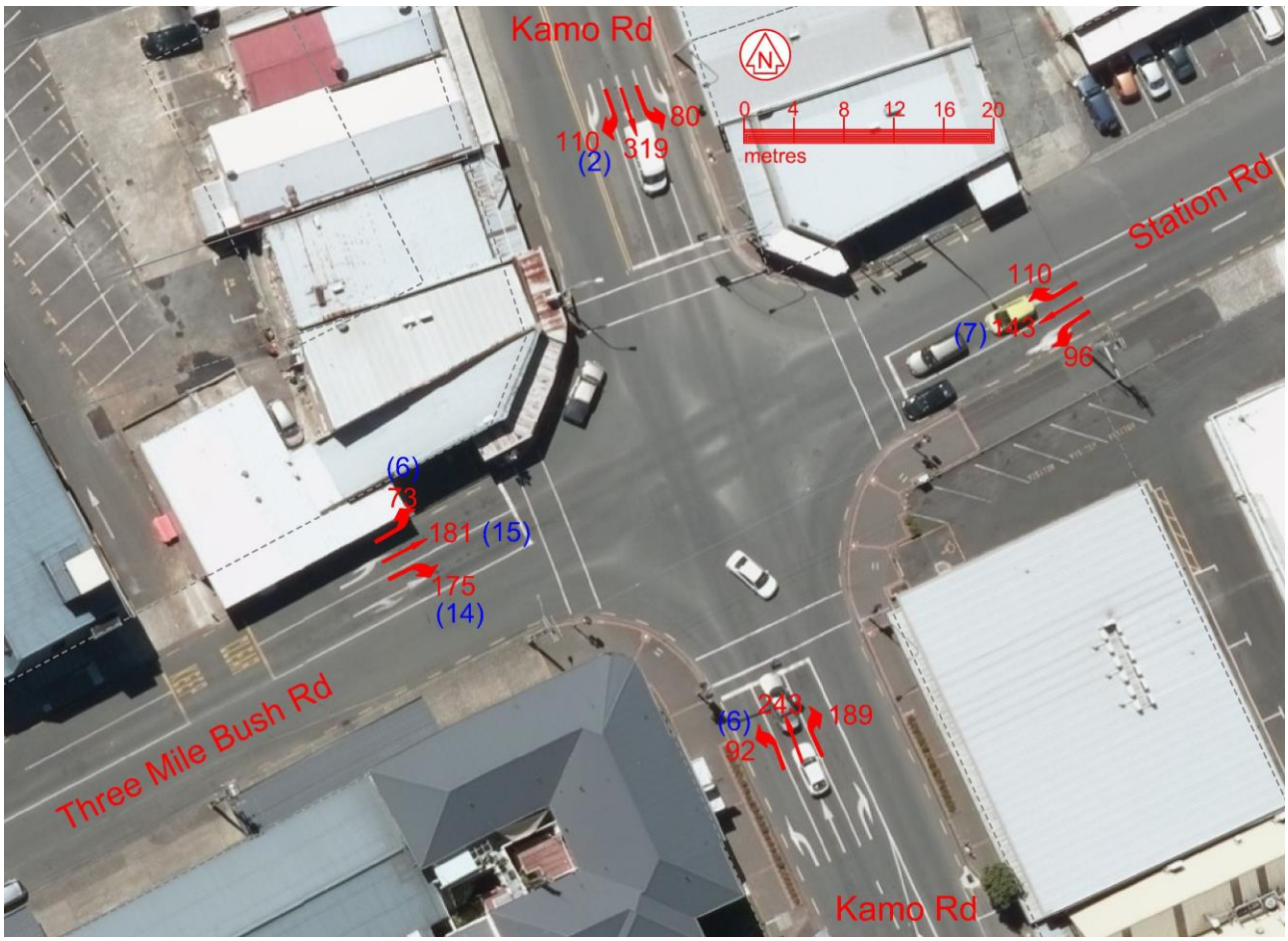
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate
South: Three Mile Bush Rd Sth												
1	L2	30	7	32	23.3	0.250	5.8	LOS A	1.5	10.8	0.30	0.62
2	T1	14	6	15	42.9	0.250	6.1	LOS A	1.5	10.8	0.30	0.62
3	R2	257	1	271	0.4	0.250	8.3	LOS A	1.5	10.8	0.30	0.62
Approach		301	14	317	4.7	0.250	7.9	LOS A	1.5	10.8	0.30	0.62
East: Three Mile Bush Rd East												
4	L2	173	5	182	2.9	0.209	5.3	LOS A	1.2	8.7	0.24	0.55
5	T1	36	1	38	2.8	0.209	5.2	LOS A	1.2	8.7	0.24	0.55
6	R2	52	1	55	1.9	0.209	8.1	LOS A	1.2	8.7	0.24	0.55
Approach		261	7	275	2.7	0.209	5.9	LOS A	1.2	8.7	0.24	0.55
North: Tuatara Drive												
7	L2	74	1	78	1.4	0.126	6.4	LOS A	0.7	5.0	0.55	0.65
8	T1	25	8	26	32.0	0.126	7.1	LOS A	0.7	5.0	0.55	0.65
9	R2	6	1	6	16.7	0.126	9.6	LOS A	0.7	5.0	0.55	0.65
Approach		105	10	111	9.5	0.126	6.8	LOS A	0.7	5.0	0.55	0.65
West: Crawford Crescent												
10	L2	2	1	2	50.0	0.178	7.4	LOS A	1.0	7.3	0.52	0.62
11	T1	122	6	128	4.9	0.178	5.9	LOS A	1.0	7.3	0.52	0.62
12	R2	31	8	33	25.8	0.178	9.4	LOS A	1.0	7.3	0.52	0.62
Approach		155	15	163	9.7	0.178	6.6	LOS A	1.0	7.3	0.52	0.62
All Vehicles		822	46	865	5.6	0.250	6.9	LOS A	1.5	10.8	0.36	0.60

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.

8.2 Kamo Road/Three Mile Bush Road/Station Road intersection

The turning traffic through this intersection has been surveyed on two occasions in October 2021[22]. The morning peak hour traffic is at least similar to that in the afternoon, potentially somewhat busier. There will also be more pressure on the Three Mile Bush Road leg of the intersection in the morning because there is a much stronger right-turn departure at that time. Figure 7 shows the turning counts obtained from the morning survey (in red), with predicted subdivision traffic in parentheses in blue.

Figure 7. The Kamo Road/Three Mile Bush Rd/Station Road intersection and current and expected turning traffic.



The intersection has been modelled and analysed using SIDRA intersection software for both the 15 and 60 minute morning peak traffic.

During 15-minute morning peak periods with only existing traffic, the model finds that all approaches are operating at level of service E, with the Kamo Road north approach experiencing the worst level of service. In particular, the right turn into Three Mile Bush Road operates at level of service F and has the highest average delays of all movements - nearly 90 seconds. This is supported by observations of the intersection, in which congestion is a regular occurrence on the Kamo Road north approach in the morning. Three Mile Bush Road is also already operating close to capacity during the 15-minute morning peak period, with average delays of nearly 60 seconds.

[22] Once during a morning commuter peak hour and once in the afternoon, both in early August 2021.

Performance is only slightly improved at average flows over the peak 60 minute period. For those flows, the model finds three approaches also operating at level of service E and an average/overall level of service E. At those levels of traffic, the Three Mile Bush Road approach operates at average level of service D, but E for both the through movement and right-turn into Kamo Road. At average flows over the peak 60 minute period, the Kamo Road north approach still experiences the highest average delays, with more than 70 seconds for the right turn into Three Mile Bush Road, but no movements operate at worse than level of service E.

There are some structural issues with the intersection that can only be addressed with significant and high-cost alterations. In particular, the right-turn lane from Kamo Road into Three Mile Bush Road, which has the worst level of service, has only a short lane – less than 25 metres at full width. That entire approach reduces to only one effective lane width barely 100 metres from the intersection and queues significantly exceed that length at times.

There is another anomaly that should be relatively easy to address and creates the most benefit for the Three Mile Bush Road approach – the approach that the subdivision has the most impact on. The anomaly is a dedicated left-turn on the Three Mile Bush Road approach even though the left turn from Three Mile Bush Road is significantly less frequent than the other two turns. If through movements were permitted on that left-turn lane then, even with the subdivision traffic added, the average delays decrease slightly and the queue lengths on Three Mile Bush Road decrease significantly compared with the existing phasing and lane discipline. The degree of saturation[23] decreases overall despite the additional traffic, with the biggest improvement felt on Three Mile Bush Road – a reduction from nearly 0.8 currently to only 0.62 (again, despite the additional traffic).

As such, if this alteration[24], is made, then the effect of the subdivision traffic at this intersection will not even be noticed by existing users. In fact, there will be a small but not insignificant improvement and betterment for existing users, compared with the existing lane layout and phasing. The situation is an existing deficiency that is considered to be the responsibility of the roading authority to correct. It is flagged here to show how the proposal will not have the effect on this intersection that the analysis of the unaltered intersection indicates.

Summary output from the SIDRA analysis of the intersection is given in Figure 8 and Figure 9. Both are for the average 60-minute morning peak commuter hour, which is the time in which the intersection is under the most stress and most of subdivision traffic on Three Mile Bush Road will be outbound, so will be having the greatest potential effect. The benefit of the amendment to lane discipline on Three Mile Bush Road is similar for shorter peak periods, but the longer period is considered more representative of effects that warrant detailed consideration and, as necessary, mitigation.

In both cases, the asterisks denote movements that govern the intersection operation.

[23] The proportion of the demand to the practical capacity of the movement.
[24] The addition of a through movement to the left-turn lane on Three Mile Bush Road and adjustments to the phasing to suit.

Figure 8. SIDRA Intersection model of the existing Three Mile Bush Road/Kamo Road/Station Road intersection (traffic signals) without the subdivision

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles
South: Kamo Rd South													
1	L2	92	3.0	92	3.0	0.196	51.2	LOS D	5.2	37.4	0.80	0.73	0.80
2	T1	243	3.0	243	3.0	0.531	52.7	LOS D	15.1	108.4	0.88	0.74	0.88
3	R2	189	3.0	189	3.0	0.813	75.8	LOS E	13.8	98.9	1.00	0.82	1.00
Approach		524	3.0	524	3.0	0.813	60.8	LOS E	15.1	108.4	0.91	0.77	0.91
East: Station Road													
4	L2	96	3.0	96	3.0	0.142	38.6	LOS D	4.6	32.8	0.68	0.72	0.68
5	T1	143	3.0	143	3.0	*0.680	63.8	LOS E	17.3	123.9	0.96	0.82	0.96
6	R2	110	3.0	110	3.0	0.680	67.1	LOS E	17.3	123.9	0.96	0.82	0.96
Approach		349	3.0	349	3.0	0.680	57.9	LOS E	17.3	123.9	0.88	0.79	0.88
North: Kamo Rd North													
7	L2	80	3.0	80	3.0	0.171	52.0	LOS D	4.5	32.3	0.79	0.74	0.79
8	T1	319	3.0	319	3.0	*0.840	56.6	LOS E	20.8	149.4	0.93	0.81	0.93
9	R2	110	3.0	110	3.0	*0.830	73.0	LOS E	7.6	54.5	0.95	0.78	0.95
Approach		509	3.0	509	3.0	0.840	59.4	LOS E	20.8	149.4	0.91	0.79	0.91
West: Three Mile Bush Rd													
10	L2	73	3.0	73	3.0	0.106	20.3	LOS C	1.9	13.5	0.66	0.67	0.66
11	T1	181	3.0	181	3.0	*0.786	59.2	LOS E	24.4	175.1	0.97	0.85	0.97
12	R2	175	3.0	175	3.0	0.786	62.6	LOS E	24.4	175.1	0.97	0.85	0.97
Approach		429	3.0	429	3.0	0.786	54.0	LOS D	24.4	175.1	0.92	0.82	0.92
All Vehicles		1811	3.0	1811	3.0	0.840	58.2	LOS E	24.4	175.1	0.91	0.79	0.91

Figure 9. SIDRA Intersection model of the existing Three Mile Bush Road/Kamo Road/Station Road intersection (traffic signals) with the subdivision traffic and amended lane discipline on Three Mile Bush Road

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles
South: Kamo Rd South													
1	L2	98	3.0	98	3.0	0.203	50.5	LOS D	5.5	39.6	0.79	0.73	0.79
2	T1	243	3.0	243	3.0	0.508	51.7	LOS D	14.9	107.3	0.87	0.74	0.87
3	R2	189	3.0	189	3.0	0.678	70.9	LOS E	13.2	95.1	0.97	0.82	0.97
Approach		530	3.0	530	3.0	0.678	58.3	LOS E	14.9	107.3	0.89	0.76	0.89
East: Station Road													
4	L2	96	3.0	96	3.0	0.128	34.3	LOS C	4.3	30.6	0.63	0.71	0.63
5	T1	150	3.0	150	3.0	*0.655	61.9	LOS E	17.5	125.4	0.95	0.82	0.95
6	R2	110	3.0	110	3.0	0.655	65.2	LOS E	17.5	125.4	0.95	0.82	0.95
Approach		356	3.0	356	3.0	0.655	55.5	LOS E	17.5	125.4	0.86	0.79	0.86
North: Kamo Rd North													
7	L2	80	3.0	80	3.0	0.167	51.1	LOS D	4.4	31.9	0.78	0.74	0.78
8	T1	319	3.0	319	3.0	*0.818	55.5	LOS E	20.6	147.8	0.92	0.80	0.92
9	R2	112	3.0	112	3.0	0.662	68.4	LOS E	7.4	53.5	0.92	0.77	0.92
Approach		511	3.0	511	3.0	0.818	57.7	LOS E	20.6	147.8	0.90	0.79	0.90
West: Three Mile Bush Rd													
10	L2	79	3.0	79	3.0	*0.621	62.2	LOS E	15.2	109.2	0.94	0.85	0.94
11	T1	196	3.0	196	3.0	*0.621	59.3	LOS E	15.2	109.2	0.94	0.85	0.94
12	R2	189	3.0	189	3.0	0.621	65.1	LOS E	15.1	108.4	0.94	0.81	0.94
Approach		464	3.0	464	3.0	0.621	62.2	LOS E	15.2	109.2	0.94	0.83	0.94
All Vehicles		1861	3.0	1861	3.0	0.818	58.5	LOS E	20.6	147.8	0.90	0.79	0.90

Appendix 5

Integrated Three Waters Report

Onoke Heights Limited

THREE WATERS DESIGN REPORT

19103 - 67 Dip Road, Kamo, Whangarei

Project Reference: 19103
November 25, 2021

DOCUMENT CONTROL

Version	Issued For	Date	Prepared By	Reviewed &Authorised By
C	Issued for Consent	25/11/2021	Leo Kim BE(Hons) *Civil Engineer*	Aaron Holland Civil/Structural/Geotechnical Engineer, CPEng *Civil Group Manager*

CONTENTS

1 PROJECT DESCRIPTION

LDE Ltd was engaged by Onoke Heights Limited to provide a report covering the three waters infrastructure and stormwater pond design for resource consent for the proposed residential subdivision and development at 67 Dip Road, Kamo, Whangarei.

Figure 1 - Site location plan, outlined in blue. Sourced from Whangarei District Council (WDC) GIS.

As with any new development water, wastewater and stormwater servicing and management is required.

The water supplies additional demand can be serviced either on the public network or with an onsite water supply which can consist of either an extension of the public system or the use of water tanks or water bores. As this development is to be smaller urban sized lots, an extension of the water network is proposed.

With wastewater, disposal connection to a public system is proposed due to the smaller lot sizes. Smaller lot areas below about 2000m² are not generally suitable for OSW disposal systems as there is generally insufficient land area available to install suitable disposal fields.

With stormwater, new impervious areas are created, and these areas require stormwater management devices to be utilised to minimise their impact on the environment. To attenuate runoff for the new impervious areas within the proposed site, the pre-development and post-development scenarios were modelled in HEC-HMS software. Additionally, the quality of stormwater runoff from high contaminant generating surfaces such as roads and carparks must be treated before discharge to minimise their impact on the health of the receiving ecosystem so the ponds design has incorporated water quality. Extended detention is also proposed to mitigate effects on the stream into which the proposed pond will discharge.

The design presented in this report is in accordance with Whangarei District Council's and Northland Regional Council's requirements in terms of mitigating stormwater runoff from impervious areas, with a stormwater pond providing water quality, extended detention, and stormwater attenuation to predevelopment flows for the 2, 10 and 100yr storms, including an increase of 20% for climate change.

2 WATER

The councils water reservoir is located immediately above the northern end of the site which will service the development. There are also existing public water mains running along the boundaries of the site which serve the surrounding developments. There will simply be an extension of these public water mains into the development provide both water supply to the new dwellings and firefighting water supply which we expect to come from the mains in Dip road.

The 95 new residential lots will require the following additional water supply capacity assuming 300ltrs/day/person with 4 people per dwelling.

Peak day demand = 2.0 x PF

- 2.0 x 300(l/day) x 4(people) x 95(lots) = 228,000ltrs/day

Peak hourly demand = 5 x PF/24hrs

- 5 x 300(l/day) x 4(people) x 95(lots)/24(hrs)= 23,750ltrs/hour

3 WASTEWATER

The wastewater servicing the development will be an extension of the existing public reticulation from Tuatara Road. It is not practical to connect to the reticulation network along Dip Road as this requires the network to cross the existing stream on the southern boundary of the subject site which would involve pipe bridging, as such the extension into the development is to be provided from Tuatara Road.

The additional wastewater flows that will be generated by the development are as follows:

Dry weather peak daily flow = 2.5 x ADWF

- 2.5 x 200(l/day) x 4(people) x 95(lots) = 190,000ltrs/day

Peak wet weather flow (PWWF) = 5 x ADWF

- 5 x 200(l/day) x 4(people) x 95(lots) = 380,000ltrs/day

4 HYDROLOGICAL ASSESSMENT

4.1 Pre-Development

The subject site, shown in the aerial photo in Figure 2, has an area of approximately 6.9ha which is currently covered in grass with trees. The northern half of the site comprises of a converging south facing slope of up to 11 degrees. The southern part of the site comprises of waning slopes towards the stream on the southern end of the subject site.

Figure 2 - Aerial photo of site indicated in blue. Sourced WDC GIS.

4.2 Post-Development

It is proposed to subdivide the site creating 95 new residential lots with majority of the areas between 340m^2 and 1050m^2. The lots are proposed to be accessed via an extension of Tuatara Road to Dip Road. The proposed scheme plan can be seen in Figure 3 below.

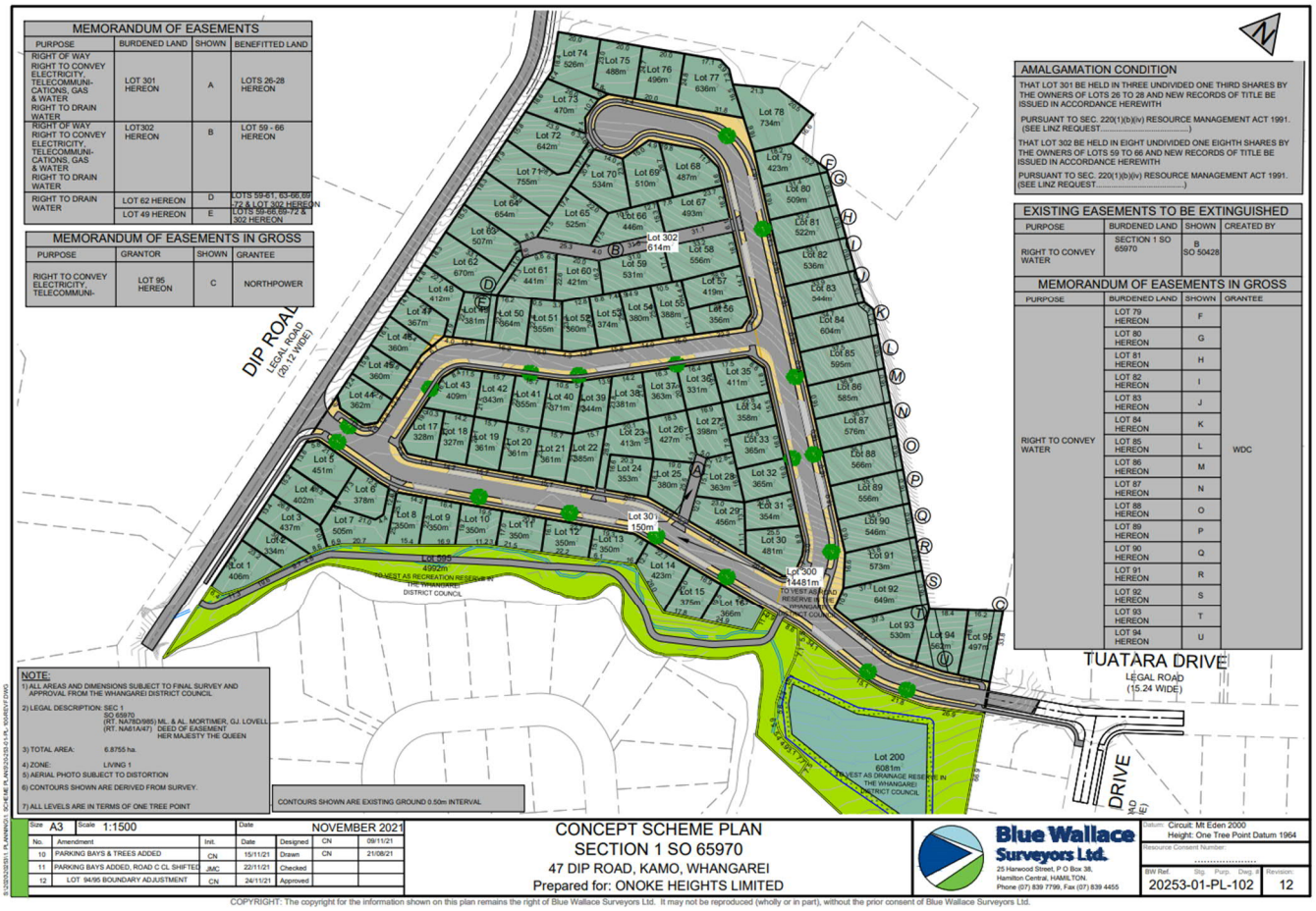


Figure 3 - Proposed scheme plan provided by Blue Wallace Surveyors Ltd.

It is proposed to construct a stormwater pond within the south-eastern end of the subdivision to provide attenuation and water quality treatment for runoff from the development. To achieve this, the pond has been designed to meet the requirements of Auckland Council's GD01.

The proposed lots have been divided into impervious and pervious components with 60% of the lot area being nominated as impervious and the remaining 40% pervious. The road reserve area was nominated a curve number of 90 based on a weighted average between the road, footpaths and berms. Refer to Figure 4 below for catchment areas and pond location.

Figure 4 – Catchment areas and pond location.

Table 1 – Pre and Post Development catchment areas and curve numbers.

Pre-Development		
Description	Curve Number (CN)	Area (m^2)
Grassed areas - Pervious	70	66,955
Total		66,955
Post Development		
Description	Curve Number (CN)	Area (m^2)
(Catchments B & C) Residential Lots - Impervious	98	21,695
(Catchments B & C) Residential Lots - Pervious	70	14,463

(Catchment D) Road Reserve (Road, Footpaths, Berms)	90	15,245
(Catchments A) Unmitigated Bush Area	70	9,375
(Catchment E) Unmitigated Lots – Pervious	70	2,471
(Catchments E) Unmitigated Lots - Impervious	98	3,706
Total		66,955

Catchment E comprises of unmitigated lots on the southern boundary that will be directly piped to the stream through its own small outfall structure and will not be attenuated by the proposed stormwater pond. Stormwater from the bush located outside the northern boundary of the site will drain into the proposed development and through the stormwater pond. Although this bush area is not part of the development, this has been taken into account into the pond design as Catchment A. Catchment G will not be developed and drains directly into the stream downstream of any developed areas.

4.3 Soil Classification

From the LDE geotechnical investigation of the site, the site is underlain by volcanic soils. For the purposes of stormwater modelling, we have assessed these soils beneath the site as being between Soil Class B&C soils as defined in the Whangarei Environmental Engineering Standards.

4.4 Flood Risk

A retaining wall is proposed on the southern boundaries of Lots 14,15 and 16 of the subject site which will sit on the edge of the 100-year flood plain outlined on WDC GIS Flood Hazard map and in Figure 5 below. A cross section was taken from the edge of the Lot 15 boundary to the adjacent side of the stream to model the peak water level for the 100-year ARI storm. Refer to Figure 5 below for location of section analysed.

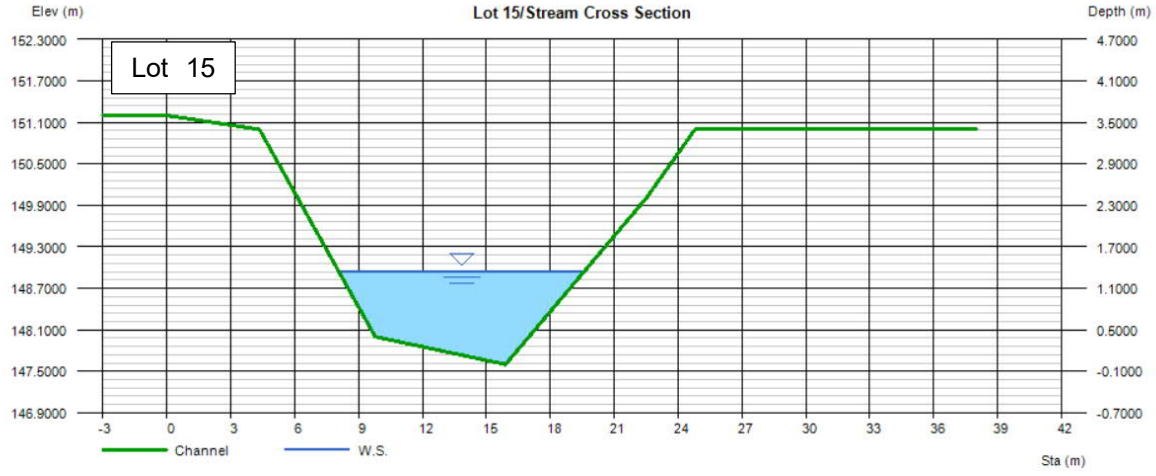
Figure 5. Cross section analysed from Lot 15 across stream.

Hydraflow Express software modelling of the stream was used to determine the peak water levels in proximity of the site. The stations and elevations of the stream were input into the user defined model to model the shape of the stream channel based on WDC GIS contours as well as the survey completed of the base of the stream.

Although the flood plain extends further into the boundary of Lot 16, the stream bed adjacent the lot is at approximately RL 144 whereas the RL of the lot 16 boundary is at approximately RL 151. There is a 7m difference

between the stream bed and the lot 16 boundary and therefore this was not considered the critical section. Instead, a section from the boundary of lot 15 through the stream was taken which was the lowest difference in elevations and the critical section, to analyse the risk of flooding.

The subject stream is assumed to have a peak flow of approximately 36m^3/s during a 100-year ARI storm (assuming an SCS type 1a storm distribution) with a catchment area of slightly less than 180 hectares with a time of concentration of 31mins. Based on the results we can see that the peak water level during a 100-year ARI storm is at RL 148.9 which is approximately 2.1m lower than the Lot 15 boundary at RL151.0 and as such, we can deem that the construction of the proposed retaining walls which will raise the platform level up to approximately RL154 along the boundaries will have no impact on the flood levels. Refer to Figure 6 below for the peak water level during a 100-year ARI storm. Note the stream channel cross section has a flow capacity well in excess of 100m3/s through this area without affecting either of the existing lots.



Depth	Q	Area	Veloc	Wp	Yc	TopWidth	Energy
(m)	(cms)	(sqm)	(m/s)	(m)	(m)	(m)	(m)
1.3503	36.00	10.37	3.4731	12.0520	1.4630	11.5564	1.9656

Figure 6. Hydraflow Express Stream model adjacent to Lot 15 existing ground levels.

5 COUNCIL REQUIREMENTS

5.1 Northland Regional Council SW requirements

Water and Soil Plan

8.3.5 Stormwater

During dry weather, contaminants such as dirt, oil, grease, and heavy metals tend to accumulate on the streets, footpaths, carparks, roofs and similar hard surfaces within urban areas. When it rains, the stormwater carries the accumulated contaminants with it into the stormwater drainage systems which in turn flow directly into nearby streams, rivers or estuaries. Such urban stormwater runoff receives little or no treatment before being discharged

into natural water bodies. Heavy metals have been found in the Upper Whangarei Harbour sediments that exceed the standards recommended for aquatic life.

These contaminants will remain in the receiving environment and will accumulate over time as stormwater discharges continue. Stormwater discharges are generally authorised by discharge permits based on a stormwater management plan. Stormwater management plans are widely used in terms of the design of the stormwater system. However, these have focused on the capacity of the stormwater system to accept runoff, with little or no attention given to stormwater quality. The plans, however, provide a useful basis upon which to institute quality controls which are available and used both in New Zealand and overseas.

8.5.6 Issues Relating to Stormwater Discharges

1. The levels of heavy metals, sediments and other contaminants, which are potentially harmful to aquatic life, in stormwater runoff.
2. The lack of attention to quality controls in stormwater system design.
3. The contribution of runoff from industrial sites to contaminant loadings in urban stormwater, including those from ancient spills.
4. The deliberate or careless disposal of oil and other household and commercial wastes to stormwater systems.

8.17 Specific Policies for Stormwater Diversions and Discharges

1. To manage the diversion and discharge of stormwater in a way that provides safeguards against flooding and maintains or enhances water quality.
2. To require the inclusion of water quality controls as far as practicable in existing stormwater management systems that are known to be causing concentrations of contaminants within the receiving environment that are in excess of applicable water quality and/or sediment quality guidelines.
3. To manage the diversion and discharge or stormwater in urban areas through long duration resource consents that are supported by comprehensive stormwater management plans.
4. To promote best practice for stormwater management design, including low impact options.
5. To promote stormwater management practices that avoid or minimise the discharge of contaminants from industrial and trade premises into stormwater drainage systems.
6. To encourage activities to operate in accordance with industry standards and/or environmental guidelines where these are intended to avoid, remedy or mitigate the adverse effects of stormwater contamination.
7. To permit the discharge of stormwater from hazardous substance storage areas and industrial or trade premises if sufficient safeguards are adopted to avoid, remedy or mitigate the potential adverse effects associated with stormwater contamination.
8. To promote public awareness of the adverse effects of stormwater discharges on natural waters, including awareness of the adverse effects of household waste introduced into stormwater systems.

5.2 Whangarei District Council Three Water Management

Three Waters Management implements provisions to manage the impact of land use and subdivision on water resources, namely stormwater, wastewater and water supply:

- Stormwater systems manage the quality and quantity of stormwater runoff to minimise flood damage and to protect people, land, infrastructure and the receiving environment from adverse effects.
- Wastewater systems collect and convey wastewater for subsequent treatment and disposal. This will normally consist of either connection to the reticulated wastewater network, or on-site treatment and disposal (either individual or communal in nature).
- A water supply is necessary to ensure that a sufficient quality and quantity of water is available to all properties.

Whangarei district council three waters policy objectives are as follows:

1. TMW-01 Connections - Ensure that connection to reticulated three waters networks is provided for within a reticulated area.
2. TWM-O2 – Reticulated Networks - Maintain the effectiveness, efficiency and sustainability of reticulated three waters networks.
3. TWM-O3 – Integrated Infrastructure - Plan and provide for three waters infrastructure in an integrated and comprehensive manner.
4. TWM-O4 – Private Systems - Ensure that private three waters systems are provided where connections are not provided to reticulated networks
5. TWM-O5 – Adverse Effects - Minimise adverse effects from stormwater and wastewater on people, property, infrastructure, the receiving environment and cultural values.

Whangarei district council policies are as follows

Policies	Explanation	Development Assessment
TWM-P1 – Three waters Infrastructure	To ensure that three waters resources are appropriately managed by requiring subdivision and development to provide three waters infrastructure that: • Is coordinated, integrated and compatible with the existing infrastructure and capacities. • Enables the existing network to be expanded or extended to adjacent land where that	The proposed stormwater ponds will limit peak flows to predevelopment level for the 2, 10 and 100yr storm events, with a 20% allowance for climate change. They will include an extended detention volume to address erosion effects on the stream network that they discharge into and provide water quality treatment for the roads within the development, based on 1/3rd of the 2yr storm.

	land is suitable for future reticulated development.	
TWM-P2 – Reticulated Areas	To sustainably and efficiently manage three waters resources by avoiding private three waters systems where connection to the reticulated network is practicable or where failure to connect may compromise the future extension of the reticulated network.	The development will provide stormwater, water and wastewater connections for each lot. Water and wastewater will connect to the existing public systems, with additional public network extensions undertaken as part of the development. Stormwater will discharge into a new public SW network that discharges into the stream. There will be one outlet point from the pond which discharges to the stream on the southern end of the site, and another smaller outfall for the lower lying lots.
TWM-P3 – Capacity	To manage the scale and design of subdivision and development where connection is provided to reticulated three waters networks to ensure that there is sufficient capacity in the reticulated networks, and where necessary require upgrades and/or extensions to the reticulated networks.	The water and wastewater networks will be extended to service the development. The new public stormwater system including the proposed stormwater pond, will mitigate effects for up to a 1% AEP. This will minimise additional effects on downstream areas.
TWM-P4 – Future Development	To ensure that reticulated three waters infrastructure is designed to accommodate planned and future development.	The water network already extends past the boundary of the proposed development, so it is not considered necessary to extend this network other than to service the proposed development. The development upstream at top of the hillside is council owned land and will not be developed, hence neither stormwater or wastewater reticulation extension is proposed.
TWM-P5 – Vested Assets	To require vested assets, and connections to vested assets, to be designed and constructed in a manner that protects the ongoing	All three waters infrastructure will be designed in accordance with relevant councils and NZ engineering standards

	operation, maintenance and upgrading of that asset.	and will be vested to council as part of the development.
TWM-P6 – Private Systems	To ensure that where connection to a reticulated three waters network is not available or practicable that provision can be made for: 1. A water supply. 2. The treatment, disposal, and where appropriate attenuation, of stormwater in a way that does not lead to significant adverse effects on or off site. 3. Management of wastewater via: a. An on-site wastewater treatment system; or b. Approval to connect to a private wastewater system.	All lots shall be able to connect into the extended public three waters network and no private systems are necessary. The water, stormwater and gravity wastewater systems will be vested to council.
TWM-P7 – Flooding	To reduce the risk of flood hazards or increased upstream and downstream flood levels resulting from stormwater discharges.	Flows from the development will be reduced to below predevelopment levels for up to a 1% AEP, and will include a 20% rainfall increase for climate change. Stormwater flows within the development will include both a piped reticulation system and secondary flow paths to manage stormwater flows up to a 1%AEP.
TWM-P8 – Integrated Three Waters Assessments	To require Integrated Three Waters Assessments for large scale developments to: 1. Manage three waters in an integrated and comprehensive manner. 2. Enable and recognise the benefits of green infrastructure and low impact and water sensitive design.	A stormwater pond will be installed as part of the development which will protect the receiving environment. The water and wastewater will be connected to the public systems to mitigate the effects of more intensive urban development.
TWM-P9 – Infrastructure	To require subdividers and developers to meet the costs of any	The subdivision will install the infrastructure necessary to service the

	upgrades or extensions of reticulated three waters infrastructure which are attributed to the impacts of the subdivision or development.	proposed development as part of its construction. No network upgrades apart from inside the subject site are required as part of the development.

With reference to Whangarei District Council's engineering standards, ponds should be designed generally in accordance with TP10/GD01, which are Auckland Council's standards for stormwater design for development and are considered a suitable set of guidelines for Northland with similar catchments and geology.

The design the stormwater ponds generally requires the following:

- An extended detention volume of 34.5mm for the site to be released over a 24hr period, This slow release volume is to minimise stream erosion and increase water quality in the pond. In accordance with the technical guidance on pond design that GD01 is based upon (TR2013-024) a 70mm (to minimise blockage risks) or larger orifice has been used to manage these flows.
- The pond is designed with capacity to mitigate post development flows to equal or less than the pre-development 24 hour 2, 10 and 100 year storm events to prevent the development increasing the flooding risks downstream.
- The Whangarei District Council's engineering standards also require new developments to apply a 20% increase to the design storm runoff figures to address future increases resulting from climate change effects this has been incorporated into the post development model.

6 PROPOSED STORMWATER MITIGATION METHODOLOGY

6.1 Proposed Devices

Due to the constraints of the site, it is proposed to mitigate the effects of the development using the following devices:

- A stormwater pond has been designed to collect the stormwater runoff from impervious and pervious areas of each lot, the road reserve and the bushed area. The pond has been designed with the necessary outlet configuration to mitigate the 2yr, 10yr and 100yr storm events to equal or less than pre-development rates, which ensures that it does not affect downstream areas with any increases in flow rates. The water will discharge from the pond into the stream running along the southern boundary of the development.
- Additional to the 2,10 and 100yr storm event mitigation an extended detention volume has been allowed for in the pond with a 24hr drain down period designed in accordance with Auckland Council's GD01. The extended detention reduces the stream erosion and increases water quality in the pond for the runoff from all the individual lots and road reserve areas and will help improve the overall quality of the stream the pond discharges to.

- The full water quality treatment volume for all areas of the development is provided within the pond (1731m^3). 50% of this shall be provided as dead storage and the rest as live storage with the extended detention storage.
- A forebay is included in the pond design to ensure settlement of sediments as required under Auckland Council's GD01. The pond will also drain completely through soakage during the drier periods.

6.2 Modelling Inputs

A HEC-HMS model was developed based on a SCS Type 1A storm profile determined from HIRDS V4 rainfall data for the site, and the hydrological parameters outlined in Table 1 above.

A time of concentration of 10 minutes was used due to the relatively small catchment lengths.

The rainfall data was increased by 20% in the post development model to account for the increases in storm intensity and frequency as a result of climate change.

6.3 Results

Table 3 below shows the pre-development and post-development peak flow rates produced by the proposed design. The full output tables from the HEC-HMS modelling are appended to this report.

Table 3 - Pre and Post Development peak flow rates from the development.

Storm Event (ARI)	Pre Development (m^3/s)	Post Development (m^3/s)
2	0.3576	0.3537
10	0.6912	0.6892
100	1.2464	1.2415

The results show that the proposed design attenuates post-development peak flows to equal or less than the pre-development peak flows.

If impermeable areas greater than those analysed in this design are proposed, then a revision of the design presented in this report will be required.

6.4 Stormwater Device Design

6.4.1 Stormwater Pond

- The footprint of the permanent pond water level covers an area of approximately 718m^2 at RL145.3m, with the depth being approximately 2.5m.

- The extended detention storage area available between the permanent water level and RL146.1m is approximately 1040m^3.
- Above the extended detention level at RL146.1m the pond as modelled will utilise 3127m^3 of volume to control up to the 100-year storm event with the expected levels during a 100 year storm to reach RL147.6m which is a maximum water depth of 4.8m from the pond base.
- The volumes and elevations for the various storm event storage are summarised in Table 5 below.

Table 4 - Pond storage at respective elevations.

Elevation (RL)	Area (m^2)	Volume (m^3)	Cumulative Volume (m^3)
142.8	38	N/A	N/A
145.3	718	945	945
145.4	863	79	1024
147.9	2204	3834	4858
148	2859	253	5112

Table 5 - Pond volumes and respective elevations for storm event storage.

Storage Event	Elevation (RL)	Cumulative Pond Volume (m^3)
Dead Storage	145.3	945
Extended Detention	146.1	1985
2 year Live Storage	146.7	3018
10 year Live Storage	147.1	3632
100 year Live Storage	147.6	4398
Total Pond Capacity	148.0	5112

- The pond will incorporate a 1m wide bench as a safety precaution to allow anyone to exit the water should anyone inadvertently enter the pond. This bench has been incorporated into the design at RL145.4m.
- The dead storage volume (945m^3) will provide water quality treatment most of which will slowly drain through soakage.
- A Ø100mm low flow outlet will control the permanent pond levels around RL 145.3, with the extended detention volume being above this level.
- The top of the pond bank is a 3m width at RL148m, this allows 0.3m freeboard from the 100yr storm event level. Additionally, the pond shall have an emergency drain into the stream installed. This is capable of discharging events in the unlikely event that the manhole overflow is blocked.
- The outfall structure of the pond will have outlets as shown in Table 6 below. A drawing of the outlet structure and pond dimensions is appended to this report.

Table 6 - Pond outlet structure summary.

Outlet	Elevation (RL)	Description
Outlet 1	145.3	Ø100mm orifice outlet
Outlet 2	146.1	Ø400mm orifice outlet

Outlet 3	146.7	Ø375mm orifice outlet
Outlet 4	147.1	Ø400mm orifice outlet
Emergency Spillway	147.7	Ø2050mm manhole overflow
Manhole Outlet	142.8	Ø1050mm outlet

- A forebay with a minimum 30% volume of 260m^3 shall be provided at the inlet to the pond to capture coarse sediments before they enter the pond. Access shall be provided to the forebay such that sediments can be cleaned out.
- A 3m wide access track shall be formed from the top of the pond down with access onto this track via a shared concrete accessway at a maximum grade of 1:4 which will also serve as the overland flow path into the pond.
- A capped 150mm PVC outlet has been installed at the base of the pond discharging into the outlet manhole, this outlet is to be only used if de-watering the pond is required for maintenance purposes, and will drain the pond completely.
- The pond will be formed so that any overflow in excess of the ponds capacity drains into the manhole and out via the outlet pipe and in an extreme case via a 3m wide spillway, should the pipe become blocked for any reason.

7 LIMITATIONS

This report has been prepared exclusively for Onoke Heights Limited with respect to the particular brief given to us. Information, opinions and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent. LDE Ltd accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party.

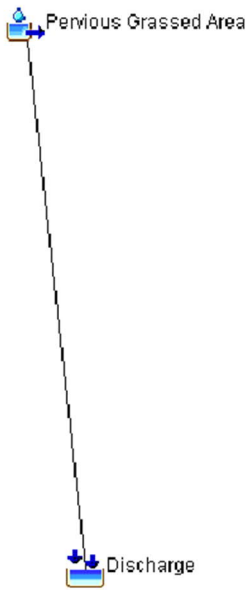
APPENDIX A
HIRDS V4 RAINFALL DATA

2, 10 AND 100 YEAR ARI STORM +20%CC RAINFALL INTENSITY (MM/H)

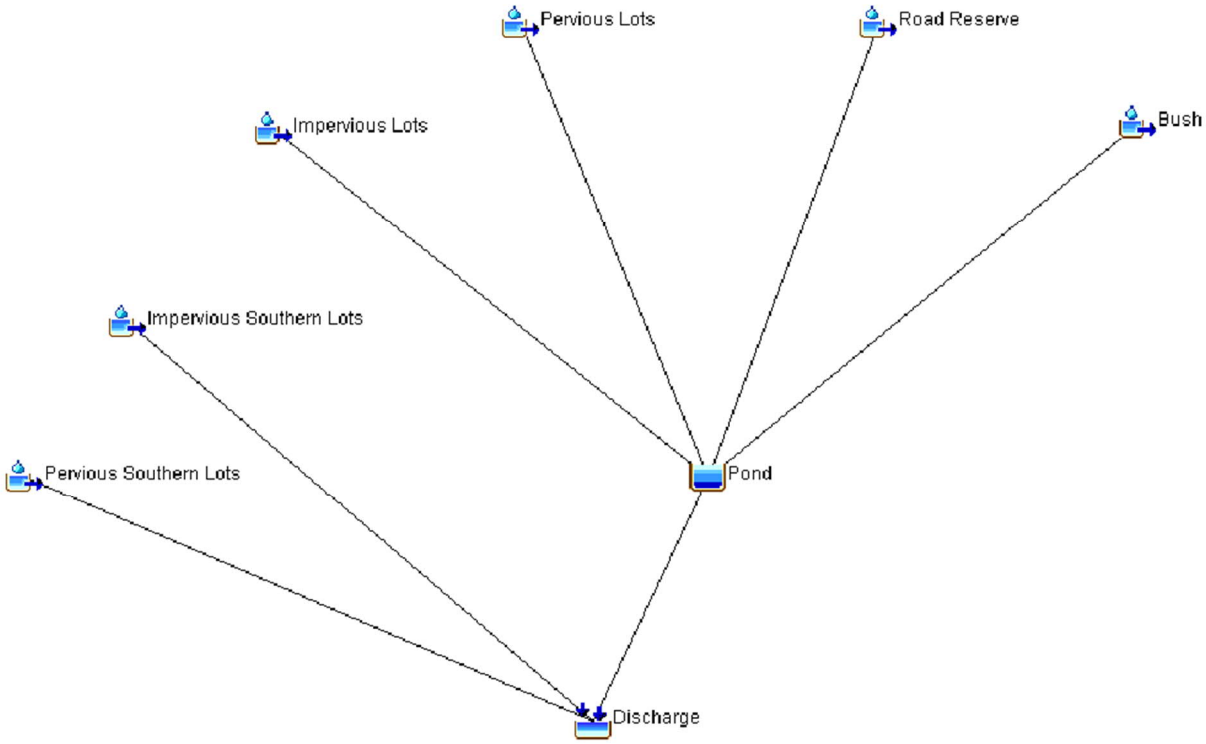
ARI	10m	20m	30m	60m	2h	6h	12h	24h	48h	72h
2	96.0	69.2	57.0	41.4	29.5	16.7	11.4	7.7	4.8	3.6
5	127.1	92.6	76.1	55.3	39.1	22.0	15.0	10.1	6.3	4.7
10	152.9	111.4	91.6	66.4	46.8	26.3	17.8	11.9	7.4	5.5
20	181.8	131.9	108.9	78.6	55.3	31.0	21.0	13.7	8.6	6.3
30	199.2	145.0	119.8	86.2	61.0	34.0	23.0	14.9	9.4	6.9
40	211.9	155.2	128.0	92.1	64.5	36.0	24.3	15.6	9.8	7.2
50	223.1	162.8	134.9	97.2	68.5	37.7	25.6	16.2	10.3	7.5
60	231.6	169.4	140.4	101.5	71.1	39.1	26.5	16.8	10.6	7.7
80	246.2	180.2	149.4	107.1	75.6	41.5	28.1	17.7	11.1	8.1
100	257.8	189.0	156.0	111.8	78.5	43.7	29.5	18.4	11.5	8.4

APPENDIX B
HEC HMS MODEL
SCHEMATICS
AND OUTPUTS

PRE DEVELOPMENT SCHEMATIC



POST DEVELOPMENT SCHEMATIC



2-YEAR ARI STORM PRE DEVELOPMENT RESULTS

Project: 67 Dip Road, Kamo Simulation Run: 2yr pre

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 10:33:24
Basin Model: Pre development
Meteorologic Model: 2yr pre
Control Specifications: 24hr

Show Elements: All Eleme... Volume Units: (●) MM ( ) 1000 M3 Sorting: Hydrolo...

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Pervious Grassed Area	0.066955	0.3576	01Jan2000, 08:00	85.628
Discharge	0.066955	0.3576	01Jan2000, 08:00	85.628

2-YEAR ARI STORM POST DEVELOPMENT RESULTS

Project: 67 Dip Road, Kamo Simulation Run: 2yr post
Reservoir: Pond

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 11:03:12
Basin Model: Post development
Meteorologic Model: 2yr post
Control Specifications: 24hr

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Inflow: 0.5865 (M3/S)
Peak Discharge: 0.3159 (M3/S)
Inflow Volume: 147.639 (MM)
Discharge Volume: 129.064 (MM)
Date/Time of Peak Inflow: 01Jan2000, 08:00
Date/Time of Peak Discharge: 01Jan2000, 08:25
Peak Storage: 1.925 (1000 M3)
Peak Elevation: 146.645 (M)

Project: 67 Dip Road, Kamo Simulation Run: 2yr post
Sink: Discharge

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 11:03:12
Basin Model: Post development
Meteorologic Model: 2yr post
Control Specifications: 24hr

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Discharge: 0.3537 (M3/S)
Volume: 131.179 (MM)
Date/Time of Peak Discharge 01Jan2000, 08:15

10-YEAR ARI STORM PRE DEVELOPMENT RESULTS

Project: 67 Dip Road, Kamo Simulation Run: 10yr pre

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 10:33:29
Basin Model: Pre development
Meteorologic Model: 10yr pre
Control Specifications: 24hr

Show Elements: All Eleme... Volume Units: (●) MM ( ) 1000 M3 Sorting: Hydrolo...

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Pervious Grassed Area	0.066955	0.6912	01Jan2000, 08:00	158.231
Discharge	0.066955	0.6912	01Jan2000, 08:00	158.231

10-YEAR ARI STORM POST DEVELOPMENT RESULTS

Project: 67 Dip Road, Kamo Simulation Run: 10yr post
Reservoir: Pond

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 11:04:32
Basin Model: Post development
Meteorologic Model: 10yr post
Control Specifications: 24hr

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Inflow: 0.9758 (M3/S)
Peak Discharge: 0.6205 (M3/S)
Inflow Volume: 243.893 (MM)
Discharge Volume: 224.697 (MM)
Date/Time of Peak Inflow: 01Jan2000, 08:00
Date/Time of Peak Discharge: 01Jan2000, 08:20
Peak Storage: 2.543 (1000 M3)
Peak Elevation: 147.062 (M)

Project: 67 Dip Road, Kamo Simulation Run: 10yr post
Sink: Discharge

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 11:04:32
Basin Model: Post development
Meteorologic Model: 10yr post
Control Specifications: 24hr

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Discharge: 0.6892 (M3/S)
Volume: 226.888 (MM)
Date/Time of Peak Discharge 01Jan2000, 08:15

100-YEAR ARI STORM PRE DEVELOPMENT RESULTS

Project: 67 Dip Road, Kamo Simulation Run: 100yr pre

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 10:33:33
Basin Model: Pre development
Meteorologic Model: 100yr pre
Control Specifications: 24hr

Show Elements: All Eleme... Volume Units: (●) MM ( ) 1000 M3 Sorting: Hydrolo...

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Pervious Grassed Area	0.066955	1.2464	01Jan2000, 08:00	277.736
Discharge	0.066955	1.2464	01Jan2000, 08:00	277.736

100-YEAR ARI STORM POST DEVELOPMENT RESULTS

Project: 67 Dip Road, Kamo Simulation Run: 100yr post
Reservoir: Pond

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 11:03:57
Basin Model: Post development
Meteorologic Model: 100yr post
Control Specifications: 24hr

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Inflow: 1.5850 (M3/S)
Peak Discharge: 1.1212 (M3/S)
Inflow Volume: 395.086 (MM)
Discharge Volume: 374.280 (MM)
Date/Time of Peak Inflow: 01Jan2000, 08:00
Date/Time of Peak Discharge: 01Jan2000, 08:15
Peak Storage: 3.356 (1000 M3)
Peak Elevation: 147.611 (M)

Project: 67 Dip Road, Kamo Simulation Run: 100yr post
Sink: Discharge

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 24Nov2021, 11:03:57
Basin Model: Post development
Meteorologic Model: 100yr post
Control Specifications: 24hr

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Discharge: 1.2415 (M3/S)
Volume: 376.633 (MM)
Date/Time of Peak Discharge 01Jan2000, 08:10

APPENDIX C
LDE DRAWINGS

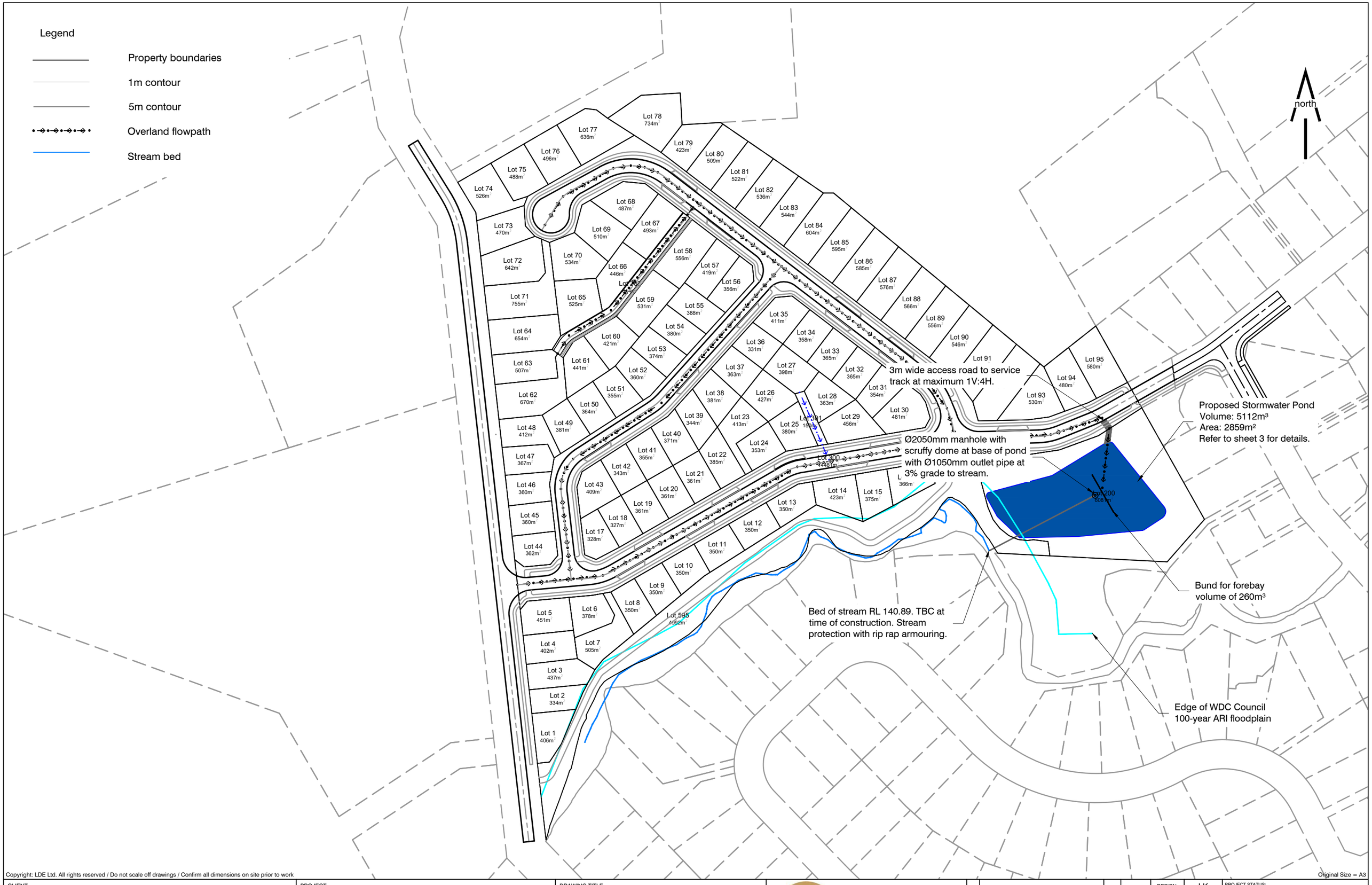
Project Number: 19103
Project Office: Warkworth
Project Manager: Aaron Holland

Stormwater Pond Drawings for

67 Dip Road, Kamo

Whangarei

CONTENTS				
SHEET	DESCRIPTION	ISSUE DATE	STATUS	REVISION
1	Stormwater Pond Location	24/11/2021	For Information	B
2	Stormwater Pond Catchment Areas	24/11/2021	For Information	B
3	Stormwater Pond Section	16/11/2021	For Information	A



Original Size = A3

CLIENT
Onoke Heights Limited

PROJECT
67 Dip Road Subdivision
Kamo, Whangarei

DRAWING TITLE
Stormwater Pond Location

LDE LAND DEVELOPMENT & ENGINEERING LTD.

No.	REVISION	BY	DATE
B	Updated lot boundaries	LK	24/11/2021
A	For Information	LK	16/11/2021

DESIGN:	LK
DRAWN:	LK
DATE:	16/11/21
CHECKED:	AH
SCALE A3:	1:1750

PROJECT STATUS: For Information
PROJECT: 19103
SHEET: 01 of 03
DRAWING No: C1
REV: B

Legend

- Property boundaries
- 1m contour
- 5m contour
- Overland flowpath
- Stream bed

north

Catchment A 9375m² (Bushed area outside of development)

Catchment B
26,014m²

Catchment D
14,481m²

Catchment C
10,294m²

Catchment E 6177m²

Catchment G 4992m² (Not included in pond design)

Original Size = A3

CLIENT
Onoke Heights Limited

PROJECT
67 Dip Road Subdivision
Kamo, Whangarei

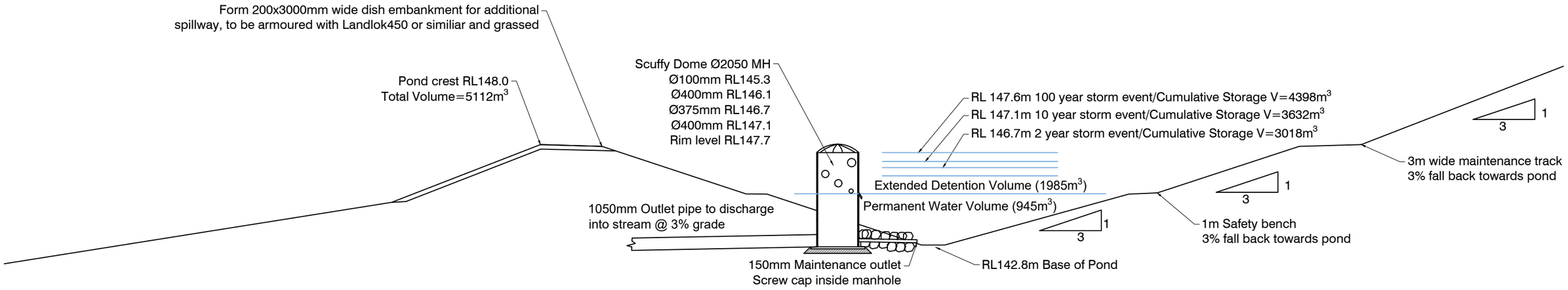
DRAWING TITLE
Stormwater Pond Catchment Areas

LDE LAND DEVELOPMENT & ENGINEERING LTD.

No.	REVISION	BY	DATE
B	Updated catchment areas	LK	24/11/2021
A	For Information	LK	16/11/2021

DESIGN:	LK
DRAWN:	LK
DATE:	16/11/21
CHECKED:	AH
SCALE A3:	1:1750

PROJECT STATUS: For Information
PROJECT: 19103
SHEET: 02of 03
DRAWING No: C2
REV: B



Original Size = A3

CLIENT
Onoke Heights Limited

PROJECT
67 Dip Road Subdivision
Kamo, Whangarei

DRAWING TITLE
Stormwater Pond Section

LAND DEVELOPMENT & ENGINEERING LTD.

No.	REVISION	BY	DATE
A	For Information	LK	16/11/2021

DESIGN:	LK
DRAWN:	LK
DATE:	16/11/21
CHECKED:	AH
SCALE A3:	NTS

PROJECT STATUS: For Information

PROJECT: 19103

SHEET: 03 of 03

DRAWING No: C3

REV: A

Appendix 6

Geotechnical Report

GEOTECHNICAL INVESTIGATION REPORT

FOR

PROPOSED RESIDENTIAL DEVELOPMENT

SECTION 1 SO 65970, DIP ROAD, KAMO, WHANGAREI

Project Reference: 19103
2 July 2021

CONTENTS

1 INTRODUCTION

LDE Ltd was engaged by Onoke Heights Limited to undertake a geotechnical suitability assessment for a proposed residential development at Section 1 SO 65970, Dip Road, Kamo, Whangarei (Lot 1).

The proposed development is expected to comprise approximately 70 moderate to high intensity residential lots, generally ranging from 400m^2 to 700m^2. The subdivision will be serviced by a vested public road through the site, connecting Dip Road to Tuatara Drive, along with a series of .

The purpose of the investigation was to determine the nature of the ground beneath the site, assess the geotechnical hazards posed to the development, and to provide engineering recommendations for site development and future dwelling construction. The assessment of the site has been undertaken to satisfy the requirements of the Resource Management Act and Whangarei District Council Environmental Engineering Standards (WDC EES).

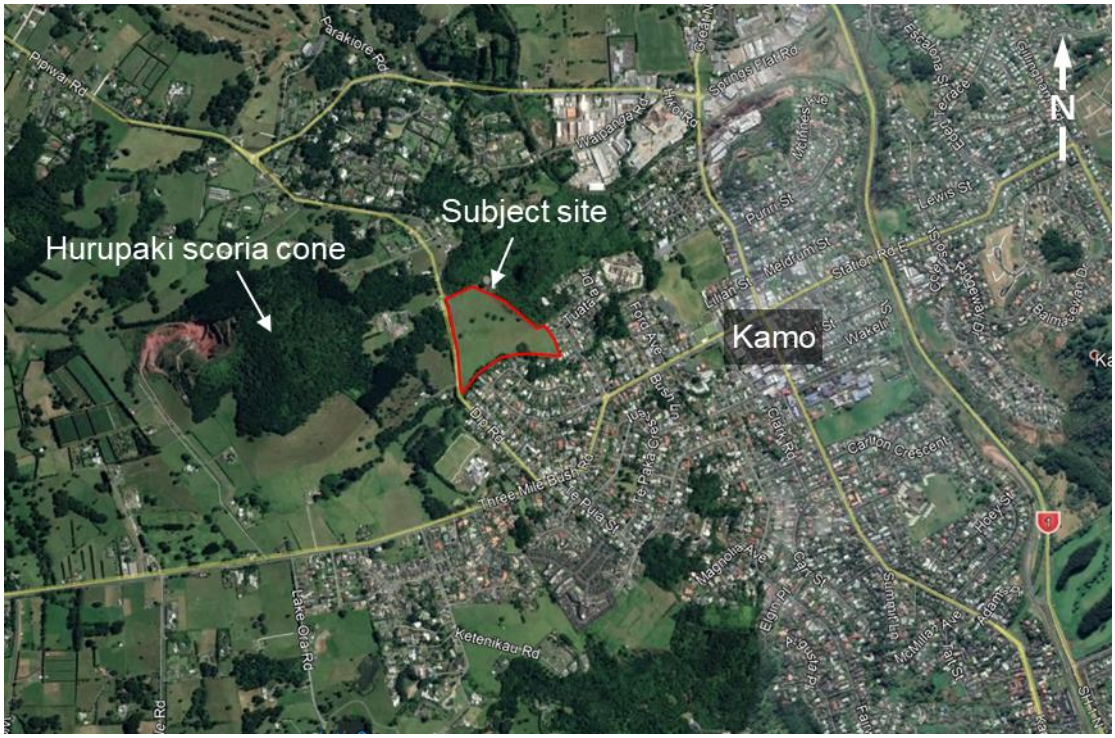


Figure 1: Location of the subject site (source: Google Earth).

2 SITE SETTING

2.1 Desktop Review

The site is legally described as Section 1 SO 65970, comprising an area of 6.87ha on the eastern side of Dip Road, approximately 5.5km northwest of Whangarei CBD. The site is

bordered by residential areas to the south and south-west, with bush to the immediate north and north east.

The site is positioned on the lower south-western slopes of an un-named hill and broadly comprises south and south-west facing slopes.

The site is entirely in pasture with some scattered native trees through the middle of the site. A small stream flows east-ward along the southern site boundary, with the banks covered in native bush.

The site is mapped entirely as low instability hazard on the Whangarei District Council Hazard Maps. The slopes to the northeast of the site are mapped as moderate instability hazard. The only high hazard area identified in the vicinity of the site is a large, narrow gully landform to the northeast of the site as shown on Figure 2.

The lower edge of the site is mapped as flooding prone, however this is confined to the banks of the stream so does not have any effect on the subject site.

No other hazards are mapped as affecting the subject site on either the WDC or NRC hazards maps.

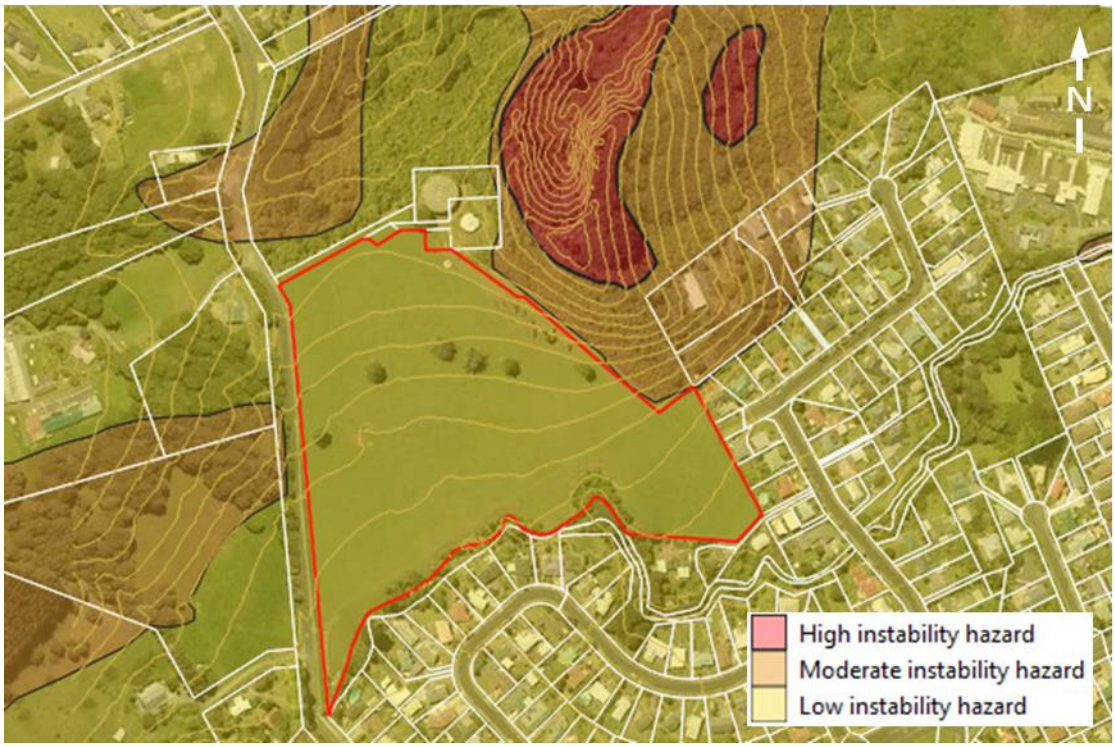


Figure 2: Stability hazard map of the subject site (data from WDC). Subject site outlined in red.

2.2 Historical Aerial Imagery

Historical aerial images of the site have been reviewed dating back to 1942. Images have been sourced from Retrolens and more recent satellite imagery has been sourced from Google Earth.

1942

The site shown to be in similar condition to existing. The bulk of the site is in pasture, with the steeper areas to the northeast being in low scrub.

Notably, a clear track is present leading into the gully feature (high instability hazard area indicated on Figure 2) directly from the railway line to the northeast. The gully itself is in scrub and the track appears overgrown. This appears to indicate that the gully is more likely a disused scoria quarry. Given the age at state of this feature by 1942, it is inferred that this was likely used in the early 1900s and was perhaps a borrow area for the construction of the North Auckland railway line.

1979

The site appears lightly overgrown by this time but no other significant changes are noted. By this time the reservoir has been constructed on the crest immediately north of the site.

Google Earth (2002 – Present)

The site was cleared prior to 2002 and appears to have remained in open pasture since this time.

In 2012 a large tree was cleared from the central-western area of the site, creating a small hollow in the slope that remains in the present topography.

No other changes are noted through the series of available images.

2.3 Published Geology

The 1:250,000 geological map of the region[1] shows the site as being underlain by Kerikeri Volcanic Group scoria across the northern edge of the site, with basalt lava flows to the south occupying the bulk of the site (Figure 3).

The geomorphology of the site is broadly consistent with the mapped geology, except that the boundary of the scoria cone is expected to align with the steepening slope, further east within the site.

[1] Edbrooke, S.W.; Brook, F.J. (compilers) 2009: Geology of the Whangarei area : scale 1:250 000. Lower Hutt: GNS Science. Institute of Geological & Nuclear Sciences 1:250,000 geological map 2. 68 p. + 1 folded map

It appears from the geological map and the wider geomorphology, that the scoria cone to the north-east of the site is a parasitic cone stemming from Hurupaki to the west of the site.

The NRC 'Managing Northland Soils' Map shows the site as being underlain by YO – Waiotu friable clay. The soils map does not recognise the scoria cone as mapped on the GNS geology map. The soils are described as well to moderately drained.

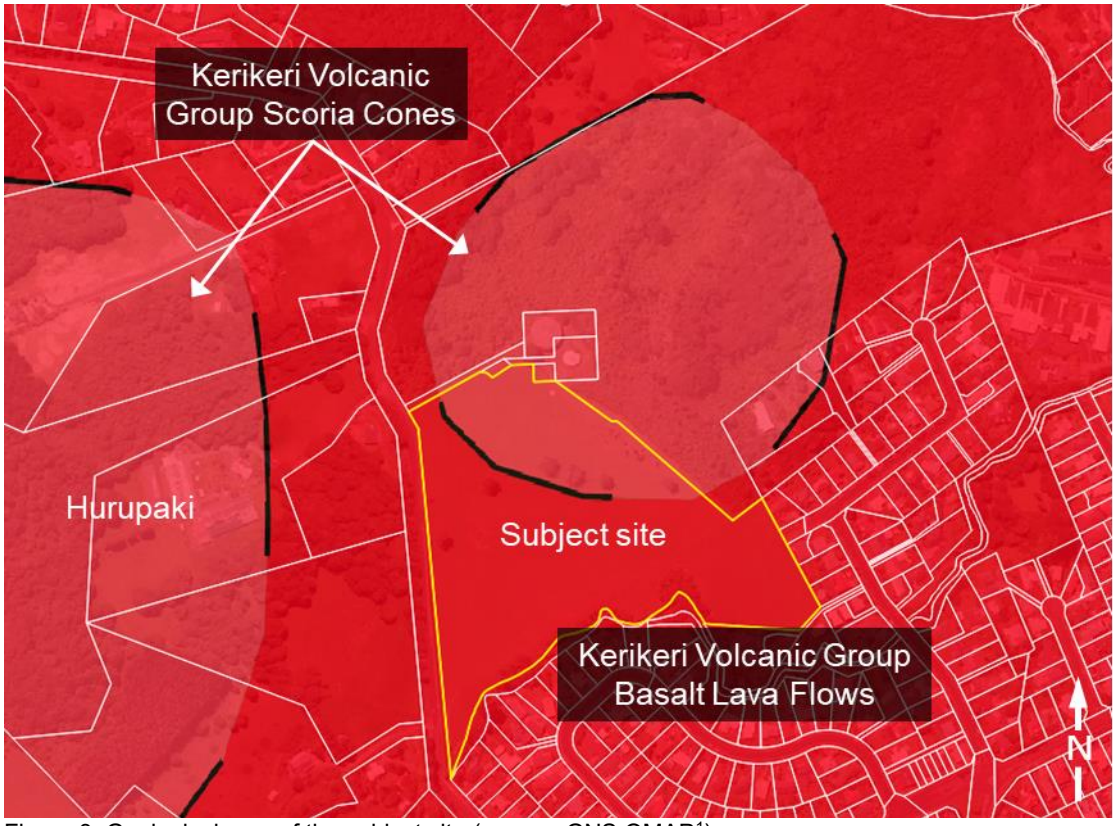


Figure 3: Geological map of the subject site (source: GNS QMAP[1]).

2.4 Site Characteristics

The topography of the site is shown on Figure 4 below, and the on the attached geotechnical investigation plan.

The northern half of the site broadly comprises a broad south facing slope of up to 1V:5H (11°). The slope is generally linear and converging towards the south. Towards the northern boundary the slopes flatten off.

The north-eastern edge of the site borders the mapped scoria cone, with the side slope of this feature forming a steep bank at the boundary, with slopes up to approximately 1V:2H (27°) (Figure 4). A rough track is cut along of the top of this slope, appearing to follow the alignment of the watermains which pass through the site.

The southern part of the site broadly comprises waning slopes which flatten towards the stream at the southern boundary of the site. The stream bank is generally a low, shallow slope. Towards the east the stream becomes more deeply incised, with an arcuate slope some 8m high at 1V:2H (27°) extending into the site at this point (Figure 5).

The stream bed appears to expose in situ basalt in places however this is more likely to be very large, displaced boulders.

Areas of erosion are noted within the steep slope at the edge of the scoria cone, and at the crest of the arcuate slope above the stream. This likely the result of livestock tracking and digging, rather than natural erosion.

Figure 4: Topographic plan of the subject site with notable site features identified. Contours shown at 1m interval with 5m major contours, falling from north to south through the site. See attached investigaiton for full scale plan.

Figure 5: Photo showing the steep slope at the north-eastern boundary.

Figure 6: View east over the crest of the arcuate stream bank slope, showing area of erosion or livestock tracking.

3 GROUND CONDITIONS

3.1 Subsurface Investigations

Our investigations of the site included the following work:

- 23 hand auger boreholes (HA01 to HA23) taken to a target depth of 3-5m or refusal, with measurements of undrained shear strength taken at 200mm increments using a shear vane.
- 13 Scala penetrometer tests carried out from the base of, or concurrent with select hand auger boreholes, to depths of up to 9.8m.

- 5 additional Scala penetrometer tests to 1.0m depth, carried out across the site for the purpose of characterising road subgrade conditions (RP01 to RP05).
- 7 Cone Penetration Tests (CPTu) tests to refusal, at depth of 7.7m to 18.0m below ground level (CPT01 to CPT07).
- 1 Flat Plate Dilatometer test to refusal and one Seismic DMT test (DMT01 and SDMT01/A).
- 1 rotary cored machine borehole to 14.8m depth (BH01).
- Laboratory triaxial testing of undisturbed push tube samples from BH01 and CPT01 targeted to zones of low strength ground.
- Allophane content testing on the same samples.

Initial shallow testing (hand augers and Scalas) was carried out in November 2019. Deep testing (CPTs, DMTs and MBH01) was undertaken in February 2021.

The investigations are summarised in Table 1 and 2 below.

Table 1: Summary of hand auger investigation. **Bold** indicates that refusal was met, all other boreholes and Scalas were taken to target depth.

Point ID	Hole depth (m)	Scala depth (m)	Depth to weathered airfall deposit (m)	Volcanic alluvium
HA01	5.00	-	1.20	-
HA02	5.00	-	1.50	-
HA03	5.00	6.80	1.10	-
HA04	3.00	**4.90**	1.70	-
HA05	3.00	4.85	1.10	-
HA06	3.00	5.80	1.70	-
HA07	3.20	-	2.50	-
HA08	**4.00**	9.80	1.50	-
HA09	5.00	-	1.80	-
HA10	3.00	-	-	-
HA11	5.00	-	3.30	-
HA12	3.00	4.85	1.50	-
HA13	5.00	-	1.90	-
HA14	3.00	**5.85**	1.40	-
HA15	3.00	**4.20**	-	✔
HA16	3.00	**3.90**	-	✔
HA17	**0.50**		-	✔

HA18	3.00	**3.15**	1.40	-
HA19	5.00	9.80	1.00	-
HA20	**3.70**	-	1.80	-
HA21	3.00	4.75	1.00	-
HA22	**3.00**	-	1.90	-
HA23	**2.50**	**3.25**	-	✔

Table 2: Summary of deep testing. All units are inferred from strength profiles at CPT and DMT tests.

Point ID	Depth (m)	Depth to weathered airfall deposit (m)	Depth to basalt (m)	Groundwater depth (m)
CPT-01	16.39	2.00	16.3	-
CPT-02	12.39	1.90	12.3	-
CPT-03	7.71	1.80	-	-
CPT-04	12.67	1.70	12.6	-
CPT-05	18.02	3.40	18	-
CPT-06	16.29	2.10	16.2	3.80
CPT-07	13.29	1.40	13.2	-
DMT-01	11.8	1.80		n/a
SDMT-01/A	11.8	1.60		n/a
MBH-01	14.8	2.25	10.6	dry

3.2 Ground Conditions

In summary, our investigation found the site to be predominantly underlain by volcanic soils associated with the Kerikeri Volcanic Group, with in situ **basalt** encountered or inferred from below 10-18m depth across the site.

The soils broadly comprised an upper unit of ash-derived **residual soil**, to 1.0 to 3.0m depth, and an underlying unit of **weathered airfall deposits** (lapilli tephra).

Volcanic clay and silt **alluvium** was encountered at several test sites around the southern edge of the site, adjacent to the stream.

These materials are described in more detail below.

3.2.1 Topsoil

Topsoil was encountered across the site, to depths of 0.1m to 0.2m, comprising generally dry to moist, slightly organic silt.

3.2.2 Alluvium

Alluvium was encountered across the lower edge of the site adjacent to the stream, within the gently sloping to flat areas (HA15 – HA17, HA23). This comprised generally very stiff to hard, low plasticity, moist, silt and clayey silt soils with variable sand and gravel. Undrained shear strengths were generally >150kPa and the soils were generally insensitive. Some low strengths (21kPa, 58kPa) were encountered near the surface at HA15, although these may be affected by gravels.

3.2.3 Residual soil

Ash-derived residual soil of the Kerikeri Volcanic Group was encountered below topsoil across most of the site, to depths ranging from 1.0m to 3.3m . This unit comprised variable low to high plasticity, very stiff to hard, homogenous clay and silt soils. Undrained shear strengths through this unit were generally >150kPa across most test sites, and the soils were typically insensitive to moderately sensitive.

CPT testing in this unit generally encountered consistent clayey silt and silty clay behaviour type with qc values of 2-4MPa (inferred undrained shear strength generally 150 to >200kPa).

3.2.4 Weathered airfall deposits (lapilli tephra)

Weathered airfall deposits were encountered below the residual ash soils, from between 1.0m and 3.3m depth.

This unit comprised predominantly low plasticity or non-plastic, moist to wet silt with variable sand, clay and gravel. Gravels consisted of generally very weak, fine to coarse basalt scoria and fine accretionary ash lapilli.

The soils notable had a greasy feel and showed and apparent moisture increase on disturbance, indicative of significant allophane content.

Vane shear strengths within this unit were highly variable but generally in the range of 50-100kPa, and typically showed moderate to very sensitive behaviour. This unit is marginally cohesive which may significantly influence the suitability of vane testing, particularly were outlying results were found.

Scala penetrometer testing in this unit generally indicated very loose soil, with test values typically around 0.5 blows per 50mm. Although some improvement with depth was noted in deeper Scalas this is likely to be influenced by skin friction and loss of efficiently with depth, rather than indicating increasing soil strength or density.

Scala refusal was met at some test sites, likely due to striking a larger, competent basalt boulder within the soil profile.

CPT testing through this unit showed highly variable cone resistance and sleeve friction. Lower-bound values through the soil profile generally indicated very low soil strength at most test sites (qc = 0.25 to 0.5MPa, inferred undrained shear strengths of 20-40kPa). DMT testing was generally consistent with CPT results, indicating similarly low shear strengths.

3.2.5 Basalt

Slightly weathered, moderately strong to strong basalt rock was encountered in MBH01 from 10.6m depth. This is expected to be intact lava flow of the Kerikeri Volcanic Group.

Basalt is inferred from below the depth of refusal at all CPT tests, possibly with the exception of CPT03 which refusals much shallower than the other tests, and may have struck a boulder within the tephra deposit.

One SPT test was carried out at the base of MBH01, refusing with no penetration (unable to seat), confirming high intact rock strong.

3.3 Laboratory Testing

Two consolidated undrained triaxial compression tests were carried out on from samples collected at 3.5m in CPT01 and 3.0m in BH01, to further characterise the strength of the weathered airfall deposit in areas where very low strength was indicated by in situ testing. Summary results are tabulated below.

Table 3: Summary of triaxial test results. Laboratory reports appended.

Test site	Sample depth (tested)	Total stress		Effective stress		Bulk density* (kN/m^3)	Dry density (kN/m^3)
		Phi (°)	C (kPa)	Phi' (°)	C' (kPa)		
BH01	3.0m (3.22-3.35)	10	22	30	11	1.38	0.67
CPT01	3.5m (3.67-3.84)	11	28	28	16	1.35	0.68

*Note bulk density is following saturation of the sample and not representative of natural condition.

The results show relatively high soil strength when compared to the very low in-situ testing results. Bulk and dry density are notably very low.

Allophane presence testing (non-quantitative) was carried out on both samples, and indicated allophane content of 5-7%.

3.4 Material Strength Parameters and Discussion

The following material strength parameters have been adopted as part of our assessment, based on the in situ and laboratory testing carried out, and our previous experience in similar materials.

The strength testing appears to show that conventional in-situ tests do not accurately predict the strength of the lapilli tephra soils (weathered airfall deposits). It is expected that this is the result of the very low soil density and open soil structure, which allows particles to redistribute before shearing under high point loads, consistent with the behaviour of collapsible soils. As a result, we expect that the CPT, DMT and DCP results significant under-predict the soil mass strength as it relates to slope stability and foundations. The triaxial tests are considered representative of lower bound in-situ effective strength parameters for this unit.

Table 4: Summary of adopted material strength parameters.

	Characteristic test values			Adopted parameters			
Unit	Shear vane (kPa)	DCP (bl/50mm)	CPT qc (MPa)	Unit weight (kN/m^3)	Su (kPa)	Eff. cohesion C' (kPa)	Eff. friction angle, Φ' (°)
Residual soil/ alluvium (very stiff to hard CLAY/SILT)	150	-	2-4	17.5	150	5	30
Weathered airfall deposits (sensitive SILT with sand and gravel)	50 - 100	0.25 - 0.5		13	50	10	30
Basalt	-	-	>50	26	-	-	-

3.5 Soil Moisture Profile and Groundwater Conditions

The soil profile across the site appears to be well draining with the near surface soils being generally dry to moist.

The allophonic soils encountered at depth across the site were found to wet up significantly on disturbance, but generally as a moist appearance when undisturbed. It is understood that this is the result of water being released from allophane as they break down.

Groundwater was encountered at CPT06 at 3.8m depth. All other CPTs were dipped at found to be dry. The machine borehole (MBH01) was dipped shortly after completion of drilling and was found to be dry, indicating both a low water table (>15m) and very rapid drainage through the basalt resulting in loss of drilling water.

Based on the observations of surface and groundwater, and the nature of the soils and rock beneath the site, it is expected that the groundwater table is near-flat lying through the site at approximately RL145 – RL150m. The water table is therefore expected to be relatively shallow across the lower edge of the site and at significant depth through the more elevated areas.

Given the free draining nature of the deeper soils and rock, the steady slope through the site, and the lack up upslope catchment, it is expected that the groundwater table is fairly steady through seasons and is unlikely to be significantly influence by extreme rainfall events. A shallow wetting front may develop during period of prolonged rainfall, however this is expected to be confined to the upper residual ash soils.

3.6 Seismic Subsoil Category and Hazard

The seismic subsoil category has been assessed in accordance with NZS1170.5 to support seismic hazard assessment and the design of future structures at the site.

Based on apparent strengths through the upper soil profile, as derived from *in situ* shear vane, Scala penetrometer, and CPT testing, the site would appear to be consistent with Class D or E, soft or very soft soil sites.

However, triaxial testing indicates relatively high strength through the same soils, and based on the inferred undrained shear strength derived from triaxial tests the site would be considered Class C, shallow soil site.

The shear wave velocity profile from SDMT01/A shows V_s values of 180 to 280m/s through the upper 10m of the soil profile. On the assumption that V_s values through the underlying basalt are high (i.e. >1500m/s), it can be inferred that the overall $V_{s\,30}$ value is likely to be greater than 360m/s, indicating site Class B. However, the depth and continuity of the basalt has not been proven, and not consideration of the underlying material has been given (likely to be Northland Allochthon mudstone).

On the balance of the site observations and inferred underlying geology at the site, a seismic subsoil category of Class C should be adopted for design purposes.

For IL2 structures (dwellings and habitable sheds) and for the design of residential retaining and earth structures, a peak ground acceleration of 0.13g for the 500-year return period ULS event, and 0.03 for the 25-year return period, SLS event should be adopted.

4 NATURAL HAZARDS AND GROUND DEFORMATION POTENTIAL

4.1 General

This section summarises our assessment of the natural hazards within the property as generally defined in Section 106 of the Resource Management Act (1991 and subsequent amendments) and Section 71 of the Building Act (2004), and the potential risk that these present to the proposed development in terms of vertical and lateral ground deformation.

4.2 Slope Instability

The site is entirely mapped as low instability hazard, while the steep scoria cone slopes above the north-east boundary are mapped as moderate instability (see Figure 2).

This is broadly consistent with our initial appraisal of the site, with the exception that

- The steep scoria cone slopes extend further downslope than the mapped moderate instability area. The steep slopes extending into the site through the north-eastern boundary should be considered moderate hazard in line with the slopes above.
- The steep arcuate slope area above the stream (at the location of HA19) appears to be of similar stability hazard to the scoria cone slopes, and should be considered as moderate hazard.

Qualitative assessment of the stability hazard through theses areas has been undertaken based on the findings of the subsurface investigation, laboratory testing, and geomorphic study. These areas are photographed in Figure 5 and 6 respectively, and are broadly delineated by the white dashed line on Figure 4.

4.2.1 Scoria Cone Slope

This slope appears to be underlain by a similar profile as that throughout the site, comprising a surficial, residually weathered fine ash deposit overlying sensitive silt soils (weathered lapilli tephra). The upper slope, above the site boundary, is expected to be underlain by more competent (higher strength) weathered scoria, overlain by similar weathered ash soils. The slope profile and engineering geological cross section are shown on the attached drawing in Appendix A.

The slope presents no evidence of recent or historical instability. The gully landform (expected to be a man-made feature through historical quarrying) to the north of the slope, comprises side

slopes at near-vertical angles, averaging 2V:1H (~65°), and show no evidence of historical failure. The ground conditions in this area are expected to be consistent with those extending into the subject site.

It can therefore be inferred that at the natural slope angle of up to 1V:1.5H, but limited to 1V:2H within the site, the factor of safety is significant higher than minimum requirements for residential development, at least with respect to deep seated failure. As a result we consider that the bulk earthworks likely to be associated with the development will have negligible effect on the deeper seated (or global) factor of safety.

Shallow seated instability is of greater concern, where minor cuts into the toe of the slope are carried out, particularly where these extend below ~1.5m depth and expose lower strength tephra soils.

It is recommended that any cuts into the toe of the scoria cone slope be support by engineered retaining structures.

4.2.2 Stream Bank Slope

This slope affects a relatively small areas of the site against the southern boundary. The slope itself is largely obscured in bush, below the fenceline, however the head of the slope is noted by an area of minor erosion and terracettes. The erosion in this area is likely the result of livestock damage.

The testing at the head of the area (HA19) showed a deep profile of tephra soils extending to below the base of the slope. Low strength is indicated by Scala testing to depth, however the soils are expected to be similar to those subject to triaxial testing, and are therefore expected to be relatively strong (and highly cohesive in particular).

The slope is steep (averaging 1V:2H, locally steeper), and appears to have been formed through stream bank erosion and the stream has incised its path below the site. As a result, it is inferred that the present slope angle is representative of its stable angle of repose (i.e. factor of safety just above 1). The establishment of bush over the slope may improve this slightly.

In any case, we consider the factor of safety in the area immediately above this area to be below the generally accepted criteria for building sites.

Without further specific assessment, we consider that a minimum building setback of 5m from slopes steeper than 1V:3H should be adopted within this area to mitigate the risk of under-slips at the edge of building sites. To avoid reducing the factor of safety of the slope, no fill should be placed within 3m of slopes steeper than 1V:3H.

4.2.3 Remainder of Site

The bulk of the site comprises gentle to moderate slopes which are considered stable. The stability is not expected to be significantly influenced by development earthworks or the loads imposed by residential buildings, provided these works are carried out in accordance with the recommendations given in Section 5 below.

4.3 Compressible Ground and Consolidation Settlement

With the exception of surficial topsoil, no compressible materials were encountered during the site investigation. The subsoils may be considered as incompressible under the expected loads of moderate earth fills and residential dwellings, subject to the recommendations given in Section 5 below.

4.4 Collapsible Soil Behaviour

The weathered airfall deposits (lapilli tephra) underlying most of the subject site, appears to display collapsible soil behaviour.

Triaxial testing appears to indicate high soil strength under confined loading conditions, however, where the soil is unconfined (such as in cut batters), or subject to very high point loads (such as highly loaded end bearing piles), much lower effective strength should be expected.

It is expected that this can be managed through careful earthworks and foundation design in accordance with the recommendations given in Section 5 below.

4.5 Ground Shrinkage and Swelling Potential

Plastic soils can be subject to shrinkage and swelling in response to seasonal changes in moisture content. The magnitude of shrinkage and swelling is a function of clay content and clay reactivity within the upper soil profile (generally within 1.5m of finished ground level).

The near surface soils (residual soil) were found to have variably low to high plasticity. The soils are derived from fine ash which is known to weather to form reactive smectite clays, and in our experience is consistent with moderately to highly expansive soils (i.e. Class M or H1 in terms of AS2870 (2011).

The underlying silt soils (weathered airfall deposits) appear to have low clay content and low plasticity. These should generally be considered as slightly expansive (Class S) unless specific testing shows that a lesser site class is appropriate.

The expansivity of these soils is somewhat mitigated by their favourable drainage properties. While the shallow soils can become extremely dry during periods of drought, extreme wetting is unlikely to occur, particularly post-development where infiltration of surface water is significantly limited by impervious areas.

Expansive soil characteristics can be exacerbated by earthworks, where the moisture content of both cut and filled ground is put out of equilibrium for a period of time until a stable state is reached.

Conventional shallow foundations should be designed for the appropriate site class depending on the finished ground level and underlying soils specific to each building platform. This should be confirmed as part of subdivision completion reporting and site specific assessment.

4.6 Tree Root Deformation

Several large trees are present across the upper part of the site. Their presence can have a significant effect on foundation perform, particularly with respect to expansive soils.

Their effect on expansive soils should be considered wherever foundations are laterally within 1.5x the mature tree height. This should be considered regardless of whether the tree remains or recently removed.

Root barriers (chemical or physical) should be considered wherever foundations are within the dripline of the tree.

Where trees are to be removed, care should be taken to ensure stumps are completely dug out and the resulting cavity is backfilled with well compacted (engineered) hardfill.

4.7 Conclusions

From our assessment of the natural hazard and ground deformation risks presented to the proposed development we consider that a building can be safely located on the site, provided that the recommendations given in Section 5 are adhered to.

5 ENGINEERING RECOMMENDATIONS

5.1 Earthworks

Earthworks for the development are expected to include large-scale cut to fill operation to form level building platforms, roads and stormwater ponds. The earthworks should be carried out in accordance with the recommendations below.

5.1.1 General Design

It is recommend that the finished ground level be designed to minimise deep cuts as far as possible (where deep is generally >3.0m), particularly for building areas, to avoid exposing potentially problematic allophanic and collapsible lapilli tephra. This can broadly be achieved by having building platforms near existing ground level and including a many small cut-fill platforms rather than forming larger platforms encompassing multiple lots.

It may be beneficial to import suitable clean fill to minimise earthworks volumes using site-won material. This will reduce risks associated with the issues outline below regarding the use of lapilli tephra as fill.

The earthworks design should be subject to geotechnical review prior to engineering approval.

5.1.2 Cuts

Unretained cuts up to 3.0m high are considered suitable within any gentle to moderately sloping areas through the subdivision Such cuts should be battered no steeper than 1V:2.5H, or otherwise retained.

On any slopes steeper than 1V:4H but not steeper than 1V:3H, unretained cuts should be limited to 1.5m in height.

Any cuts into slopes steeper than 1V:3H (being confined to the steep area along the north-eastern boundary), all cuts should be supported by engineered retaining structures, or otherwise subject to specific assessment.

Deeper cuts into the underlying tephra may become problematic. These soils are expected to stand relatively steeply un-retained, but without confinement may not support surcharge loading (i.e. for building or filling above cut slopes), and stability may become a concern. For deeper cuts into tephra (i.e. >3-4m depth), over-cutting and then capping with cohesive fill may be required to provide confinement to these soils.

5.1.3 Earth fills

The upper ~1.0 - 3.0m of the soil profile, comprising weathered ash, is expected to be generally suitable as earth fill.

The underlying tephra soils, which are expected to have high allophane content, are less suitable. Upon reworking, these soils are expected to decrease significant in strength, become

excessively wet or saturated, and lose significant volume where high compaction forces are used.

With a specifically developed methodology supported by laboratory testing and field trials, bulk filling using the allophonic soils may be possible. It is expected that this will require spreading, discing and drying for an extended period before carefully compacting to achieve the required specification for engineered fill.

Treatment of these soils using additives (e.g. lime and cement) may be feasible depending on allophane content. However, research has shown treatment with relatively low lime addition has only a temporary effect on soil properties, and significant lime addition is required to achieve lasting improvement. Discussion of this is included in a Hiway Stabilizers research paper[2]. The allophane content appears to be high enough that it will influence treatment properties and will likely require uneconomic quantities of additives to achieve lasting results.

Alternatively, imported clean fill such as quarry strippings may be used in stead of site won material. This will reduce earthworks volumes with potentially problematic materials and reduce the overall project risk that these present.

All earth fills should be placed in accordance with NZS4431 (1989). Compaction control should generally be in terms of air voids, dry density and vane strength, but should be confirmed based on the specific materials used and laboratory standard compaction testing.

It is expected that fills can be placed up to 4m thick without specific assessment, based on the strength profile of the underlying soils. Unretained fill batters should be formed at no steeper than 1V:2.5H unless otherwise approved.

If the lapilli tephra material is used as fill, it should generally not be used to form the faces of fill batters unless otherwise approved as it will require capping layers. Clean cohesive fill (imported or residual soils) should be used for this purpose.

5.1.4 Retaining Walls

Any retaining walls constructed as part of the subdivision works should be subject to specific engineering design.

Conventional cantilevered timber pole and gravity retaining systems are considered suitable for the site. The near surface soils were generally free from any large rocks which may obstruct the drilling of pile holes.

[2] http://hiways.co.nz/assets/Uploads/allophanes-conference-paper.pdf

Retaining walls should be designed for the specific ground conditions at their locations. The material strength parameters given in Section 3.4 are considered appropriate for design.

For walls founded in cut ground on lapilli tephra soils:

- Any cantilevered pole retaining walls should allow for no lateral support for the first 1m of embedment to avoid over-loading the shallow, unconfined soil.
- Shallow bearing gravity or concrete cantilevered walls should be founded a minimum of 1.0m below cleared ground level with no reliance on the first 1.0m of embedment. Walls should be designed for a geotechnical ultimate bearing capacity of 150kPa, to limit loads on shallow unconfined tephra soils. These walls may otherwise be set within a capping layer of clean cohesive clay fill.

5.2 Restricted Building Areas

The following building restrictions are provided to ensure the development of individual lots take due account for potential slope instability and ground conditions at likely foundation depths.

- Buildings should be set back a minimum of 5m from stream bank slopes steeper than 1V:3H (18°) along the southern edge of the site, without specific geotechnical assessment and foundation design.
- Any buildings on slope steeper than 1V:4H (generally along the north-eastern boundary of the site, should be subject to specific geotechnical assessment and foundation design.

These restrictions should be reviewed and confirmed at the time of subdivision completion, to take into account any earthworks or retaining constructed as part of the development.

5.3 Foundation Design

The shallow ash soils to 2m depth are of high strength and appear favourable for standard building foundations (i.e. shallow timber piles, strip footings, raft slabs).

Where building sites are cut down onto tephra soils, foundation options will need to be considered carefully. High point loadings have the potential to cause soil collapse. As a result, we expect that foundation bearing pressures will need to be limited, particularly at shallow depth where the soil is less confined.

For preliminary design shallow bearing raft-slab or shallow pile foundations should be designed for a geotechnical ultimate bearing capacity of 150kPa. Shallow gravel rafts may be adopted to spread loads to achieve this reduced bearing pressure using conventional slab designs.

For deeper pile foundations embedded into tephra soils, piles may be designed for drained soil conditions in accordance with the NZ Building Code (B1/VM4), using the effective stress soil parameters give in Section 3.4.

Conventional raft slab type foundations are expected to be suitable, and for lightly clad single level structures on-grade construction is expected to be suitable. Where a greater bearing capacity is required (i.e. for multistorey or heavy cladding/roofing materials), undercutting and backfilling with gravel hardfill may be required to distribute foundation loads more evenly.

5.4 Roading

The ash soils at existing ground level (below topsoil) appear generally favourable to support pavements, based on the result of shallow Scalas across the site (RP1-RP5). Being of high strength and well-drained, it is expected that conventional minimum pavement depths in accordance with the WDC EES will be acceptable. Likewise engineering fills of the same material are expected to be favourable.

The underlying tephra soils show very low results under Scala testing, which is conventionally used for determination of subgrade CBR and pavement design. This is thought to be due to the collapsing nature of the soils under this type of testing.

Small strain deflection testing (i.e. light weight/falling weight deflectometer, plate load testing, benkleman beam testing) on cut in-situ tephra soils is expected to yield a more reasonable result. These soils may still fall outside the limits for minimum pavements thickness (i.e. less than 7% CBR). Thickened reinforced pavements or subgrade stabilisation may be required.

It is recommended that where earthfill is required to from pavement subgrades, use of the tephra soils is avoided entirely unless a specific methodology and subgrade testing is carried out to confirm suitability. Residual soil or imported fill should be used for the purpose.

6 OTHER CONSIDERATIONS

This report has been prepared exclusively for Onoke Heights Limited with respect to the particular brief given to us. Information, opinions and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent. LDE Ltd accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party.

This report was prepared in general accordance with current standards, codes and practice at the time of this report. These may be subject to change.

Opinions given in this report are based on visual methods, and subsurface investigations at discrete locations. It must be appreciated that the nature and continuity of the subsurface materials between these locations are inferred and that actual conditions could vary from that described herein. We should be contacted immediately if the conditions are found to differ from that described in this report.

This report should be read in its entirety to understand the context of the opinions and recommendations given.

For and on behalf of LDE Ltd

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L:\19100 to 19199\19103 67 Dip Road, Three Mile Bush\05 Reporting\19103 GIR Onoke Heights, Dip Road, Kamo.docx

APPENDIX A

GEOTECHNICAL INVESTIGATION PLAN AND CROSS SECTION

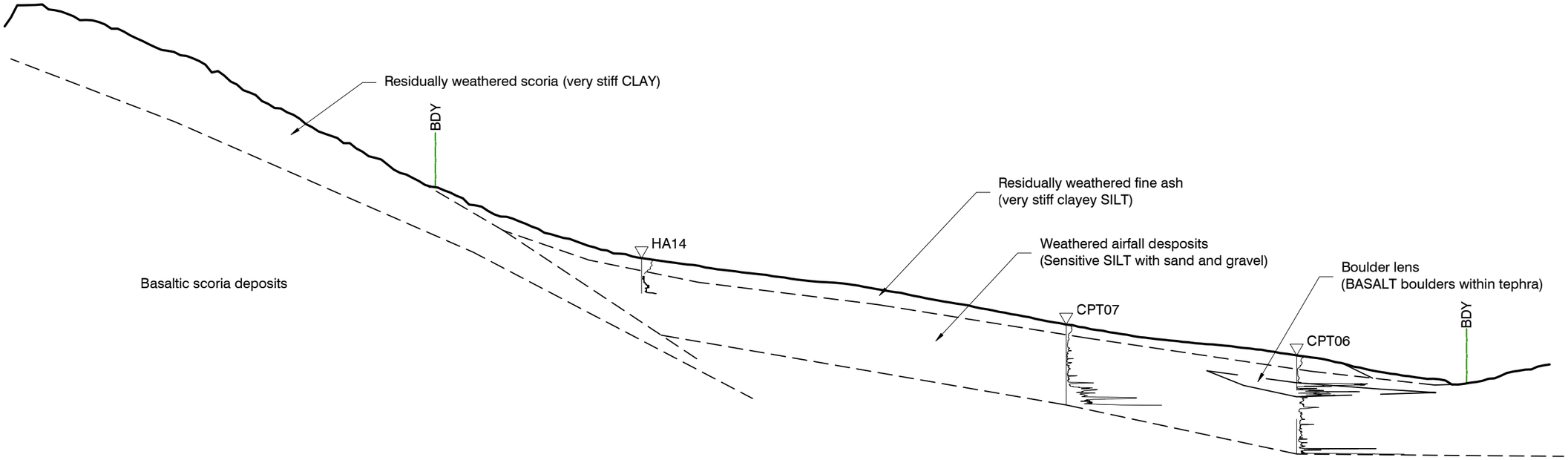
Notes:
1/ Base aerial and boundaries sourced from LINZ (cc-by 4.0)
2/ Investigaiton locations shown approximately only, located by hand held GPS.
3/ Contours derived from NRC LiDAR DEM (2018 survey).

LAND DEVELOPMENT & ENGINEERING LTD.

Geotechnical Investigation Plan

Section 1 SO 65970, Dip Road, Kamo

Project Number:	19103
Date:	25/06/2021
Drawn by:	FWH
Scale A3:	1 : 1500



Notes:
1/ Topographic section derived from NRC LiDAR DEM (2018).
2/ Investigation points show approximately, projected up to ~12m.
3/ Investigaiton data plotted for information only, see attached logs for detail profiles.
4/ All material boundaries are approximate. The wider geological boundaries and are inferred only, based on geomorphic and desktop study of the site.

0 7.5 15 22.5 30 37.5

Scale 1:750 (m)

Original Size = A3

CLIENT: Onoke Heights Ltd

PROJECT: Onoke Heights Subdivision
Section 1 SO 65970, Dip Road, Kamo
Whangarei

DRAWING TITLE: Engineering Geological Cross Section

No.	REVISION	BY	DATE
0		--	dd.mm.yy

DESIGN:	--
DRAWN:	FWH
DATE:	25.06.21
CHECKED:	--
SCALE A3:	750

PROJECT STATUS: INFORMATION
PROJECT: 19103
SHEET: 1 of 1
DRAWING No: G01
REV: 0

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APPENDIX B

GEOTECHNICAL INVESTIGATION DATA

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA01**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050591mN, 1716613mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	179.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	835

Depth (m)	Material Description	Geology
0.0	Organic SILT; brown. Dry.	Topsoil
	Clayey SILT. Very stiff; low plasticity; dry to moist.	Kerikeri Volcanic Group - Residual soil
0.5	CLAY; brownish orange. Very stiff; high plasticity; moist.	
1.0		
1.5	Clayey SILT, with some gravel, with minor sand. Stiff to very stiff; low plasticity; moist; gravel, fine to medium, very weak scoria/basalt lapilli.	Kerikeri Volcanic Group - Weathered airfall deposit
2.0	2.0m - 2.4m: Clayey SILT; brownish orange. Very stiff; moist.	
2.5		
3.0	3.0m: wet to saturated, black and orange mottling	
3.5	3.5m - 3.6m: Clayey SILT; brownish orange. Very stiff; high plasticity; moist.	
	3.8m: wet to saturated	
4.0		
4.5	4.5m: moist to wet	
5.0		
5.5		

Water: Groundwater Not Encountered

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm): 2, 4, 6, 8

Shear Vane, Su (kPa): 50, 100, 150, 200

Test Values	RL (m)
130 / 33	179.0
157 / 33	178.5
91 / 19	178.0
141 / 78	177.5
63 / 28	177.0
63 / 31	176.5
100 / 34	
85 / 38	176.0
88 / 44	175.5
176 / 44	
130 / 36	175.0
138 / 63	174.5
	174.0

Hole Depth: 5.00m

Termination: Reached target depth

Remarks:

Vane peak; Vane residual; Vane UTP; Standing water level; Groundwater inflow; Groundwater outflow

UTP = Unable to Penetrate

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

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Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA02**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050532mN, 1716588mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	175m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	835

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm)	In-situ Testing: Shear Vane, Su (kPa)	Test Values	RL (m)
0.0	Organic SILT; dark brown. Moist.	Topsoil					175.0
	SILT; brownish orange. Very stiff; non-plastic; dry to moist.	Kerikeri Volcanic Group - Residual soil					
0.5	CLAY, with minor silt; brownish orange. Very stiff; low plasticity; moist.					141 / 44	174.5
1.0						146 / 41	174.0
1.5	Clayey SILT, with some sand and gravel; dark brownish grey. Very stiff; moist to wet; gravel, fine to medium, very weak basalt/scoria lapilli.	Kerikeri Volcanic Group - Weathered airfall deposit				122 / 31	173.5
2.0	2.1m: wet		Groundwater Not Encountered			116 / 16	173.0
	2.3m: increasing clay, moist						
2.5	2.5m - 2.7m: highly plastic, clay dominated zone					138 / 38	172.5
	2.7m: becomes gravel/scoria dominated, shear vanes may not be valid						
3.0						85 / 41	172.0
						47 / 36	
3.5							171.5
4.0						28	171.0
4.5							170.5
5.0						50	170.0
5.5							169.5

Hole Depth: 5.00m

Termination: Reached target depth

Remarks:

Vane peak | Vane residual | Vane UTP | Standing water level | Groundwater inflow | Groundwater outflow

UTP = Unable to Penetrate

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

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Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA03**				
Project ID:	19103				
Sheet:	1 of 2				
Client:	Onoke Heights Limited	**Coordinates:**	6050549mN, 1716651mE	**Test Date:**	26/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	FWH
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	173.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	2249

Depth (m)	Material Description	Geology
0.0	Silty CLAY, with some rootlets; brownish orange. Hard; high plasticity; dry to moist; friable.	Kerikeri Volcanic Group - Residual soil
0.3	0.3m: highly plastic, moist	
1.0	Clayey SILT, with trace sand and gravel; brown, some black mno speckling. Very stiff; low plasticity; moist; gravel, fine, extremely weak basalt/scoria lapilli; friable, sensitive.	Kerikeri Volcanic Group - Weathered airfall deposits
1.4	1.4m: increasing moisture, moist to wet	
1.6	1.6m - 1.8m: brownish orange	
2.0	Sandy gravelly SILT. Non-plastic; wet to saturated; gravel, fine, extremely weak basalt/scoria lapilli; firm to stiff/very loose (marginally cohesive), friable, sensitive, allophanic - greasy. .	
3.2	3.2m: auger grinds, larger weak basalt cobble/coarse gravel	
4.0	4.0m: saturated, no inflow	

Water: Groundwater Not Encountered

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm) — 2, 4, 6, 8

Shear Vane, Su (kPa) — 50, 100, 150, 200

Test Values	RL (m)
205+ / 73	173.5
205+ / 88	
205+ / 146	
203 / 134	
177 / 72	172.5
136 / 18	
121 / 32	172.0
164 / 70	
92 / 15	
101 / 26	171.5
61 / 26	
58 / 15	
73 / 44	171.0
99 / 18	
99 / 41	170.5
120 / 15	
101 / 31	170.0
101 / 38	169.5
99 / 41	
91 / 35	169.0
	168.5
	168.0

Hole Depth: 5.00m **Termination:** Reached target depth

Remarks:

Vane peak; Vane residual; Vane UTP; Standing water level; Groundwater inflow; Groundwater outflow

UTP = Unable to Penetrate

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

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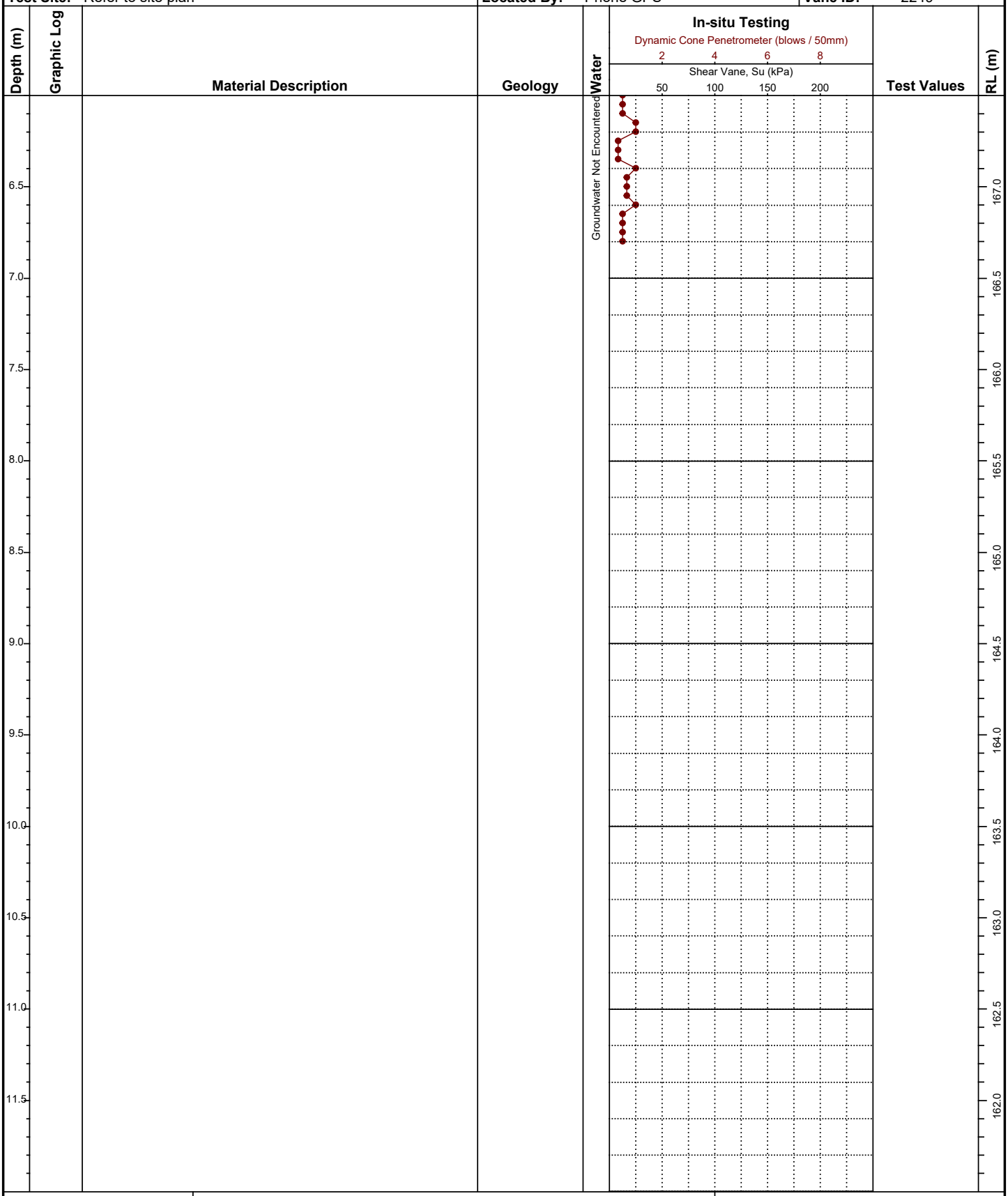
Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA03**
Project ID:	19103
Sheet:	2 of 2

Client:	Onoke Heights Limited	**Coordinates:**	6050549mN, 1716651mE	**Test Date:**	26/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	FWH
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	173.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	2249



Hole Depth: 5.00m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA04**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050579mN, 1716683mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	FWH
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	177.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	2249

Depth (m)	Material Description	Geology	Water	In-situ Testing	Test Values	RL (m)
0.0	Organic SILT; dark brown. Dry; rootlets, friable.	Topsoil			UTP	177.5
	CLAY, with some silt; reddish brown; homogeneous. Hard; high plasticity; moist.	Kerikeri Volcanic Group - Residual soil			205+	
0.5	Clayey SILT; brownish orange; homogeneous. Very stiff to hard; high plasticity; moist; friable.				196 / 91	177.0
	0.8m - 1.2m: some clay, orange					
1.0					205+ / 96	176.5
	1.2m - 1.7m: minor clay, brown, very friable					
1.5					161 / 35	176.0
	Sandy SILT, with some gravel, with minor clay; dark brownish grey, some black and orange mottling. Very loose to loose; non-plastic; wet; sand, coarse; gravel, fine, clasts of extremely weak scoria/basalt lapilli; allophanic - greasy .	Kerikeri Volcanic Group - Weathered Airfall Deposit			88 / 15	
2.0					107 / 15	175.5
	2.2m - 2.3m: SILT; brown. Stiff; non-plastic; wet; homogenous.				63 / 22	
2.5					66 / 23	175.0
					88 / 29	
					79 / 22	
3.0					72 / 26	174.5
3.5						174.0
4.0						173.5
4.5						173.0
5.0					13	172.5
5.5						172.0

Groundwater Not Encountered

Dynamic Cone Penetrometer (blows / 50mm): 2, 4, 6, 8

Shear Vane, Su (kPa): 50, 100, 150, 200

Hole Depth: 3.00m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

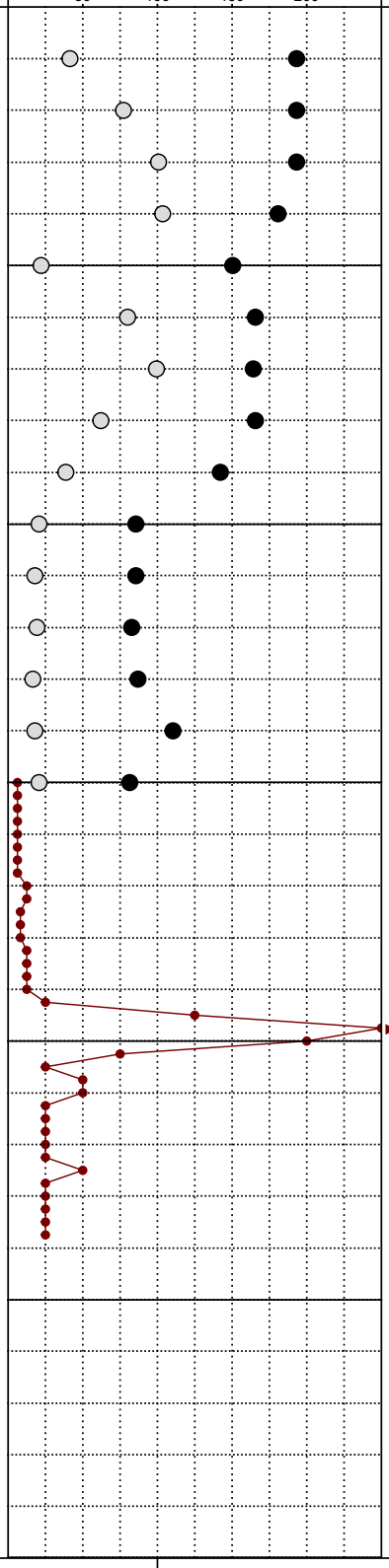
Method: 50mm hand auger, DCP

Test ID:	**HA05**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050504mN, 1716594mE	**Test Date:**	28/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	170m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Plan setout	**Vane ID:**	131

Depth (m)	Material Description	Geology
0.0	SILT, with some rootlets/organics and sand; light brown. Dry; sand, fine.	Topsoil
	SILT, with some clay; brownish orange. Very stiff to hard; low plasticity; moist.	Kerikeri Volcanic Group - Residual soil
0.5	0.7m: trace of clay	
1.0	SILT, with trace sand; brown. Low plasticity; moist; sand, fine.	Kerikeri Volcanic Group - Weathered airfall deposit
	1.3m - 1.7m: trace of clay, light brownish orange	
1.5	1.7m - 1.9m: no clay, some fine sand, brown	
2.0	Sandy SILT, with some gravel; dark brownish grey. Stiff to very stiff; moist to wet; gravel, fine to medium, very weak bassalt/scoria lapilli; sensitive.	
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		

Groundwater Not Encountered



Test Values	RL (m)
193 / 41	
193 / 77	169.5
193 / 101	
181 / 104	
150 / 22	169.0
166 / 80	
164 / 99	168.5
166 / 62	
142 / 39	
86 / 21	168.0
86 / 18	
83 / 19	
87 / 17	167.5
110 / 18	
81 / 21	167.0
	166.5
	166.0
	165.5
	165.0
	164.5

Hole Depth: 3.00m **Termination:** Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA06**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050503mN, 1716669mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CP
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	164.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	1945

Depth (m)	Material Description	Geology	Test Values	RL (m)
0.0	Organic clayey SILT; brown. Dry; friable, rootlets.	Topsoil	UTP	164.5
	Silty CLAY, with trace gravel; reddish brown. Very stiff; high plasticity; moist; gravel, fine.	Kerikeri Volcanic Group - Residual soil	190 / 124	
0.5	0.5m: increase silt		212 / 117	164.0
	Clayey SILT, with trace gravel; reddish brown. Very stiff; high plasticity; moist; gravel, fine, very weak basalt/scoria lapilli.		193 / 86	
1.0	1.0m - 1.7m: reddish orange, less plastic (low plasticity)		193 / 80	163.5
			186 / 66	
1.5			UTP	163.0
	Clayey SILT, with trace gravel; brown. Very stiff; high plasticity; wet; gravel, fine, very weak basalt/scoria lapilli; sensitive.	Kerikeri Volcanic Group - Weathered airfall deposit	146 / 40	
2.0			139 / 29	162.5
	Sandy SILT, with trace gravel. Stiff to very stiff; non-plastic; saturated; gravel, fine, very weak basalt/scoria lapilli; sensitive.		128 / 22	
2.5	2.3m: gravel becomes fine to medium (max. 20mm), saturated		128 / 22	162.0
			128 / 26	
3.0				161.5
3.5				161.0
4.0				160.5
4.5				160.0
5.0				159.5
5.5				159.0

Water: Groundwater Not Encountered

In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm) 2 4 6 8; Shear Vane, Su (kPa) 50 100 150 200

Hole Depth: 3.00m **Termination:** Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

Vane peak; Vane residual; Vane UTP; Standing water level; Groundwater inflow; Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA07**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050521mN, 1716696mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	167.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	835

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm)	In-situ Testing: Shear Vane, Su (kPa)	Test Values	RL (m)
0.0	Organic SILT; dark brown. Dry to moist.	Topsoil	Groundwater Not Encountered	2 4 6 8	50 100 150 200		167.5
	Silty CLAY; brownish orange. Very stiff; high plasticity; moist.	Kerikeri Volcanic Group - Residual soil					
0.5	0.3m: decreasing silt (some)					172 / 81	167.0
1.0	1.0m: silty, trace of fine gravel (completely weathered scoria), low plasticity					177 / 83	166.5
1.5	1.4m: trace of silt, high plasticity					146 / 72	166.0
2.0	2.1m: minor black/brown mottling					157 / 38	165.5
2.5	SILT, with some sand and gravel; brown. Stiff; moist to wet; gravel, fine to medium, very weak scoria/basalt lapilli.	Kerikeri Volcanic Group - Weathered airfall deposits				71 / 28	165.0
	2.8m: minor black mottling, moist					160 / 42	
3.0	3.0m: moist to wet					130 / 38	164.5
						138 / 56	
3.5							164.0
4.0							163.5
4.5							163.0
5.0							162.5
5.5							162.0

Hole Depth: 3.20m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA08**
Project ID:	19103
Sheet:	1 of 2

Client:	Onoke Heights Limited	**Coordinates:**	6050553mN, 1716724mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	FWH
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	173.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	2249

Depth (m)	Material Description	Geology
0.0	Organic SILT; dark brownish orange. Very stiff to hard; dry to moist.	Topsoil
	CLAY, with some silt; brownish orange; homogeneous. Hard; high plasticity; moist; slightly friable.	Kerikeri Volcanic Group - Residual soil
1.0	Clayey SILT; orange. Very stiff to hard; low plasticity; moist.	
1.5	Sandy SILT, with some gravel, with minor clay; dark brownish grey, some black and orange mottling. Very loose to loose/firm to stiff; non-plastic; wet; sand, coarse; gravel, fine, clasts of extremely weak scoria and basalt lapilli; allophanic - greasy.	Kerikeri Volcanic Group - Weathered airfall deposits
2.0	1.9m - 2.1m: SILT; brown. Stiff; non-plastic; wet; homogenous.	
	2.2m: becoming saturated, no inflow	
4.0		

Water: Groundwater Not Encountered

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm): 2, 4, 6, 8

Shear Vane, Su (kPa): 50, 100, 150, 200

Test Values	RL (m)
205+ / 117	173.0
205+ / 143	172.5
164 / 102	172.0
117 / 18	
113 / 20	
137 / 53	171.5
83 / 29	
51 / 20	171.0
58 / 26	
56 / 26	170.5
66 / 32	170.0
66 / 25	
▶10 ▶20 ▶12	169.5
	169.0
	168.5
	168.0

Hole Depth: 4.00m

Termination: impenetrable material (gravel)

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

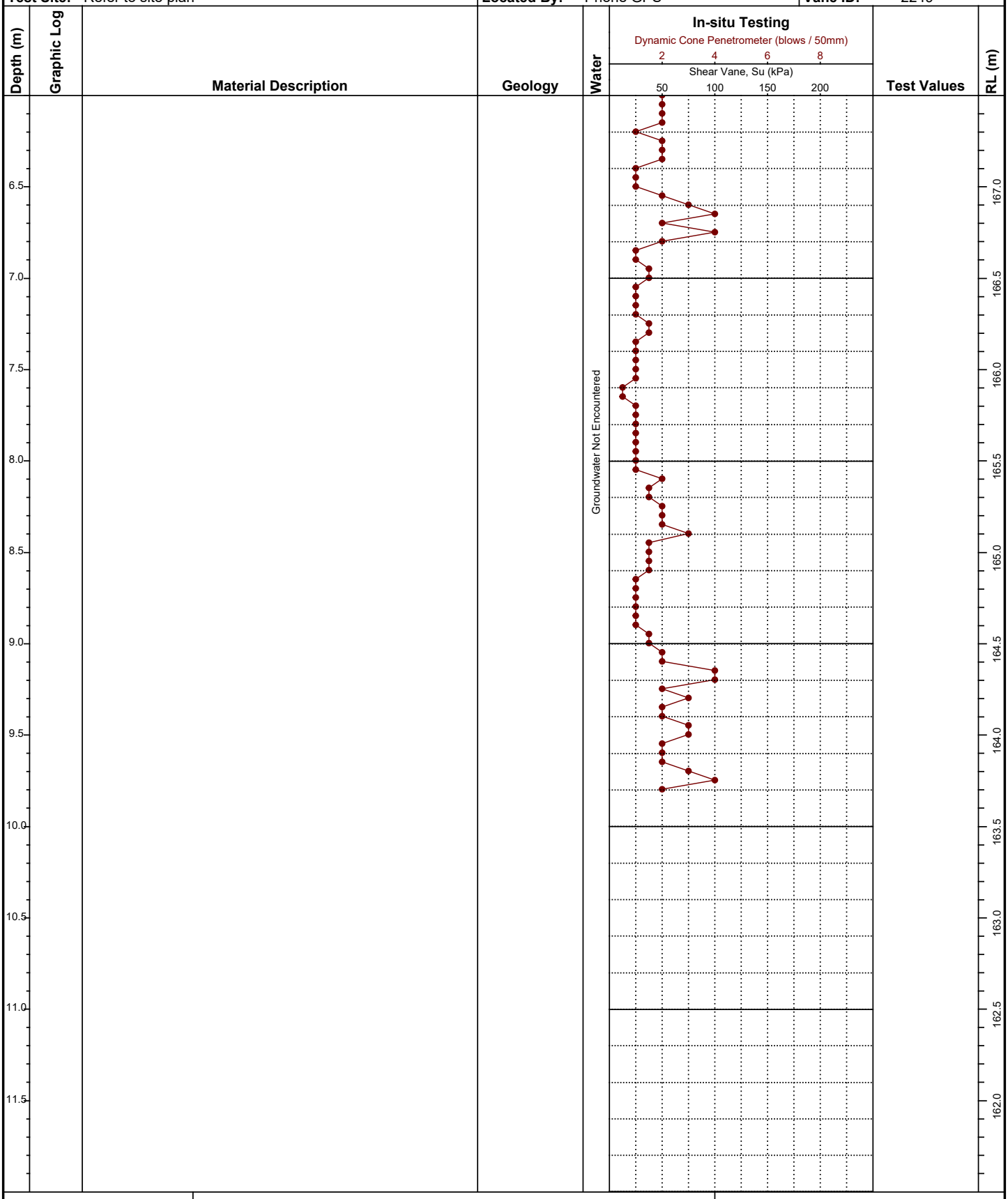
UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA08**
Project ID:	19103
Sheet:	2 of 2

Client:	Onoke Heights Limited	**Coordinates:**	6050553mN, 1716724mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	FWH
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	173.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	2249



Hole Depth: 4.00m **Termination:** impenetrable material (gravel)

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

Vane peak | Standing water level
Vane residual | Groundwater inflow
Vane UTP | Groundwater outflow
UTP = Unable to Penetrate

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Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA09**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050459mN, 1716600mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	164m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	835

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm)	In-situ Testing: Shear Vane, Su (kPa)	Test Values	RL (m)
0.0	Organic clayey SILT; dark brown. Dry to moist.	Topsoil					164.0
	Clayey SILT; brownish orange. Very stiff; low plasticity; moist.	Kerikeri Volcanic Group - Residual soil					
0.5	CLAY, with some silt; brownish orange. Very stiff; high plasticity; moist.					172 / 91	163.5
1.0	1.1m: becomes silty, low plasticity					157 / 102	163.0
1.5						219+ / 110	162.5
2.0	SILT, with minor sand and gravel; brown. Stiff; non-plastic; moist to wet; gravel, very weak scoria/basalt lapilli.	Kerikeri Volcanic Group - Weathered airfall deposits	Groundwater Not Encountered			74 / 25	162.0
						56 / 31	
2.5						60 / 31	161.5
3.0	3.2m: wet to saturated, increasing scoria lapilli					58 / 36	161.0
3.5						85 / 34	160.5
						81 / 34	
4.0						78 / 31	160.0
						85 / 49	
4.5						81 / 44	159.5
5.0						85 / 47	159.0
5.5							158.5

Hole Depth: 5.00m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

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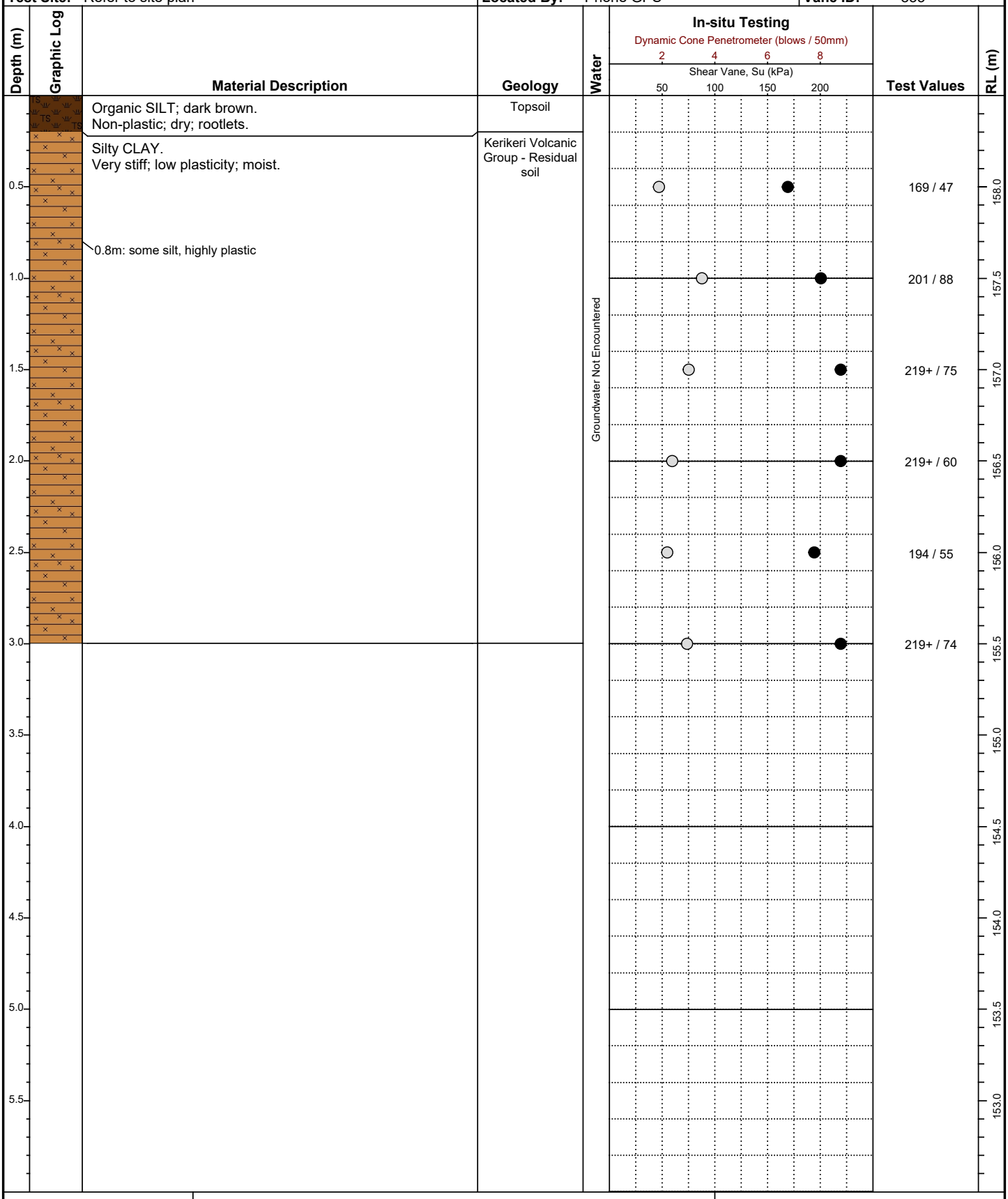
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA10**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050421mN, 1716609mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	158.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	835



Hole Depth: 3.00m **Termination:** Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger

Test ID:	**HA11**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050439mN, 1716656mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	157.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Plan setout	**Vane ID:**	131

Depth (m)	Material Description	Geology
0.0	SILT, with some rootlets; light brown. Dry.	Topsoil
	Clayey SILT; brownish orange. Hard; low plasticity; dry to moist.	Kerikeri Volcanic Group - Residual soil
0.5	0.5m: minor gravel, fine black weak basalt/scoria lapilli, moist	
3.0	Clayey SILT, with trace gravel; brown. Stiff; high plasticity; moist; gravel, fine, weak basalt/scoria lapilli; sensitive.	Kerikeri Volcanic Group - Weathered airfall deposit
3.5	3.5m: moist to wet	
	3.8m: wet	
4.0	4.0m: some sand	
	4.2m: no sand, moist	
4.5	Sandy gravelly SILT. Stiff and loose; non-plastic; moist; sand, fine to coarse, gravel, fine to medium, weak basalt/scoria lapilli.	
	4.9m - 5.0m: becoming silty, brownish orange	
5.0		

Groundwater Not Encountered

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm) — 2, 4, 6, 8

Shear Vane, Su (kPa) — 50, 100, 150, 200

Test Values	RL (m)
150+ / 46	157.5
193+ / 120	
193+ / 117	
193+ / 98	
193+ / 97	156.5
193+ / 135	
193+ / 178	
193+ / 92	156.0
193+ / 128	
193+ / 119	155.5
193+ / 163	
193+ / 166	
193+ / 98	155.0
193+ / 104	
193+ / 102	154.5
150 / 66	
72 / 30	154.0
66 / 22	
62 / 21	
104 / 18	153.5
110 / 54	
90 / 33	153.0
98 / 29	
102 / 26	152.5
69 / 25	

Hole Depth: 5.00m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA12**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050462mN, 1716721mE	**Test Date:**	28/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	159m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Plan setout	**Vane ID:**	131

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm)	In-situ Testing: Shear Vane, Su (kPa)	Test Values	RL (m)
0.0	Organic SILT; dark brown, organic stained. Dry to moist; Trace rootlets.					135 / 44	159.0
0.5	SILT, with trace clay; brownish orange. Hard; low plasticity; moist.					193 / 94	158.5
	0.6m: some clay					193 / 113	
1.0						193 / 120	158.0
	1.2m - 2.1m: trace of clay, orange					193 / 121	
1.5						193 / 108	157.5
	1.7m: minor fine sand					193 / 110	
2.0						163 / 25	157.0
	2.1m - 2.7m: trace gravel, fine, black, extremely weak residually weathered lapilli					138 / 35	
	2.3m: some fine sand					131 / 28	
2.5	2.5m: pockets of lensoidal, extremely weak, black to dark red weathered gravel/scoria lapilli					190 / 72	156.5
	Sandy gravelly SILT; cark greyish brown, black and orange mottling. Very stiff; wet; sand, fine to coarse, gravel, fine to medium, very weak basalt/scoria lapilli.					113 / 36	
3.0						83 / 25	156.0
						124 / 15	
3.5						173 / 30	155.5
4.0							155.0
4.5							154.5
5.0							154.0
5.5							153.5

Groundwater Not Encountered

Hole Depth: 3.00m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA13**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050489mN, 1716747mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	163.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	835

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm)	In-situ Testing: Shear Vane, Su (kPa)	Test Values	RL (m)
0.0	Organic SILT; dark brown. Dry.	Topsoil	Groundwater Not Encountered	2 4 6 8	50 100 150 200		163.5
	Silty CLAY; brownish orange. Very stiff; high plasticity; moist.	Kerikeri Volcanic Group - Residual soil					
0.5	0.6m: trace of silt					166 / 55	163.0
	0.8m: some black mottling						
1.0						212 / 89	162.5
	1.2m: silty						
	1.3m - 1.9m: predominantly SILT, low plasticity					160 / 50	
1.5						144 / 22	162.0
2.0	SILT, with some gravel, with minor sand; dark greyish brown. Stiff to very stiff; non-plastic; wet; gravel, fine to medium, very weak basalt/scoria lapilli.	Kerikeri Volcanic Group - Weathered Airfall Deposit				128 / 24	161.5
	2.2m: increasing scoria					103 / 16	
2.5	2.4m - 4.0m: decreasing gravel (some), brownish orange					110 / 25	161.0
3.0	3.0m: wet to saturated					97 / 20	160.5
						71 / 22	
3.5	3.4m: trace of gravel, some black mottling, moist to wet					119 / 34	160.0
4.0	4.0m: wet					71 / 27	159.5
	4.2m: trace black mottling, wet to saturated					113 / 39	
4.5	4.5m: brownish orange					116 / 39	159.0
	4.8m: increasing scoria, saturated						
5.0						160 / 20	158.5
5.5							158.0

Hole Depth: 5.00m **Termination:** Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

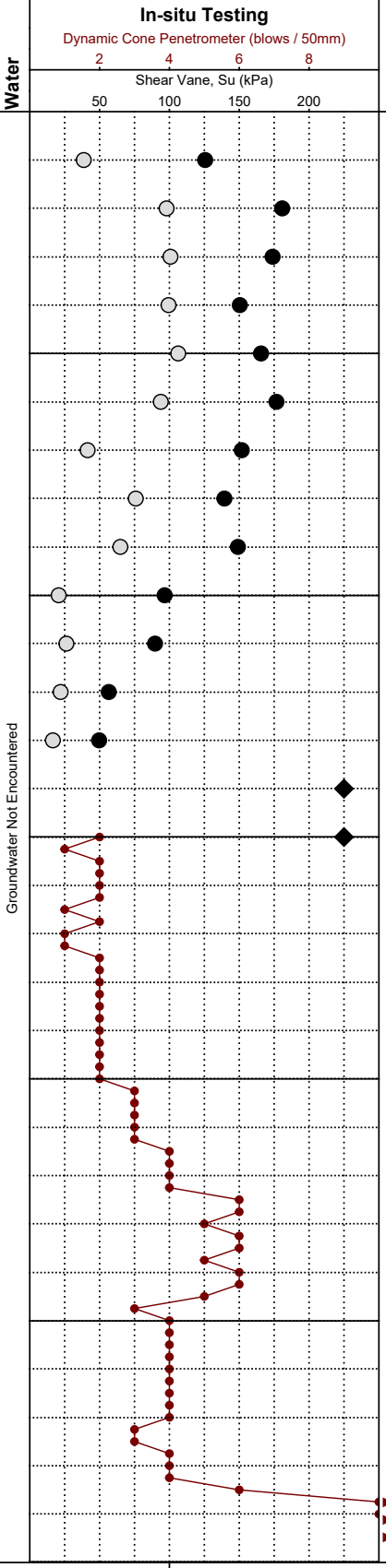
Method: 50mm hand auger, DCP

Test ID:	**HA14**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050521mN, 1716773mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	168.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Plan setout	**Vane ID:**	131

Depth (m)	Material Description	Geology
0.0	SILT; brownish orange. Low plasticity; dry.	Topsoil
	Clayey SILT. Very stiff; low plasticity; dry to moist.	Kerikeri Volcanic Group - Residual soil
0.5	0.5m: moist	
	0.6m - 0.9m: orange	
1.0	0.9m - 1.4m: trace fine gravel (very weak basalt/scoria lapilli), brown	
1.5	SILT, with minor sand, with trace gravel. Very stiff; non-plastic; moist; sand, fine to coarse; gravel, fine, very weak basalt/scoria lapilli.	Kerikeri Volcanic Group - Weathered airfall deposit
	1.7m: some gravel, fine to medium, sub angular to sub rounded	
2.0	1.9m: no gravel	
	2.1m - 3.0m: variable silt, clay, sand and gravel, gravels fine to medium, brownish grey with brown and orange mottling, moist to wet	
2.5		
	2.8m: mostly gravel lapilli, moist to wet, crushes under auger	
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		

Water: Groundwater Not Encountered



Test Values
126 / 39
181 / 98
174 / 101
150 / 99
166 / 106
177 / 94
152 / 41
139 / 76
149 / 65
97 / 21
90 / 26
57 / 22
50 / 17
UTP
UTP

RL (m): 168.0, 167.5, 167.0, 166.5, 166.0, 165.5, 165.0, 164.5, 164.0, 163.5, 163.0

Hole Depth: 3.00m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

Vane peak | Vane residual | Vane UTP | Standing water level | Groundwater inflow | Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

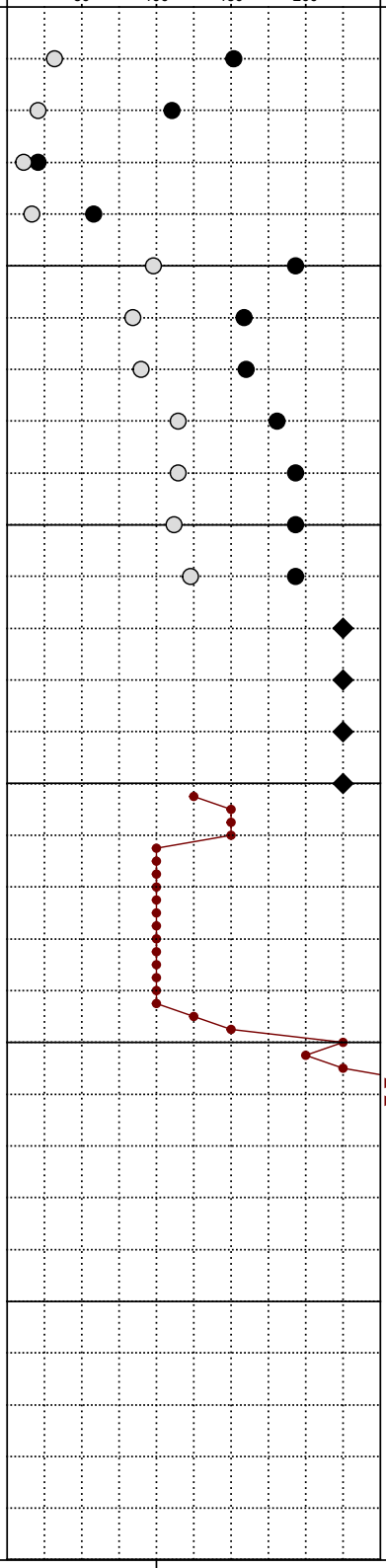
Method: 50mm hand auger, DCP

Test ID:	**HA15**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050343mN, 1716609mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	154m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Plan setout	**Vane ID:**	131

Depth (m)	Material Description	Geology
0.0	Organic SILT; brownish black. Dry to moist; some rootlets.	Topsoil
0.5	Silty sandy GRAVEL; brownish grey, some orange mottling. Loose; dry; gravel, fine to medium, subround, very weak basalt/scoria lapilli.	Alluvium (Kerikeri Volcanic Group derived)
1.0	Sandy SILT, with trace gravel; brownish orange, some orange mottling. Firm to stiff; non-plastic; moist; sand, fine to medium; gravel, fine.	
1.5	Clayey SILT; brownish orange. Very stiff; low plasticity; moist.	
2.0	2.1m: minor gravel, fine, black, very weak basalt/scoria lapilli	
2.5	2.5m: some gravel as above	
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		

Water: Groundwater Not Encountered



Test Values	RL (m)
152 / 32	154.0
110 / 21	153.5
21 / 11	
58 / 17	
193+ / 98	153.0
159 / 84	
160 / 90	152.5
181 / 115	
193+ / 115	
193+ / 112	152.0
193+ / 123	
UTP	151.5
UTP	
UTP	
UTP	151.0
	150.5
	150.0
	149.5
	149.0
	148.5

Hole Depth: 3.00m **Termination:** Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

Vane peak | Vane residual | Vane UTP | Standing water level | Groundwater inflow | Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA16**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050394mN, 1716643mE	**Test Date:**	28/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	155m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Plan setout	**Vane ID:**	131

Depth (m)	Material Description	Geology
0.0	Organic SILT; dark brown. Dry.	Alluvium (Kerikeri Volcanic Group derived)
0.3	SILT; reddish brown. Very stiff to hard; low plasticity; dry. 0.3m - 3.0m: trace of clay, brownish orange, moist	
0.8	0.8m: some clay, increasing plasticity	
1.5	1.5m: minor gravel, black, sub angular, very weak basalt/scoria lapilli	
2.2	2.2m: trace of clay	
3.0		

Groundwater Not Encountered

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm)

Shear Vane, Su (kPa)

Depth (m)	Test Values	RL (m)
0.0	135 / 26	155.0
0.3	193+ / 110	154.7
0.5	193+ / 126	154.5
0.7	193+ / 131	154.3
1.0	193+ / 132	154.0
1.2	193+ / 155	153.8
1.3	193+ / 156	153.7
1.5	193+ / 124	153.5
1.7	193+ / 135	153.3
2.0	193+ / 152	153.0
2.2	193+ / 167	152.8
2.4	193+ / 134	152.6
2.5	193+ / 149	152.5
2.7	193+ / 138	152.3
3.0	193+ / 131	152.0
3.2	10	151.8
3.3	11	151.7
3.4	10	151.6
3.5		151.5
4.0		151.0
4.5		150.5
5.0		150.0
5.5		149.5

Hole Depth: 3.00m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA17**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050385mN, 1716693mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	152m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	

Depth (m)	Graphic Log	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm) 2 4 6 8 / Shear Vane, Su (kPa) 50 100 150 200	Test Values	RL (m)
0.0	TS TS TS	Organic SILT; brown. Dry.	Topsoil	Groundwater Not Encountered			152.0
0.5		Clayey SILT, with trace gravel; brownish orange, some dark specks. Very stiff; high plasticity; moist; gravel, fine, subround.	Residual soil				151.5
		Silty CLAY; brownish orange. Very stiff; high plasticity; moist.					
1.0							151.0
1.5							150.5
2.0							150.0
2.5							149.5
3.0							149.0
3.5							148.5
4.0							148.0
4.5							147.5
5.0							147.0
5.5							146.5

Hole Depth: 0.50m **Termination:** impenetrable material

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak ▼ Standing water level
○ Vane residual ◁ Groundwater inflow
◆ Vane UTP ▷ Groundwater outflow
UTP = Unable to Penetrate

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Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA18**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050416mN, 1716731mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CP
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	154m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	1945

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm)	In-situ Testing: Shear Vane, Su (kPa)	Test Values	RL (m)
0.0	Organic clayey SILT; brown. Dry; friable, rootlets.	Topsoil	Groundwater Not Encountered	2 4 6 8	50 100 150 200	UTP	154.0
	Silty CLAY, with trace gravel; reddish brown. Very stiff; high plasticity; moist; gravel, fine.	Kerikeri Volcanic Group - Residual soil				204 / 93	
0.5						212 / 106	153.5
1.0	1.2m: rare completely weathered coarse gravels/cobbles					190 / 109	
						182 / 102	153.0
						UTP	
1.5	Clayey sandy SILT, with minor gravel; dark brownish orange. Very stiff; high plasticity; moist; gravel, fine, very weak basalt/scoria lapilli.	Kerikeri Volcanic Group - Weathered airfall deposit				146 / 33	152.5
	1.8m - 2.2m: brown, wet					146 / 66	
2.0						109 / 18	152.0
	2.2m - 2.7m: brownish black					120 / 18	
2.5						182 / 26	151.5
	2.6m: saturated						
	Silty CLAY; greyish orange. Very stiff; high plasticity; wet.					255+	
3.0						UTP	151.0
						20	
3.5							150.5
4.0							150.0
4.5							149.5
5.0							149.0
5.5							148.5

Hole Depth: 3.00m

Termination: Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA19**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050435mN, 1716810mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	FWH
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	153.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	2249

Depth (m)	Material Description	Geology	Test Values	RL (m)
0.0	SILT, with some clay; brownish orange; homogeneous. Hard; low plasticity; dry.	Kerikeri Volcanic Group - Residual soil	UTP	153.5
0.2	0.2m: moist		205+ / 126	
0.5			184 / 114	153.0
			191 / 134	
1.0			143 / 58	152.5
1.2	Sandy SILT, with some gravel, with minor clay; dark brownish grey, some black and orange mottling. Very loose to loose, sensitive; non-plastic; wet; sand, coarse; gravel, fine, clasts of extremely weak scoria and basalt lapilli; allophanic greasy.	Kerikeri Volcanic Group - Weathered airfall deposits	83 / 15	
1.5	1.6m: 2cm SILT layer. Stiff; non-plastic; wet; homogenous.		91 / 15	152.0
			70 / 15	
2.0	2.1m: wet to saturated			151.5
2.1			UTP	
2.5			99 / 19	151.0
			105 / 26	
3.0			73 / 18	150.5
3.5			92 / 29	150.0
			72 / 29	
4.0	4.0m: saturated, no inflow		110 / 48	149.5
4.4	4.4m - 4.8m: becoming heavily black stained, MnO deposit		UTP	149.0
4.8	4.8m - 5.0m: brownish orange, heavy black mottling		137 / 32	
5.0				148.5
5.5				148.0
6.0				147.5
6.5				147.0
7.0				146.5
7.5				146.0
8.0				145.5
8.5				145.0
9.0				144.5
9.5				144.0

Water: Groundwater Not Encountered

In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm) 2 4 6 8; Shear Vane, Su (kPa) 50 100 150 200

Hole Depth: 5.00m **Termination:** Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

Vane peak; Vane residual; Vane UTP; Standing water level; Groundwater inflow; Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA20**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050489mN, 1716817mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	162.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	835

Depth (m)	Material Description	Geology	Test Values	RL (m)
0.0	Organic SILT; dark brown. Dry.	Topsoil		162.5
	SILT; brownish orange. Very stiff; low plasticity; moist.	Kerikeri Volcanic Group - Residual soil		
0.5	CLAY, with trace silt; brownish orange. Very stiff; low plasticity; moist.		180 / 66	162.0
1.0	Clayey SILT; brownish orange. Very stiff; low plasticity; moist.		121 / 44	161.5
1.5	1.6m: increase SILT, low plasticity		172 / 128	161.0
2.0	SILT, with some gravel, with minor sand; dark greyish brown. Firm to stiff; non-plastic; wet; gravel, fine to medium, very weak scoria/basalt lapilli.	Kerikeri Volcanic Group - Weathered Airfall Deposits	36 / 16	160.5
	2.2m: wet to saturated		78 / 24	
2.5			85 / 25	160.0
			44 / 24	
3.0	3.0m: increasing weak scoria/basalt lapilli		94 / 25	159.5
			125 / 31	
3.5	3.6m: saturated		88 / 39	159.0
4.0				158.5
4.5				158.0
5.0				157.5
5.5				157.0

Water: Groundwater Not Encountered

In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm) 2 4 6 8; Shear Vane, Su (kPa) 50 100 150 200

Hole Depth: 3.70m **Termination:** hard material

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

Vane peak; Vane residual; Vane UTP; Standing water level; Groundwater inflow; Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm hand auger, DCP

Test ID:	**HA21**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050467mN, 1716857mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	153.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Plan setout	**Vane ID:**	131

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm)	In-situ Testing: Shear Vane, Su (kPa)	Test Values	RL (m)
0.0	SILT, with trace rootlets; dark brown. Dry.	Topsoil				159 / 30	153.5
0.5	Clayey SILT; orange brown, trace orange mottling. Hard; low plasticity; dry to moist. 0.3m - 1.0m: brown, moist	Kerikeri Volcanic Group - Residual soil				193 / 86	
1.0	0.8m: minor gravel, fine to medium, black, basalt/scoria lapilli					193 / 98	152.5
1.5	SILT, with some sand, with minor gravel. Stiff to very stiff; moist; sand, fine; gravel, fine to medium, very weak basalt/scoria lapilli. 1.4m: trace of clay	Kerikeri Volcanic Group - Weathered airfall deposit				193 / 110	152.0
2.0						126 / 40	151.5
2.5	Sandy gravelly SILT, with minor clay. Stiff to very stiff; non-plastic; moist; gravel, fine to medium, very weak basalt/scoria lapilli. 2.9m - 3.0m: becoming sandy, brownish grey with orange brown and brown mottling					150 / 79	151.0
3.0						138 / 66	150.5
3.5						121 / 37	150.0
4.0						108 / 26	149.5
4.5						81 / 19	149.0
5.0						79 / 26	148.5
5.5						58 / 25	148.0
						55 / 26	
						102 / 25	
						128 / 39	

Groundwater Not Encountered

Hole Depth: 3.00m **Termination:** Reached target depth

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

Vane peak | Vane residual | Vane UTP | Standing water level | Groundwater inflow | Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA22**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050418mN, 1716861mE	**Test Date:**	05/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	CK
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	149m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Phone GPS	**Vane ID:**	835

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm)	In-situ Testing: Shear Vane, Su (kPa)	Test Values	RL (m)
0.0	Organic SILT; dark brown. Dry.	Topsoil	Groundwater Not Encountered	2 4 6 8	50 100 150 200		149.0
	CLAY, with some silt; brownish orange. Very stiff to hard; high plasticity; moist.	Kerikeri Volcanic Group - Residual soil					
0.5						219+ / 81	148.5
1.0	0.9m: silty					193 / 47	148.0
1.5						196 / 53	147.5
2.0	Clayey SILT; brownish orange. Very stiff; low plasticity; moist.	Kerikeri Volcanic Group - Weathered airfall deposit				207 / 38	147.0
	2.3m: some black mottling						
2.5						219+ / 44	146.5
	2.6m - 3.0m: no clay, trace of gravel; brown; wet, non-plastic; gravel, fine very weak basalt/scoria lapilli.					63 / 28	
3.0						UTP	146.0
3.5							145.5
4.0							145.0
4.5							144.5
5.0							144.0
5.5							143.5

Hole Depth: 3.00m

Termination: impenetrable material

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

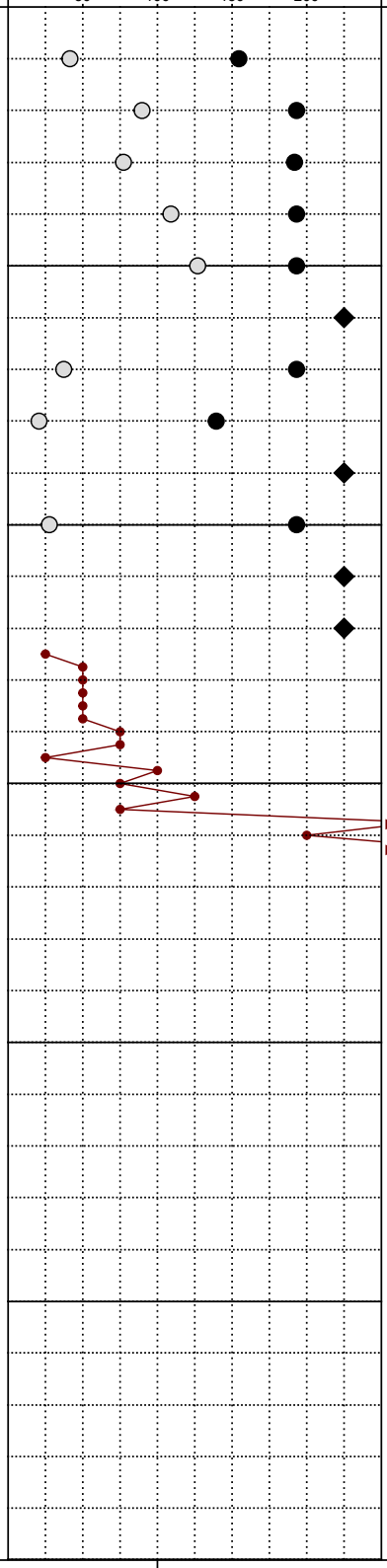
Method: 50mm hand auger, DCP

Test ID:	**HA23**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050396mN, 1716885mE	**Test Date:**	27/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	145.5m	**Checked By:**	DD
Test Site:	Refer to site plan	**Located By:**	Plan setout	**Vane ID:**	131

Depth (m)	Material Description	Geology
0.0	SILT, with trace rootlets; dark brown. Dry.	Topsoil
0.5	Clayey SILT; brownish orange. Very stiff to hard; low plasticity; dry to moist.	Alluvium (Kerikeri Volcanic Group derived)
	0.5m: minor fine gravel, sub angular, black; moist	
1.0	1.0m - 1.6m: dark brown, becomes sensitive	
	1.4m: minor sand (weak scoria lapilli)	
1.5	1.6m - 2.0m: some gravel, fine to medium very weak basalt/scoria lapilli; brownish red with trace orange mottling	
2.0	2.0m - 2.5m: variable sand, silt, clay and fine gravel lapilli	
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		

Water: Groundwater Not Encountered



Test Values
155 / 41
193 / 90
192 / 77
193 / 109
193 / 127
UTP
193 / 37
139 / 21
UTP
193 / 28
UTP
UTP

RL (m): 145.0, 144.5, 144.0, 143.5, 143.0, 142.5, 142.0, 141.5, 141.0, 140.5, 140.0

Hole Depth: 2.50m **Termination:** impenetrable material

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

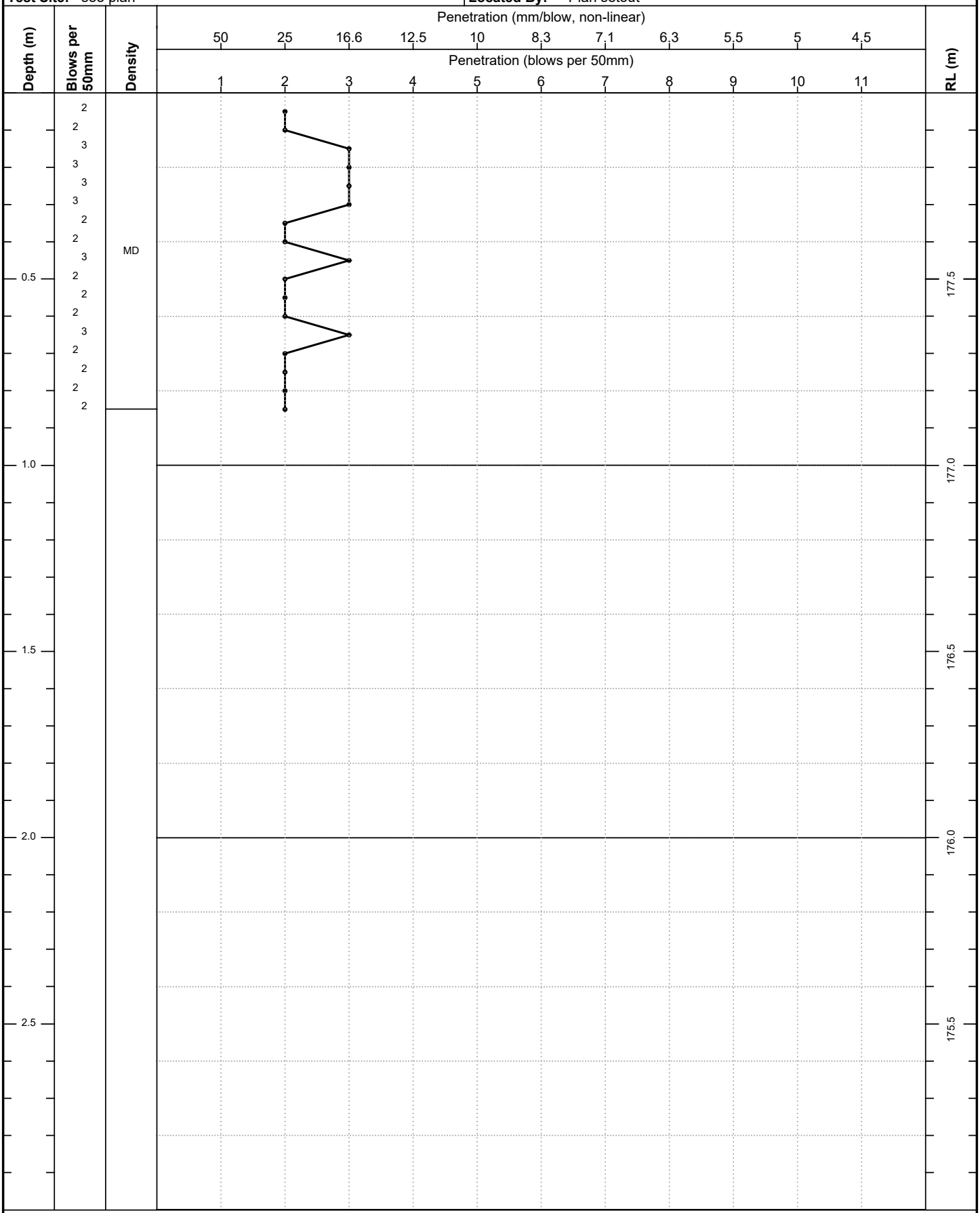
Vane peak | Vane residual | Vane UTP | Standing water level | Groundwater inflow | Groundwater outflow

UTP = Unable to Penetrate

Scala Penetrometer Test Log

Test ID:	**RP01**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050579mN, 1716623mE	**Test Date:**	28/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	178m	**Checked By:**	DD
Test Site:	see plan	**Located By:**	Plan setout		

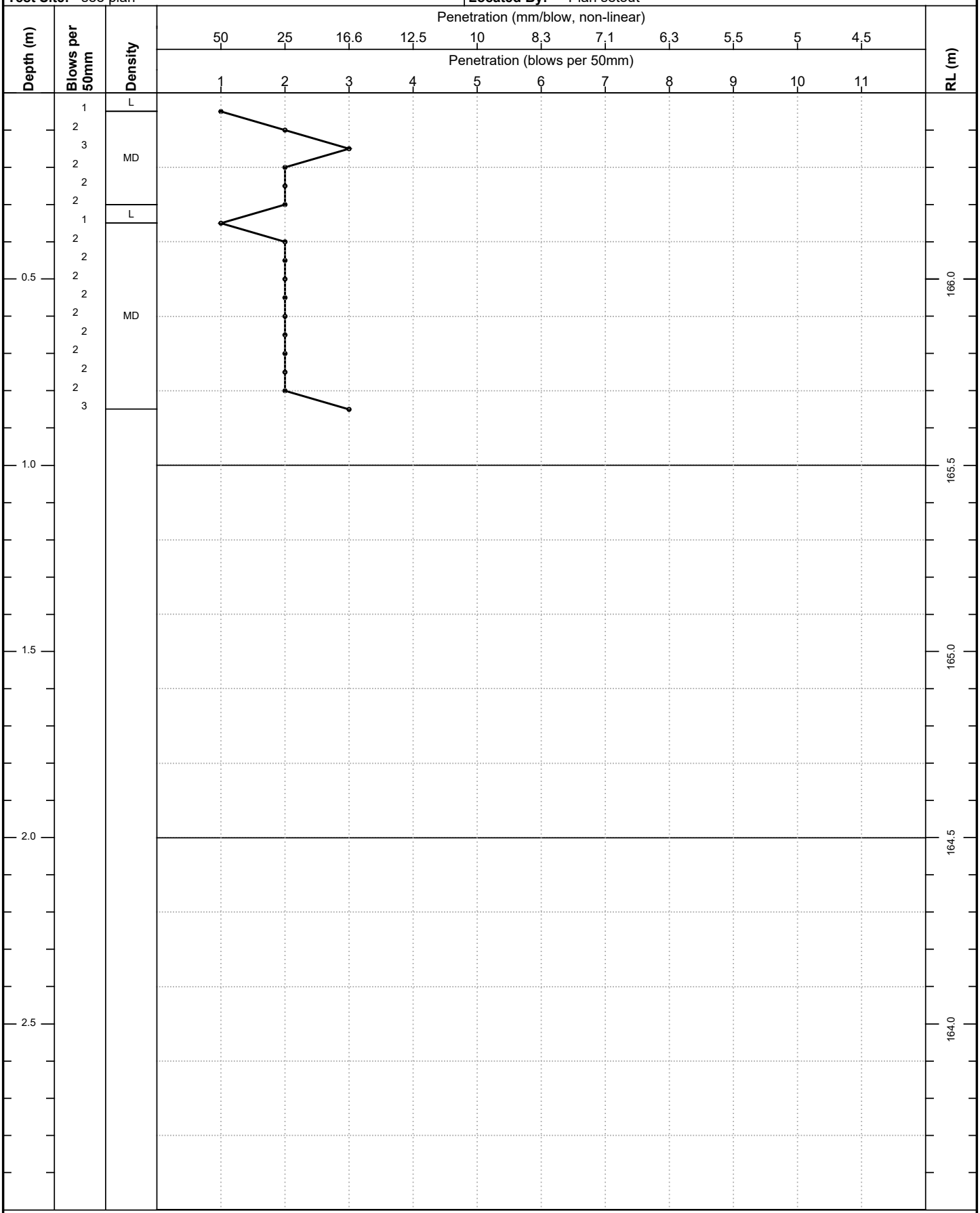


Remarks: Results may be affected by skin friction, particularly where the tested depth exceeds 1.5m. Density classification in terms of NZGS Field Description of Soil and Rock (2005).

Scala Penetrometer Test Log

Test ID:	**RP02**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050513mN, 1716763mE	**Test Date:**	28/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	166.5m	**Checked By:**	DD
Test Site:	see plan	**Located By:**	Plan setout		

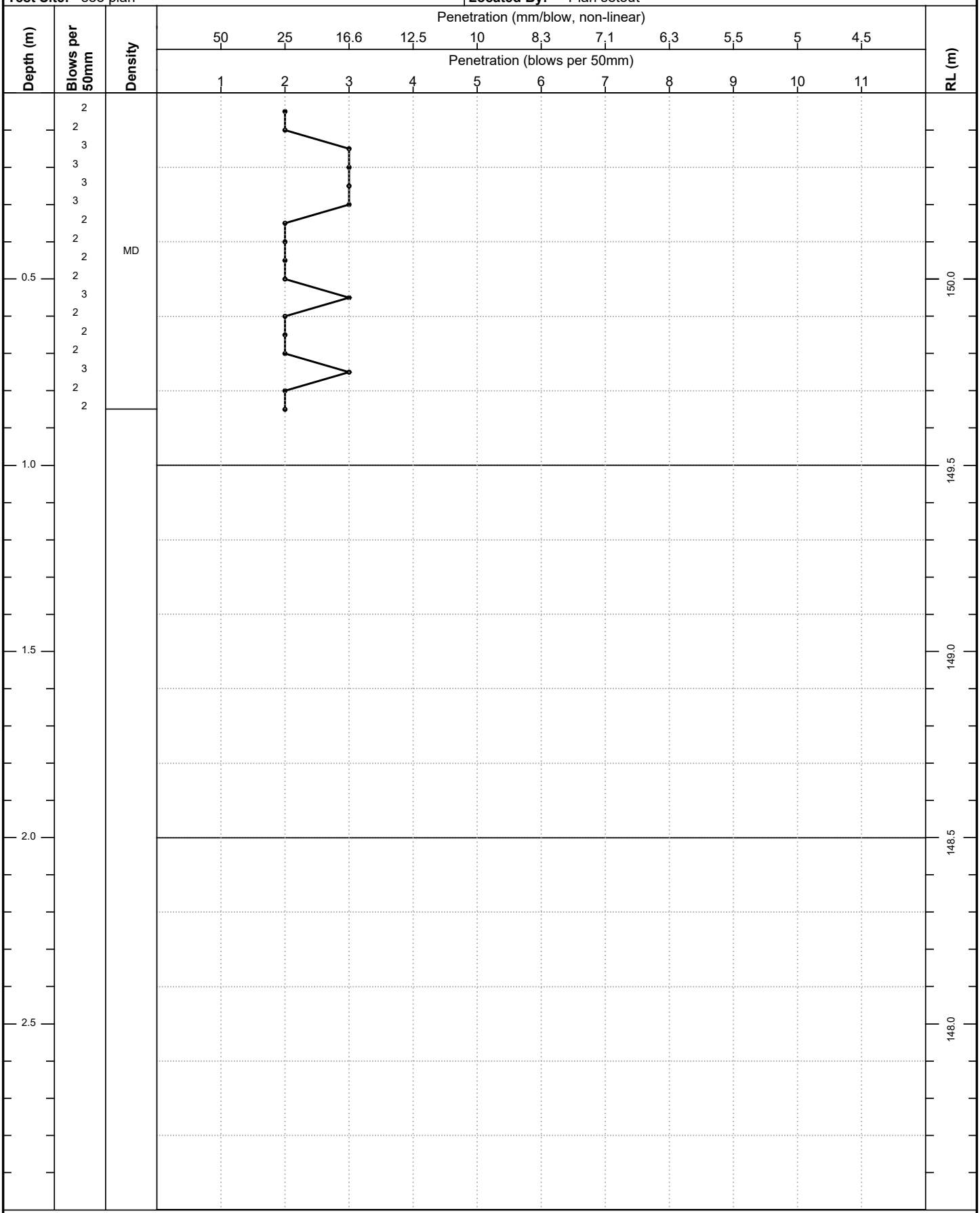


Remarks: Results may be affected by skin friction, particularly where the tested depth exceeds 1.5m. Density classification in terms of NZGS Field Description of Soil and Rock (2005).

Scala Penetrometer Test Log

Test ID:	**RP03**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050448mN, 1716867mE	**Test Date:**	28/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	150.5m	**Checked By:**	DD
Test Site:	see plan	**Located By:**	Plan setout		

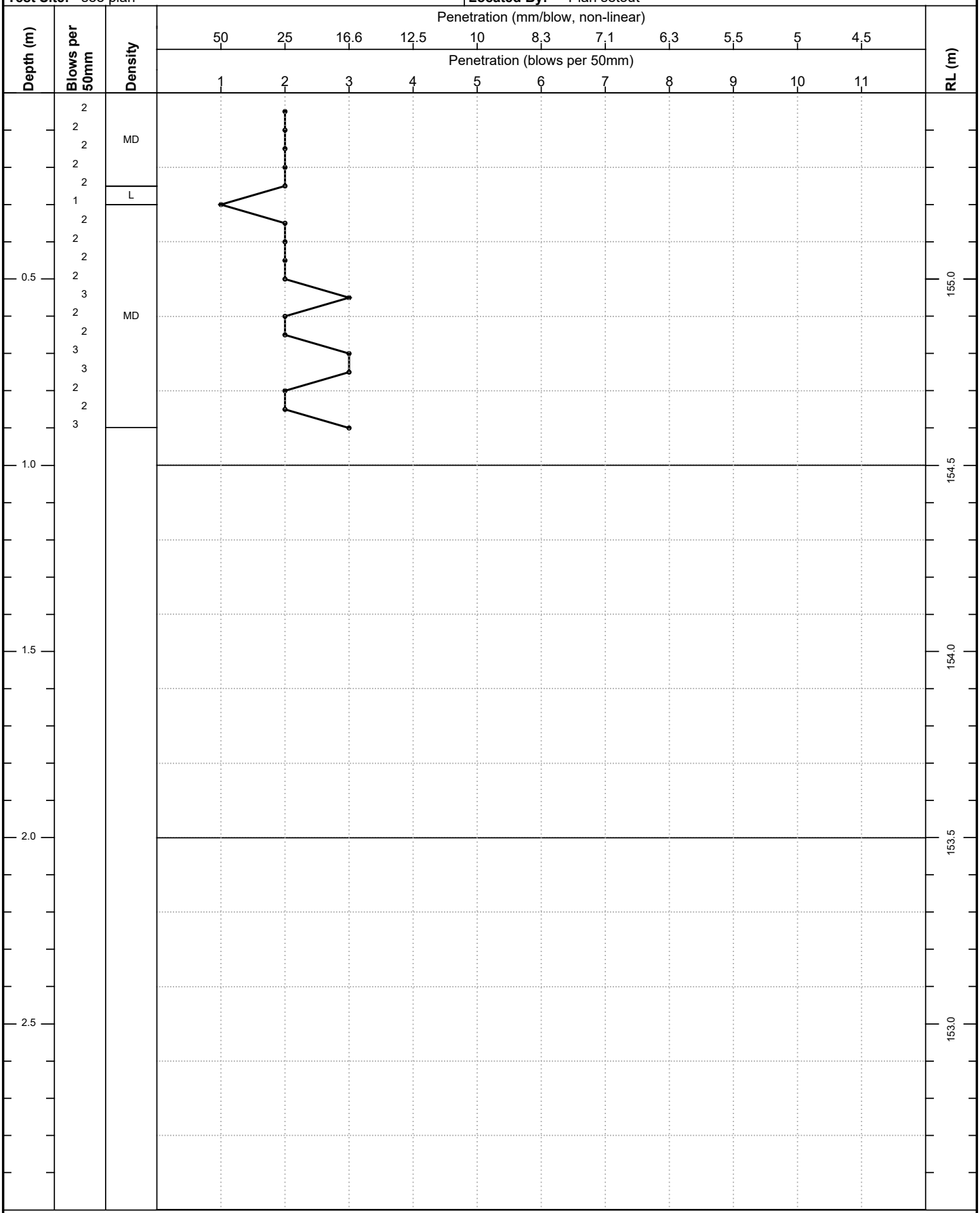


Remarks: Results may be affected by skin friction, particularly where the tested depth exceeds 1.5m. Density classification in terms of NZGS Field Description of Soil and Rock (2005).

Scala Penetrometer Test Log

Test ID:	**RP04**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050431mN, 1716728mE	**Test Date:**	28/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	155.5m	**Checked By:**	DD
Test Site:	see plan	**Located By:**	Plan setout		

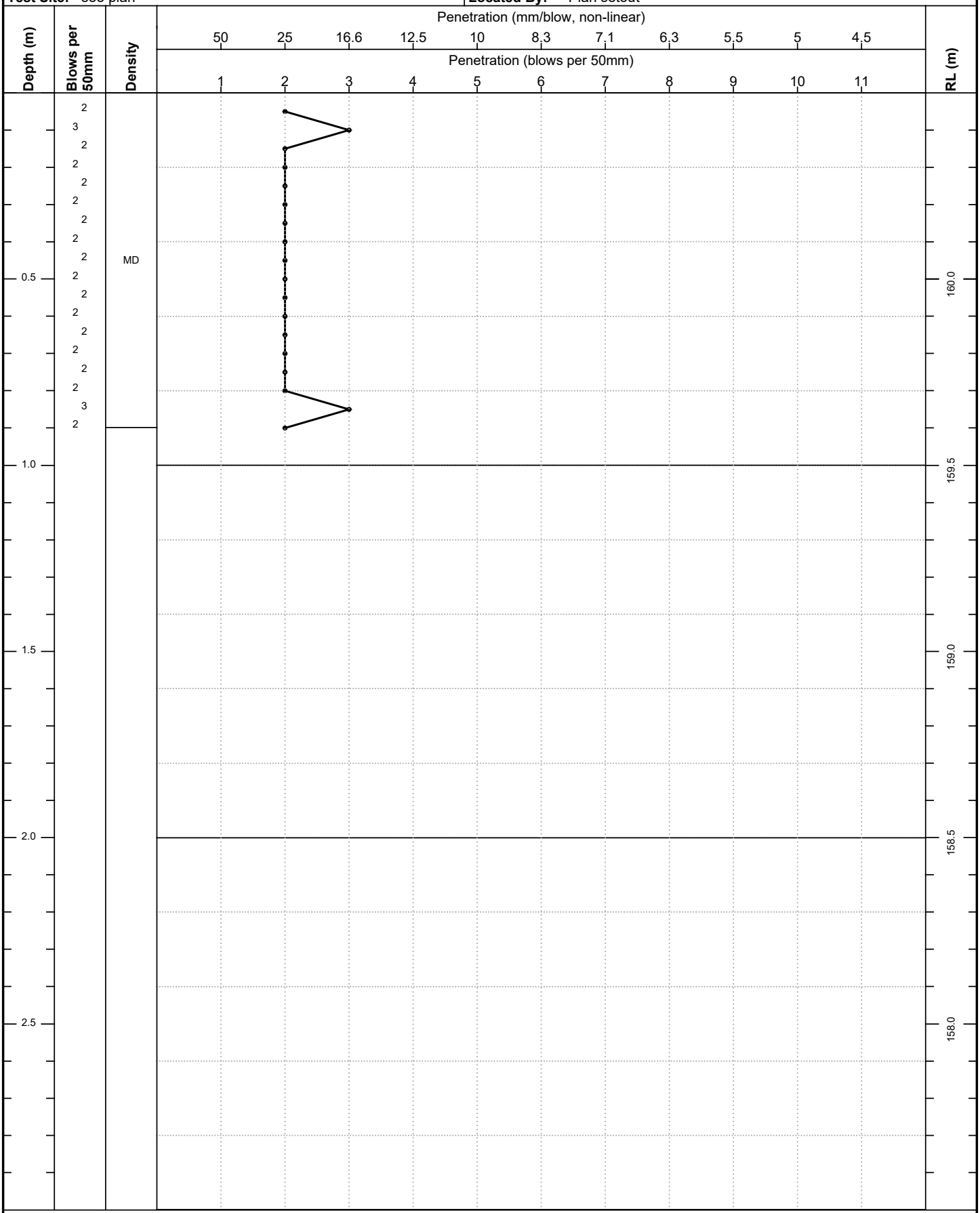


Remarks: Results may be affected by skin friction, particularly where the tested depth exceeds 1.5m. Density classification in terms of NZGS Field Description of Soil and Rock (2005).

Scala Penetrometer Test Log

Test ID:	**RP05**
Project ID:	19103
Sheet:	1 of 1

Client:	Onoke Heights Limited	**Coordinates:**	6050437mN, 1716609mE	**Test Date:**	28/11/2019
Project:	Geotechnical Suitability Assessment for Subdivision	**System:**	NZTM	**Logged By:**	AM
Location:	67 Dip Road, Three Mile Bush	**Elevation:**	160.5m	**Checked By:**	DD
Test Site:	see plan	**Located By:**	Plan setout		



Remarks: Results may be affected by skin friction, particularly where the tested depth exceeds 1.5m. Density classification in terms of NZGS Field Description of Soil and Rock (2005).

Generated with CORE-GS by Geroc - NEW - Scala Log - 25/06/2021 2:35:11 PM

BOREHOLE LOG

HOLE NO.: MBH01

CLIENT: CC Developments LTD

PROJECT: Subdivision Suitability

JOB NO.: 19103

SITE LOCATION: 67 Dip Road, Three Mile Bush

CO-ORDINATES: 1716656mE, 6050495mN (NZTM)

CONTRACTOR: DS Geotechnical **RIG:** LT140

ELEVATION: Ground

DRILLER: Damian Spratt

START DATE: 10/02/2021

END DATE: 10/02/2021

LOGGED BY: CP

DEPTH	GRAPHIC	MATERIAL DESCRIPTION (In accordance with NZGS 'Field Description of Soil and Rock' (2005))	GEOLOGY	METHOD	TCR (%)	SPT N-VALUE (Uncorrected)	TEST DATA	WATER
0.0		Organic SILT with minor clay, dark brown, moist, rootlets	Topsoil	HQTT	100%			Groundwater Not Encountered
		CLayey SILT with minor fine sand (black), brown, moist, highly plastic	Weathered Ash - Kerikeri Volcanic Group					
		0.6m - 2.3m: grading to brownish orange and becoming increasingly greasy						
1.0								
		1.8m: becoming wet		HQTT	100%			
2.0								
		SILT with trace sand, clay and fine gravel. Brown. Low plasticity; wet to saturated: brittle/sensitive becoming greasy on disturbance (allophanic). Gravel is extremely weak angular scoria to 15mm, and fine rounded accretionary lapilli.	Lapilli Tephra - Kerikeri Volcanic Group	HQTT	46%			
	N/R	Sandy SILT with some gravel, trace clay. Brown with clasts of reddish brown, black, and yellowish brown. Non-plastic; saturated, becoming greasy on disturbance (allphanic). Gravel is extremely weak to weak angular scoria to 20mm and fine accretionary lapilli. Clasts break down to saturated clay/silt under firm hand pressure.		Push Tube Sample	100%			
3.0		2.8m - 3.0m: assumed core loss						
		3.0m - 3.4m: push tube sample (triaxial test)		HQTT	100%			
4.0								
	N/R	4.5m - 4.9m: push tube sample (not tested)		Push Tube Sample	100%			
5.0				HQTT	100%			
		5.3m: outlying scoria gravel clast, 50mm, black with minor yellow staining, very weak						
		5.3m - 9.0m: grading to brownish orange with yellow, black and reddish brown clasts						
6.0		6.0m: trrace clay		HQTT	100%			
7.0				HQTT	100%			
8.0				HQTT	100%			
9.0		Clayey SILT with some gravel. Blackish brown. Wet; highly plastic; gravel is dark grey highly vesicular basalt, weak to moderately strong, angular.		HQTT	100%			

REMARKS

Hole terminated at target depth. Borehole dry shortly after drilling.

REF	DATE / TIME	LEVEL	REMARK

LDE Whangarei

127 Bank St, Whangarei

Ph: 0800 397 566

info@lde.co.nz

BOREHOLE LOG

HOLE NO.: MBH01

CLIENT: CC Developments LTD

JOB NO.: 19103

PROJECT: Subdivision Suitability

SITE LOCATION: 67 Dip Road, Three Mile Bush

START DATE: 10/02/2021

CO-ORDINATES: 1716656mE, 6050495mN (NZTM)

ELEVATION: Ground

END DATE: 10/02/2021

CONTRACTOR: DS Geotechnical

RIG: LT140

DRILLER: Damian Spratt

LOGGED BY: CP

DEPTH	GRAPHIC	MATERIAL DESCRIPTION (In accordance with NZGS 'Field Description of Soil and Rock' (2005))	GEOLOGY	METHOD	TCR (%)	SPT N-VALUE (Uncorrected)	TEST DATA	WATER
		[CONT] Clayey SILT with some gravel. Blackish brown. Wet; highly plastic; gravel is dark grey highly vesicular basalt, weak to moderately strong, angular.	[CONT] Lapilli Tephra -	HQTT	100%			
11.0		Slightly weathered BASALT, dark grey, highly vesicular, moderately strong to strong, yellow and black discoloration along vertical joints, iron oxide staining in vesicles.	Basalt Lava Flow - Kerikeri Volcanic Group	HQTT	100%			
12.0				HQTT	100%			
13.0		13.4m: becoming less vesicular						
		13.8m: becoming more vesicular		HQTT	100%			
14.0		14.0m: becoming less vesicular						
		14.2m: quartz clast with serpentinization around exterior (entrained clast from country rock)						
		EOH: 14.80m					50 for 15mm N=50 for 0mm	Groundwater Not Encountered
15.0								
16.0								
17.0								
18.0								
19.0								

REMARKS

Hole terminated at target depth. Borehole dry shortly after drilling.

REF	DATE / TIME	LEVEL	REMARK

LDE Whangarei

127 Bank St, Whangarei

Ph: 0800 397 566

info@lde.co.nz

CORE PHOTOS

HOLE NO.: MBH01

JOB NO.: 19103

0.00-3.40m

3.40-6.80m

6.80-9.60m

9.60-12.50m

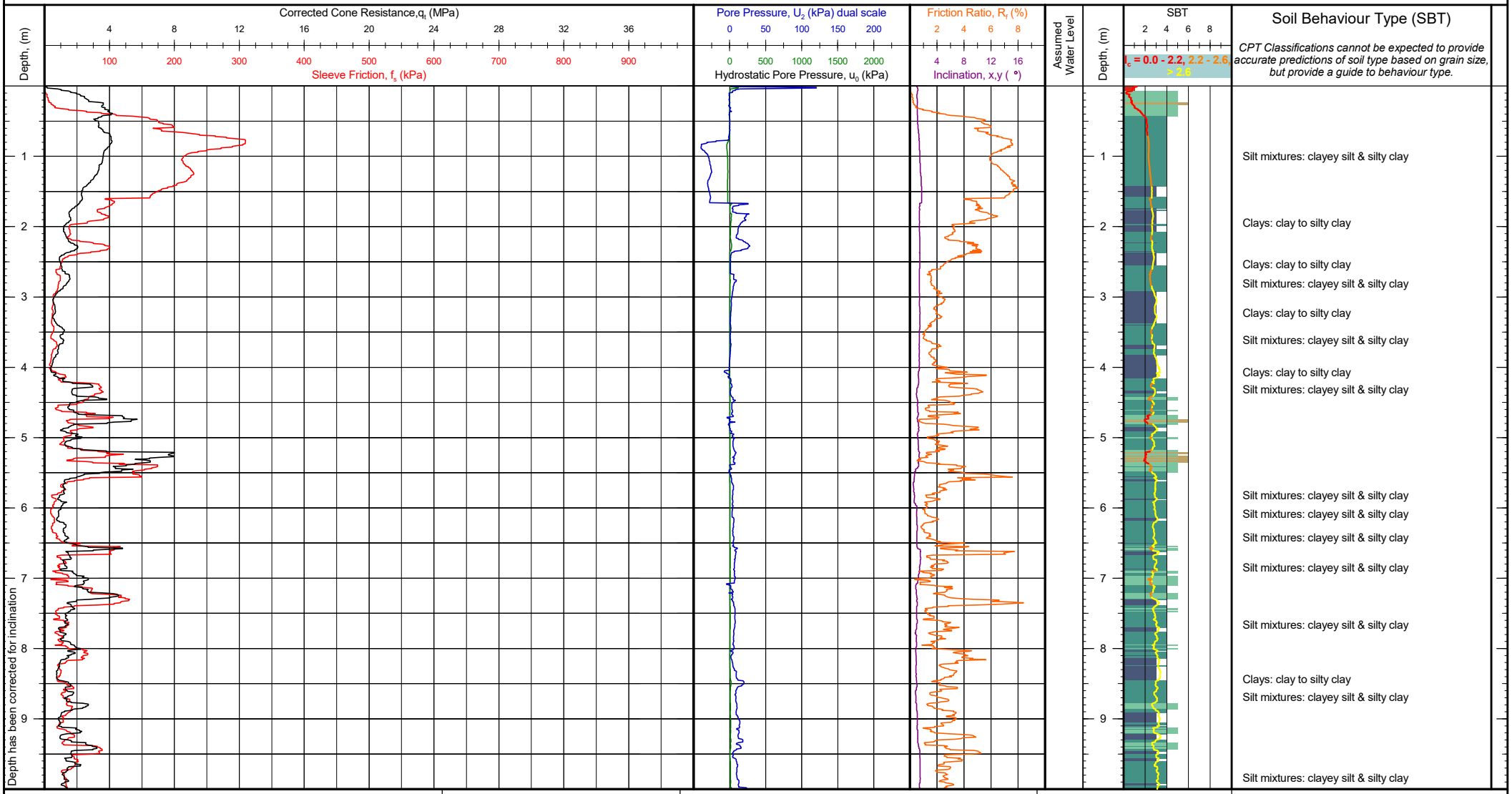
CORE PHOTOS

HOLE NO.: MBH01

JOB NO.: 19103

12.50-14.80m

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
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- Silt mixtures: clayey silt & silty clay
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- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050565.67, 1716688.48
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.681908,174.289509
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**	
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance

Elevation (m):	Unknown
Date of Test:	10/02/2021
Depth (m):	16.39
Pre Drill (m):	N/A

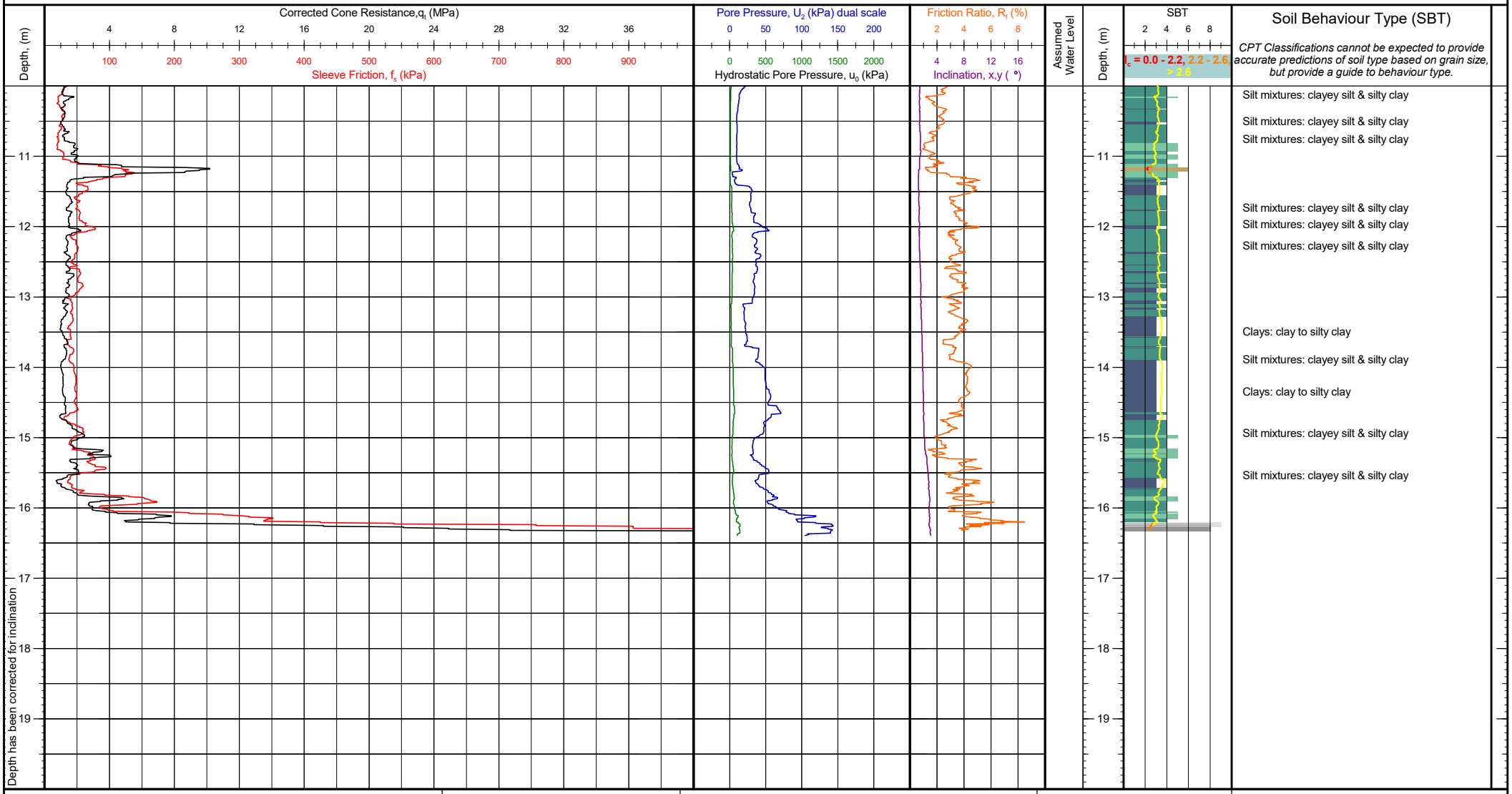
Client Reference:

Test Number: **CPT-01**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
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- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050565.67, 1716688.48	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.681908,174.289509	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	16.39
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

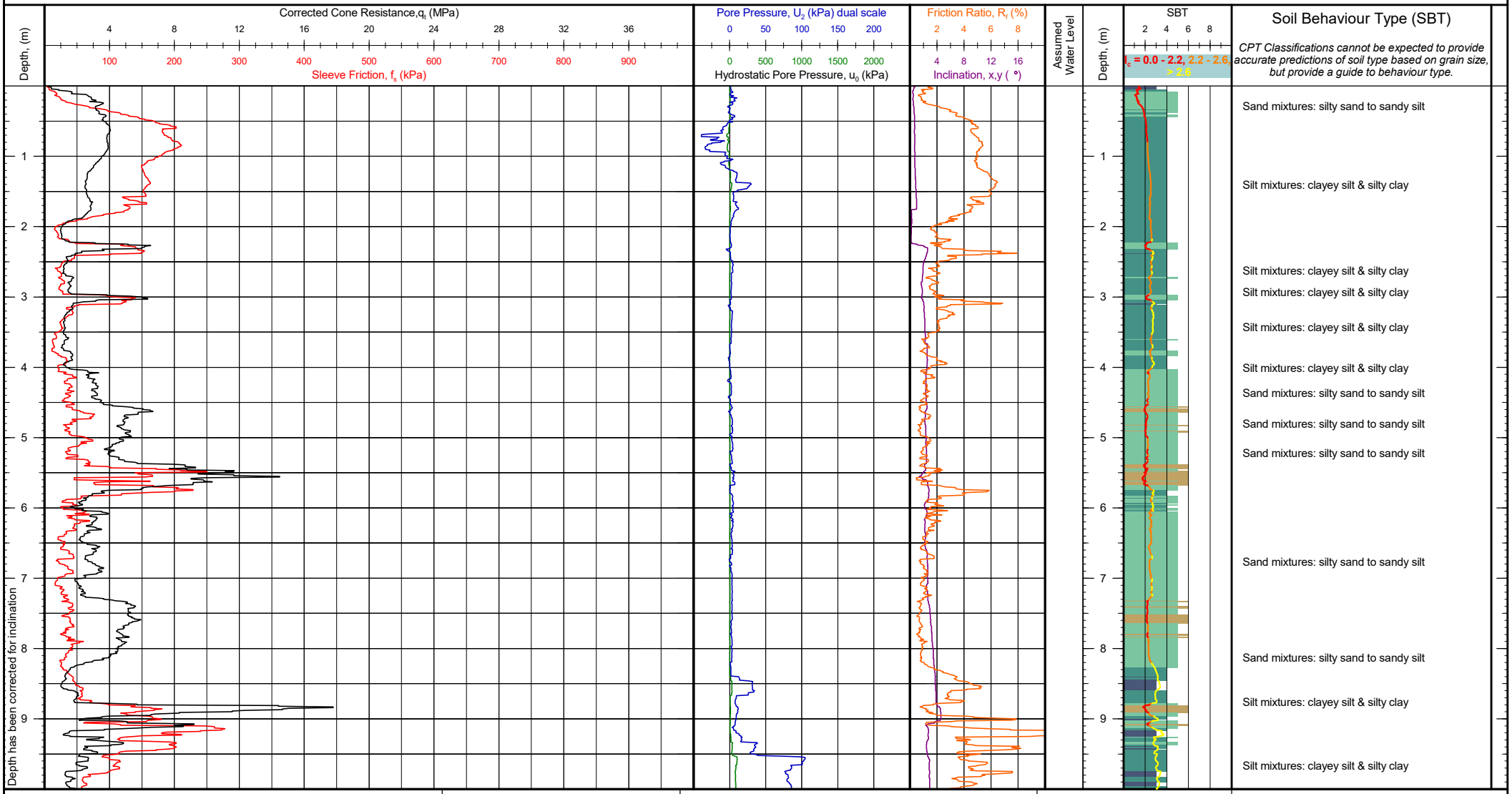
Client Reference:

Test Number: **CPT-01**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050550.22, 1716614.61	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.682056,174.288695	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	12.39
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High friction resistance		

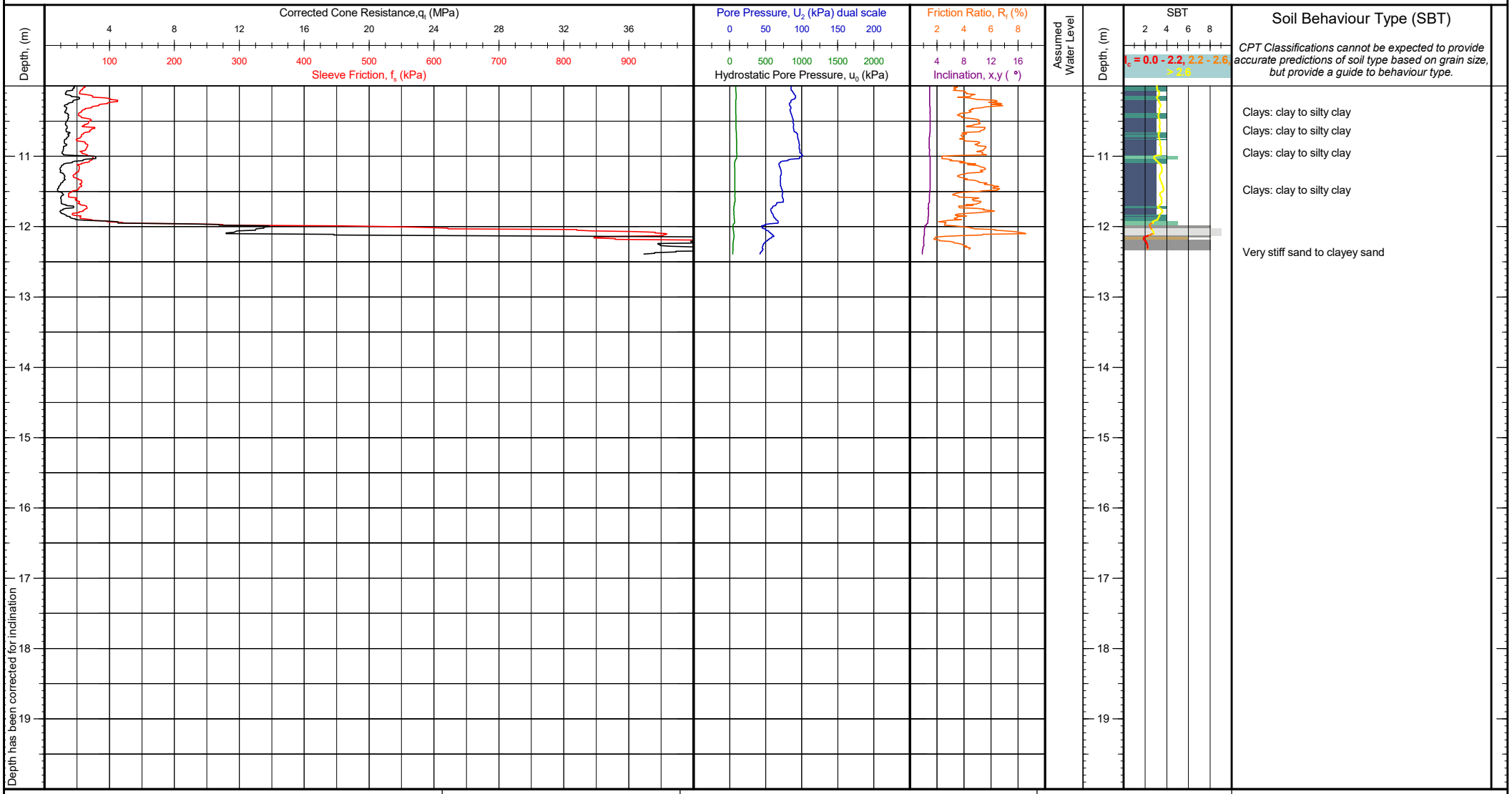
Client Reference:

Test Number: **CPT-02**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050550.22, 1716614.61	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.682056,174.288695	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	12.39
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High friction resistance		

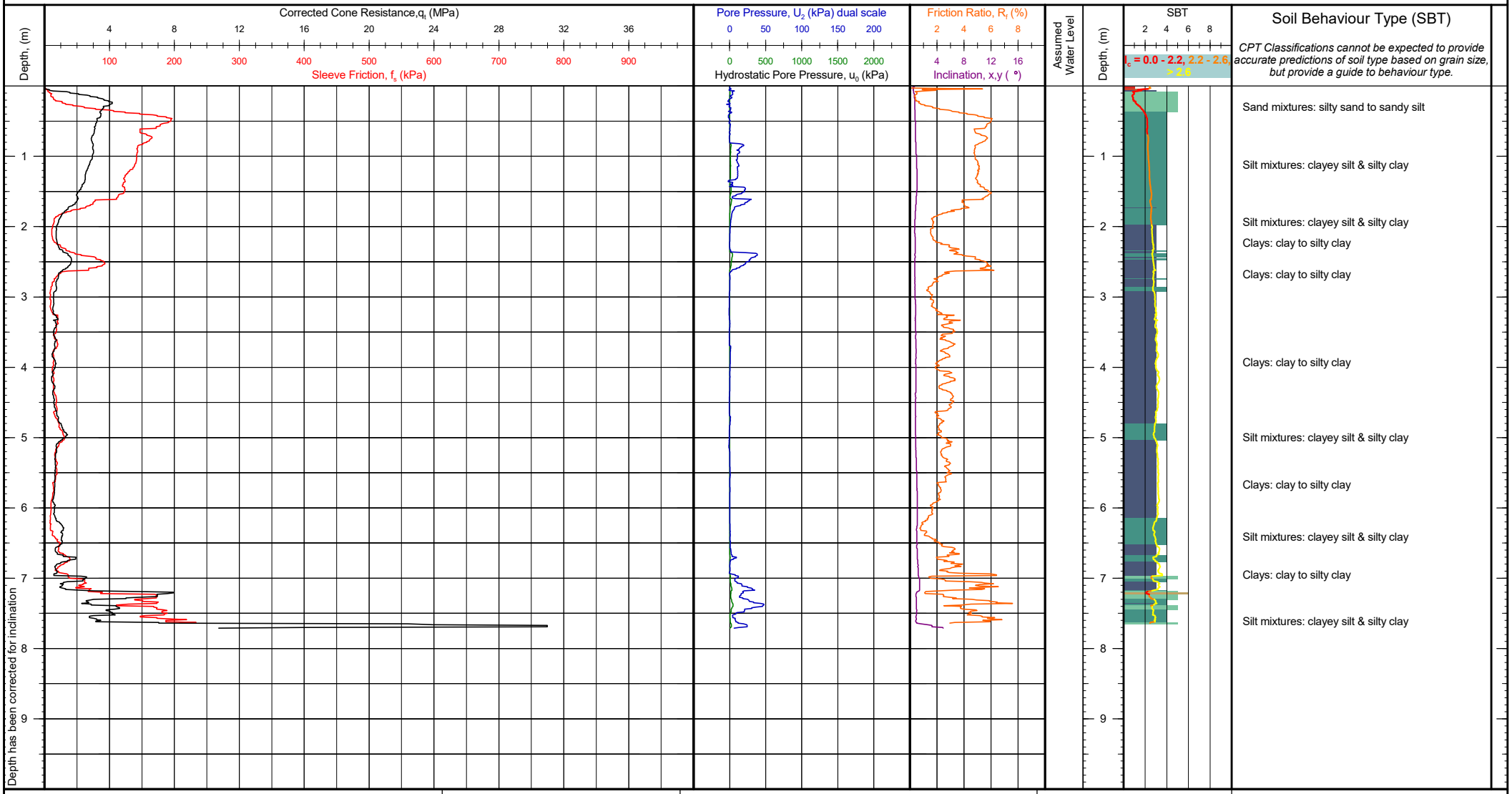
Client Reference:

Test Number: **CPT-02**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



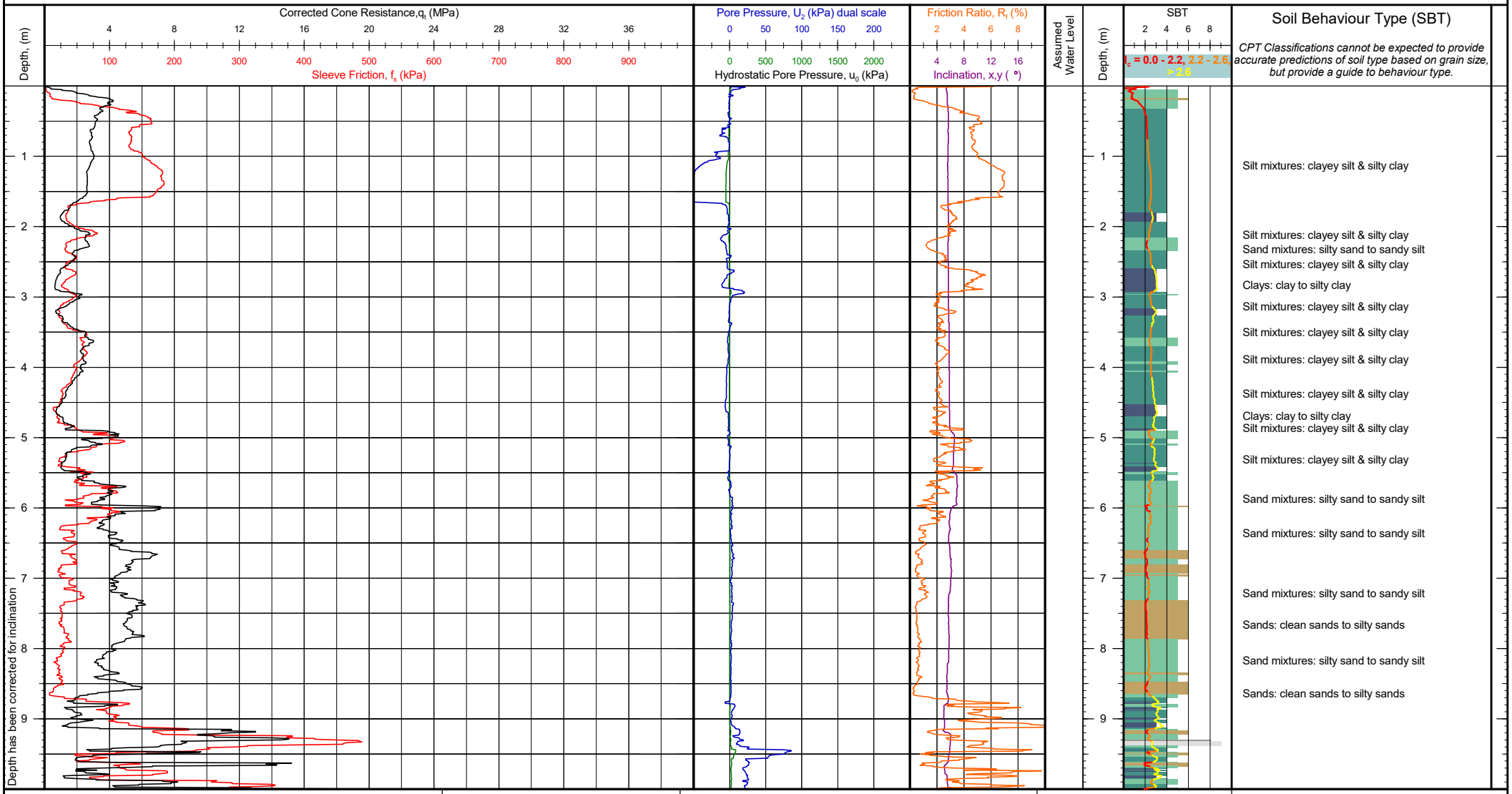
Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050520.21, 1716594.03	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.682329,174.288472	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	7.71
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	Inclination high or rapid increase	**G.I. Job Ref:**	210082

Client Reference:

Test Number: **CPT-03**

Comments:

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt
- Sands: clean sands to silty sands
- Sand mixtures: silty sand to sandy silt
- Sands: clean sands to silty sands

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050497.39, 1716650.30	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ291	**WGS84 (deg):**	-35.682528,174.289097	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	12.67
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

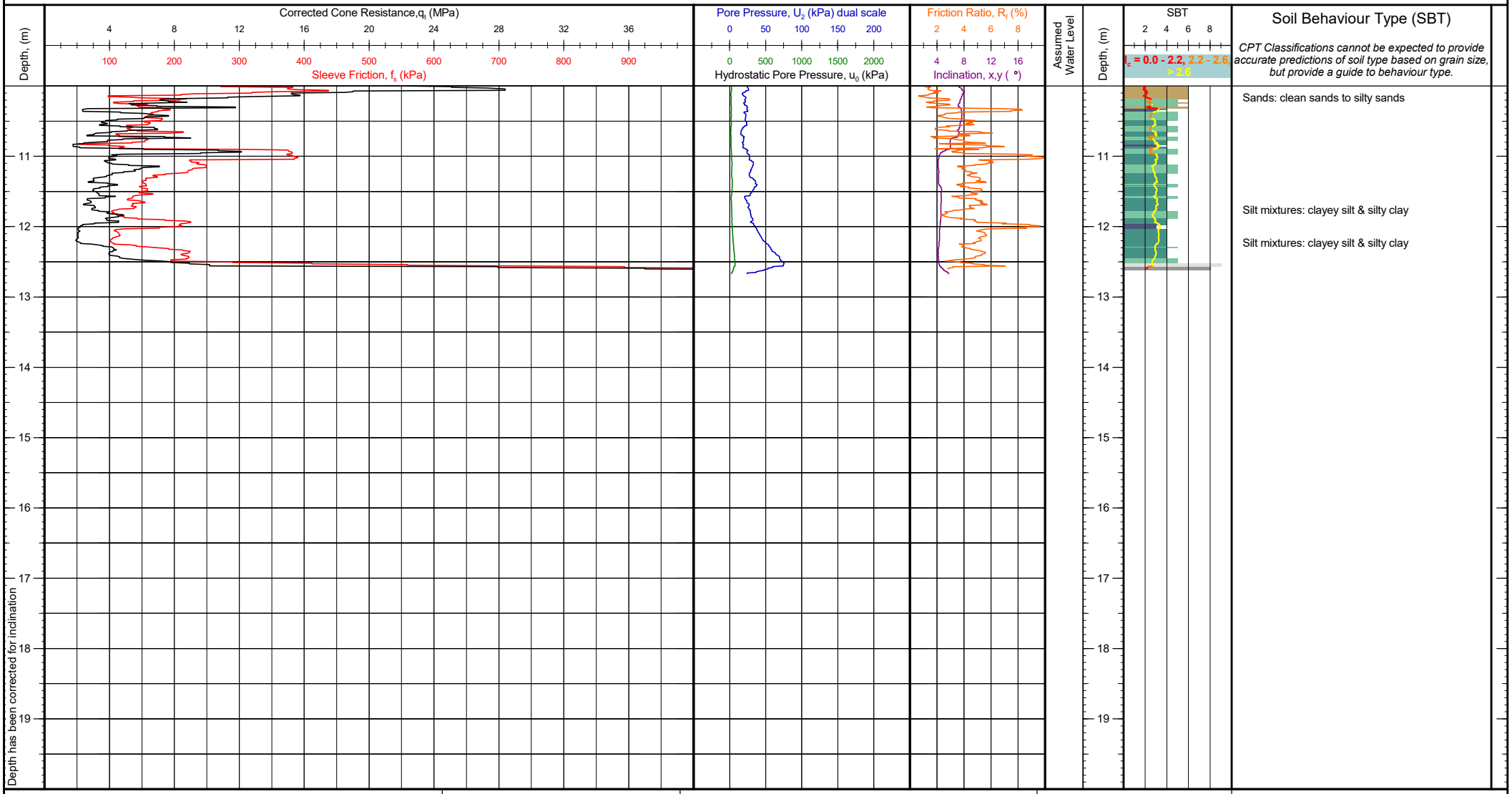
Client Reference:

Test Number: **CPT-04**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

Sands: clean sands to silty sands

Silt mixtures: clayey silt & silty clay

Silt mixtures: clayey silt & silty clay

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050497.39, 1716650.30	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ291	**WGS84 (deg):**	-35.682528,174.289097	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	12.67
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

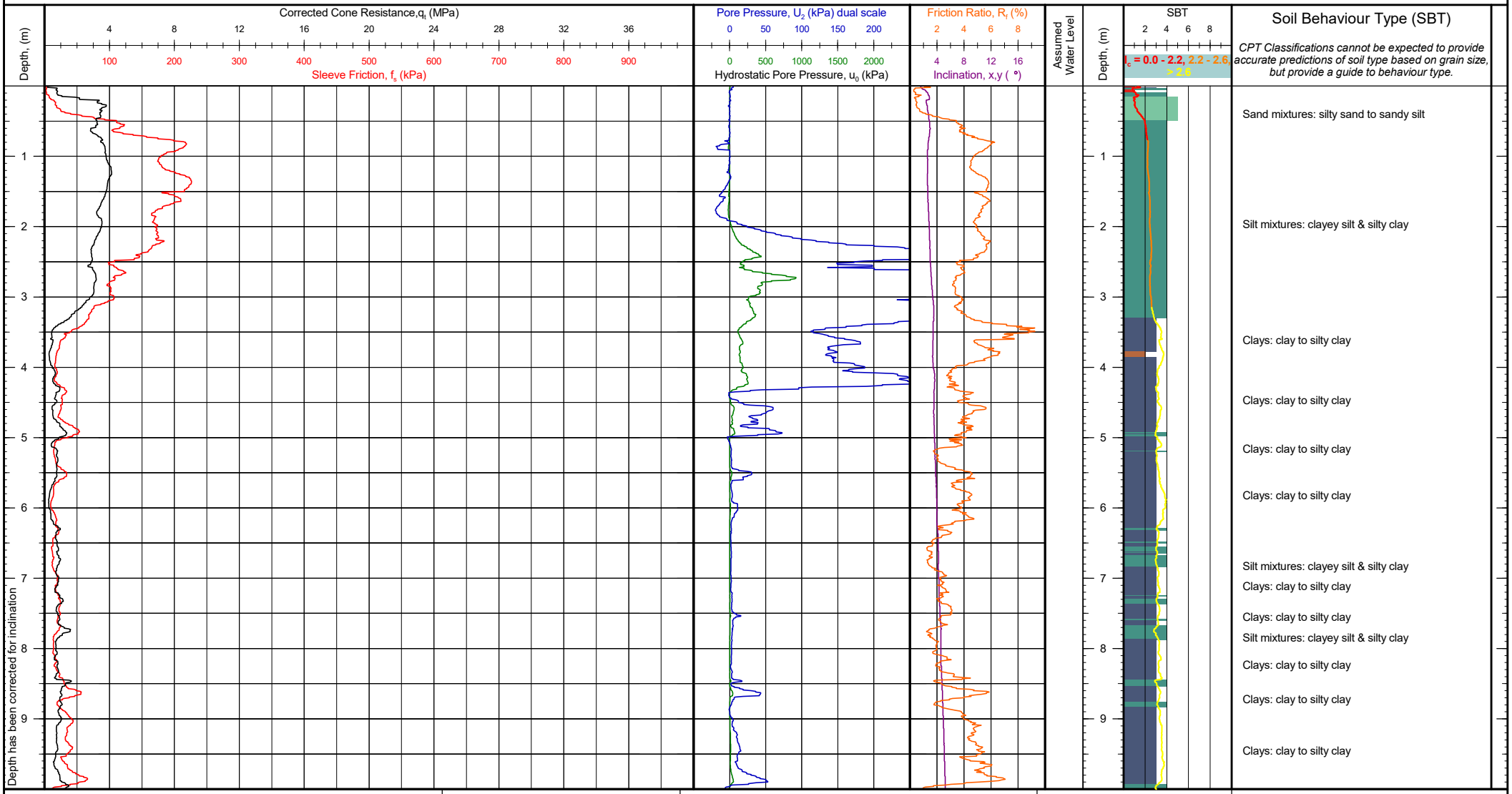
Client Reference:

Test Number: **CPT-04**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
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- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
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- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Clays: clay to silty clay
- Clays: clay to silty clay

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050455.93, 1716656.90	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.682901,174.289176	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	18.02
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	Danger of buckling rods		

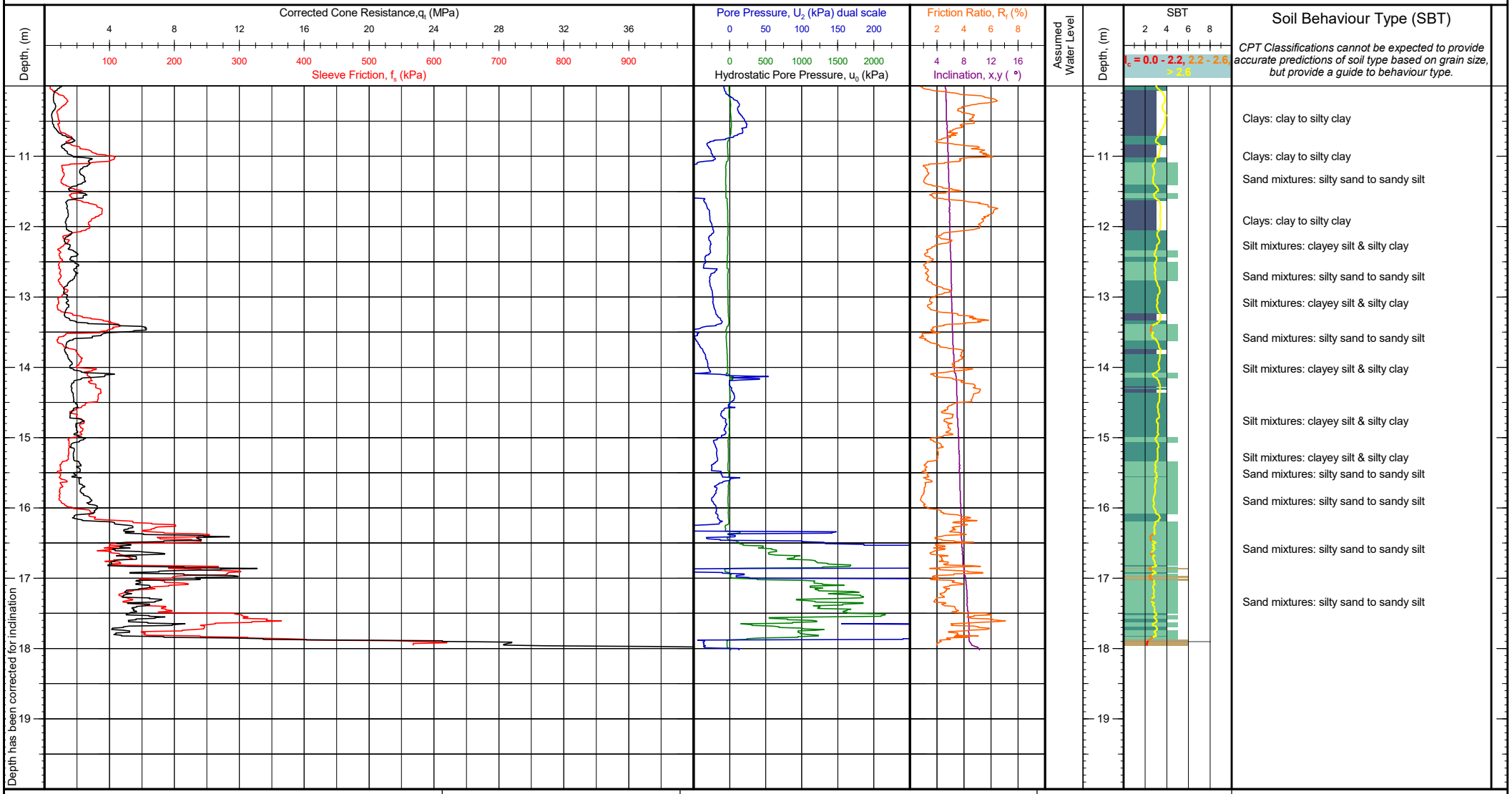
Client Reference:

Test Number: **CPT-05**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

- Clays: clay to silty clay
- Clays: clay to silty clay
- Sand mixtures: silty sand to sandy silt
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
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- Sand mixtures: silty sand to sandy silt
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- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050455.93, 1716656.90	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.682901,174.289176	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	18.02
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	Danger of buckling rods		

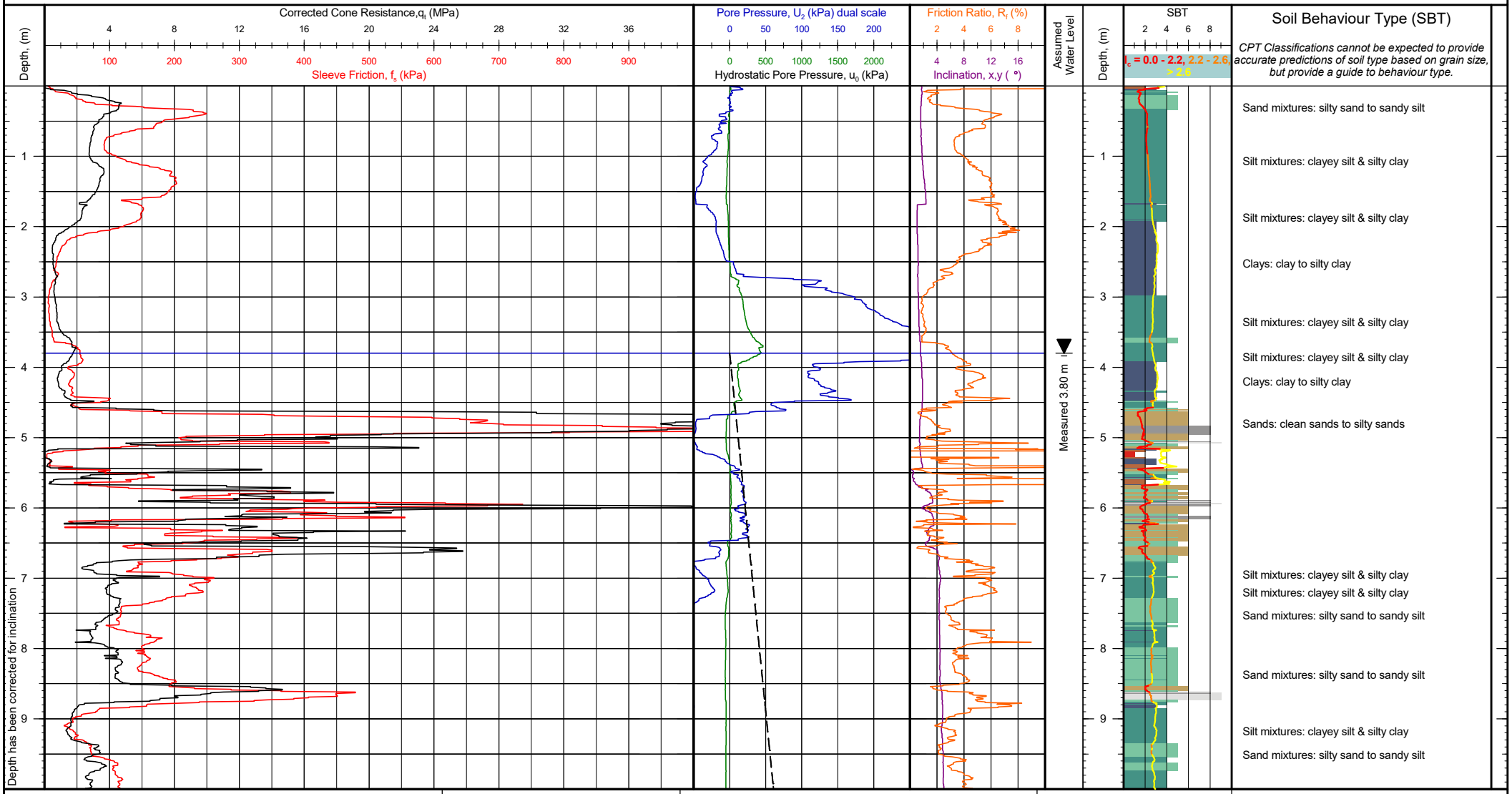
Client Reference:

Test Number: **CPT-05**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050409.56, 1716774.86	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.683305,174.290486	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	16.29
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

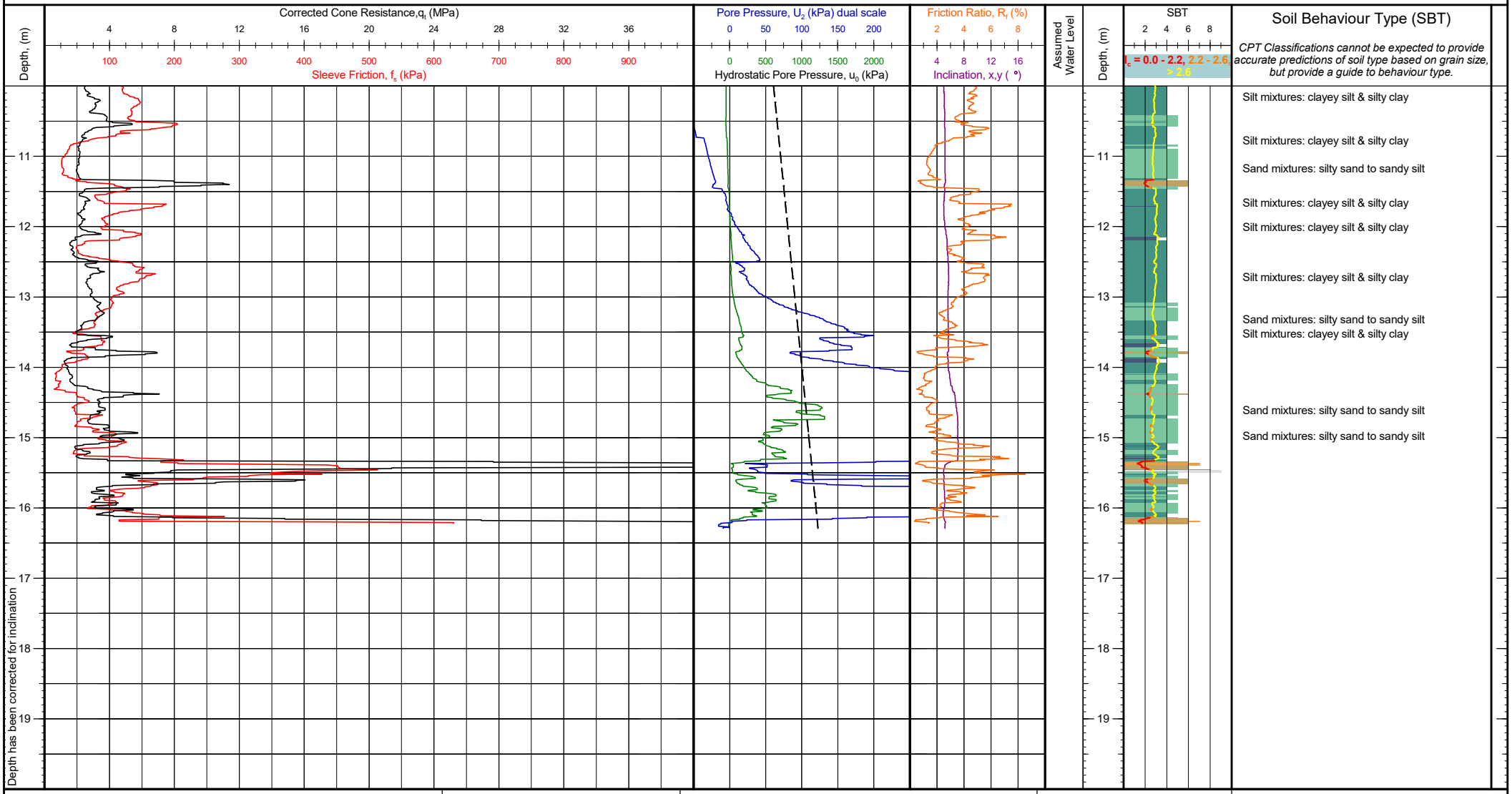
Client Reference:

Test Number: **CPT-06**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Sand mixtures: silty sand to sandy silt

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050409.56, 1716774.86	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.683305,174.290486	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	16.29
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

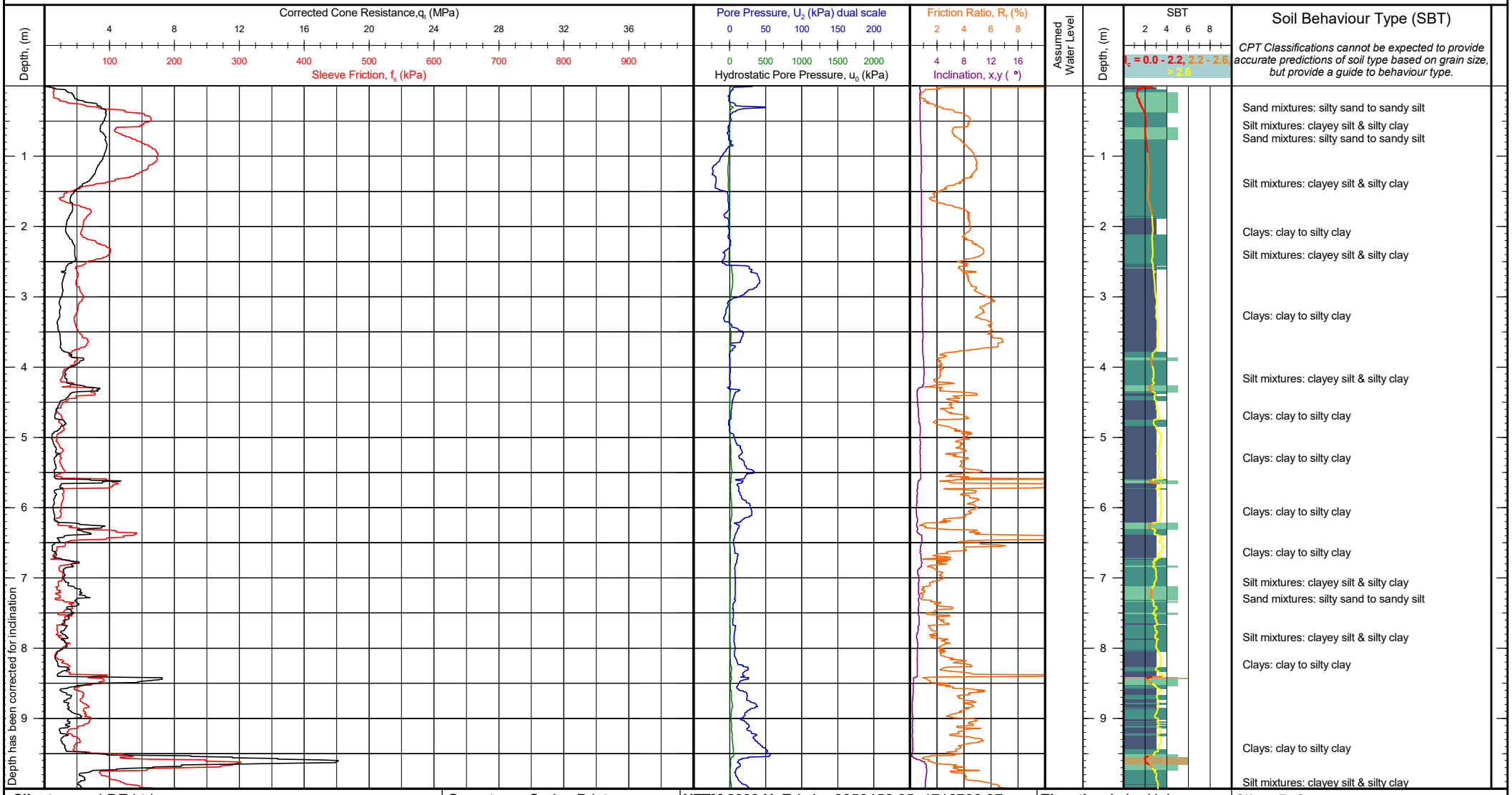
Client Reference:

Test Number: **CPT-06**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Soil Behaviour Type (SBT)

CPT Classifications cannot be expected to provide accurate predictions of soil type based on grain size, but provide a guide to behaviour type.

- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Clays: clay to silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay
- Sand mixtures: silty sand to sandy silt
- Silt mixtures: clayey silt & silty clay
- Clays: clay to silty clay
- Clays: clay to silty clay
- Silt mixtures: clayey silt & silty clay

Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050452.95, 1716790.37	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.682912,174.290651	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	13.29
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

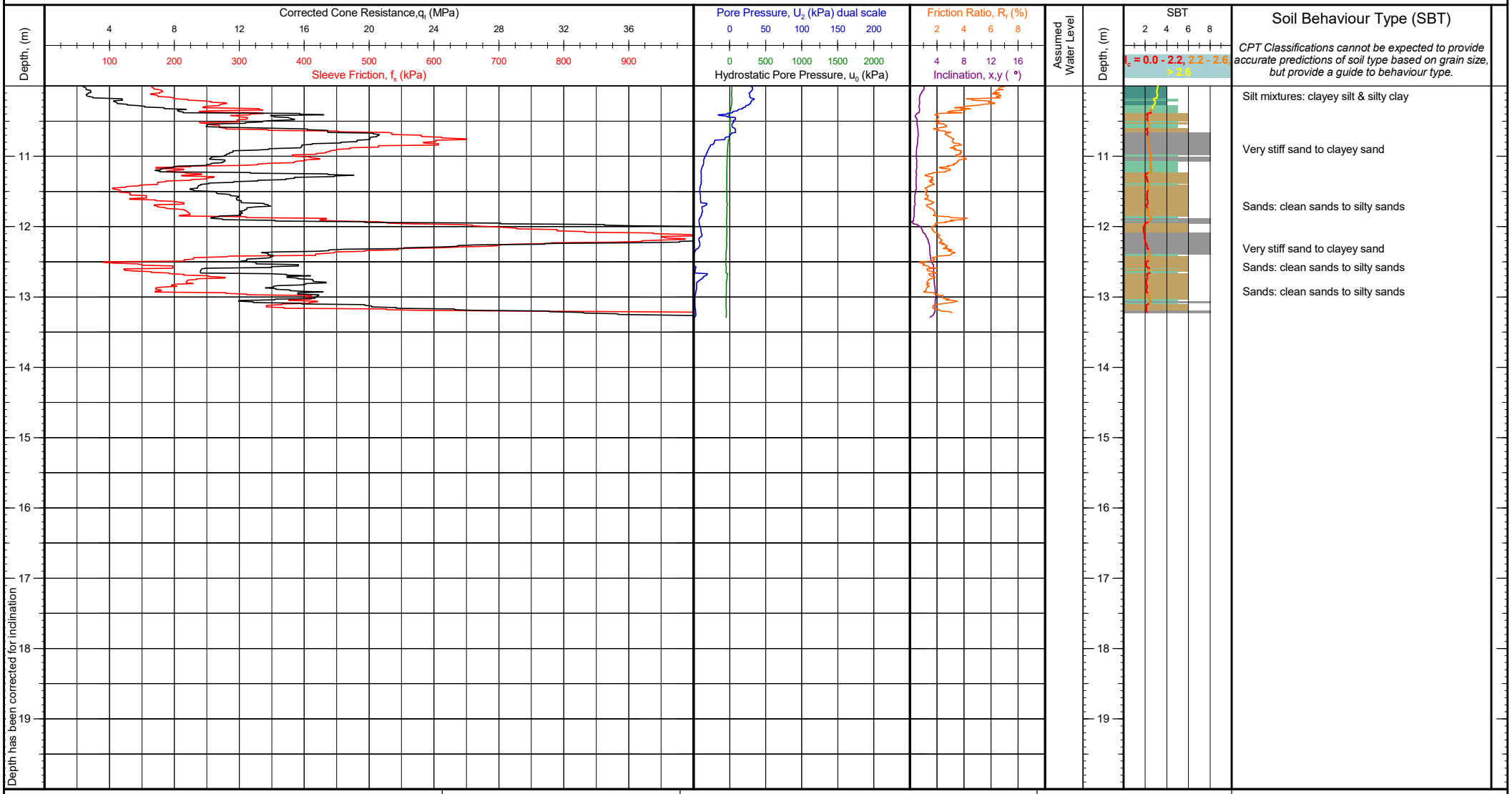
Client Reference:

Test Number: **CPT-07**

G.I. Job Ref: 210082

Comments:

CONE PENETRATION TEST (CPT) LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050452.95, 1716790.37	**Elevation (m):**	Unknown
Project:	Dip Road	**Cone Ref:**	MKJ325	**WGS84 (deg):**	-35.682912,174.290651	**Date of Test:**	10/02/2021
Location:	Kamo, Whangarei	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	13.29
Engineer:	Finlay Wallen-Halliwell	**Area Ratio:**	0.80	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

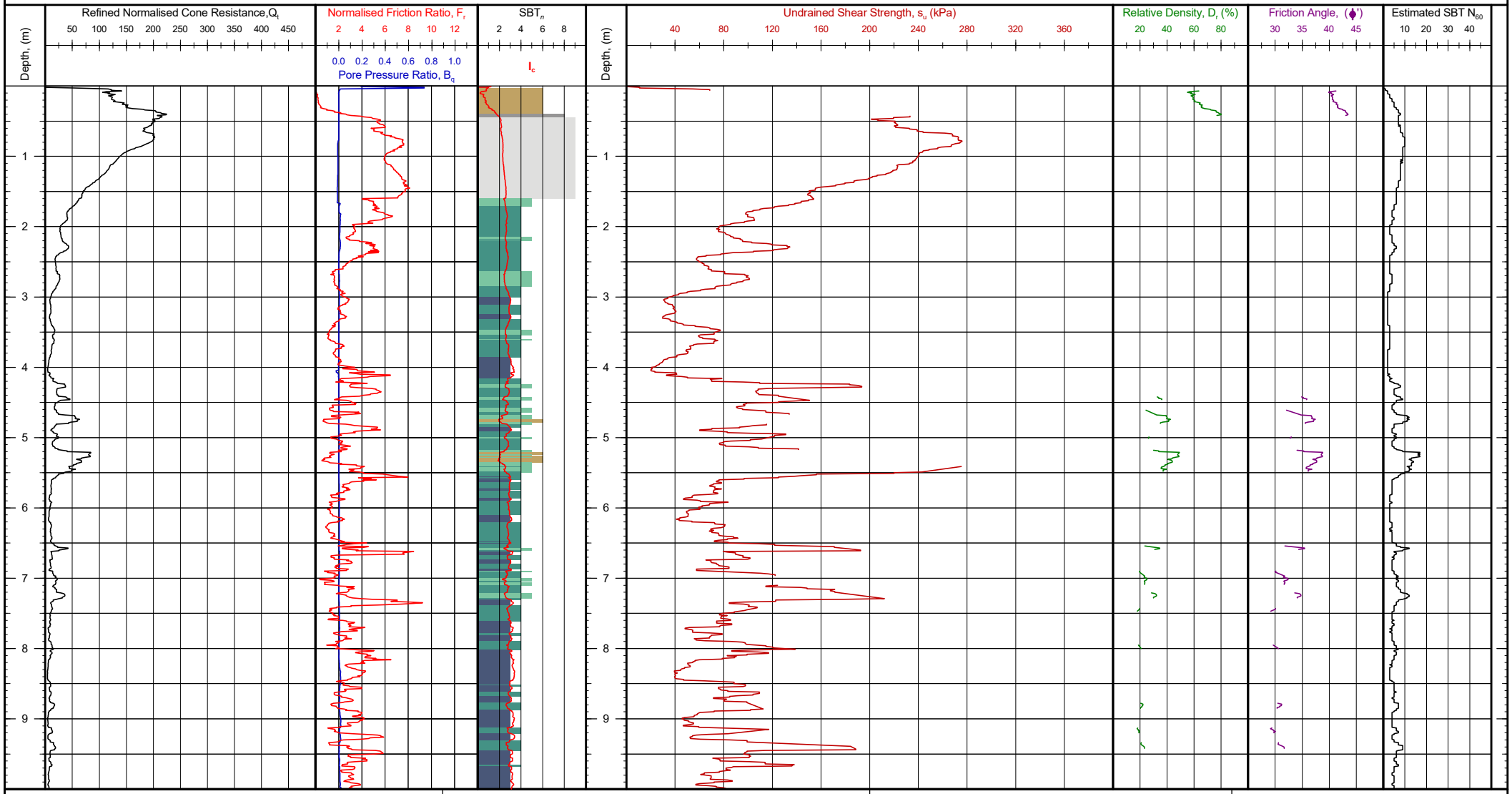
Client Reference:

Test Number: **CPT-07**

G.I. Job Ref: 210082

Comments:

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

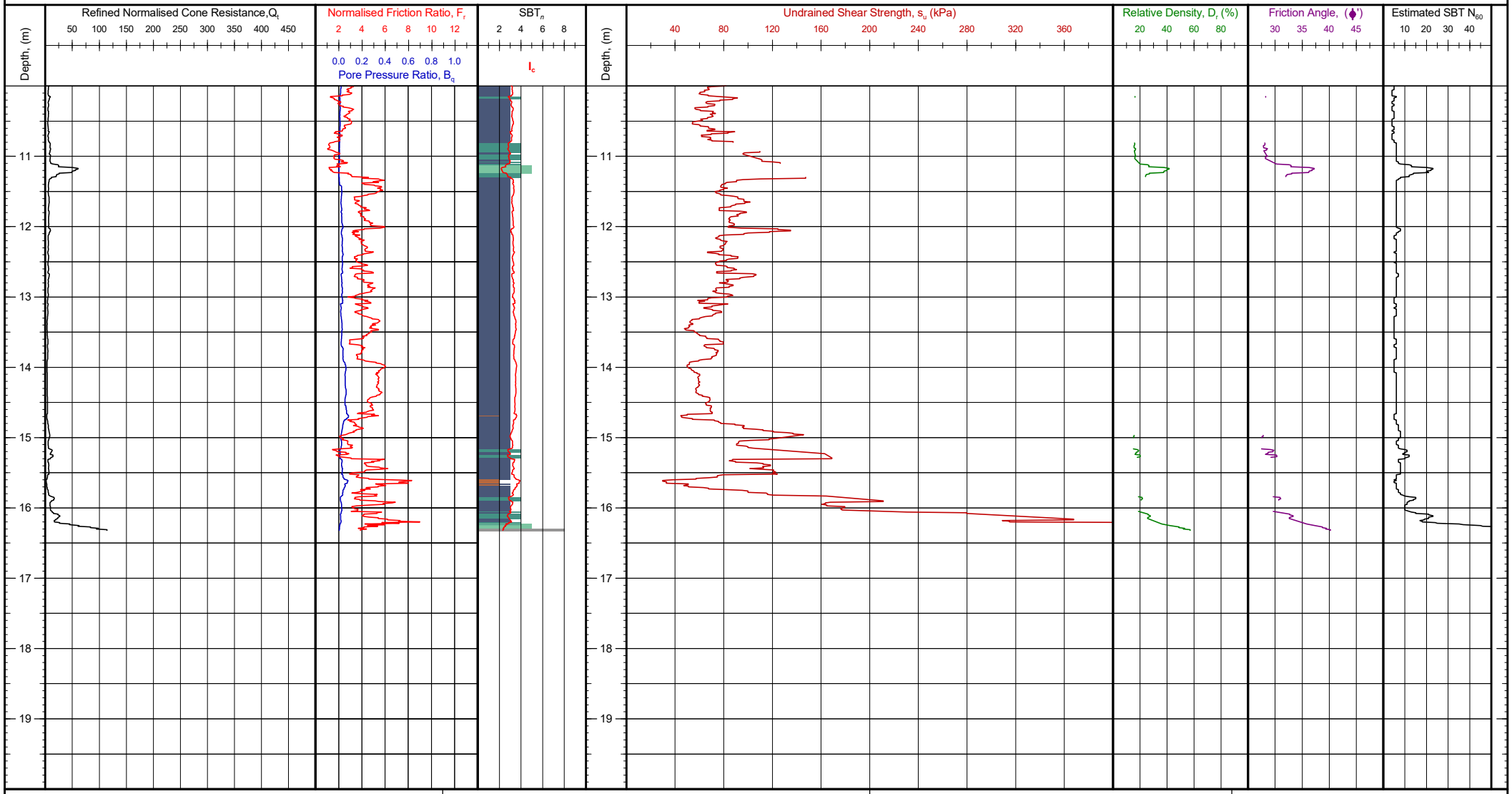
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-01**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

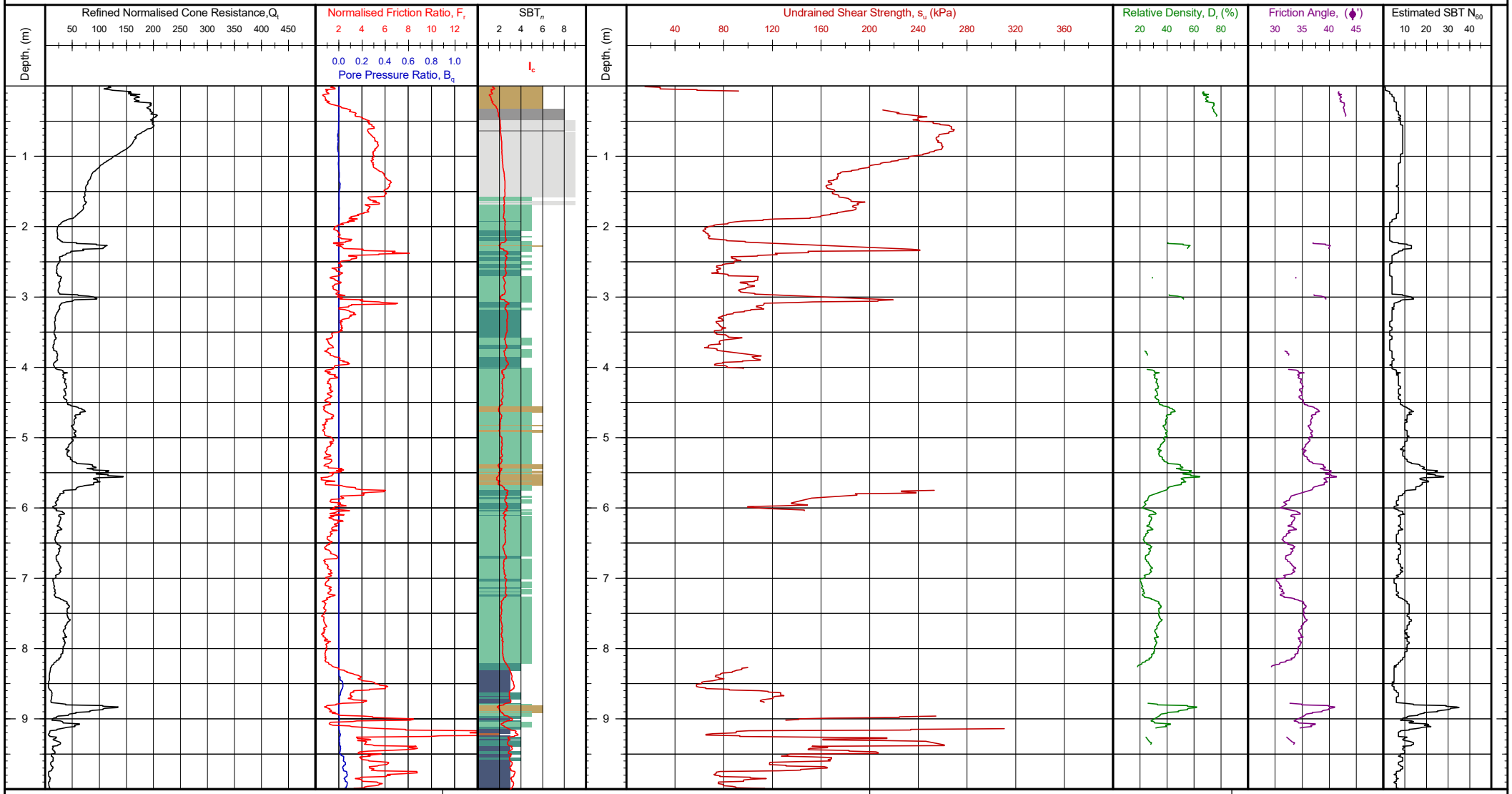
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-01**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
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4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

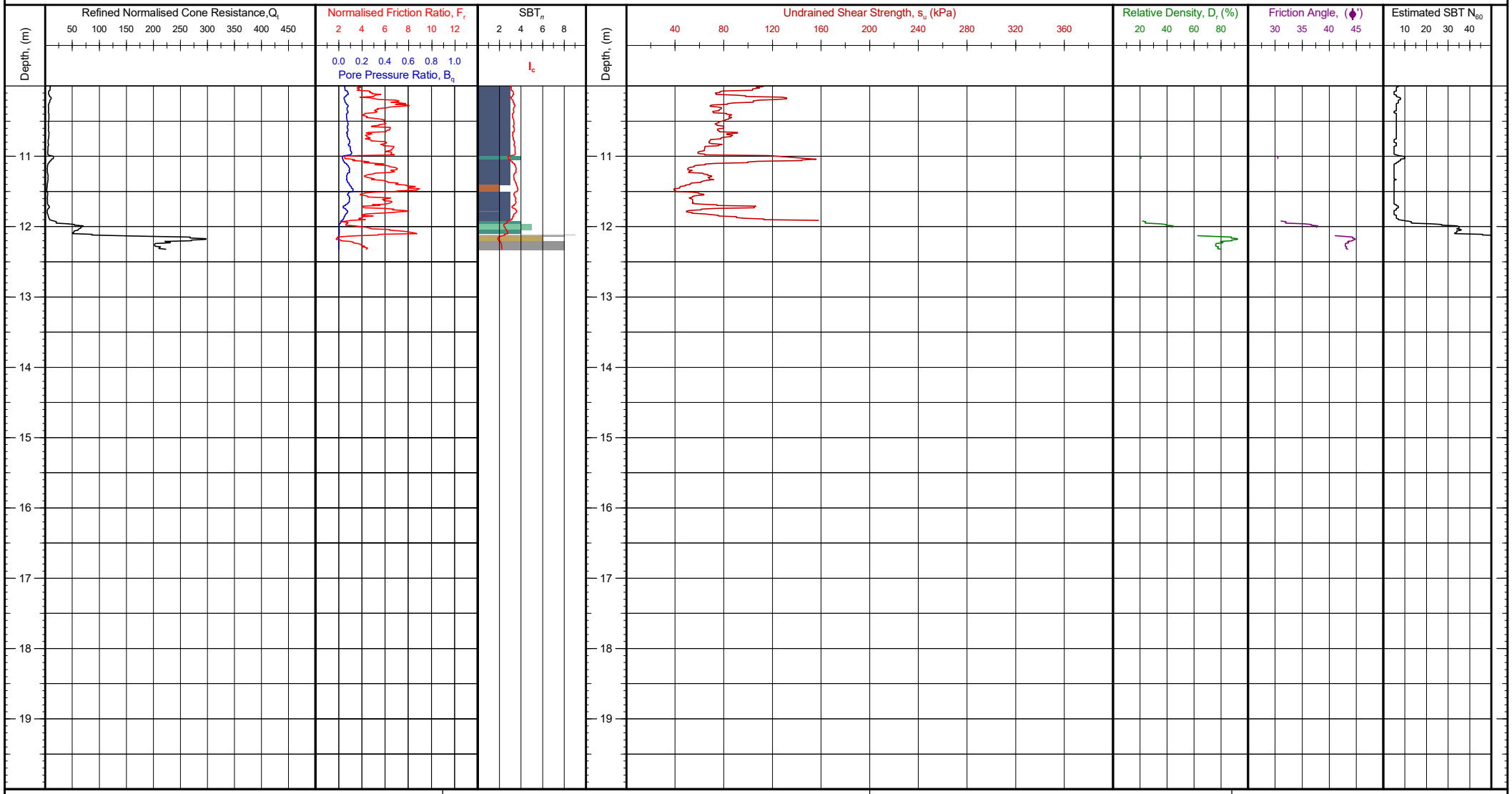
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-02**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

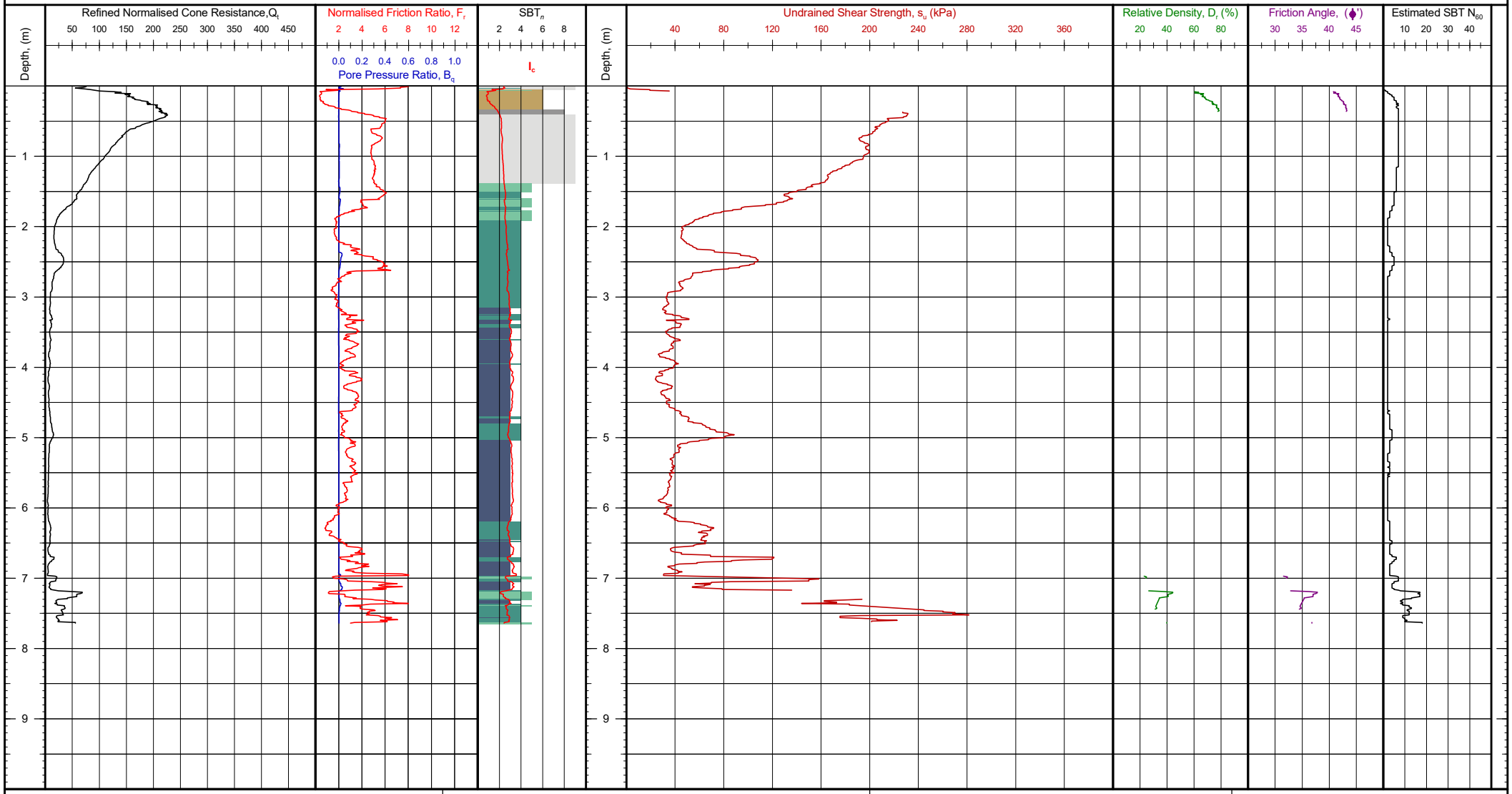
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-02**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

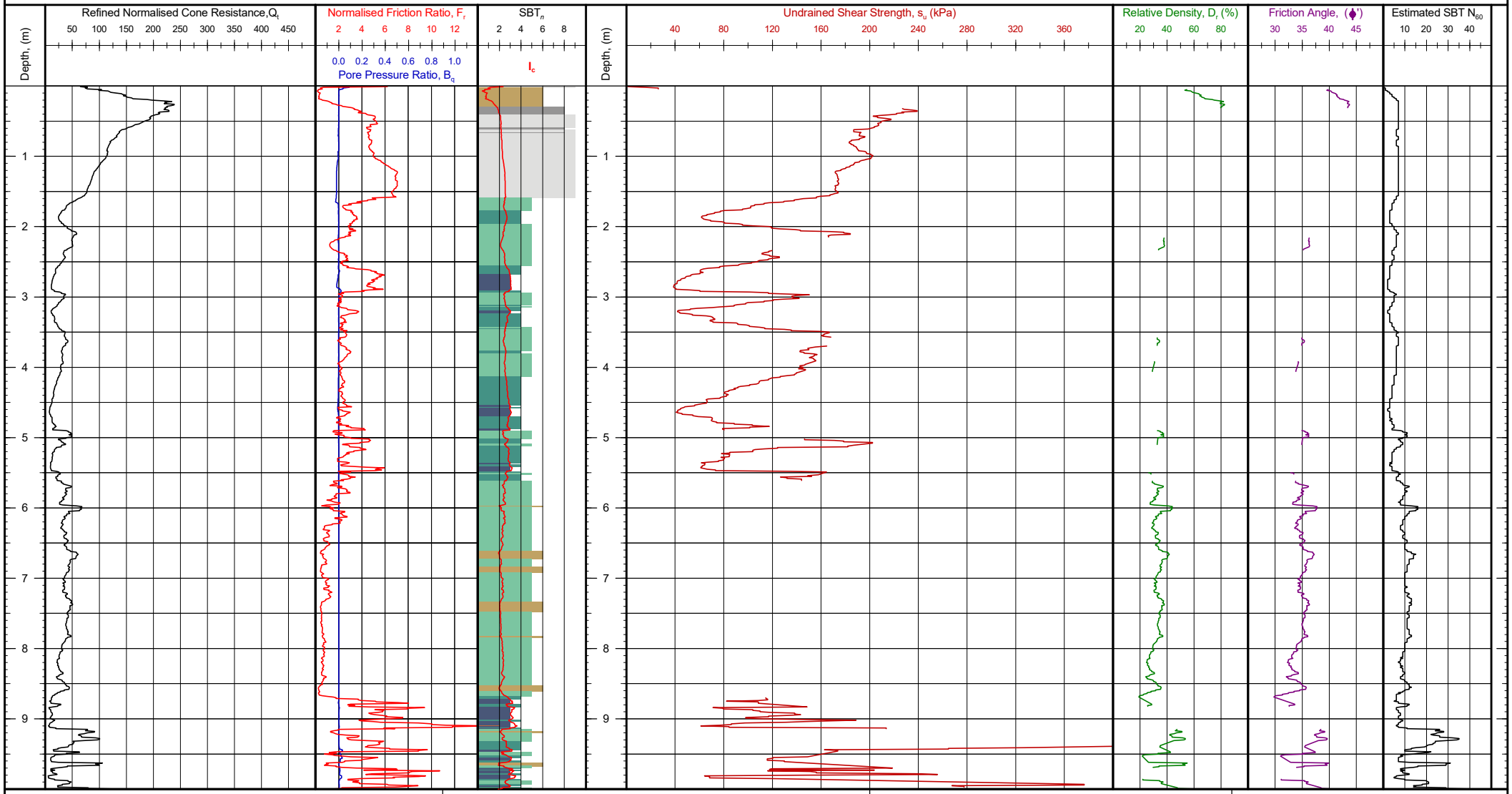
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-03**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

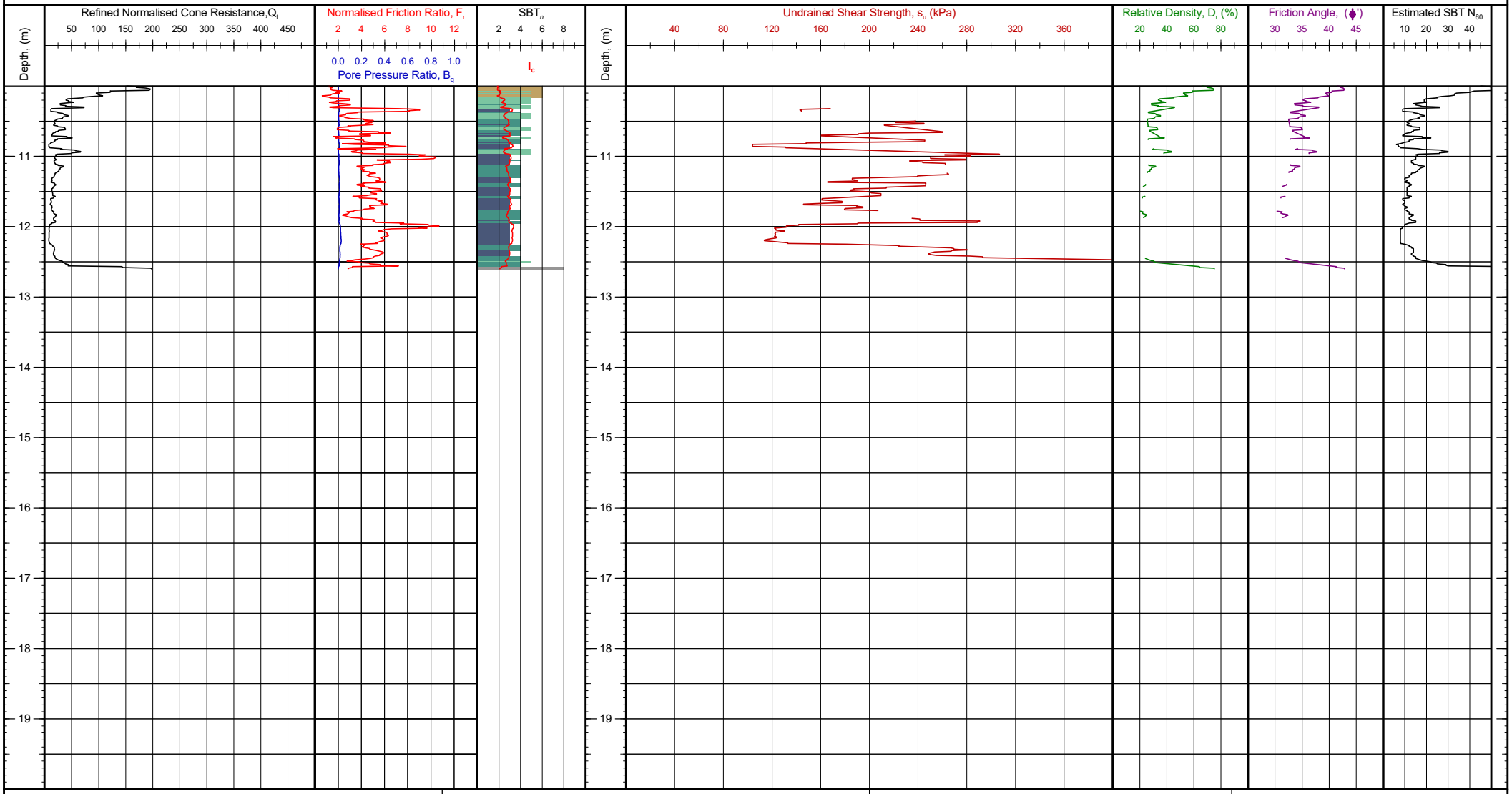
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-04**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

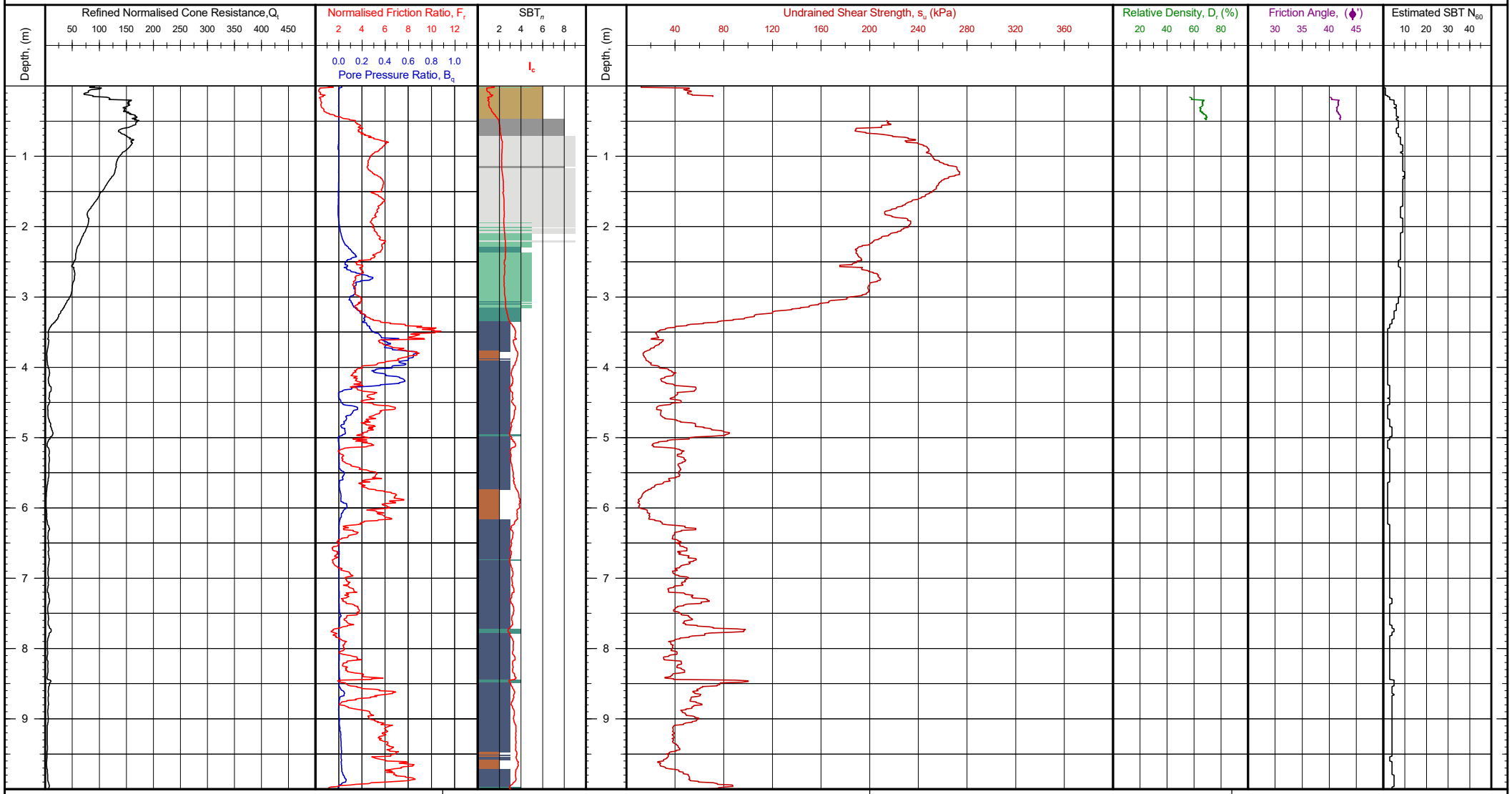
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-04**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

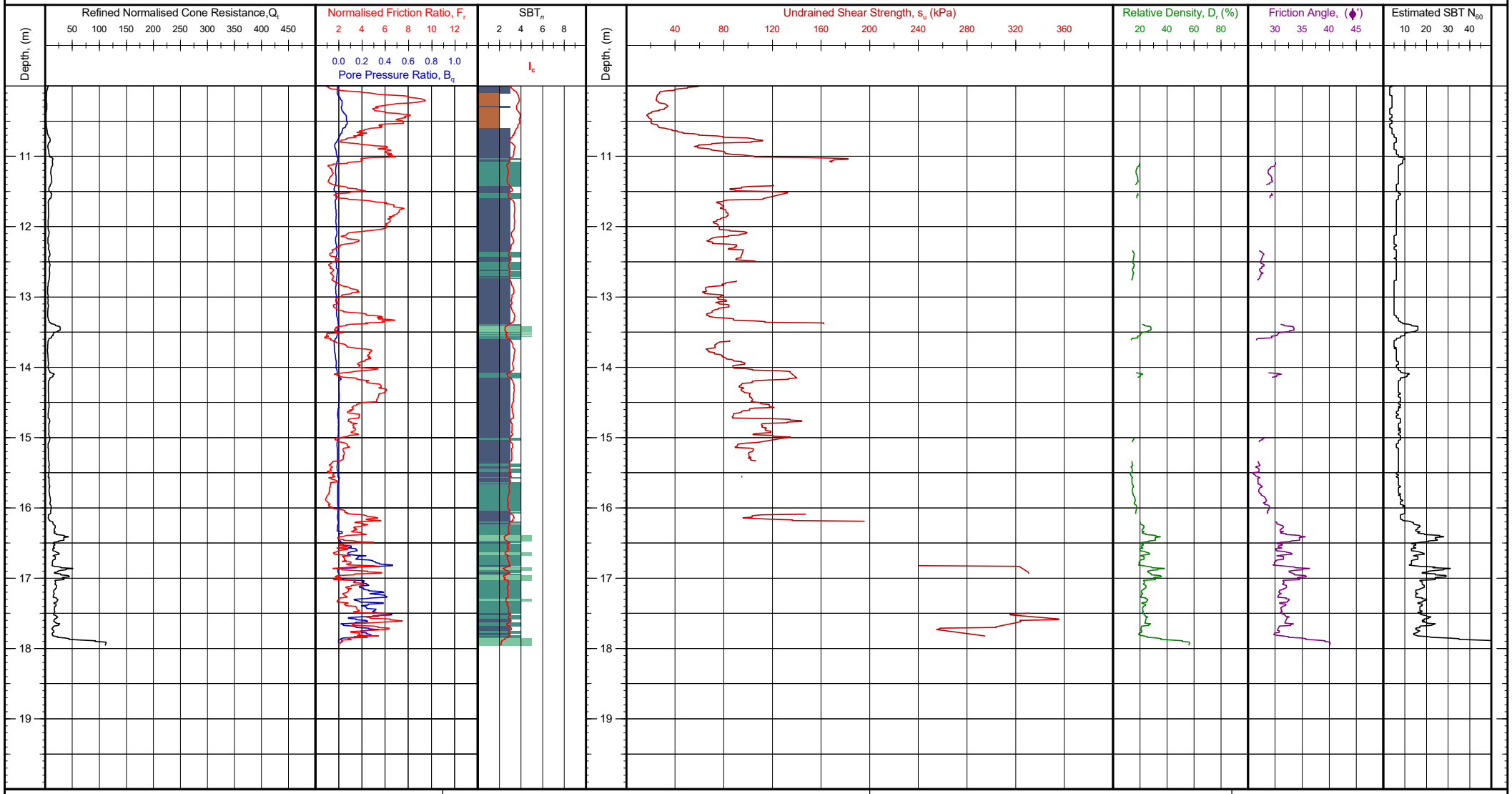
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-05**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
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Notes and Limitations:

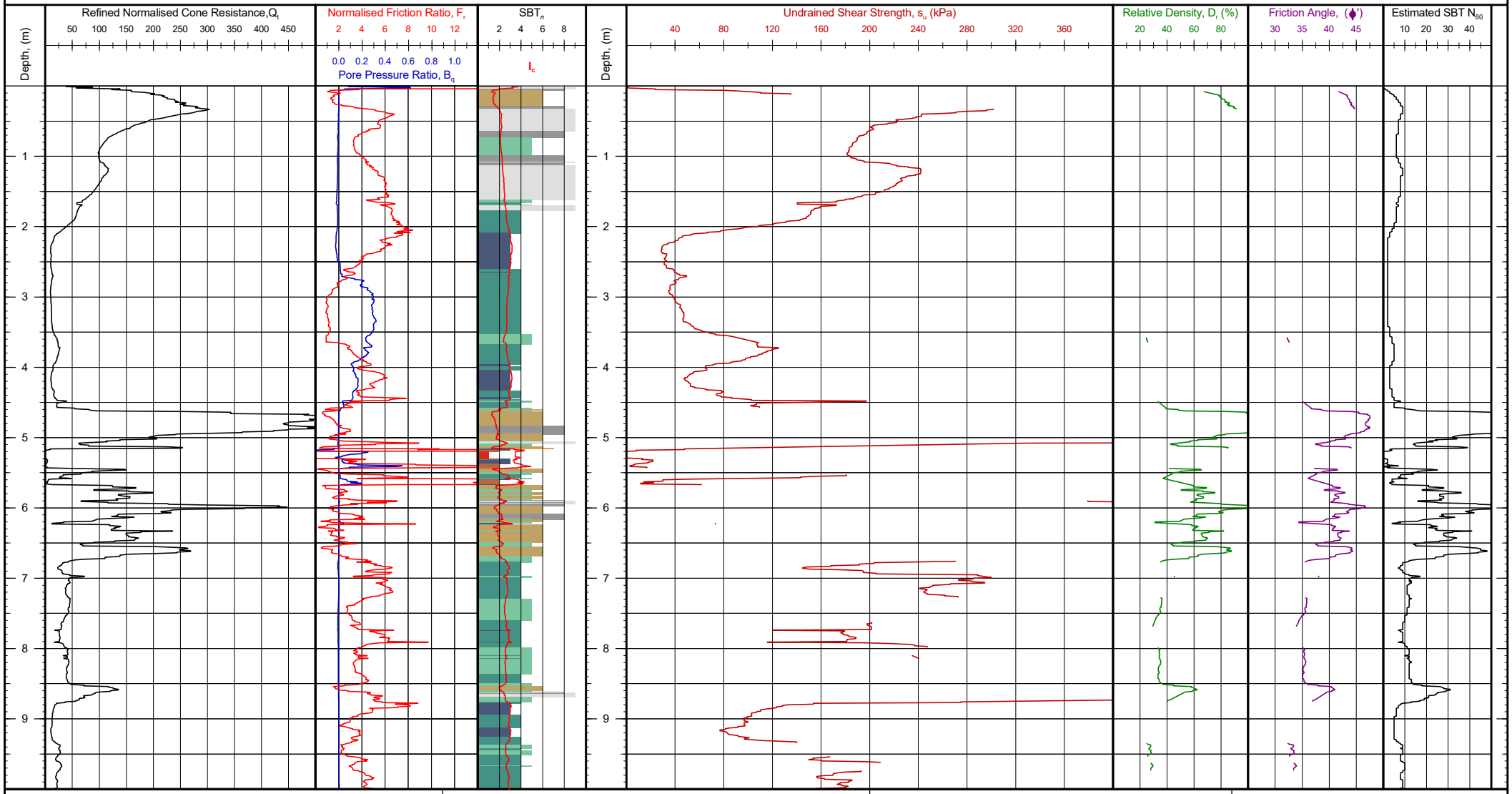
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-05**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

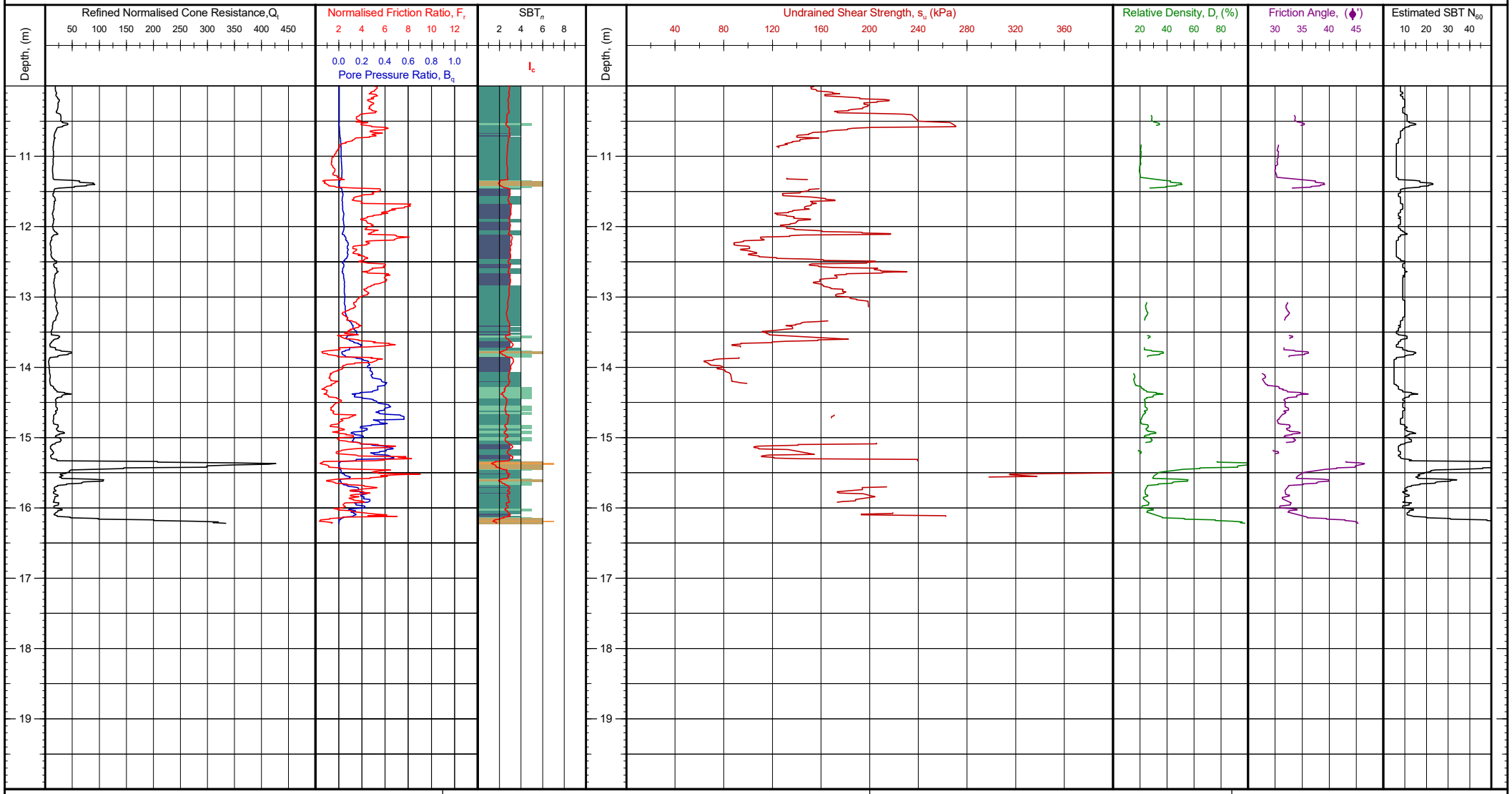
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-06**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

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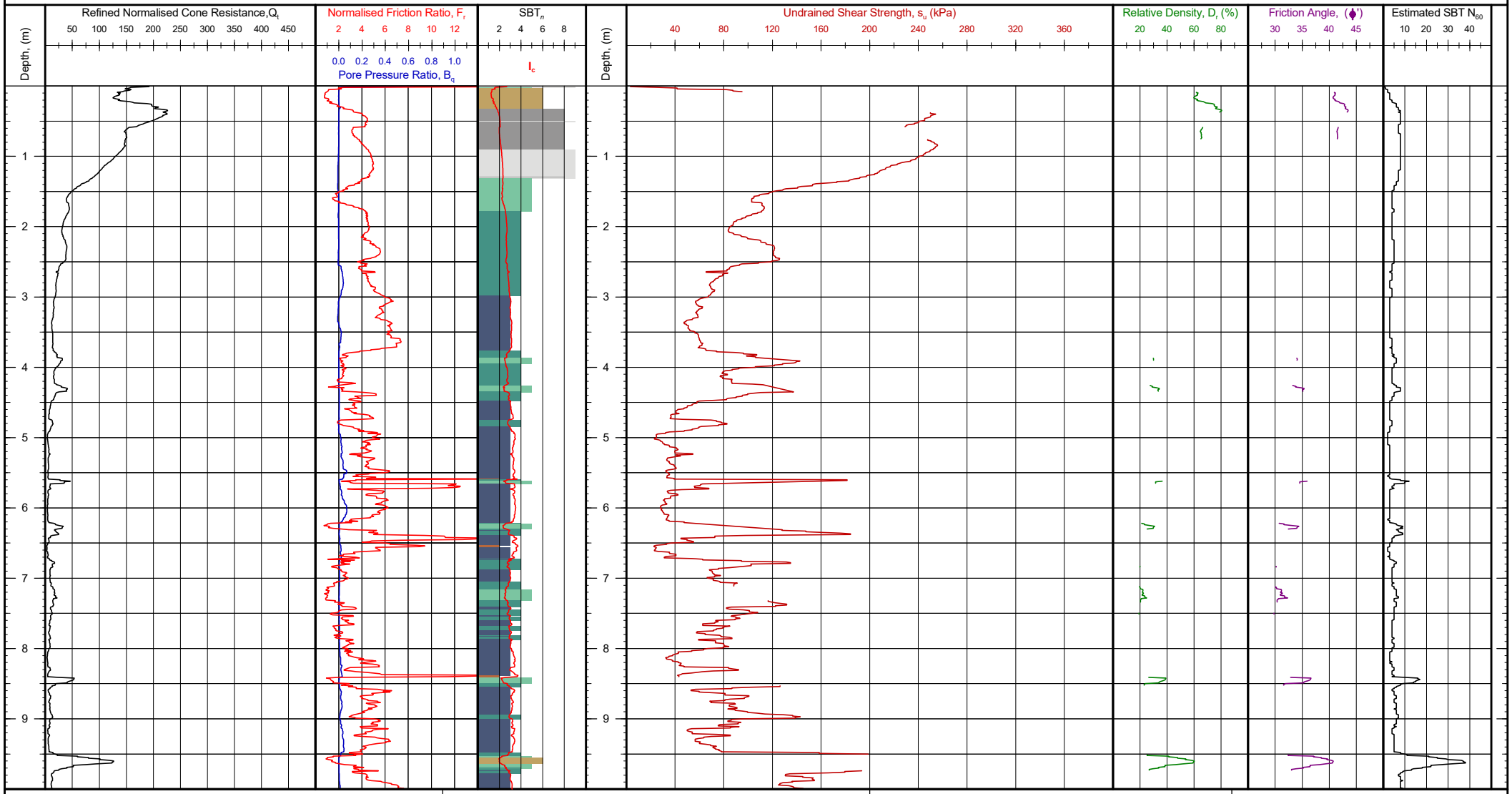
Client Reference:

Test Number: **CPT-06**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
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4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

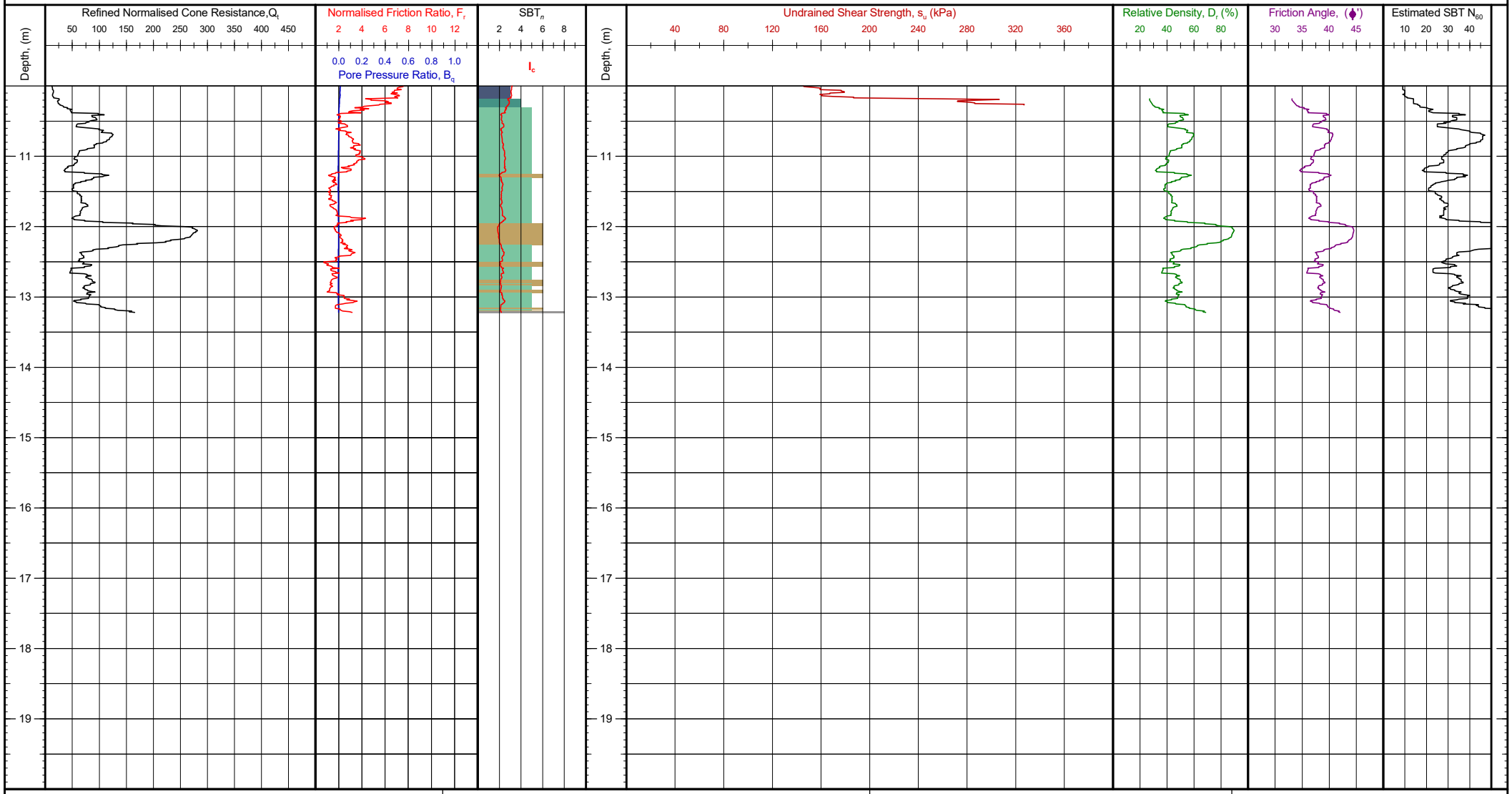
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-07**

G.I. Job Ref: 210082

CPT PARAMETER LOG



Client: LDE Ltd

Project: Dip Road

Location: Kamo, Whangarei

Engineer: Finlay Wallen-Halliwell

Contractor: Ground Investigation Ltd

Soil Behaviour Type SBT_n - Robertson et al. 1990

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine grained	6	Sands: clean sands to silty sands
2	Organic: Organic clay/silt, peat	7	Dense sand to gravelly sand
3	Clay: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff silt/clay

Notes and Limitations:

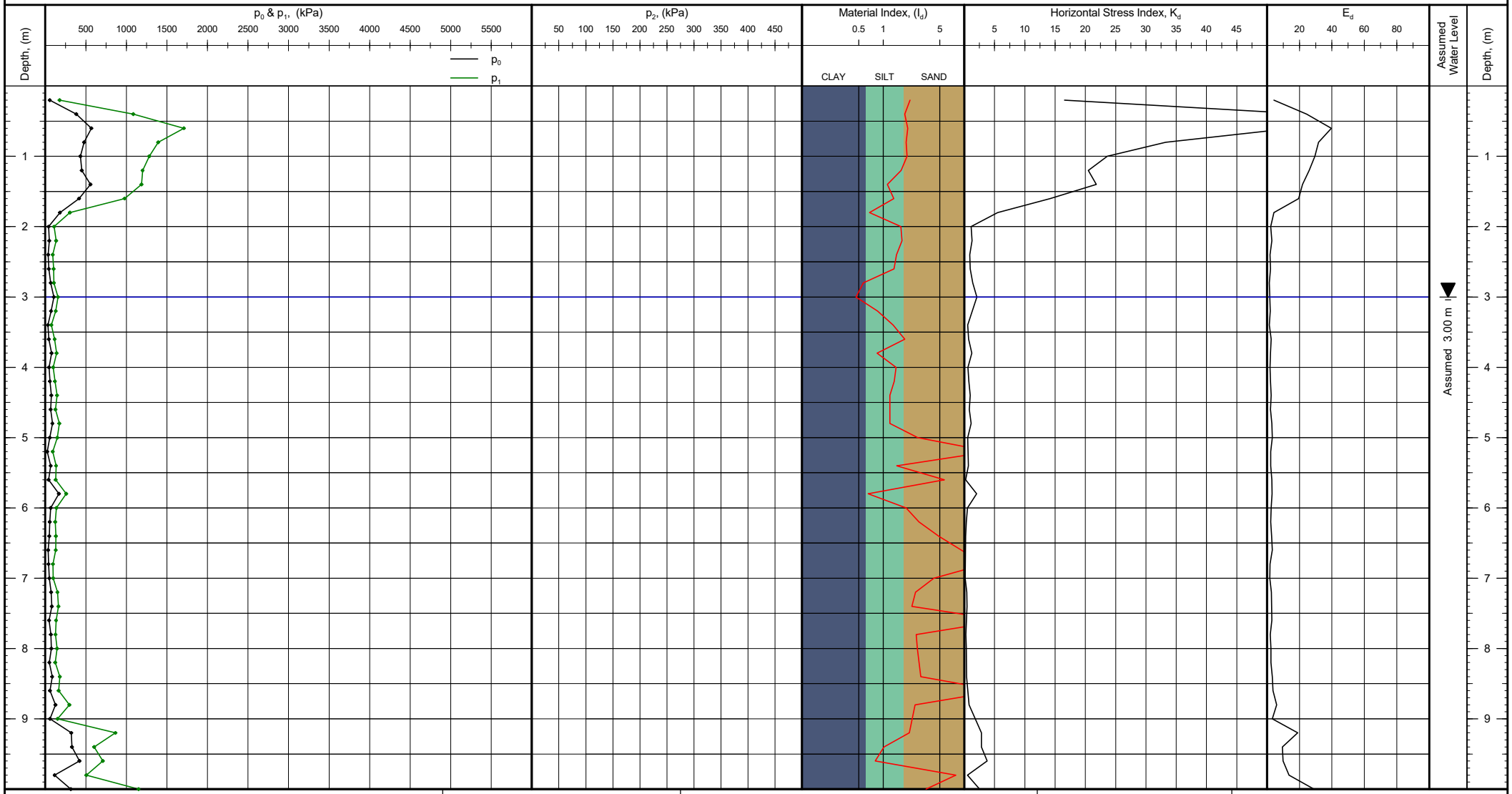
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P.K. Robertson and K.L. Cabel (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed by the user. Ground Investigation Ltd. does not warrant the correctness or applicability of any of the geotechnical soil and design parameter shown and does not assume any liability for any use of the results in any design or review. The used should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Client Reference:

Test Number: **CPT-07**

G.I. Job Ref: 210082

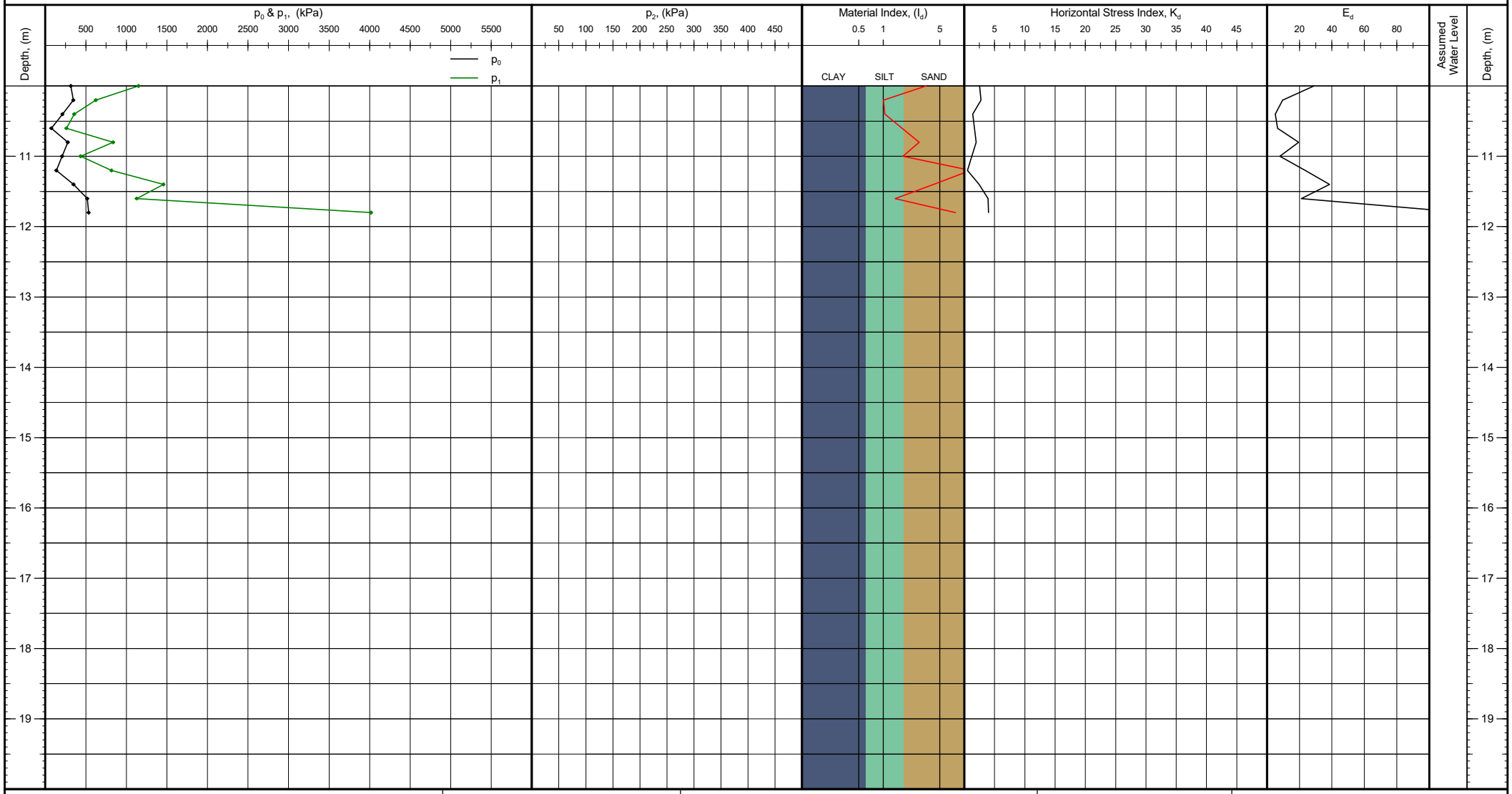
FLAT DILATOMETER TEST (DMT) LOG



Client: LDE Ltd	**Operator:** Carlos Prieto	**NZTM 2000 N, E (m):** 6050552.71, 1716619.34	**Elevation (m):** Unknown	**Client Reference:**	
Project: Dip Road	**Blade Reference:** N/A	**WGS84 (deg):** -35.682033,174.288747	**Date of Test:** 11/02/2021	**Test Number:**	**DMT-01**
Location: Kamo, Whangarei	**Diaphragm Thickness:** 0.25 mm	**Location Method:** Handheld GPS	**Depth (m):** 11.80		
Engineer: Finlay Wallen-Halliwell	**A-Reading Calibration:** 8 kPa	**Surveyor:**	**Pre Drill (m):** N/A		
Contractor: Ground Investigation Ltd	**B-Reading Calibration:** 69 kPa	**Termination Reason:** Maximum Nominal Pressure		**G.I. Job Ref:** 210082	

Comments:

FLAT DILATOMETER TEST (DMT) LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050552.71, 1716619.34	**Elevation (m):**	Unknown
Project:	Dip Road	**Blade Reference:**	N/A	**WGS84 (deg):**	-35.682033,174.288747	**Date of Test:**	11/02/2021
Location:	Kamo, Whangarei	**Diaphragm Thickness:**	0.25 mm	**Location Method:**	Handheld GPS	**Depth (m):**	11.80
Engineer:	Finlay Wallen-Halliwell	**A-Reading Calibration:**	8 kPa	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**B-Reading Calibration:**	69 kPa	**Termination Reason:**	Maximum Nominal Pressure		

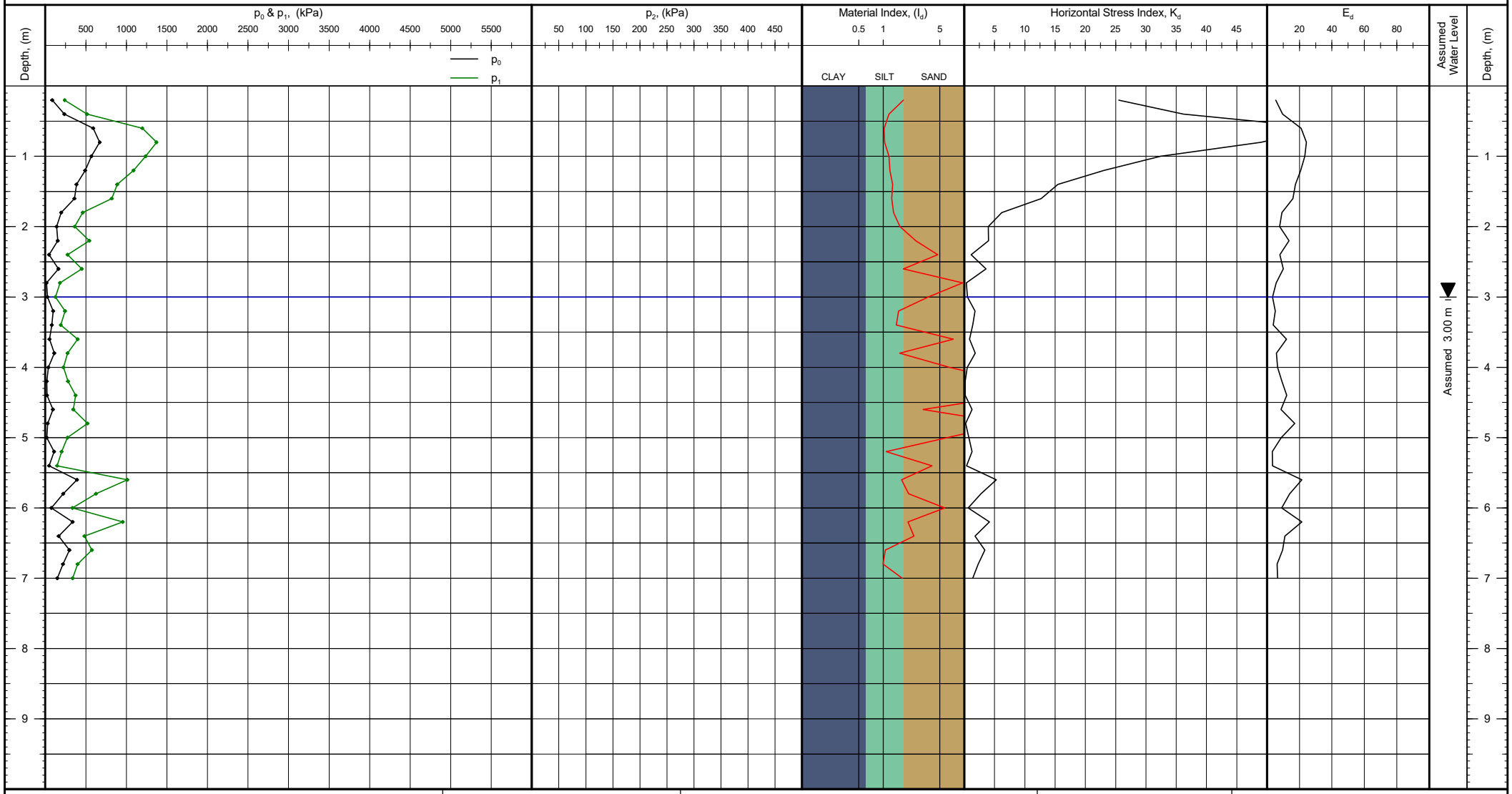
Client Reference:

Test Number: **DMT-01**

G.I. Job Ref: 210082

Comments:

FLAT DILATOMETER TEST (DMT) LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050496.52, 1716649.20	**Elevation (m):**	Unknown
Project:	Dip Road	**Blade Reference:**	N/A	**WGS84 (deg):**	-35.682536,174.289085	**Date of Test:**	11/02/2021
Location:	Kamo, Whangarei	**Diaphragm Thickness:**	0.25 mm	**Location Method:**	Handheld GPS	**Depth (m):**	7.60
Engineer:	Finlay Wallen-Halliwell	**A-Reading Calibration:**	8 kPa	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**B-Reading Calibration:**	74 kPa	**Termination Reason:**	Other - see notes		

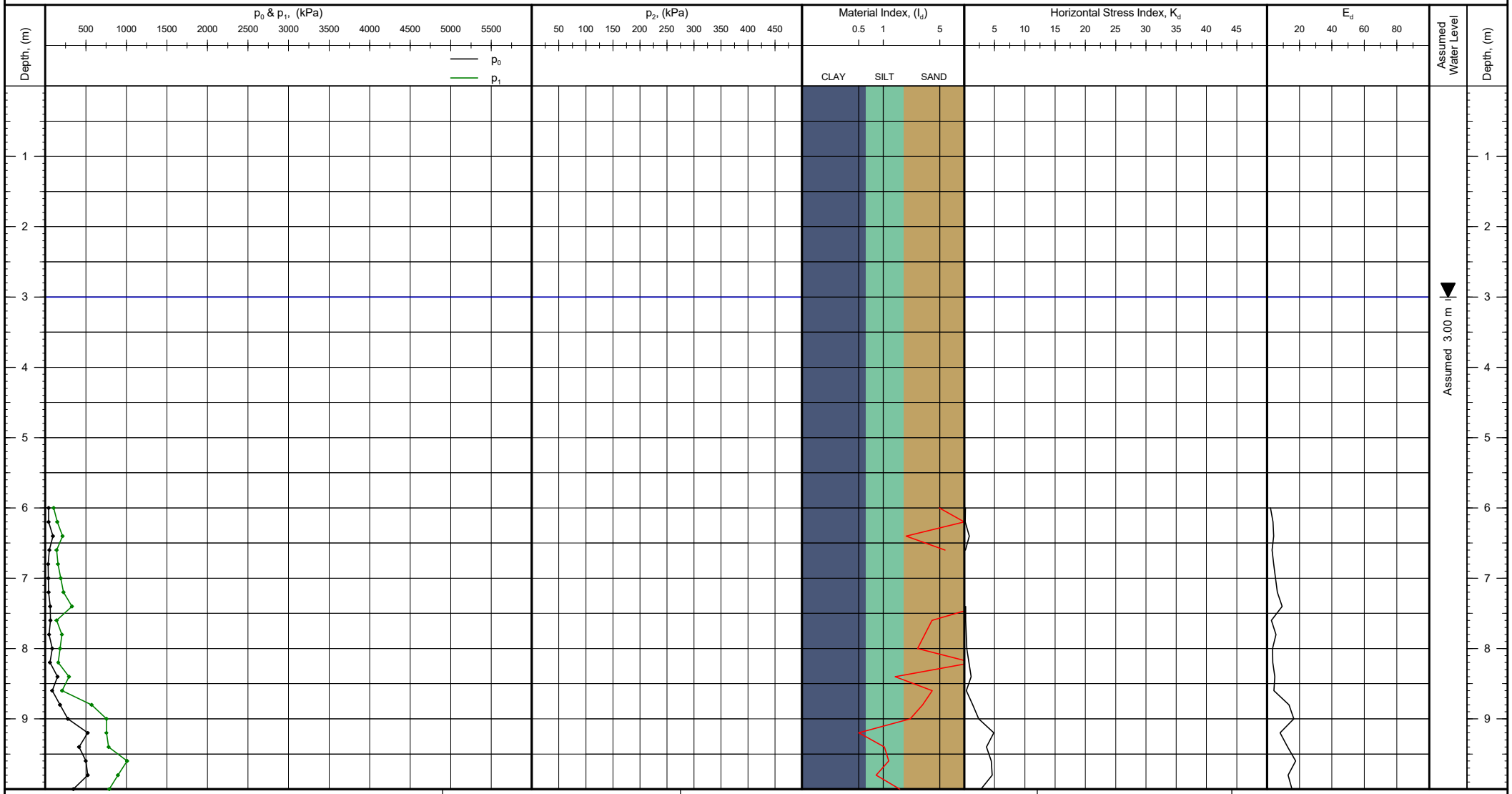
Client Reference:

Test Number: **SDMT-01**

G.I. Job Ref: 210082

Comments: Diagram overinflated, restart test from 6.00m with SDMT-01A

FLAT DILATOMETER TEST (DMT) LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050497.76, 1716647.50	**Elevation (m):**	Unknown
Project:	Dip Road	**Blade Reference:**	N/A	**WGS84 (deg):**	-35.682525,174.289066	**Date of Test:**	11/02/2021
Location:	Kamo, Whangarei	**Diaphragm Thickness:**	0.25 mm	**Location Method:**	Handheld GPS	**Depth (m):**	11.80
Engineer:	Finlay Wallen-Halliwell	**A-Reading Calibration:**	13 kPa	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**B-Reading Calibration:**	71 kPa	**Termination Reason:**	Maximum Nominal Pressure		

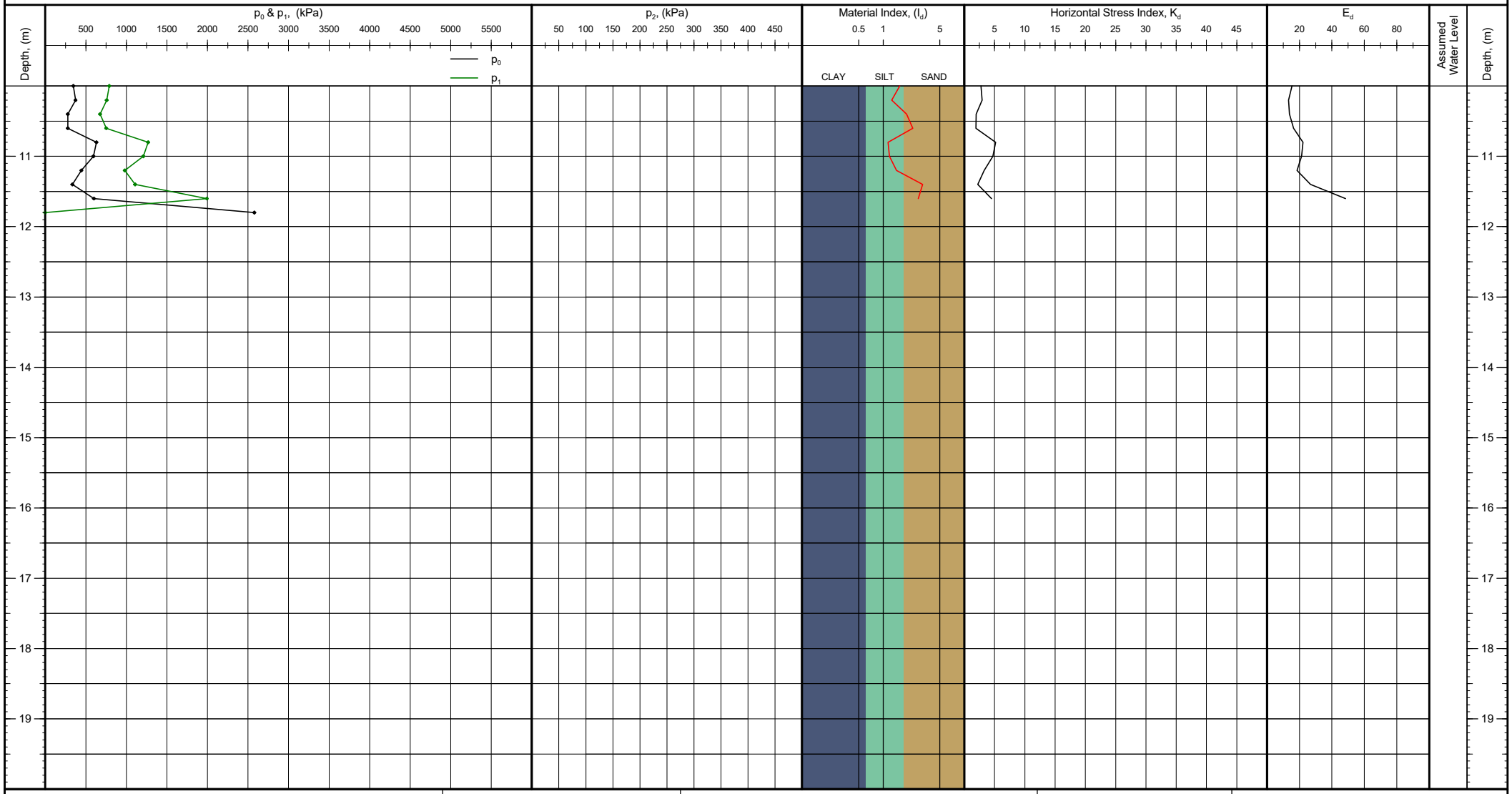
Client Reference:

Test Number: **SDMT-01A**

G.I. Job Ref: 210082

Comments:

FLAT DILATOMETER TEST (DMT) LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050497.76, 1716647.50	**Elevation (m):**	Unknown
Project:	Dip Road	**Blade Reference:**	N/A	**WGS84 (deg):**	-35.682525,174.289066	**Date of Test:**	11/02/2021
Location:	Kamo, Whangarei	**Diaphragm Thickness:**	0.25 mm	**Location Method:**	Handheld GPS	**Depth (m):**	11.80
Engineer:	Finlay Wallen-Halliwell	**A-Reading Calibration:**	13 kPa	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**B-Reading Calibration:**	71 kPa	**Termination Reason:**	Maximum Nominal Pressure		

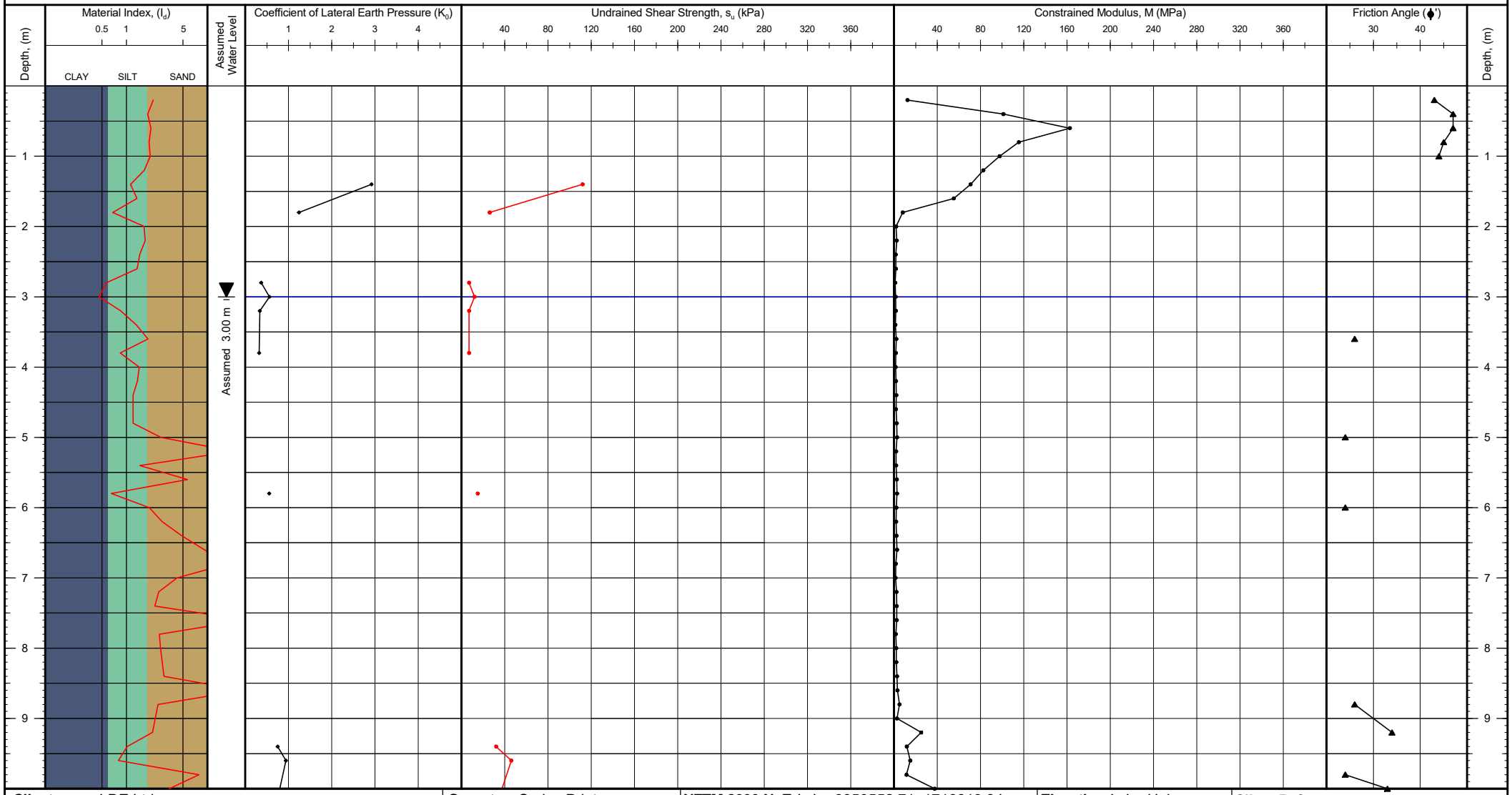
Client Reference:

Test Number: **SDMT-01A**

G.I. Job Ref: 210082

Comments:

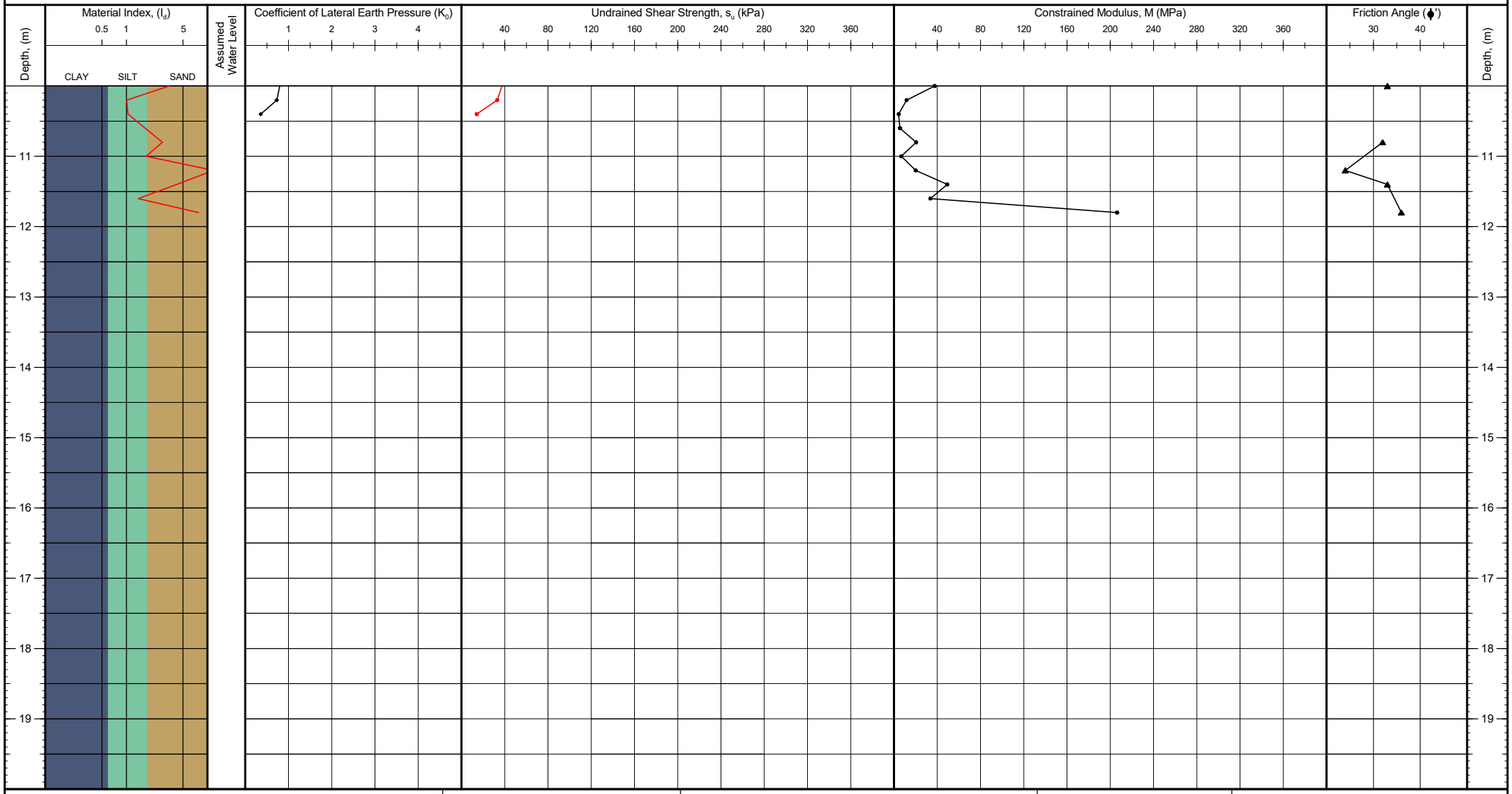
DMT PARAMETER LOG



Client: LDE Ltd	**Operator:** Carlos Prieto	**NZTM 2000 N, E (m):** 6050552.71, 1716619.34	**Elevation (m):** Unknown	**Client Reference:**	
Project: Dip Road	**Blade Reference:** N/A	**WGS84 (deg):** -35.682033,174.288747	**Date of Test:** 11/02/2021		
Location: Kamo, Whangarei	**Diaphragm Thickness:** 0.25 mm	**Location Method:** Handheld GPS	**Depth (m):** 11.80	**Test Number:**	**DMT-01**
Engineer: Finlay Wallen-Halliwell	**A-Reading Calibration:** 8 kPa	**Surveyor:**	**Pre Drill (m):** N/A		
Contractor: Ground Investigation Ltd	**B-Reading Calibration:** 69 kPa	**Termination Reason:** Maximum Nominal Pressure		**G.I. Job Ref:** 210082	

Comments:

DMT PARAMETER LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050552.71, 1716619.34	**Elevation (m):**	Unknown
Project:	Dip Road	**Blade Reference:**	N/A	**WGS84 (deg):**	-35.682033,174.288747	**Date of Test:**	11/02/2021
Location:	Kamo, Whangarei	**Diaphragm Thickness:**	0.25 mm	**Location Method:**	Handheld GPS	**Depth (m):**	11.80
Engineer:	Finlay Wallen-Halliwell	**A-Reading Calibration:**	8 kPa	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**B-Reading Calibration:**	69 kPa	**Termination Reason:**	Maximum Nominal Pressure		

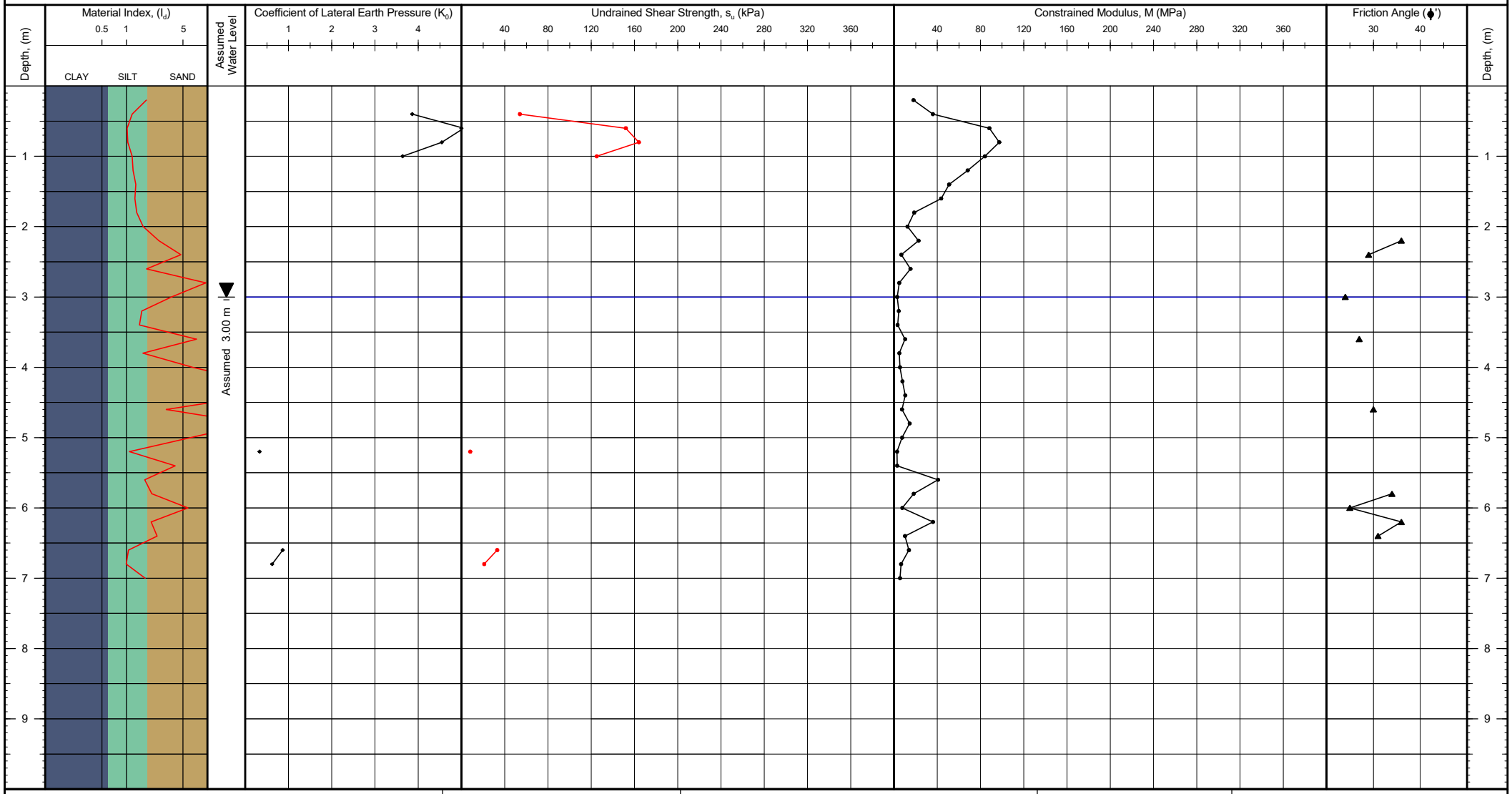
Client Reference:

Test Number: **DMT-01**

G.I. Job Ref: 210082

Comments:

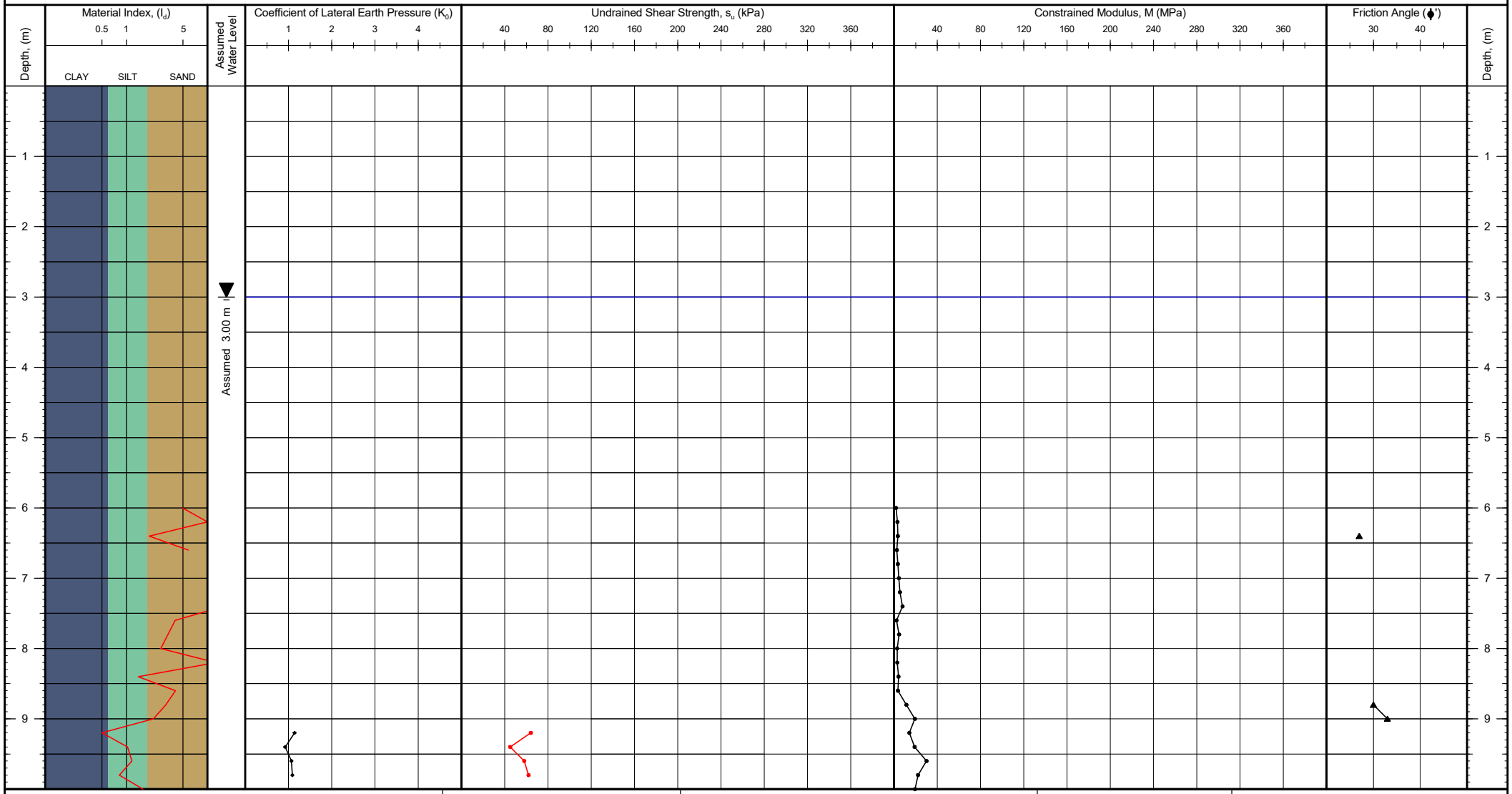
DMT PARAMETER LOG



Client: LDE Ltd	**Operator:** Carlos Prieto	**NZTM 2000 N, E (m):** 6050496.52, 1716649.20	**Elevation (m):** Unknown	**Client Reference:**	
Project: Dip Road	**Blade Reference:** N/A	**WGS84 (deg):** -35.682536,174.289085	**Date of Test:** 11/02/2021		
Location: Kamo, Whangarei	**Diaphragm Thickness:** 0.25 mm	**Location Method:** Handheld GPS	**Depth (m):** 7.60	**Test Number:**	**SDMT-01**
Engineer: Finlay Wallen-Halliwell	**A-Reading Calibration:** 8 kPa	**Surveyor:**	**Pre Drill (m):** N/A		
Contractor: Ground Investigation Ltd	**B-Reading Calibration:** 74 kPa	**Termination Reason:** Other - see notes		**G.I. Job Ref:** 210082	

Comments: Diagram overinflated, restart test from 6.00m with SDMT-01A

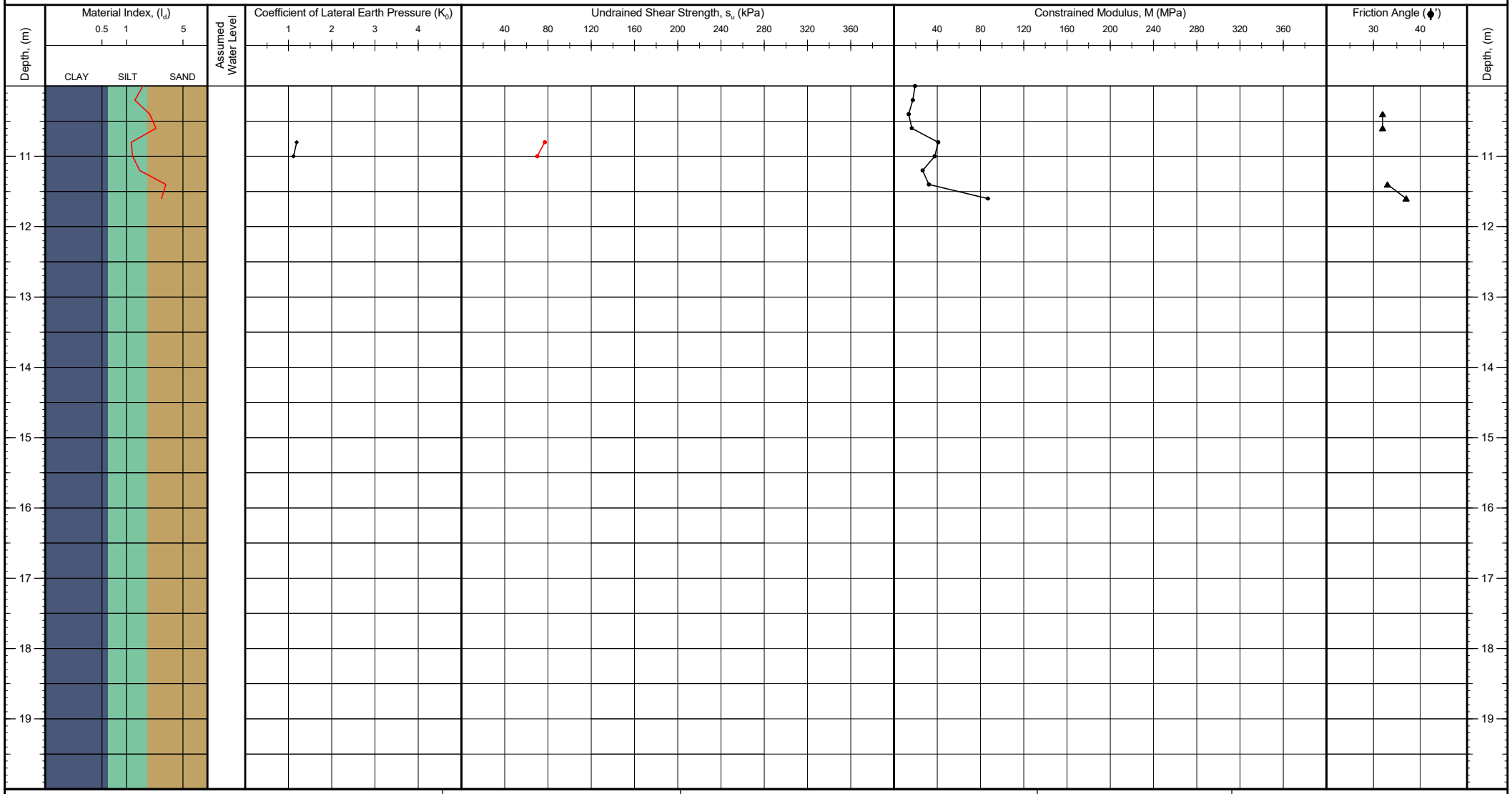
DMT PARAMETER LOG



Client: LDE Ltd	**Operator:** Carlos Prieto	**NZTM 2000 N, E (m):** 6050497.76, 1716647.50	**Elevation (m):** Unknown	**Client Reference:**	
Project: Dip Road	**Blade Reference:** N/A	**WGS84 (deg):** -35.682525,174.289066	**Date of Test:** 11/02/2021	**Test Number:**	**SDMT-01A**
Location: Kamo, Whangarei	**Diaphragm Thickness:** 0.25 mm	**Location Method:** Handheld GPS	**Depth (m):** 11.80		
Engineer: Finlay Wallen-Halliwell	**A-Reading Calibration:** 13 kPa	**Surveyor:**	**Pre Drill (m):** N/A		
Contractor: Ground Investigation Ltd	**B-Reading Calibration:** 71 kPa	**Termination Reason:** Maximum Nominal Pressure		**G.I. Job Ref:** 210082	

Comments:

DMT PARAMETER LOG



Client:	LDE Ltd	**Operator:**	Carlos Prieto	**NZTM 2000 N, E (m):**	6050497.76, 1716647.50	**Elevation (m):**	Unknown
Project:	Dip Road	**Blade Reference:**	N/A	**WGS84 (deg):**	-35.682525,174.289066	**Date of Test:**	11/02/2021
Location:	Kamo, Whangarei	**Diaphragm Thickness:**	0.25 mm	**Location Method:**	Handheld GPS	**Depth (m):**	11.80
Engineer:	Finlay Wallen-Halliwell	**A-Reading Calibration:**	13 kPa	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd	**B-Reading Calibration:**	71 kPa	**Termination Reason:**	Maximum Nominal Pressure		

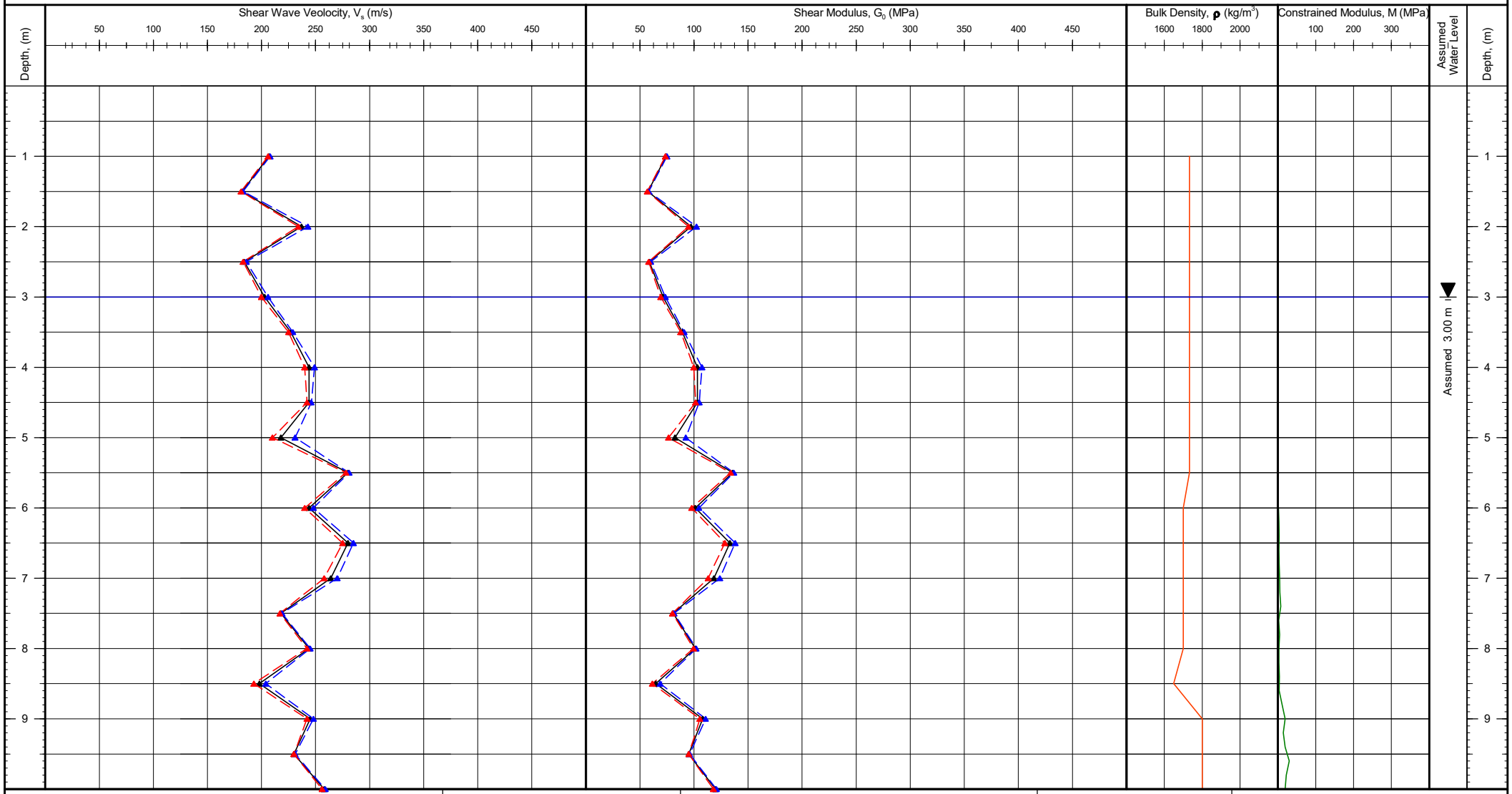
Client Reference:

Test Number: **SDMT-01A**

G.I. Job Ref: 210082

Comments:

FLAT DILATOMETER TEST (DMT) SEISMIC LOG



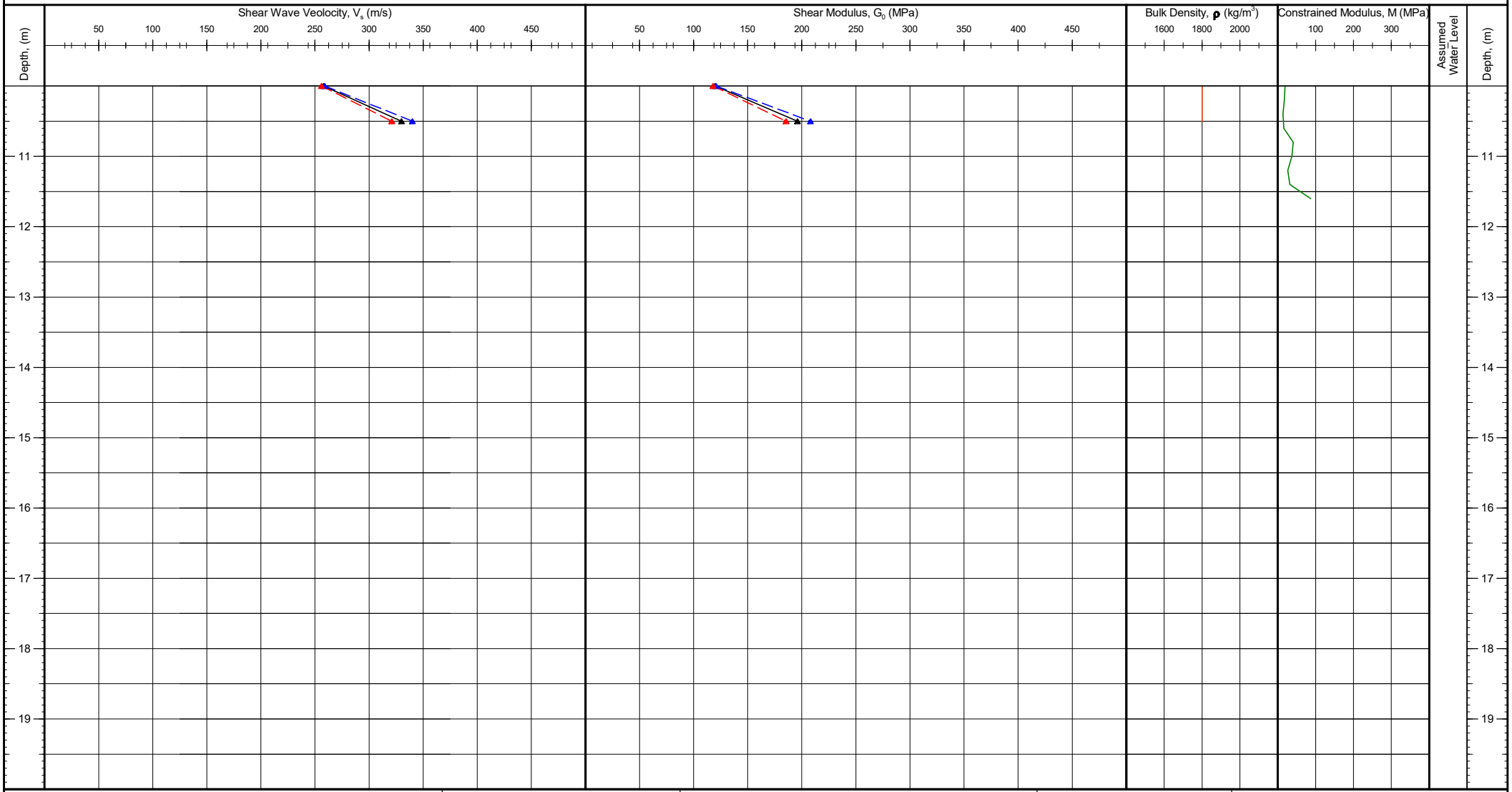
Client:	LDE Ltd	Estimated from CPT	**NZTM 2000 N, E (m):**	6050497.76, 1716647.50	**Elevation (m):** Unknown
Project:	Dip Road	Measured Lower Bound	**WGS84 (deg):**	-35.682525,174.289066	**Date of Test:** 11/02/2021
Location:	Kamo, Whangarei	Measured Average Bound	**Location Method:**	Handheld GPS	**Depth (m):** 11.80
Engineer:	Finlay Wallen-Halliwell	Measured Upper Bound	**Surveyor:**		**Pre Drill (m):** N/A
Contractor:	Ground Investigation Ltd	ρ from G_0 Calculation	**Termination Reason:**	Maximum Nominal Pressure	**G.I. Job Ref:** 210082

Client Reference:

Test Number: **SDMT-01A**

Comments:

FLAT DILATOMETER TEST (DMT) SEISMIC LOG



Client:	LDE Ltd	Estimated from CPT	**NZTM 2000 N, E (m):**	6050497.76, 1716647.50	**Elevation (m):**	Unknown	**Client Reference:**
Project:	Dip Road	Measured Lower Bound	**WGS84 (deg):**	-35.682525,174.289066	**Date of Test:**	11/02/2021	
Location:	Kamo, Whangarei	Measured Average Bound	**Location Method:**	Handheld GPS	**Depth (m):**	11.80	**Test Number:** SDMT-01A
Engineer:	Finlay Wallen-Halliwell	Measured Upper Bound	**Surveyor:**		**Pre Drill (m):**	N/A	
Contractor:	Ground Investigation Ltd	ρ from G_0 Calculation	**Termination Reason:**	Maximum Nominal Pressure			**G.I. Job Ref:** 210082

Comments:

CPT ZEROS AND DRIFT

G.I. Job Ref: 210082

Cone Reference	CPT Name	Push Number	Tip Resistance			Local Friction			Pore Pressure		
			Initial (MPa)	Final (MPa)	Difference (kPa)	Initial (MPa)	Final (MPa)	Difference (kPa)	Initial (MPa)	Final (MPa)	Difference (kPa)
MKJ325	CPT-01	1	23.892	23.913	21.3	0.2950	0.2950	0.0	2.8524	2.8522	-0.2
MKJ325	CPT-02	1	23.940	23.950	10.6	0.2958	0.2961	0.3	2.8515	2.8513	-0.2
MKJ325	CPT-03	1	23.950	23.865	-85.4	0.2959	0.2955	-0.4	2.8513	2.8545	3.2
MKJ291	CPT-04	1	20.142	20.137	-5.3	0.2963	0.2969	0.6	2.9389	2.9380	-0.9
MKJ325	CPT-05	1	23.924	23.876	-48.0	0.2958	0.2954	-0.4	2.8530	2.8543	1.3
MKJ325	CPT-06	1	23.945	23.897	-48.1	0.2955	0.2953	-0.2	2.8532	2.8546	1.4
MKJ325	CPT-07	1	23.956	23.902	-53.4	0.2950	0.2958	0.8	2.8521	2.8527	0.6

Client: LDE Ltd
Project: Dip Road

Location: Kamo, Whangarei
Engineer: Finlay Wallen-Halliwell

Note: Zero difference colour-coded based on application classes following ISO 22476-1:2012. Blue indicates Class 1, green Class 2, orange Class 3 and red Class 4. Grey represents if a test is below Class 4.

APPENDIX C

LABORATORY TEST CERTIFICATES

GEOTECHNICS

Our Ref: 1100731.0000/Rep1
Customer Ref: 19103
4 March 2021

LDE Ltd
192 Bank Street
Regent
Whangarei 0112

Attention: Finlay Wallen-Halliwell

Dear Finlay

67 Dip Road, Kamo, Whangarei

Laboratory Test Report

Customer's Instructions

We performed CU triaxial tests on received samples as instructed by Finlay Wallen-Halliwell in emails dating 11 and 16 February.

Sampling Procedure

Samples have been tested as received from the customer.

Sample Location Plan

Not applicable.

Samples

Three tube samples were received. Samples were labelled with reference numbers.

Date of Sample Receipt

15/02/2021

Test Method(s)

ISO 17892:2018 Part 9 - Consolidated triaxial compression tests on water saturated soils

NZS 4402: 1986 Test 2.1 - Water Content

Material Description

Descriptions are provided in the attached presentation pages.

Test Results

Test results are attached.

Test Remarks

Test remarks are included in the presentation page.

General Remarks

Samples not destroyed during testing, will be retained for one month from the date of this report before being discarded.

Descriptions are enclosed for your information, are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of LDE Ltd, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

Please reproduce this report in full when transmitting to others or including in internal reports.

If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of the letterhead page.

GEOTECHNICS LTD

Report prepared by:

.....

Cameron Tier
Instrumentation Technician

Authorised for Geotechnics by:

.....

Steven Anderson
Project Director

Report checked by:

.....

Helen Wang
Triaxial Laboratory Manager
Approved Signatory

ACCREDITED IANZ TESTING LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

4-Mar-21
t:\geotechnicsgroup\projects\1100731\issueddocuments\20210304 dip road cati.rep1.docx

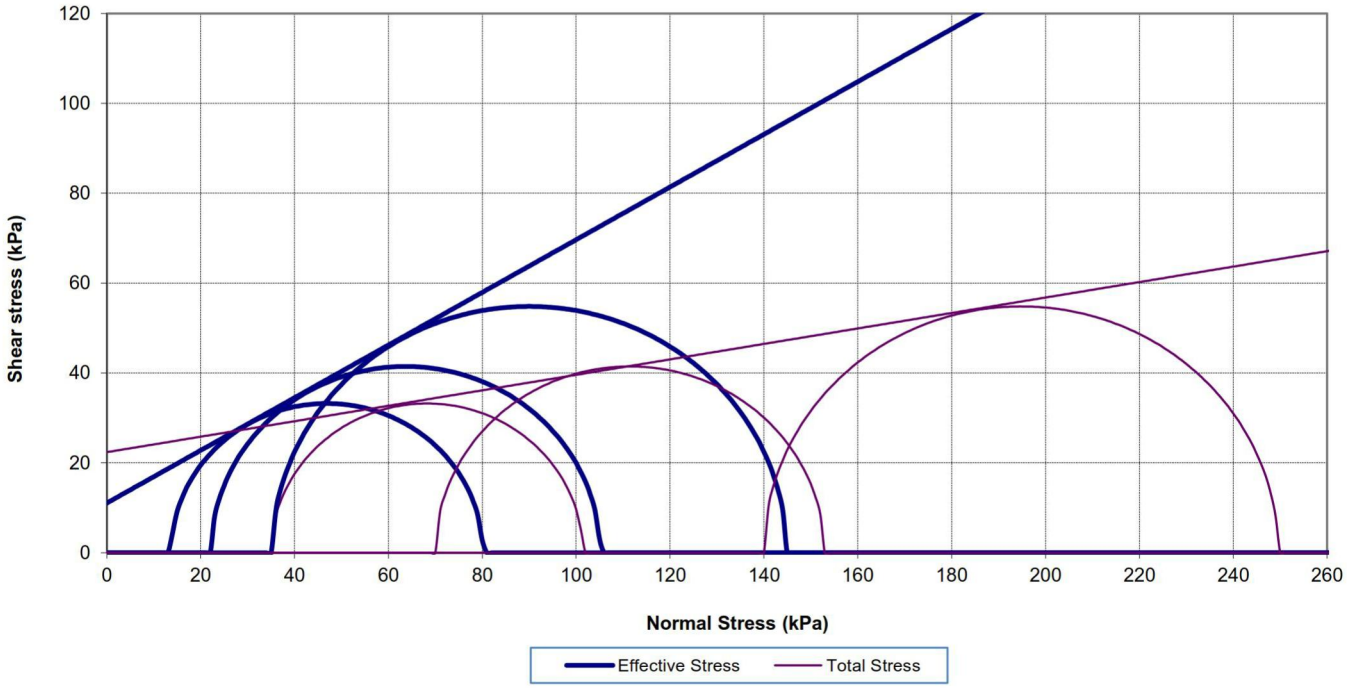
GEOTECHNICS
1 Hill Street
Onehunga
Auckland
New Zealand
p. +64 9 356 3510

Geotechnics Project ID: 1100731.0000
QESTLab Work Order ID:
Customer Project ID: 19103

Site: 67 Dip Road, Kamo, Whangarei
Location ID: BH01
Sample Ref.: --
Depth: 3.22 - 3.35 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST (MULTI-STAGE)

MOHR CIRCLES OF TOTAL AND EFFECTIVE STRESSES



General Sample Parameters

Initial Sample Height:	124.71	mm	Initial Water Content:	105	%
Initial Sample Diameter:	60.77	mm	Initial Bulk Density:	1.38	t/m³
Initial B Value:	36	%	Initial Dry Density:	0.67	t/m³
B Value before Consolidation:	98	%	Final Water Content:	104	%

Test Results

	At the End of Consolidation Stage					Failure Values						Failure Mode & Photo
	Effective Stress		Back	Volumetric		Deviator Stress	Vertical	Effective Stress		Corrections (kPa)		
	Horizontal σ_h'(kPa)	Vertical σ_v'(kPa)	Pressure (kPa)	Strain (%)	Rate (%/hr)	$(\sigma_v' - \sigma_h')$ (kPa)	Strain ε (%)	Vertical σ_v' (kPa)	Horizontal σ_h'(kPa)	Membrane $(\Delta\sigma_v)_m$	Filter P $(\Delta\sigma_v)_{fp}$	
Stage 1	35	36	450	0.56	0.01	66.41	1.85	80.11	13.70	1.08	0.00	
Stage 2	70	71	450	1.46	0.00	82.91	1.50	105.11	22.20	0.88	0.00	
Stage 3	140	141	450	2.93	0.00	109.62	1.60	144.82	35.20	0.93	0.00	

		Total			Effective		
Angle of Frictional Resistance:	ϕ =	10	°	ϕ' =	30	°
Cohesion:	c =	22	kPa	c' =	11	kPa
Linear Regression Coefficient:	r =	0.997		r =	1.000	

Sample History: Undisturbed core trimmed at natural water content.

Soil description: SAND, silty, lightly packed, orangey brown with dark brown and light grey.

Test Speed: 0.022 (mm/min)

Test Remarks: The sample was saturated by increments of cell pressure and back pressure.
It was drained from both ends in the consolidation stages.
Failure for each stage was determined by either the maximum effective stress ratio or the maximum deviator stress. Strength parameters have been derived by using a linear regression fitting method.

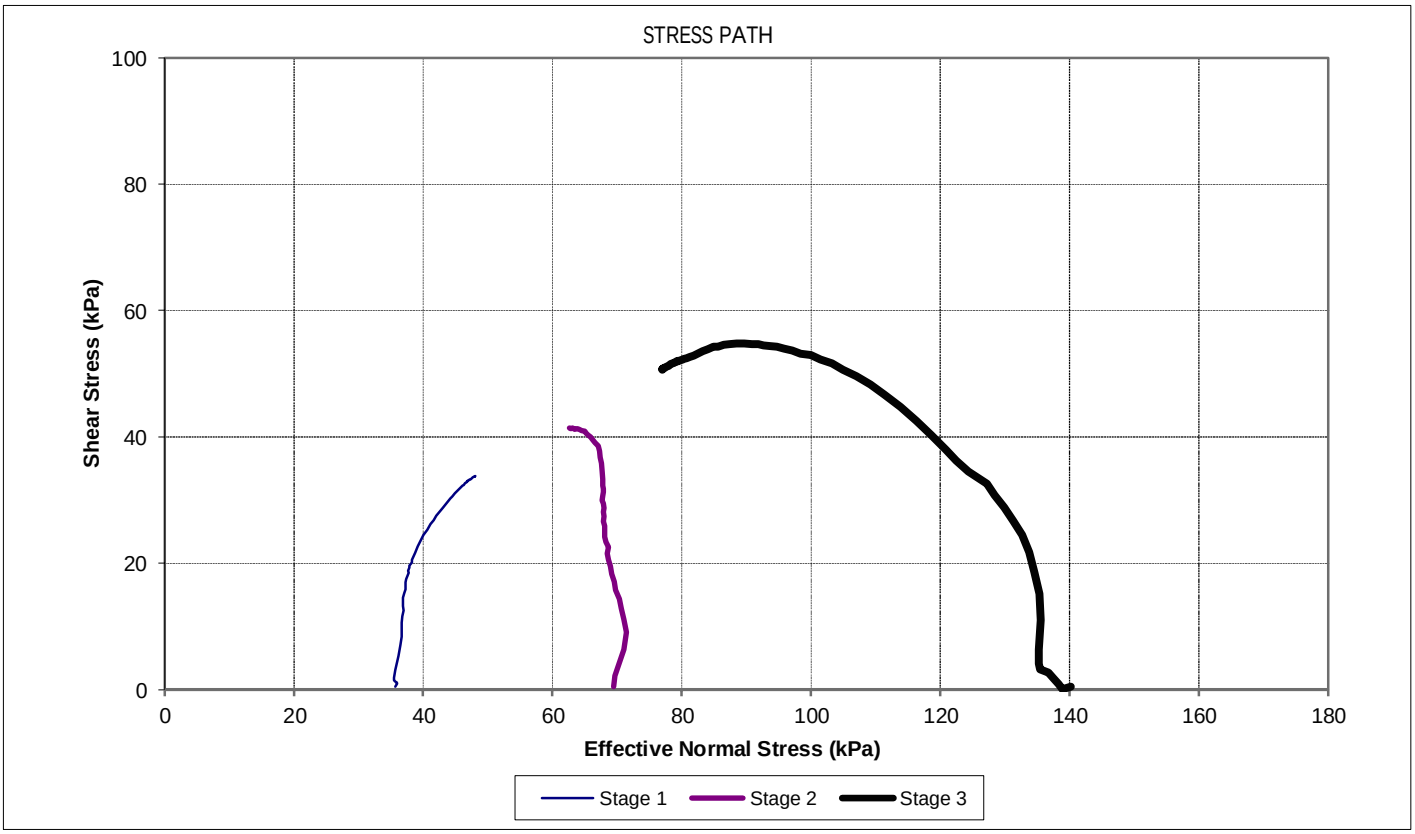
Approved Signatory: Date: 4/03/2021

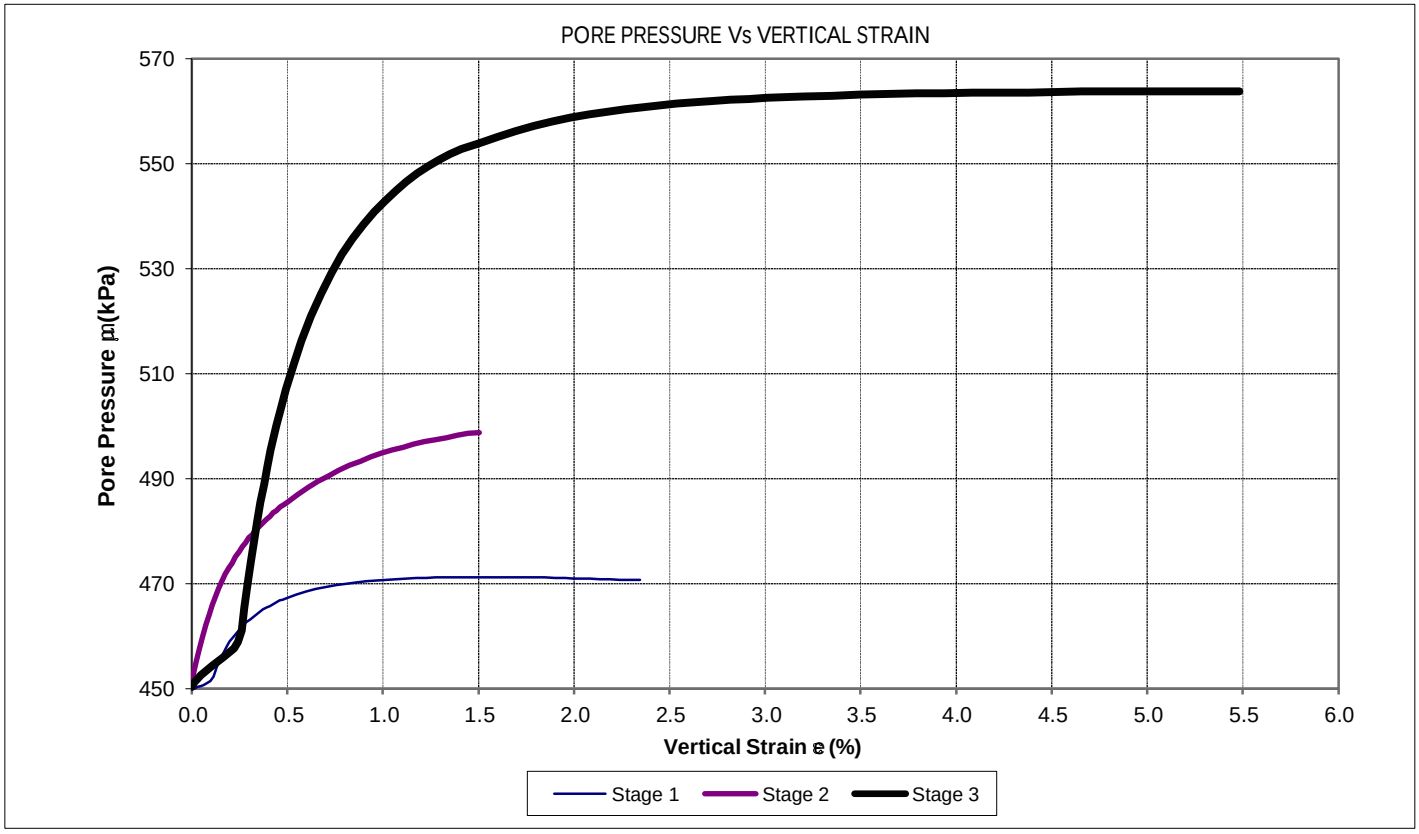
GEOTECHNICS
1 Hill Street
Onehunga
Auckland
New Zealand
p. +64 9 356 3510

Geotechnics Project ID: 1100731.0000
QESTLab Work Order ID:
Customer Project ID: 19103

Site: 67 Dip Road, Kamo, Whangarei
Location ID: BH01
Sample Ref.: --
Depth: 3.22 - 3.35 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

GRAPHS





Approved Signatory: Date: 4/03/2021

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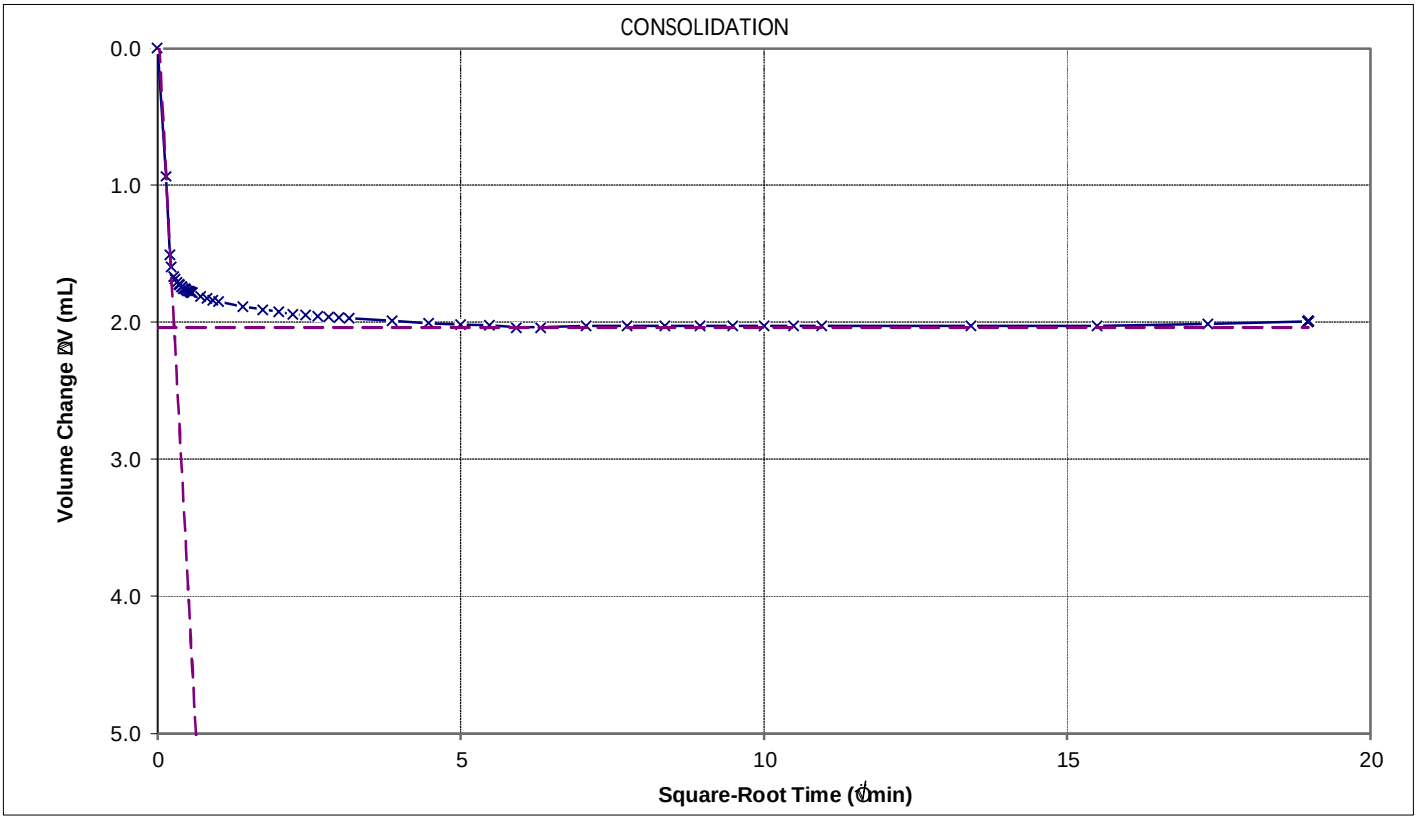
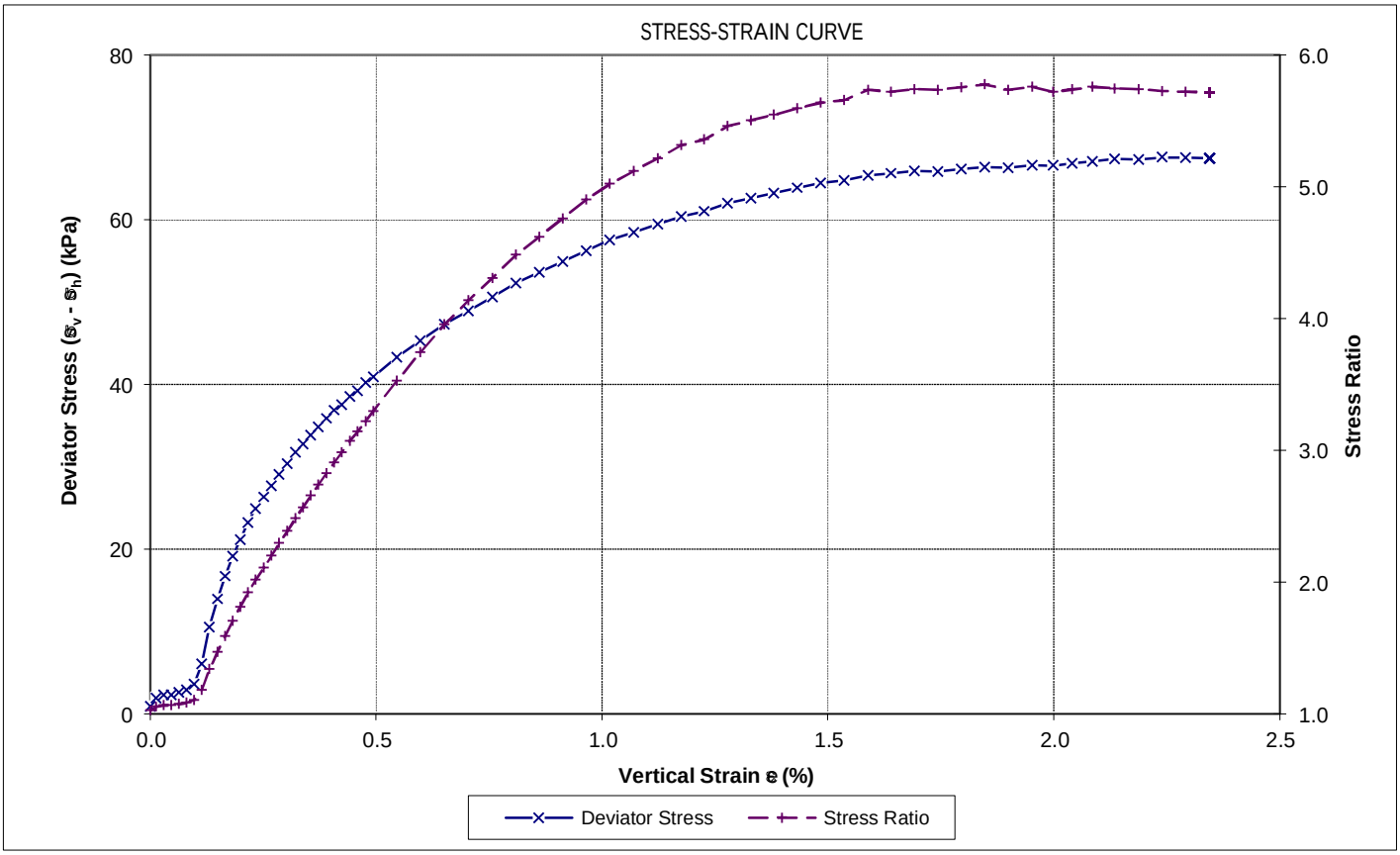
NZS 4402:1986 Test 2.1 Determination of Water Content

STAGE 1 GRAPHS





Approved Signatory: Date: 4/03/2021

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Geotechnics Project ID: 1100731.0000
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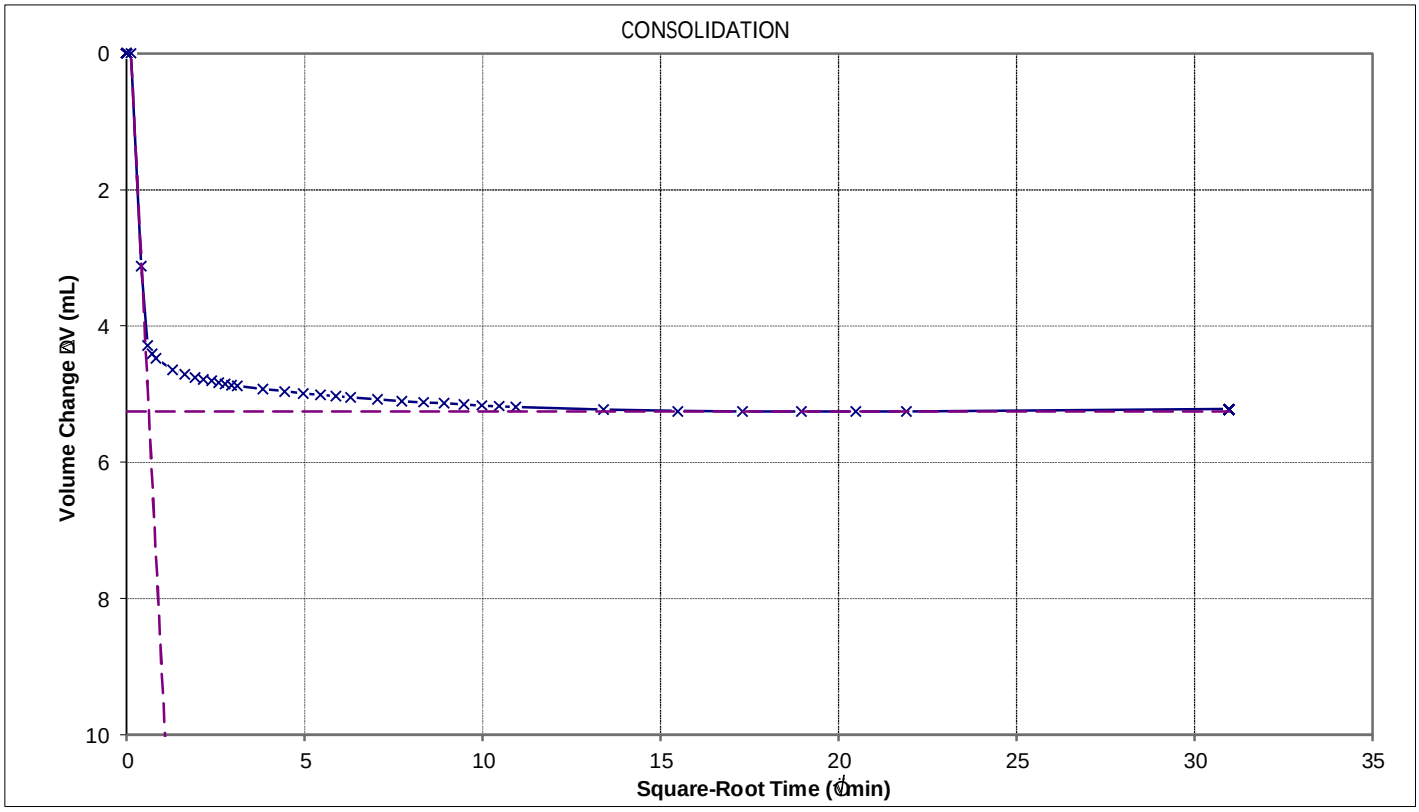
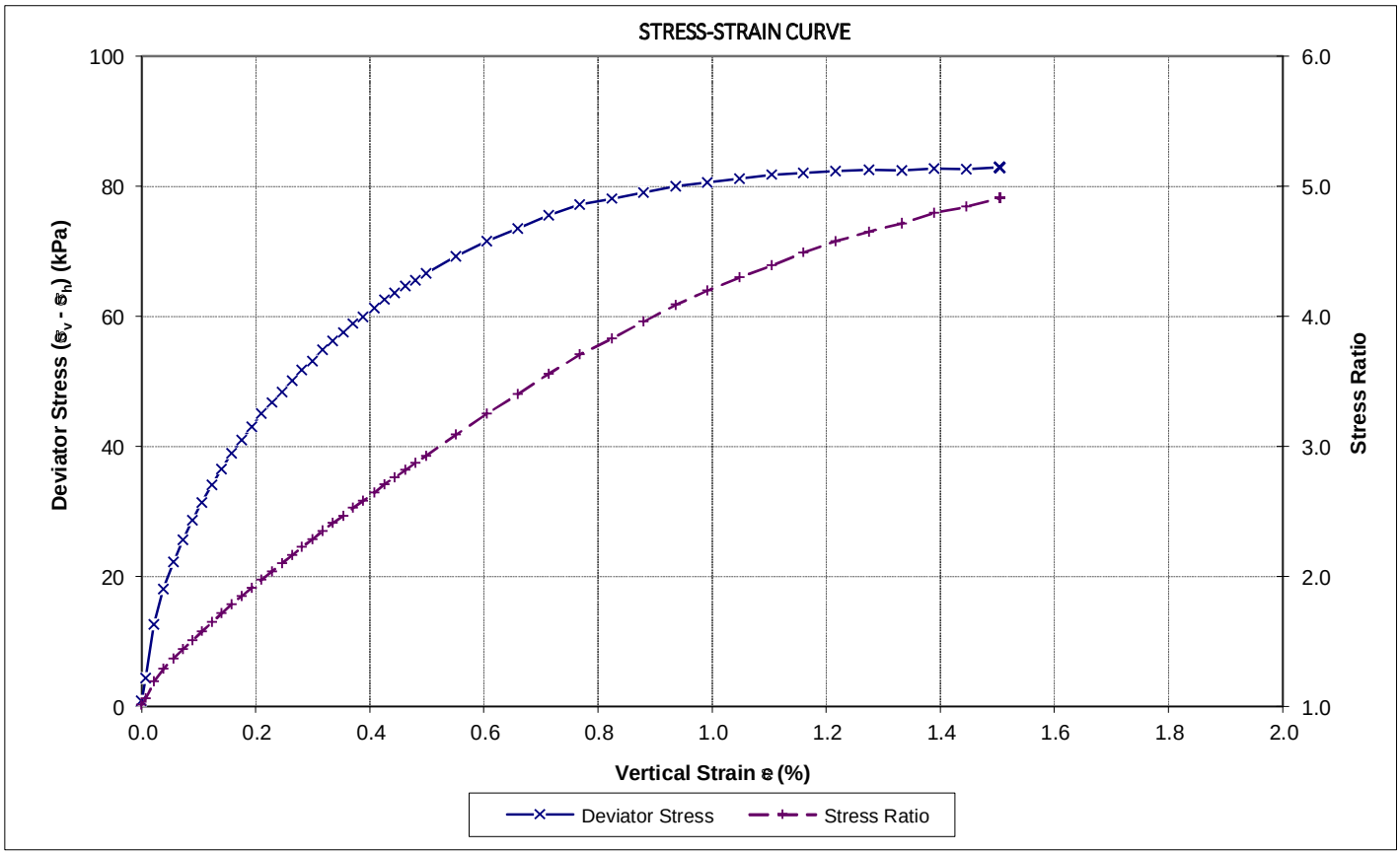
Depth: 3.22 - 3.35 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

STAGE 2 GRAPHS





Approved Signatory: Date: 4/03/2021

GEOTECHNICS
1 Hill Street
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Auckland
New Zealand
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Geotechnics Project ID: 1100731.0000
QESTLab Work Order ID:
Customer Project ID: 19103

Site: 67 Dip Road, Kamo, Whangarei
Location ID: BH01
Sample Ref.: --
Depth: 3.22 - 3.35 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
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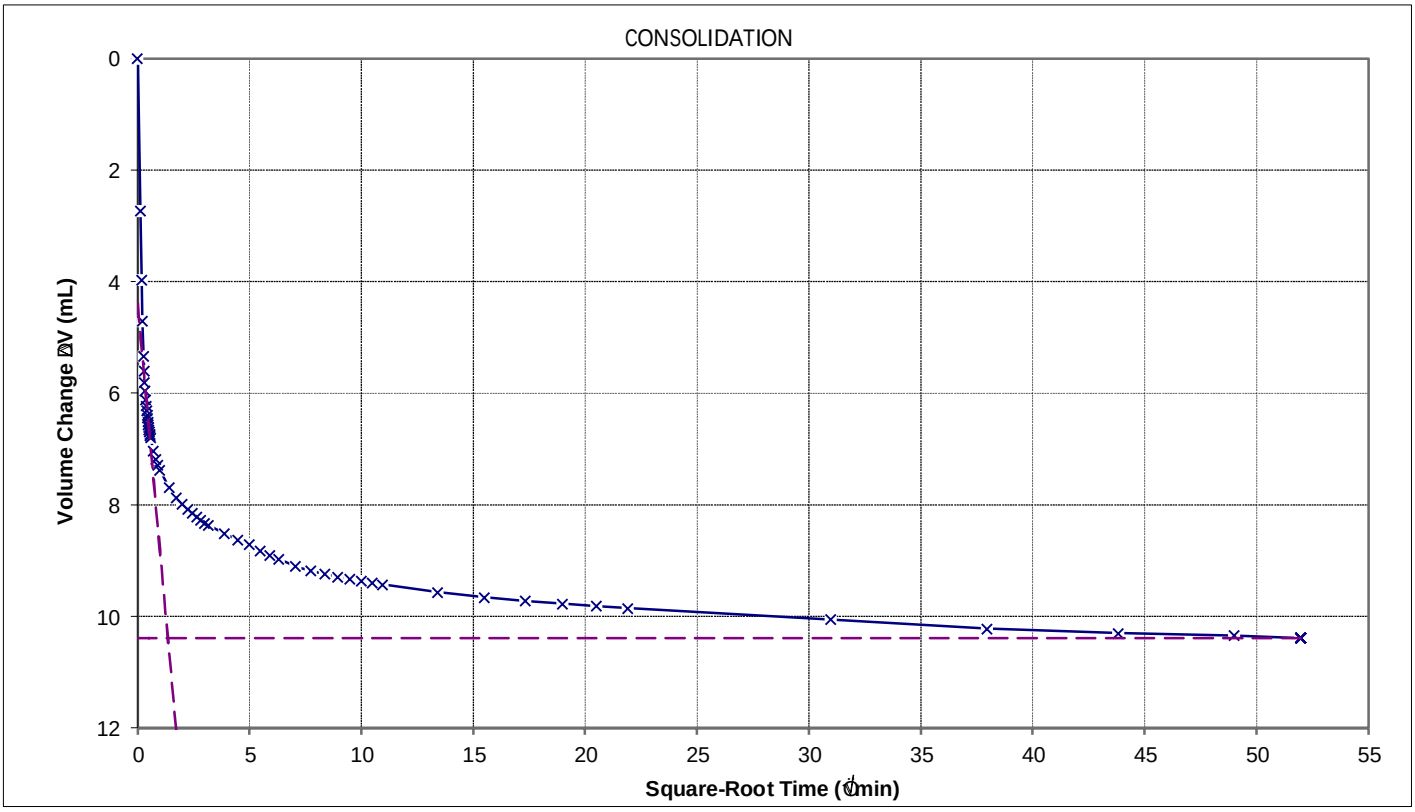
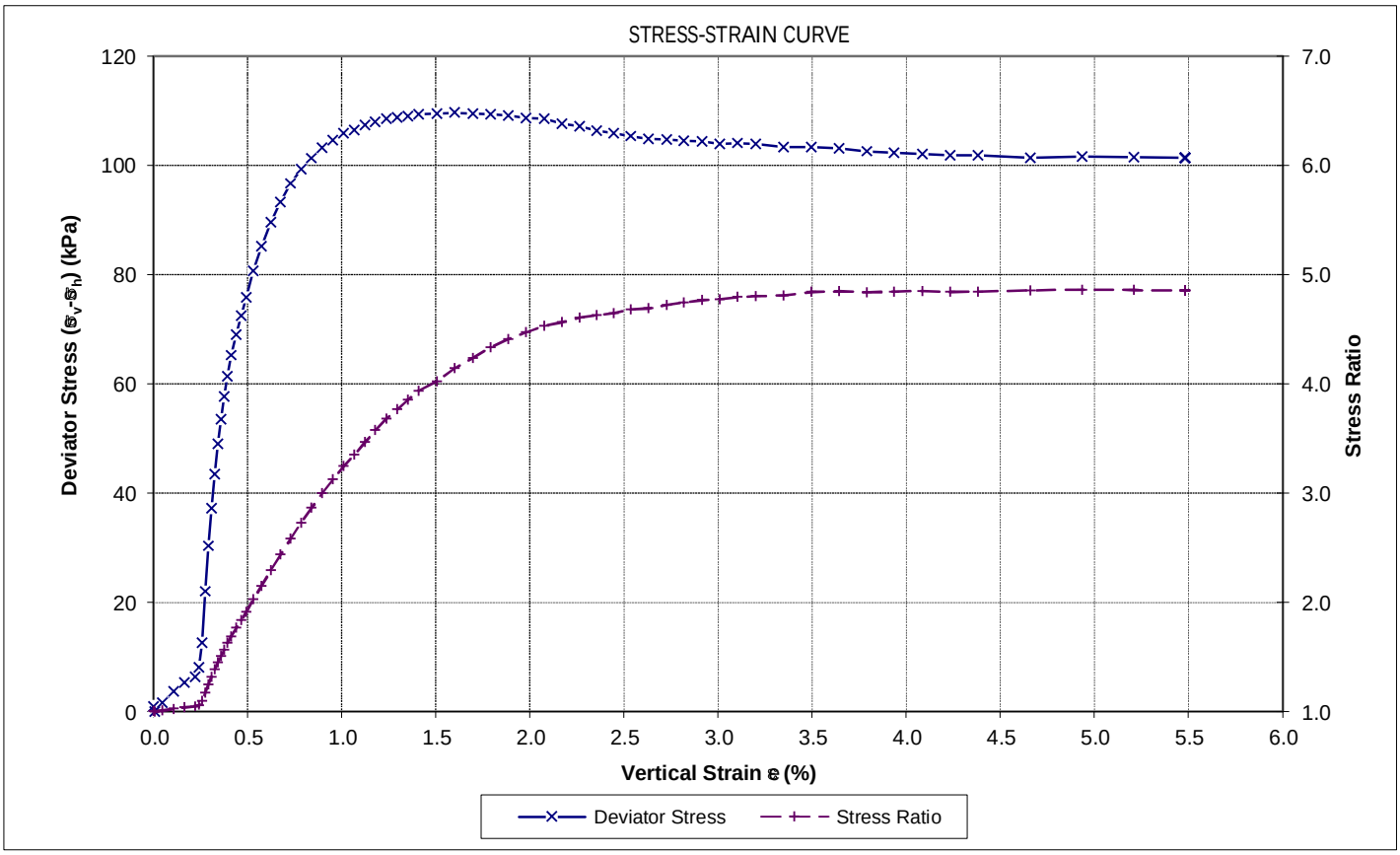
STAGE 3 GRAPHS





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Geotechnics Project ID: 1100731.0000
QESTLab Work Order ID:
Customer Project ID: 19103

Site: 67 Dip Road, Kamo, Whangarei Location ID: CPT01
Sample Ref.: -- Depth: 3.67-3.84 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST (MULTI-STAGE)

MOHR CIRCLES OF TOTAL AND EFFECTIVE STRESSES

General Sample Parameters

Initial Sample Height:	175.03	mm	Initial Water Content:	96.0	%
Initial Sample Diameter:	85.64	mm	Initial Bulk Density:	1.34	t/m³
Initial B Value:	30	%	Initial Dry Density:	0.68	t/m³
B Value before Consolidation:	94	%	Final Water Content:	101	%

Test Results

	At the End of Consolidation Stage					Failure Values						Failure Mode & Photo
	Effective Stress		Back	Volumetric		Deviator Stress	Vertical	Effective Stress		Corrections (kPa)		
	Horizontal σ_h'(kPa)	Vertical σ_v'(kPa)	Pressure (kPa)	Strain (%)	Rate (%/hr)	$(\sigma_v' - \sigma_h')$ (kPa)	Strain ε (%)	Vertical σ_v' (kPa)	Horizontal σ_h'(kPa)	Membrane $(\Delta\sigma_v)_m$	Filter P $(\Delta\sigma_v)_{fp}$	Planar
Stage 1	35	36	500	0.40	0.00	83.24	1.91	100.64	17.40	0.38	2.80	
Stage 2	70	71	500	1.16	0.00	105.04	1.34	133.64	28.60	0.26	1.96	
Stage 3	140	141	500	1.80	0.00	134.87	1.23	180.77	45.90	0.24	1.81	

	Total			Effective		
Angle of Frictional Resistance:	ϕ =	11	°	ϕ' =	28	°
Cohesion:	c =	28	kPa	c' =	16	kPa
Linear Regression Coefficient:	r =	0.994		r =	1.000	

Sample History: Undisturbed core trimmed at natural water content.

Soil description: SAND, silty, lightly packed, orangey brown with dark brown, light yellow grey and black.

Test Speed: 0.025 (mm/min)

Test Remarks: The sample was saturated by increments of cell pressure and back pressure.
It was drained from radial boundary and both ends in the consolidation stages.
Failure for each stage was determined by either the maximum effective stress ratio or the maximum deviator stress. Strength parameters have been derived by using a linear regression fitting method.

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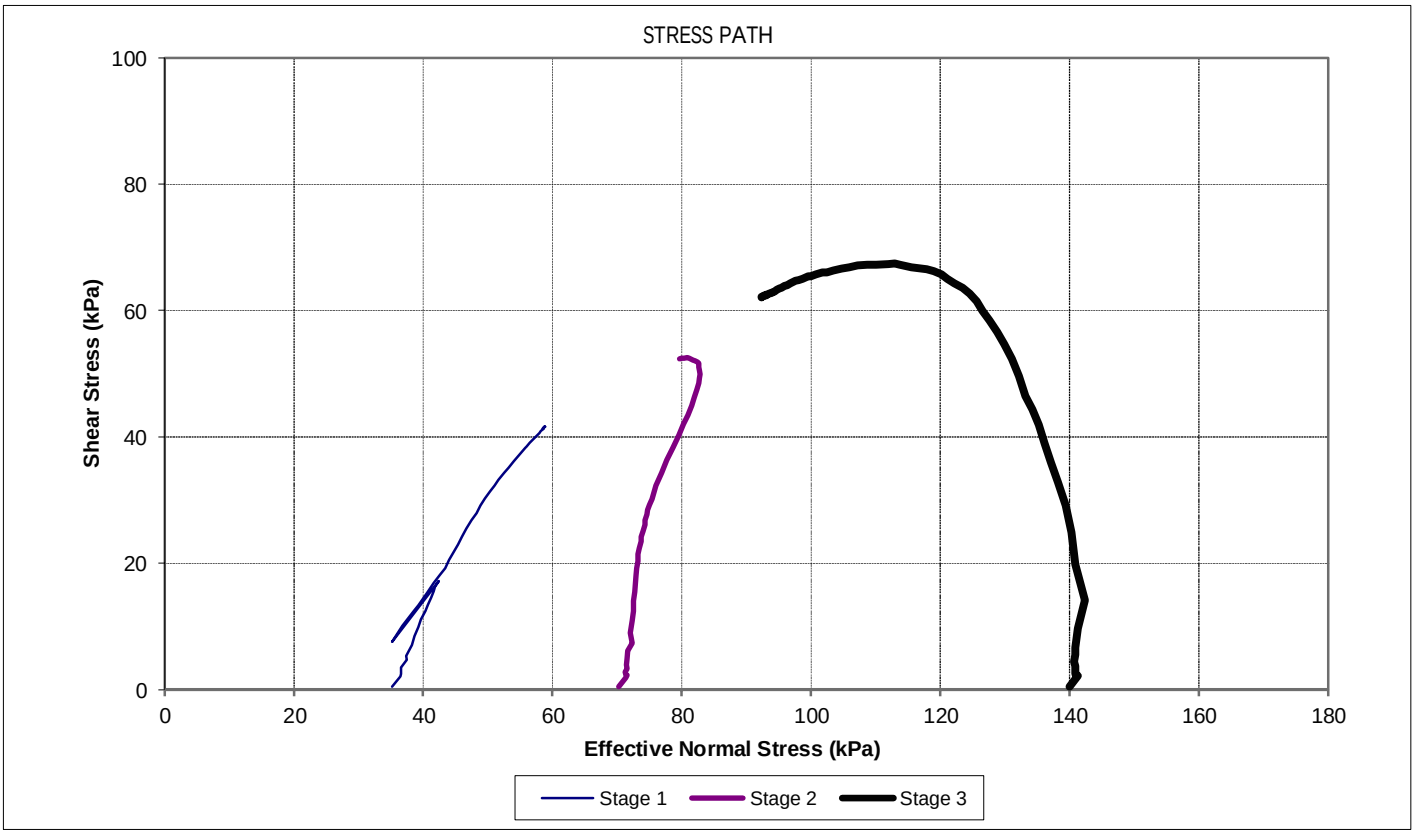
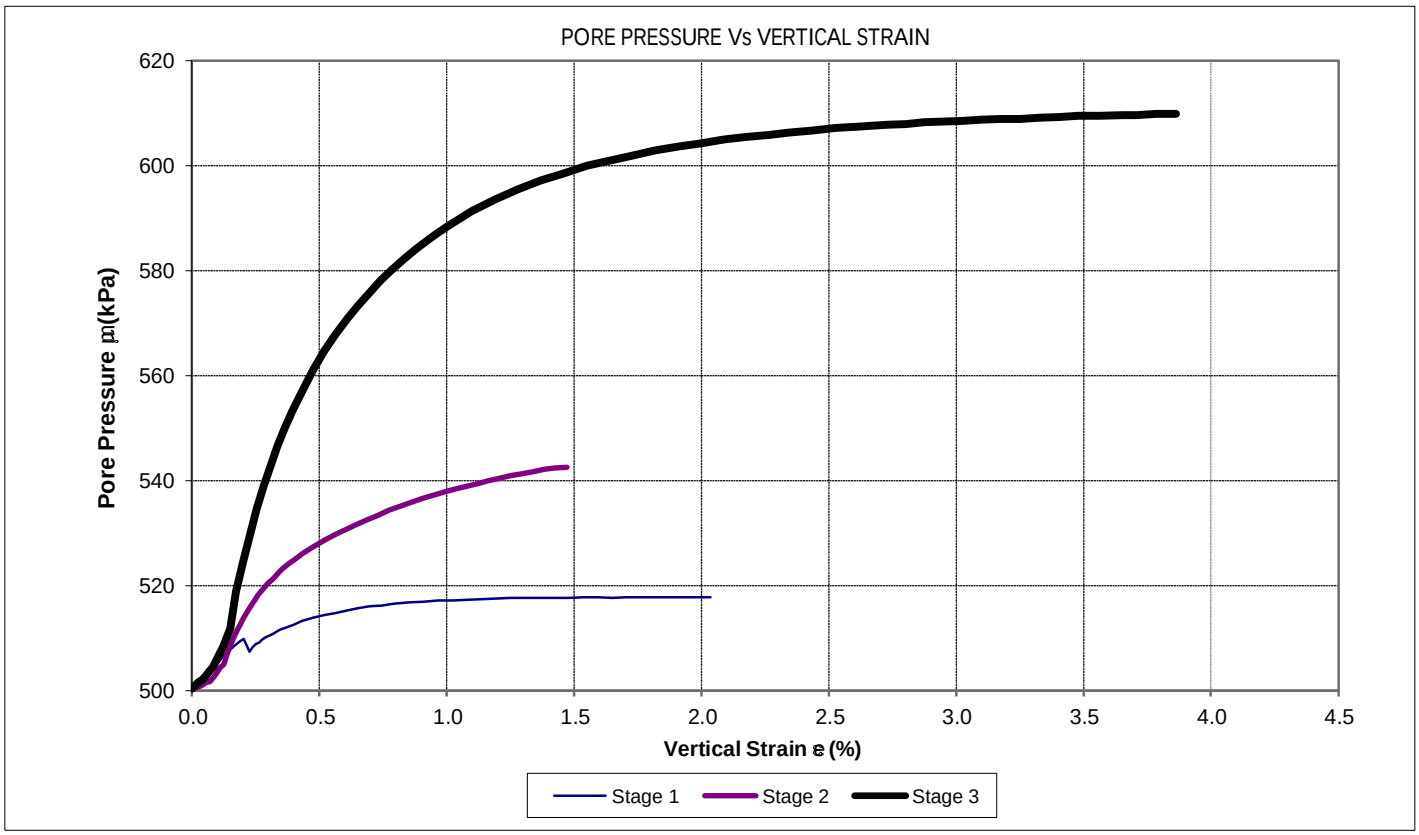
GRAPHS





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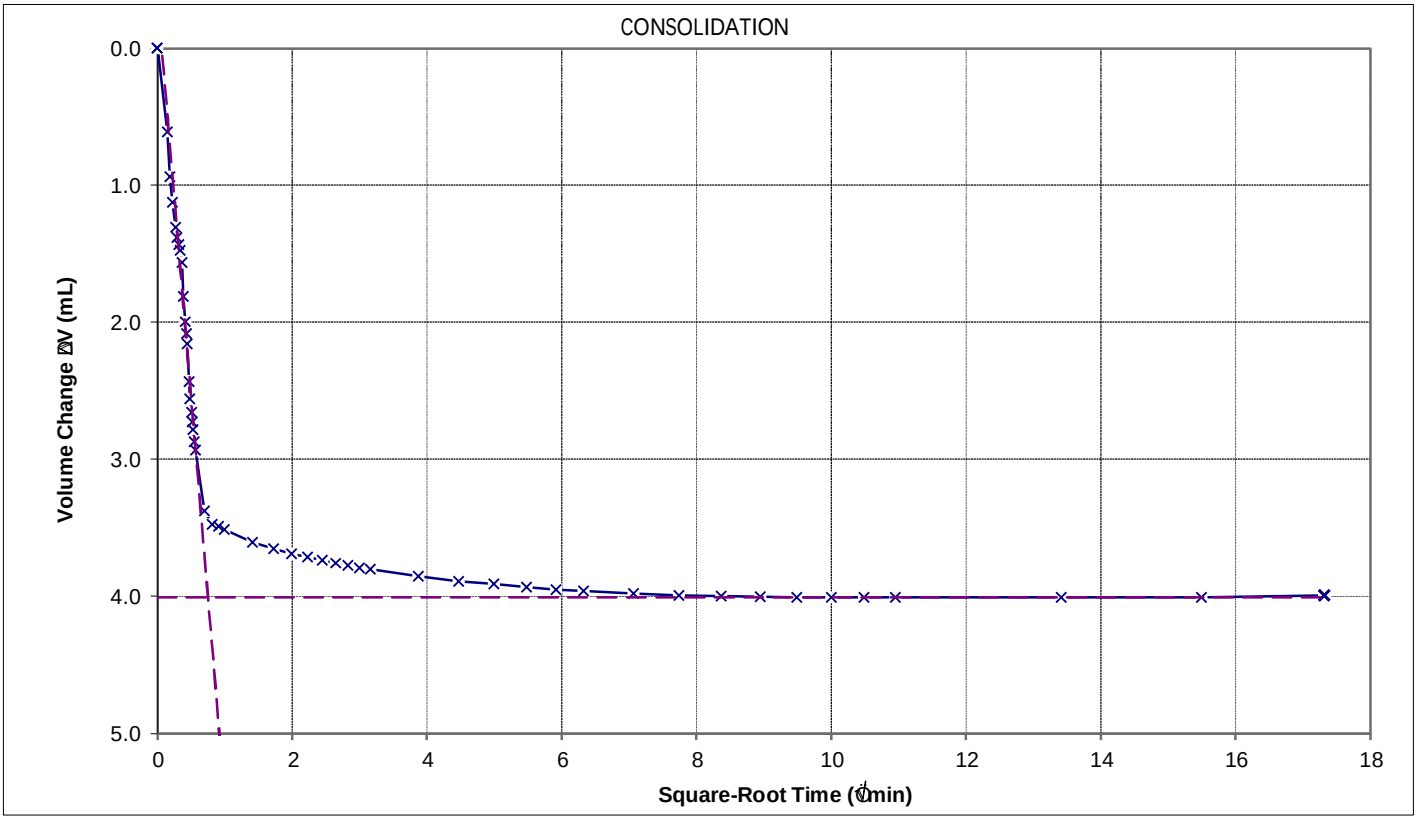
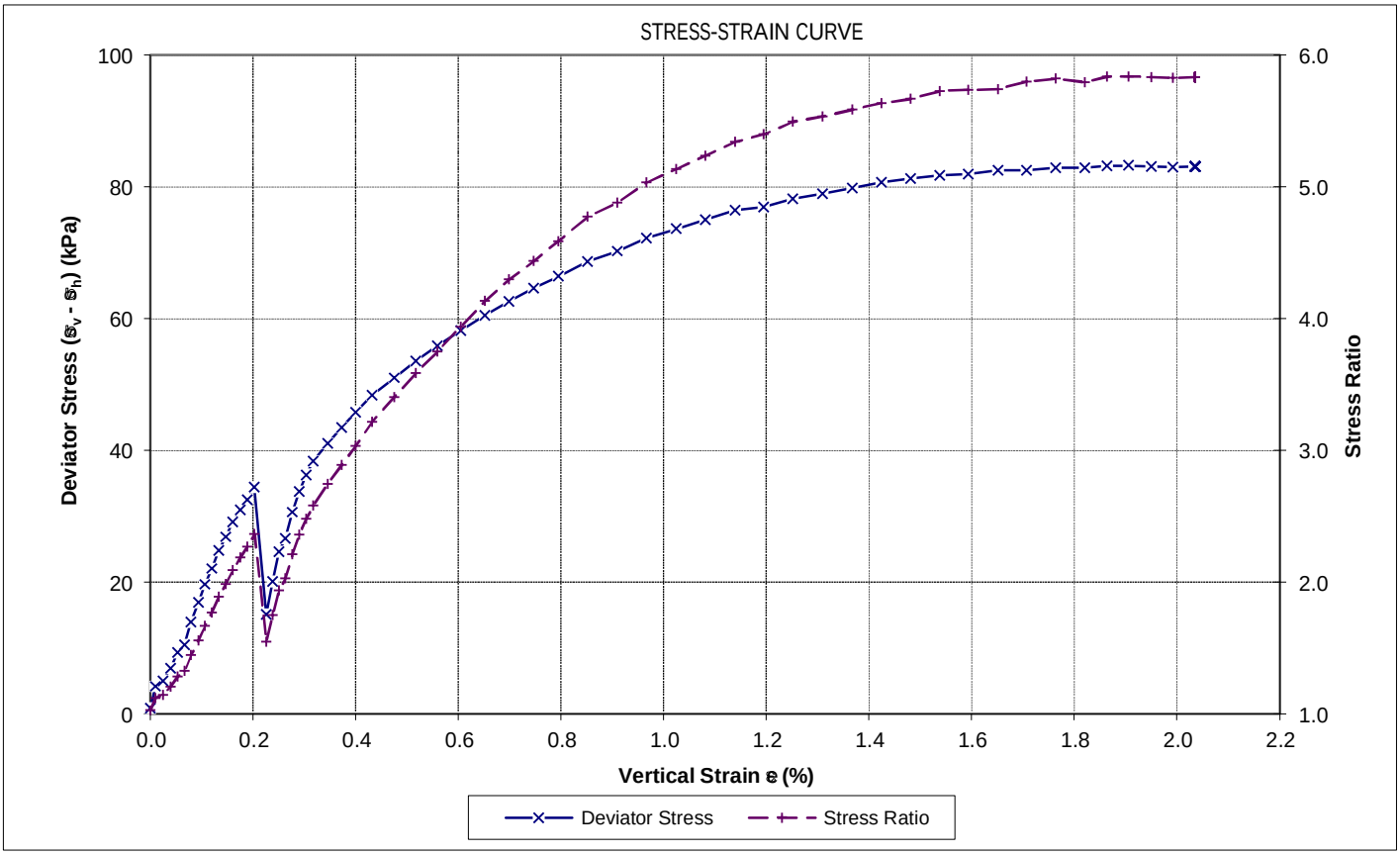
STAGE 1 GRAPHS





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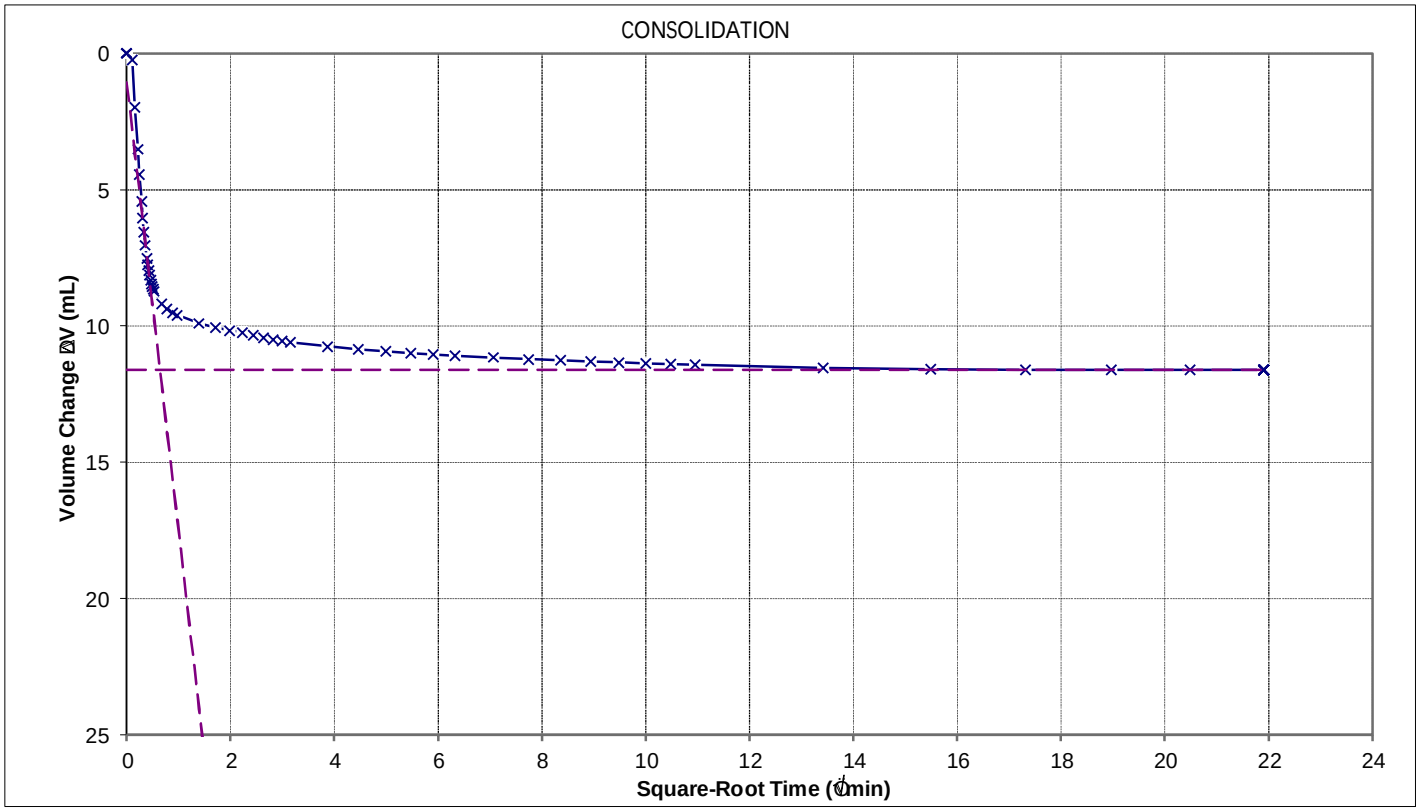

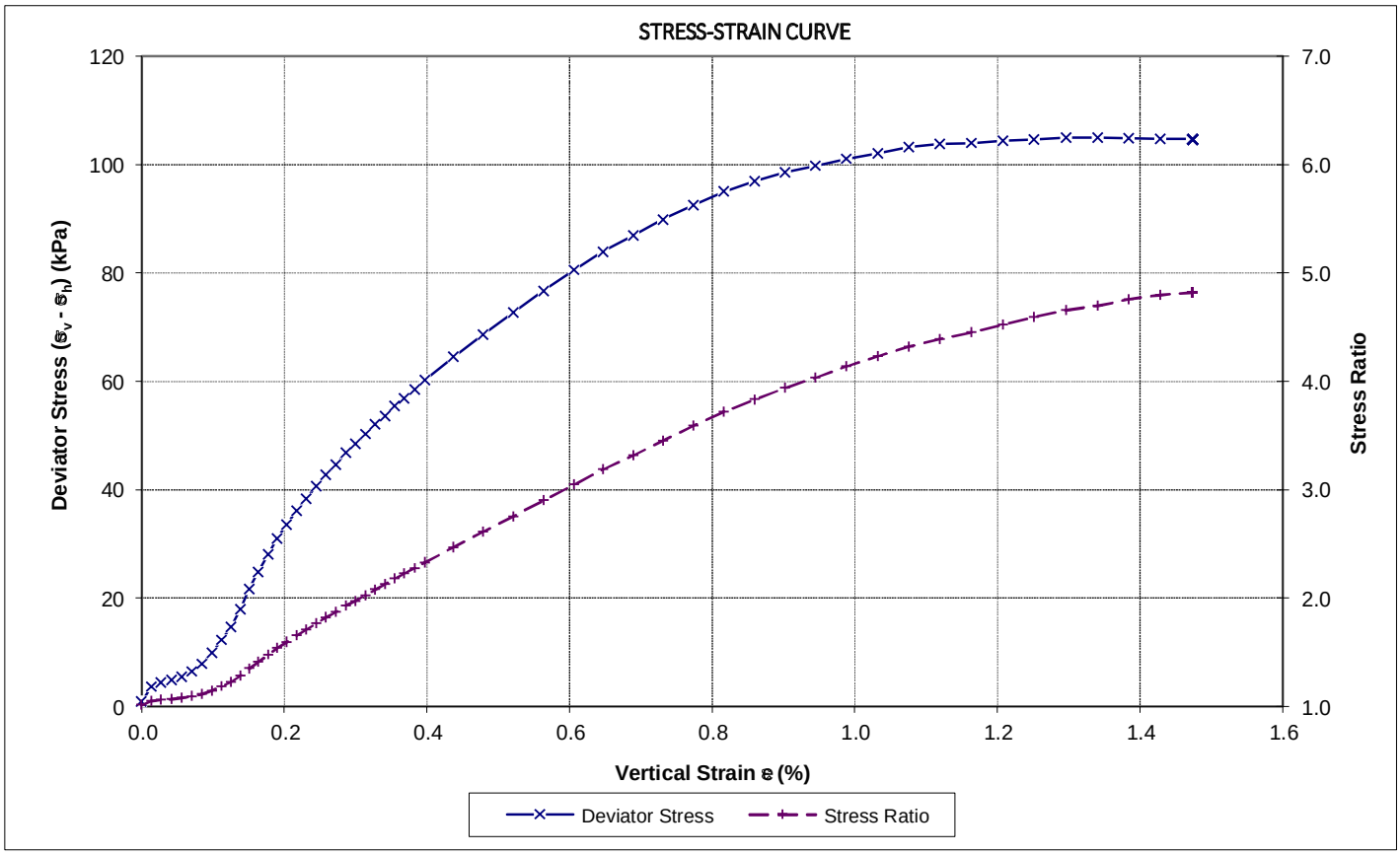

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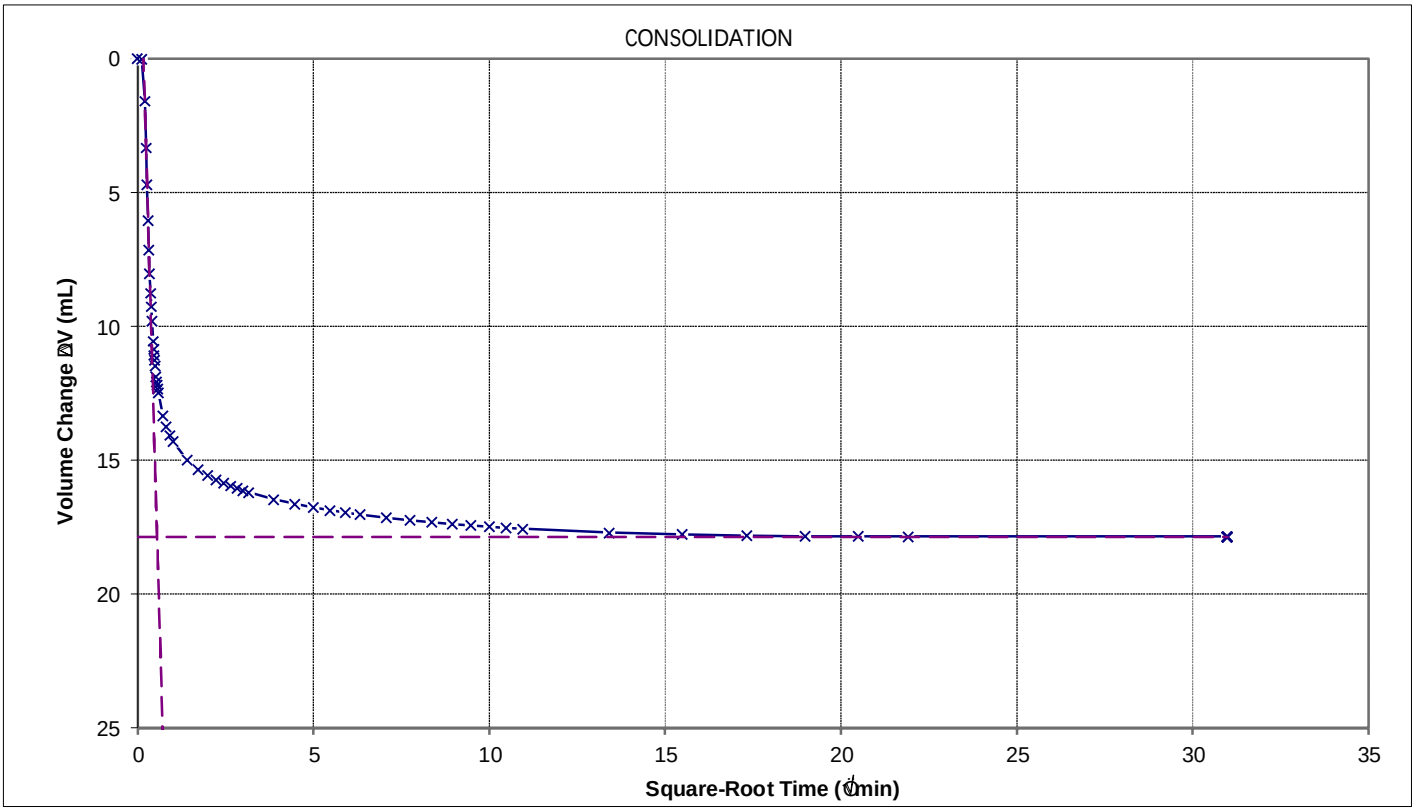

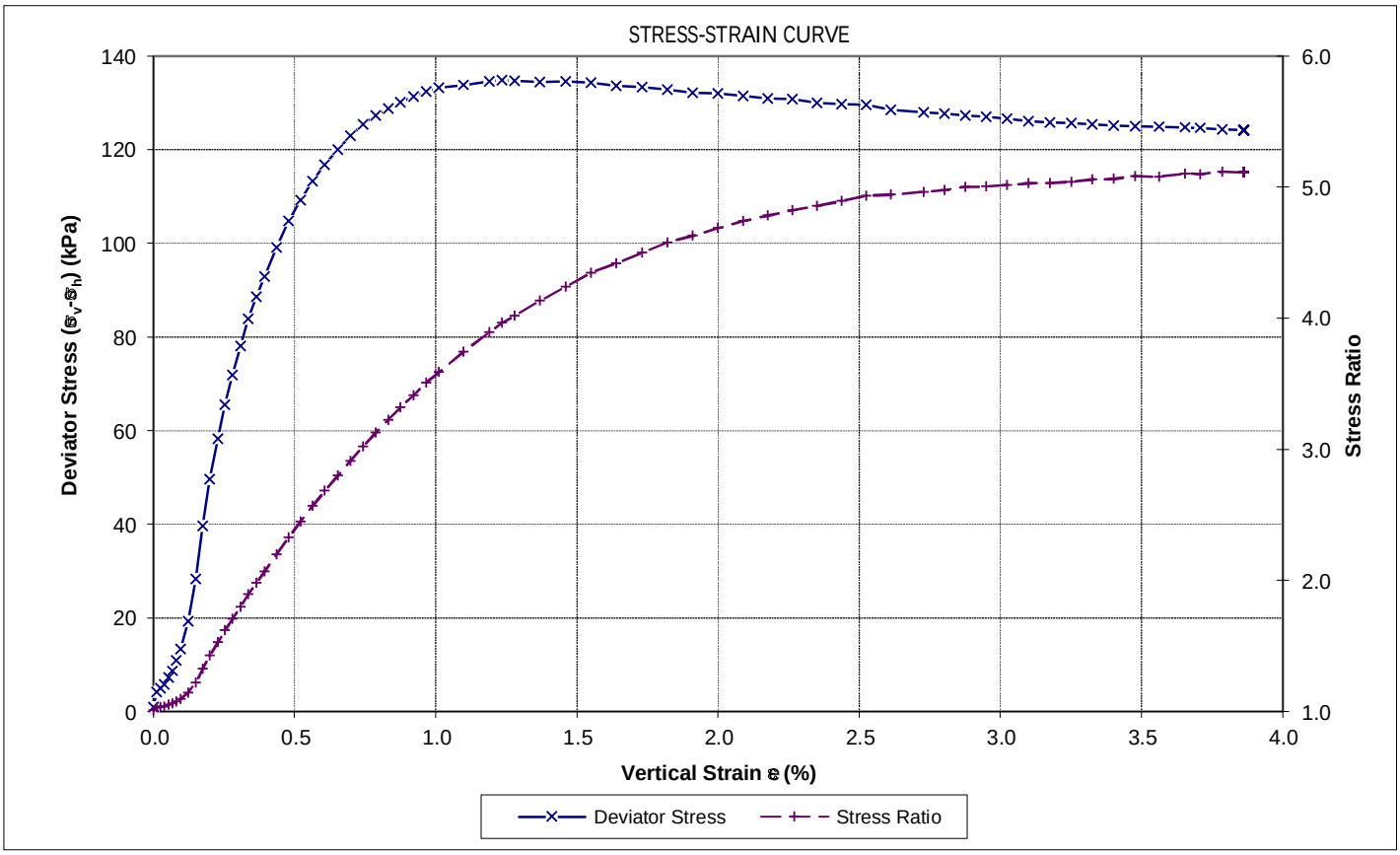

Approved Signatory: Date: 4/03/2021

GEOTECHNICS

Our Ref: 1100731.2.0.0/Rep2
Customer Ref: 19103
5 March 2021

Land Development & Exploration Limited
Warkworth
PO Box 471
0941

Attention: Finlay Wallen-Halliwell

Dear Finlay

67 Dip Road Kamo Whangarei

Laboratory Test Report

Samples from the above mentioned site have been tested as received according to your instructions and the results are included in this report. Results apply only to the sample(s) tested.

Descriptions are enclosed for your information, but are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of Land Development & Exploration Limited, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

This report may be reproduced only in full.

Samples not destroyed during testing will be retained for one month from the date of this report before being discarded. If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of this page.

GEOTECHNICS LTD

Report prepared by:

.....
Tylah Wardrope
Laboratory Technician

Authorised for Geotechnics by:

.....
Paul Burton
Project Director

Report checked by:

.....
Ryan Milligan
Project Manager
Approved Signatory
5-Mar-21
t:\geotechnicsgroup\projects\1100731\workingmaterial\tga lab\lde 67 dip road kamo whangarei-cu.docx

ACCREDITED IANZ TESTING LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

GEOTECHNICS

15C Amber Crescent
Judea
Tauranga 3110
New Zealand
p +64 7 571 0280

Geotechnics Project Number	1100731.2.0.0
QESTLab Work Order ID	W21TG-0038
Customer Project ID	19103

Detection of the Presence of Allophane in Soils - NZS 4402:1986 Test 3.4

TEST DETAILS

LOCATION	**Description**	67 Dip Road Kamo Whangare		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S21TG000081		
	Reference	CPT01	**Top Depth**	3.85m
	Sampled By	Others, Tested As Received	**Bottom Depth**	**3.86m**
	Description	silty SAND, lightly packed, orange brown with dark brown, light yellow grey and black.		
SPECIMEN	**Reference**		**Depth**	
	Description			

TEST RESULTS

Colour Intensity	Pink to Red
Allophane Content	**5% to 7%**

This result is an approximate indication of allophane content.

Bright Red - More than 7% Allophane Presence
Pink to Red - 5 to 7 % Allophane Presence
Colourless - Less than 5% Allophane Presence

TEST REMARKS

• The material used for testing was natural. • This test result is IANZ accredited.•Date tested 05/03/2021

Approved Signatory Ryan Milligan

Date 05/03/2021

GEOTECHNICS

15C Amber Crescent
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Tauranga 3110
New Zealand
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Geotechnics Project Number	1100731.2.0.0
QESTLab Work Order ID	W21TG-0038
Customer Project ID	19103

Detection of the Presence of Allophane in Soils - NZS 4402:1986 Test 3.4

TEST DETAILS

LOCATION	**Description**	67 Dip Road Kamo Whangare		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S21TG000082		
	Reference	BH01	**Top Depth**	3.36m
	Sampled By	Others, Tested As Received	**Bottom Depth**	**3.38m**
	Description	silty SAND, lightly packed, orange brown with dark brown and light grey.		
SPECIMEN	**Reference**		**Depth**	
	Description			

TEST RESULTS

Colour Intensity	Pink to Red
Allophane Content	**5% to 7%**

This result is an approximate indication of allophane content.

Bright Red - More than 7% Allophane Presence
Pink to Red - 5 to 7 % Allophane Presence
Colourless - Less than 5% Allophane Presence

TEST REMARKS

• The material used for testing was natural. • This test result is IANZ accredited.•Date tested 05/03/2021

Approved Signatory Ryan Milligan

Date 05/03/2021

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AUCKLAND I GISBORNE | NAPIER | TAURANGA I

WARKWORTH | WHANGANUI | WHANGAREI

www.lde.co.nz

Appendix 7

Geotechnical Earthworks Letter

Project Reference: 19103

24/11/2021

Onoke Heights Limited
C/- M Holland
mark@waibury.co.nz

Dear Mark,

EARTHWORKS DESIGN REVIEW

Onoke Heights, 67 Dip Road, Kamo, Whangarei

LDE Limited have been engaged to provide geotechnical engineering support for the Onoke Heights residential development at 67 Dip Road, Kamo, Whangarei.

A geotechnical suitability report has been prepared by LDE to support the resource consent for the proposed development, with preliminary recommendations for the earthworks design for the development.

A preliminary subdivision design has now been completed with earthworks plans prepared by Blue Wallace, reference 20253, and supplied to LDE for review prior to submission for resource consent.

This report outlines our review of the proposed earthworks design and is intended to support resource consent. Further investigation and analysis will be required to inform the design of specific structures for engineering plan approval and building consent.

1 PROPOSED DESIGN

The proposed design (latest version dated 23/11/2021 at time of review), broadly comprises:

- Bulk filling to form level or near level building platforms through to south-western and central areas of the site.
    - Filling is supported by a series of broad retaining walls along the base of Lots 1-16, below Lots 35 to 43, below Lots 56-62, below Lots 69 and 70, and at the northern boundary above Lots 74-78. Several other smaller walls are also proposal.
    - Retained heights up to 5m are indicated.

- Battered cuts along the north-eastern edge of the site, along the base of the small scoria cone slope, to form the road.
- A retained cut along the northern edge of the site, below the reservoir site and driveway.
- Various shallow battered cuts and fills to the southeast of the site form building platforms and the proposed stormwater pond.

2 GEOTECHNICAL ASSESSMENT

The stability of the site was previously assessed as part of the subdivision geotechnical suitability report. The site was found to be in a generally stable condition. The steep slope up to the scoria cone on the north-eastern edge of the site was deemed 'moderate' instability hazard (in accordance with WDC EES criteria), as was the steep arcuate slope into the stream on the southern boundary of the site. Further assessment has been undertaken to consider the effects of the proposed earthworks on these two areas.

Preliminary assessment of other areas of significant earthworks have also been considered, as outlined below. Further investigation and analysis of these other areas will be required.

2.1 North-eastern slope (Lots 80 – 92)

Stability analysis has been undertaken assess the stability of this slope and the proposed earthworks. The earthworks generally comprise significant down-cutting at the lower edge of the slope, to form the road. This cut will then be battered back to natural ground level towards the top edge of the sites.

The proposed cut is deepest at the south-western boundaries of Lots 88, 89 and 90, at up to approximately 5m depth. The sites are battered back from this edge at up to 1V:2.7H (20°).

The slope has been modelled as generally described in the subdivision suitability report and shown in the cross section appended to that report (drawing 19103 G-01).

Material strength parameters for the weathered and un-weathered scoria have been conservatively estimated based on assessment of existing slopes and in particular the deep quarry cut to the north-east of the hill. Parameters for the remaining units were as given in in the report. All parameters are shown on the appended printouts.

Modelling has been undertaken in general accordance with Whangarei District Council 'Land Development Stabilisation – Technical Design Requirements', April 2018[1]. Normal/design groundwater, extreme groundwater, and seismic scenarios have been analysed. The normal groundwater scenario were found to be the controlling

[1] https://www.wdc.govt.nz/Council/Council-documents/Policies/Land-Development-Stabilisation-Policy

case, as would be expected given the very low groundwater table, favourable drainage conditions, and low seismicity at the site.

The slope was found to be stable in the design case with the proposed cut, with the factor of safety for failures through the slope being >1.7. The existing design of these lots is therefore considered appropriate.

It was found that any significant steepening of the cut slope, and in particularly any deep cuts (i.e. an unsupported cut for the dwelling) would result in potential instability from the reserve land above the slope. As a result specific assessment and design would be required for any future dwellings on these sites. It is generally expected that the sites will be suitable for suspended pole houses or multistorey houses cut into the slope with retaining. At the design grade some minor cuts will be required to gain access into the sites. Cuts for access are likely to also require retaining.

2.2 Stream Bank Slope (Road)

The proposed subdivision design shows the road passing near the crest of the stream bank slope, with minor fills extending over the slope crest. This slope is inferred to be in a marginal state of stability, and is not expected to meet minimum factor of safety criteria and will require specific engineering design.

It is expected that a cantilevered timber pole retaining wall will be suitable to support the proposed fill for the road. Due to the presence of low strength tephra soils and the steep downslope angle it is likely that an engineered retaining wall will be required to achieve the required factors of safety.

2.3 Lot 78 (Reservoir Cut)

A large cut is proposed at the northern edge of Lot 78, adjacent to the Reservoir site. Earthworks plans show this being retained over 3m at the boundary.

Given the some-what unfavourable ground conditions for cantilever retaining, as noted in the geotechnical suitability report, and the potential surcharge loading that would need to be considered for the usage of the site above, it may not be practical to retain this slope. If retaining is proposed then this may need to be set within the site to reduce retained heights, which would then limit the building area.

It is recommended that this lot be graded to an even slope in a similar manner to Lots 80 to 92. The site would then be suitable for similar types of dwellings as outlined in Section 2.1 or may otherwise be cut flat and retained at the time of building consent, subject to specific engineering design.

2.4 Deep Fills

Through the central area of the site, fills up to approximately 6.5m are proposed. These are expected to be constructed as some form of MSE wall. The internal stability of the proposed fill will therefore need to be addressed as part of the geotechnical design. It is expected that global stability and bearing capacity will be

checked as part of the design. Preliminary analysis indicates that the proposed fill depths can be achieved with conventional MSE construction (e.g. Redirock walls), without significantly affected the instability hazard at the site.

Preliminary settlement analysis has been undertaken to check expected settlements under the proposed fill loads, with the primary concern being the potential consolidation of the loose tephra soil in the fill areas. Based on a lower bound oedometric modulus of 5MPa, estimated from the consolidation stages of CU triaxial tests, total expected settlement would be on the order 150 to 200mm. Further investigation and analysis are proposed as part of detailed design.

Settlement of the tephra soils is expected to be near immediate. No settlement of building sites is expected to occur beyond the completion of the subdivision.

3 CONCLUSIONS

Based on our review of the supplied earthworks design, subject to the above recommendations and detailed design requirements, the proposed works are not expected to adversely affect the stability of the site.

The building sites created by the works are expected to be suitable to support dwellings, subject to requirements for specific engineering design at some lots.

4 LIMITATIONS

This letter has been prepared exclusively for Onoke Heights Limited with respect to the brief given to us. Information, opinions, and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent. LDE Ltd accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party.

This report was prepared in general accordance with current standards, codes, and practice at the time of this report. These may be subject to change.

This report should be read in its entirety to understand the context of the opinions and recommendations given.

For and on Behalf of Land Development and Engineering Ltd

Report prepared by:

Finlay Wallen-Halliwell
Engineering Geologist
BSc, PMEG

Report reviewed by:

Aaron Holland
Senior Civil & Geotechnical Engineer
CMEngNZ (CPEng)

Attached: Stability Analysis for north-eastern slope

LEGEND

Section line

Basemaps

LINZ Aerial Basemap

0 30 60 90 120 m

SCALE A3: 1:1500

NOTES

1. Aerial basemap and property boundaries sourced from LINZ Data Service (CC-BY 4.0).
2. Design surface from Blue Wallace ref. 20253 dated 23/11/2021. See full earthworks plan set for details.

CLIENT

Onoke Heights

PROJECT

Onoke Heights Development
67 Dip Road
Whangarei

DRAWING TITLE

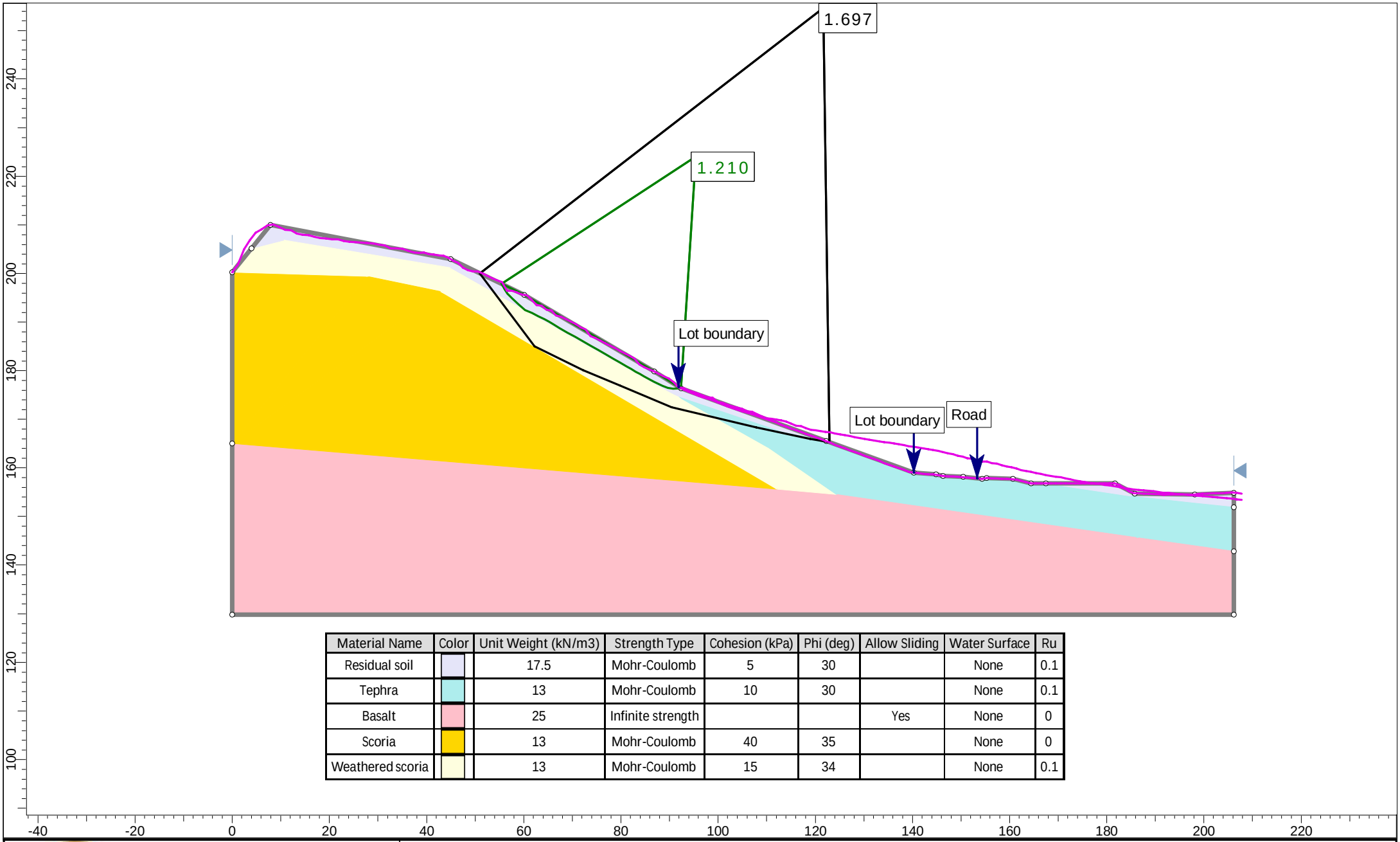
Cross section location plan

LDE LAND DEVELOPMENT & ENGINEERING LTD.

PROJECT REF	DRAWING REF	REVISION
19103	G02	A
DATE	PREPARED BY	CHECKED BY
23/11/2021	FWH	AH

FILE PATH

M-FILES\LDE - Project\0430\19103 - Dip Rd Earthworks Check\19103 Base Data v1.qgz



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Allow Sliding	Water Surface	Ru
Residual soil		17.5	Mohr-Coulomb	5	30		None	0.1
Tephra		13	Mohr-Coulomb	10	30		None	0.1
Basalt		25	Infinite strength			Yes	None	0
Scoria		13	Mohr-Coulomb	40	35		None	0
Weathered scoria		13	Mohr-Coulomb	15	34		None	0.1

LAND DEVELOPMENT & ENGINEERING LTD.

SLIDEINTERPRET 9.019

Project	Section 101 - 67 Dip Road, Kamo 19103		
Analysis Description	Group 1 - Master Scenario		
Drawn By FWH	*Scale* 1:1000	*Date* 23/11/2021	
File Name	19103 CS-101.slmd		

Appendix 8

Rules Assessment

Rules Assessment

Proposal: Onoke Heights - Subdivision: to create 95 residential allotments, drainage and recreational reserves to vest and other associated works.

Address: Dip Road, Kamo

Site Zoning	
Zone	**General Residential Zone**
Overlays/Controls	Critical Electricity Line, Flood Susceptible
Designations	Nil

Transport	Compliance	Consents required / areas of non-compliance
TRA-R2 Required Spaces	N/A	
TRA-R3 Location and Identification	N/A	
TRA-R4 Parking Gradient	N/A	
TRA-R5 Vehicle Crossing design and location 1. Permitted where constructed in accordance with TRA Appendix 2. 2. A shared private access serves no more than 8 principle residential units. 3. The vehicle crossing is not fronting a state highway. 4. Any unused vehicle crossings are reinstated to match the existing footpath and kerbing. 5. The vehicle or pedestrian crossing is not over a railway corridor.	1. Vehicle crossings to each allotment will be constructed at time of building. 2. Two access lots are proposed: Lot 301: - serving lots 26 to 28 Lot 302 – serving lots 59 to 66 3. N/A 4. Existing vehicle crossing at Dip Road will be decommissioned and relocated, the vehicle crossing at Tuatara Drive will be upgraded. 5. N/A **Permitted Activity**	
TRA-R6 Setbacks 1.The new vehicle crossing is located at least: a. 30m from a railway level crossing. b. 8m from a dedicated	Vehicle crossings will be constructed at time of building – proposed allotments are of	

pedestrian crossing facility (including pedestrian crossing, midblock pedestrian signals, refuge islands and traffic signalled intersections). c. 2m from a separate vehicle crossing.	sufficient size to enable compliance. Permitted Activity	
TRA-R7 Manoeuvring Space	N/A	
TRA-R8 Vehicle Crossing, Access and Parking Area	N/A	
TRA-R9 Setbacks (Strategic Road Protection)	N/A	
TRA-R9A New Buildings, Excluding Minor Buildings (Strategic Railway Line Protection)	N/A	
TRA-R10 Landscaping Within Parking Areas.	N/A	
TRA-R11 Tree Planting Within Parking Areas.	N/A	
TRA-R12 Electric Vehicle Charging Station	N/A	
TRA-R13 Subdivision Controlled Where: 1. The site does not contain an indicative road or a strategic road protection area. 2. Subdivision results in all sites having access and crossings which comply with TRA-R5 – R6. 4. Subdivision results in a shared access which serves no more than 8 allotments.		1. N/A 2. All access and crossings will comply with TRA-R5 and R6. 4. Subdivision will result in no access serving more than 8 allotments. Controlled Activity
TRA-R14 Any Activity Activity Status: Restricted Discretionary Where, with respect to Table TRA 15: 3. Any subdivision proposes more than 25 vacant allotments; or 4. Subdivision is proposed of an allotment that existed at 15 April 2021 and the area of the parent allotment is equal to or larger than: b. 1ha within the General Residential Zone or Rural Village Residential Zone.		3. The subdivision, proposes 95 vacant allotments. 4. The proposal includes the subdivision of a 6.8ha site, larger than 1ha in the General Residential Zone. Restricted Discretionary Activity Note: Integrated Traffic Assessment has been prepared to comply with REQ.2 see Appendix 4.
TRA-R15 Any Activity		

Activity Status: Restricted Discretionary Where, with respect to Table TRA 16: 3. Any subdivision proposes more than 50 vacant allotments; or 4. Subdivision is proposed of an allotment that existed at 15 April 2021 and the area of the parent allotment is equal to or larger than: b. 2ha within the General Residential Zone or Rural Village Residential Zone.		
TRA-R16 Construction of Any New Public Road or Service Lane Restricted Discretionary Activity **TRA- R17 Major Roading Alteration to an Existing Public Road** Restricted Discretionary Activity.		The proposed subdivision includes an extension of the existing public road extending across the site from Tuatara Drive to Dip Road. **Restricted Discretionary Activity** Note: Integrated Traffic Assessment has been prepared to comply with REQ.3 see **Appendix 4.**
Three Waters Management	Compliance	Consents required / areas of non-compliance
TWM-R2 Stormwater Restricted Discretionary Where: All allotments are designed for: a. The collection, treatment and disposal of stormwater that meets the following requirements: i. Any attenuation is able to accommodate an additional 20% for climate change. ii. The primary stormwater system is capable of conveying a 50% AEP storm event (+20%) where the system is a piped network with no surcharge. iii. The primary stormwater system is capable of conveying a 20% AEP storm event (+20%) where the system is a piped network allowing a discharge within 0.3m of the lid level. iv. The secondary stormwater system is capable of conveying the 1% AEP		The proposed subdivision includes the construction of three stormwater ponds which have been designed with capacity to mitigate post development flows refer to Three Waters Design Report – **Appendix 5.** **Restricted Discretionary Activity**

storm event (+20%) within a defined path to ensure that surface water will not enter buildings (excluding detached garages). v. The stormwater system will not connect or overflow to any wastewater system. vi. The stormwater system is designed and constructed for an asset life of at least 50 years. b. Connection to a public reticulated stormwater network where the allotment is located within a reticulated stormwater area.		
TWM-R3 Wastewater Restricted Discretionary Where: 1. All allotments (excluding any allotment for access, roads, utilities and reserves) are designed and located so that provision is made for: a. Collection, treatment and disposal of wastewater. b. Connection to a public reticulated wastewater network where the allotment is located within a reticulated wastewater area.		All residential allotments proposed are designed and located to ensure that collection, treatment and disposal of wastewater will be by way of connection to public reticulation. As detailed in Three Waters Design Report – Appendix 5. Restricted Discretionary Activity
TWM-R4 Water Supply Restricted Discretionary Where: 1.All allotments (excluding any allotment for access, roads, utilities and reserves where no irrigation is required) are designed and located so that provision is made for: a. A water supplies. b. Connection to a public reticulated water supply network where the allotment is located within a reticulated water supply area.		All residential allotments proposed are designed and located to ensure potable water will be supplied by way of connection to public reticulation. As detailed in Three Waters Design Report – Appendix 5. Restricted Discretionary Activity
TWM-R5 Integrated Three Waters Assessments Controlled Where: The subdivision results in 8 or more additional allotments from one parent allotment which existed.		The proposed subdivision will result in 95 residential allotments. Controlled Activity Note: Integrated Three Waters Assessment has been prepared to comply with REQ.1 see Appendix 5.

Critical Electricity Lines and Substations	Compliance	Consents required / areas of non-compliance
CEL.1.2.1 Permitted Activity Land Use The following activities are permitted activities: 1. Within 10m of a CEL or the designation boundary of a substation: i. Any building or structure that does not require building consent; or ii. Alteration of any building or major structure (excluding minor buildings) that does not exceed outside the envelope or footprint of the existing building or major structure (excluding minor buildings); or iii. Earthworks, gardening or cultivation that: a. Are not directly above an underground cable(s); and b. Do not result in a reduction of existing ground clearance distances from overhead lines below the minimums prescribed in the New Zealand Code of Practice 34:2001 (NZECP 34:2001); and c. Are in accordance with NZECP 34:2001. 2. Within 20m of a CEL or the designated boundary of a substation: i. Planting of trees other than shelterbelts, plantation forestry or commercial horticultural operations	Northpower Critical Electricity Line – Overhead CEL is located within the subject site. The CEL will be converted to an underground line as part of the proposed development The proposal will not result in any building or structure, earthworks that will result in the reduction in ground clearance distances. Permitted Activity.	
CEL.1.4.1 Restricted Discretionary Activities – Subdivision Subdivision within 32m of the centre line of a CEL, or within 32m from the designation boundary of a substation shall be a restricted discretionary activity.		The proposal includes the subdivision of a site which is traversed by a CEL. Restricted Discretionary Activity.
Subdivision	**Compliance**	**Consents required / areas of non-compliance**
SUB-R2 Any Subdivision Controlled where: 1.The land contains a Site of Significance to Maori or area of		1. No site of significance to Maori or area of historic heritage is identified within the subject site.

historic heritage – contained entirely within one allotment. 2.The land contains existing buildings or major structures – proposed allotments result in compliance with relevant zone permitted activity. 3.Every allotment is provided with: a. An underground connection or easements to secure connection to a reticulated electrical supply system at the boundary of the allotment. b. A connection, or the ability to connect to a wireless, above ground, or underground telecommunications system. (131 Three Mile Bush Only) 5. Every allotment is provided with: a. The ability to connect, to an electrical supply at the boundary of the allotment. b. A connection to a wireless, above ground, or underground telecommunications system. (189 Three Mile Bush Only) 8. The most efficient route for electrical supply to any allotment(s) is across other allotments or other land owned by the subdivider, and easements are provided to secure the route.		2. The site is vacant. 3. a. Every allotment proposed will be supplied with connection to reticulated electricity supply to the boundary of each allotment. 3.b Every allotment will be provided with the ability to connect to wireless telecommunications system. 5a and b - As above. 8. The most efficient route for electrical supply to all allotments has been proposed. Controlled Activity.
SUB-R5 Subdivision in GRZ Controlled where: 1. Every vacant allotment: b. For subdivisions involving parent sites equal to or greater than 1ha: i. Has a net site area of at least 320m2 ; and ii. The average net site area of all proposed allotments is at least 400m2 2. Every allotment can contain a rectangle of at least 8m by 15m; and 4. The allotment is is vacant, contains an identified building area of at least 100m2 within which a residential unit can be built so there is compliance: a. As a permitted activity with the General Residential Zone.		1.b The parent site is greater than 1ha, every lot proposed has a net site area larger than 320m2 and an average net site area larger than 400m2. 2. Every allotment can contain a rectangle of at least 8m by 15m. 4. Every allotment contains an identified building area of at least 100m2. Controlled Activity.

b. As a controlled activity with NAV.6.6. Note: 131 Three Mile Bush Only		
SUB-R12 Subdivision of Consented Residential Units	N/A	
Earthworks	**Compliance**	**Consents required / areas of non-compliance**
EARTH-R1 Earthworks Associated with Subdivision Controlled where: 1. The earthworks do not occur within: a. A Site of Significance to Māori. b. 10m of any archaeological site. c. Three times the maximum radius of the canopy dripline of a New Zealand Kauri tree (Agathis Australis). 2. A site suitability report is provided which certifies that: a. A 100m2 building area within each allotment is suitable to construct a building either: i. In accordance with NZS 3604/2011; or ii. With specific engineering design of foundations. b. Access to the certified building area within each allotment is suitable to construct.		1.a. No recorded site of significance to Maori is located within the site. 1b. No recorded archaeological sites are located within the site. 1.c. No Kauri Trees are located within the portion of the site subject to subdivision and associated earthworks. 2. A geotechnical report has been provided refer to Appendix 9. Controlled Activity.
Lighting	**Compliance**	**Consents required / areas of non-compliance**
LIGHT-R7 Any Subdivision Controlled where: 1. Artificial lighting is provided for all streets, walkways, cycleways and roads created by the subdivision. 2. The artificial lighting complies with the AS/NZS1158 series of standards.		All lighting within the proposed subdivision will comply. Controlled Activity.
Noise and Vibration	**Compliance**	**Consents required / areas of non-compliance**
NAV.6.1 Noise Arising from Activities	All proposed activities will comply with NAV.6.1 limits. Permitted Activity.	

NA.6.2 Construction Noise Noise construction, shall comply with the guidelines and recommendations of NZS 6803: 1999 "Acoustics - Construction Noise". Noise levels shall be measured and assessed in accordance with New Zealand Standard NZS 6803: 1999 "Acoustics - Construction Noise".	All proposed activities will comply with NAV.6.2 limits. **Permitted Activity.**	

Rule	Compliance	Non-Compliance
General Residential Zone (GRZ)		
GRZ-R2 Minor Buildings Activity Status: Permitted Note: 1. Minor buildings are exempt from rules GRZ-R3 – R5 and R8	N/A	
GRZ-R3 Building & Major Structure Height Permitted Where: 1. The maximum building height and major structure height is 8m above ground level, except that 50% of a building's roof in elevation, measured vertically from the junction between wall and roof, may exceed this height by 1m where the entire roof slopes 15 degrees or more.	1. Proposed retaining walls are considered to be major structures by definition. All proposed retaining walls will be less than 8m in height. **Permitted Activity**	
GRZ-R4 Building and Major Structure Setbacks Permitted Where: 1. All buildings and major structures are set back at least: a. 3m from road boundaries. b. 1.5m from side and rear boundaries. c. 20m from Mean High Water Springs or the top of the bank of any river that has a width exceeding 3m (excluding bridges, culverts and fences). 2. Except that: a. GRZ-R4.1(b) does not apply where there is an existing or proposed common wall between two buildings on adjacent sites; and b. Non-habitable major structures and buildings, and non-habitable rooms of buildings, may be set back 0m for a	1.c The Waitaua Stream is located along the southern boundary of the site, it is less than 3m in width. 2.a N/A 2.b N/A	1.a. A proposed retaining wall ranging in height from 1m to 4m is located within 3m of Dip Road. The wall is proposed to be located along the western boundary of proposed lot 48 for a length of approximately 12m. 1.b A proposed retaining wall ranging in height from 2m to 4m is located within 1.5m of the northern site boundary. **Restricted Discretionary**

Rule	Compliance	Non-Compliance
maximum length of 7.5m on a single side or rear boundary and a maximum total length of 10.5m on all side and rear boundaries, provided they are setback at least 2.5m from habitable rooms on any other site.		
GRZ-R5 Building and Major Structure Height in Relation to Boundary Permitted Where: 1. All buildings and major structures do not exceed a height equal to 3m above ground level plus the shortest horizontal distance between that part of the building or major structure and any side or rear boundary, except any boundary: a. Where there is an existing or proposed common wall between two buildings on adjacent sites; or b. That is adjoining a business zone; or c. That is adjoining an Open Space and Recreation Zone where the Open Space and Recreation Zone site is: i. Greater than 2000m2 ; and ii. Greater than 20m in width when measured perpendicular to the 90e point where the measurement of GRZ-R5.1 is taken from…	All retaining walls will be located below ground level and will comply. **Permitted Activity**	
GRZ-R6 Outdoor Living Court	N/A	
GRZ-R7 Impervious Areas	N/A	
GRZ-R8 Building and Major Structure Coverage	N/A	
GRZ-R9 Fences	N/A	
GRZ-R10 Car Parking	N/A	
GRZ-R11 Outdoor Areas of Storage or Stockpiles	N/A	

Appendix 9

Assessment Criteria

Matters of Control & Discretion

The proposed development of 47 Dip Road to develop 95 residential allotment subdivision and other associated works, is a restricted discretionary activity (as detailed in the AEE).

With respect to Section 95D(c) (deciding whether an activity will have or is likely to have adverse effects) Council:

c. in the case of a restricted discretionary activity, must disregard an adverse effect of the activity that does not relate to a matter for which a rule or national environmental standard restricts discretion; and

With respect to 95E(2)(b) (for limited notification deciding whether a person is an affected person) assessing an activity's adverse effects on a person Council:

(b) must, if the activity is a controlled activity or a restricted discretionary activity, disregard an adverse effect of the activity on the person if the effect does not relate to a matter for which a rule or a national environmental standard reserves control or restricts discretion; and

Relevant matters of control and discretion are assessed as follows:

Matters of Discretion	
General Residential Zone	**Discussion**
GRZ-R4 Building and Major Structure Setbacks Matters of discretion: 1. The outlook and privacy of adjoining and adjacent properties. 2. Effects of shading and visual dominance on adjoining properties. 3. Impacts on the amenity of any adjacent public walkway. 4. Where GRZ-R4.1(a) is infringed, the effects on the: a. Streetscape character anticipated within the General Residential Zone. b. Safety and efficiency of the adjacent transport network	The proposed retaining walls will be located within the Dip Road boundary and the norther site boundary in proximity to the access leg into the reservoir. The proposed retaining walls will not result in any impact to neighbouring outlook and privacy, shading or visual dominance of adjoining properties. The retaining will not result in any impact to adjacent public walkways.
Transport	**Discussion**
Subdivision	
TRA-R14 Subdivision Matters of control: 1. Effects on the road network in the vicinity due to increased traffic from the subdivision. 2. The need for footpaths, kerb and channel on roads in the vicinity, including for stormwater management. 3. The adequacy of the access for the anticipated use. 4. The ability of the access to contain required services. 5. Traffic safety and visibility.	Matters of control: 1. Effects on the road network have been considered in the Integrated Transport Assessment (**Appendix 4**). 2. Footpaths, kerb and channel have been provided in the proposed development. 3. The Integrated Transport Assessment concludes that the proposed access is adequate. 4. All services can be accommodated within the proposed road network. 5. The proposed road network, intersection with Dip Road and connection to Tuatara

Matters of Discretion	
6. Type, frequency and timing of traffic. 7. Access design, and number and location of vehicle crossings. 8. Design and construction of any bridges or culverts. 9. The construction and maintenance of new vehicle crossings or alterations to existing vehicle crossings where proposed as part of the subdivision. 10. Where relevant, the provision, location, design, capacity, connection, upgrading, staging and integration of transport infrastructure. 11. Pedestrian and cycle connections to public roads from existing reserves and/or pedestrian accessways, especially where the connection will provide a significantly shorter distance. 12. Design of pedestrian and cycle connections to ensure ease of use, accessibility and safety. 13. In the Rural (Urban Expansion) Zone, the protection of land within the proposed allotments to allow access and linkages to adjacent allotments for future transport infrastructure. Matters of discretion: 1. The matters of control listed in TRA-R14. 2. Location, size and design of vehicle crossings and access. 3. The safety and efficiency of the transport network for vehicles, pedestrians and cyclists. 4. Effects on the future growth or expansion of the transport network. 5. The extent to which the subdivision impacts on the future ability to form a road or access within an indicative road or strategic road protection area, and any mitigation to not preclude that future formation. 6. The adequacy of the access for the anticipated use. 7. The ability of the access to contain required services.	Drive will ensure traffic safety and visibility as confirmed in the Integrated Transport Assessment. 6. Type, frequency and timing of traffic is addressed in the Integrated Transport Assessment. 7. Assess and road design are detailed in the engineering plans (**Appendix 3**). 8. N/A 9. N/A 10. Provision, location, and design of roading and footpath infrastructure are detailed in **Appendix 3** and **Appendix 4**. 11. The proposal includes footpaths within the development, a footpath within the link road resever between Tuatara Drive and Dip Road and a pedestrian path within the reserve adjacent to Waitaua Stream Upgrading of the footpath along the length of the site frontage within Dip Road. 12. Design detailed in **Appendix 3**. 13. N/A. Matters of Discretion: 1. As above. 2. As above. 3. Detailed in the Integrated Transport Assessment. 4. The Integrated Transport Assessment concludes that the proposed development will not have adverse effects to the future growth or expansion of the transport network. 5. N/A 6. As above. 7. As above.
Three Waters Management	**Discussion**
Stormwater	
TWM-R2 Subdivision Matters of discretion: 1. Adverse effects on existing reticulated stormwater networks. 2. The capacity of existing reticulated stormwater networks and whether the servicing needs of the	1. The Integrated Three Waters Assessment (**Appendix 5**) concludes that the proposed development will result in no adverse effects to the existing reticulated stormwater network.

Matters of Discretion	
proposal require upgrades to existing infrastructure. 3. Feasibility of connection to and logical extension of the existing reticulated stormwater networks. 4. Adverse effects on the surrounding environment and neighbouring properties from the collection, treatment and disposal of stormwater. 5. The efficient provision of services to the land being subdivided and to nearby land that might be subdivided in the future. 6. The appropriate level of attenuation within the allotment based on surrounding and downstream flooding risks. 7. The ability of the stormwater system to ensure that the peak discharge flow rates from the allotment are not increased beyond the levels that exist prior to the proposed subdivision and future land uses (except in circumstances where that is not appropriate).	2. The existing reticulated system has capacity to accommodate the proposal, subject to provision of the proposed onsite pond. 3. Refer to the Integrated Three Waters Assessment (**Appendix 5**). 4. The proposed stormwater system will result in positive effects to the environment and neighbouring properties reducing potential of down stream flooding and treating the water before entering the Waitaua Stream. 5. The subject site is located at the edge of the General Residential Zone, the site is bound by road, reserve and reservoir with no development potential. 6. The Integrated Three Waters Assessment concludes that the proposal will have positive effects on downstream flooding risks. 7. The Integrated Three Waters Assessment concludes that the peak discharge flow rate will not be increased.
Wastewater	
TWM-R3 Subdivision Matters of discretion: 1. Adverse effects on existing reticulated wastewater networks. 2. The capacity of existing reticulated wastewater networks and whether the servicing needs of the proposal require upgrades to existing infrastructure. 3. Feasibility of connection to and logical extension of the existing reticulated wastewater networks. 4. Provision of wastewater collection, treatment and disposal. 5. Adverse effects on the surrounding environment and neighbouring properties from the collection, treatment and disposal of wastewater. 6. The efficient provision of services to the land being subdivided and to nearby land that might be subdivided in the future.	1. The Integrated Three Waters Assessment (**Appendix 5**) concludes that the proposed development will result in no adverse effects to the existing reticulated wastewater network. 2. The existing reticulated system has capacity to accommodate the proposal. 3. Refer to the Integrated Three Waters Assessment (**Appendix 5**). 4. Each allotment will be connected to the public reticulated network. 5. The proposal will not have adverse effects to the surrounding environment. 6. The subject site is located at the edge of the General Residential Zone, the site is bound by road, reserve and reservoir with no development potential.
Water Supply	
TWM-R4 Subdivision Matters of discretion: 1. Adverse effects on existing reticulated water supply networks. 2. The capacity of existing reticulated water supply networks and whether the servicing needs of the proposal require upgrades to existing infrastructure.	1. The Integrated Three Waters Assessment (**Appendix 5**) concludes that the proposed development will result in no adverse effects to the existing reticulated water network. 2. The existing reticulated system has capacity to accommodate the proposal, subject to provision of the proposed onsite pond.

Matters of Discretion	
3. Feasibility of connection to and logical extension of the existing reticulated water supply networks. 4. Provision of suitable drinking water. 5. The efficient provision of services to the land being subdivided and to nearby land that might be subdivided in the future.	3. Refer to the Integrated Three Waters Assessment (**Appendix 5**). 4. All allotments proposed will have connection to reticulated water supply. 5. The subject site is located at the edge of the General Residential Zone, the site is bound by road, reserve and reservoir with no development potential.
Subdivision	**Discussion**
SUB-R2 Any Subdivision Matters of discretion: 1. The effect of the design and layout of the allotments and whether it enables the efficient use of land. 2. The effects of infrastructure and servicing. 3. The matters of discretion of the relevant zone land use rule that is infringed. 4. Matters listed in the How the Plan Works Chapter, HPW-R9.	1. The proposed subdivision design provides for an efficient use of land in accordance with the residential density anticipated in the General Residential Zone. 2. As above. 3. As below. 4. As below.
SUB-R5 Subdivision in the General Residential and Neighbourhood Centre Zone Matters over which control is reserved: 1. Matters listed in the How the Plan Works Chapter, HPW-R9. 2. The ability of future buildings and access to comply with the relevant district wide and zone rules. 3. The location and design of allotments to enable efficient use of land.	1. As below. 2. The proposed allotments are all of sufficient size and shape to allow for future development in accordance with General Residential Zone permitted activity bulk and location rules. 3. The proposed subdivision design provides for an efficient use of land in accordance with the residential density anticipated in the General Residential Zone.
Earthworks	**Discussion**
EARTH-R1 Earthworks Associated with Subdivision Matters of control: 1. Effects on the stability and safety of surrounding land, buildings and structures, including infrastructure. 2. Protocol for accidental discovery of kōiwi, archaeology and artefacts of Māori origin. 3. Appropriate methods to avoid, or where avoidance is not possible, contain or control the spread of plant pathogens. 4. Building and access location, scale and design. 5. The adequacy of the site suitability report and any further information provided through the consent process and any conditions, recommendations and development restrictions.	1. The Geotechnical Report (**Appendix 6**) concludes that the proposed development will result in no adverse effects to the stability of surrounding land, buildings and structures. 2. The applicant will adhere to the accidental discovery protocol. 3. N/A 4. Refer to above. 5. The Geotechnical Report (**Appendix 6**) is adequate.
Critical Electricity Lines and Substations	

Matters of Discretion	
CEL.1.4.1 Restricted Discretionary Activities – Subdivision When considering any restricted discretionary activity under CEL.1.3 and CEL.1.4, discretion will be restricted to: i. the safe and efficient operation and maintenance of the electricity supply network, including: a. The use, design and location of buildings and major structures (excluding minor buildings); and b. The mature size, growth rate, location, and fall zone of any associated tree planting, including landscape planting and shelterbelts; and c. Compliance with NZECP 34:2001; and d. Effects on public health and safety; and e. Effects on access to CEL's, designated substations and associated infrastructure for maintenance purposes.	a. The existing CEL will be relocated to sit within the road reserve, underground. Future built development within the proposed allotments will be setback sufficiently to ensure safe and efficient operation of the CEL. b. N/A c. The proposed CEL will be located underground which will ensure compliance. d. The proposed CEL will be located underground which will ensure public health and safety. e. The proposed CEL will be located within the proposed road reserve providing for access to the CEL.
Additional Matters Over Which Control Has Been Reserved or Discretion Restricted:	
a. Financial contributions in the form of money or land, or a combination of these. b. Bonds or covenants, or both, to ensure performance or compliance with any conditions imposed. c. Works or services to ensure the protection, restoration or enhancement of any natural or physical resource, including (but not limited to) the creation, extension or upgrading of services and systems, planting or replanting, the protection of Significant Ecological Areas or any other works or services necessary to ensure the avoidance, remediation or mitigation of adverse environmental effects. d. Administrative charges to be paid to the Council, in respect of processing applications, administration, monitoring and supervision of resource consents, and for the carrying out of the Council's functions under Section 35 of the Resource Management Act 1991. e. The duration of a resource consent, under Section 123 of the Resource Management Act 1991. f. Lapsing of a resource consent, under Section 125 of the Resource Management Act 1991. g. Change and cancellation of a consent, under Sections 126 and 127 of the Resource Management Act 1991.	a. N/A b. No bonds or covenants are necessary. c. As detailed in the AEE, reserve area is proposed to protect Waitaua Stream and native vegetation. d. As necessary. e. Standard duration. f. N/A. g. N/A h. Standard review clause.

Matters of Discretion	
h. Notice that some, or all conditions, may be reviewed at some time in the future, under Section 128 of the Resource Management Act 1991.	i. N/A.
i. Whether any subdivision consent should attach to the land to which it relates, and be enjoyed by the owners and occupiers for the time being, under Section 134 of the Resource Management Act 1991.	j. Amalgamation conditions sought to apply to JOALs.
j. The matters on which conditions can be imposed under Section 220 of the Resource Management Act 1991. These include: esplanade reserves and strips, amalgamation of land, holding parcels in same ownership, design of structures, protection against Natural hazards, filling and compacting of land, and creation or extinguishing of easements.	k. Geotechnical consent conditions.
k. Consent notices to secure compliance with continuing conditions, under Section 221 of the Resource Management Act 1991.	l. As above.
l. The design, size, shape, gradient and location of any allotment.	m. As above.
m. The location of vehicle crossings, access or rights-of-way and proposed allotment boundaries so as to avoid ribbon development.	n. N/A.
n. Location of existing buildings, access and manoeuvring, and private open space.	o. All allotment boundaries have be located to ensure efficient use of land to avoid conflicts.
o. The location of proposed allotment boundaries and building areas so as to avoid potential conflicts between incompatible land use activities, including reverse sensitivity effects.	p. N/A.
p. The location of proposed allotment boundaries, building areas and access ways or rights-of-way so as to avoid sites of historic heritage including Sites of Significance to Māori.	q. As detailed above.
q. The provision, location, design, capacity, connection, upgrading, staging and integration of infrastructure, and how any adverse effects on existing infrastructure are managed.	r. N/A.
r. In the Rural (Urban Expansion) Zone, the protection of land within the proposed allotments to allow access and linkages to adjacent allotments for future infrastructure.	s. N/A.
s. The provision of reserves, including esplanade reserves and strips.	t. As detailed in Appendix 5.
t. Avoidance or mitigation of natural or man-made hazards.	

Matters of Discretion	
u. The extent to which the subdivision avoids adverse effects on significant flora and fauna habitats, including methods of weed and pest management and measures to control cats and dogs.	u. The proposed development will protect existing vegetation along the Waitaua Stream.
v. Those matters described in sections 108 and 220 of the Resource Management Act 1991.	v. As necessary.
w. The safe and efficient movement of people and vehicles including traffic manoeuvring, pedestrians and cyclists, and the potential effects on the accessibility and safety of transport networks.	w. As above.
x. The potential for reverse sensitivity effects on existing lawfully established activities and any measures proposed to avoid remedy or mitigate those effects.	x. N/A.
y. The impact on the transport network, taking into account the two-tier transport network hierarchy.	y. As above.

Appendix 10

Potentially Contaminant Search Report

Private Bag 9023 | Whangarei 0148 | New Zealand
T: 09 430 4200 | 0800 WDC INFO | 0800 932 463 | F: 09 438 7632
W: www.wdc.govt.nz | E: mailroom@wdc.govt.nz

Report of the outcome of a "Potentially Contaminated Site" Property search under Section 6 of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

Application No: PCS180156

Cook Costello Limited
2 Norfolk Street
Whangarei 0110

Date report compiled: 15/11/2018

Property Search Details:

Address: Dip Road

Kamo 0112

Legal Description: SEC 1 SO 65970

PID NO: 3583

The search undertaken on Council records for this property has not identified any indication of current or previous activities in the area of the site that are included on the current version of the Hazardous Activities and Industries List (HAIL) issued by the Ministry for the Environment.

DISCLAIMER

This Report has been prepared for the purposes of Section 6 of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 and contains all information known to the Whangarei District Council to be relevant to the land as described. It is based on a search of Council records only and there may be other information relating to the land which is unknown to Council. The Council has not undertaken any inspection of the land or any building on it for the purposes of preparing this report.

Signed

Whitney Peat |
Building Control - Contractor

Appendix 11

NRC Application

Onoke Heights Limited

Regional Consent - Land Use

Dip Road, Kamo

Assessment of Environmental Effects and Statutory Analysis

26 November 2021

B&A
Urban & Environmental

Prepared for:
Onoke Heights Limited

B&A Reference:

18541

Status:

Final Revision

Date:

26 November 2021

Prepared by:

Melissa McGrath

Reviewed by:

Alisa Neal

Contents

Appendices

Appendix 1: Record of Title and Interests

Appendix 2: Scheme Plan and Engineering Plans (Blue Wallace)

Appendix 3: Three Waters Design Report (LDE)

Appendix 4: Rules Assessment

Appendix 5: Potentially Contaminated Site Search

Appendix 6: Geotechnical Investigation Report (LDE)

Appendix 7: Earthworks Geotechnical Letter (LDE)

1.0 Applicant and Property Details

To:	Northland Regional Council
Site Address:	Dip Road, Kamo
Applicant Name:	Onoke Heights Limited
Address for Service:	Barker & Associates Ltd PO Box 37 Whangarei 0140 Attention: Melissa McGrath
Legal Description:	Section 1 SO Plan (refer to Record of Title as **Appendix 1**)
Site Area:	6.8700 ha (total)
Site Owner:	Onoke Heights Limited
Regional Plan:	Northland Regional Plan
Regional Plan Zoning:	Operative Regional Water and Soils Plan Not identified on map showing: • Erosion Prone Land • Flood Hazard Proposed Regional Plan (Appeals Version): Groundwater Quality and quantity management units – 'Other Aquifers' River water quantity management unit – 'Coastal River' Hill Country and Low land Areas – 'Lowland Area' and 'Other' Whangārei Swimming Sites Stock Exclusion Areas – 'Upstream Catchment
District Plan Zoning:	Operative District Plan Living 1 Environment Proposed District Plan (Appeals Version) General Residential Zone Operative District Plan - Overlays

	Critical Electricity Line Living Overlay
Additional Limitations:	N/A
Brief Description of Proposal:	To enable bulk earthworks and stormwater discharge associated with a residential development as described within Section 4.
Summary of Reasons for Consent:	Regional Water and Soil Plan for Northland Resource consent is required as a controlled activity pursuant to rule 22.2.1 Diversion of Stormwater from Land Disturbance. Proposed Regional Plan (Appeals Version) Resource consent is required as a **controlled activity** pursuant to rule C.6.4.3 as the stormwater discharge does not comply with the permitted activity standards in C.6.4.1. Resource Consent is also required as a **controlled activity** C.8.3.2 as the earthworks do not comply with all of the permitted activity standards in Rule C.8.3.1, in particular the 5000m2 area limit for earthworks. A full list of reasons for consent is contained within Section 5. Overall, resource consent is required as a **controlled activity.**

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

2.0 Background

This report has been prepared in support of a resource consent application to undertake bulk earthworks of approximately 134,349m^3 (52,799m^3 cut and 81,550m^3 fill), over an area of 6.8ha, with a maximum cut depth of 6m and a maximum fill height of 4m and discharge of stormwater associated with the earthworks on behalf of Onoke Heights Limited in preparation for a 95 residential allotment subdivision and associated access and services located at Dip Road, Kamo. Restricted discretionary resource consent is concurrently being sought from Whangārei District Council (WDC) for the proposed development.

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

3.0 Site Context

3.1 Site Description

The 6.8ha subject site is comprised of on a single allotment (legally defined as Section 1 SO 65970), fronting Dip Road, with access to Tuatara Drive (see **Figure 1** below).

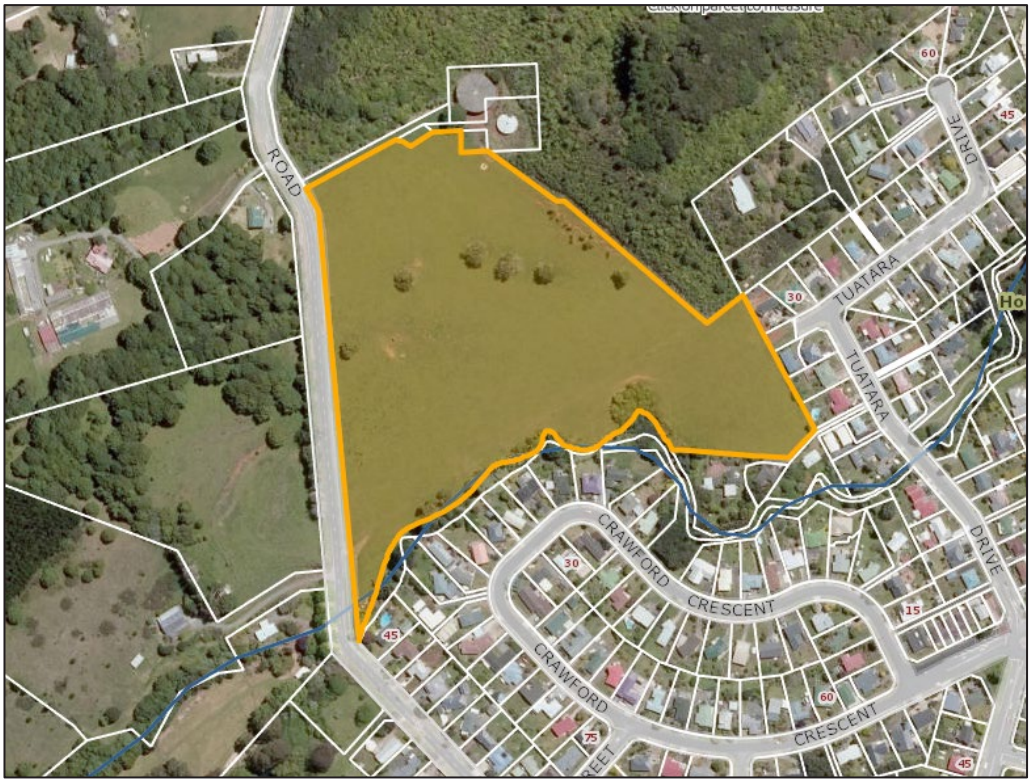


Figure 1: Locality plan – see full scale version in **Appendix 2.**

The subject site is vacant, being grassed in pasture, with a scattering of trees within the centre of the site and along the edge of Waitaua Stream. The northern half of the site comprises of a converging south facing slope of up to 11 degrees. The southern part of the site comprises of waning slopes towards the Waitaua Stream on the southern end of the subject site. Fragmented indigenous vegetation with broadleaf forest remnants encompassing the Waitaua Stream extending along the southern boundary of the site.

The site is situated at the north-western residential edge of the suburb of Kamo, located north of Three Mile Bush Road. The site is situated between the existing residential streets of Dip Road and Tuatara Drive. A Whangārei District Council water reservoir (Designation WDC-25) is located directly north of the subject site with water pipe lines from the reservoir extending south along the eastern site boundary (subject to 3m wide easement) to Tuatara Drive. Directly to the east of the subject site is Onoke Reserve comprised of a large area of native vegetation.

Dip Road is defined as a secondary collector road by the District Plan, with two sealed lanes and a carriageway width of approximately 6.4, Dip Road has a legal width of 20m including carriageway, berms and a footpath is located on the eastern side. Dip Road has a speed limit of 80 kilometres per hour along the site frontage, reducing to 50 kilometres per hour 100m south of the proposed new intersection. There are no street trees in the road reserve adjacent to the site. However, there are a number of power poles and light poles that the proposed design has responded to.

Tuatara Drive is defined as an access road by the District Plan, with two sealed lanes being 8.2m between kerb faces and a footpath along the eastern side. It has an internal tee intersection, one leg of which continues north eastwards to existing residential development, the other being a short stub that leads to two existing houses and currently ends only 25 metres west of the intersection. Tuatara Drive has a speed limit of 50 kilometres per hour.

3.2 Records of Title

The development site is contained within a single Record of Title, copy of which are contained in Appendix 1. The only interest of relevance to the processing of this application is the water right easement.

3.3 Surrounding Locality

The surrounding locality is predominantly residential in nature, featuring a mix of single-storey and two-storey dwellings. The existing built form comprises houses that are typically set back from the street by around 5-8m, with either fully open front yards or low fencing. Interconnected suburban streets of Crawford Crescent, Tuatara Drive and Dip Road feed into Three Mile Bush Road. Hurupaki Primary School and Kindergarten are located directly south west of the site within walking distance along Dip Road.

Rural residential development is located to the north west of the site along Dip Road, with

With respect to schools and amenities, Hurupaki Primary School and Kindergarten are located immediately to the east, while Kamo Primary School is located less than 1km to the east. The Local Centre of Kamo approximately 1km east of the site providing community services, convenience shopping and Kamo High School. Neighbourhood shops are within approximately 400m of the site, including dairy and takeaway outlets.

The area is served by public transport and pedestrian infrastructure. The bus network includes services along Three Mile Bush Road within approximately 1000m walking distance from the site.

The area is well serviced by public open space networks with natural reserves within Hurupaki Cone to the west, Onoke Reserve and Hodges Park to the east. Kamo park has active open space located within Kamo Centre.

4.0 Proposal

4.1 Earthworks

The proposed earthworks involve modification of the site to enable the construction of the building platforms, site access and carparking areas, stormwater infrastructure, over an area of approximately 6.8ha. A total of approximately 134,349m^3 (52,799m^3 cut and 81,550m^3 fill) is proposed, with a maximum cut depth of 6m and a maximum fill height of 4m during earthworks. Earthworks will involve modification of the site to enable the construction of the building platforms, site access and carparking areas. Significant retaining of the site is proposed, including walls up to 5m in height (refer to **Appendix 2**, retaining wall scheme plan 20253-01-RC-203).

As previously described the topography of site is sloping, with earthworks proposed to prepare the land for residential development. Engineered retaining walls may be used to support batter slopes and increase flat areas within sites, and may be required with design beyond the cut and fill batter limitations.

An indicative earthworks cut/fill plan prepared by Blue Wallace Surveyors Ltd is provided within the application and attached as **Appendix 2** and supported by Geotechnical Report and Earthworks Geotechnical letter prepared by LDE and attached as **Appendices 6** and **7**.

4.2 Stormwater

The proposed development will be supported by a comprehensively designed stormwater system to be vested with Whangārei District Council. The servicing strategy for the proposed development is set out in the Integrated Three Waters Design report by LDE, included as **Appendix 3**, and the accompanying Engineering Drawings by Blue Wallace Surveyors, included as **Appendix 2**.

The proposed stormwater system has been designed to mitigate the 2yr, 10yr and 100yr storm events to equal or less than pre-development rates, which ensures that it does not affect downstream areas with any increases in flow rates. Additional to the 2, 10 and 100yr storm event mitigation an extended detention volume has been allowed for in the pond with a 24hr drain down period designed in accordance with Auckland Council's GD01.

This includes an onsite stormwater pond to be vested with Whangārei District Council, which will include an extended detention volume to address erosion effects on the stream network that they discharge into and provide water quality treatment for the roads within the development, based on 1/3rd of the 2 year storm.

The proposed stormwater pond is in close proximity to Waitaua stream, however the proposed system will not alter the course of the stream, fish passage will be maintained and no damage will occur to existing flood defences. There are no natural wetlands within 50m of the proposed system.

During Construction

The main source of stormwater from the site will be from surface run-off of rainwater. It is proposed to discharge all stormwater run-off to ground within the construction work area.

In order to minimise the potential for off-site discharge of contaminants from excavation of soils and waste material into stormwater, the following erosion and sediment control measures are proposed and offered as mitigation for this consent application:

- Stabilising the accessway and carparking areas (metal/concrete) as soon as practical as this will provide a safe and tidy access for the following building construction stage;
- The site will be separated into four work areas, surrounded by earth bunds with stormwater from each area being directed to sediment retention ponds (future stormwater ponds);
- Monitor the site after storm events and repair as necessary. Regular maintenance of the devices will also be necessary to ensure their effectiveness during general earthworks; and
- Adopt Auckland Council's GD05 (good guidelines for the industry) as the standard for all devices and sediment control measures.

An Erosion and Sediment Control Plan will be prepared, it is proposed that this control plan and any further detail or a Construction Management Plan be conditioned to provide an opportunity for the nominated contractor to further develop and provide site specific context.

4.3 Mitigation

The proposal includes the following mitigation offered as part of the comprehensive development of the site:

- Location of earthworks will avoid disturbance within the riparian margin of Waitaua Stream.
- Erosion and sediment control during construction (detailed further below).
- Extensive management and treatment of stormwater improving quality of stormwater entering Waitaua Stream (detailed further below).
- Protection by way of reserve the entire length of Waitaua Stream.
- Proposed accidental discovery protocol in accordance with Heritage New Zealand Pouhere Taonga Act.

5.0 Reasons for Consent

A rules assessment against the provisions of the Regional Water and Soil Plan('RWSP'), and the Proposed Regional Plan (appeals version) are attached as **Appendix 4.**

5.1 Operative Regional Water and Soil Plan for Northland (RWSP)

Rule 22.2.1

Under the provisions of the RWSP, resource consent is required pursuant to following:

- Rule 22.2.1 Diversion and discharge of stormwater: As highlighted above, controlled consent is required for a Land Disturbance Activity Rule, accordingly resource consent is also required as a controlled activity pursuant to 22.2.1 (1).

5.2 Proposed Northland Regional Plan (PRP)

Rule C.6.4.3

Under the provisions of the PRP, resource consent is required for the following:

- Rule C.6.4.3 Stormwater discharges - The proposed stormwater system and discharge will be vested with Whangārei District Council as a public stormwater network within the urban area of Whangārei City the proposed stormwater discharge is therefore a controlled activity.

Rule C.8.3.2

- C.8.3.2 Earthworks Controlled Activity - The proposed earthworks include a total area of exposed earth being approximately 6.8ha at any one time. This exceeds the permitted standards in Rule C.8.3.1 –controlled activity.

5.3 NES Contaminated Soils

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES Contaminated Soils) were gazetted on 13th October 2011 and took effect on 1st January 2012.

The standards are applicable if the land in question is, or has been, or is more likely than not to have been used for a hazardous activity or industry and the applicant proposes to subdivide or change the use of the land, or disturb the soil, or remove or replace a fuel storage system.

Council property search (PSC180456) was completed in November 2018 which confirms that there is no indication of current or previous activities within the area of the site that are identified as Hazardous Activities and Industries. This report is included as Appendix 5. Use of the subject site has not changed since 2018.

As a result, the NES Contaminated Soils is not applicable and no resource consents are required pursuant to it.

5.4 National Environmental Standard for Freshwater Management

The proposal is assessed as a permitted activity under the NES-FM

5.5 Activity Status

Overall, this application is for a controlled activity under the Regional Water and Soil Plan and a controlled activity under the Proposed Regional Plan.

6.0 Public Notification Assessment (Sections 95A, 95C and 95D)

6.1 Assessment of Steps 1 to 4 (Sections 95A)

Section 95A specifies the steps the council is to follow to determine whether an application is to be publicly notified. These are addressed in statutory order below.

6.1.1 Step 1: Mandatory public notification is required in certain circumstances

Step 1 requires public notification where this is requested by the applicant; or the application is made jointly with an application to exchange of recreation reserved land under section 15AA of the Reserves Act 1977.

The above does not apply to the proposal.

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

Step 2 describes that public notification is precluded where all applicable rules and national environmental standards preclude public notification; or where the application is for a controlled activity; or a restricted discretionary, discretionary or non-complying boundary activity.

In this case, the proposal is a controlled activity or a boundary activity. Therefore, public notification is precluded.

6.1.3 Step 3: If not required by step 2, public notification required in certain circumstances.

Step 3 describes that where public notification is not precluded by step 2, it is required if the applicable rules or national environmental standards require public notification, or if the activity is likely to have adverse effects on the environment that are more than minor.

As noted under step 2 above, public notification is not precluded, and an assessment in accordance with section 95A is required, which is set out in the sections below. As described below, it is considered that any adverse effects will be less than minor.

6.1.4 Step 4: Public notification in special circumstances

If an application is not required to be publicly notified as a result of any of the previous steps, then the council is required to determine whether special circumstances exist that warrant it being publicly notified.

Special circumstances are those that are:

- Exceptional or unusual, but something less than extraordinary; or
- Outside of the common run of applications of this nature; or
- Circumstances which make notification desirable, notwithstanding the conclusion that the adverse effects will be less than minor.

The development of the subject site for earthworks and stormwater discharge associated with residential subdivision and development which is anticipated by the District Plan General Residential Zoning.

It is considered that there is nothing noteworthy about the proposal. It is therefore considered that the application cannot be described as being out of the ordinary or giving rise to special circumstances.

6.2 Public Notification Conclusion

Having undertaken the section 95A public notification tests, the following conclusions are reached:

- Under step 1, public notification is not mandatory;
- Under step 2, public notification is not precluded;
- Under step 3, public notification is not required as it is considered that the activity will result in less than minor adverse effects; and
- Under step 4, there are no special circumstances.

Therefore, based on the conclusions reached under steps 3 and 4, it is recommended that this application be processed without public notification.

7.0 Limited Notification Assessment (Sections 95B, 95E to 95G)

7.1 Assessment of Steps 1 to 4 (Sections 95B)

If the application is not publicly notified under section 95A, the council must follow the steps set out in section 95B to determine whether to limited notify the application. These steps are addressed in the statutory order below.

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

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

The above does not apply to this proposal.

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

Step 2 describes that limited notification is precluded where all applicable rules and national environmental standards preclude limited notification; or the application is for a controlled activity (other than the subdivision of land).

In this case, the applicable rules do not preclude limited notification and the proposal is not a controlled activity. Therefore, limited notification is not precluded.

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

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

- In the case of a boundary activity, an owner of an allotment with an infringed boundary;
- In the case of any other activity, a person affected in accordance with s95E.

The application is not for a boundary activity, and therefore an assessment in accordance with section 95E is required and is set out below.

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

7.1.4 Step 4: Further notification in special circumstances

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

In this instance, having regard to the assessment in section 6.1.4 above, it is considered that special circumstances do not apply.

7.2 Section 95E Statutory Matters

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

In deciding who is an affected person under section 95E:

- Adverse effects permitted by a rule in a plan or national environmental standard (the 'permitted baseline') may be disregarded;
- Only those effects that relate to a matter of control or discretion can be considered (in the case of controlled or restricted discretionary activities); and
- The adverse effects on those persons who have provided their written approval must be disregarded.

Having regard to the above provisions, an assessment is provided below.

7.3 Matters of Discretion

Under section 104A of the Act, as a controlled activity, the consent authority must consider only those matters over which it has reserved its control in its plan, being:

7.3.1 Regional Water and Soil Plan:

22.2.1 Diversion of Stormwater from Land Disturbance.

Matters Subject to Control: The matters over which the Council will exercise control are:

(1) The permissible maximum concentration of contaminants in the discharge.

(2) The size and zone of reasonable mixing.

(3) The adequacy of the proposed stormwater management and treatment systems. (4) The adequacy of the proposed inlets to collect the stormwater at the design return period.

(5) The adequacy of the proposed measures to prevent scouring and erosion of riverbanks or river beds.

(6) The acceptable degree of flooding of adjacent properties.

(7) Information and monitoring requirements.

(8) The duration of any resource consent.

(9) Any necessary staging of works.

7.3.2 Proposed Regional Plan:

C.6.4.3 Stormwater discharges – controlled activity

Matters of control:

1) The maximum concentration or load of contaminants in the discharge.

2) The size of the zone of reasonable mixing.

3) The adequacy of measures to minimise erosion.

4) The adequacy of measures to minimise flooding caused by the stormwater network.

5) The design and operation of the stormwater system and any staging of works.

C.8.3.2 Earthworks – controlled activity

Matters of control:

1) The design and adequacy of erosion and sediment control measures with reference to good management practice guidelines, equivalent to those set out in the Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region 2016 (Auckland Council Guideline Document GD2016/005).

2) The location, extent, timing, and duration of earthworks.

3) The adequacy of site rehabilitation and revegetation measures to control erosion and sediment discharges.

4) Adverse effects on water bodies and coastal water.

5) Management of flooding effects and avoiding increased natural hazard risks on other property.

6) Adverse effects on regionally significant infrastructure.

7) Adverse effects on the following, where present in adjacent fresh waterbodies or the coastal marine area:

a) wāhi tapu, and

b) the identified values of mapped Sites and Areas of Significance to tāngata whenua (refer I Maps | Ngā mahere matawhenua).

7.4 Assessment of Effects on Adjacent Properties

The adjacent properties to be considered in the limited notification assessment under section 95B and 95E are shown in **Figure 2** below, and include:

- Onoke Reserve (North west);
- 28 Tuatara Drive (East);
- 26B Tuatara Drive (East);
- 24 Tuatara Drive (East);
- 22 Tuatara Drive (East);
- 20 Tuatara Drive (South);
- Waitaua Stream Esplanade (South);
- 50 Dip Road (West);
- 54 Dip Road (West);
- 66 Dip Road (West);
- 86 Dip Road (West); and
- WDC Water Reservoir (North).

Figure 2: Adjacent properties in relation to subject site. (Source: Emaps)

The following sections set out an assessment of effects of the proposal, and it is considered that effects in relation to the following matters are relevant:

- Erosion and Sediment Control;

- Stormwater Quality;
- Ecological Effects;
- Flooding Effects; and
- Cultural Effects.

These matters are set out and discussed below:

7.4.1 Erosion and Sediment Control and Construction effects (location, timing, extent and duration of earthworks)

Earthworks are required to modify the site to enable the construction of the building platforms and associated access, parking and services.

It is proposed to excavate approximately 134,349m^3 (52,799m^3 cut and 81,550m^3 fill) over an area of 6.8ha exposed at any one time as depicted on the earthworks plan prepared by Blue Wallace Surveyors Ltd provided in **Appendix 2**.

The topography of the site is sloping earthworks…engineered retaining walls will be used to support batter slopes and increase flat areas within sites, and may be required with design beyond the cut and fill batter limitations.

All earthworks work is anticipated to be completed within the next earthworks season (October to April), will be undertaken during standard working hours (e.g. 7am to 7pm) and working days (e.g. Monday to Saturday). Works are also expected to comply with the construction noise limits as set out within the NZS 6803: 1999 "Acoustics – Construction Noise".

Any effects associated with the construction phase of the project will be temporary in nature, and can be effectively managed through adherence to the erosion and sediment control measures which will be setup before onsite work commences to avoid any potential adverse effects on the surrounding environment. Conditions of consent requiring design and adherence to an erosion and sediment control plan is proposed (see Appendix 3) which will include measures that are designed to ensure that sediment is removed from stormwater runoff prior to discharge from the site. Key elements of the erosion and sediment control plan will include the installation of silt fences, clean water and dirty water diversion channels and a stabilised construction entrance. The proposed erosion and sediment control measures will be implemented in accordance with the Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region (2016) for the duration of the activity.

As well as measures to mitigate erosion and sediment runoff effects, measures to control dust generation and noise generation will also be implemented in accordance with standard good practice procedures.

On the basis of the above, it is considered that any adverse erosion and sediment runoff effects associated with the proposed earthworks will be less than minor.

7.4.2 Stormwater Quality

In order to reduce the potential for discharge of other contaminants from the excavation of the site, the stormwater management procedures and sediment controls outlined above will be implemented. These measures are considered to be appropriate for the scale of the works, and

will avoid or otherwise mitigate potential sedimentation of stormwater and the receiving environment.

The proposed stormwater system has been designed by LDE and is detailed in Three Waters Design Report (Appendix 4). This report concludes that the proposal will improve the quality of stormwater:

- All stormwater from site will be directed to existing and proposed public stormwater system.
- The onsite stormwater pond has been designed to collect the stormwater runoff from impervious and pervious areas of each proposed residential lot and the road reserve and an extended detention volume has been allowed for in the pond with a 24hr drain down period designed in accordance with Auckland Council's GD01. The extended detention reduces the stream erosion and increases water quality in the pond for the runoff from all the individual lots and road reserve areas and will help improve the overall quality of the stream the pond discharges to.

The proposed mitigation will ensure that the proposed earthworks and future development of the proposed residential allotments will improve the stormwater quality.

7.4.3 Ecological Effects

Earthworks associated with the development of the site will be setback from the Riparian Management Area of the Waitaua Stream and a reserve area extending the length of the stream is proposed. The earthworks does have a minimal potential to result in sediment runoff to Waitaua Stream, risk of addition of fine sediment to stream environments during construction phase of the development has the potential to alter water chemistry, increase turbidity and decrease light penetration that affects primary production and feeding for some fish species.

The proposed that all earthworks will be undertaken in accordance with best practice erosion and sediment control plans. This should ensure that any sediment/erosion related effects on water quality and habitat in the downstream receiving environment will be negligible (i.e., minimal sediment mobilization). With the implementation of appropriate silt controls during the construction phase, the effects of earthworks on water quality in the receiving environment during construction will be avoided and the overall level of effect is assessed as low.

The proposed mitigation will ensure that the proposed earthworks, stormwater run off and culvert will have less than minor ecological effects.

7.4.4 Flooding Effects

The proposed stormwater system has been designed by LDE and is detailed in Three Waters Design Report (Appendix 4). This report concludes that the proposal will improve the potential flood hazard risk for adjacent properties and downstream because:

- The onsite stormwater pond has been designed to collect the stormwater runoff from impervious and pervious areas of each proposed residential lot and the road reserve. The pond has been designed with the necessary outlet configuration to mitigate the 2yr, 10yr and 100yr storm events to equal or less than pre-development rates, which ensures that it does not affect downstream areas with any increases in flow rates.
- Additional to the 2, 10 and 100yr storm event mitigation an extended detention volume has been allowed for in the pond with a 24hr drain down period designed in accordance with

Auckland Council's GD01. The extended detention reduces the stream erosion and increases water quality in the pond for the runoff from all the individual lots and road reserve areas and will help improve the overall quality of the stream the pond discharges to.

This proposed mitigation combined with the proposed stormwater solution, will ensure that the proposed earthworks and stormwater discharge will not create or exacerbate any flooding effects on the surrounding environment.

7.4.5 Cultural (waahi Tapu) Effects

The application site is not located within an identified area of cultural significance and the regional plan does not identify recorded sites of significance to Māori within the subject site.

As the subject site is located within the rohe of Ngāti Kahu O Torongare. The importance of Waitaua Stream has been recognised, earthworks within proximity to the Waitaua Stream have been carefully designed to reduce effect on the stream and the watercourse with not be altered. The treatment of any sediment laden stormwater will be contained within the site, prior to the discharge of any 'treated stormwater' to ground. Effects of the proposed earthworks and stormwater will be mitigated by the protection by way of reserve the entire length of Waitaua Stream.

It is considered the proposed mitigation measures, will ensure that the potential for adverse effects on the cultural values of the proposed development, particularly from the proposed earthworks and stormwater discharge will be less than minor.

7.5 Summary of Effects

Overall, any adverse effects on these properties are considered to be less than minor.

It is considered, therefore, that there are no adversely affected persons in relation to this proposal.

7.6 Limited Notification Conclusion

Having undertaken the section 95B limited notification tests, the following conclusions are reached:

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

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

8.0 Consideration of Applications (Section 104)

8.1 Statutory Matters

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

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

As a controlled activity, section 104A of the Act states that a council:

(a) must grant the resource consent, unless it has insufficient information to determine whether or not the activity is a controlled activity; and

(b) may impose conditions on the consent under section 108 only for those matters over which it has reserved its control in its plan.

8.2 Weighting of Proposed Plans

The Act requires that before a Plan change becomes operative, any resource consent application be considered in terms of the provisions of both the Operative Plan and a Proposed Plan/Plan Change. In this case, a number of provisions of the Operative Water and Soil Plan do not require consideration because appeals to the Proposed Regional Plan have been settled. Greater weight has been applied to the Proposed Regional Plan.

In this instance and with specific regard to the proposed bulk earthworks for the proposed development, it is considered that both the operative Regional Water and Soil Plan provisions and Proposed Regional Plan (appeals version) provisions seek similar outcomes regarding minimising erosion and discharge of sediment to water. Given this consistency, and the fact that discretionary activity resource consent is required under both plans, it is not considered necessary to undertake a full weighting assessment.

9.0 Effects on the Environment (Section 104(1)(A))

In addition to the above, the following is noted in respect to positive effects and on-site amenity effects:

9.1 Positive Effects

It is considered that the proposal will also result in positive effects as the earthworks and stormwater discharge proposed will be managed in a manner that will improve water quality, reduce flood risk downstream and protect ecological values onsite. These matters are set out and assessed below.

The earthworks and stormwater discharge are a necessary precursor to the proposed development that will enable people to meet the needs of future generations and result in positive effects for the local community.

9.2 Summary OF Effects

Having regard to the actual and potential effects on the environment of the activity resulting from the proposal, it is concluded in the assessment above that any adverse effects relating to the proposal will be acceptable.

Further, it is considered that the proposal will result in significant positive effects as described in section 8.1 above. The earthworks and stormwater discharge are a required precursor to the proposed development that will enable people to meet the needs of future generations and result in positive effects for the local community.

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

10.0 Regional Plan and Statutory Documents (Section 104(1)(B))

Section 104(1)(b) of the Act sets out that when considering an application for resource consent, council shall have regard to the relevant provisions of any national environmental standards, other regulations, policy statements (national and regional, including proposed regional policy statements), or plans or proposed plans.

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

- National Policy Statement for Freshwater Management
- National Environmental Standards – Fresh Water
- Northland Regional Policy Statement
- Operative Regional Water and Soils Plan
- Proposed Regional Plan (Appeals Version)

10.1 National Policy Statement for Freshwater Management

The fundamental concept of the National Policy Statement for Freshwater Management (NPS-FM) is "Te Mana o te Wai" the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. It protects the mauri of the wai. Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community. The only objective of the NPS-FM is:

2.1 Objective

(1) The objective of this National Policy Statement is to ensure that natural and physical resources are managed in a way that prioritises:

(a) first, the health and well-being of water bodies and freshwater ecosystems

(b) second, the health needs of people (such as drinking water)

(c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

Policies of the NPS-FM focuses upon the management of freshwater in an integrated way to ensure that the health and well-being of water bodies and freshwater ecosystems is maintained and improved.

The subject site does not contain any wetlands, the Waitaua Stream extends along the southern boundary of the subject site. Policies 2, 3, 5, and 9 are considered relevant to the proposed development. As previously detailed various aspects of the proposed development will have the potential to affect the Waitaua Stream.

During the construction phase of the proposed development bulk earthworks will be undertaken and located outside the riparian management area of the Waiaua Stream. Sediment and erosion control will be in place to mitigate potential affects to the Waiaua Stream.

The proposal will result in residential development being located north the Waiaua Stream, any future built development within the proposed residential allotments will be appropriately setback from site boundaries and physically separated by the proposed reserve. Any stormwater runoff from built form and impervious areas will be directed into the proposed stormwater system.

The proposal includes a comprehensive stormwater system which will result in an onsite stormwater pond (designed to accommodate 2yr, 10 yr and 100yr storm events). The water will discharge from this pond into the Waitaua Stream catchment into the headwaters of the catchment. The full water quality treatment volume for all areas of the development is provided within the pond.

The proposal will result in the entire area of the Waitaua Stream being protected by way of reserve including the surrounding native vegetation. This will ensure on-going protection of native vegetation and the habitat of the Waitaua Stream.

For these reasons, it is considered that the proposal is consistent with the relevant NPS-FM policies and achieves objective 1.

10.2 National Environmental Standard for Freshwater Management

The proposal is considered to be a permitted activity under the NES-FM therefore no further assessment is necessary.

10.3 Northland Regional Policy Statement

The Northland Regional Policy Statement (RPS) covers the management of natural and physical resources across the Northland Region. The provisions within the RPS give guidance at a higher planning level in terms of the significant regional issues. As such it does not contain specific rules that trigger the requirement for consent but rather give guidance to consent applications and the development of Plans on a regional level.

Objectives range from integrated catchment management, improvement of overall quality of Northland's water quality, maintaining ecological flows, protecting areas of significant indigenous ecosystems and biodiversity, sustainable management of natural and physical resources in a way that is attractive for business and investment that will improve the economic wellbeing. enabling economic wellbeing, regional form, the role of tangata whenua kaitiaki role is recognised and provided for in decision making, risks and impacts of natural hazards are minimised, outstanding natural landscapes and features and historic heritage are protected from inappropriate subdivision, use and development.

Relevant policy has been identified and summarised as follows:

- Policy 4.2.1 seeks to improve the overall quality of Northland's water resources by, establishing freshwater objectives, reducing loads of sediment, nutrients and faecal matter to water and promoting and supporting the active management, enhancement and creation of vegetated riparian margins. The propose development will have a positive effect on the fresh water of the Waitaua Stream, as sediment and nutrient run off will be reduced by the proposed stormwater management system. The stream and surrounding area will be protected by proposed reserve and protection of the indigenous vegetation.
- According to Policy 7.1.1 subdivision, use and development of land will be managed to minimise risks of natural hazards. The proposed subdivision and residential use of the site, will be managed to minimise the risk of natural hazards by way of comprehensive design of onsite stormwater management, avoidance of areas high instability hazards.

For these reasons, it is considered that the proposal is consistent with the relevant RPS provisions.

10.4 Operative Northland Regional Water and Soil Plan

The Regional Water and Soil Plan was made operative on 28 August 2004. With respect to this application, the following objectives and policies set out in Chapter 12 are the most relevant to the proposal:

12.5.1 *The protection of the soil resources including soil quality and soil quantity, from degradation or loss as a result of unsustainable land use and land use practices.*

12.5.2. *The safeguarding of the life-supporting capacity of water and ecosystems from the adverse effects of unsustainable land uses and land use practices.*

12.5.4. *Avoid, remedy or mitigate the adverse effects of activities so as to achieve the protection of areas of significant indigenous vegetation, significant habitats of indigenous fauna, natural character of water bodies and their margins; and to recognise and provide for waahi tapu and other sites of significance to tangata whenua.*

In general, these objectives and policies seek to protect soil quality, water quality, and cultural and heritage values from unsustainable land use. Further, the strategic policy direction in chapter 12 of the RWSP is to regulate earthworks to minimise erosion and discharge of sediment to water.

It is considered that the proposed works will be consistent with these objectives and associated policies. Erosion and sediment control measures will be installed and stormwater system has been comprehensively designed which will ensure that any stormwater discharge will be contained within the subject site and appropriately managed to minimise any risk of soil erosion, or surface or groundwater contamination.

10.5 Proposed Northland Regional Plan

The Proposed Regional Plan was notified in September 2017, with all rules in the Proposed Regional Plan having legal effect under Section 86B of the RMA. With respect to this application, Policy D.4.31 (and associated objectives) is the most relevant to the proposal.

D.4.31 Managing the effects of land-disturbing activities

Earthworks, vegetation clearance and cultivation must:

1) *be done in accordance with established good management practices, and*

2) *avoid significant adverse effects, and avoid, remedy or mitigate other adverse effects on:*

   a) *human drinking water supplies, and*

   b) *areas of high recreational use, and*

   c) *aquatic receiving environments that are sensitive to sediment or phosphorus accumulation.*

It is considered that the proposed development is consistent with this direction as there will be no adverse effects on water quality. As established throughout the application, appropriate sediment and erosion control measures will be implemented in accordance with the Guidelines for Land Disturbing Activities in the Auckland Region (2016) to manage any sediment laden runoff for the duration of the activity. This will ensure that any stormwater discharge will be contained within the subject site and appropriately managed to minimise any risk of soil erosion, or surface or groundwater contamination. The proposed works will be stabilised as soon as is practicable after works are complete.

10.6 Summary

It is considered that the proposed development is consistent with the relevant statutory planning documents.

11.0 Part 2 Matters

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

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

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

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

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

12.0 Other Matters (Section 104(1)(C))

There are no other matters considered relevant to the determination of this application for resource consent.

13.0 Conclusion

Onoke Heights Ltd applies for a landuse consent from the Northland Regional Council for earthworks and stormwater discharge activities associated with the subdivision and residential development of 95 residential allotments, at Dip Kamo. A separate land use and subdivision application is being sought concurrently from Whangārei District Council.

Based on the above report it is considered that:

- The application is a controlled activity and is precluded from public notification;
- Any adverse effects in relation to the proposed activity are considered to be less than minor, and acceptable when considering the positive effects of the proposal;
- The proposal is considered to accord with the Regional Policy Statement and operative and proposed Regional Plans; and
- The proposal is considered to be consistent with Part 2 of the Act.

It is therefore concluded that the proposal satisfies all matters the consent authority is required to assess, and that it can be granted.

AUTHORS

Melissa McGrath

Associate

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Associate

Barker & Associates Ltd

Date: 26 November 2021

Appendix 12

Northpower Written Approval

Northpower

File Ref: 18784
Your Ref: 20253

19 November 2021

Northpower Ltd
Private Bag 9018
Whangarei 0148
Ph 09 430 1803
Ph DDI: 0-9-430 1819
Email: consent.applications@northpower.com

Dear Charlotte

CRITICAL ELECTRICITY LINE AND RESOURCE CONSENT REQUIREMENTS

Subdivision – 47 Dip Road, Kamo

In reply to your application dated 16/09/2021, regarding the critical electricity line requirements and the electricity supply requirements for the above subdivision, I would advise you of the following.

Critical Electricity Line Requirements

There is a 33,000 volt critical overhead line located along the southern boundary of the subdivision.

If the line is to be converted to underground and installed within lot 100 (road to be vested to the council) there will be no requirements for easements.

If the line is to remain overhead, the future land owners need to be made aware of their obligation, under section 23 of the Electricity Act 1992 and the Whangarei District Council District Plan provisions for Critical Electricity Lines, to secure and allow access to the existing sub transmission line for operation and maintenance.

To achieve this Northpower requires that an electricity and telecommunications easement in gross will be provided where the line passes over the subdivision. The easements should be 16 meters wide. Northpower can contribute to any additional survey and legal costs associated with establishing this easement. If a contribution is required please forward a quotation for approval before proceeding.

Note that there are restrictions on buildings within 10 meters and on planting trees within 20 meters of the critical electricity line

The easements may be shown on the scheme plan for the “approval of activity by a Critical Electricity Line”. Easements will require to be shown as “Memorandum of Easements in Gross” with purpose as “Right to Convey Electricity Telecommunications and Computer Media” and the grantee as “Northpower Limited and Northpower Fibre Limited”.

Northpower provides approval for this subdivision in regards to critical electricity line.

Subdivision Requirements

Residential Living Zone

Lots 1 - 94 do not have electricity supplies available. The resource consent requirement is that a connection to the reticulated electricity supply system is provided by the boundary of each lot.

Lot 201 is reserve to be vested to the district council, for which there are no requirements.

To secure the electricity supply to the subdivision, easements in gross will be required over the access lots 300, 301 and 302.

Easements will require to be shown as “Memorandum of Easements in Gross” with purpose as “Right to Convey Electricity and Telecommunications” and the grantee as “Northpower Limited and Northpower Fibre Limited”.

Should you have any queries please contact me at our Whangarei office.

Yours faithfully

Jessica Woollam
Network Quality Lead