Draft Proposed Variation 1 to Proposed Plan Change 5 – Whenuapai Draft Section 32 Report

19 April 2021

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1. Introduction

1.1 Purpose of this report

This report has been prepared by Auckland Council to fulfil the statutory requirements of section 32 of the Resource Management Act 1991 (RMA or the Act). The purpose of this report is to record of the evaluation undertaken for Draft Proposed Variation 1 (Variation 1) to Proposed Plan Change 5 – Whenuapai (PPC5) to the Auckland Unitary Plan (Operative in Part) (AUP (OP)), in accordance with section 32 of the RMA.

Clause 16A of Schedule 1 of the RMA allows for a locally authority to initiate a variation to a proposed policy statement or plan, or to a proposed plan change at any time before the approval of the policy statement or plan.

Council seeks to propose a variation to PPC5 to address the following:

- Response to the PPC 5 engine testing noise contours have been updated by the Minister of Defence
- National Policy Statement Urban Development 2020 (NPSUD2020) Objectives and Policies coming into force
- Further information has come forward about other aspects of the plan change relating to:
    - Amended precinct provisions to be consistent with the Regional Discharge Consent
    - Change in land use at 86 Hobsonville Road, which includes a plan change boundary adjustment
    - Acquisition of land for Open Space purposes at 92 and 94A Trig Road, 161 and 167 Brigham Creek Road
    - Rezoning of the land that is located within both the Whenuapai Airbase designation 4310 which is within the proposed Whenuapai Precinct 3
    - Trig Road Arterial Road Realignment
    - Transport provisions and precinct amendments to the indicative collector roads to reflect the changes:
        - Change in zoning in the PPC5 area,
        - Open Space acquisitions

This means that PPC5 is now not the wholly most effective and efficient method of meeting the objectives of the requirements of the Regional Policy Statement in terms of the urbanisation of Future Urban zoned land and Variation 1 seeks to meet these requirements.

When preparing a plan change under the RMA, the Council must carry out an evaluation under section 32 of the Act. This evaluation must occur prior to the public notification of any proposed plan change or variation. A section 32 evaluation report examines:

- the extent to which the objectives of the proposals are the most appropriate way to achieve the purpose of the RMA – these are specific objectives being introduced or amended, or the purpose of the proposal (if they do not relate to specific objectives); and
- whether the provisions of the proposal are the most appropriate way to achieve the objectives – these are the specific policies, rules and other methods that implement, or give effect to, the objectives of the proposal.

The evaluation report must be made available at the same time as the plan change being notified.

Section 32(3) of the RMA is relevant to this variation as this is an amending proposal to an existing proposal (PPC5). Section 32(3) states:

> *(3) If the proposal (an amending proposal) will amend a standard, statement, national planning standard, regulation, plan, or change that is already proposed or that already exists (an existing proposal), the examination under subsection (1)(b) must relate to—*
> *(a) the provisions and objectives of the amending proposal; and*
> *(b) the objectives of the existing proposal to the extent that those objectives—*
> *(i) are relevant to the objectives of the amending proposal; and*
> *(ii) would remain if the amending proposal were to take effect.*

In accordance with the above, this report sets out the relevant outcomes identified in the Proposed Whenuapai Plan Change: Section 32 Report (PPC5 section 32 report) dated 21 September 2017, and the relevant objectives proposed in PPC5, and provides an evaluation of Variation 1.

For completeness and in accordance with section 32(6) of the RMA and for the purpose of this report the following applies:

- **the proposal** refers to Variation 1
- **the objectives** refer to the objectives of the Proposed Whenuapai 3 Precinct
- **the provisions** refer to the policies, rules and other methods that implement the objectives of the Proposed Whenuapai 3 Precinct.

PPC5 precinct objectives have been recommended to be amended through the hearing process. The relationship between the amendments sought through Variation 1 and the recommended amendments arising from the hearings process are provided in full in Appendix 2 of this report.

This section 32 report only addresses the matters within the scope of Variation 1. The PPC5 section 32 report should be referred to for all other PPC5 matters.

1.2 Background

1.2.1 Proposed Plan Change 5 Chronology

PPC5 was publicly notified on 21 September 2017. Submissions closed on 19 October 2017 and further submissions closed on 23 November 2017. A hearing of submissions on PPC5 was held on 4, 7 and 10 May 2018. The hearing was adjourned to allow the Hearing Panel to undertake a site visit and to seek further clarification (Appendix 3) and comment from the Council officers on several matters (Appendix 4).

The Neil Group, a submitter to PPC5 commenced declaration proceedings in the Environment Court on 5 April 2019, regarding the interpretation of and application of Designation 4310 – Whenuapai Airbase. The Court issued its decision on 16 September 2019 and this is referred to as (2019) EnvC 154 (Appendix 5b).

Following this decision, the Minister of Defence issued a certificate under section 4 of the Resource Management Act 1991 that exempted engine testing at the Whenuapai Airbase from the RMA (Appendix 5c).

1.2.2 Proposed Plan Change 5 Description

PPC5 is located approximately 23km northwest of central Auckland with majority of the area currently zoned Future Urban. The existing area is currently predominately rural with a mix of lifestyle blocks. PPC 5 proposes to rezone 351 hectares of land in the southern part of Whenuapai, which is currently zoned Future Urban in the AUP (OP), to a mix of residential, business and open space zones. The PPC5 area and existing AUP (OP) zoning are shown in Figure 1 below.

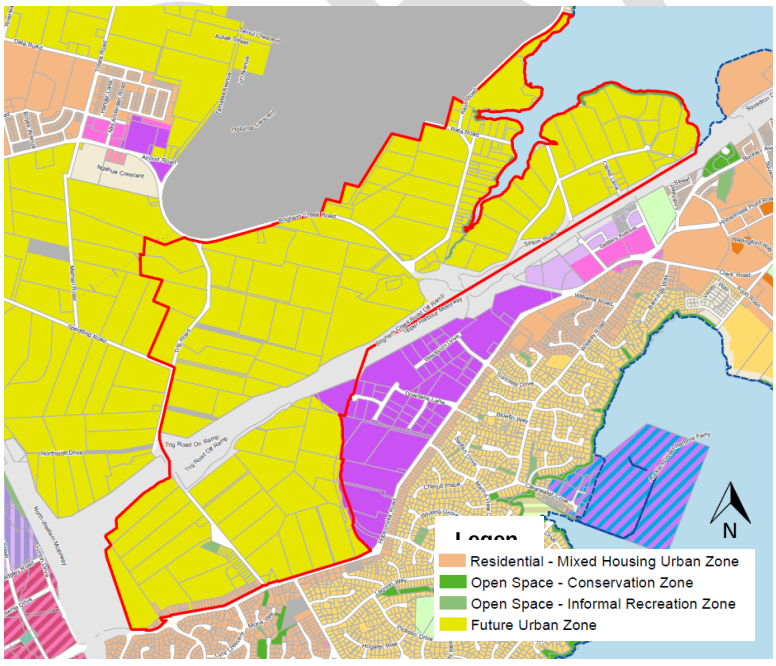


Figure 1: Proposed Plan Change 5 Area – Land Within Red Boundary

In addition to the rezoning, PPC5:

- introduces a new 'Whenuapai 3' Precinct, which will be in Chapter I of the AUP (OP). Whenuapai 3 precinct contains specific provisions that are tailored to the area covered by PPC5. The precinct ensures that subdivision, use and development within the plan change area is integrated with infrastructure provision, taking into account the sensitive receiving environment of the Upper Waitematā Harbour.
- makes amendments to Schedule 14.1 Schedule of Historic Heritage and Schedule 14.2 Historic Heritage Areas – Maps and statement of significance of the AUP (OP)
- applies a stormwater management area – Flow 1 control to the whole plan change area.

The following outcomes are identified in section 6 of the PPC5 section 32 report:

- The plan change area is developed in a comprehensive way that is integrated with the provision of infrastructure and provides a mix of high quality residential and employment opportunities
- The transport network is provided as development progresses
- There is a coordinated approach to the provision of water and wastewater infrastructure across the plan change area as development progresses
- Stormwater runoff is managed using an integrated management approach and there is an overall improvement in water quality and ecosystem health in streams and estuaries in the Upper Waitematā Harbour
- Development and use do not adversely affect biodiversity and ecological and biodiversity values are restored when possible
- Subdivision, use and development within the plan change area occurs in a way that enables operations at Whenuapai Airbase to continue in a safe and efficient manner
- The existing and future community of Whenuapai is adequately protected from the adverse effects of noise from the ongoing operations at Whenuapai Airbase (which includes aircraft engine testing noise)
- Archaeological and heritage items and sites are appropriately managed in the plan change area
- A functional and attractive open space network that meets the diverse needs of the community and is an integral part of Whenuapai's social, cultural, and physical environment.

Engine Testing Noise Summary of Events Post May 2018

The PPC5 section 32 report identified that there could be potential effects from aircraft engine testing noise on new activities sensitive to aircraft noise within the PPC5 area. The NZDF commissioned a report from Malcolm Hunt Associates (dated 24 August 2017) which provided an assessment of noise from engine testing. That report was peer reviewed by the Council's acoustic consultant (Acousafe) and formed part of the section 32 for PPC5.

PPC5 introduced aircraft engine testing noise boundaries based on the Malcolm Hunt Associates report, and the Council's proposed zoning was informed by those noise boundaries. Areas within the 65 Ldn noise contour were proposed to be zoned light

industrial, while outside of the 65 Ldn but inside the 57 Ldn was proposed to be zoned Residential Single House Zone.

On the 3 May 2018 the New Zealand Defence Force (NZDF) provided updated aircraft engine testing noise data to the Council. This data was for a time period different to the period that was modelled for PPC5. The additional data was for the period between 16 July 2017 and 19 January 2018. A 60-day period in 2016 was previously modelled for PPC5.

The Hearings Panel received evidence at the hearing on noise contours from the Council and submitters. The Panel subsequently issued 'Direction 2' on 29 June 2018 (refer Appendix 3). The direction included several matters that the Panel sought clarification on, including engine testing noise at Whenuapai Airbase. The Council's responses to the Panel's questions are provided in a memo dated 23 August 2018. The memo is provided in Appendix 4.

Question 1(c) in Direction 2 relates to the 57 dB L_{dn} aircraft engine testing noise boundaries (emphasis added):

> *We wish to better understand the justification for applying the Single House zone to land adjoining the Light Industry zone and within the 57 dB L_{dn} and 65 dB L_{dn} Whenuapai Engine Testing Boundaries. What role, if any, did Chapter D24 – Aircraft Noise Overlay play in this assessment to choose a lower intensity zone? Could architectural design and construction methods provide mitigation against the adverse effects of aircraft noise and allow a high intensity zoning to be established?* ***What reliance are we able to give to the 57 dB L_{dn} contour if there is no control on engine testing noise?***

The response provided in the Council's memo to the Panel dated 23 August 2018 states:

> *As stated in the Council's opening statement, the NZDF provided additional testing data to the Council on 3 May 2018, one day before the commencement of the hearing. As requested in by the Panel in Direction 4, this data was made available on the Council's website on 9 August 2018. The data shows more night-time testing activity than that which was modelled in the work carried out by Malcolm Hunt on behalf of the NZDF that informed the engine testing noise boundaries. It also shows testing of engines running at high power for up to two hours. This data was not included in the modelling carried out by Mr Hunt. As noted in Mr Lloyd's memo, his opinion is that the new data would "significantly change" the predicted aircraft engine testing noise boundaries. In my view, further modelling of the worst-case scenario based on the latest information provided by the NZDF is necessary to ensure the noise boundaries in the plan change area can adequately be relied upon. I do not consider the 57 dB L_{dn} noise boundary in Plan Change 5 is reliable in light of the additional data received and the comments from Mr Lloyd. The Council has therefore requested additional time to undertake modelling of the new data.*

After this memo was provided to the Panel, the Council commissioned Acousafe to undertake modelling of the new engine testing noise data. However, during this commissioning process, the NZDF advised that they were also undertaking modelling of the new data. On the 5 of March 2021 the Council received the updated engine testing noise contour dated accompanied with a report prepared by Tonkin and Taylor (Appendix 5a). The Panel was updated by Council about this process by Memorandum on 12 February 2021.

This modelling has informed the Variation 1 land use methodology, adjusting the aircraft engine testing noise contours. The modelled aircraft testing noise contours and supporting documentation is provided in Appendix 5a. Variation 1 responds to the outputs from the updated aircraft engine testing noise modelling and informs the land use controls that apply in the Whenuapai 3 Precinct.

1.3 Purpose of Variation 1

In response to the updated aircraft engine testing noise contours supplied by NZDF, the NPS-UD 2020, and findings of the technical reports commissioned after the PPC5 hearing was adjourned, Variation 1 seeks to enhance the outcomes sought by Plan Change 5. These outcomes are to:

- ensure existing and future communities are protected from the adverse effects of aircraft engine testing noise
- ensure operations at Whenuapai Airbase can continue in a safe and efficient manner while protecting the airbase from reverse sensitivity issues
- ensure residential capacity is enabled
- ensure infrastructure to support urban growth is enabled by the precinct provisions.

To implement the latest information, amendments have been made to the PPC5 Precinct provisions, precinct plans, and the GIS zoning maps. When integrated with PPC5, the plan change and Variation 1 will provide a robust policy and rule framework that will manage subdivision, development, and land use in the Whenuapai 3 Precinct. The draft proposed changes in zoning are in Appendix 1; and amendments to Whenuapai 3 Precinct 1 are in Appendix 2. Section 6 of this report provides an analysis of the draft proposed variation amendments.

2. Statutory and Planning Context

2.1 Resource Management Act 1991

The Resource Management Act 1991 (RMA) provides a legislative framework for the sustainable management of natural and physical resources in New Zealand. The purpose of the RMA is to promote the sustainable management 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 wellbeing, and for their health and safety.

The principles of the RMA are stated in sections 6, 7 and 8 of the Act. An assessment against Part 2 of the RMA is provided in the evaluation of objectives for each topic in Section 7 of this report.

Section 6 of the RMA contains the matters of national importance that are required to be recognised and provided for:

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:

(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development;

(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development;

(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers;

(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

(f) the protection of historic heritage from inappropriate subdivision, use, and development;

(g) the protection of protected customary rights;

(h) the management of significant risks from natural hazards.

Sections 6(a), (d), (e), (f) and (h) are relevant considerations for PPC5 and are discussed in section 7 of the PPC5 section 32 report. These sections of the RMA are also relevant to Variation 1 and are discussed in section 7 of this report.

Section 7 of the RMA contains other matters which shall be given particular regard to:

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—

(a) kaitiakitanga:

(aa) the ethic of stewardship:

(b) the efficient use and development of natural and physical resources:

(ba) the efficiency of the end use of energy:

(c) the maintenance and enhancement of amenity values:

(d) intrinsic values of ecosystems:

(e) [Repealed]

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

(h) the protection of the habitat of trout and salmon:

(i) the effects of climate change:

(j) the benefits to be derived from the use and development of renewable energy.

Of these matters, section 7(a), (aa), (b), (c), (f) and (i) are considered to have particular relevance to Variation 1. These sections of the RMA are relevant to Variation 1 and are discussed in section 7 of this report.

The principles of the Treaty of Waitangi must also be taken into account under section 8 of the RMA. Variation 1 does not alter the outcomes sough from PPC5, rather it seeks to update and better improve the policy and rule framework that will manage subdivision, land use and development in the Whenuapai 3 Precinct. Consequently Variation 1 does not raise any new issues that have not previously been consulted upon with iwi as part of the development of PPC5.

Council continues to meet its RMA requirements by consulting with iwi on this draft of Variation 1. This includes written correspondence with the iwi and an opportunity to provide feedback on this draft Variation. Section 7.1 of this report describes the involvement of mana whenua in the development of Variation 1.

2.2 Planning context

The planning context is set out in the PPC5 section 32 report (sections 3 and 4) and is not repeated here. However, this section will provide an overview of the planning framework relevant to managing the effects on the environment in the context of Variation 1. The planning response in Variation 1 seeks to address matters raised with in submissions to PPC5, and is based on the latest information and data, with concurrent consideration of submissions made on PPC5.

2.2.1 National Policy Statement on Urban Development 2020

On the 23 July 2020 the National Policy Statement on Urban Development Capacity 2016 (NPSUDC) was replaced by the National Policy Statement on Urban Development 2020 (NPSUD 2020) which took effect on the 20 August 2020. PPC5 predated the NPSUD.

The NPSUD 2020 requires local authorities to provide sufficient development capacity enabled in locations that meet the diverse needs of communities and encourages well-functioning, liveable urban environments. The NPSUD 2020 provides direction to ensure capacity is provided in response to demand and in accessible places. The Auckland Region is recognised under the NPSUD 2020 as a Tier 1 authority.

The Ministry for the Environment Guidance Introductory Guide (July 2020) states in its "Table 3 Overview of timeline for implementing policies" (on page 13) that the NPSUD 2020 Objectives apply immediately from commencement. Part 4[1] of the NPSUD 2020 goes on to specify timeframes for implementing the NPSUD 2020 Policies, and none of those dates have arrived yet. Consequently the following table addresses how Variation 1 addresses the NPSUD 2020 objectives (and refers to the NPSUD Policies where they are relevant)

Table 1 below outlines the NPSUD 2020 Objectives and their relevance to Variation 1.

Table 1 National Policy Statement on Urban Development 2020 Objectives

Objective	Summarised Objective	How does Variation 1 implement the Objective
1	Well functioning urban environment	Policy 1 sets out how planning decisions will contribute to a well-functioning urban environment. Variation 1 gives effect to Policy 1 by enabling a variety of residential zones that are accessible to nearby business zones. Variation 1 also provides open space, natural spaces, access to transport infrastructure and other amenities.

[1] Page 30 Part 4:Timing of the Nation Policy Statement on Urban Development 2020

2	Housing affordability	Variation 1 will enable approximately 5,710 residential units supporting the development capacity required for the region.
3	Regional Policy Statements and District Plans enable more people to live in urban environments	Auckland falls under a Tier 1 Authority category and is must to give effect to Policy 3 and 4. Variation 1 gives effect to policy 3(c) by establishing a Terrace Housing and Apartment Building Zone with a height variation control of 19m (6 stories) within a walkable distance from the boundary to the Westgate Metropolitan Area. The remainder of the plan change area meets Policy 3(d) where amenities are available.
4	Changing urban environments	Variation 1 gives effect to Policies (1), (2) and (3), Variation 1 is consistent with Policy 6. Further, the change from Future Urban Zone to a more enabling zone provides a changing urban environment.
5	Planning decisions take into account the Treaty of Waitangi	Variation 1 is prepared under the RMA and will meet the requirements of iwi and hapū involvement. PPC5 and the Whenuapai Structure Plan, (that Variation 1 is based upon), has gone through iwi participation.
6	Local authority decision making	Objective 6 relates to the Councils decision making that affects the urban environments in regards to infrastructure, which are strategic over the long and medium term, and responsive to large proposals. The preparation of PPC5 is accompanied by technical reports setting out infrastructure requirements. Variation 1 seeks to enable a large area of land for urban development, but only if it is consistent with RPS Policy B2.4.2(6). This policy requires the plan change area to infrastructure ready at the same time as residential intensification.
7	Local authority information	Variation 1 reflects this objective, as it incorporates new policy and technical information to inform the planning decision for PPC5
8	Green house gasses and climate change	Variation 1 contributes to this objective by supporting development along transport routes, and retains the provisions relating to the coastal edge in PPC5

2.2.2 National Policy Statement – Fresh Water

The National Policy Statement – Fresh Water (NPS-FW) is being responded to by all Council in New Zealand. The Council response for Auckland is expected to meet the timeframes set by the NPS. Consequently the NPS-FW is not applicable to Variation 1.

2.2.3 National Environmental Standard – Fresh Water

The National Environmental Standard – Fresh Water (NES-FW) sets requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems. Anyone carrying out these activities will need to comply with the standards. It came into force on 3 September 2020 and applies to the Council's regulatory functions. The NES-FW will apply to subdivision, land use and development once PPC% and Variation 1 are operative.

2.2.4 Auckland Plan 2050

The Auckland Plan 2050 is the Council's key strategic document which sets out how the Council will address challenges relating to high population growth, shared prosperity, and environmental degradation. The Auckland Plan has been updated in June 2018, after the date that PPC5 was notified.

A key component of the June 2018 Auckland Plan 2050 is the Development Strategy that sets out how future growth will be accommodated over the next 30 years. The Development Strategy builds on the quality compact urban form approach identified in the previous Auckland Plan 2012. The plan focuses on a multi-nodal model within the existing urban footprint with Albany, Westgate and Manukau being key nodes. It recognises Westgate as the centre for future urban development for Red Hills, Whenuapai and Kumeu-Huapai. Whenuapai Stage 1 (being the PPC5 area) is sequenced for development in 2018-2022. This is consistent with the Council's Future Urban Land Supply Strategy 2017. Variation 1 contributes to achieving the outcomes identified in the Auckland Plan 2050.

2.2.5 Future Urban Land Supply Strategy 2017

The Future Urban Land Supply Strategy informs the Council's infrastructure funding priorities and feeds directly into the Council's long-term plans, annual plans, and other strategic documents. The Council's Future Urban Land Supply Strategy was refreshed in July 2017. It implements the Auckland Plan and contributes to giving effect to the NPSUD 2020. The Strategy identifies a programme to sequence the enablement of future urban land over 30 years. The strategy only relates to greenfield land, and plans for 20 years of land supply for housing at all times. It also seeks to provide a seven-year average of unconstrained and development-ready land supply. Development-ready means land with an operative urban zoning that has infrastructure in place (such as transport and water infrastructure).

Whenuapai Stage 1 (being the PPC5 area) is sequenced for development in 2018-2022. Variation 1 contributes to achieving the outcomes identified in the Future Urban Land Supply Strategy.

2.2.6 Auckland Unitary Plan (Operative in Part)

The AUP (OP) comprises the regional policy statement (RPS), regional coastal plan, regional plan and district plan. The AUP (OP) provides the regulatory framework for managing Auckland's natural and physical resources while enabling growth and development and protecting matters of national and regional importance. PPC5 seeks to rezone Future Urban zoned land that is located within the Rural Urban Boundary. This means that it has previously been determined (as part of the development of the AUP (OP) that Whenuapai is to be urbanised.

Chapter B2 of the RPS contains provisions that promote a quality compact urban form in Auckland. Through Policy B2.2.2(7), the RPS also seeks to enable the rezoning of future urban land to accommodate growth to support a quality compact urban form, provide a range of housing and employment, and integrate with infrastructure provision. PPC5 built upon the structure plan undertaken, and now Variation 1 refines this further.

There is direction in the RPS Policy B2.4.2(7) that seeks to manage reverse sensitivity effects from urban intensification on land with existing incompatible activities The RPS also seeks to protect infrastructure, which includes the Whenuapai Airbase, from reverse sensitivity effects caused by incompatible subdivision, use and development. Additionally, Policy B3.2.2(5) seeks to "ensure subdivision, use and development do not occur in a location or form that constrains the development, operation, maintenance and upgrading of existing and planned infrastructure". This is recognised throughout the AUP (OP), including in Chapters D24 Aircraft Noise Overlay, E25 Noise and vibration, E26 Infrastructure, E38 Subdivision – Urban and E39 Subdivision – Rural.

Of particular relevance to Variation 1 are the provisions in the AUP (OP) relating to the transportation network, zoning of land and aircraft engine testing. The land affected by the Aircraft Engine Testing Noise Overlay in Variation 1 is the area of land south of the airbase, but north of Brigham Creek Road. Refer to Appendix 2 Whenuapai 1 Precinct 3 Plan 3.

Provisions in D24 Aircraft Noise Overlay are discussed in section 3.1.1 of this report and in section 6.8.1 of the PPC5 section 32 report.

3. Problem definition

3.1 Zoning amendments

3.1.1 Problem definition - Aircraft engine testing noise at Whenuapai Airbase

The PPC5 section 32 report contains a discussion about the issue of aircraft engine testing noise in section 6.8. The report identified adverse effects of aircraft and engine testing noise from Whenuapai Airbase (Designation 4310) on the health and wellbeing of existing and future residents outside the Airbase and in the plan change area as an issue.

The purpose of Designation 4310 is as follows:

> Defence purposes (as defined by section 5 of the Defence Act 1990) – air base

The following functions of the NZDF are also provided within the purpose of Designation 4310 (emphasis added):

i. *Defence Force command, land operations, sea operations, air operations, training, logistic support, ship berthing and docking, construction, repair, **maintenance**, munitions handling and storage, administration, and communication, and for the acquisition and improvement of the skills necessary for such functions;*
ii. *Resources, accommodation and facilities for these functions;*
iii. *Accommodation for members of the New Zealand Defence Force and any visiting force, training, recreational, welfare and medical facilities for them;*
iv. *Facilities for the storage of matériel, food and fuel, and the conservation and display of historic material;*
v. ***Facilities for the construction, repair and maintenance of vessels, aircraft**, vehicles and other equipment, including the vessels, aircraft, vehicles and equipment of forces of other nations;*
vi. *To provide for the rapid and efficient deployment of the New Zealand Defence Force; and*
vii. ***Any other activity required in the delivery of New Zealand Defence Force outputs** as described annually in the Departmental Forecast Report: New Zealand Defence Force.*

It is understood that NZDF's aircraft requirements are unlike those of a commercial aircraft operator, and they will vary from week to week. There will be periods of low activity and periods of higher activity, especially if there are deployments, preparation for military training, search and rescue or humanitarian requirements. The engine testing is undertaken for the following active aircraft at Whenuapai Airbase:[2]

- Boeing 757
- Lockheed C-130H Hercules
- Lockheed P-3K2 Orion (P3)
- Kaman SH-2 Seasprite helicopter.

[2] Tokin & Taylor, 2021 Whenuapai Airbase – Engine Testing Noise Contours Plan Change 5 (section 5)

It is understood that noise levels from the Seasprite helicopter are significantly lower than noise from other aircraft, and this activity would not affect the overall predicted levels of engine testing noise. Therefore, noise from this aircraft has not been included in assessments to date.

Variation 1 proposes to introduce new and updated aircraft engine testing noise boundaries and related zoning provisions in the Whenuapai 3 Precinct. These would apply to subdivision, land use and development outside the boundary of the Airbase. They would address any adverse effects on activities sensitive to aircraft engine testing noise in the plan change area.

Designation 4310

In April 2019 the Neil Group filed Declaration proceedings in the Environment Court, seeking to established that all noise from aircraft at the Whenuapai airbase (including engine testing noise) has to comply with the noise conditions in Designation 4310. The Environment Court issued its Declaration in September 2019. The Environment Court Declaration recognises that the testing of aircraft engines is a regular part of operations at Whenuapai Airbase and that it is necessary for maintenance, testing and training purposes. The Court declared that the designation applies to all noise generated from aircraft operations at the airbase, including engine testing noise. The result of this decision was that not all aircraft operations at the airbase can contain their noise effects within the designation boundaries and air noise contours. The effect of the declaration is that engine testing at the airbase has the potential to not meet the designation conditions, and therefore not comply with the RMA.

The Certificate issued by the Minister of Defence following the Declaration states that national security would be compromised if engine testing practices were not able to be undertaken, and that would preclude military and other operations. Consequently the certificate exempts aircraft engine testing at Whenuapai Airbase from the RMA.

Land within Designation 4310 also within Whenuapai 3 Precinct

There is an area of land within the Whenuapai Airbase designation, which PPC5 proposed to be zoned as Light Industrial. NZDF advises that this land is used for Airbase purposes and is unlikely to ever be developed for light industrial activity. Variation 1 proposes to amend the zoning of the land within the airbase that is in Whenuapai 3 Precinct to be consistent with the remainder of Whenuapai Airbase designation being Special Purpose Zone.

Chapter D24 Aircraft Noise Overlay

Chapter D24 Aircraft Noise Overlay manages the subdivision of land and location of activities sensitive to aircraft noise in areas of high cumulative noise around the region's airports and airfields. This is done so that the continued operation of the airports and airfields is not compromised, and reverse sensitivity issues are addressed.

The PPC5 noise contours do not reflect the most up to date engine testing data from NZDF. Variation 1 seeks to enhance the PPC5 provisions by responding to the new information.

3.1.3 Problem definition - National Policy Statement Urban Development 2020

On the 20 August 2020 the National Policy Statement on Urban Development 2020 came into force. The NPS-UD 2020 replaces the National Policy Statement Urban Development Capacity 2016, and it is a requirement for any changes to the Regional Policy Statement or District Plans to give effect to the NPSUD 2020 objectives. The NPSUD 2020 requires Councils to plan for a well-functioning urban environment for all people, communities, and future generations.

As outlined in section 2.2.1 of this report, PPC5 predated the NPSUD 2020. Variation 1 has responded to the NPS-UD 2020 in Section 7 below, by apply a zoning response that is both consistent with the AUP (OP) RPS and the objectives and (where relevant) policies of the NPSUD 2020.

3.1.4 Problem definition – Land for the purpose of Open Space – Sport and Active Recreation Zone.

Two areas of land have now been obtained by Auckland Council and are proposed to be zoned Open Space – Sport and Active Recreation Zone. The areas sites are:

- approximately 16 hectares of the PPC5 area for the land at 161 and 167 Brigham Creek Road Whenuapai 0618; and
- approximately 4 hectares of the PPC5 area for the land at 92 and 94A Trig Road.

The land at 161 and 167 Brigham Creek Road was previously owned by the New Zealand Transport Agency (NZTA). A land agreement between Council and NZTA was completed after the notification of the PPC5 (Refer to Appendix 7). The agreement included the acquisition of the land for another 'public work' namely recreation purposes. The land agreement was concluded, and Variation 1 seeks to rezone the land to Open Space – Sport and Active Recreation.

For the land at 92 and 94A Trig Road, PPC5 identified this land as 'Indicative Open Space'. Since PPC5 was adjourned, this site along with two others (outside the PPC5 boundary) have been purchased by the Council for Open Space Purposes. As the Council now owns the land, it is considered appropriate for Variation 1 to zone the land that is within the PPC5 Precinct boundary to be Open Space – Sport and Active recreation.

It is intended that this area of open space will contribute to meeting the recreational needs of the Upper-Harbour and Henderson Massey Local Board areas, and it is also anticipated to be of benefit to the recreational needs of the greater north-west area.

3.1.5 Problem definition – 86 Hobsonville Road

The western portion of the site at 86 Hobsonville Road was included in PPC5, and it is proposed in Variation 1 to be Mixed Housing Urban. Since the adjournment of the PPC5 hearings, the site at 84 Hobsonville Road has been subdivided. This subdivision leaves a

small portion of the land west of that Open Space zoned land and this is zoned as Light Industry. This portion of land is approximately 7714 square metres and is located outside the Precinct boundary of the PPC5 Whenuapai 3 Precinct. This portion of land is illustrated in Figure 2 below.

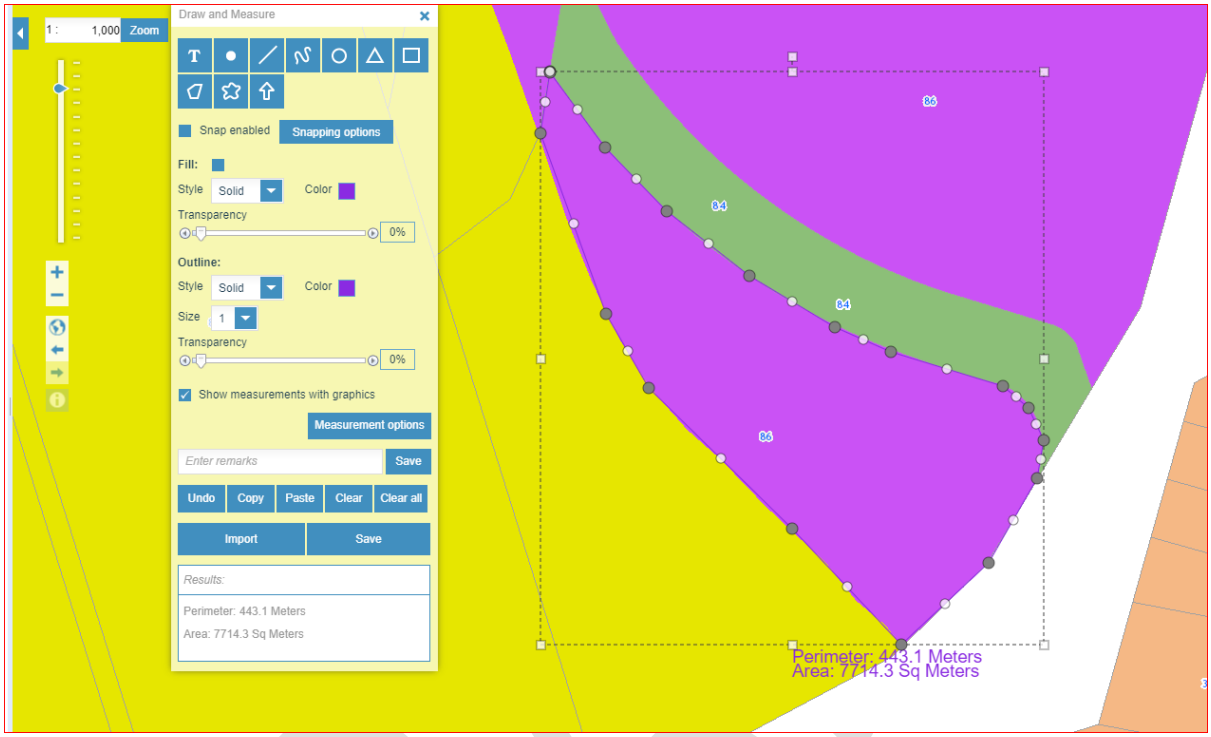


Figure 2 Land at 86 Hobsonville Road, Whenuapai

The landowner of 86 Hobsonville Road has raised the possibility of having this eastern portion (outlined in Figure 2 above) of land that has an operative Light Industry Zoning to be included in PPC5 by variation. Consequently this portion of land is proposed to be rezoned Mixed housing Urban zone and the boundary of the Whenuapai 3 Precinct is proposed to be extended to include this portion of land. This will lead to an integrated resource management outcome for the anticipated residential development west of the Open Space zoning for 84 Hobsonville Road.

It is proposed to amend the boundary of the Whenuapai 3 Precinct to include this portion of Light Industry zoned land at 86 Hobsonville Road. This rezoning will allow for the portion of land to be developed in an integrated manner with the adjacent residential zoned land. Direction 4 of PPC5 identified areas that were out of scope of being included in PPC5. The reasons for these areas of land not being included in PPC5 was they were outside the area that could be serviced by Watercare Services Limited. As this section of land has available infrastructure, it is considered appropriate to include 86 Hobsonville Road in Variation 1.

3.2 Transport Provisions

Since the adjournment of the PPC5 Hearings, further information has come forward on:

- The roading layout in PPC5
- Infrastructure funding for roading.

3.2.1 Problem Definition – Roading alignment

Variation 1 proposes to make amendments to the roading layout proposed in PPC5, as a change in understanding of the roading network has meant that amendments are relevant and required. These amendments are:

a) Deletion of the realignment of the Trig Road arterial that intersects with Hobsonville Road and Luckens Roads. Additional consequential amendments to the indicative collector roads that intersect with the realigned Trig Road
b) Deletion of the collector road and realignment of the collector road abutting NZDF Designation 4310
c) Amendment to the indicative collector roads that will be affected by the rezoning of land for Open Space – Sport and Active Recreation Zone at 161 and 167 Brigham Creek Road.

Trig Road Arterial Alignment

PPC5 included the realignment of the existing Trig Road and its intersection with Hobsonville Road to be relocated east, and by doing so forming a crossroads intersection with Hobsonville Road and Luckens Road. The upgrade of Trig Road (that portion of the road south of State Highway 18) to arterial road status is identified to be funded by the Housing Infrastructure Fund. Consequently the Supporting Growth Alliance has undertaken further assessments of this proposed realignment, and concluded that given the geological constraints with the proposed alignment (a substantial gully system that would need over 100,000 cubic metres of fill) that the realignment will not proceed.

This means that the existing alignment of Trig Road is proposed to be upgraded to arterial road status. Consequently, the proposed realignment of Trig Road on 16.10.2 Whenuapai 3 Precinct Plan 2 requires deletion and the existing Trig Road be annotated as a “Proposed upgrade of existing arterial road”, and the arterial road annotation added to the Controls section of the GIS Maps.

Indicative Collector Road on NZDF Designation 4310 Boundary

The collector road that is located along the NZDF Whenuapai Airbase Designation boundary (east of Brigham Creek Road) is proposed to be deleted and the collector road realigned. The land within the NZDF Whenuapai Airbase Designation 4310 was previously proposed in PPC 5 to be zoned Light Industry. This land is now proposed in Variation 1 to be rezoned as Special Purpose Zone. As a consequence of this, the Indicative Collector Road that was to provide access to the NZDF land is no longer required and is proposed to be deleted and realigned. This is depicted in Figure 3 below.

Figure 3 Location of the proposed deletion of the Indicative Collector Road.

161 and 167 Brigham Creek Road

Section 3.1.4 of this report discusses the amendments to the zoning for the land at 161 and 167 Brigham Creek Road. This has been purchased by Council for Auckland's open space requirements. PPC5 notified an indicative collector road that traverses across these sites from Brigham Creek Road to Trig Road. The collector roads that are encompassed by Brigham Creek Road, Trig Road and State Highway 18 are realigned in response to the change in land-use. The open space purposes would not be achieved if the road severed the majority of the developable re-zoned open space land.

3.3 Aircraft engine testing noise contours

After the hearing on PPC5 was adjourned, the Council commissioned Acousafe to undertake modelling of the new additional aircraft engine testing data provided by NZDF at the time of the hearing. However, during this process, the NZDF advised that they had engaged AECOM to undertake modelling of the new data. This has occurred and Acousafe subsequently provided input into the AECOM modelling process and peer reviewed the AECOM report. This avoided duplication of analysis. In addition to the new data that was provided by the NZDF, AECOM received further information from the NZDF which enabled a more detailed analysis of the data to be undertaken, be checked for accuracy and adjusted as required.

On the 5 of March 2021, the Council received the Whenuapai Airbase – Engine Testing Noise Contours report prepared by Tonkin & Taylor (Appendix 5a) which contained updated aircraft engine testing noise contours from NZDF. These noise contours in Variation 1 now reflect the most up to date aircraft engine testing data from the NZDF.

The new aircraft engine testing noise contours are now reduced in size, consequentially the area of land that was originally affected is smaller and in a different location to PPC5. The report supplied by NZDF concludes that based on the engine testing data from a seven-day period that was modelled using computer software, the aircraft engine testing contours are now located as depicted in Appendix 5a. The report also allows for changes in the use of the Whenuapai Airbase over time. To provide for this, the model has applied the time spent each at each power setting to increase by a factor of 20%.

Even though the aircraft engine testing noise contours were a matter considered in PPC5, the new contours now apply to different sites that were not previously subject to the contours. This means that landowners who are now affected by these contours are provided provided the opportunity to make a submission on Variation1.

Variation 1 includes the new noise contours and, as a consequence, the zoning underneath the contours has been adjusted. The land outside the 65 dba contour has been proposed to be zoned as Single House Zone, as shown in the zoning map at Appendix 1.

3.4 Network Discharge Consent

3.4.1 Problem Definition – Network Discharge Consent

The Network Discharge Consent (NDC) was introduced by the Council's Healthy Waters department to provide a clear process and requirements for stormwater discharge throughout the Auckland region. The NDC public notification and hearings process was completed and the NDC was granted in April 2019 and was appealed to the Environment Court. Following mediation with different parties, the Environment Court issued a consent order in October 2019.

As the NDC was granted after the adjournment of the PPC5 hearing, it has yet to be introduced or integrated into the Whenupai 3 Precinct 1 provisions. The proposed PPC5 provisions relating to stormwater are now out of date and not consistent with the NDC. It is proposed that the provisions relating to stormwater are amended to give effect to the NDC.

4 Proposed Plan Change 5 Variation 1 Options Analysis

The objectives of Variation 1 are the same as the objectives of Proposed Plan Change 5. The purpose of Variation 1 is to provide amendments to PPC5 as new information has been received. The amendments in Variation 1 seek to ensure that PPC5 is the most effective and efficient mechanism for meeting the objectives of the plan change.

In accordance with section 32(1)(b)(i), the following options were considered in the development of Proposed Variation 1:

Option 1: Do nothing – continue the PPC5 process without a variation. This would mean a process of reconvening the adjourned hearing, closing reply by the Council and decision on PPC5.

Option 2: Partial withdrawal of PPC5 – withdraw the residential areas north of State Highway 18 affected by aircraft engine testing noise and continue the PPC5 process for land proposed to be zoned Light Industry located along Brigham Creek Road and the residential land south of State Highway 18. When there is greater certainty, initiate a new plan change for the land north of State Highway 18.

Option 3: Initiate a variation to rezone land affected by aircraft engine testing noise to Business – Mixed Use if the site is directly affected by the 65 Ldn contour or is contiguous to a site that is directly affected by the 65 Ldn contour. Sites that are within the 57 Ldn will be zoned Residential. Option 3 also includes amendments to other parts of PPC5 where new information has been received and responds to the NPS-UD. .

Option 4: Initiate a variation to rezone land affected by aircraft engine testing to Light Industry if the site is directly affected by the 65 Ldn contour or is contiguous to a site that is directly affected by the 65 Ldn contour. Sites that are within the 57 Ldn are zoned a residential zone. This option avoids zoning residential land adjacent to or contiguous with Light Industry land. Option 4 will also include amendments to other parts of PPC5 where new information has been received and responds to the NPS-UD.

An analysis of the above options is provided in Table below.

Table 2: Proposed Variation 1 options analysis

Options	Costs	Benefits	Risks and implications
Option 1: Do nothing – continue PPC5 process without a variation.	▪ In light of new engine testing noise data provided by the NZDF, the proposed planning response to the PPC5 aircraft engine testing noise issue is no longer appropriate. ▪ The aircraft engine testing noise boundaries as notified in PPC5 do not align with the most up to date aircraft engine testing noise boundaries provided by the NZDF. ▪ Current aircraft engine testing noise effects at the Whenuapai Airbase are not adequately addressed in accordance with Chapter D24 Aircraft Noise Overlay, as the PPC5 zoning remains based on the aircraft engine testing noise boundaries in earlier noise modelling reports. ▪ The approach does not take into account the Whenuapai Airbase's future operational scenario that has now been modelled.	▪ A decision on PPC5 may be made sooner than if a variation were initiated. ▪ Zoning will provide for a mix of residential densities and employment land. ▪ Zoning will support the ability to provide a future rapid transit network along SH18. ▪ The Whenuapai 3 Precinct provisions will enable subdivision, land use and development.	▪ The approach does achieve the objectives of PPC5[3] and is made inconsistent with the RPS[4] as new aircraft engine testing noise contour information makes this option outdated. ▪ Proceeding with PPC5 will put the aircraft engine testing noise contours in an inaccurate location that does not reflect the newly modelled environmental effects. Option 1 could mean unreasonable levels of constraint on landowners' who are potentially not affected by aircraft engine testing noise. ▪ This option does not respond to the NPS-UD 2020
Option 2: Partial withdrawal of PPC5 – withdraw the residential areas north of State Highway 18 and continue the PPC5 process for land proposed to be zoned Light Industry along Brigham Creek Road and residential land south of State Highway 18. Continue working	▪ Residential land north of State Highway 18 is not released in accordance with the Future Urban Land Supply Strategy (Whenuapai Stage 1 scheduled for 2018-2022). ▪ Delay in zoning some land in Whenuapai for housing.	▪ A more comprehensive planning exercise can be undertaken with greater certainty of the aircraft engine testing noise environment. ▪ Delay in rezoning land north of State Highway 18 could enable further discussions between the	

[3] Objectives I616.2 (1), (12) and (13) (as at 23 August 2018)
[4] Objective B3.2(6)

Options	Costs	Benefits	Risks and implications
with the NZDF to gain more certainty about the future noise environment in Whenuapai.		Council, landowners and the NZDF about how to best manage the effects of aircraft engine testing noise on subdivision, land use and development.	
Option 3: Initiate a variation to rezone land affected by aircraft engine testing noise to Business – Mixed Use if the site is directly affected by the 65 Ldn contour or is contiguous to a site that is directly affected by the 65 Ldn contour. Sites that are within the 57 Ldn and not contiguous to a site affected by the 65 Ldn be zoned Mixed Housing Suburban. Option 3 will also include amendments to other parts of PPC5 as new information has been received and would respond to the NPS-UD.		▪ This option provides flexibility for land owners to develop land that may be affected by aircraft engine testing noise, and deliver housing supply and business activities. ▪ It allows the Council to assess noise effects as part of assessment of resource consent applications. It ensures that activities that are sensitive to aircraft engine testing noise are avoided on land that is located under the 65 Ldn area. This option allows for other changes to be made that are consistent with the most up to date data and information. ▪ This option meets the objective of the plan change and the objectives of the precinct.	
Option 4: Initiate a variation to rezone land affected by aircraft engine testing noise to Light industry if the site or part of the site is directly affected by the 65 Ldn contour. Sites that are within the 57 Ldn are zoned a residential zone. Option 4 will also include amendments to other parts of the PPC5 Precinct as		▪ This option provides greater certainty for land development, and the delivery of housing supply and light industrial activities. It also allows Auckland Council to provide the level of Open Space required for the region. ▪ It allows the Council to assess aircraft engine testing noise effects at the resource consent application	

Options	Costs	Benefits	Risks and implications
new information has been received and it also responds to the NPS-UD.		stage. It ensures activities that activities that are sensitive to aircraft noise are avoided on land that is zoned and lies under the 65 Ldn contours. ▪ This option allows for other changes to be made that are consistent with the most up to date data and information. ▪ This option meets the objective of the plan change and the objectives of the precinct.	

Option 4 is the preferred option. Option 4 provides the highest level of certainty using the most up to date data and information to rezone the land and improve the policy and rule framework for the Whenuapai Precinct 3.

Option 4 will protect the Whenuapai Airbase from reverse sensitivity and will protect activities sensitive to aircraft engine testing noise. It enables landowners to achieve sustainable land development outcomes.

It is considered that Option 4 is the most appropriate way to achieve the objectives of PPC5.

5 Objectives

Variation 1 does not propose new objectives to be included in the Proposed Whenuapai 3 Precinct. It does however make an amendment to objective I616.2(7)[5] and (13)[6]. Section 7 of this report provides an assessment of the proposed provisions of Variation 1 against the relevant Whenuapai 3 Precinct objectives and the purpose of PPC5 which is stated in section 1.3 of this report. For completeness, the relevant objectives of Variation 1 are listed in section 7 of this report[7].

The objectives are assessed in section 7 of the PPC5 section 32 report in accordance with section 32(1)(a) of the RMA. The objectives have had some amendments recommended to them in response to the assessment of submissions. These are discussed in the section 42A report dated 12 April 2018 and the addendum report dated 30 April 2018 in accordance with section 32AA of the RMA.

Table 3 PPC5 Objectives

Whenuapai 3 Precinct Objectives
(1) Subdivision, use and development in the Whenuapai 3 Precinct is undertaken in a comprehensive and integrated way to provide for a compatible mix of residential living and employment opportunities while recognising the ongoing operation and strategic importance of Whenuapai Airbase.
(2) Subdivision, use and development achieves a well-connected, safe and healthy environment for living and working with an emphasis on the public realm including parks, roads, walkways and the natural environment.
Integration of Subdivision and Development with the Provision of Infrastructure
(3) Subdivision and development does not occur in advance of the availability of transport infrastructure, including regional and local transport infrastructure.
(4) The adverse effects, including cumulative effects, of subdivision and development on infrastructure are managed to meet the foreseeable needs of the Whenuapai 3 Precinct area, including through the provision of new and upgraded infrastructure.
(5) Subdivision and development does not occur in a way that compromises the ability to provide efficient and effective infrastructure networks within the Whenuapai 3 Precinct area and the wider network.
Transport
(6) Subdivision and development implements the transport network connections and elements as shown on Whenuapai 3 Precinct Plan 2 and takes into account the regional and local transport network.
Development in the Neighbourhood Centre Zone
(7) Development in the Neighbourhood Centre Zone: (a) is coordinated and comprehensive;

[5] Objective I616.2(7) has been amended as a consequence of the amendments to the Trig Road realignment being remove.
[6] Objective I616.2(13) has been amended to reflect the definition of 'activities sensitive to aircraft noise'
[7] The I616.2 objectives have been amended through the PPC5 process, these amendments are illustrated in Appendix 2

(b) has active frontages facing Hobsonville Road; and
(c) promotes pedestrian linkages.

(8) Through subdivision, use and development, implement a stormwater management approach that:
(a) is integrated across developments;
(b) avoids new flood risk;
(c) mitigates existing flood risk;
(d) protects and enhances the ecological values of the receiving environment;
(e) seeks to mimic and protect natural processes;
(f) integrates with, but does not compromise the operation of, the public open space network.; and
(g) minimises the attraction of birds that could become a hazard to aircraft operating at Whenuapai Airbase.

Coastal Erosion Risk

(9) New development does not occur in areas identified as subject to coastal erosion, taking into account the likely long-term effects of climate change.

Biodiversity

(10) Subdivision, use and development enhance the coastal environment, biodiversity, water quality, and ecosystem services of the precinct, the Waiarohia and the Wallace Inlets, and their tributaries.

Open Space

(11) Subdivision, use and development enable the provision of a high quality and safe public open space network that integrates stormwater management, ecological, amenity, and recreation values.

Effects on Whenuapai Airbase

(12) The effects of subdivision, use and development on the operation and activities of Whenuapai Airbase are avoided, as far as practicable or otherwise remedied or mitigated.

Aircraft Engine Testing Noise

(13) The adverse effects of aircraft engine testing noise on activities sensitive to aircraft noise are avoided, remedied or mitigated at the receiving environment.

6 Assessment of provisions in Variation 1

Table 3 below outlines the amendments and issue statements for the amendments proposed in Variation 1. For the remainder of the provisions, the PPC5 section 32 report and any corresponding section 42a amendments and / or recommendations are still applicable.

A summary of the proposed provisions is provided below:

- Response to the PPC 5 engine testing noise contours have been updated by the Minister of Defence
- National Policy Statement Urban Development 2020 (NPSUD2020) Objectives and Policies coming into force
- Further information has come forward about other aspects of the plan change relating to:
    - Updated precinct provisions to be consistent with the Regional Network Discharge Consent
    - Change in land use at 86 Hobsonville Road, which includes a plan change boundary adjustment
    - Acquisition of land for Open Space purposes at 92 and 94A Trig Road, 161 and 167 Brigham Creek Road
    - Rezoning of the land that is located within both the Whenuapai Airbase designation 4310 which is within the proposed Whenuapai Precinct 3
    - Trig Road Arterial Road Realignment
    - Transport provisions and precinct amendments to the indicative collector roads to reflect the changes:
        - Change in zoning in the PPC5 area,
        - Open Space acquisitions

The proposed zoning map is shown in Appendix 1.

Variation 1's full text amendments to the Whenuapai 3 Precinct are provided in Appendix 2. Variation 1 amendments are in red.

Blue amendments in strikethrough and underlined have been previously included in the Council's response to the Hearing Panel's Second Direction (as at 23 August 2018). These are included to assist readers of Variation 1 to understand how the Variation 1 amendments integrate with the amendments previously recommended by Council.

The amendments listed above are based on updated information. It is considered that these amendments also seek to ensure that Whenuapai Precinct 3 has clarity and certainty.

6.2 Risk assessment

In light of the new aircraft engine testing noise data that was provided by the NZDF and the subsequent modelling that was undertaken, it is appropriate to initiate a variation to PPC5. This will ensure that the effects of aircraft engine testing noise are adequately addressed, and the Whenuapai 3 Precinct provisions are based on the most robust information available.

The risk of not acting by continuing with the PPC5 process without a variation outweighs any risks relating to future operations at Whenuapai Airbase and the amenity values experienced by residential dwellers in Whenuapai 3 Precinct. Further, with the new NZDF information available, there is sufficient information to make zoning decisions with certainty. It is considered that the risk of acting is less than not acting.

6.3 Proposed Plan Change 5 Variation 1

Variation 1 relies on the PPC5 policies, rules and standards other than those relating to aircraft engine testing noise, infrastructure, transport and open space.

6.3.1 Zoning and Boundary amendments

Proposed zoning amendments to Whenuapai 3 Precinct

The new aircraft engine testing noise data has resulted in the following zoning amendments:

- The area of land within the 65 Ldn noise contour or are contiguous with a site that is affected by the 65 Ldn contour is proposed to be zoned Business – Light Industrial Zone.
- The area of land that are in the 57 Ldn noise contour are to be zoned Residential – Single House Zone
- For residential areas outside of the noise contour boundaries, these sites have been up zoned to a minimum of Residential - Mixed Housing Urban Zone.

Explanation: For the land that is located under the 65 Ldn noise contour, it is a prohibited activity to establish any new activities that are sensitive to aircraft engine testing noise. This is directed by Chapter D24 Aircraft Noise Overlay. The purpose of this is to ensure that the airbase is protected from reverse sensitivity issues. Therefore, is it considered more effective to zone this area Light Industry.

As the 65 Ldn only affects a small number of sites, there is a risk of 'spot' zoning this area of land, and creating an island of Light Industry surrounded by residential land.

Sites that are outside of the 65 Ldn and are affected by the 57 Ldn, these sites are to be zoned Residential – Single House Zone. This is consistent with policy D24.3.(3)(a) in Chapter D24. Aircraft Noise Overlay, which states:

> *"(3) Avoid establishing residential and other activities sensitive to aircraft noise at:*
> *(a) airports/airfields except for Auckland International Airport: within the area between the 55dB Ldn and 65dB Ldn noise contours, unless the effects can be adequately remedied or mitigated through restrictions on the*

numbers of people to be accommodated through zoning and density mechanisms and the acoustic treatment (including mechanical ventilation) of buildings containing activities sensitive to aircraft noise excluding land designated for defence purposes;"

PPC5 proposed Single House Zone, and Variation 1 maintains this approach. Policy D24.3.(3)(a) does not direct the zoning under this part of the overlay to be single house, but through limiting the number of people and acoustic treatment the effects of aircraft engine testing noise are mitigated. The land that is located within the airbase that was included in PPC5 to be zoned light industrial. These parcels of land are to be zoned Special Purpose Zone. This will make the zoning of these parcels to be consistent with the zoning of the airbase.

Zoning amendments to give effect to the NPS-UD 2020 are

- Height variation control of 19m to enable development to 6 six stories for areas that are considered walkable distance to/from:
    a. Westgate Metropolitan Centre; and
    b. A future planned rapid transport stop on State Highway 18 off Clarks Lane.
- The sites adjacent to this walkable catchment have been zoned Terraced Housing and Apartment Buildings Zone (THAB).
- Sites that along Hobsonville Road from Westgate are to be zoned THAB.
- Mixed Housing Urban for the area of land recently subdivided at Makete Crescent and Waipana Street.
- For areas that do not meet the NPS-UD Policy (3) criteria, these areas will be zoned Residential – Mixed Housing Urban if the site is not affected by an environmental constraint or are not indicated for business land use.

Explanation: The NPS-UD 2020 Policy 3 states:

"Policy 3: In relation to tier 1 urban environments, regional policy statements and district plans enable:

(a) in city centre zones, building heights and density of urban form to realise as much development capacity as possible, to maximise benefits of intensification; and

(b) in metropolitan centre zones, building heights and density of urban form to reflect demand for housing and business use in those locations, and in all cases building heights of at least 6 storeys; and

(c) building heights of least 6 storeys within at least a walkable catchment of the following:
    (i) existing and planned rapid transit stops
    (ii) the edge of city centre zones
    (iii) the edge of metropolitan centre zones; and

(d) in all other locations in the tier 1 urban environment, building heights and density of urban form commensurate with the greater of:

(i) the level of accessibility by existing or planned active or public transport to a range of commercial activities and community services;

(ii) *or relative demand for housing and business use in that location."*[8]

The Auckland region is categorised as tier 1 under the NPS-UD and therefore Policy 3 needs to be taken into consideration. Sites that are proposed to have a height variation control ("HVC") to enable a height of 19m (6 stories), are considered to be within a walkable distance to either the Westgate metropolitan area or the future planned rapid transport network on State Highway 18. The sites that are immediately adjacent to the HVC have been zoned to THAB.

The exemption to the 19m HVC is based upon the sites at Waipana Street and Markete Crescent being recent subdivided. For this area to not be zoned up to 6 stories, the Council must demonstrate that the area meets part 3.32(1)(h) of the NPS-UD, which states:

*"**3.32 Qualifying matters***

(1) In this National Policy Statement, qualifying matter means any of the following:

…

(h) any other matter that makes high density development as directed by Policy 3 inappropriate in an area, but only if the requirements of clause 3.33(3) are met."

Clause 3.33(3) of the NPS-UD states:

*"**3.33 Requirements if qualifying matter applies***

(3) A matter is not a qualifying matter under clause 3.32(1)(h) in relation to an area unless the evaluation report also:

(a) identifies the specific characteristic that makes the level of development directed by Policy 3 inappropriate in the area, and justifies why that is inappropriate in light of the national significance of urban development and the objectives of this National Policy Statement; and

(b) includes a site-specific analysis that:

(i) identifies the site to which the matter relates; and

(ii) evaluates the specific characteristics on a site-specific basis to determine the spatial extent where intensification needs to be compatible with the specific matter; and

(iii) evaluates an appropriate range of options to achieve the greatest heights and densities directed by Policy 3, while managing the specific characteristics."

[8] Nation Policy Statement for Urban Development 2020 Policy 3

These sites have recently been subdivided and there are now multiple owners. This is considered to be a specific characteristic that makes the level of development identified in Policy 3 inappropriate in this area. Any consented building is required to have a minimum life span of 50 years under the building code, of which exceeds the 30 year long term period as identified by the NPS-UD. Council has yet to be able to develop any development capacity figures, so it is difficult to determine the effects on the zoning pattern that these figures will have. It is also considered that these sites are discrete and if the additional housing was constructed, it would have a minimal effect on the total development capacity.

This approach could be considered a region wide issue; however Council has not responded to the NPS-UD 2020 for the region yet and a consistent approach to this matter will be applied then.

This approach applies to all sites located on Markete Crescent and Waipana Street (refer to Appendix 1) and it is considered that this is the best option for managing this specific circumstance.

For the sites located directly north of Hobsonville road, the requirement under Policy 3 of the NPS-UD coupled with the RPS policy B2.4.2(2) means this area of land is to be zoned THAB. This is based upon the accessibility to the public transport network along Hobsonville Road. Policy B2.4.2(2) states:

> *"B2.4.2 Policies*
> *…*
> *(2) Enable higher residential intensities in areas closest to centres, the public transport network, large social facilities, education facilities, tertiary education facilities, healthcare facilities and existing or proposed open space."*

Therefore it is considered appropriate to zone these areas as THAB, and the sites that do not have this level of access to public transport to Mixed Housing Urban. The sites to be zoned Mixed Housing Urban are considered to be at a moderate distance to the public transport network. This is consistent with policy B2.4.2(3). Which states:

> "*B2.4.2 Policies:*
> *…*
> *(3) Provide for medium residential intensities in area that are within moderate walking distance to centres, public transport, social facilities and open space."*

Variation 1 also proposes to increase the density for sites that are consistent with NPS-UD policy (3)(d) and the RPS policy B2.4.1(3) along Hobsonvile Road.

<u>Zoning amendments for Open Space - Sport and Active Recreation:</u>

- Land at 161 Brigham Creek Road, Whenuapai
- Land at 92 and 94A Trig Road, Whenuapai

Explanation: Variation 1 seeks to amend approximately 16 ha of the PPC5 area for the land at 161 and 168 Brigham Creek Road Whenuapai 0618, and 4ha area of land at 92 and 94A Trig Road for open space purposes.

The reasons for this amendment are that part of the State Highway 1 and 16 improvements utilising land around Constellation Drive. These included sections of Northshore United Hockey Club land, which were acquired by Waka Kotahi, which consequentially meant a relocation of this facility.

The land at 161 and 168 Brigham Creek Road was owned by Waka Kotahi and an agreement between Council and the authority was undertaken (Please refer to Appendix 6). The agreement included the acquisition of the land for another 'public work' namely recreation sports purposes. The land agreement was completed and Variation 1 proposes to zone the land to Open Space – Sport and Recreation. These sites were zoned Single House in the PPC5.

This acquisition was completed after the notification of PPC5 and the hearing of submissions. This sequence of events provides the reasons for departing from the Whenuapai structure plan to include this area for open space, and the regional sports purpose that the land will have for servicing the residents. It is intended that this open space will meet the recreational need of the Upper-Harbour and Henderson Massey Local Board areas, and there is also expected to be benefit in the greater Auckland region.

The land at 92 and 94A Trig Road, Whenuapai 0618 the land has been purchased by the Council for open space purposes. Variation 1 proposes to zone this site Open Space – Sport and Active Recreation. This zone is consistent with the Whenuapai Structure Plan, which indicates for an open space site to be in this area. This area of land will help fulfil the open space requirements for the greater Whenuapai area. The zoning amendments are as shown in Appendix 1 of this report.

6.3.2 Transport provisions and precinct changes

<u>Amendments to Whenuapai 3 Precinct Plan 2</u>
Variation 1 seeks amend the roading layout on Whenuapai 3 Precinct Plan 2 (refer to Appendix 1)

Explanation: At the time of the hearing, the Council had secured funding for the upgrade of the southern part of Trig Road, including a realignment to create a cross intersection with Hobsonville and Luckens Roads. That realignment includes traversing over terrain that required significant investment to complete. Variation 1 seeks to amend Precinct Plan 2 to have Trig Road follow the current roading pattern. The collector roads associated with Trig Road have to be realigned as a consequence of this.

For the collector road that traverses across 161 and 167 Brigham Creek Road, the proposed collector road would go across the land suitable for sports pitches. This road has been realigned to ensure sufficient open space can be provided.

6.4 Assessment of the Variation 1 provisions

The costs, benefits, efficiency, and effectiveness of the proposed provisions are set out in Table 4. Section 32(2)(b) of the RMA requires costs and benefits to be quantified where practicable. The assessment in Table 9 of the PPC5 section 32 report still stands for all other provisions in PPC5 relating to aircraft engine testing noise, unless otherwise stated.

6.4.1 Section 6 Considerations

Section 2.1 of this report outlines the requirement to consider section 6 of the RMA. In section 2.1 it is consider that part 6(a), (d), (f) and (h) are relevant considerations to PPC5 and Variation 1. The proposed amendments meet those sections' requirement as the precinct provisions:

- Use appropriate tools and mechanisms to preserve the natural character of the coastal environment by protecting areas from inappropriate subdivision, use and development;
- Maintains access and provides for public access to and along the coastal marine area and rivers.

For these reasons Variation 1 meets the section 6 requirements of the RMA.

6.4.2 Section 7 Considerations

Section 2.1 of this report outlines the requirement to comply section 7(b), (c), (f) and (i) of the RMA. The proposed amendments meet the section 7 requirements as the precinct provisions:

- allows for the efficient use and development of the area of land within the Rural Urban Boundary
- The AUP (OP) zones overlays and the precinct provide for amenity outcomes
- The AUP (OP) Auckland wide provisions along with the precinct provisions seeks to ensure infrastructure is delivered in a timely manner to maintain or enhance the quality of the environment
- The effects of climate change are considered in the existing AUP (OP) rules.

For these reasons, Variation 1 meets the section 7 requirements of the RMA.

Table 4: Assessment of proposed provisions in Proposed Variation 1

Costs	Benefits	Efficiency and Effectiveness
Economic • The land that is not directly affected by the 65 ldn engine testing noise contour can be developed as residential land and will contribute to Auckland's Housing supply. • The land that is affected by the 65 Ldn engine testing noise contours is restricted to activities that are not sensitive to aircraft engine testing.	**Environmental** • The provisions seek to enable development under the aircraft engine testing noise contours. Whilst ensuring any adverse noise effects from the airbase's engine testing activity can be adequately avoided, remedied or mitigated. • The updated Storm Water Provisions manage the adverse effects of development on the Upper-Harbour catchment. **Social** • The provisions provide for, and do not restrict, the ongoing operation of Whenuapai Airbase which is of national and strategic importance. • Variation 1 provides a greater area of Open Space for sport and active recreation. This is considered to have a positive outcome for the area and the future communities. These benefits are considered to also be regional as these areas contribute to meeting the open space demand in the Upper-Harbour and Henderson Massey Local Board areas. **Economic** • Overall decrease in enabled residential capacity from 6444 dwellings enabled by PPC5 to approximately 5,710 dwellings enabled by this variation. This is based on the calculation for the area proposed to zoned residential. • This is anticipated to continue to have economic benefits in the short and long term for the area. • Variation 1 increases the area of business land; which will increase employment opportunities in the area.	**Efficiency** Variation 1 is considered to be the most efficient method to achieve the plan change objectives, and more specifically Objectives I616.2 (1), (12) and (13). The proposed provisions are considered to be efficient in managing the adverse effects of aircraft engine testing noise on activities sensitive to noise. This is due to reserve sensitive issues being avoided, remedied or mitigated. The variation also provides greater certainty to plan users. The amended zoning provides development opportunity for the landowners, whilst meeting the objectives of PPC5. Zoning outcomes are considered the most efficient use of land, and the most efficient option to meeting the objective of PPC5, and the AUP(OP) and the NPS-UD 2020. **Effectiveness** The proposed provisions in Variation 1 are the most effective way to achieve Objectives I616.2 (1), (12) and (13). The proposed zoning is considered the most effective mechanism to meeting the objectives of PPC5 given the constraints that are present. The provisions recognise the national and strategic importance of Whenuapai Airbase as a defence facility. The zoning approach ensures that new activities sensitive to aircraft noise are avoided within the current 65 dB L_{dn} noise boundary, and if they cannot not be avoided, they are managed through appropriate controls.

7 Consultation

7.1 Iwi consultation

All iwi that identify as mana whenua in this area are being consulted on Variation 1, and their feedback is being sought.

7.2 Stakeholder consultation

The Henderson Massey and Upper Harbour Local Boards are being consulted on Variation 1 and their feedback is being sought. Submitters to PPC5 and other interested parties are being consulted, and their feedback is being sought.

8 Conclusion

The purpose of Variation 1 is to update PPC5 following the receipt of new technical data and to respond to policy and planning matters that have occurred since the adjournment of the PPC5 hearing in May 2018. These matters are aircraft engine testing noise, road alignment changes, response to the NPS-UD, response to the granted network discharge consent for Auckland, correction of zoning matters and other consequential amendments.

As assessed in section 6 of this report, the proposed amendments to PPC5 within Variation 1, when considered in conjunction with PPC5 (as recommended to be amended following considerations of submissions) and relevant existing AUP (OP) objectives, is the most appropriate way to address the resource management issues identified and to achieve the purpose of the RMA. Variation 1 is within the scope of the council's functions under section 31 of the Act.

Overall, Variation 1 supports PPC5 to enable subdivision, use and development within a greenfield area while ensuring any adverse effects on the environment can be appropriately avoided, remedied or mitigated in a way that is consistent with Part 2 of the RMA and the direction given by the Regional Policy Statement.

Appendix 1: Proposed Variation 1 – Proposed Zoning Map

PPC5: Proposed Whenuapai Plan Change Variation 1

Date : 19 April 2021

Zoning map

19m

19m

19m

Indicative Coastline

- Height Variation Control
- Residential - Single House Zone
- Residential - Mixed Housing Suburban Zone
- Residential - Mixed Housing Urban Zone
- Residential -Terrace Housing and Apartment Buildings Zone
- Open Space - Conservation Zone
- Open Space - Informal Recreation Zone
- Open Space - Sport and Active Recreation Zone
- Open Space - Civic Spaces Zone
- Business - Metropolitan Centre Zone
- Business - Local Centre Zone
- Business - Neighbourhood Centre Zone
- Business - Mixed Use Zone
- Business - General Business Zone
- Business - Light Industry Zone
- Future Urban Zone
- Strategic Transport Corridor Zone
- Special Purpose Zone
- Coastal - General Coastal Marine Zone [rcp]
- Coastal - Marina Zone [rcp/dp]
- Coastal - Coastal Transition Zone
- Water [i]
- Road [i]

N

0 150 300 600 Metres

Auckland Council

Appendix 2: Draft Proposed Variation 1 amendments to Proposed Plan Change 5 – Whenuapai 3 Precinct
Integrated with the recommended text changes following the adjournment of the hearing of Proposed Plan Change 5 in May 2018

Draft amendments in Proposed Variation 1 to Proposed Plan Change 5 – Whenuapai 3 Precinct

19 April 2021

Explanation of Text Amendments

Black text shows the Proposed Whenuapai 3 Precinct text from Proposed Plan Change 5 (PPC5) as notified.

Blue text with ~~strikethrough~~ and underline shows the recommended changes to PPC5 as attached to the response to the second direction on 23 August 2018. The text is annotated with submission points on PPC5 in blue that provide scope for the recommended changes. However, in some instances there may be other submission points that also provide scope. These amendments are not part of Variation 1.

Red text with ~~strikethrough~~ and underline shows the text changes in Draft Proposed Variation 1 to PPC5.

Addition to Chapter I Precincts West

I616. Whenuapai 3 Precinct

I616.1. Precinct Description

The Whenuapai 3 Precinct is located approximately 23 kilometres northwest of central Auckland. Development in the Whenuapai 3 Precinct will enable an increase in housing capacity and provide employment opportunities through the efficient use of land and infrastructure.

The purpose of the precinct is for the area to be developed as a liveable, compact and accessible community with a mix of high quality residential and employment opportunities, while taking into account the natural environment and the proximity of Whenuapai Airbase.

Development of this precinct is directed by Whenuapai 3 Precinct Plans 1, 2 and 3.

Whenuapai 3 Precinct Plan 1 shows:

- indicative open space, esplanade reserves and coastal esplanade reserves;
- the permanent and intermittent stream network, including streams wider than three metres, and natural wetlands; and ***[22.11]***
- the Whenuapai 3 coastal erosion setback yard.

Whenuapai 3 Precinct Plan 2 shows:

- indicative new roads and intersections;
- proposed upgrades to existing roads and intersections~~; and~~
- ~~development areas for transport infrastructure~~. ***[consequential to amendments in response to 42.9 and 42.10]***

Whenuapai 3 Precinct Plan 3 shows:

- aircraft engine testing noise boundaries from engine testing activity at Whenuapai Airbase.

Integration of Subdivision and Development with Infrastructure

The comprehensive and coordinated approach to subdivision, use and development outlined in the precinct reflects the size and significant amount of infrastructure required to enable subdivision and development. Funding of all required infrastructure is critical to achieving the integrated management of the precinct. The primary responsibility for funding of local infrastructure lies with the applicant for subdivision and/or development. The council may work with developers to agree development funding agreements for the provision of infrastructure, known as Infrastructure Funding Agreements. These agreements define funding accountabilities, who delivers the works, timings and securities, amongst other matters.

Transport

~~Whenuapai 3 Precinct is split into five areas, 1A-1E, based on the local t~~Transport infrastructure upgrades required to enable the transport network to support development

in the precinct ~~areas. These upgrades~~ are identified in Table I616.6.2.1. ~~and~~ These upgrades are required to be in place prior to development going ahead. The cost of these transport infrastructure upgrades ~~are~~ is to be proportionally shared across ~~each area~~ the precinct as development progresses. ***[Consequential to amendments in response to 42.9 and 42.10]*** If these upgrades are not in place prior to development occurring developers are able to provide an alternative measure for the provision of the upgrade works. This may include an agreement with the council to ensure that the local share of the upgrade works attributable to the development is provided for. This could include an Infrastructure Funding Agreement or some alternative funding mechanism.

Where there is an Auckland Transport project to provide the new or upgraded roads, developers may be required to contribute to it in part. Where a development proceeds ahead of an Auckland Transport project, the developer is required to work with Auckland Transport to ensure that the Auckland Transport project(s) is not precluded by the development.

Neighbourhood Centre

A neighbourhood centre is proposed along ~~on the corner of~~ Hobsonville Road~~. and the proposed realigned Trig Road~~. Service access and staff parking are provided at the rear of the development to encourage the continuity of retail frontages. Pedestrian linkage(s) to the centre are is provided ~~at the intersection of~~ along Hobsonville Road ~~and the realigned Trig Road~~.

Stormwater Management

~~Stormwater management within the precinct is guided by the Whenuapai 3 Precinct Stormwater Management Plan (2017). This assessment has identified that t~~The streams and coastal waters within the precinct are degraded and sensitive to changes in land use and stormwater flows. ***[19.25]*** As part of the stormwater management approach, stormwater treatment requirements and the stormwater management area control – Flow 1 have been applied to the precinct. Sedimentation effects from land disturbance during construction are addressed by Standard E11.6.2(2) requiring implementation of best practice erosion and sediment control measures for all permitted land disturbance activities. ***[22.10]***

Coastal Erosion Risk

The precinct area includes approximately 4.5 km of cliffed coastline. The precinct manages an identified local coastal erosion risk based on the area's geology and coastal characteristics. A coastal erosion setback yard is used to avoid locating new buildings in identified areas of risk.

Biodiversity

The North-West Wildlink aims to create safe, connected and healthy habitats for native wildlife to safety travel and breed in between the Waitakere Ranges and the Hauraki Gulf Islands. The precinct recognises that Whenuapai is a stepping stone in this link for native wildlife and provides an ability to enhance these connections through riparian planting.

Open Space

An indicative public open space network to support growth in the precinct is shown on Whenuapai 3 Precinct Plan 1 ~~2~~. This will generally be acquired at the time of subdivision. A network of public open space, riparian margins and walking and cycling connections is proposed to be created as development proceeds. Development is encouraged to positively respond to and interact with the proposed network of open space areas.

Reverse Sensitivity Effects on Whenuapai Airbase

The Whenuapai Airbase is located at the northern edge of the Whenuapai 3 Precinct boundary. While the airbase is outside of the precinct boundary it contributes to the precinct's existing environment and character. The airbase is a defence facility of national and strategic importance. Operations at the airbase include maritime patrol, search and rescue, and transport of personnel and equipment within New Zealand and on overseas deployments. Most of the flying activity conducted from the airbase is for training purposes and includes night flying and repetitive activity.

The precinct manages lighting to ensure safety risks and reverse sensitivity effects on the operation and activities of the airbase are avoided, remedied or mitigated.

Any future subdivision, use and development within the precinct will need to occur in a way that does not adversely ~~effect on~~ affect the ongoing operation of the airbase.

Aircraft Engine Testing Noise

The aircraft that operate out of Whenuapai Airbase are maintained at the airbase. Engine testing is an essential part of aircraft maintenance. Testing is normally undertaken between 7am and 10pm but, in circumstances where an aircraft must be prepared on an urgent basis, it can be conducted at any time and for extended periods.

Whenuapai 3 Precinct Plan 3 shows the 57 dB L_{dn} and 65 dB L_{dn} noise boundaries for aircraft engine testing noise.

The noise boundaries recognise that engine testing is an essential part of operations at Whenuapai Airbase. ~~and~~ Development within the residentially zoned land between the 65 and 57 dB L_{dn} contours requires acoustic treatment for activities sensitive to aircraft noise. This is to address the effects of aircraft engine testing noise, and the potential for reverse sensitivity effects that development between the 65 and 57 dB L_{dn} contours ~~within the precinct~~ could have on ~~those~~ airbase operations.

Zoning

The zoning of the land within this precinct is Residential – Single House, Residential – Mixed Housing Urban, Residential – Terrace Housing and Apartment Buildings, Business – Light Industry, Business – Neighbourhood Centre, Open Space – Informal Recreation, Open Space – Conservation and Special Purpose – Airports and Airfields zones.

The relevant overlays, Auckland-wide and zone provisions apply in this precinct unless otherwise specified in this precinct.

In addition to the provisions of I616 Whenuapai 3 Precinct, reference should also be had to the planning maps (GIS Viewer) which shows the extent of all designations, overlays and controls applying to land within the Whenuapai 3 Precinct. ***[41.25]***

I616.2. Objectives

(1) Subdivision, use and development in the Whenuapai 3 Precinct is undertaken in a comprehensive and integrated way to provide for a compatible mix of residential living and employment opportunities while recognising the ongoing operation and strategic importance of Whenuapai Airbase. ***[41.11]***

(2) Subdivision, use and development achieves a well-connected, safe and healthy environment for living and working with an emphasis on the public realm including parks, roads, walkways and the natural environment.

Integration of Subdivision and Development with the Provision of Infrastructure

(3) Subdivision and development does not occur in advance of the availability of transport infrastructure, including regional and local transport infrastructure.

(4) The adverse effects, including cumulative effects, of subdivision and development on ~~existing and future~~ infrastructure are managed to meet the foreseeable needs of the Whenuapai 3 Precinct area, including through the provision of new and upgraded infrastructure. ***[42.4]***

(5) Subdivision and development does not occur in a way that compromises the ability to provide efficient and effective infrastructure networks ~~for~~ within the ~~wider~~ Whenuapai 3 Precinct area and the wider network. ***[42.5]***

Transport

(6) Subdivision and development implements the transport network connections and elements as shown on Whenuapai 3 Precinct Plan 2 and takes into account the regional and local transport network.

Development in the Neighbourhood Centre Zone

(7) Development in the Neighbourhood Centre Zone:

(a) is coordinated and comprehensive;

(b) has active frontages facing Hobsonville Road ~~the street~~; and

(c) promotes pedestrian linkages.

Stormwater Management

(8) Through subdivision, use and development, implement a stormwater management approach that:

(a) is integrated across developments;

(b) avoids new flood risk;

(c) mitigates existing flood risk;

(d) protects and enhances the ecological values of the receiving environment; ***[22.22]***

(e) seeks to mimic and protect natural processes; ~~and~~

(f) integrates with, but does not compromise the operation of, the public open space network~~.~~; and

(g) minimises the attraction of birds that could become a hazard to aircraft operating at Whenuapai Airbase. ***[41.1 and 41.2]***

Coastal Erosion Risk

(9) New development does not occur in areas identified as subject to coastal erosion, taking into account the likely long-term effects of climate change.

Biodiversity

(10) Subdivision, use and development enhance the coastal environment, biodiversity, water quality, and ecosystem services of the precinct, the Waiarohia and the Wallace Inlets, and their tributaries.

Open Space

(11) Subdivision, use and development enable the provision of a high quality and safe public open space network that integrates stormwater management, ecological, amenity, and recreation values.

~~*Reverse Sensitivity*~~ *Effects on Whenuapai Airbase*

(12) The ~~lighting~~ effects of subdivision, use and development on the operation and activities of Whenuapai Airbase are avoided~~,~~ as far as practicable or otherwise remedied or mitigated. ***[41.13]***

Aircraft Engine Testing Noise

(13) The adverse effects of aircraft engine testing noise on activities sensitive to noise outside the Whenuapai Airbase designation 4310 are avoided, remedied or mitigated at the receiving environment.

The overlay, Auckland-wide and zone objectives apply in this precinct in addition to those specified above.

I616.3. Policies

(1) Require subdivision, use and development to be integrated, coordinated and in general accordance with the Whenuapai 3 Precinct Plans 1 and 2.

(2) Encourage roads that provide for pedestrian and cycle connectivity alongside riparian margins and open spaces.

(3) Encourage high quality urban design outcomes by considering the location and orientation of buildings in relation to roads and public open space.

Integration of Subdivision and Development with the Provision of Infrastructure

(4) Require subdivision and development to be managed and designed to align with the coordinated provision and upgrading of the transport infrastructure network within the precinct, and with the wider transport network.

(5) Require subdivision and development to ~~A~~avoid~~, remedy~~ or mitigate the adverse effects, including cumulative effects, ~~of subdivision and development~~ on the ~~existing and future~~ infrastructure required to support the Whenuapai 3 Precinct through the provision of new and upgraded infrastructure. ***[42.8]***

(6) Require the provision of infrastructure to be proportionally shared across the precinct.

(7) ~~Require subdivision and development to provide the local transport network infrastructure necessary to support the development of the areas 1A-1E shown in Whenuapai 3 Precinct Plan 2.~~ ***[36.26]***

Transport

(8) Require the provision of new roads and upgrades of existing roads as shown on Whenuapai 3 Precinct Plan 2 through subdivision and development, with amendments to the location and alignment of collector roads ~~only~~ allowed where the realigned road will provide an equivalent transport function. ***[34.11]***

Development in the Neighbourhood Centre Zone

(9) Ensure development in the neighbourhood centre zone maximises building frontage along Hobsonville Road ~~and the realigned Trig Road~~ by:

(a) avoiding blank walls facing the road~~s~~;

(b) providing easily accessible pedestrian entrances on the road frontage~~s~~;

(c) maximising outlook onto the road ~~streets~~ and public places;

(d) providing weather protection for pedestrians along the road frontage~~s~~;

(e) providing service access and staff parking away from the frontage~~s~~; and

(f) providing car parking and service access behind buildings, with the exception of kerbside parking.

(10) ~~Ensure all development in the Neighbourhood Centre Zone is consistent with the layout of the Trig Road realignment as shown on Whenuapai 3 Precinct Plan 2.~~

(11) Limit the number of vehicle access points from the Neighbourhood Centre Zone onto Hobsonville Road ~~and the Trig Road realignment~~ to ensure safe and efficient movement of vehicles and pedestrians.

Stormwater Management

(12) Require subdivision and development within the Whenuapai 3 Precinct to:

(a) apply an integrated stormwater management approach;

(b) ~~manage stormwater diversions and discharges~~ treat stormwater runoff at-source to enhance the quality of freshwater systems and coastal waters~~; and~~ ***[8.5]***

(c) be consistent with any relevant network discharge consent and Stormwater Management Plan approved by the network utility operator ~~be consistent with the requirements of the Whenuapai 3 Precinct Stormwater Management Plan (2017) and any relevant stormwater discharge consent~~. ***[19.25]***

(d) minimise bird strike risk through the specific design of stormwater management devices ~~ponds/wetlands~~. ***[41.1]***

(e) mitigate existing, and avoid, potential stream bank erosion.

(13) Require development to:

(a) avoid locating new buildings in the 1 per cent annual exceedance probability (AEP) floodplain;

(b) avoid increasing flood risk; and

(c) mitigate existing flood risk where practicable.

(14) Ensure stormwater outfalls are appropriately designed, located and managed to avoid or mitigate adverse effects on the environment, including:

(a) coastal or stream bank erosion;

(b) constraints on public access;

(c) amenity values; and

(d) constraints on fish passage into and along river tributaries.

Coastal Erosion Risk

(15) Avoid locating new buildings on land within the Whenuapai 3 coastal erosion setback yard.

(16) Avoid the use of hard protection structures to manage coastal erosion risk in the Whenuapai 3 coastal erosion setback yard.

Biodiversity

(17) Recognise the role of riparian planting in the precinct to support the ecosystem functions of the North-West Wildlink.

(18) Avoid stream and wetland crossings where practicable, and if avoidance is not practicable, ensure crossings take the shortest route ~~are constructed perpendicular to the channel~~ to minimise or mitigate freshwater habitat loss. ***[22.28]***

(19) Require, at the time of subdivision and development, riparian planting of appropriate native species along the edge of permanent and intermittent streams and wetlands to:

(a) provide for and encourage establishment and maintenance of ecological corridors through the Whenuapai area;

(b) maintain and enhance water quality and aquatic habitats;

(c) enhance existing native vegetation and wetland areas within the catchment; and

(d) reduce stream bank erosion.

Open Space

(20) Require the provision of open space as shown on Whenuapai 3 Precinct Plan 1 through subdivision and development, unless the council determines that the indicative open space is no longer required or fit for purpose.

(21) ~~Only a~~Allow amendments to the location and alignment of the open space where the amended open space can be demonstrated to achieve the same size and the equivalent functionality. ***[36.30]***

~~*Reverse Sensitivity*~~ *Effects on Whenuapai Airbase* ***[41.20]***

(22) Require subdivision, use and development within the Whenuapai 3 Precinct to avoid, remedy or mitigate any adverse effects, including reverse sensitivity effects and safety risks relating to lighting, glare and reflection, on the operation and activities of Whenuapai Airbase.

(23) Require the design of roads and associated lighting to be clearly differentiated from runway lights at Whenuapai Airbase to provide for the ongoing safe operation of the airbase.

Aircraft Engine Testing Noise

(24) Avoid the establishment of new activities sensitive to noise within the 65 dB L_{dn} aircraft engine testing noise boundary shown on Whenuapai 3 Precinct Plan 3.

(25) Avoid establishing ~~residential and other~~ activities sensitive to noise within the area between the 57 dB L_{dn} and 65 dB L_{dn} aircraft engine testing noise boundaries as shown on Whenuapai 3 Precinct Plan 3, unless the noise effects can be adequately avoided, remedied or mitigated at the receiving site through the acoustic treatment, including mechanical ventilation, of buildings containing activities sensitive to noise.

The overlay, Auckland-wide and zone policies apply in this precinct in addition to those specified above.

I616.4. Activity table

The activity tables in any relevant overlays, Auckland-wide and zones apply unless the activity is listed in Table I616.4.1 Activity table below.

Table I616.4.1 specifies the activity status of land use and subdivision activities in the Whenuapai 3 Precinct pursuant to sections 9(3) and section 11 of the Resource Management Act 1991.

Note 1: A blank cell in the activity status means the activity status of the activity in the relevant overlays, Auckland-wide or zones applies for that activity.

Table I616.4.1 Land use and subdivision activities in Whenuapai 3 Precinct

Activity		**Activity status**
Subdivision		
(A1)	Subdivision listed in Chapter E38 Subdivision – Urban	
(A2)	Subdivision that does not comply with Standard I616.6.2 Transport infrastructure requirements	NC
(A3)	Subdivision that complies with Standard I616.6.2 Transport infrastructure requirements, but not complying with any one or more of the other standards contained in Standards I616.6	D
Coastal protection structures		
(A4)	Hard protection structures	D
(A5)	Hard protection structures located within the Whenuapai 3 coastal erosion setback yard	NC
Stormwater outfalls		
(A6)	Stormwater outfalls and associated erosion and protection structures located within the Whenuapai 3 coastal erosion setback yard identified in Table I616.6.5.1	RD
Use and development		
(A7)	Activities listed as permitted or restricted discretionary activities in Table H3.4.1 Activity table in the Residential – Single House Zone	

Activity		Activity status
(A8)	Activities listed as permitted or restricted discretionary activities in Table H5.4.1 Activity table in the Residential – Mixed Housing Urban Zone	
(A9)	Activities listed as permitted or restricted discretionary activities in Table H6.4.1 Activity table in the Residential – Terrace Housing and Apartment Buildings Zone	
(A10)	Activities listed as permitted or restricted discretionary activities in Table H12.4.1 Activity table in the Business – Neighbourhood Centre Zone	
(A11)	Activities listed as permitted or restricted discretionary activities in Table H17.4.1 Activity table in the Business – Light Industry Zone	
(A12)	Activities listed as permitted or restricted discretionary activities in Table H7.9.1 Activity table in the Open Space – Informal Recreation	
(A13)	Activities listed as permitted or restricted discretionary activities in Table H7.9.1 Activity table in the Open Space – Conservation	
(A14)	Any structure located on or abutting an indicative road identified in the Whenuapai 3 Precinct Plan 2, unless an alternative road alignment has been approved by a resource consent	RD
~~(A15)~~	~~Activities not otherwise provided for~~	~~D~~ ***[24.6 and 24.8]***
(A16)	Activities that comply with: • Standard I616.6.2 Transport infrastructure requirements; • Standard I616.6.5 New buildings within the Whenuapai 3 coastal erosion setback yard; and • Standard I616.6.10 Development within the aircraft engine testing noise boundaries; but do not comply with any one or more of the other standards contained in Standards I616.6	D
(A17)	Activities that do not comply with: • Standard I616.6.2 Transport infrastructure requirements; • Standard I616.6.5 New buildings within the Whenuapai 3 coastal erosion setback yard; and • Standard I616.6.10 Development within the aircraft engine testing noise boundaries	NC
(A18)	New activities sensitive to noise within the 65 dB L_{dn} noise boundary shown on Whenuapai 3 Precinct Plan 3	Pr
Stormwater structures		

Activity		Activity status
(A19)	Dry detention basin/ Stormwater ponds~~/wetlands~~ complying with Standard I616.6.12	RD ***[41.1]***
(A20)	Dry detention basin/ Stormwater ponds/~~wetlands~~ not complying with Standard I616.6.12	D ***[41.1]***

I616.5. Notification

(1) Any application for resource consent for an activity listed in Table I616.4.1 Activity table above will be subject to the normal tests for notification under the relevant sections of the Resource Management Act 1991.

(2) When deciding who is an affected person in relation to any activity for the purposes of section 95E of the Resource Management Act 1991 the council will give specific consideration to those persons listed in Rule C1.13(4).

I616.6. Standards

(1) The standards in the overlays, Auckland-wide and zones apply to all activities listed in Table I616.4.1 Activity table in this precinct unless specified in Standard I616.6(2) below.

(2) The following overlay, Auckland-wide or zone standards do not apply to activity (A1) listed in Table I616.4.1 Activity table for land in the Whenuapai 3 coastal setback yard identified in Whenuapai 3 Precinct Plan 1:

(a) Standard E38.7.3.4 Subdivision of land in the coastal erosion hazard area

(3) Activities listed in Table I616.4.1 Activity table must comply with the specified standards in I616.6.1 – I616.6.11.

I616.6.1. Compliance with Whenuapai 3 Precinct Plans

(1) Activities must comply with Whenuapai 3 Precinct Plan 1 and Whenuapai 3 Precinct Plan 2.

(2) Activities not meeting Standard I616.6.1(1) must provide an alternative measure that will generally align with, and not adversely affect ~~compromise~~, the outcomes sought in Whenuapai 3 Precinct Plans 1 and 2.

I616.6.2. Transport infrastructure requirements

(3) All subdivision and development must meet its proportional share of ~~local~~ transport infrastructure works as identified in Table I616.6.2.1 below unless otherwise provided for by (2) and (3) below. ***[42.10]***

(4) Where the applicant, in applying for resource consent, cannot achieve or provide the required ~~local~~ transport infrastructure work identified in Table I616.6.2.1 below, alternative measure(s) to achieve the outcome required must be provided. ***[42.10]***

(5) The applicant and the council must agree the alternative measure(s) to be provided as part of the application and provide evidence of this agreement in writing as part of the application for resource consent.

Table I616.6.2.1 ~~Local t~~Transport infrastructure requirements *[42.9]*

~~Areas~~	~~Local t~~Transport infrastructure required
~~1A~~	~~New collector roads extending west from Trig Road into the Stage 1A area as indicatively shown in Precinct Plan 2.~~
	~~New collector roads extending east from Trig Road into the Stage 1A area as indicatively shown in Precinct Plan 2.~~
	Signalisation at the ~~new~~ intersection of Trig Road and Hobsonville Road, and the intersection of Luckens Road and Hobsonville Road.
	Formation and signalisation of the intersection at the location of the new collector road and Trig Road as indicatively shown on Precinct Plan 2.
	Upgrade of the intersection at Trig Road and the State Highway 18 off ramp.
~~1B~~	Upgrade and signalisation of the intersection of Brigham Creek Road and Kauri Road including: • dual right-turn lanes from Brigham Creek Road into Kauri Road; and • suitable bus and cycle priority provision.
	Formation and signalisation of the intersection at the location of the new collector road and Brigham Creek Road as indicatively shown on Precinct Plan 2.
~~1C~~	Addition of a fourth leg to the Brigham Creek Road and Kauri Road intersection.
	~~New collector road from the Brigham Creek Road and Kauri Road intersection westwards to the boundary of the Stage 1C area as indicatively shown on Precinct Plan 2.~~
~~1D~~	~~Road stopping of Sinton Road to the west of 18 Sinton Road, and replacement with a new collector road from Sinton Road to Kauri Road as indicatively shown on Precinct Plan 2.~~ ***~~[48.18]~~***
	~~New collector road crossing State Highway 18 connecting Sinton Road to Sinton Road East as indicatively shown on Precinct Plan 2.~~ ***~~[48.18]~~***
	~~New collector roads as indicatively shown in Precinct Plan 2.~~ ***~~[48.18]~~***
~~1E~~	~~New collector roads from Brigham Creek Road extending south into the Stage 1E area as indicatively shown in Precinct Plan 2.~~
	Formation and signalisation of the intersections of Brigham Creek Road with the new collector roads required as part of the Stage 1E area.
	Upgrade and signalisation of the intersection of Trig Road and Brigham Creek Road.
	~~New collector roads from Trig Road extending east into the Stage 1E area as indicatively shown in Precinct Plan 2.~~

[21.3, 34.15, 35.4, and 42.9]

I616.6.3. Stormwater management

(1) Stormwater runoff from new development must not cause the 1 per cent annual exceedance probability (AEP) floodplain to rise above the floor level of an existing habitable room or increase flooding of an existing habitable room on any property.

(2) All new buildings must be located outside of the 1 per cent AEP floodplain and overland flow path.

(3) Stormwater runoff from impervious areas (excluding roofs, and excluding roads that are subject to Auckland-wide rules in E9) totalling more than 1,000m^2 associated with any subdivision or development proposal must be: ***[42.13]***

(a) treated at-source by a stormwater management device or system that is sized and designed in accordance with 'Guidance Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01)'~~;~~ ~~Technical Publication 10: Design Guideline Manual for Stormwater Treatment Devices (2003);~~ or ***[8.5]***

(b) ~~where alternative devices are proposed, the device must demonstrate it is designed to achieve an equivalent level of contaminant or sediment removal performance.~~ treated by a communal stormwater management device or system that is sized and designed in accordance with 'Guidance Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01)' that is designed and authorised to accommodate and treat stormwater from the site; or

(c) treated by an approved alternative device that must be demonstrated as being designed to achieve an equivalent level of contaminant or sediment removal performance.

(4) All sStormwater runoff from:

(a) commercial and industrial waste storage areas including loading and unloading areas; and

(b) communal waste storage areas in apartments and multi-unit developments

must be directed to a device that removes gross stormwater pollutants prior to entry to the stormwater network or discharge to water being directed to one of the treatment options in (3).

(5) Stormwater runoff from impervious areas not directed to an approved stormwater management device (achieving either quality treatment or ~~hydrology mitigation~~ retention (volume reduction) in

accordance with Stormwater management area control – Flow 1) must:

(a) achieve quality treatment ~~on-site~~ at-source in accordance with Technical Publication 10: Design Guideline Manual for Stormwater Treatment Devices (2003) prior to disposal to the stormwater network; or

(b) use inert building materials. ***[19.30]***

I616.6.4. Riparian planting

(1) The riparian margins of a permanent or intermittent stream or a wetland must be planted to a minimum width of 10m measured from the top of the stream bank and/or the wetland's fullest extent.

(2) Riparian margins must be offered to the council for vesting.

(3) The riparian planting proposal must:

(a) include a plan identifying the location, species, planting bag size and density of the plants;

(b) use eco-sourced native vegetation where available;

(c) be consistent with local biodiversity;

(d) be planted at a density of 10,000 plants per hectare, unless a different density has been approved on the basis of plant requirements.

(4) Where pedestrian and/or cycle paths are proposed, they must be located adjacent to, and not within, the 10m planted riparian area.

(5) The riparian planting required in Standard I616.6.4(1) above must be incorporated into a landscape plan. This plan must be prepared by a suitably qualified and experienced person and be approved by the council.

(6) The riparian planting required by Standard I616.6.4(1) cannot form part of any environmental compensation or offset mitigation package where such mitigation is required in relation to works and/or structures within a stream.

I616.6.5. New buildings within the Whenuapai 3 coastal erosion setback yard

(1) New buildings must not be located within the Whenuapai 3 coastal erosion setback yard shown in Whenuapai 3 Precinct Plan 1. The widths of the yard are specified in Table I616.6.5.1 and is to be measured from mean high water springs. This is to be determined when the topographical survey of the site is completed.

(2) Alterations to existing buildings within the Whenuapai 3 coastal erosion setback yard must not increase the existing gross floor area.

Table I616.6.5.1 Whenuapai 3 coastal erosion setback yard

Area	Coastal erosion setback yard
A	41m
B	40m
C	26m
D	35m

I616.6.6. External alterations to buildings within the Whenuapai 3 coastal erosion setback yard

(1) External alterations to buildings within the Whenuapai 3 coastal erosion setback yard identified in Standard I616.6.5 and Whenuapai 3 Precinct Plan 1 must not increase the existing gross floor area.

I616.6.7. Subdivision of land in the Whenuapai 3 coastal erosion setback yard

(1) Each proposed site on land in the Whenuapai 3 coastal erosion setback yard must demonstrate that all of the relevant areas/features below are located outside of the Whenuapai 3 coastal erosion setback yard:

(a) in residential zones and business zones - a shape factor that meets the requirements of Standard E38.8.1.1 Site shape factor in residential zones or Standard E38.9.1.1 Site shape factor in business zones;

(b) access to all proposed building platforms or areas; and

(c) on-site private infrastructure required to service the intended use of the site.

I616.6.8. Roads

(1) Development and subdivision occurring adjacent to an existing road must upgrade the entire width of the road ~~adjacent to~~ from the property boundary of the site where subdivision and development is to occur, to the kerb on the opposite side of the road. ***[46.11]***

(2) Development and subdivision involving the establishment of new roads must:

(a) provide the internal road network within the site where subdivision and development is to occur; ~~and~~

(b) be built through to the site boundaries to enable existing or future connections to be made with, and through, neighbouring sites; and

(c) provide a full arterial road width along any proposed new arterial alignment shown on Whenuapai 3 Precinct Plan 2 if the development is proceeding ahead of the arterial road. ***[42.12, 47.11 and 48.12]***

I616.6.9. Development in the Neighbourhood Centre Zone

I616.6.9.1. Access

~~(1) Vehicle accesses must not be located on that part of a site boundary located within 30m of the intersection of Hobsonville Road and the realigned Trig Road~~.

~~(2)~~ (1) All development must provide pedestrian access that connects to the intersection of Hobsonville Road and ~~the realigned~~ Trig Road.

I616.6.9.2. Building frontage

~~(1)~~ Any new building must:

(a) front onto Hobsonville Road ~~or the realigned Trig Road identified in Precinct Plan 2~~; and

(b) have a building frontage along the entire length of the site excluding vehicle and pedestrian access.

I616.6.9.3. Verandas

(1) The ground floor of any building fronting Hobsonville Road ~~and the realigned Trig Road~~ must provide a veranda over the adjacent footpath along the full extent of the frontage, excluding vehicle access.

(2) The veranda must:

(a) be contiguous with any adjoining building;

(b) have a minimum height of 3m and a maximum height of 4.5m above the footpath;

(c) have a minimum width of 2.5m; and

(d) be set back at least 600mm from the kerb.

I616.6.10. Development within the aircraft engine testing noise boundaries

(1) Between the 57 dB L_{dn} and 65 dB L_{dn} noise boundaries as shown on Whenuapai 3 Precinct Plan 3, new activities sensitive to noise and alterations and additions to existing buildings accommodating activities sensitive to noise must provide sound attenuation and related ventilation and/or air conditioning measures:

(a) to ensure the internal environment of habitable rooms does not exceed a maximum noise level of 40 dB L_{dn}; and

(b) that are certified to the council's satisfaction as being able to meet Standard I616.6.10(1~~2~~)(a) by a person suitably qualified and experienced in acoustics prior to its construction; and ***[error]***

(c) so that the related ventilation and/or air conditioning system(s) satisfies the requirements of New Zealand Building Code Rule G4, or any equivalent standard which replaces it, with all external doors of the building and all windows of the habitable rooms closed.

I616.6.11. Lighting

(3) No person or activity may illuminate or display the following outdoor lighting between 11:00pm and 6:30am:

(a) searchlights; or

(b) outside illumination of any structure or feature by floodlight that shines above the horizontal plane. ***[34.20 and 41.28]***

I616.6.12 Dry detention basin/stormwater ponds/~~wetlands~~

(1) Dry detention basin/ Stormwater ponds/~~wetlands~~ must be designed ~~to minimise bird settling or~~ roosting by a suitably qualified and experienced person to:

(a) to minimise bird settling or roosting; and

(b) fully drain down within 48 hours of a 2 per cent Annual Exceedance Probability (AEP) storm event; and

(c) have side slopes at least as steep as 4 vertical to 1 horizontal (4:1) except for:

(i) any side slope treated with rock armouring; or

(ii) any area required for vehicle access, provided that such vehicle access has a gradient of at least 1 vertical to 8 horizontal (1:8). ***[41.1]***

I616.7. Assessment – controlled activities

There are no controlled activities in this precinct.

I616.8. Assessment – restricted discretionary activities

I616.8.1. Matters of discretion

The council will restrict its discretion to all the following matters when assessing a restricted discretionary activity resource consent application, in addition to the matters specified for the relevant restricted discretionary activities in the overlay, Auckland-wide and zone provisions.

(1) Subdivision and development:

(a) safety, connectivity, walkability, public access to the coast and a sense of place;

(b) location of roads and connections with neighbouring sites;

(c) functional requirements of the transport network, roads and different transport modes;

(d) site and vehicle access, including roads, rights of way and vehicle crossings;

(e) location of buildings and structures;

(f) provision of open space; and

(g) provision of the required local transport infrastructure or an appropriate alternative measure.

(2) Use and development in the Neighbourhood Centre Zone:

(a) the design and location of onsite parking and loading bays; and

(b) building setbacks from Hobsonville Road ~~and the realigned Trig Road~~.

(3) Subdivision of land in the Whenuapai 3 coastal erosion setback yard:

(a) the effects of the erosion on the intended use of the sites created by the subdivision and the vulnerability of these uses to coastal erosion.

(4) Stormwater outfalls and associated erosion and protection structures within the Whenuapai 3 coastal erosion setback yard:

(a) the effects on landscape values, ecosystem values, coastal processes, associated earthworks and landform modifications;

(b) the effects on land stability including any exacerbation of an existing natural hazard, or creation of a new natural hazard, as a result of the structure;

(c) the resilience of the structure to natural hazard events;

(d) the use of green infrastructure instead of hard engineering solutions;

(e) the effects on public access and amenity, including nuisance from odour;

(f) the ability to maintain or enhance fish passage; and

(g) risk to public health and safety.

(5) Lighting associated with development, structures, infrastructure and construction.

(6) Stormwater ~~ponds/wetlands~~ management methods proposed for the management of adverse effects on receiving environment, including cumulative effects, having regards to:

(a) hydrology mitigation

(b) Quality treatment

(c) Downstream flooding

(d) the effects of the design of the stormwater ponds/wetlands on bird settling and roosting; and

(e) the effects on the safe operation of the Whenuapai Airbase.~~; and~~

~~(c) the effects of the proposed planting.~~ ***[41.1]***

I616.8.2. Assessment criteria

The council will consider the relevant assessment criteria below for restricted discretionary activities, in addition to the assessment criteria specified for the relevant restricted discretionary activities in the overlay, Auckland-wide and zone provisions.

(1) Subdivision and development:

(a) the extent to which any subdivision or development layout is consistent with and provides for the upgraded roads and new indicative roads shown on the Whenuapai 3 Precinct Plan 2;

(b) the extent to which any subdivision or development provides for public access to the coast;

(c) the extent to which any subdivision or development layout achieves a safe, connected and walkable urban form with a sense of place;

(d) the extent to which any subdivision or development layout is consistent with and provides for the indicative open space shown within Whenuapai 3 Precinct Plan 1;

(e) the extent to which any subdivision or development layout complies with the Auckland Transport Design Manual ~~Code of Practice~~ or any equivalent standard that replaces it;

(f) the extent to which any subdivision or development layout provides for the functional requirements of the existing or proposed transport network, roads and relevant transport modes;

(g) the extent to which access to an existing or planned arterial road, or road with bus or cycle lane, minimises vehicle crossings by providing access from a side road, rear lane, or slip lane;

(h) the extent to which subdivision and development provides for roads to the site boundaries to enable connections with neighbouring sites; and

(i) whether an appropriate ~~public~~ funding mechanism(s) is in place to ensure the provision of all required infrastructure. ***[42.15]***

(2) Use and development in the Neighbourhood Centre Zone:

(a) the extent to which staff car parking, loading spaces and any parking associated with residential uses is:

(i) located to the rear of the building; and

(ii) maximises the opportunity for provision of communal parking areas.

(b) the extent to which building setbacks are minimised to ensure buildings relate to Hobsonville Road ~~and the realigned Trig Road~~.

(3) Subdivision of land in the Whenuapai 3 coastal erosion setback yard:

(a) the effects of the hazard on the intended use of the sites created by the subdivision and the vulnerability of these uses to coastal erosion:

(i) whether public access to the coast is affected;

(ii) the extent to which the installation of hard protection structures to be utilised to protect the site or its uses from coastal erosion hazards over at least a 100 year timeframe are necessary; and

(iii) refer to Policy E38.3(2).

(4) Stormwater outfalls and associated erosion and protection structures within the Whenuapai 3 coastal erosion setback yard:

(a) the extent to which landscape values, ecological values and coastal processes are affected or enhanced by any works proposed in association with the structure(s);

(b) the extent to which site specific analysis, such as engineering, stability or flooding reports have been undertaken and any other information about the site, the surrounding land and the coastal marine area;

(c) the extent to which the structure(s) is located and designed to be resilient to natural hazards;

(d) the extent to which the proposal includes green infrastructure and solutions instead of hard engineering solutions;

(e) the extent to which public access and / or amenity values, including nuisance from odour, are affected by the proposed structure(s);

(f) the extent to which fish passage is maintained or enhanced by the proposed structure(s); and

(g) the extent to which adverse effects on people, property and the environment are avoided, remedied or mitigated by the proposal.

(5) Lighting associated with development, structures, infrastructure and construction:

(a) The effects of lighting on the safe and efficient operation of Whenuapai Airbase, to the extent that the lighting:

(i) avoids simulating approach and departure path runway lighting;

(ii) ensures that clear visibility of approach and departure path runway lighting is maintained; and

(iii) avoids glare or light spill that could affect aircraft operations.

(6) Stormwater ~~ponds/wetlands~~ management

(a) Subdivision and development is in accordance with the approved Stormwater Management Plan and Policies E1.3(1) – (14).

c) A treatment train approach is used to treat runoff from all impervious surfaces so that all contaminant generating surfaces are treated including the cumulative effects of lower contaminant generating surfaces.

d) Where downstream storm water assets/devices (including communal devices) affected by flooding are identified at the time of subdivision, flood effects are mitigated by attenuating up to the 1% AEP flood event within the precinct.

e) The design and efficacy of infrastructure and devices (including communal devices), with consideration given to the likely effectiveness, lifecycle costs, ease of access and operation and integration with the built and natural environment.

(f) the extent to which the design of the dry detention basin/ stormwater ponds~~/wetlands~~ and any proposed planting minimises risks of bird strike on the safe operation of Whenuapai Airbase.
[41.1 and 41.6]

I616.9. Special information requirements

(1) Riparian planting plan

An application for land modification, development and subdivision which adjoins a permanent or intermittent stream must be accompanied by a riparian planting plan identifying the location, species, planter bag size and density of the plants.

(2) Permanent and intermittent streams and wetlands

All applications for land modification, development and subdivision must include a plan identifying all permanent and intermittent streams and wetlands on the application site.

(3) Stormwater management

All applications for development and subdivision must include a plan demonstrating how stormwater management requirements will be met including:

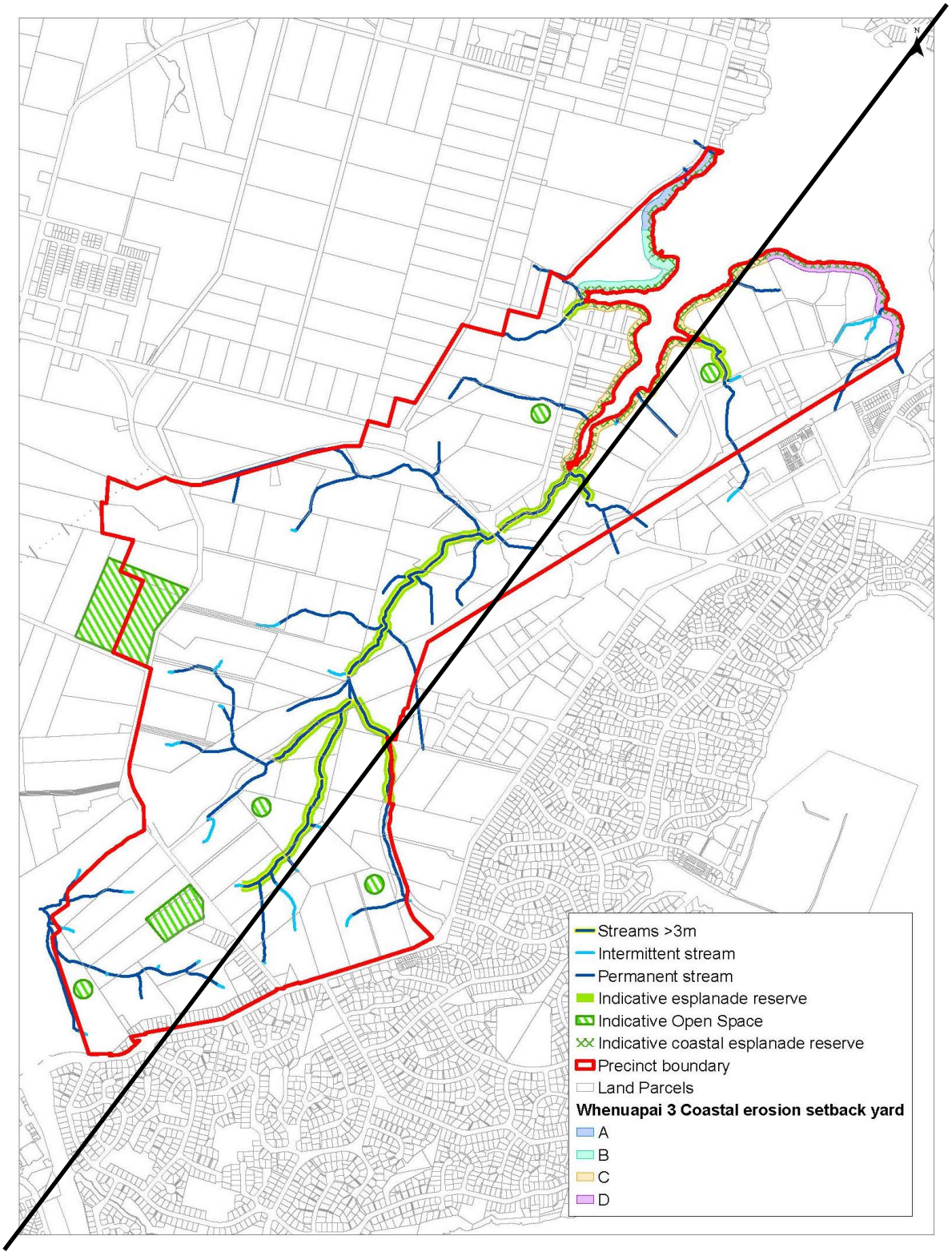
(a) areas where stormwater management requirements are to be met on-site and where they will be met through communal infrastructure;

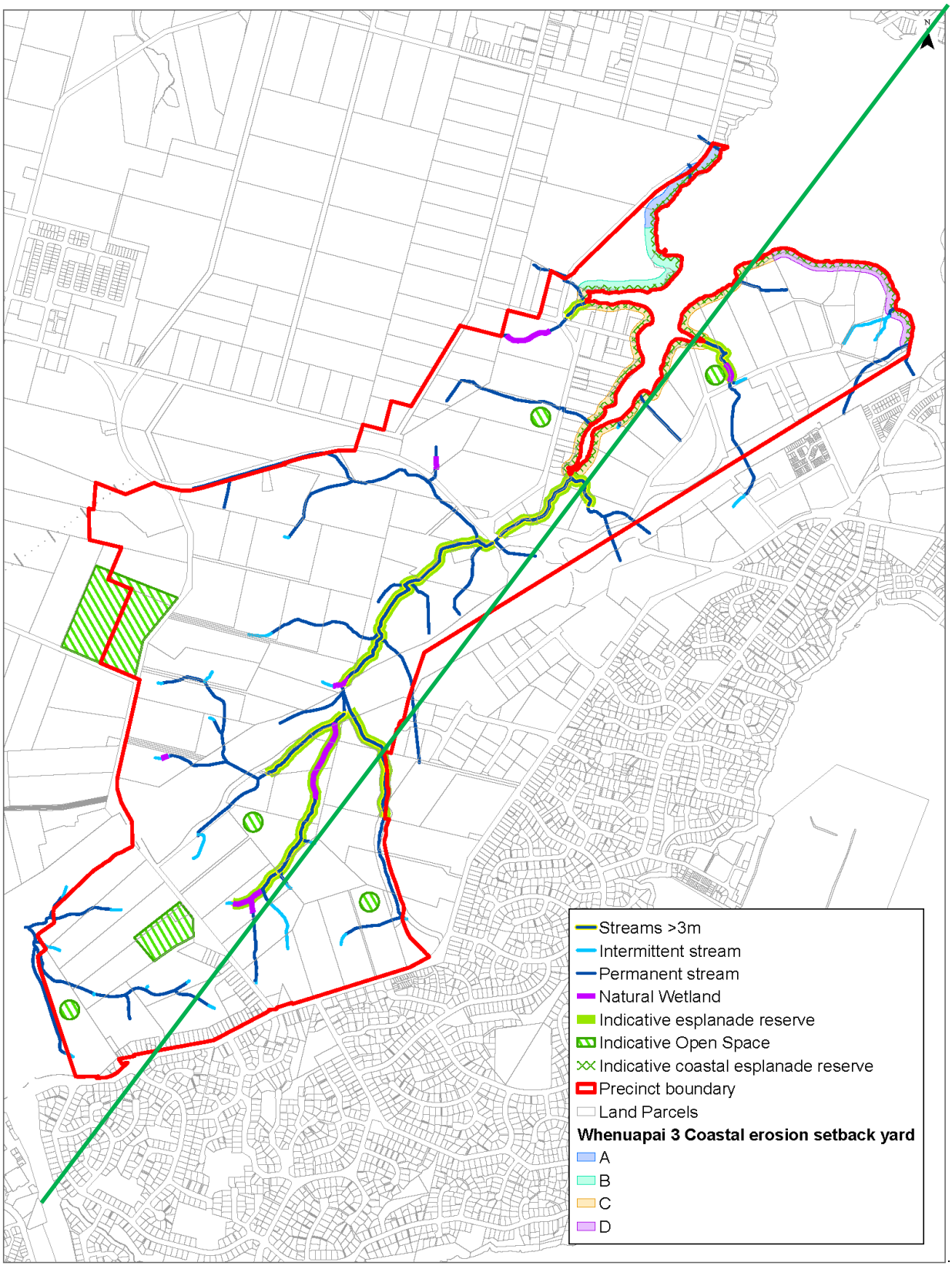
(b) the type and location of all public stormwater network assets that are proposed to be vested in council;

(c) consideration of the interface of the methodology for stormwater management, including proposed infrastructure with the management of ~~with, and cumulative effects of,~~ stormwater ~~infrastructure~~ in the wider precinct.

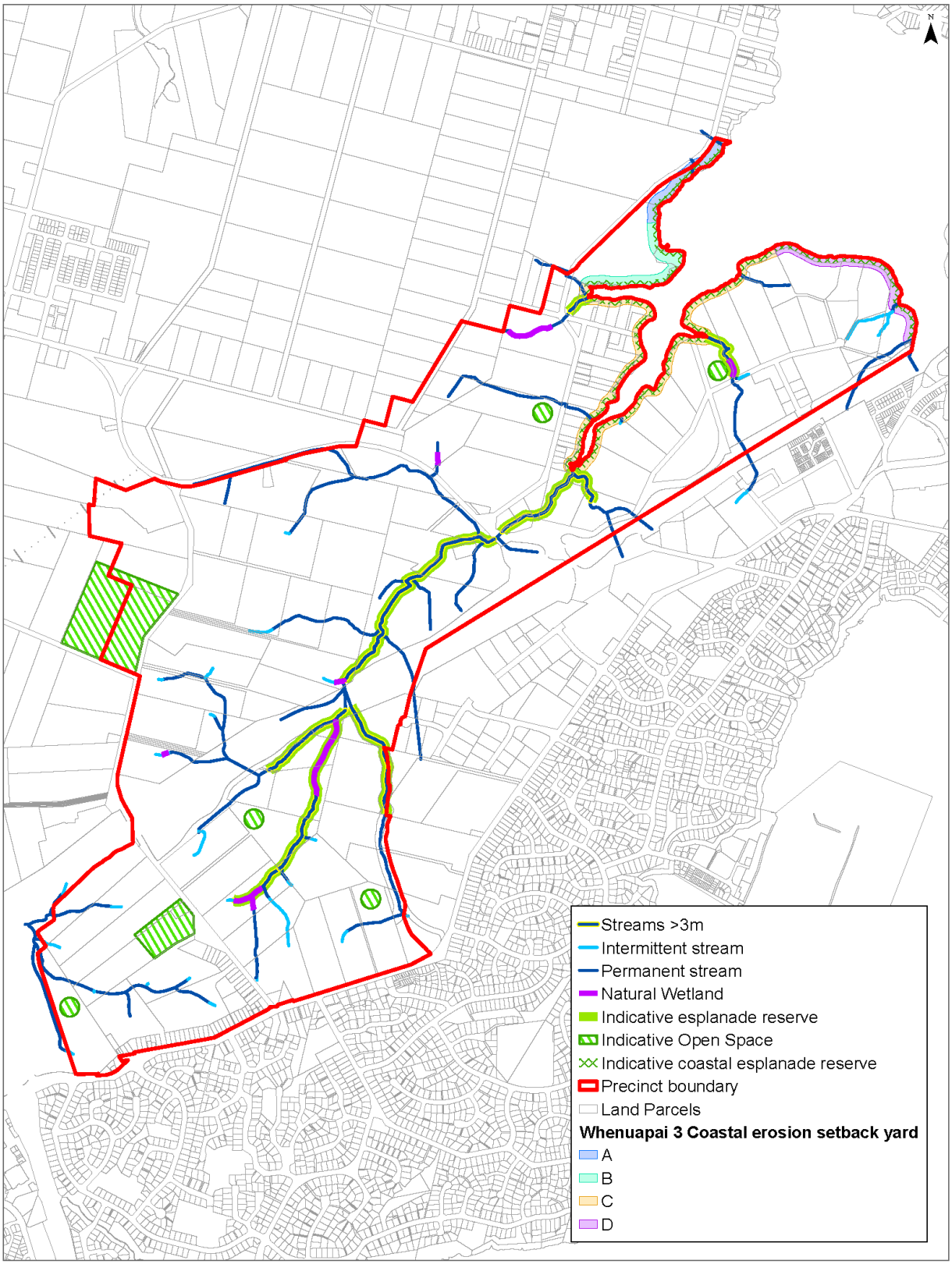
I616.10. Precinct plans

I616.10.1. Whenuapai 3 Precinct Pan 1

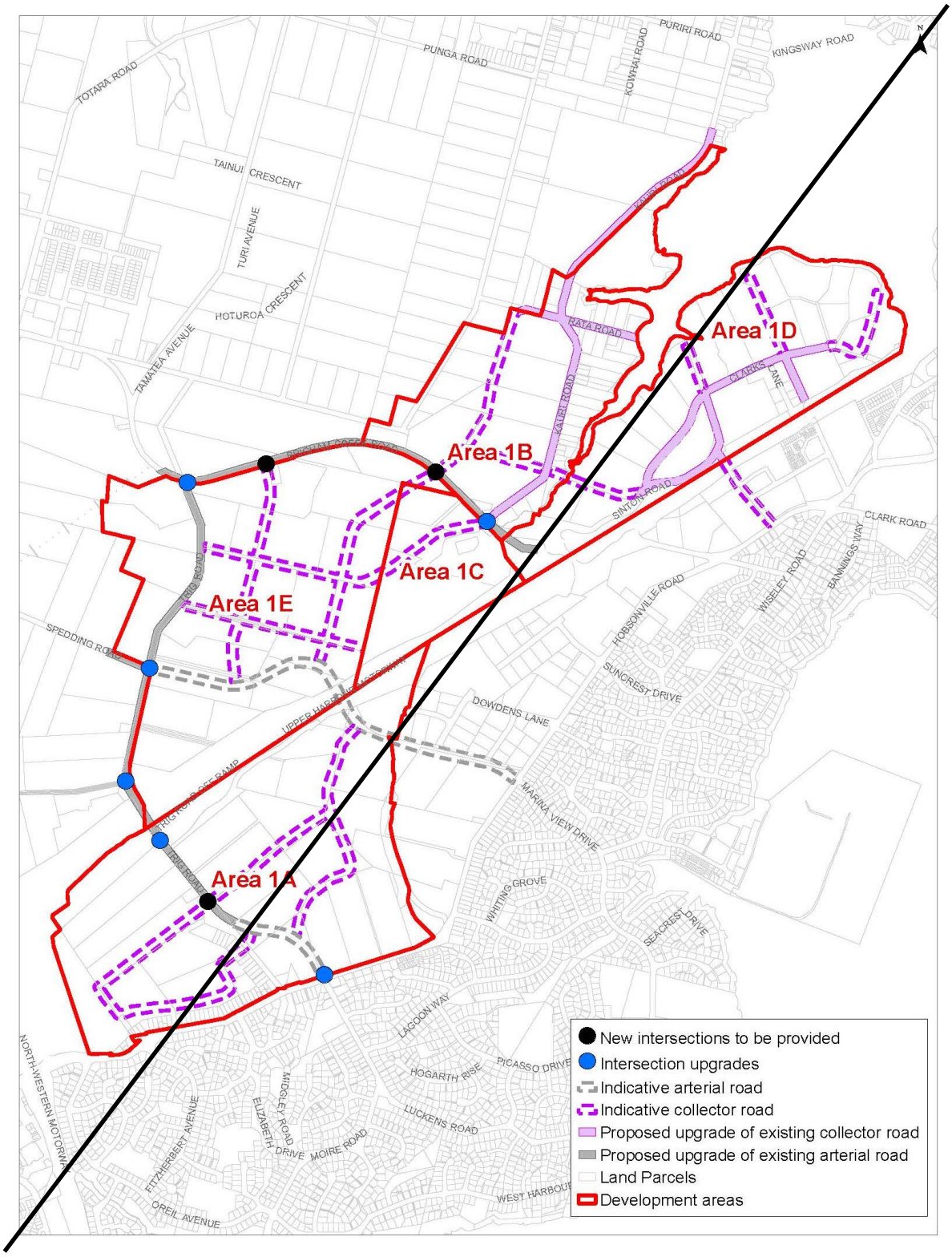


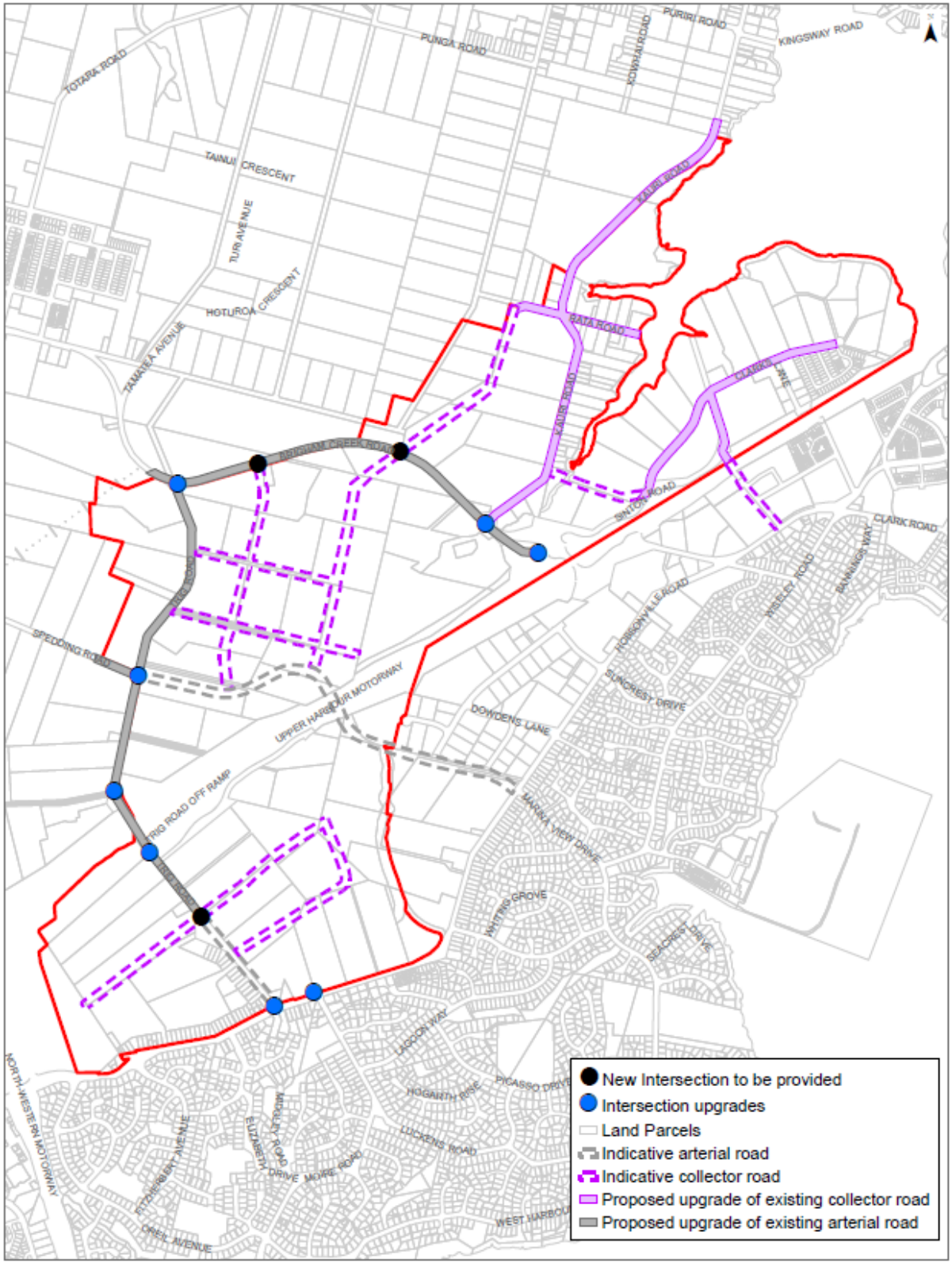


[22.11, 22.12, 22.43]


N
Streams >3m
Intermittent stream
Permanent stream
Natural Wetland
Indicative esplanade reserve
Indicative Open Space
Indicative coastal esplanade reserve
Precinct boundary
Land Parcels
Whenuapai 3 Coastal erosion setback yard
A
B
C
D

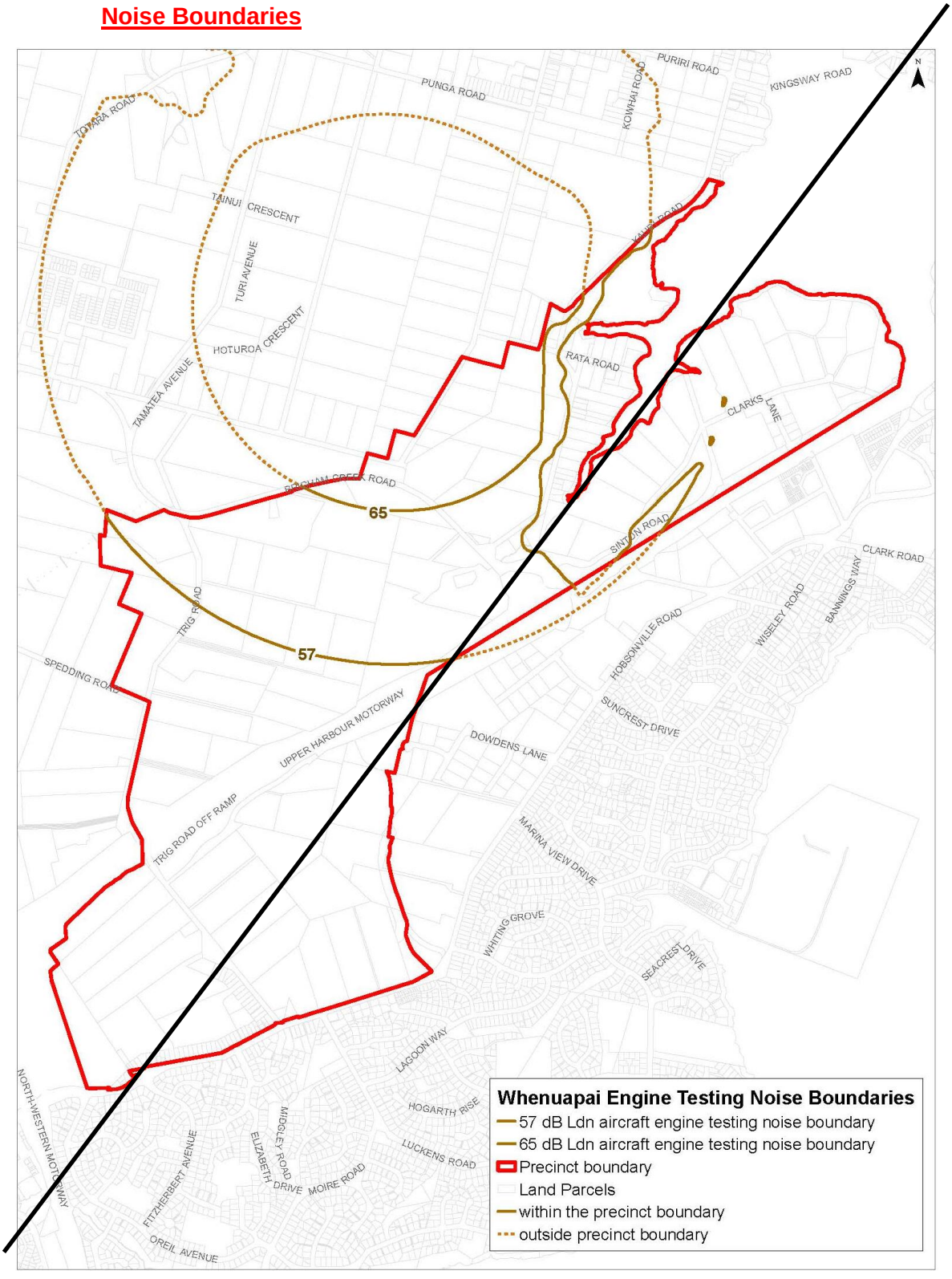
I616.10.2. Whenuapai 3 Precinct Plan 2

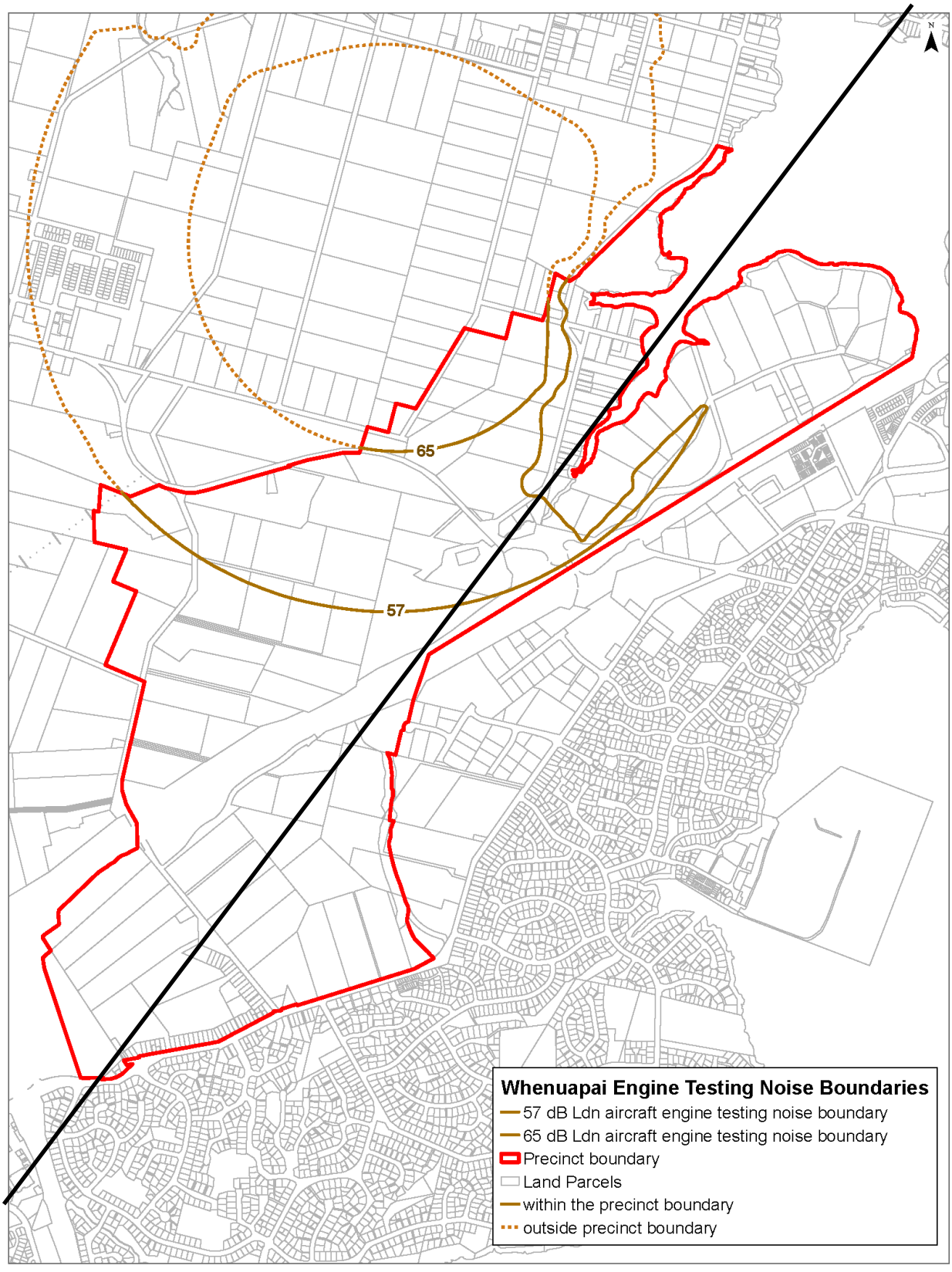




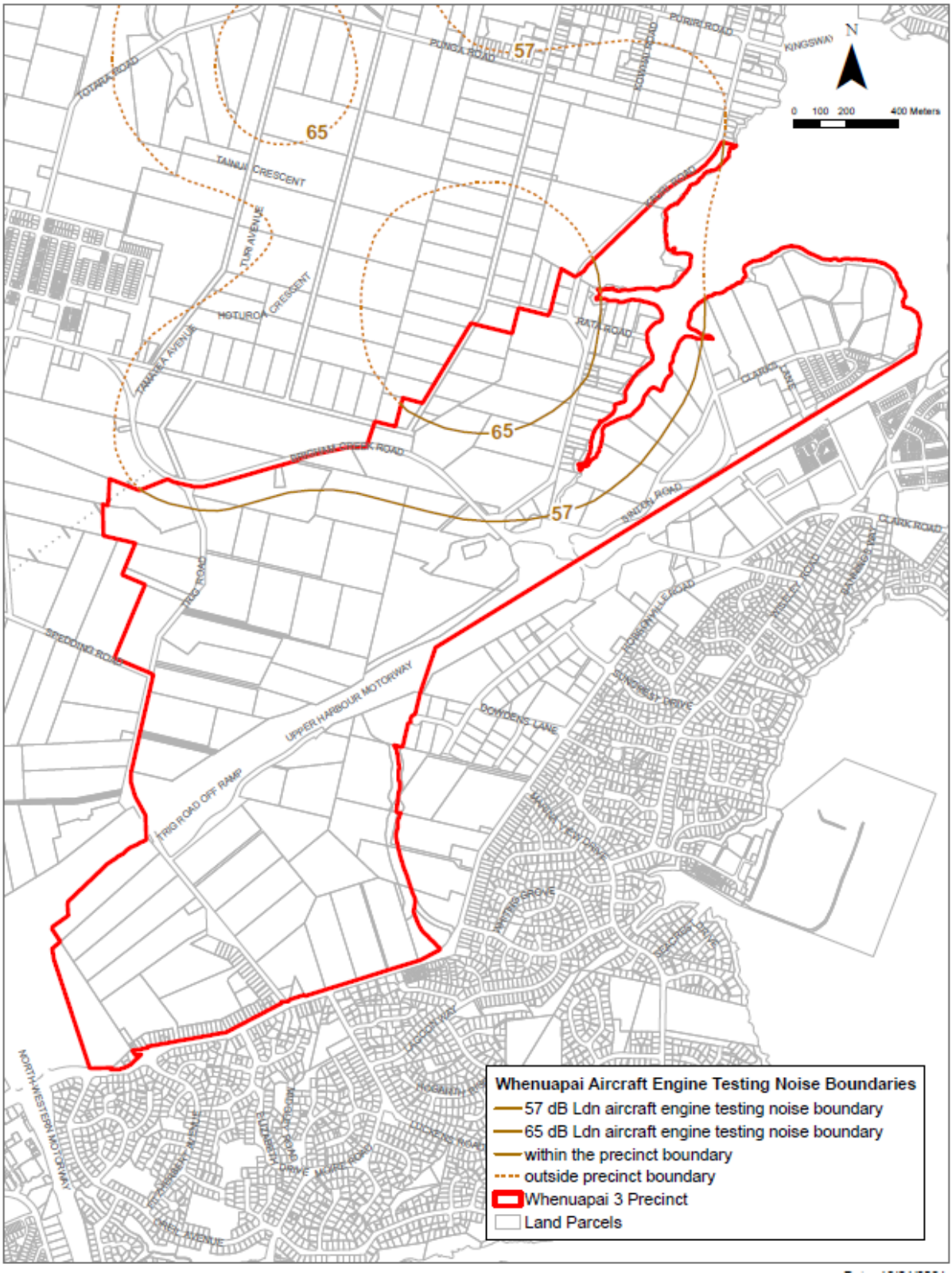
[21.5, 21.6, 26.4, 26.5, 26.6, 29.3, 29.4, 29.5, 29.6, 32.4, 32.5, 32.6, 33.4, 33.5, 33.6, 35.2, 48.8, 48.9]

I616.10.3. Whenuapai 3 Precinct Plan 3 – Whenuapai Aircraft Engine Testing Noise Boundaries




65
57
Whenuapai Engine Testing Noise Boundaries
57 dB Ldn aircraft engine testing noise boundary
65 dB Ldn aircraft engine testing noise boundary
Precinct boundary
Land Parcels
within the precinct boundary
outside precinct boundary

[41.9]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TOTARA ROAD
PUNGA ROAD
PURIRI ROAD
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HOTUROA CRESCENT
TAMAKI AVENUE
RATA ROAD
CLARKS LANE
BROOKHAVEN DRIVE
SPEDDING ROAD
TRIG ROAD
UPPER HARBOUR MOTORWAY
TRIG ROAD OFF RAMP
DOWDENS LANE
CLARK ROAD
NORTH-WESTERN MOTORWAY
Whenuapai Aircraft Engine Testing Noise Boundaries
57 dB Ldn aircraft engine testing noise boundary
65 dB Ldn aircraft engine testing noise boundary
within the precinct boundary
outside precinct boundary
Whenuapai 3 Precinct
Land Parcels

Appendix 3: Direction 2 of the Hearing Panel of Commissioners: Plan Change 5 dated 29 June 2018

IN THE MATTER of the Resource Management Act 1991

AND

PLAN CHANGE 5 Whenuapai Plan Change to Auckland Unitary Plan Operative in part

DIRECTION 2 OF THE HEARING PANEL OF COMMISSIONERS: PLAN CHANGE 5

1. The Auckland Council (the Council) has appointed Independent Hearing Commissioners Robert Scott (Chair), Juliane Chetham, Gavin Lister and Councillor Chris Darby pursuant to section 34A of the Resource Management Act 1991 (RMA), to hear and determine submissions to Plan Change 5.

2. The hearing of evidence was held on 4, 7 and 10 May 2018. At the conclusion of evidence the hearing was adjourned to allow the Panel to undertake a site visit to various properties within plan change area. This was undertaken on Wednesday 13 June 2018.

4. Following the site visit it is our intention to clarify and request further comment on a number of matters from Council officers (in writing) and then reconvene the hearing to allow Council officers to respond to our questions and to provide a closing statement to the evidence presented. We will not be calling any further evidence from submitters.

5. The matters that we seek further clarification and comment on are as follows:

1. Aircraft Noise on RNZAF Base Whenuapai Land

(a) We request a legal opinion on the status of the existing designation 4310 as it relates to noise. Specifically:

i. is engine testing included within the "Aircraft Noise" condition (Condition 1) of the designation where it refers to "aircraft operations on the RNZAF Airbase"?

ii. what relevance is NZS 6805:1992 and FAA Integrated Noise Model (INM) to this determination?

iii. does section 16 of the Resource Management Act 1991 apply to a designation (and Designation 4310 in particular) when considering aircraft noise and engine testing noise effects?

iv. Are there any other methods available to the Council for the control of engine testing on NZDF land?

(b) The issue of bird strike was explained in detail in the evidence of Mr Shaw for the NZDF and specific provisions were offered to address the adverse effects of bird strike. How significant is the risk of bird strike to aircraft operations and are the provisions offered by NZDF in Mr Shaw's evidence necessary to avoid the adverse effect of bird strike?

(c) We wish to better understand the justification for applying the Single House zone to land adjoining the Light Industry zone and within the 57 dB L_{dn} and 65 dB L_{dn}

Whenuapai Engine Testing Boundaries. What role, if any, did Chapter D24 – Aircraft Noise Overlay play in this assessment to choose a lower intensity zone? Could architectural design and construction methods provide mitigation against the adverse effects of aircraft noise and allow a high intensity zoning to be established? What reliance are we able to give to the 57 dB L_{dn} contour if there is no control on engine testing noise?

2. Infrastructure Funding

(a) Please provide an update on the status of the various funding mechanisms expected to be available for Plan Change 5 as referred to in the evidence of Mr Winter and Ms Bell (Auckland Transport) and Mr Shields.

Transport infrastructure requirements

(a) Please provide further detail on how a "proportional share of local infrastructure works as identified in Table I616.6.2.1" in Standard I616.6.2 would be calculated?

(b) What process or framework will the Council use when calculating a proportionate share?

(c) Can more certainty with regard to how a proportional share is determined (i.e. a formula), and whether such information should be included in the provisions either as part of a standard in the Precinct or other method in the Auckland Unitary Plan such as a non-statutory method in Chapter M? Is it reasonable to include a rule requiring the payment of a proportional share if the process to determine it is not determined until the resource consent stage?

(d) Please clarify how Infrastructure Funding Agreements would be used as a mechanism for transport infrastructure funding within the Plan Change 5 with particular reference to issues such as fragmented and multiple ownership? Please explain further the role of the Development Programme Office in this process? Specifically, what mechanism would ensure the timely and equitable provision of the collector roads necessary to enable development, having regard to the location of such roads with respect to property ownership?

(e) If Auckland Transport were to use its powers of designation to establish the roading upgrades as set out in (amended) Table I616.6.2.1 (or similar) or act as "banker" to fund the road upgrades, what would be the implications for the implementation of roading infrastructure in terms of Standard I616.6.2?

3. Indicative Open Space

(a) Please clarify the process used to determine the need for Open Space areas as shown in Precinct Plan 1?

(b) What is the intended open space function for the areas identified?

(c) What factors were taken into consideration when identifying locations for open space areas?

(d) Is a statement in the Precinct Plan necessary to clarify what "indicative Open Space" means and the extent of flexibility expected in the final determination of its location?

4. Land Bounded by Trig Road, Upper Harbour Drive and Hobsonville Road

(a) The land within this area is zoned Terrace Housing and Apartment zone (THAB), to the south and west, and Mixed Housing Urban, to the north. A number of submitters seek that this entire area be rezoned THAB due to its proximity to the Westgate and NorthWest Shopping Centres. Please provide additional comment on the zoning proposed by submitters including the following:

i. Anticipated walking/cycling distances and times to the existing Westgate commercial areas;

ii. The planned or anticipated public transport connectivity for this area;

iii. The role, if any, Upper Harbour Highway plays in terms of connectivity, or lack thereof, to commercial areas;

iv. Any measures within the development area that might improve connectivity (including a possible pedestrian/active mode bridge) to the Westgate centre;

v. Any other relevant physical or topographical matters.

5. Single House Zone Adjoining the CMA

(a) We wish to better understand the reasoning for a lower intensity residential zone (Single House zone) at the CMA boundary in addition to a coastal hazard setback to manage the risk of hazard. Please provide additional comment on why a lower intensity zone is necessary in addition to coastal setbacks? What provisions of the Unitary Plan (including the Regional Coastal Plan) or the New Zealand Coastal Policy Statement have the Council considered or relied upon in this assessment?

6. Out of Scope Submissions

(a) If we were to consider submissions 43.3 and 44.3 to be within scope (seeking to be added to the plan change and zoned Light Industry) what would the merits to including these sites within the plan change area?

7. Responses to these questions should be in writing but are not required prior to the reconvening of the hearing. Where Council specialists are used they should also be available for questioning at the reconvened hearing. Depending on availability we are looking to reconvene the hearing in approximately three to four weeks' time.

8. If Council officers have any queries or seek further clarification of the matters raised in this ıse direct these through the hearing advisor - Robert Boswell, Senior Hearings rt.boswell@aucklandcouncil.govt.nz.

Robert Scott
for the Hearing Commissioners
29 June 2018

Appendix 4: Auckland Council Memo in response to the Panel's Second Direction dated 23 August 2018

Memo

23 August 2018

To: Commissioners Robert Scott, Juliane Chetham, Gavin Lister and Councillor Chris Darby

From: Anne Bradbury, Principal Planner, North West and Islands Planning, Plans and Places

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Subject: Proposed Plan Change 5 (Whenuapai Plan Change) – responses to the Panel's Second Direction

1. This memo contains the responses to the panel's questions in their Second Direction that was issued on 29 June 2018.

2. The author from the reporting team that has responded to each question can be seen in the table below.

Table 1: Authors of the responses to the panel's questions

Question	Author
1. Aircraft Noise	Emily Ip
2. Infrastructure funding	Anne Bradbury
Transport infrastructure requirements	Anne Bradbury
3. Indicative open space	Wayne Siu
4. The Trig Road block	Anne Bradbury
5. Single House Zone adjoining the CMA	Wayne Siu
6. Out of scope submissions	Anne Bradbury

3. The appendices attached to this memo are listed in the table below.

Table 2: List of appendices

Appendices	
Appendix 1	Legal opinion and Designation 4310
Appendix 2	Memo from Rue Statham 20 July 2018
Appendix 3	Memo from Healthy Waters 2 May 2018
Appendix 4	Memo from Nigel Lloyd 27 July 2018
Appendix 5	Memo from Ezra Barwell 31 July 2018
Appendix 6	Letter from Richard Reinan-Hamill 4 May 2018
Appendix 7	Plan Change 5 latest recommended changes 24.08.18

Question 1. Aircraft Noise on RNZAF Base Whenuapai Land

(a) We request a legal opinion on the status of existing designation 4310 as it relates to noise. Specifically:

i. is engine testing included within the "Aircraft Noise" condition (Condition 1) of the designation where it refers to "aircraft operations on the RNZAF Airbase"?

ii. what relevance is NZS 6805: 1992 and FAA Integrated Noise Model (INM) to this determination?

iii. does section 16 of the Resource Management Act 1991 apply to a designation (and Designation 4310 in particular) when considering aircraft noise and engine testing noise effects?

iv. Are there any other methods available to the Council for control of engine testing on NZDF land?

4. DLA Piper has provided a legal opinion on behalf of council. This legal opinion is attached in Appendix 1.

(b) The issue of bird strike was explained in detail in the evidence of Mr Shaw for the NZDF and specific provisions were offered to address the adverse effects of bird strike. How significant is the risk of bird strike to aircraft operations and are the provisions offered by NZDF in Mr Shaw's evidence necessary to avoid the adverse effect of bird strike?

5. The risk of bird strike is a concern for the New Zealand Defence Force (NZDF). This was discussed in Mr Shaw's evidence and at the hearing. I understand that from the perspective of the NZDF, the risk of bird strike to aircraft operations is significant and I agree that bird strike is a safety concern. However, I consider there is not sufficient evidence to assess how significant bird strike risk will be based on the land uses enabled by the proposed zoning.

6. As the area develops, the amount of open grass areas will be reduced. As outlined in the memo from Rue Statham dated 20 July 2018 which is attached in Appendix 2, the urbanisation of the plan change area will reduce the attractiveness for some birds, for example dotterel and spur-winged plovers. The kinds of birds that are attracted to a more urban environment are generally smaller species which can survive in built-up urban environments such as feral pigeons, sparrows, starlings and native bush birds.

7. I generally do not support the bird strike provisions put forward by the NZDF at the hearing. The activities identified as having very high or high risk on page 20 of Mr Shaw's evidence are non-complying activities in all the relevant zones, except for wetlands which are provided for in *E26 Infrastructure* as a controlled activity. The integrated stormwater management approach, and the requirement for at-source stormwater treatment sought in the Whenuapai 3 Precinct stormwater provisions, will result in a reduced number of stormwater ponds or wetlands.

8. However, I acknowledge the safety concerns that the NZDF have about the risk of bird strike and I support amendments to the Whenuapai 3 Precinct to manage the design of stormwater ponds and wetlands to minimise the risk of bird strike. Attachment 1 of the Healthy Waters memo dated 2 May 2018 shows additional provisions adapted from Mr Shaw's evidence. I have attached the Healthy Waters memo in Appendix 3 for ease of reference. I support the provisions in the Healthy Waters memo but note that Policy I616.3(12)(c) should be about minimising bird strike risk, and not the adverse effects of bird strike as stated in the Healthy Waters memo. In addition, I consider refinements are necessary to proposed Standard I616.6.12(1)(b) to describe the gradients in a clearer manner. The amendments which I support are shown in blue text below:

> ***Objective I616.2(8)***
> *Through subdivision, use and development, implement a stormwater management approach that:*
> *(a) is integrated across developments;*
> *(b) avoids new flood risk;*
> *(c) mitigates existing flood risk;*
> *(d) protects and enhances the ecological values of the receiving environment;* *[22.22]*
> *(e) seeks to mimic and protect natural processes; ~~and~~*
> *(f) integrates with, but does not compromise the operation of, the public open space network~~.~~; and*
> *(g) minimises the attraction of birds that could become a hazard to aircraft operating at Whenuapai Airbase.*

Policy I616.3(12)

Require subdivision and development within the Whenuapai 3 Precinct to:

(a) apply an integrated stormwater management approach;

(b) ~~manage stormwater diversions and discharges~~ treat stormwater runoff at-source to enhance the quality of freshwater systems and coastal waters; and [8.5]

~~(c) be consistent with the requirements of the Whenuapai 3 Precinct Stormwater Management Plan (2017) and any relevant stormwater discharge consent.~~ [19.25]

(c) minimise bird strike risk through the design of stormwater ponds/wetlands.

Table I616.4.1 Land use and subdivision activities in Whenuapai 3 Precinct

Activity		Activity status
Stormwater structures		
(A19)	*Stormwater ponds/wetlands complying with Standard I616.6.12*	*RD*
(A20)	*Stormwater ponds/wetlands not complying with Standard I616.6.12*	*D*

Standard I616.6.12 Stormwater ponds/wetlands

(1) Stormwater ponds/wetlands must be designed to minimise bird settling or roosting by a suitably qualified and experienced person to:

(a) fully drain down within 48 hours of a 2 per cent Annual Exceedance Probability (AEP) storm event; and

(b) have side slopes at least as steep as 4 vertical to 1 horizontal (4:1) except for:

(i) any side slope treated with rock armouring; or

(ii) any area required for vehicle access, provided that such vehicle access has a gradient of at least 1 vertical to 8 horizontal (1:8).

I616.8.1. Matters of discretion

(6) Stormwater ponds/wetlands

(a) the effects of the design of the stormwater ponds/wetlands on bird settling and roosting;

(b) the effects on the safe operation of the Whenuapai Airbase; and

(c) the effects of the proposed planting.

I616.8.2. Assessment criteria

(6) Stormwater ponds/wetlands

(a) the extent to which the design of the stormwater ponds/wetlands and any proposed planting minimises risks of bird strike on the safe operation of Whenuapai Airbase.

9. I do not support the amendment sought by the NZDF to Objective I616.2(11) as the objective is about the provision of open space and not about managing the effects of open space. In addition, I do not support the new policy put forward by the NZDF as shown in paragraph 10.4 of Mr Shaw's evidence. I consider Policy I616.3(22) to be sufficient for considering all adverse effects on Whenuapai Airbase, including effects on aircraft operational safety.

10. Regarding the new roof standard put forward by the NZDF, I understand from Mr Shaw's evidence that flat roofs are of concern as they may support roosting or nesting bird populations. I do not support the new standard proposed by the NZDF which requires all roofs to have a minimum gradient of 15 degrees because there is no background to how this gradient was derived, and there is no supporting assessment to demonstrate the efficiency and effectiveness of the standard.

11. I do not support any new provisions that specify appropriate plant species as requested by the NZDF without an assessment of the appropriate plant species for the local environment. It was noted in Mr Shaw's evidence that the planting list in his evidence was taken from the

Christchurch Replacement District Plan and the suitability of those species for reducing bird attraction in the Whenuapai area is beyond his area of expertise. As mentioned in the memo from Mr Statham, all plants will attract wildlife and it is likely that planting along riparian and coastal margins in Whenuapai will attract smaller birds suited to the urban environment, not gulls or larger forest birds.

12. In his evidence, Mr Shaw suggested that all resource consent applications should be required to be accompanied by a bird management plan. In my view, this requirement will add unnecessary time and cost to the consenting process. The activities identified in Mr Shaw's evidence as being very high or high risk are all non-complying activities under the relevant zones. Therefore a full assessment of environmental effects will need to be undertaken for any resource consent application for these activities, including any effects on the operation and activities at Whenuapai Airbase.

13. The amendments to the proposed plan change that I support in relation to stormwater ponds and wetlands are shown in Appendix 7 of this document.

(c) We wish to better understand the justification for applying the Single House zone to land adjoining the Light Industry zone and within the 57 dB L_{dn} and 65 dB L_{dn} Whenuapai Engine Testing Boundaries. What role, if any, did Chapter D24 – Aircraft Noise Overlay play in this assessment to choose a lower intensity zone? Could architectural design and construction methods provide mitigation against the adverse effects of aircraft noise and allow a high intensity zoning to be established? What reliance are we able to give to the 57 dB L_{dn} contour if there is no control on engine testing noise?

Justification for the Single House Zone

14. Chapter D24 Aircraft Noise Overlay played a role in the application of the Single House Zone for land between the 57 dB L_{dn} and 65 dB L_{dn} aircraft engine testing noise boundaries. This is discussed in paragraphs 101 and 102 of the Hearing Report.

15. In particular, direction was taken from Policy D24.3(3). For ease of reference, these policies are provided below [emphasis added]:

> ***Policy D24.3(3)***
> *Avoid establishing residential and other activities sensitive to aircraft noise at:*
> *(a)* ***airports/airfields except for Auckland International Airport:*** *within the area between the 55dB L_{dn} and 65dB L_{dn} noise contours, unless the effects can be adequately remedied or mitigated through restrictions on the numbers of people to be accommodated through zoning and density mechanisms* ***and*** *the acoustic treatment (including mechanical ventilation) of buildings containing activities sensitive to aircraft noise excluding land designated for defence purposes;*
> *…*
> *(c)* ***Auckland International Airport****: within the area subject to more than 57dB L_{dn} of* ***aircraft engine testing noise*** *(which when added to aircraft operations noise would give a cumulative total noise level over 60dB L_{dn}), unless the effects can be adequately remedied or mitigated through restrictions on the numbers of people exposed to aircraft noise in the external environment through zoning and density controls and the acoustic treatment (including mechanical ventilation) of buildings containing activities sensitive to aircraft noise.*

16. Policy D24.3(3)(a) applies to all airports and airfields apart from Auckland International Airport. I note the word "and" as highlighted in the policy above means that the expectation is to limit the number of people exposed to the noise as well as require the acoustic treatment of buildings.

17. Further, while the Aircraft Noise Overlay does not include engine testing noise at Whenuapai Airbase, I note that Policy D24.3(3)(c) relates to aircraft engine testing noise at Auckland International Airport. It states that residential and other activities sensitive to aircraft noise should be avoided in areas subject to more than 57 dB L_{dn} of aircraft engine testing noise "unless the effects can be adequately remedied or mitigated through restrictions on the numbers of people exposed to aircraft noise in the external environment **through zoning and density controls and the acoustic treatment** (including mechanical ventilation) of buildings containing activities sensitive to aircraft noise" [emphasis added]. This policy is implemented through activity rules D24.4.3 (A37) to (A42).

18. The zoning proposed by Plan Change 5 for land between the 57 dB L_{dn} and 65 dB L_{dn} aircraft engine testing noise boundaries in Plan Change 5 is consistent with the policies in Chapter D24 through the application of the Single House Zone, and Policy I616.3(25) and Standard I616.6.10 in the Whenuapai 3 Precinct.

Architectural design and construction methods as mitigation against the effects of aircraft noise

19. Based on advice provided by Nigel Lloyd attached in Appendix 4, if the site is outside the 65 dB L_{dn} engine testing noise boundary, architectural design may be used to mitigate the effects of aircraft noise and provide an appropriate internal noise amenity. Mr Lloyd states that a "soundly constructed modern dwelling" with windows closed can achieve noise reduction of about 25 decibels. The application of the Single House Zone for sites between the 57 dB L_{dn} and 65 dB L_{dn} aircraft engine testing noise boundaries is consistent with the approach taken in Policy D24.3(3) to restrict the number of people to be accommodated through zoning and density mechanisms. Therefore I consider the Single House Zone is the most appropriate zone for these sites.

No control on engine testing noise

20. As stated in the council's opening statement, the NZDF provided additional testing data to the council on 3 May 2018, one day before the commencement of the hearing. As requested in by the panel in Direction 4, this data was made available on the council's website on 9 August 2018. The data shows more night-time testing activity than that which was modelled in the work carried out by Malcolm Hunt on behalf of the NZDF that informed the engine testing noise boundaries[1]. It also shows testing of engines running at high power for up to two hours. This data was not included in the modelling carried out by Mr Hunt. As noted in Mr Lloyd's memo, his opinion is that the new data would "significantly change"[2] the predicted aircraft engine testing noise boundaries. In my view, further modelling of the worst-case scenario based on the latest information provided by the NZDF is necessary to ensure the noise boundaries in the plan change area can adequately be relied upon. I do not consider the 57 dB L_{dn} noise boundary in Plan Change 5 is reliable in light of the additional data received and the comments from Mr Lloyd. The council has therefore requested additional time to undertake modelling of the new data.

Question 2. Infrastructure Funding

(a) Please provide an update on the status of the various funding mechanisms expected to be available for Plan Change 5 as referred to in the evidence of Mr Winter and Ms Bell (Auckland Transport) and Mr Shields.

21. Since Plan Change 5 was publicly notified there have been amendments and updates to various funding policies, particularly in regard to the new financial year from 1 July 2018.

[1] Malcolm Hunt Associates. 2017. Airbase Auckland: Whenuapai Noise from Aircraft Engine Testing: Noise Predictions & Assessment.
[2] Paragraph 5.3 of Mr Lloyd's memo dated 27 July 2018 attached in Appendix 4.

The table below shows an update on the range of funding mechanisms that the council has available in the plan change area.

Table 3: Funding mechanisms in the plan change area

Funding Mechanism	Impact on Plan Change 5
Long-Term Plan 2018-2028 (LTP)	• Adopted on 27 June 2018. • The Parks Department has approval and budget to acquire two parks in the plan change area, the sports park on the corner of Trig and Spedding Roads and the suburb park on Trig Road. • Includes a line item for the Supporting Growth[3] business cases across Auckland. This includes budget for investigation, option development and route protection. • No other projects have been specifically allocated for the plan change area.
Regional Land Transport Plan 2018 (RLTP)	• Adopted on 20 June 2018. • Includes a $300m Greenfield Growth fund comprising of $126m from the Regional Fuel Tax with the remainder largely from the Housing Infrastructure Fund (HIF). • Of the $300m, approximately $200m is allocated to the Whenuapai and Redhills areas for the projects the HIF fund will cover, including the southern part of Trig Road in the plan change area. • $25m of the $300m is allocated to Wainui. • The remaining money, approximately $75m, is for the Supporting Growth programme across the region.
Regional Fuel Tax	• Adopted as part of the RLTP.
National Land Transport Programme (NLTP) and National Land Transport Fund (NLTF)	• NLTP is due to be finalised on 31 August 2018. • NLTP must take the RLTP into account because it allocates the NZTA funded parts of the projects identified in the RLTP. • The NLTF is the funding source for the NLTP.
Local Residential Growth Fund	• Available to be considered for new projects. • No monies in this fund have been allocated to projects in the plan change area.
Housing Infrastructure Fund (HIF)	• Detailed business case has been submitted to Ministry of Business, Innovation & Employment. • Funding agreement to be signed by September 2018. • Business case includes funding for three water and transport projects in Whenuapai and Redhills. • The part of Trig Road south of State Highway 18 is included in the HIF business case. • The HIF is part of the $300m Greenfield Growth fund in the RLTP and the LTP.
Crown Infrastructure Partners	• Stage 1 is under negotiation and does not include any projects in the plan change area. • Projects in the plan change area could be put forward for consideration for Stage 2 in the later part of the 2018-2019 financial year.
Development Contributions	• The council's existing Development Contributions Policy has been extended until February 2019. • A new Development Contributions Policy will be ready before February 2019.

[3] Supporting Growth is a joint project between Auckland Transport, Auckland Council and the New Zealand Transport Agency to develop transport networks to support greenfield development in Auckland over the next 30 years.

Funding Mechanism	Impact on Plan Change 5
	• There will be a funding area for Whenuapai in the new policy, however it will only include projects that are funded in the LTP.
Targeted rates	• Targeted rates have been approved in principle for use. • Any new targeted rate would need to be consulted on and would not be able to be introduced in the plan change area until 1 July 2019 at the earliest. • Targeted rates would supplement development contributions.

22. There are two items of particular importance in the table above. The first is that the delivery of half of the upgrade of Trig Road to an urban arterial standard is to be funded by the Housing Infrastructure Fund (HIF). The second is that the business cases for the Supporting Growth network are included in the LTP. This means that there is funding in the LTP to investigate and protect the routes for the arterial roads in the plan change area in the next three years. This gives a clear indication of the council and Auckland Transport's intention to see the roads delivered. Business case investigations have begun for the business cases for the Supporting Growth network in the North West, including the plan change area.

23. The LTP will be reviewed in three years' time, by which time the business cases for the arterial roads will be complete. Once the routes are protected, a source of funding will need to be found to build the roads. This could be in the form of development contributions or a targeted rate. Funding for the roads could be included in future iterations of the LTP.

24. As well as Auckland Council and Auckland Transport projects in the plan change area, there are New Zealand Transport Agency (NZTA) projects that will improve the transport network in the area and enable growth. These projects include a new State Highway 16/State Highway 18 connection, a motorway interchange at the State Highway 16 and Northside Drive, and west facing motorway ramps at Squadron Drive (just outside of the plan change area). The NZTA has commenced the business case investigations for these projects. Again this signals intent to improve the transport network in the area to enable growth.

<u>Transport infrastructure requirements</u>

(a) Please provide further detail on how a "proportional share of local infrastructure works as identified in Table I616.6.2.1" in Standard I616.6.2 would be calculated?

(b) What process or framework will the Council use when calculating a proportionate share?

25. A proportional share could be calculated in a similar method to the calculations done in the Redhills Precinct. In Redhills an Integrated Transport Assessment was used to determine cost allocation across the precinct. Matters that were considered in this analysis include:

    - the cost of the road upgrades and calculation of the total demand on these roads from the precinct, as a proportion of overall modelled traffic demand
    - zoning and expected yields within the precinct
    - the use of the ART traffic model to identify traffic movements within the precinct.

26. A contribution was calculated per dwelling and/or per 100m^2 of GFA retail and commercial floorspace.

27. In the Redhills Precinct, it was agreed by the developers' network to share the cost equally across the precinct, instead of varying the proportional share based on proximity to different parts of the arterial. This avoids undue complexity and is the approach that would be used for a targeted rate or development contributions in the long-term.

(c) Can more certainty with regard to how a proportional share is determined (i.e. a formula), and whether such information should be included in the provisions either as part of a standard in the Precinct or other method in the Auckland Unitary Plan such as a non-statutory method in Chapter M? Is it reasonable to include a rule requiring the payment of a proportional share if the process to determine it is not determined until the resource consent stage?

28. I do not consider it appropriate to incorporate a formula for working out the proportional share in a non-statutory chapter of the Auckland Unitary Plan (Operative in Part). As stated in response to question (b) above, there are a range of variables to be considered and the specific share would need to be agreed with the applicants for resource consent.

29. I consider that it is reasonable for the proportional share to be determined at the resource consent stage. Applicants will have to show how they meet Standard I616.6.2 at the resource consent stage. The standard is there to ensure that the adverse effects of development on the transport network can be adequately mitigated and to give effect to the Regional Policy Statement (RPS). When an applicant submits a resource consent application, they need to show how their proposal is consistent with the RPS. Objectives B2.2.1 (1)(g), B3.2.1 (5) and B3.3.1 (1)(d) of the RPS are particularly relevant and seek to ensure that infrastructure enables growth and mitigates the adverse effects of development on the environment. This is discussed in section 10.5 of the Hearing Report. If there are other AUP (OP) provisions that the applicant needs to be consistent with, then they will need to show how they are doing this at the resource consent stage too.

(d) Please clarify how Infrastructure Funding Agreements would be used as a mechanism for transport infrastructure funding within the Plan Change 5 with particular reference to issues such as fragmented and multiple ownership?

30. Infrastructure Funding Agreements (IFAs) are a voluntary contract between Auckland Council and a private developer. In the case of transport infrastructure, Auckland Transport (AT) would also be a party to the agreement. An IFA can bring forward projects that are listed in the council's Long-term Plan (LTP), or an IFA can be for new projects that are not in the LTP. IFAs are usually triggered by resource consent applications seeking to satisfy AT that the effects of growth can be managed.

31. An IFA should be entered into to secure funding from a resource consent applicant where growth requires arterial roads in the precinct. This would address the cumulative adverse effects on the transport network that would result from the application. This approach has been used in the Wainui Precinct and is being used in the Redhills Precinct.

32. Fragmented land ownership can be problematic as subdivision and development may not be co-ordinated across the different landowners. Council cannot control when landowners and developers in the plan change area will develop. This means that there is no certainty as to when funding to contribute to the arterial roads in the plan change area is able to be recovered from applicants. An IFA will have to be negotiated with each resource consent applicant on a case by case basis. However, council can bank money received from IFAs until such time as there is enough budget to build the road. IFAs will not replace the need for other funding sources to contribute to the effective delivery of transport infrastructure in the plan change area.

33. An IFA would be entered into for the applicant's reasonable contribution towards arterial roads. There are two likely scenarios:
    i. Scenario A: a new arterial road runs through the applicant's property. In this case, the applicant should construct the portion of arterial road through their land in lieu of entering into an IFA.

ii. Scenario B: the development requires the arterial road to be constructed but is not on the applicant's land. The applicant cannot control the delivery of a road on third party land so they enter into an IFA with council and AT.

34. Scenario B would run parallel to the consent process. This would mean that landowners/developers that wish to develop in advance of infrastructure being constructed or funded, could mitigate the effects their development is having on the transport network by contributing to the future development of the infrastructure. This would be an interim measure until funding for the arterial roads was identified in the LTP and the recovery of its cost reflected in the Development Contributions Policy or a targeted rate.

Please explain further the role of the Development Programme Office in this process?

35. The Development Programme Office (DPO) oversees selected major infrastructure projects, housing development and significant public realm development across Auckland. This ensures growth is enabled and supported by infrastructure and that there is an improved public realm in Auckland. The DPO works with developers and other providers to ensure the necessary infrastructure is available to enable quality development to proceed.

36. The Infrastructure Strategy and Funding Unit in the DPO has a team that manages the development of a range of funding agreements across council. These include infrastructure works where the developer and council cost share, agreements for council funded works delivered by council or by the developer on behalf of the council, and commercial agreements with developers to achieve strategic/integrated infrastructure outcomes. This has occurred in Drury, Wainui and other new growth areas. The Development Programme Office co-ordinates asset owners, such as AT, Parks, Healthy Waters, from across council (excluding Watercare Services) to enter into agreements. This team would negotiate IFAs in the plan change area with the applicants and where appropriate with AT.

Specifically, what mechanism would ensure the timely and equitable provision of the collector roads necessary to enable development, having regard to the location of such roads with respect to property ownership?

37. The mechanisms to ensure the provision of collector roads are set out in the Whenuapai 3 Precinct. The relevant provisions are outlined below.

38. Policy I616.3(8) is shown below with recommended changes in response to submissions shown in strikethrough and underline:

> *(8) Require the provision of new roads and upgrades of existing roads as shown on Whenuapai 3 Precinct Plan 2 through subdivision and development, with amendments to the location and alignment of collector roads ~~only~~ allowed where the realigned road will provide an equivalent transport function.* ***[34.11]***

39. This means that an applicant who has a road on their land is required to build the portion of road that covers their land. If an arterial road crosses their land, they would be required to build the road to collector road standard and leave sufficient width for it to be upgraded to arterial standard.

40. Standard I616.6.8 of the Whenuapai 3 Precinct requires developers to build collector roads through to the property boundaries and to the kerb on the opposite side of the road. Standard I616.6.8 is shown below with recommended changes in response to submissions shown in strikethrough and underline:

I616.6.8 Roads

*(1) Development and subdivision occurring adjacent to an existing road must upgrade the entire width of the road ~~adjacent to~~ from the property boundary of the site where subdivision and development is to occur, to the kerb on the opposite side of the road. **[46.11]***

(2) Development and subdivision involving the establishment of new roads must:

(a) provide the internal road network within the site where subdivision and development is to occur; ~~and~~

(b) be built through to the site boundaries to enable existing or future connections to be made with, and through, neighbouring sites; and

*(c) provide a full arterial road width along any proposed new arterial alignment shown on Whenuapai 3 Precinct Plan 2 if the development is proceeding ahead of the arterial road. **[42.12, 47.11 and 48.12]***

41. As development can occur in a piecemeal way across the precinct, collector roads could be developed in a piecemeal fashion as and when development occurs. This is the nature of greenfield development. It might be more equitable for AT to build collector roads and recover a proportional share from all landowners in the precinct towards the cost of those roads. However AT does not generally build collector roads as there is no funding available to build them. Collector roads are the responsibility of the developers.

(e) If Auckland Transport were to use its powers of designation to establish the roading upgrades as set out in (amended) Table I616.6.2.1 (or similar) or act as "banker" to fund the road upgrades, what would be the implications for the implementation of roading infrastructure in terms of Standard I616.6.2?

42. Standard I616.6.2 and Table I616.6.2.1 would stay the same if AT were to use their powers of designation. AT and council would still be looking at recouping costs for the arterial roads if they are designated.

43. If council was able to charge development contributions for the arterial roads then Standard I616.6.2 would not be needed depending on the level at which contributions were set. At present, collecting development contributions for the arterial roads is not possible as the road projects are not line items in the council's Long-term Plan 2018-2028.

Question 3. Indicative open space

(a) Please clarify the process used to determine the need for Open Space areas as shown in Precinct Plan 1?

44. The Whenuapai Structure Plan: Parks and Open Space Report (2016) prepared to support the Whenuapai Structure Plan identified the locations of indicative open space. The council's Open Space Provision Policy 2016 was used to determine the amount and indicative spatial arrangement of open space in the Whenuapai Structure Plan area. Part 2 of the Open Space Provision Policy 2016 contains the basis for the provision of open space. The policy does not identify a ratio of open space to population, rather it identifies open space typologies within a walking catchment driven by an assessment of the needs of the future community. The relevant provision metrics from the policy are set out in Table 4: [4]

[4] Page 30 of the Open Space Provision Policy 2016

Table 4: Open space typologies and provision targets from the Open Space Provision Policy 2016

Typology	Description	Indicative amenities	Provision target
Pocket Park	Provides 'door step' access to small amenity and socialising spaces in high density residential areas. Provides visual relief in intensively developed areas. New pockets parks are typically between 0.1 to 0.15 hectares.	• landscaping and gardens • small lawn areas • furniture • specimen trees • hard surface treatments • areas for socialising and respite	Voluntarily provided at no capital cost and only on agreement by council. Alternatively pocket parks can be retained in private ownership. Located in urban centres or high density residential areas. Must be located on a public street and not an internalised space within a development block. Not to be located within 100m of other open space. In addition to requirements for neighbourhood parks.
Neighbourhood Park	Provides basic informal recreation and social opportunities within a short walk of surrounding residential areas. New neighbourhood parks are typically between 0.3 to 0.5 hectares.	• play space • flat, unobstructed, kick-around space for informal games (30m by 30m) • areas for socialising and respite • landscaping • specimen trees • furniture	400m walk in high and medium density residential areas. 600m walk in all other residential areas. Provides a range of different recreation opportunities between nearby neighbourhood and suburb parks.
Suburb Park	Provides a variety of informal recreation and social experiences for residents from across a suburb. Located in prominent locations and help form the identity of a suburb. Suburb parks will often accommodate organised sport facilities, such as sportsfields. New suburb parks are typically 3 to 5 hectares if providing for informal recreation uses only and up to 10 hectares or larger if also accommodating organised sport uses.	• walking circuits or trails within the park • multiple kick-around spaces • socialising spaces, including picnic and barbeque facilities • larger and more specialised informal recreation attractions, such as large playgrounds, skate parks, hard courts • beaches and watercraft launching facilities • organised sport facilities • community event space • car parking and toilets	1000m walk in high and medium density residential areas. 1500m walk in all other residential areas. Provides a range of different recreation opportunities between nearby neighbourhood and suburb parks. Provides a neighbourhood park function for immediately neighbouring residential areas.

45. The Open Space Provision Policy 2016 provides the requirement and general configuration of the overall open space network. Following this, site suitability criteria from the Parks and Open Space Acquisition Policy 2013 was applied to the Whenuapai area to identify the location of each indicative open space. This was then reported in the Whenuapai Structure Plan: Parks and Open Space Report (2016).

46. The criteria for site selection from the Parks and Open Space Acquisition Policy 2013[5] are:
    - location and physical characteristics
    - financial aspects
    - community support
    - amenity
    - planning and legal restrictions.

[5] Page 22 of the Open Space Acquisition Policy 2013.

(b) What is the intended open space function for the areas identified?

47. Whenuapai 3 Precinct Plan 1 identifies seven areas of indicative open space. The precinct provisions do not specify the typology of each indicative open space. These are outlined in the Whenuapai Structure Plan: Parks and Open Space Report (2016.

48. Of the seven indicative areas of open space, the following types are proposed:
    - one suburb/sports park
    - one suburb park
    - five neighbourhood parks.

49. The Open Space Provision Policy 2016 provides a description of their indicative uses and functional requirements. This can be seen in Table 4 above.

50. The suburb/sports park will service the organised sports needs of the projected population growth in both Whenuapai and the wider North-West region through the provision of playing fields and complementary activities (for example playgrounds), and ancillary services (for example changing rooms).

(c) What factors were taken into consideration when identifying locations for open space areas?

51. As outlined above, the council's two open space policies contain the criteria for identifying the location of the indicative open space areas, as follows:

    i) The Open Space Provision Policy 2016 contains a target walking catchment within different residential densities, that is, what amount of open space is needed to service a specific population.

    ii) The Parks and Open Space Acquisition Policy 2013 contains a set of site suitability criteria for selecting a preferred site. These criteria are:

    - Location and physical characteristics
      Some activities and park functions have specific physical requirements, for example size for a sports field and flat areas for informal recreation. A park's relation to the surrounding environment including infrastructure capacity, should be suitable for the scale of the park. Hazards such as site contamination and flooding may also affect a site's suitability.

    - Financial aspects
      The cost of developing a site and its ongoing maintenance. Acquiring new parks and open space commits the council to ongoing financial costs as assets have to be appropriately maintained and renewed.

    - Community support
      Opportunities for community involvement and education are important outcomes that are considered when assessing the suitability of a site.

    - Amenity
      The environment surrounding a site will influence the amenity of a park and what type uses it is suitable for. A pleasant outlook can contribute to the quality of a park.

    - Planning and legal restrictions
      Planning restrictions or encumbrances on the property title will influence the type of activities that can occur on a site and how easy it will be to develop.

(d) Is a statement in the Precinct Plan necessary to clarify what "indicative Open Space" means and the extent of flexibility expected in the final determination of its location?

52. I do not consider it necessary for the precinct plan to provide guidance on what the word indicative means, or on the extent of flexibility the precinct provisions provide. Whenuapai 3 Precinct Plan 1 gives an indication of where open space might be located. There are also text provisions in the Whenuapai 3 Precinct that reflect this and provide flexibility. I have listed these provisions below.

> ***Policy I616.6.3(8)***
> *Require the provision of new roads and upgrades of existing roads as shown on Whenuapai 3 Precinct Plan 2 through subdivision and development, with amendments to the location and alignment of collector roads ~~only~~ allowed where the realigned road will provide an equivalent transport function.*
>
> ***Policy I616.3(20)***
> *Require the provision of open space as shown on Whenuapai 3 Precinct Plan 1 through subdivision and development, unless the council determines that the indicative open space is no longer required or fit for purpose.*
>
> ***Policy I616.2(21)***
> *~~Only a~~Allow amendments to the location and alignment of the open space where the amended open space can be demonstrated to achieve the same size and the equivalent functionality.*
>
> ***Standard I616.6.1 Compliance with Whenuapai 3 Precinct Plans***
> *(1) Activities must comply with Whenuapai 3 Precinct Plan 1 and Whenuapai 3 Precinct Plan 2.*
> *(2) Activities not meeting Standard I616.6.1(1) must provide an alternative measure that will generally align with, and not compromise, the outcomes sought in Whenuapai 3 Precinct Plans 1 and 2.*
>
> ***Rule I616.4.1 (A3)** states that subdivision not complying with Standard I616.6.1 is a discretionary activity.*
>
> ***Rule I616.4.1 (A16)** states that use and development not complying with standard I616.6.1 is a discretionary activity.*

53. I agree with the view of Mr Barwell in his memo attached in Appendix 5, that the Open Space Provision Policy 2016 provides adequate guidance on spatial distribution of open space and provides flexibility for both landowners and the council. It clearly sets out the principles of open space planning that each application must consider. Departures from indicative locations will be negotiated on a case-by-case basis using the policy as the primary guidance.

54. While flexibility is provided for in the Whenuapai 3 Precinct provisions outlined above, variation in open space locations will affect the spatial distribution of open space within the wider network. Care will be needed to ensure that the future community has equitable access to open space and the wider open space network will not be compromised.

Question 4. Land Bounded by Trig Road, Upper Harbour Drive and Hobsonville Road

The land within this area is zoned Terrace Housing and Apartment zone (THAB), to the south and west, and Mixed Housing Urban, to the north. A number of submitters seek that this entire area be rezoned THAB due to its proximity to the Westgate and NorthWest

Shopping Centres. Please provide additional comment on the zoning proposed by submitters including the following:

i. Anticipated walking/cycling distances and times to the existing Westgate commercial areas

55. Figure 1 and Table 5 show approximate walking and cycling times from various parts of the block bounded by Trig Road, Upper Harbour Highway and Hobsonville Road to Westgate over the existing Hobsonville Road overbridge.

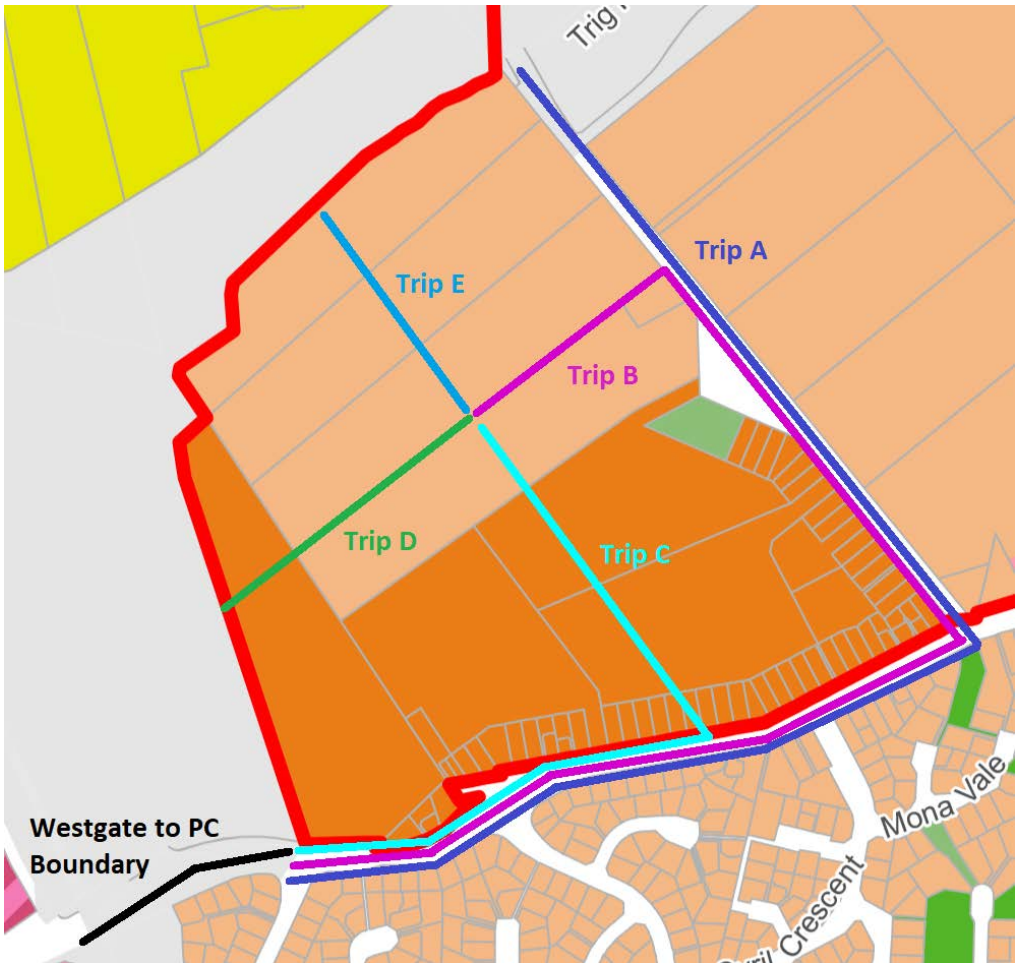

Figure 1: Potential walking and cycling routes from the Trig Road block to Westgate

Table 5: Approximate distances, walking and cycling times from the Trig Road block to Westgate

Trip	Distance to Westgate (Approx.)	Estimated walking/cycling time (Approx.)
Westgate to PC Boundary	340m	4/1 Minutes
Trip A	1980m	30/8 Minutes
Trip B	1955m	30/8 Minutes
Trip C	1260m	18/5 Minutes
Trip D + B	2285m	34/9 Minutes
Trip D + C	1590m	22/6 Minutes
Trip E + B	2235m	33/9 Minutes
Trip E + C	1540m	21/6 Minutes
Walking time: 15 minutes per 1000m		
Cycling Time: 4 minutes per 1000m		

56. Auckland Transport's Code of Practice[6] states that pedestrian and cycle ways should have:

> *…a vertical alignment generally no steeper than 1 in 10 with an absolute maximum gradient of 1 in 8 in exceptional circumstances.*

57. Gradients that are too steep are undesirable because the ascents can be difficult for cyclists to climb and the descents can cause some cyclists to exceed the speeds at which they are competent or comfortable. The gradient in this area ranges from less than one per cent close to State Highway 18, to 14 per cent as the land slopes up towards Hobsonville Road. The gradient in this area will make cycling difficult and would warrant design considerations to take the slope and length of the hill into account. Cycling and walking can still be possible, but where gradients are too steep, AT would need to consider stairways and appropriate ramps for universal access.

ii. The planned or anticipated public transport connectivity for this area

58. There are two services under the bus network that was rolled out in June 2017:
    i. A connector service with buses at least every 30 minutes between 7am and 7pm along Hobsonville Road.
    ii. A local service with buses at least once an hour along Trig Road that circulates through Whenuapai on its route between Hobsonville and Westgate.

59. Both of these service standards are minimum standards. This means that for a connector service the frequency is better than every 30 minutes at peak, it will be approximately every 15 minutes at peak.

60. Both services are planned to be increased in frequency over time. The connector service will be increased to a 15 minute minimum between 7am and 7pm. The local Trig Road service will increase to a connector service standard.

iii. The role, if any, Upper Harbour Highway plays in terms of connectivity, or lack thereof, to commercial areas

61. There are three routes in and out of the block of land bounded by Trig Road, Upper Harbour Highway and Hobsonville Road. The first route is via Hobsonville Road. This route would be used to travel to existing commercial areas along Hobsonville Road and in Westgate. This route could be attractive for people living in the southern part of the block and is the only route to Westgate. The second route is via the Trig Road overbridge that crosses the Upper Harbour Highway and would be used to access the proposed commercial area north of the Upper Harbour Highway. This is the only crossing point over the Upper Harbour Highway for this block. The third route is to use the Upper Harbour Highway which can be accessed by east facing on ramps at Trig Road. The Upper Harbour Highway could be used to access existing commercial areas along Hobsonville Road by vehicles joining the Upper Harbour Highway at Trig Road and exiting at the Brigham Creek Road off ramp. This route could be attractive for people living in the northern part of the block.

62. In the future there will be a fourth route to Westgate along Northside Drive when it is extended. People using this route will still need to cross the Upper Harbour Highway at the existing Trig Road overbridge.

63. While the Upper Harbour Highway could be used for people travelling east, I consider that it is a barrier to connectivity in the area.

[6] Section 13.4.4, Chapter 13 Cycling Infrastructure Design

iv. Any measures within the development area that might improve connectivity (including a possible pedestrian/active mode bridge) to the Westgate centre

64. I am not aware of any measures within the area that might improve connectivity to the Westgate centre. I am unaware of any plans for an additional pedestrian or cycle bridge over State Highway 16 to the Westgate Centre and there is no funding allocated for a bridge in the RLTP or the council's LTP. The Integrated Transport Assessment prepared for the Whenuapai Structure Plan, and later transport modelling updates, did not include any additional connectivity across State Highway 16.

v. Any other relevant physical or topographical matters

65. The land bounded by Trig Road, Upper Harbour Highway and Hobsonville Road is comprised of mainly flat to rolling land with localised areas of steep terrain around incised channels. I do not consider that there is any reason to depart from the proposed zoning based on the topography of the land.

66. The catchment area contains the Totara Stream, flowing to the north-western corner. This is the lowest point in the area with an elevation of 30m. The area contains sections which are in flood plains located around the Totara Stream. The area affected by this is minimal and concentrated along the steams. The Whenuapai 3 Precinct: Stormwater Management Plan 2017 states:

> *…flood hazard is not a key constraint in the catchment provided an appropriate approach to development and the management of flood plains and overland flow path is implemented.*

67. State Highway 16 is a physical barrier that severs the land from the retail and business area at Westgate and the Northwest Shopping Centre. The Hobsonville Road overbridge is the only connection to the area. While the overbridge provides for vehicle, cycling and pedestrian access, there are wide on and off-ramps accessing the bridge from all sides, resulting in an environment dominated by cars. Without alternative connections to Westgate and Northwest Shopping Centre from the Whenuapai area, I consider the zoning proposed in Plan Change 5 remains the most appropriate way to achieve the direction of *B2.2 Urban growth and form* and *B2.4 Residential growth* as discussed in section 10.4 of the Hearing Report.

<u>Question 5. Single House Zone adjoining the CMA</u>

a) We wish to better understand the reasoning for a lower intensity residential zone (Single House zone) at the CMA boundary in addition to a coastal hazard setback to manage the risk of hazard. Please provide additional comment on why a lower intensity zone is necessary in addition to coastal setbacks? What provisions of the Unitary Plan (including the Regional Coastal Plan) or the New Zealand Coastal Policy Statement have the Council considered or relied upon in this assessment?

68. In paragraphs 104 and 105 of the Hearing Report the provisions in the New Zealand Coastal Policy Statement and the Regional Policy Statement (RPS) of the Auckland Unitary Plan (Operative in Part) that the reporting team considered when applying the Single House Zone around the coast are listed. I have listed them again here for ease of reference.

69. New Zealand Coastal Policy Statement 2010 provisions:

- Objective 5 – locating new development away from areas prone to coastal hazard risks
- Policy 3 – adopt a precautionary approach to the use and management of coastal resources potentially vulnerable to climate change
- Policy 6(1) – in terms of development in the coastal environment, consider if the existing built environment should be encouraged; and set back development from the coastal marine area where practicable to protect the natural character, open space, public access and amenity values of the coastal environment
- Policy 7(1) – in the preparation of plans, identify areas where particular activities and forms of subdivision, use and development may be inappropriate and provide protection through plan provisions
- Policy 24 – identify areas that are potentially affected by coastal hazards taking into account national guidance such as the Ministry for the Environment Coastal Hazards and Climate Change: Guidance for Local Government
- Policy 25 – avoid increasing the risk of social, environmental and economic harm from coastal hazards.

70. AUP(OP) RPS provisions:
    - Objective B2.3.1(1) – subdivision, use and development that respond and adapt to the effects of climate change
    - Policy B2.4.2(4) – provide for lower residential intensity in areas that are subject to high environmental constraints
    - Policy B2.4.2(5) – avoid intensification in areas that are subject to significant natural hazard risks
    - Objective B8.2.1(2) – subdivision, use and development in the coastal environment are designed, located and managed to preserve the characteristics that contribute to the natural character of the coastal environment
    - Objective B8.3.1(1) – subdivision, use and development in the coastal environment are located in appropriate places and are of an appropriate form
    - Objective B8.3.1(7) – subdivision, use and development avoid increasing the risk of social, environmental and economic harm
    - Objective B10.2.1(3) – avoid new risks to people, property and infrastructure when carrying out new subdivision, use and development
    - Objective B10.2.1(4) – the effects of climate change on natural hazards are recognised and provided for
    - Objective B10.2.1(5) – manage subdivision, use and development of land subject to natural hazards
    - Policy B10.2.2(13) – in areas potentially affected by coastal hazards over the next 100 years, avoid changes in land use that would increase the risk of adverse effects from coastal hazards.

71. I am of the view that the term “avoid” used in Policy 25 of the NZCPS provides a strong directive that higher density residential use is inappropriate in areas of coastal hazard risk. I am also of the view that Objectives B2.2.1 Urban growth and form need to be considered in the context of giving proper weighting to the RPS objectives identified above in areas of coastal hazard risk. I consider that the balance of zones proposed in the plan change area provides sufficient development capacity and land supply to accommodate growth.

72. It is my understanding of probability based risk-assessment that the coastal hazard setback yard identifies an area that is subject to erosion. However, there is a five per cent chance that erosion would exceed the extent of the setback yard by the year 2120. The Coastal Hazard Assessment undertaken for the plan change[7] identifies maximum extents of erosion in the area as 47m, 26m, 32m, and 42m respectively within coastal areas A, B, C, and D. These increase to 50m, 49m, 34m, and 43m respectively by 2150. This understanding is supported by Richard Reinan-Hamill in section 4 of his letter dated 4 May 2018 that was

[7] Coastal Hazard Assessment Whenuapai Plan Change, prepared by Tonkin and Taylor, August 2017

attached as Appendix 1 to the memo sent to the panel on 8 May 2018. This memo is attached again here in Appendix 6 for ease of reference. Increasing extreme weather events and further sea level rise higher than what has been modelled may exacerbate the extent of erosion.

73. I also considered future coastal hazard risk management approaches when applying the Single House Zone. Lower residential intensity landward of the coastal hazard setback yard will allow for more flexible responses to coastal hazard risks. This is in accordance with the Ministry for the Environment Coastal Hazards and Climate Change: Guidance for Local Government. Fewer assets will need to be protected, thereby reducing the need for hard protection structures and making managed retreat easier.

74. Therefore, taking a precautionary approach, I consider the Single House Zone within 50m of Mean High Water Springs remains the most appropriate zone.

Question 6. Out of Scope Submissions

(a) If we were to consider submissions 43.3 and 44.3 to be within scope (seeking to be added to the plan change and zoned Light Industry) what would the merits to including these sites within the plan change area?

75. Submitters 43 and 44 are seeking to include land at 84-90 Trig Road in the plan change area. As stated in section 10.2 of the Hearing Report, in my opinion, submissions 43 and 44 are not on the plan change and therefore the council is unable to consider these submissions. A section 32 analysis for including these sites in the plan change area has not been undertaken.

76. If the panel is minded to consider that submissions 43 and 44 are on the plan change, I consider that the Light Industry Zone is the most appropriate zone for these sites based on the analysis carried out for the Whenuapai Structure Plan. The Light Industry Zone would be consistent with the proposed zoning in the surrounding areas.

77. There may be some merit in rezoning both sides of Trig Road at the same time if both sides of the road were to be developed at a similar time. Then there will be land uses of a similar nature along both sides of the road. However, council cannot control when private landowners develop. It is likely that both sides of the road will eventually have the same zone, and the land at 84-90 Trig Road will be included in a future plan change area. In addition, if the sites at 84-90 Trig Road are rezoned as submitters 43 and 44 are requesting, 62, 64 and 82 Trig Road, which are located to the south of 84 Trig Road, will remain as Future Urban Zone as there were no submissions seeking to rezone these sites. This means there will still be parts of Trig Road where both sides of the road do not have the same zone.

78. If only one side of the road is developed, Standard I616.6.8 in the Whenuapai 3 Precinct requires developers to upgrade the road to the kerb on the opposite side of the street. This means that if development occurs on only one side of the road, Trig Road will still be upgraded to the opposite side of the road if the development happens in advance of Auckland Transport upgrading the road. Therefore there is no benefit in rezoning 84-90 Trig Road in this plan change in terms of upgrading to Trig Road.

Direction 4 of the Hearing Panel

79. As instructed in Direction 4 of the Hearing Panel of Commissioners that was issued on 10 August 2018, I will contact the panel in the first week of October so that a date can be set to reconvene the hearing.

Kind regards

Anne Bradbury

Principal Planner, North West and Islands Planning

Appendix 5a: Whenuapai Airbase – Engine Testing Noise Contours from Tonkin & Taylor prepared for the New Zealand Defence Force

REPORT

Tonkin+Taylor

Whenuapai Airbase - Engine Testing Noise Contours

Plan Change 5

Prepared for
New Zealand Defence Force
Prepared by
Tonkin & Taylor Ltd
Date
March 2021
Job Number
1009485

Exceptional thinking together
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Document Control

Title: Whenuapai Airbase - Engine Testing Noise Contours					
Date	Ver.	Description	Prepared by:	Reviewed by:	Authorised by:
5 March 2021	1	Final	D. Humpheson	L. Leitch	K. Baverstock

Distribution:

New Zealand Defence Force	1 PDF copy
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Table of contents

1 Executive Summary

Whenuapai Airbase has existed more or less in its present form since the 1940s and has been continuously occupied and used by the Royal New Zealand Air Force since that time. While there have been changes in the number, size and type of aircraft located at the base over this time, noise from aircraft operations and engine testing forms part of the local noise environment and has done for at least the past 50 years.

Engine testing is a regular activity at Whenuapai Airbase and is required for maintenance, testing and training purposes. Engine testing and the frequency and duration of engine testing varies between different aircraft and the tasks being undertaken. It does not follow a regular schedule but is dependent on aircraft requirements and can vary greatly in noise level and duration. Night-time engine testing may be required in some circumstances, although this is avoided if possible.

Engine testing is authorised under Designation 4310 in the Auckland Unitary Plan Operative in part (AUP) and the designation includes aircraft noise contours for Whenuapai Airbase. These contours were prepared to include the noise generated by aircraft when taking off and landing, but not the noise contribution from engine testing. Accordingly, despite engine testing being within the scope of the designation it is unable to comply with the noise limits in the conditions of the designation which reference the contours. However, engine testing currently undertaken at Whenuapai Airbase does not breach the Resource Management Act 1991 (RMA) due to a certificate issued under section 4(2) of the RMA relating specifically to this activity.

Auckland Council notified proposed Plan Change 5: Whenuapai (PC5) in 2017. As part of the plan change process a series of engine testing contours were produced to inform future land use planning controls in accordance with New Zealand Standard NZS 6805:1992 '*Airport Noise Management and Land Use Planning*' (NZS 6805). A finalised set of engine testing contours have now been produced taking into account a projection of future engine testing operations at Whenuapai Airbase, which is in accordance with NZS 6805. The time spent engine testing has been increased by a factor of 20% from the existing situation to account for future changes.

Two contours have been produced:

- 65 dB Ldn engine testing Inner Control Boundary - within which the amount of engine testing noise exposure is sufficiently high to require appropriate land use controls or other measures to avoid, remedy or mitigate any adverse effects on the environment, including effects on community health and amenity values. These controls typically prevent new noise sensitive development occurring.
- 57 dB Ldn engine testing Outer Control Boundary - within which there should be sound insulation performance requirements for new or altered buildings to ensure a reasonable level of indoor noise amenity with windows and doors closed.

The intent is that the new engine testing noise contours will inform PC5 and form the basis of future land use planning controls to provide protection against adverse levels of engine testing noise as anticipated by NZS 6805. The contours are included at Appendix D to this report.

2 Introduction

2.1 Background

The Royal New Zealand Airforce Base Auckland (Whenuapai Airbase) is located at Whenuapai and was first established in 1937. There has been an operational airfield at Whenuapai since 1928. Whenuapai Airbase has existed more or less in its present form since the 1940s and has been continuously occupied and used by the Royal New Zealand Air Force (RNZAF) since that time. Whenuapai was also Auckland's civil international airport from 1945 to 1965.

Whenuapai Airbase has two main runways plus extensive aircraft parking with associated taxiways and infrastructure. There are three flying squadrons located at the airbase as follows:

- No. 5 Squadron – Maritime Surveillance, using Lockheed P-3 Orion aircraft operating out of Whenuapai since 1968;
- No. 6 Squadron – Naval Aviation, using Kaman SH-2G Super Seasprite helicopters operating out of Whenuapai since 2005; and
- No. 40 Squadron – Tactical and Strategic Transport, using Lockheed C-130H Hercules operating out of Whenuapai since 1965 and Boeing 757 aircraft operating out of Whenuapai since 2002.

A location plan is shown in Figure 2.1 showing the boundary of the base and main runways.

Engine testing[1] of Whenuapai-based aircraft is required for maintenance, testing and training purposes. Engine testing is a regular activity at Whenuapai Airbase and the frequency and duration of engine testing varies between different aircraft and the tasks being undertaken. Unlike when aircraft take-off, land and taxi, engine tests can be prolonged depending upon the engineering and training requirements. Although there are some predictable elements of routine maintenance, engine testing does not follow a regular schedule but is dependent on aircraft and operational requirements and can vary greatly in noise level and duration. Night-time[2] engine testing may be required in some circumstances, although this is avoided if possible, and is conducted only with specific approval from the Base Commander[3].

While there have been changes in the size and type of aircraft being tested over the years, engine testing has always been undertaken. In this respect noise from engine testing undertaken by the RNZAF forms part of the local noise environment and has done for at least the past 80 years. Engine testing is a necessary requirement to allow flight operations at the Base to occur.

2.2 Purpose of report

Previous assessment work undertaken by New Zealand Defence Force (NZDF) for Auckland Council's Plan Change 5 (PC5) included the production of engine testing noise contours[4]. The purpose of this report is to update these engine testing noise contours to more accurately reflect day to day operations and to allow for future changes in engine testing requirements at Whenuapai Airbase by increasing the duration of current engine testing by 20% (see Section 6.3). The intent is that these new contours will inform PC5 and form the basis of future land use planning controls to provide protection against adverse levels of engine testing noise.

[1] In this report, engine testing is the preferred terminology to describe when aircraft are stationary and engines are operating for maintenance, testing and training. Other reports may use a variety of descriptors such as engine ground running, ground engine running, engine running, ground run-up, or on-wing engine runs, which are all variants of engine testing.
[2] Night-time has two meanings in this report see Section 5.2.
[3] See Section 4.2 - NZDF Base Standing Orders
[4] AECOM, Whenuapai Plan Change 5, Base Auckland – Engine Running Noise Assessment, November 2018.

A glossary of terms is included at the end of this report.

Figure 2.1: Location of Whenuapai Airbase, Whenuapai (Copyright TTMapViewer 2019)

3 Designation 4310

Designation 4310 in the AUP applies to Whenuapai Airbase and provides for the operation of the airbase for defence purposes as defined by section 5 of the Defence Act 1990. Engine testing is authorised by the designation. Condition 1 of the designation relates to aircraft noise and is reproduced below:

> *Aircraft Noise*
>
> *1. Aircraft operations on the RNZAF Airbase shall not exceed a day/night (Ldn) level of:*
>
> *a. 65dBA outside the Airnoise Boundary (Ldn 65 dBA Contour) shown on the Airbase Noise map;*
>
> *b. 55dBA outside the Outer Control Boundary (Ldn 55 dBA Contour) shown on the Airbase Noise map.*
>
> *For the purpose of this control noise will be measured in accordance with the NZS 6805:1992 and calculated, as stated in NZS 6805:1992, using FAA Integrated Noise Model (INM) and records of actual aircraft operations and calculated as a 90 day rolling logarithmic average.*
>
> *Exceptions to noise limits:*
>
> *a. The aircraft is landing in an emergency;*
>
> *b. The aircraft is landing at the Airbase as an alternative in adverse weather conditions; or*
>
> *c. The aircraft is using the airfield as part of a search and rescue operation or civil emergency.*

The Airbase Noise map referred to in condition 1 is included in the Designation (reference Drawing 9A-2) and is attached at Appendix A. The Airbase Noise map is reproduced in the AUP as the Aircraft Noise Overlay for Whenuapai Airbase, see Appendix B. The contours represent the extent of aircraft noise from aircraft either in flight or when on the ground during taking off or landing. Noise is only present along the runways and flight tracks. The contours were not prepared to include the noise contribution from any other source of aircraft noise (including additional noise around taxiways, aprons, and engine testing locations). However, pursuant to a recent (2019) decision of the Environment Court, engine testing noise was required to comply with the noise limits in the conditions of the designation which reference the contours. Because NZDF could not comply with those limits, engine testing has been exempted from compliance with these limits pursuant to a certificate issued under section 4(2) of the RMA.

Three types of aircraft operations at Whenuapai Airbase are expressly excluded from compliance with the airnoise boundary of condition 1. These operations relate to unplanned or unforeseen events such as emergencies (emergency landings or diversions due to adverse weather) or where aircraft are used for search and rescue or civil events such as those declared under the Civil Emergency Management Act 2002.

4 Land use planning – aircraft noise

4.1 NZS 6805:1992

New Zealand Standard NZS 6805:1992 'Airport Noise Management and Land Use Planning' is used to assess and rate aircraft noise in the vicinity of airports (including aerodromes / airfields). This standard does not specifically exclude nor include engine testing noise when assessing the overall level of airport noise. Rather it is focused on the noise generated by aircraft from 'start of roll', when inflight and when an aircraft lands and departs the runway. NZS 6805:1992 is relevant to this assessment since it provides guidance on the use of the day / night sound level (Ldn) and the averaging of aircraft activity.

The Ldn parameter is the day / night average energy level and it has a 10 dB weighting for any aircraft noise events which occur during the period 2200-0700 hrs. Ldn is widely used to assess environmental noise from other sources as well as aircraft noise and has been used to establish reasonable noise thresholds for determining community response to noise from aircraft operations (take-off and landing movements) and other sources of environmental noise. The Ldn 10 dB weighting recognises that night-time noise can be more disturbing than noise that occurs during the day, and that noise at night can result in adverse health effects due to loss of sleep. The Ldn weighting means that, for example, a 5-minute night-time engine test would be equivalent to 10 similar tests conducted during the day.

To account for the variation in activity that may occur at an airport, NZS 6805 recommends that a busy three-month (90 day) period is used to determine the typical level of aircraft movements that may occur over a busy 24-hour day. This averaging period reflects the normal convention that at commercial airports, the busy summer period (December, January, and February) is when aircraft movements are at their greatest. If the same averaging duration were applied to engine testing then the consequence would be a significant underestimation of the true noise effects as engine testing is more sporadic / infrequent. For engine testing, a busy 7-day period is typically preferred and has been used elsewhere in New Zealand, for example at Christchurch International Airport. This is based on a rolling period of 7 days and reflects that engine testing can vary from day to day and can occur on weekends. In contrast to operational flying, if a longer period were to be used, it would tend to average out short term 'peaks' in engine testing activity. This 7-day period is then used to calculate a representative 24-hour period.

Unlike a commercial operator, NZDF aircraft requirements will vary from week to week and there will be periods of low activity in contrast to periods of higher activity, especially if there are deployments, preparation for military training, search and rescue or humanitarian requirements (see graphs in Section 6.2). This variation can result in a significant difference in the aircraft noise environment from day to day and from week to week. While this variation may not affect the aircraft noise contours based on a 90-day assessment period, a 7-day assessment period for engine testing noise can result in multiple scenarios being developed as the frequency of engine testing can vary much more than flight movements. When developing engine testing contours for land use planning purposes this 7-day period must therefore allow for a worst case, or at least a busy scenario in a similar manner to that required by NZS 6805 for airnoise (i.e. busy 24-hour day average).

4.2 Airnoise boundary

NZS 6805 uses the Airnoise Boundary concept to enable councils to establish appropriate land use planning controls for the management of aircraft noise at airports to protect the health and amenity of neighbouring communities without unduly restricting the operation of airports. The Standard provides the minimum requirement to protect people from adverse effects by establishing a

maximum level of aircraft noise exposure (Airnoise Boundary) and a separate Outer Control Boundary for the protection of amenity values.

Figure 4.1 shows Whenuapai Airbase's Airnoise Boundary (the darker blue shaded area) and Outer Control Boundary (the lighter blue shaded area) of Condition 1 (Designation drawing 9A-2, refer Appendix A). These airnoise boundaries are included in the AUP via the Aircraft Noise Overlay (as shown in Appendix B) which provides for land use controls consistent with NZS 6805.

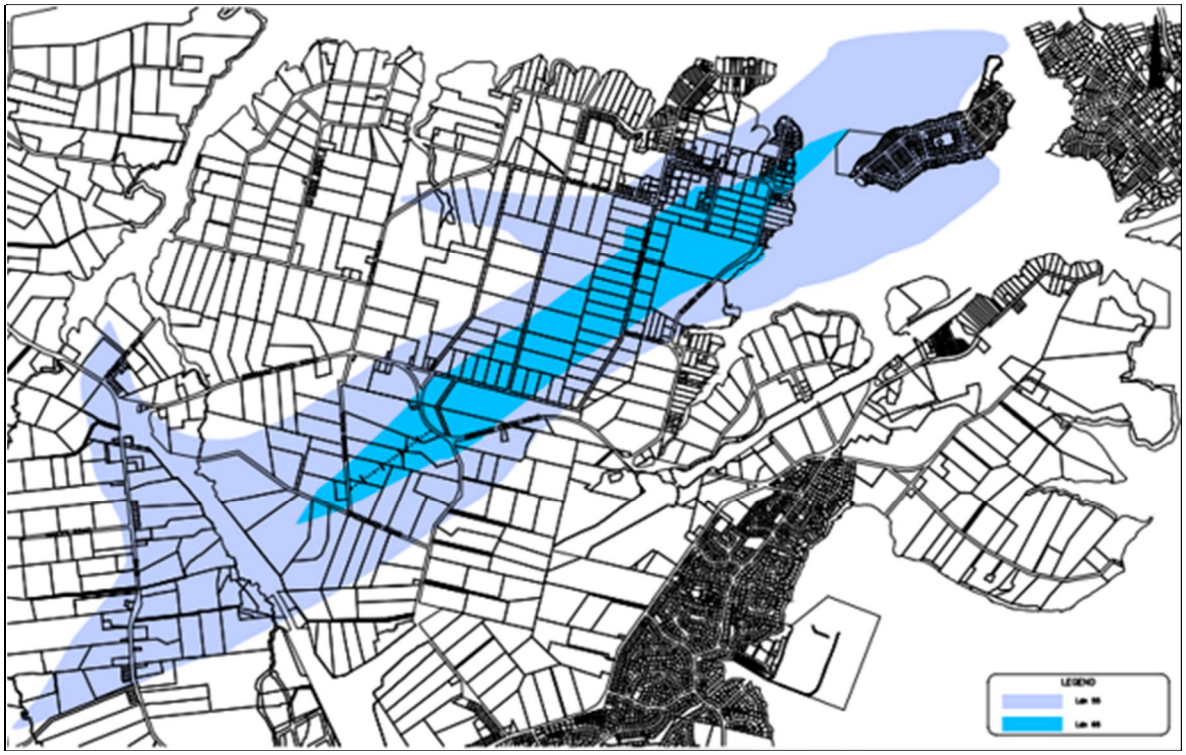

Figure 4.1: Whenuapai Airbase Airnoise Boundaries

Noise from "aircraft operations" is not to exceed either the 65 dBA Airnoise Boundary (i.e. the outer edge of the dark blue shaded area) or the 55 dBA Outer Control Boundary (i.e. the outer edge of the light blue shaded area). NZS 6805 defines the Airnoise Boundary as:

> *'an area around an airport within which the current or future daily amount of aircraft noise exposure will be sufficiently high to require appropriate land use controls or other measures to avoid, remedy or mitigate any adverse effects on the environment, including effects on community health and amenity values whilst recognizing the need to operate an airport efficiently.'*

Unlike the Airnoise Boundary, which precludes new noise sensitive development, NZS 6805 defines the Outer Control Boundary as:

> *"an area within which there shall be no new incompatible land uses, unless a district plan permits such uses subject to requirements to incorporate appropriate acoustic insulation".*

The noise boundaries can represent either the existing level of aircraft noise or a future forecast of aircraft noise. However NZS 6805 recommends that a projection should be made of future operations and that a minimum period of 10 years should be used as the basis of the projected contours. Typically, commercial airports will forward forecast to a point 20-30 years into the future to reflect a projection of anticipated growth in airport capacity.

Unlike a commercial airport with planned growth in passenger and freight traffic and hence greater numbers of aircraft movements (and/or larger capacity aircraft), there is not the same anticipated level of growth for NZDF operations due to the NZDF's role remaining relatively unchanged, i.e. similar activities are anticipated in the future as currently occur. However, future global uncertainty may require enhanced military capability or increased humanitarian support following the effects of natural disasters and climate change. This uncertainty should be allowed for when defining land use planning control noise boundaries in terms of the numbers of future aircraft movements and probable changes in the future Whenuapai Airbase home aircraft fleet. It should also be noted that the noise signature of new aircraft may be higher if they have jet engines.

4.3 Whenuapai Airbase noise boundaries

As discussed above, the Whenuapai Airbase aircraft noise modelling (and the associated airnoise contours) did not include the noise from aircraft taxiing or from engine testing.

The noise from taxiing operations is negligible in comparison to the noise from either aircraft movements on the runway or from engine testing at Whenuapai Airbase due to the relatively low numbers of taxiing operations, the relatively low noise emissions and that the main taxiways are located close to the main runway (see Figure 5.1).

It is common practice both nationally and internationally to assess the effects of noise from aircraft in flight and from engine testing separately[5]. For aerodromes with occasional engine testing, the noise contribution from engine testing may be included in the airnoise contours. However for aerodromes which have significant engine testing due to the presence of maintenance, repair, and overhaul (MRO) facilities, which is the case at Whenuapai Airbase, separate contours will be produced and the effects of the two aircraft noise sources will be treated separately. Local communities near aerodromes with MRO engine testing activity will hear both aircraft in flight, and engine testing. In these situations, appropriate land use controls are adopted by defining separate noise boundaries for each activity.

When assessing the effects of airnoise, thresholds of Ldn 65 dB and 55 dB are used for airport noise management and for setting land use planning controls (including the AUP Aircraft Noise Overlay as shown in Appendix B). These thresholds are derived from community noise studies. An overview of community response to aircraft noise is included at Appendix C together with the dose response thresholds that form the recommended land use control thresholds of NZS 6805. These dose responses are used to assess the degree of community noise annoyance to various modes of transportation, including aircraft.

Unlike airnoise, there are no community noise significance thresholds used to rate the annoyance from engine testing noise. For PC5, engine testing noise thresholds of Ldn 65 dB and 57 dB[6] were adopted which are based on the airnoise thresholds. The upper level of 65 dB being the threshold at which 20% of the exposed population would be highly annoyed by airnoise and 57 dB is roughly at the onset of significant community annoyance from airnoise (i.e. similar to the airnoise threshold of Ldn 55 dB). Below 57 dB there will be a proportion of the population who will be annoyed by airnoise, however, this proportion is considered statistically small.

[5] Aircraft in flight (take off, landings and circuit work) can be short in duration with many events during the day and lesser numbers at night. Whereas engine testing can be prolonged and comprise irregular activity during the day and at night. Hence the two assessment approaches.

[6] 57 dB Ldn was adopted on the basis that narrowly open windows have been shown to achieve a reduction of approximately 17 dB. This would result in an internal Ldn of 40 dB which is an appropriate indoor sound level and is consistent with extant Rule D24.6.1 (for North Shore Airport, Kaipara Flats and Whenuapai). It is also consistent with the onset of significant community response to aircraft noise with a minor adjustment of 2 dB to reflect the intermittent nature of engine testing compared to flight operations.

5 Engine testing at Whenuapai Airbase

The airfield has two main paved runways plus extensive aircraft parking. Figure 5.1 shows a plan of Whenuapai Airbase as extracted from the New Zealand Aeronautical Information Publication (NZ AIP[7]). The plan shows the two main runways (RWY), main taxiways (TWY) and the airfield's aprons. There are four possible runway directions RWY 08/26 and RWY 03/21. The main runway is 03/21.

The locations marked as TWY F (Foxtrot) and TWY J (Juliet) are where high-power engine testing can be undertaken (see Section 5). TWY D (Delta) is no longer available for engine testing as discussed at Section 5.2. Lower-power testing occurs on the apron outside the squadron hangars.

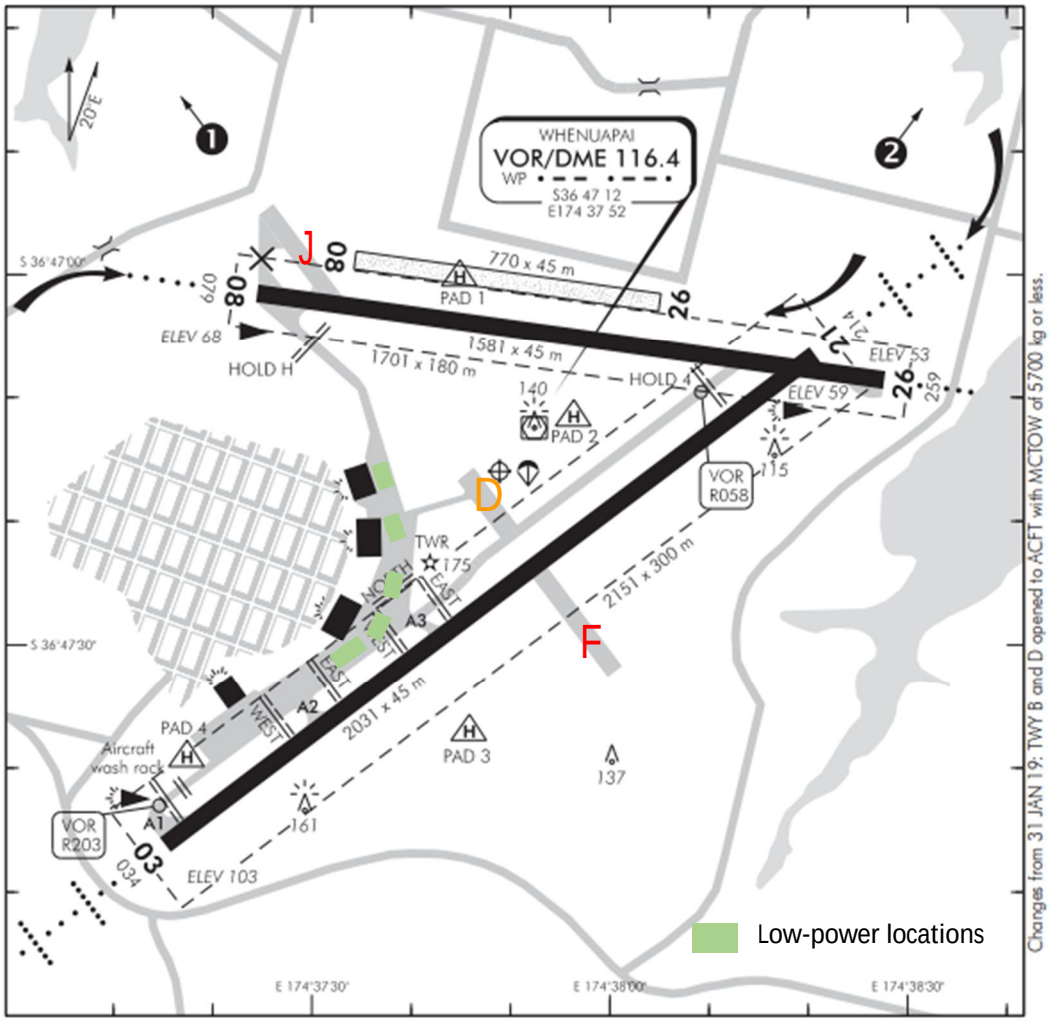

Figure 5.1: Airfield layout showing high-power engine testing locations marked (F & J currently used and D has been decommissioned) and low-power locations (source NZ AIP)

As set out in Section 1, there are three flying squadrons operating out of Whenuapai Airbase:

- No. 5 Squadron – Maritime Surveillance, using Lockheed P-3K2 Orion aircraft (large four engine turboprop).
- No. 6 Squadron – Naval Aviation, using Kaman SH-2G Super Seasprite helicopters.

[7] NZWP AD 2 - 51.1 (http://www.aip.net.nz/pdf/NZWP_51.1_51.2.pdf)

- No. 40 Squadron – Tactical and Strategic Transport, using Lockheed C-130H Hercules (large four engine turboprop military transport aircraft) and Boeing 757 aircraft (large twin engine jet airliner).

The P-3K2 Orion (P-3), which performs a search and rescue role, is being decommissioned and is being replaced by the P-8A Poseidon (P-8A) aircraft which will be based at RNZAF Base Ohakea. The P-3 will no longer operate from Whenuapai Airbase from around 2023. The P-8A will not provide full operational cover for the P-3 and additional aircraft resources may be required, which could be provided by either a new aircraft or increased use of the existing fleet (i.e. either additional aircraft or increased utilisation).

The following sections discuss the engine testing requirements of the different home aircraft, including what should be allowed for to account for future engine testing.

5.1 Engine testing requirements

Engine testing is required for scheduled maintenance or rectification maintenance. Scheduled maintenance is based on operating time or flying hours and is planned as part of the aircraft fleet management plan. Scheduled maintenance, and the individual tasks within the maintenance schedule, are set by the manufacturer and ensures aircraft are technically air worthy, i.e. fit and safe for flight operations. Rectification maintenance is completed when something fails or does not operate as expected, or when an inspection discovers a component or system not functioning correctly. This is responsive in its nature and cannot be planned for. This rectification maintenance may have to be undertaken at short notice to prepare aircraft for immediate deployment or for other operational reasons. Work may have to take place at night to ensure aircraft are available the following day or immediately following the maintenance.

Engine testing is generally classed into the following categories (this is not an exhaustive list).

Low-power:

- Leak checks.
- Operational and functional checks.
- Scheduled maintenance.
- Fault investigation.
- Pressurisation runs.
- Personnel training (tied into runs in the previous categories where possible).

High-power:

- Operational and functional checks.
- Fault investigation.
- Scheduled maintenance.
- Propeller balancing.
- Personnel training (as above).

Additionally, the P-3 is required to have approximately 15 minutes of high-power engine testing at the thresholds of the main runway (THR RWY 03 and THR RWY 21) prior to in-flight evaluation checks. These checks do not take place every flight and occur approximately every fortnight for each aircraft depending upon aircraft usage.

5.2 NZDF Base Standing Orders

The following 'self-imposed' restrictions are in place under current NZDF Base Standing Orders.

Currently authorised locations for high-power engine runs for C–130H and P–3K2 are:

- TWY Foxtrot (F).
- THR RWY 08.
- TWY Juliet (J).

The authorised location for high-power engine tests for B757 is THR RWY 08. No other locations can be used due to either the unsuitability of the surface for jet engine testing or jet blast safety considerations.

Low-power engine tests (nil throttle movement) lasting less than 20 minutes may be conducted on the aprons outside each squadron's hangar. High-power engine tests during day-time hours (0700-2200) can only occur after obtaining clearance from Operations. High-power tests are prohibited on TWY F overlay when prevailing wind direction is 225–255° due to propeller wash and fume hazards to neighbouring properties. Out of normal working hours, i.e. 2200-0700 hrs, high-power engine runs require prior authorisation by the Base Commander and can only take place on TWY J. During daylight savings this time is extended to 2300 hrs, which is different to the NZS 6805 definition of night-time, i.e. 2200-0700 hrs.

Historically TWY D was used for engine testing, however, due to the poor surface condition of TWY D, it can no longer be used. TWY D was decommissioned in early 2018 and is noted in the NZ AIP as only being suitable for aircraft taxiing (no engine testing) with a maximum certificated take-off weight (MCTOW) of less than 5,700 kg. None of the home aircraft at Whenuapai Airbase are less than MCTOW 5,700 kg. For night-time high-power testing, TWY F is now used instead of TWY D (together with continued use of TWY J).

Base Standing Orders do not explicitly impose any restrictions on engine testing with respect to noise, apart from the seeking the necessary approvals to perform engine testing at night. However, restrictions on wind direction when aircraft are using TWY F does have noise benefits for the closest dwellings on Rata Road and Kauri Road, due to the orientation of the aircraft and hence its noise signature. The Base is mindful of other noise management measures and these are discussed at Section 8.4.

5.3 Other practical requirements for engine testing

In addition to these Aviation Orders, there are additional practicalities that dictate when and where engine testing can and cannot occur. Some of these requirements are Whenuapai Airbase specific, whereas others are accepted practice for engine testing.

- Engine testing must not interfere with the operations that are taking place that day, by blocking a taxiway or interfering with the safe operation of the active runway. Runways must always remain open, especially for any emergencies which may require diverted aircraft to land. Runway clearance requirements must be met (depicted by the dashed outline around each runway as shown in Figure 5.1). This clearance ensures that aircraft do not penetrate the inner transitional side surface of the runway.
- Operational tasks such as search and rescue or humanitarian assistance / disaster relief response may mean that unscheduled engine testing has to be done in the evening or during the night. NZDF is required to have a P-3 or C-130H on standby and ready to be airborne within two hours at all times.

- When conducting high-power engine testing, aircraft are positioned into the wind to increase cooling and to minimise any in-flow air turbulence. Low-power engine runs do not require the aircraft to be positioned into wind.
- Due to the effects of jet blast and prop wash, engine testing can only occur within certain areas of the Base such that the effects of running engines do not pose a hazard for people, buildings, or other aircraft due to the potential to generate flying debris (FOD – foreign object damage).
- Noise effects on Base personnel (inside and outside offices/workshops and living quarters) are also a consideration.
- Low-power tests can occur anywhere on the apron and do not require the aircraft to be taxied to a specific area.
- During engine testing, engine settings may be increased from idle to a high-power setting to simulate what would happen in flight. Not all engine testing requires high-power settings.
- The frequency of engine testing fluctuates according to operational requirements. There can be days when no testing occurs and depending upon operational requirements, there can be busy periods prior to aircraft deployments or exercises.

There are also limitations on the use of high-power testing:

- Engines do not run at maximum power continuously during a high-power engine test, rather the engines are turned up and down throughout the entire power range. Generally, an engine will not run continuously at high-power for more than five minutes at a time due to the stress imposed on the aircraft.
- For aircraft with more than two engines, only one engine is run at maximum power at a time.

Meetings[8] have been held at Whenuapai Airbase with engineering personnel from No. 5 Squadron (P-3) and No. 40 Squadron (C-130H and B757) and other Base personnel. The most recent meeting was held in November 2019 and clarified several matters regarding the use of pulling power and high-power tests. From the two meetings the following additional information was obtained.

- It was confirmed that the Air Traffic Control (ATC) engine testing records record any movement of the throttle from ground idle (low-power) as a high-power engine run, even if maximum take-off power is not used.
- For a high-power engine test recorded by ATC, Base personnel considered that typically 50 % of the time is spent at low-power, i.e. ground idle and 50 % at a high-power setting. As noted above, a high-power setting is whenever the throttle is moved and does not necessarily mean maximum power and hence maximum noise.
- Base personnel indicated that the engine testing records were recorded on the sheets by ATC prior to the aircraft having completed its maintenance check. An engine test recorded as being 20 minutes in duration could, if an issue arose during the test, last either longer or shorter than that noted on the record sheet. In some situations, there may be a delay in the time of the planned test, and conversely a test may occur earlier than planned. Without going through each individual aircraft's maintenance log the ATC records are the best source of available information. Base personnel considered that the ATC records when aggregated across each aircraft type were representative of the tests being performed on Base (duration and time of occurrence).
- Analysis of the ATC engine testing records show that tests vary in duration from 20 to 120 minutes, with 60 minutes being the most common duration. From discussion with engineering

[8] Meetings held in October 2018 and November 2019.

staff, an engine test may involve multiple start / stops of engine(s). Hence there may not be continuous operation of the engines during a prolonged engine test.

Initial noise modelling for PC5 assumed that any movement of the throttle resulted in use of maximum take-off power. This assumption therefore resulted in depicting a greater noise impact than in practice. Following input from Base personnel at the last meeting, three power settings were established – ground idle, pulling power and high (maximum take-off) power. An example situation was provided that for a high-power test of a P-3, a 20-minute test could have approximately 10 % of the test being at 'pulling power', with only 1 minute of the test at high-power (i.e. 17 minutes of ground idle, 2 minutes at pulling power and 1 minute at high-power). In comparison to the PC5 assumption, this example results in an approximate 2-4 dB reduction. Base personnel provided a range of operating situations for which maximum power would be used. It was noted that not every test required use of maximum take-off power, which includes high duration testing of the Hercules. This information was also verified by a period of noise monitoring which is discussed later in this report (Section 6.6).

TWY D was decommissioned in early 2018. Base personnel confirmed that using the historic records it would be realistic to substitute a combination of TWY F and TWY J in place of engine testing that occurred on TWY D. For night-time testing, the total engine testing on TWY D and TWY F should be summed, with 90 % of the total moved to TWY F and 10 % to THR TWY 08 / TWY J. For daytime running a 50 / 50 split should be assumed between TWY F and TWY J. There are no current plans to recommission TWY D.

The P-3 is required to have a 15-minute engine test at the threshold of the main runway (THR RWY 03 or THR RWY 21[9]) prior to in-flight evaluation checks. This generally only happens about once every fortnight for each of the aircraft. The pre-flight test involves approximately ten minutes of low-power running and five minutes of high-power testing (maximum power rather than pulling power).

During the November 2019 meeting it was determined with Base personnel that a combination of unattended noise monitoring and further engine testing data would assist in establishing a representative breakdown of how long tests last and the variation in engine setting and hence noise level. This data collection is detailed in Section 6.5 and forms the basis of the assumptions regarding the future engine testing regime (Section 6.3).

[9] RWY 03 is used for 60 % of the time and RWY 21 is used for 40 % of the time.

6 Engine testing noise

6.1 Overview

Sound levels will vary around an aircraft during engine testing due to the directivity pattern of the engines and the noise generated from the propellers of turboprop aircraft. Sound level differences of 20 dB can be experienced around the aircraft with the highest sound levels generally being towards the rear and approximately 120° and 240° from the nose of the aircraft. At the lower power settings there can be a marked difference between the directivity pattern compared to a high-power test. As aircraft are positioned into wind for high-power testing the prevailing wind direction will influence the extent of the noise experienced around Whenuapai. For low-power tests on the apron the aircraft are assumed to be positioned in their normal parked position, which is typically with the nose of the aircraft towards the hangars.

The frequency content of the noise will also vary around the aircraft. For example, jet aircraft will generate higher frequency sound levels to the front of the aircraft due to compressor fan noise, whereas behind the aircraft jet mixing noise will result in a greater proportion of low frequency noise. The blade passing frequency of the turbo-prop aircraft will generate a noticeable peak in the frequency content of the C-130H and P-3 aircraft especially on axis to the propellers. As sound level propagation is dependent upon the frequency content of the sound it is important to characterise the frequency content of the aircraft noise source (higher frequencies are attenuated more quickly than low frequencies).

The overall level of engine testing noise is therefore dependent on:

- Aircraft type.
- Engine power setting.
- Duration at each power setting.
- Location of the aircraft.
- Orientation of the aircraft.
- Time of day (whether night-time penalty applies).

6.2 Engine records

Whenuapai Airbase has been recording engine testing records via ATC since 2017. These records record the planned date and time of the test, the aircraft type, duration of the test for low-power and high-power, the location and the prevailing wind direction. All aircraft requiring an engine test are required to communicate with ATC, especially when manoeuvring aircraft from the apron to the high-power testing locations. All manoeuvring is done by tractor and not under the aircraft's own power. The ATC is not staffed 24 hours a day and for afterhours running, testing is recorded separately by the individual squadrons. Engine testing normally takes place between Monday and Friday with occasional testing on the weekend.

For PC5 modelling, the ATC records covered a period of 124 days during which there was 61 days with recorded high-power tests and 101 days with low-power tests. During this period, high-power testing occurred on 15 nights.

T+T was provided with the original hand-written records which were prepared by ATC when any engine testing occurred[10]. These same records were used in 2018 to derive the contours that were included in the notified PC5.

The ATC records span from August 2017 to 19 January 2018, being 157 days in total. However, there was a large gap in recording data over the whole of December 2017 (hence the 124 days of valid data). During the period, there were periods of no engine testing which demonstrates the variability of engine testing, i.e. unlike a commercial airport with scheduled flights there is a variability at Whenuapai Airbase on a week-to-week basis. This variability must be considered when developing a future engine testing scenario for noise modelling.

Figure 6.1 provides a breakdown for the entire recording period of the number of engine tests performed by each aircraft type split into day (0700-2200) and night (2200-0700).

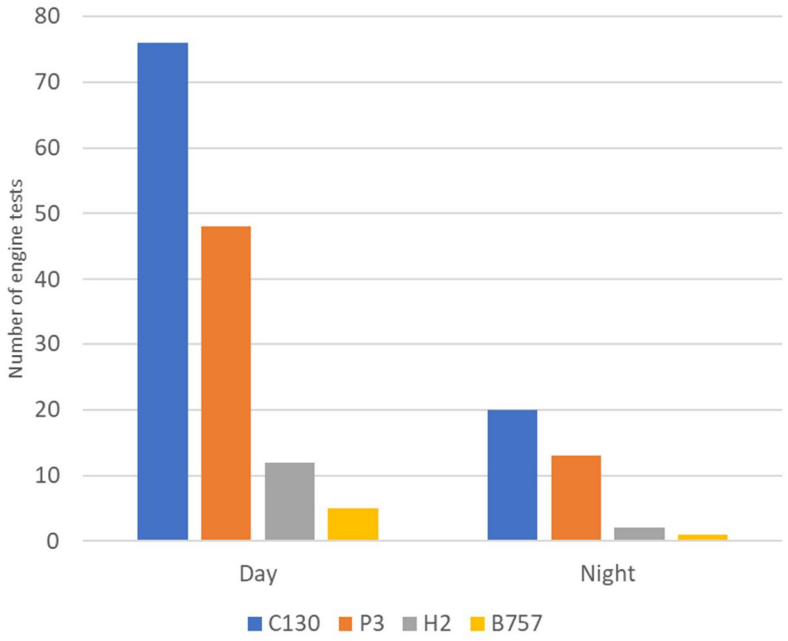

Figure 6.1: Breakdown of engine testing by aircraft type over 124 days

The time of day breakdown is provided in Figure 6.2, and Figure 6.3 provides the duration of engine testing (both low and high-power combined) as recorded by ATC.

Most of the engine testing takes place during daytime hours. Night-time testing occurs more frequently during the period 2200 to 0000 hrs.

[10] The records provided include a separate log of out of hours records when the ATC was closed. These additional records were recorded by engineering personnel and provided additional information on engine testing. All subsequent references to ATC logs include these out of hour records.

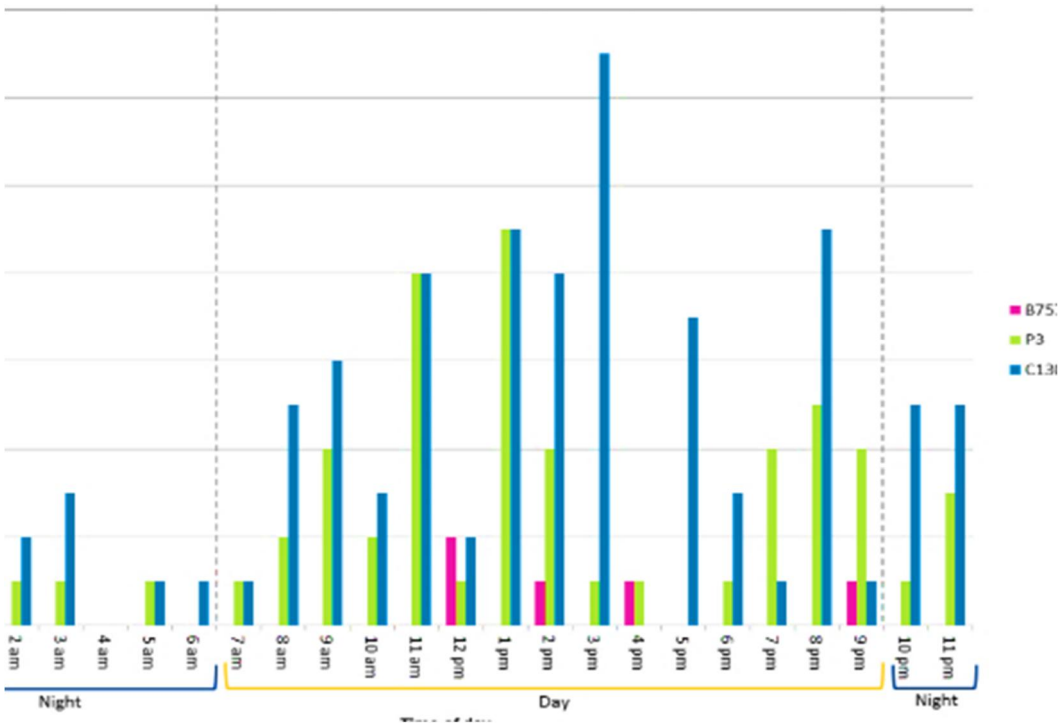

Figure 6.2: Count of engine runs by aircraft type and time of day over 124 days

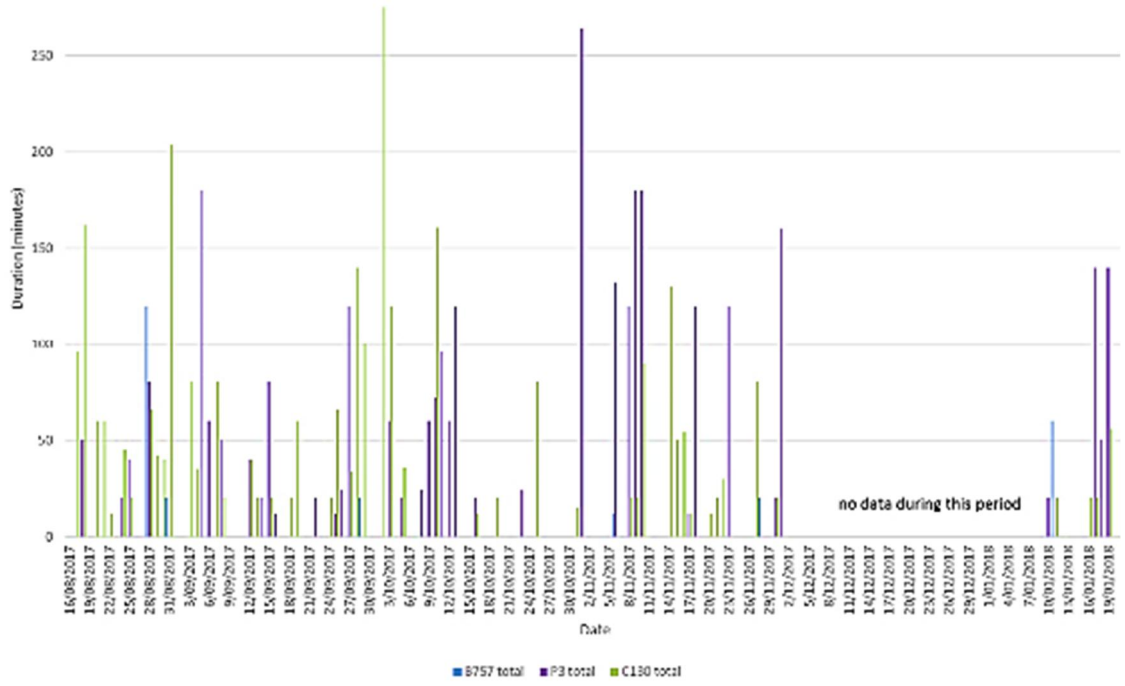

Figure 6.3: Total duration of engine testing per day over period August 2017 to January 2018

Figure 6.3 highlights the variability of engine testing and that for some weeks there is minimal engine testing. This is further emphasised by the breakdown in the ATC records for low-power (Figure 6.4) and high-power (Figure 6.5) testing. There are significant periods of no high-power runs during the assessment period. In some cases a week or more can go by between high-power testing. Therefore a long term appraisal of engine testing is required to establish a representative level of testing rather than simply relying on a two to four week 'snapshot'.

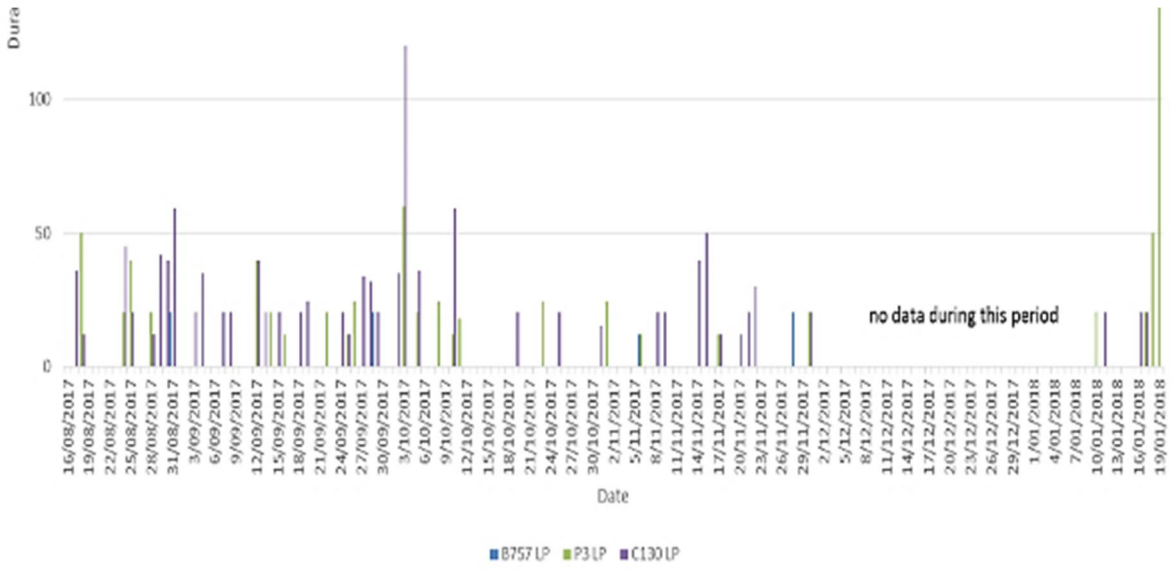

Figure 6.4: Total duration of low-power engine testing per day over period August 2017 to January 2018

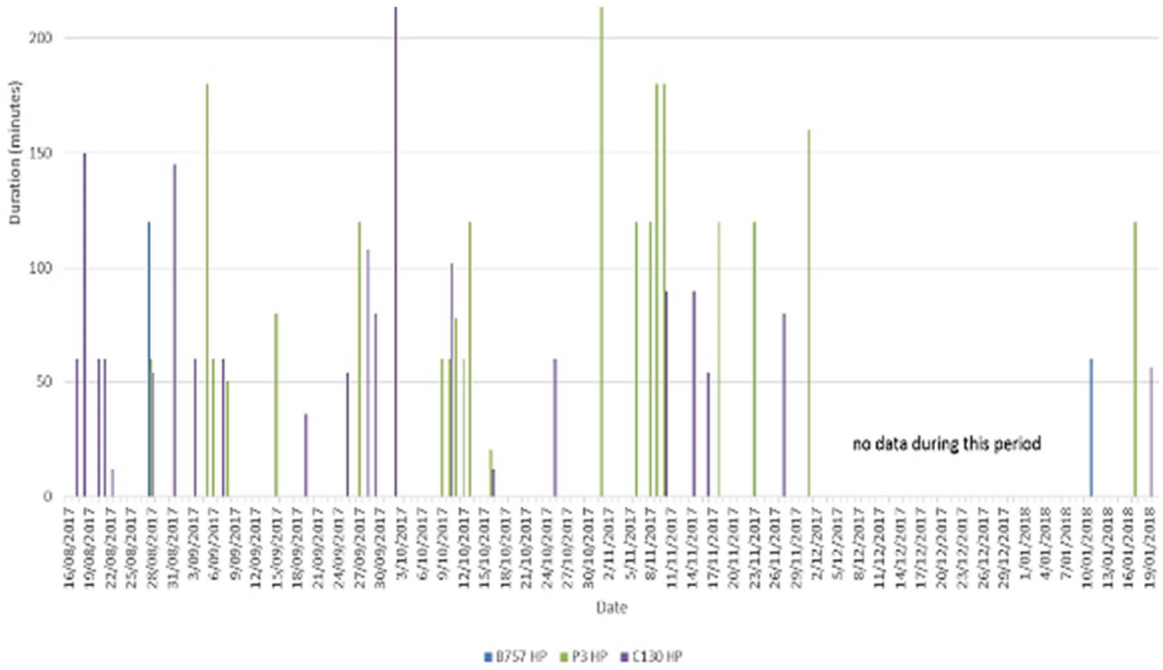

Figure 6.5: Total duration of high-power engine testing per day over period August 2017 to January 2018

The total duration over a rolling 7-day period was calculated, and two 7-day periods were established from the engine testing records which represented a busy period and a noisy period. The busiest week is based on duration only, with no weighting for night-time duration. The noisiest week included the 10 dB night-time penalty and reflects the greatest level of noise.

The busiest 7-day week commenced 27 September 2017 and had three hours of C-130H night-time running logged on 3 October 2017, as well as over 11 hours of C-130H daytime running over the course of the week. In addition, there was some running of B757 and P3 aircraft. The noisiest 7-day week commenced 9 October 2017 and included five hours of P3 running at night over the 7 days.

The noisiest week has been used as the basis for calculating the engine testing contours as this reflects the noisiest period during the 124 days. The resulting contours represent the 'base case', or

existing environment based on the worst case (noisiest week) for the purposes of establishing land use controls.

6.3 Future engine testing regime

The C-130H is by far the most common aircraft which performs engine testing. At Whenuapai Airbase there are five C-130H aircraft and in June 2020 the Government announced the replacement of the aging 'H' variant with five C-130J Super Hercules in 2024/2025. The C-130J has updated engines and propellers, as well as being able to carry heavier payloads. The overall noise signature when engine testing is similar to the H-version, albeit that the blade passing frequency increases to 102 Hz[11] compared to 68 Hz for the C-130H[12]. This change results in a different noise character for the replacement Hercules. Due to changing circumstances the role of the future Hercules fleet may change resulting from a greater need to support future operations and this should be allowed for when developing noise contours for engine testing that will control the noise that can be generated by the activity in the future.

Similarly, the two B757s are likely to be replaced in the future due to increasing maintenance requirements to keep these aircraft operational. These two aircraft currently provide freight and passenger services. Although the replacement aircraft hasn't been identified, it may be larger in size with different noise characteristics. The maintenance requirements of these replacement aircraft are unknown; however it is reasonable to assume that future aircraft will perform engine testing in a similar manner to the B757 fleet.

As the P-3 will be replaced by the P-8A in 2023, which will be based at Base Ohakea, there will be no further P-3 engine testing once the P-8A has commenced full service. As mentioned previously, additional aircraft, which are not currently within the NZDF fleet, will be needed to supplement the role of the P-8A. This aircraft fleet could be based at Whenuapai Airbase. As the aircraft type and numbers are currently unknown, the noise signature and engine testing records of the P-3 have been incorporated into the future engine testing scenario as a place holder. This includes an element of engine testing at the thresholds of the main runway during daytime hours to potentially accommodate this activity prior to inflight evaluation tests. NZDF has confirmed that inclusion of the P-3 is appropriate given the unknown future situation regarding the additional aircraft.

The H-2 helicopter entry in the data is rotary wing engine testing of the SH-2G. Noise levels from this aircraft will be significantly lower than from other aircraft and will not materially affect overall predicted levels of engine testing noise. Any engine testing of the helicopter is performed on the apron and only low-power is used. This aircraft type has therefore been disregarded in this assessment.

In summary, engine testing noise from C-130H, P-3 and B757 aircraft was assessed for the noisiest period of operations.

To account for future operations and aircraft types, the noisy week engine testing durations have been increased by 20%. This factor equates to an approximate 1 dB increase in engine testing noise levels compared to the existing environment contours, a level of average noise increase which is not discernible. NZDF has confirmed that within this allowance, there is sufficient scope to allow for an

[11] George, E.J. (2001). C-130J Human and equipment vibration environment investigation (AFFTCPRR-01-01). Edwards Air Force Base, CA: Air Force Flight Test Centre.
[12] Cook, R., & Jarvis, G. (2002). Vibration & acoustic assessment of the C-130J-30 and C-130H transport aircraft (NAL Consulting Commissioned Report No. 303). Chatswood, Australia: National Acoustic Laboratories.

increase in future operations. In addition, within this 20%[13], any modelling uncertainty associated with the engine testing records is allowed for, as discussed in Section 6.6.

6.4 Aircraft locations

All aircraft are generally positioned outside the relevant squadron hangars and aprons on the airfield as shown in Figure 5.1. It is only when performing certain types of engine tests that the aircraft will be moved, as noted in the Base Standing Orders. The high-power locations are shown in Figure 5.1.

6.5 Measured sound levels

Measured sound level data has been used for each of the three aircraft in the assessment: the B757, C-130H and P-3. Data for each aircraft type included both octave data (or finer resolution 1/3rd octave data) and polar data. Several engine power scenarios were measured for each aircraft, for example low-power, and different running options for high-power.

6.6 Noise monitoring

Noise monitoring was conducted at Whenuapai Airbase between Wednesday 13 November 2019 and 29 November 2019. Two Ngara noise monitors were installed at the locations shown in Figure 6.6. Location 1 was positioned near to TWY F to record noise from engine testing on the taxiway and Location 2 near to the RWY THR 08 and TWY J for engine testing of B757 aircraft. The equipment was setup to continuously record one second data. The principal aim of the survey was to record the variation of engine testing noise levels. Engine testing records were provided by Whenuapai Airbase as to which aircraft was being tested and the type of test being performed during the survey. The overall noise levels from each monitor also provided information that could be used to validate/calibrate the engine testing noise model.

[13] The Airports Council International indicates a growth rate of 2% per annum for aircraft movements at commercial airports i.e. 40% forecasted growth over a 20-year period (https://aci.aero/data-centre/annual-traffic-data/). While not directly relevant, the 20% adopted for Whenuapai Airbase is considerably lower than this.

Figure 6.6: Noise survey locations (source Google Earth imagery 2019)

Weekly measured noise level data is provided in Figure 6.7 and Figure 6.8. The data shows the normal diurnal variation of the noise environment at each location due to on-Base and off-Base noise (aircraft and general environmental noise sources such as road traffic).

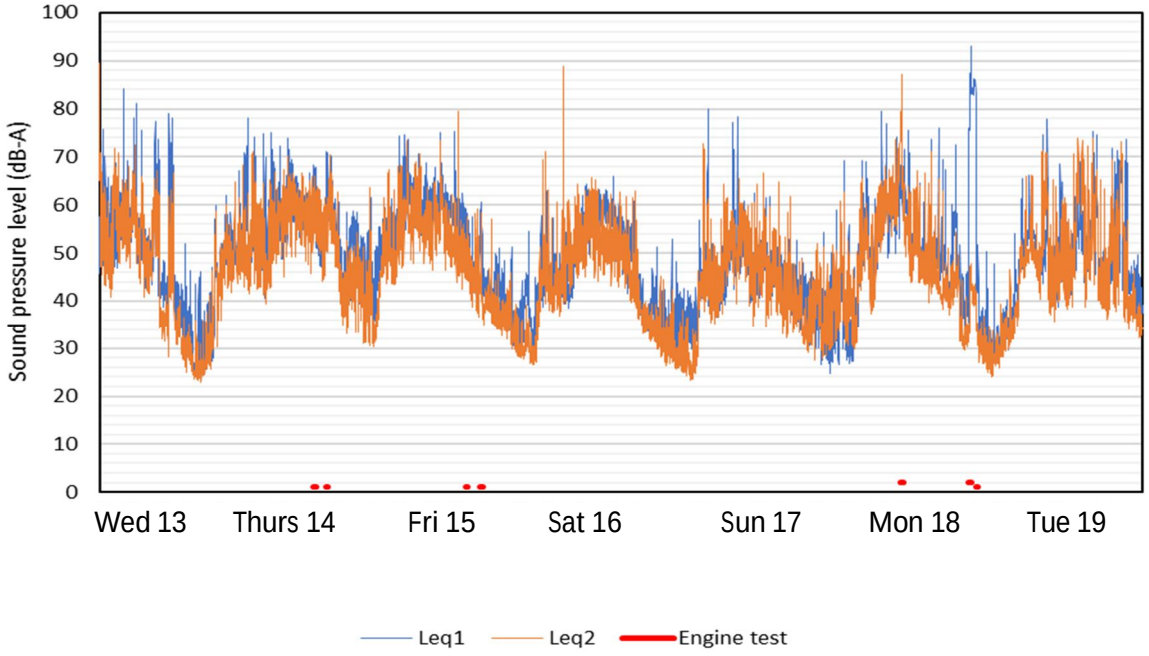

Figure 6.7: Week 1 time history data

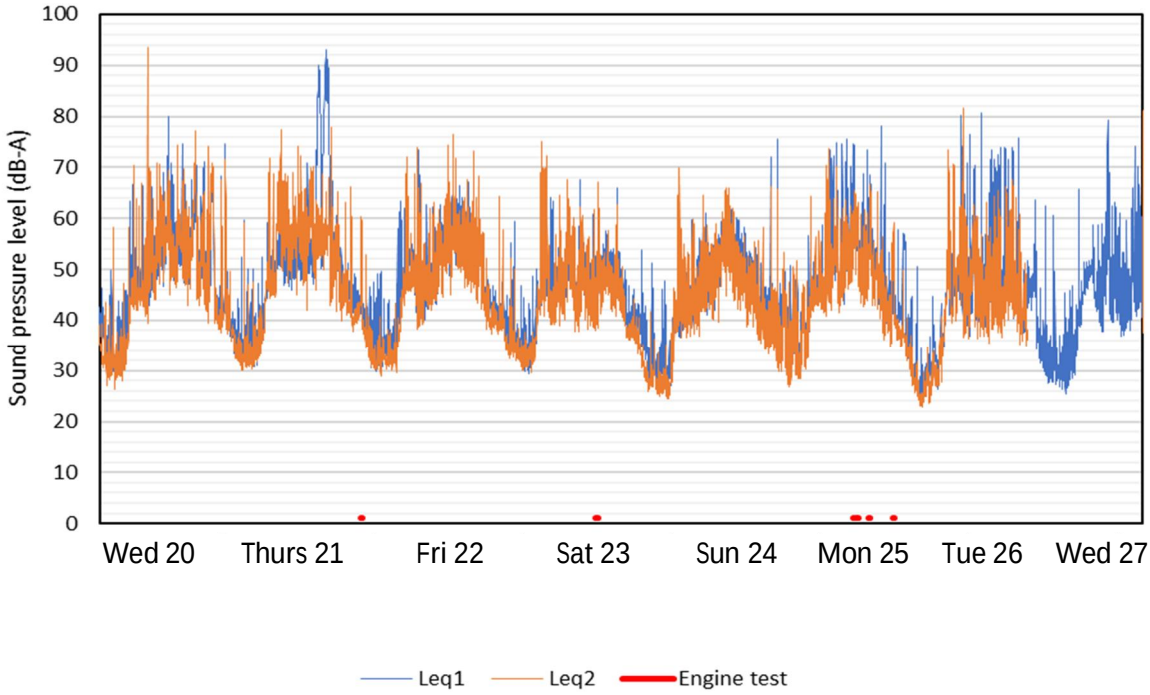

Figure 6.8: Week 2 time history data

Figure 6.9 shows an example of a two hour C-130H test involving running each engine at high-power. The aircraft was positioned on TWY F. A more detailed engine test breakdown is shown in Figure 6.10. In the ATC records high-power engine testing of a C-130H on TWY F was scheduled to be completed in 20 minutes and prior to 2200 hrs. The test shows the engine testing running until approximately 2300 hrs. This example highlights a limitation in the ATC records. While the 7-day period during which the test was conducted was not busy, as the test extended into the night time period the resulting noise impact would have been much greater than if the ATC records alone were relied on. This therefore justifies the addition of a headroom factor which should be applied to the noisy engine testing period to reflect situations such as this example.

Considering the potential for a future change in the engine testing regime (Section 6.3) and any limitation in the ATC records, it is considered that the 20% adjustment discussed previously would allow for any uncertainties in the engine testing contours both now and in the future, i.e. in at least 10 years' time.

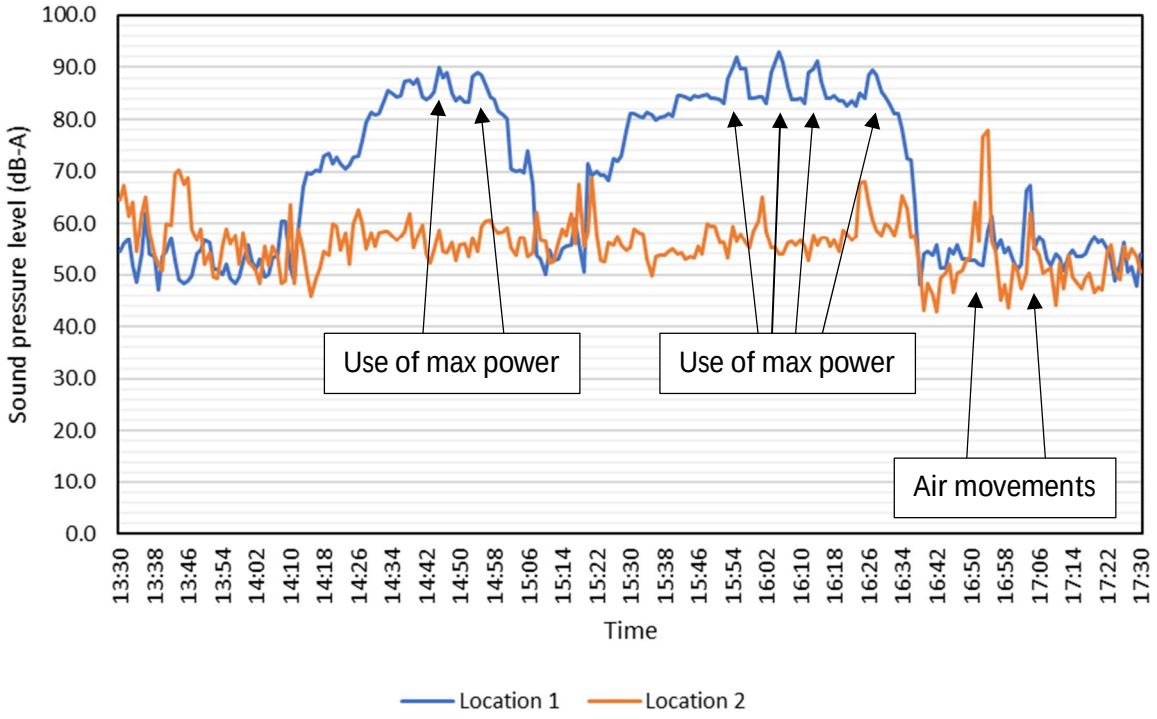

Figure 6.9: Thursday 21 November 2019 C-130H engine test showing a pause during the testing

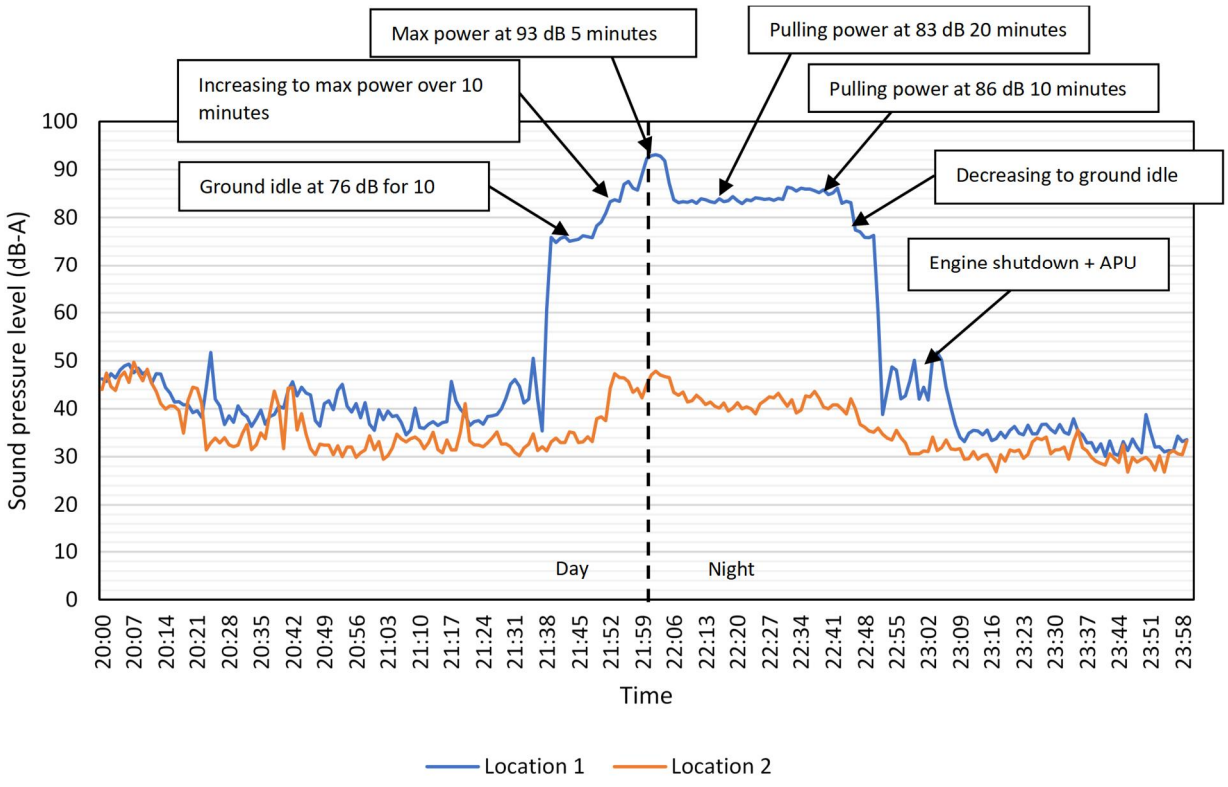

Figure 6.10: C-130H engine test on Monday November 18 2019

6.7 Aircraft orientation

Wind data for Auckland Airport was obtained and the long-term wind rose for the area is shown in Figure 6.11. A much shorter duration dataset for the local area around Whenuapai Airbase was cross

referenced to the long-term data and found to be comparable. As the wind direction influences the orientation of the aircraft at Whenuapai Airbase for high-power engine testing, this information will influence the pattern of noise received around the airfield and may result in higher sound levels at locations that are downwind of aircraft more often.

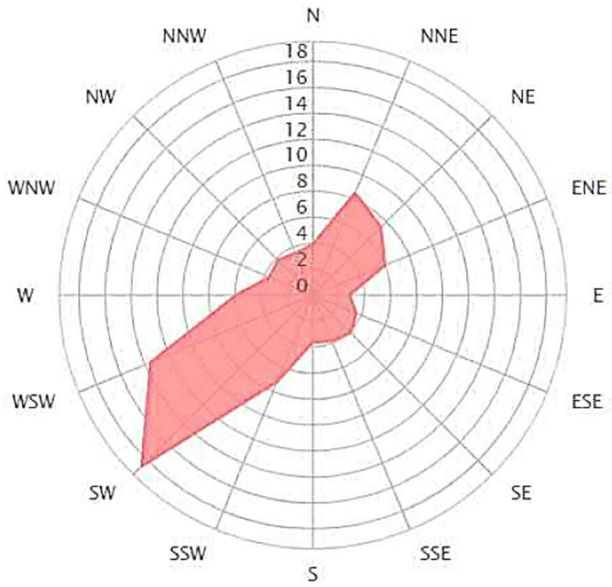

Figure 6.11: Long term wind rose for Auckland Airport (% distribution)

As noted in Section 5.2, the current Aviation Orders prohibit engine testing for certain wind vectors. The wind rose above and the individual aircraft polar plots were combined to create a long-term average directivity pattern for each aircraft type. The source directivities were weighted proportionally according to the wind rose as per the following simplified example. If the wind rose is taken as 75 % from the SW and 25 % from the NE then the directivity for the aircraft would be rotated to 225° (SW) and weighted as 75 %, then rotated to face 45° (NE) and weighted for 25 % of the time. These two weighted directivities would be summed for each direction.

7 SoundPlan noise model

SoundPlan 8.2 software was used to produce the engine testing noise contours using the sound propagation calculations of ISO 9613. ISO 9613:1996 predicts sound levels under moderate downwind conditions and is independent of the source directivity corrections performed in this assessment.

Land Information New Zealand (LINZ) ground contours with a resolution of 1 metre were processed to form a digital elevation model. This terrain data provides a degree of shielding when there is no line of sight between the source of the noise and receiver location. Building footprints were also obtained from LINZ. These were set to have a uniform height of 6 m, with no reflectivity, whereas hangars were set to a height of 12 m.

Ground absorption was set to 1, i.e. soft ground across the site. A penalty of 10 dB was applied to all night-time running. A receiver calculation grid of 4 metres above local ground height was used for the calculations.

7.1 Sound level data

Sound power levels were calculated assuming hemispherical radiation. Each aircraft is treated as a point source which is appropriate given the calculation distance. Directivity was applied to each point source as per the aircraft orientation described in Section 6.7.

Table 7.1: Aircraft source data

Aircraft Type	Sound Power Level L_{WA} / dB		
	Low-power	Intermediate or "pulling" power	High-power
P-3	139	142	147
C-130H	127	136	140
B757	130	142	150

The low-power and high-power data has been taken from the 2018 dataset, and the pulling power taken from an analysis of the noise monitoring and from additional sources of engine performance data[14].

The aircraft noise sources were modelled at the following heights; representative of the mid-point of the engines, following consultation with Whenuapai Airbase personnel:

- B757 at 2.3 m.
- C-130H at 4.1 m.
- P3 at 2.9 m.

7.2 Duration

The following rolling average 7-day durations were used (data represents the time for one single 24-hour period). This data was taken from the noisy week beginning 9 October 2017.

[14] Taken from a number of sources including BADA (Base of Aircraft Data) and technical reports from the USAF and UK RAF.

Table 7.2: Noisy scenario – base case modelled data

Aircraft	Power setting	Location	Daytime duration (min)	Night time duration (min)
B757	Low	15	3	
C130	High	TWY F	15	
	low	Area 11		2
P3	Low	Area 3	2	2
	Low	Area 7	2	
	Low	TWY F		3
	High	TWY F	9	23
	High	TWY J		22
	Low	THR 03	12	
	Low	THR 21	8	
	High	THR 03	6	
	High	THR 21	4	

For high-power testing, the time spent at “pulling power”, i.e. between 70-85 % of full power, maximum power was taken as 90 % pulling power and the remainder as maximum take-off power. This breakdown has been derived from discussions with NZDF personnel and November 2019 noise monitoring.

8 Engine testing noise levels

8.1 Engine testing contours

The modelled engine testing noise contours that NZDF are seeking Auckland Council to include in PC5 are presented at Appendix D.

The SoundPlan modelling output has been smoothed to remove any modelling 'irregularities'. Contour smoothing is the preferred method of presenting aircraft noise contours, especially for engine testing which is strongly influenced by terrain and building shielding.

8.2 Absolute sound levels

Table 8.1 provides sound level data for the three aircraft types tested at Whenuapai Airbase, together with estimated sound levels at different distances for each power setting. This distance data is based on the maximum level of noise from the aircraft, i.e. towards the rear of the aircraft. Unlike the engine testing contours, which are based on a 7-day Ldn average, this table provides an indication what the sound level could be during a specific engine test.

Table 8.1: Aircraft sound levels

Aircraft Type	Power setting	Sound power L_{WA} dB	Sound Pressure Level at distance – dB(A)					
			100 m	200 m	300 m	400 m	500 m	600 m
P-3K2	Low	139	90	82	78	75	73	71
P-3K2	High	147	98	90	86	83	81	79
C-130H	Low	127	78	70	66	63	61	59
C-130H	High	140	91	83	79	76	74	72
B757	Low	130	81	73	69	66	64	62
B757	High	150	101	93	89	86	84	82

8.3 Noise effects

Individuals living around Whenuapai Airbase currently hear aircraft. After a period of time based on their experiences, it is likely that they will be able to discern the difference between an aircraft taking off and landing compared to an aircraft performing an engine test[15]. Unlike a commercial airport which has reasonably well defined periods of aircraft activity, the noise generated by NZDF aircraft is more variable. For engine testing, this variability will mean that there are periods (couple of days or more) of no activity to periods of high activity (including night time engine testing) as aircraft are prepared for operations. The future engine testing scenario has used the actual worst case period of engine testing records and applied a 20% allowance to allow for a future situation.

The worst case period used to derive the engine testing contours occurred in a continuous 7-day period from a total of 124 days of recorded engine tests. Although the duration of engine testing during this worst case period has been increased by 20%, engine testing in the future may mean that there is more frequent testing. This may mean 'more of the same' (greater frequency of testing), or that different and potentially noisier aircraft will be introduced in the next 10-20 years. Whichever situation arises, the inclusion of engine testing noise contours in the AUP via PC5 will assist in managing the noise effects of engine testing by introducing land use planning controls.

[15] Unlike the noise generated by air movements on the runway (taking off and landing), engine testing noise can be prolonged – this is demonstrated by the sound level data shown in Figure 6.9.

As engine testing at Whenuapai Airbase is only conducted at specific locations, noise effects are localised around the airfield. As is often the case, the engine testing noise contours extend further from the airnoise contours in the areas between runway ends (see Appendix A). This is due to noise from aircraft taking-off or landing having less overall sound energy (in terms of duration) compared to engine testing noise. Within these areas, noise sensitive land uses can expect engine testing noise to be clearly audible in comparison to ambient noise levels. The noise experienced varies in magnitude and character depending upon the location of the listener. The highest noise levels occur towards the rear of the aircraft and have a more pronounced low frequency component compared to noise generated to the front.

As the engine testing contours (Appendix D) are an average of a 7-day period, event specific sound levels (see Table 8.1) can exceed 70 dB when experienced during a high-power engine test anywhere within the 57 dB Ldn contour. Within the 65 dB Ldn contour sound levels can exceed 75 dB during high power engine tests. As residents experience noise inside and outside their dwellings, an indication of the potential noise effects is provided in Table 8.2.

Table 8.2: Subjective response to environmental noise levels

External sound level (LAeq)	Potential daytime effects outdoors	Corresponding internal sound level (LAeq)	Potential daytime effects indoors[1]
Up to 65 dB	Conversation becomes strained, particularly over longer distances.	Up to 45 dB	Noise levels would be noticeable but unlikely to interfere with residential activities.
65 to 70 dB	People would not want to spend any length of time outside	45 to 50 dB	Concentration would start to be affected. TV and telephone conversations would begin to be affected.
70 to 75 dB	Outdoor users would experience considerable disruption.	50 to 55 dB	Phone conversations would become difficult. Personal conversations would need slightly raised voices. For residential activity, TV and radio sound levels would need to be raised.
75 to 80 dB	Some people may choose hearing protection for long periods of exposure. Conversation would be very difficult, even with raised voices.	55 to 60 dB	People would actively seek respite when exposed for a long duration.
80 to 90 dB	Hearing protection would be required for prolonged exposure (8 hours at 85 dB) to prevent hearing loss.	60 to 70 dB	Untenable for residential environments. Unlikely to be tolerated for any extent of time.

1 - Note: The adjustment factor between the external noise level and the internal noise level is based on a 20-dB reduction as allowed for in NZS 6803:1999 'Acoustics – Construction noise'. 20 dB is considered to be the typical sound reduction achieved in New Zealand buildings with doors and windows closed.

Historically engine testing of aircraft has been undertaken at Whenuapai Airbase for a considerable period of time. For example, the C-130H aircraft of No. 40 Squadron were procured in the mid to late 1960s and the noise generated by C-130H engine testing has been a feature of the local noise environment for over 50 years. Although the frequency of engine testing may have changed over time, which would affect the Ldn, the absolute levels of noise will not have changed.

For some of the closest existing dwellings outside the designation boundary on Rata Road and Kauri Road (approximately 370 m from an engine test), high-power noise levels of approximately 75-80 dBA can be expected for short periods. When outdoors, conversation will be difficult even with raised voices. Noise levels will be similar to being next to a busy road with large trucks driving by. When indoors, TV and radio sound levels would need to be increased and personal conversation would need raised voices even with windows and doors closed. At lower power settings, conversation outdoors would start to be affected if people are standing more than 5 metres apart and noise levels indoors would be noticeable but unlikely to interfere with residential activities.

8.4 Engine testing noise management

There are existing procedures in place at Whenuapai Airbase to manage engine testing noise (see Section 5.3). For example, Base Standing Orders require that any night-time engine testing must have prior approval from the Base Commander and there are certain limitations on when high-power engine testing can be performed on TWY F due to its proximity to dwellings on Rata Road and Kauri Road. From discussions with Base personnel, the Base is also cognisant of the noise effects on the Base community which also includes the noise experienced by Base personnel within offices/workshops and living quarters.

From discussions with Base personnel and having reviewed the existing controls, Whenuapai Airbase manages engine testing noise in a similar manner to other airports according to three considerations:

1 Location – can the engine testing be conducted at a location which minimises the noise experienced at noise sensitive locations? If distance alone does result in a positive outcome, then the number of people affected needs to be considered by limiting the number of people exposed to high levels of noise. Another consideration is that the location of engine testing must maintain safe operation of the taxiways and runway(s), therefore engine testing locations are usually near the outer edges of the airfield away from the runways and active taxiways.

2 Time of day – can the engine testing be carried out in the non-sensitive periods of the day, i.e. 0900-1500 hrs for example. If testing must be carried out in the evening and night, can it be completed as early as practicable?

3 Orientation – For high-power testing aircraft have to be positioned into wind, however can engine testing wait until favourable conditions occur such that the highest noise levels are not in the direction of noise sensitive locations?

All of these considerations indicate that, wherever practicable, Whenuapai Airbase manages engine testing noise to minimise adverse noise effects and that the extents of the engine testing contours are constrained by these noise management and mitigation measures.

9 Conclusions

Engine testing noise contours for Whenuapai Airbase have been developed to be included in Auckland Council's PC5.

The noise from engine testing has been modelled using computer software using data from a 7-day period of considerable low-power and high-power aircraft engine testing. To allow for future changes which could occur, the time spent at each power setting has been increased by a factor of 20%.

Two noise contours have been produced:

- 65 dB Ldn engine testing Inner Control Boundary - within which the amount of aircraft noise exposure is sufficiently high to require appropriate land use controls or other measures to avoid, remedy or mitigate any adverse effects on the environment, including effects on community health and amenity values. These controls typically prevent new noise sensitive development being constructed.
- 57 dB Ldn engine testing Outer Control Boundary – within which there should be sound insulation performance requirements for new or altered buildings to ensure a reasonable level of indoor noise amenity with windows and doors closed.

The extents of the engine testing contours are constrained by noise management and mitigation measures that are implemented at Whenuapai Airbase. The engine testing noise contours are therefore localised around the Base and reflect the locations where engine testing takes place.

It is recommended that the engine testing noise contours included at Appendix D are reflected in PC5.

10 Applicability

This report has been prepared for the exclusive use of our client the New Zealand Defence Force, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that this report will be used by Auckland Council in undertaking its regulatory functions in connection with PC5.

Tonkin & Taylor Ltd

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
	
.....	.....
Darran Humpheson	Karen Baverstock
Senior Acoustics Specialist	Project Director

DAHU
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11 Glossary of Terms

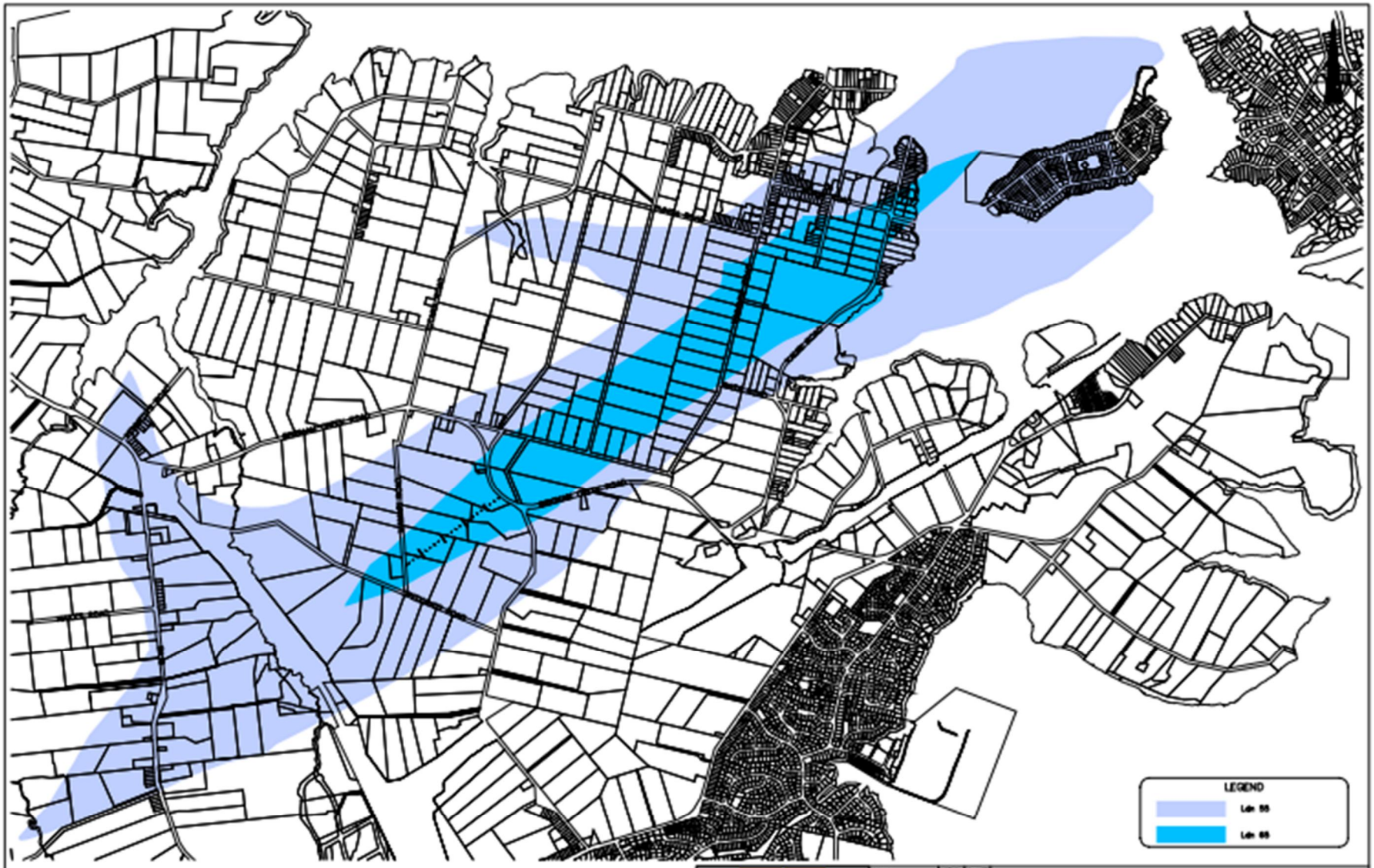
Term	Definition
AIP	Aeronautical information publication - http://www.aip.net.nz/
Airnoise	The noise from aircraft in flight while departing from and arriving at an aerodrome. That includes the noise of the take-off ground roll and use of reverse thrust after landing. It excludes the noise of taxiing and from all other aircraft and non-aircraft sources within the aerodrome boundaries - which together are referred to as ground noise.
Airnoise boundary	Area around an airport within which the current or future daily amount of aircraft noise exposure will be sufficiently high as to require appropriate land use controls or other measures to avoid, remedy or mitigate any adverse effect on the environment, including effects on community health and amenity values whilst recognising the need to operate an airport efficiently.
APU	Auxiliary power unit
ATC	Air traffic control
AUP	Auckland Unitary Plan
CoS	Chief of Staff
Decibel (dB)	A unit of measurement on a logarithmic scale which describes the magnitude of sound pressure with respect to a reference value (20 µPa).
Ground-noise	Sound or noise emanating from an aerodrome from sources other than aircraft taking off and landing. These include aircraft taxiing, maintenance activities, auxiliary power units, surface vehicles and any other sources within the aerodrome boundaries. It excludes the noise from aircraft on the runways and in flight while departing from and arriving at the aerodrome which is referred to as air noise.
Hertz (Hz)	Unit of frequency – the number cycles per second of a wave form.
$L_{Aeq(t)}$	The A-weighted time-average sound level over a period of time (t), measured in units of decibels (dB).
L_{Amax}	The maximum A-weighted sound pressure level over a period of time or of a particular noise event, measured in units of decibels (dB).
Ldn	The A-weighted time weighted average sound level over a period of 24 hours after the addition of 10 decibels to sound levels measured during the night (2200-0700).
$L_{Aeq,t}$	The A-weighted time weighted average sound level over a period of time, t.
L_w / SWL	Sound power level of a source, measured in decibels (dB).
MRO	Maintenance repair and overall.
RWY	Runway
SEL / L_{Ae}	Sound exposure level – the A-weighted sound pressure level which is maintained constant for a period of one second would contain the same sound energy of a given noise event.
THR	Threshold of runway
TWY	Taxiway
Noise	Unwanted sound
Noise contour	A line of constant value of cumulative aircraft noise level or index around an airport.
Outer control boundary	An area outside the airnoise boundary within which there shall be no new incompatible land uses

Every 10 dB increase in sound level doubles the perceived noise level. A sound of 70 dB is twice as loud as a sound level of 60 dB and a sound level of 80 dB is four times louder than a sound level of 60 dB. An increase or decrease in sound level of 3 dB or more is perceptible. A change in sound level of less than 3 dB is not usually discernible, with a 1 dB change not being perceptible.

As sound levels are measured on a logarithmic scale, the following chart provides examples of typical sources of noise.

Decibel (dB)	Example
0	Hearing threshold
20	Still night-time
30	Library
40	Typical office room with no talking
50	Heat pump running in living room
60	Conversational speech
70	10 m from edge of busy urban road
80	10 m from large diesel truck
90	Lawn mower - petrol
100	Riding a motorcycle at 80 kph
110	Rock band at a concert
120	Emergency vehicle siren
140	Threshold of permanent hearing damage

Appendix A: Condition 1 of Designation 4130 – noise contours


LEGEND
Ldn 55
Ldn 65
SCALE 1:20,000
0 200 400 600 800 1000 (m)
ORIGINAL IN COLOUR
Property boundaries sourced from Land Information New Zealand data as at 7-Feb-2012 (Crown Copyright Reserved).
Tonkin & Taylor
Environmental and Engineering Consultants
NEW ZEALAND DEFENCE FORCE
NOISE CONTROL AREA
NZDF WHENUAPAI
Site Plan
Figure 9A-2
0

Appendix B: AUP aircraft noise overlay Whenuapai Airbase

Source - https://unitaryplanmaps.aucklandcouncil.govt.nz/upviewer/

Appendix C: Community response to aircraft noise

C1 Factors in community response to noise

Community response to noise is affected by a wide range of factors, both physical and psychological. The physical factors are easier to quantify and include (for aircraft noise) the number of flights, the duration, and the frequency of events. The measurable noise level will affect the response, as well as the time of day or night that flights occur. The difference in noise level between the event and the general level of background noise is also important.

Psychological factors are a lot more subjective, and therefore much harder to quantify. These include people's perception of the noise source, and whether they think it is reasonable, as well as their general sensitivity to noise. This may depend on tasks being undertaken and time of day amongst other factors.

C2 Types of response to noise

Psychological or behavioural responses to noise start with disturbance: distraction from tasks, sleep disturbance and speech interference. At a higher level of noise this will lead to annoyance, and action such as making complaints.

Physical or physiological responses to noise range from health effects such as stress to noise induced hearing loss.

C3 Community response to noise

A community's response to noise will vary widely with different people's sensitivities and perceptions. There is no simple indicator of how a certain level of noise will be perceived by a community.

Schultz (1978) compared the percentage of survey respondents who were 'highly annoyed' with the day-night noise level for different modes of transport noise, including aircraft noise, and produced a dose-response curve, commonly known as the Schultz curve (shown below). This demonstrates that community annoyance levels can be correlated with the long-term noise exposure of that community. For aircraft noise the dose-response relationship occurs at lower sound levels, i.e. people are generally more annoyed by aircraft than other sources of environmental noise.

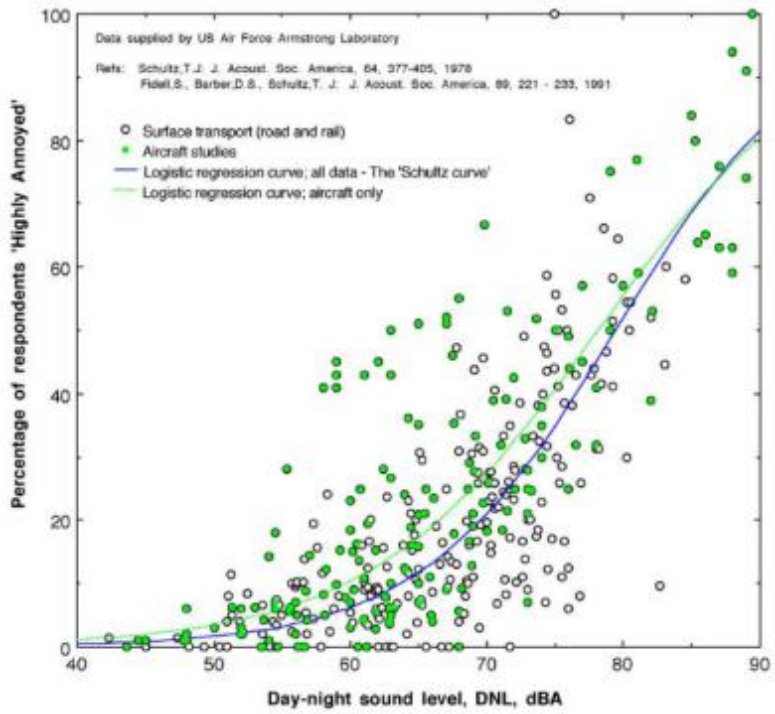
An extensive survey was undertaken by the CAA in 1980 of people living in close proximity to airports around the UK (CAA, 1985). The results of the Aircraft Noise Index Study (ANIS) were subsequently compared to the Schultz curve and showed the same general trends.

An Ldn of 65 dB corresponds to 20% of the community being highly annoyed from the Schultz curve, and this value is taken as the threshold of significant noise exposure, above which noise levels are not acceptable for residential activity. At approximately Ldn 55-57 dB adverse annoyance begins for the community as a whole.

Since Schultz there have been other studies – Kryter (1982 & 1983); Fidell et al. (1991); Miedema and Vos (1998); Miedema and Oudshoorn (2001), which have undertaken further work and reported meta-analyses of community noise studies.

The Miedema and Oudshoorn (2001) study analysed the dose response data from multiple studies and established a polynomial approximation between Ldn and annoyance for aircraft:

$\%HA : -1.395x10^{-4} (Ldn-42)^3 + 4.081X10^{-2} (Ldn-42)^2 + 0.342(Ldn-42)$



CAA (1985), DR Report 8402 - United Kingdom Aircraft Noise Index Study: Main Report

Fidell, S., Barber, D. S., and Schultz, Th. J (1991). Updating as dosage-effect relationship for the prevalence of annoyance due to general transportation noise, J. Acoust.Soc.Am. 90, pp 221-233.

Kryter, K.D. (1982) Community annoyance from aircraft and ground vehicle noise, J. Acoust.Soc.Am. 90, pp 1212-1242.

Kryter, K.D. (1983) Response to K.D. Kryter to modified comments by TH.J. Shultz on "Community annoyance from aircraft and ground vehicle noise", J. Acoust.Soc.Am. 73, pp 1066-1068.

Miedema, H.M.E. and Vos, H. (1998). Exposure -response relationships for transportation noise, J. Acoust.Soc.Am. 104, pp 3336-3344.

Miedema, H.M.E. and Oudshoorn, C.G.M. (2001) Annoyance from transportation noise: relationships and exposure metrics DNL and DENL and their confidence intervals. Environmental Health 109, PP. 409-416.

Schultz, T J. "Synthesis of social surveys on noise annoyance." The Journal of the Acoustical Society of America vol. 64,2 (1978): 377-405. doi:10.1121/1.382013

Appendix D: Engine testing noise contours

C:\Users\cobe\Documents\whenuapai\Whenuapai\Whenuapai.apx Layout: T+T A3 Landscape Map Template4 2021-Jan-29 16:14 Drawn by COBE

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NOTES:
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REV	DESCRIPTION	GIS	CHK	DATE
0	First version	COBE	DAHU	4/03/21

LOCATION PLAN

PROJECT No.	1009485		
DESIGNED	COBE	MAR.21	
DRAWN	COBE	MAR.21	
CHECKED			
APPROVED	DAHU	4/03/21	

CLIENT **NEW ZEALAND DEFENCE FORCE**
PROJECT **NZAF WHENUAPAI ENGINE TESTING CONTOURS**
TITLE NZDF WHENUAPAI AIRBASE - ENGINE TESTING CONTOURS - PC5
SCALE (A3) 1:25,000 FIG No. FIGURE D. REV 0

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REV	DESCRIPTION	GIS	CHK	DATE
0	First version	COBE	DAHU	29/01/21

LOCATION PLAN

PROJECT No.	1009485		
DESIGNED	COBE	JAN 21	
DRAWN	COBE	JAN 21	
CHECKED			
APPROVED	DAHU	29/01/20	

CLIENT NEW ZEALAND DEFENCE FORCE
PROJECT NZAF WHENUAPAI ENGINE TESTING CONTOURS
TITLE NZDF WHENUAPAI AIRBASE - ENGINE TESTING CONTOURS - PC5
SCALE (A3) 1:24,711 FIG No. FIGURE 1. REV 0

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Appendix 5b: Environment Court Decision EnvC 154

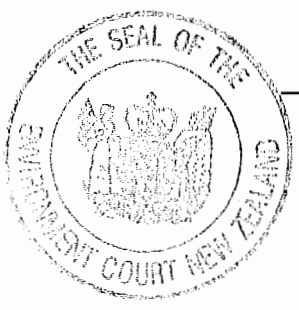
BEFORE THE ENVIRONMENT COURT
I MUA I TE KOOTI TAIAO O AOTEAROA

Decision No. [2019] NZEnvC 154

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of an application for declarations under s311 of the Act
BETWEEN	NEIL CONSTRUCTION LIMITED (ENV-2019-AKL-000053) Applicant
AND	AUCKLAND COUNCIL First Respondent
AND	MINISTER OF DEFENCE Second Respondent
AND	L O LEE, S C LIN & S C CHEN Section 274 Parties

Court:	Environment Judge D A Kirkpatrick Environment Commissioner K Prime Environment Commissioner A Gysberts
Hearing:	5 August 2019
Appearances:	R E Bartlett QC and V J Toan for Neil Construction Ltd A F Buchanan for Auckland Council P M S McNamara and S J Mitchell for Minister of Defence No appearance for s 274 parties
Date of Decision:	16 September 2019
Date of Issue:	16 SEP 2019

DECISION OF THE ENVIRONMENT COURT



A: The Environment Court declares that Condition 1 to Designation 4310 – Whenuapai Airbase by the Minister of Defence in the Auckland Unitary Plan applies to all noise generated from aircraft operations on the Airbase including noise from engine testing.

B: This declaration is suspended for 20 working days from the date of issue and, if an appeal be filed against this decision within that time, such suspension shall continue pending the ultimate outcome of that appeal.

C: Leave is reserved to any party to apply for further directions or orders in the meantime.

D: There is no order as to costs.

REASONS

Introduction

[1] Neil Construction Limited (**Neil**) seeks the following declarations from the Court:

(a) That aircraft noise generated within the area affected by Designation 4310 held by the Ministry of Defence in the Auckland Unitary Plan: operative in part (**AUP**), being the area known as Whenuapai Airbase and also known as RNZAF Base Auckland and its surrounds (**Whenuapai Airbase**), must comply with the conditions of Designation 4310;

(b) That an exceedance of the aircraft noise limits of condition 1 of Designation 4310 within the area effected by Designation 4310 is a breach of the designation and potentially a breach of s9 of the Resource Management Act 1991 (**RMA**);

(c) That the use of NZS6805:1992 and FAA Integrated Noise Model for the measurement of noise generated by the requiring authority is mandatory.

[2] The Auckland Council and the Ministry of Defence oppose the making of these or any other declarations.

[3] The main issue raised between the parties is about engine testing noise and whether and to what extent such noise is controlled by the conditions of Designation 4310.

Background

[4] Whenuapai Airbase is located in West Auckland on land generally within the area bounded by Brigham Creek Road, Kauri Road, Kowhai Road, Punga Road, and Totara Road. It was established by the Royal New Zealand Air Force (**RNZAF**) shortly before the Second World War. After the War, the Airbase also functioned as Auckland's international airport until 1965, when civil aviation operations were transferred to Mangere Airport (now, Auckland International Airport). All of this occurred before any land use controls were in place.

[5] The Airbase continues to be operated by the New Zealand Defence Force, and is currently the base for transport, patrol and helicopter squadrons of the RNZAF and its parachute training support unit. Various references were made in the evidence and in submissions before us about likely or possible changes to operations at the Airbase, but for the purposes of this application we do not need to consider those.

[6] In 1973, under the Waitemata County District Scheme, Whenuapai Airbase was designated for *Defence purposes*. The designation included height restrictions on neighbouring land to protect airport approach surfaces, but there were no controls relating to noise.

[7] In 1984, as well as that designation, the reviewed district scheme included section 6.4 for "Public works requiring special provision". That section included the following:

> **(b) R.N.Z.A.F. Airbase**
>
> The Ministry of Defence operates the R.N.Z.A.F. Airbase at Whenuapai and Hobsonville, which will continue to be important to New Zealand's interests. The land directly affected by the two airfields has been designated appropriately. There are also restrictions on development below the approach paths and in the vicinity of the fields, to assist the safe and efficient operation of the base and restrict any increase in the number of people likely to be affected by the noise of operation.
>
> **Policies**
>
> 1. That the Airbase be designated for 'Defence Purposes' in the District Scheme.
> 2. That particular restrictions on development under the approach paths be imposed to ensure such development does not interfere with the efficient functioning of the base.
> 3. That in recognition of the noise nuisance and possible danger generated by the operations of the airfields, significant extensions of the residential function of surrounding areas be resisted.

[8] The Waitakere City District Plan, notified on 14 October 1995 and made operative

on 27 March 2003, included designation MD1 for Whenuapai Airbase for *Defence purposes – RNZAF air bases and associated defence activities, including but not limited to Youth Development Unit.* Condition 3 of that designation required:

> Activities on the RNZAF Airbase shall meet the following Standards:
>
> (a) Aircraft operations not exceed a Day/Night (L_{dn}) level of:
>
> - 65 dBA outside the Airnoise Boundary (L_{dn} 65dBA Contour) shown on the Airbase Noise map; and
> - 55 dBA outside the Outer Control Boundary (L_{dn} 55 dBA Contour) shown on the Airbase Noise map.
>
> For the purpose of this control noise will be measured in accordance with the NZS6805:1992 and calculated, as stated in NZS6805:1992, using FAA Integrated Noise Model (INM) and records of actual aircraft operations and calculated as a 90-day rolling logarithmic average.
>
> (b) Aircraft operations exceeding the standard in (a) above where:
>
> - The aircraft is landing in an emergency;
> - The aircraft is landing at the Airbase as an alternative in adverse weather conditions; or
> - The aircraft is using the airfield as part of a search and rescue operation or civil emergency.

Current plan provisions

[9] On 30 November 2013 the Council notified a combined plan, incorporating a proposed regional policy statement and proposed regional, regional coastal and district plans, as the Auckland Unitary Plan. This proposed plan included a requirement by the Minister of Defence for Designation 4310, in essentially the same terms as the earlier designation MD1, to be inserted pursuant to cl 4 of schedule 1 to the RMA.

[10] The Minister lodged submission #838, which included, as submission point 39, opposing the requirement for Designation 4310 on the basis that the existing condition controlling aircraft noise was not appropriate and seeking that the noise condition be deleted and replaced by conditions as set out in that submission. The replacement conditions, as submitted, included a proposed condition to restrict the starting or running of aircraft propulsion engines for the purposes of aircraft engine testing to:

i) 65 dB $L_{Aeq(1\ hour)}$ between 7 a.m. and 10 p.m.;

ii) 45 dB $L_{Aeq(1\ hour)}$ at all other times; and

iii) 75 dB L_{AFmax} between 10 p.m. and 7 a.m.

Those levels were to be applied at or within the boundary of any residentially zoned site or within the notional boundary to any dwelling in the Future Urban Zone existing as at 31 March 2014 and were to be measured in accordance with NZS6801:2008 "Acoustics - Measurement of Environmental Sound" and assessed in accordance with NZS6802:2008 "Acoustics - Environmental Noise".

[11] That submission point was ultimately withdrawn by the Minister and not considered or reported on by the Auckland Unitary Plan Independent Hearings Panel.

[12] On 15 November 2016 the AUP replaced the Waitakere City District Plan and Designation 4310, as notified, became operative. In particular, it includes as condition 1 essentially the same noise condition as condition 3 in the previous designation MD1. A copy of the whole of Designation 4310 in the AUP is **attached** as Appendix 1 to this decision, including two diagrams: a Site Plan indicating the extent of the designated land, and the *Noise Control Area* (which we understand to be the *Airbase Noise map* referred to in condition 1). Regrettably, the quality of the two diagrams in the AUP is very poor and the legends are illegible. The first diagram also shows an associated Defence facility at the corner of Bristol and Dale Roads to the west of the Airbase within the scope of this designation, but this area plays no role in this proceeding.

[13] As will be discussed in more detail below, the focus of this application is on the interpretation of condition 1 to Designation 4310 and the meaning of the term "aircraft operations."

[14] There is no definition of the term "aircraft operations" in respect of Designation 4310. There is an inclusive definition of "aircraft operations" in Chapter J1 of the AUP, as follows:

> **Aircraft operations** includes:
> - the landing and take-off of any aircraft at an airport or airfield;
> - the taxiing of aircraft associated with landing and take-off and other surface movements of aircraft for the purpose of taking an aircraft from one part of the airport to another; and
> - aircraft flying along any flight path.

[15] However, it was common ground among the parties that the definitions in Chapter J1 of the AUP do not apply to designations, as stated in Rule J1.1(7) in relation to interpreting the definitions. As counsel for Neil noted, each designation is intended to stand on its own terms and not to rely on other provisions in the AUP. We observe that this intention is consistent with the scheme of the Act in relation to designations: while

included in district plans as if they were rules (s 175(2)(a) RMA), the effect of a designation is that the restriction of s 9(3) RMA on the use of land does not apply to the designated work (s 176(1)(a) RMA) and the provisions of the district plan only apply to the extent that the land is used for a purpose other than the designated purpose (s 176(2) RMA).

[16] The AUP provisions in respect of the land subject to Designation 4310 are:

(a) An underlying zoning as "Special Purpose – Airports and Airfields Zone";

(b) General rules in Chapter C; and

(c) Auckland-wide rules in Chapter E.

[17] Section H23.1 of the AUP describes the Special Purpose – Airports and Airfields Zone as follows:

> The Special Purpose – Airports and Airfields Zone applies to select airports and airfields across the Auckland region.
> There are no objectives, policies or rules within this zone; refer to [Chapter] I Precincts for the provisions applicable to each airport or airfield.

There is no precinct in relation to Whenuapai Airbase.

[18] In the General Rules of the AUP, Rule C1.7 relates to activities not provided for, and states:

> (1) Any activity that is not specifically classed in a rule as a permitted, controlled, restricted discretionary, discretionary, non-complying or prohibited activity is a discretionary activity unless otherwise specified by a rule for an overlay, zone or precinct or in an Auckland-wide rule.

[19] The Auckland-wide rules in Chapter E include noise standards. There are no particular rules for airports and airfields. In such circumstances, it appears that the underlying noise control would default to Rule E25.6.22 which states:

> Where noise generated by any activity on a site in one zone is received by any activity on a site in a different zone, the activity generating the noise must comply with the noise limits and standards of the zone at the receiving site.

[20] At the present time, Whenuapai Airbase is generally surrounded by the Future Urban Zone. The noise standards in that zone are set out in Rule E25.6.3(1) in the AUP as follows:

E25.6.3. Noise levels in rural and future urban zones
(1) The noise (rating) level from any activity in the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or the Future Urban Zone measured within the notional boundary on any site in any rural zone must not exceed the limits in Table E25.6.3.1 Noise levels in the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or the Future Urban Zone below:

Table E25.6.3.1 Noise levels in the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or the Future Urban Zone

Time	Noise level
Monday to Saturday 7am-10pm	55dB L_{Aeq}
Sunday 9am-6pm	
All other times	45dB L_{Aeq} 75dB L_{AFmax}

[21] The extent of control under Designation 4310 on activities, including noise from activities, at Whenuapai Airbase is substantially less than the extent of controls at other airports and airfields in the Auckland region under the AUP. For example, the provisions in relation to Auckland International Airport are substantially more detailed at least insofar as noise from testing in situ aircraft engines is specifically controlled by condition 13 to Designation 1100 and exempt from other control by Rule I402.6.4(1) for the Auckland Airport Precinct. Condition 13 essentially limits noise from the testing of in situ aircraft engines to 55 dB L_{dn} within two defined residential areas (Ihumatao village and southern Mangere), measured on a 7-day rolling average in accordance with New Zealand Standard NZS6801: 2008 *Acoustics – Measurement of Environmental Sound.* There is an exception from the 7-day rolling average for testing required by an airworthiness directive or similar safety requirement issued by the Minister of Transport, the Director of Civil Aviation or the Civil Aviation Authority.

[22] On 21 September 2017 the Council notified Plan Change 5 to the AUP. Plan Change 5 proposes to rezone some 360 ha of the land mostly zoned Future Urban and generally to the south of Whenuapai Airbase to a mix of business and residential zones. As well as that rezoning, Plan Change 5 proposes particular controls relating to, among other things, aircraft engine testing by placing noise boundaries on certain land in the Whenuapai 3 Precinct outside the Whenuapai Airbase and restricting noise-sensitive activities within those boundaries. Neil owns land in that proposed precinct which it intends to develop for residential purposes (which would be a noise-sensitive activity) and has lodged a submission seeking, among other things, the deletion of these noise

boundaries from the land it owns.

[23] Commissioners appointed by the Council are currently hearing submissions on Plan Change 5. They have directed the Council to provide:

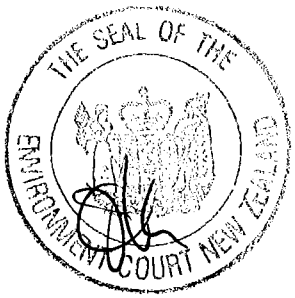
> ... a legal opinion on the status of the existing designation 4310 as it relates to noise. Specifically:
>
> i. is engine testing included within the "Aircraft Noise" condition (Condition 1) of the designation where it refers to "aircraft operations on the RNZAF Airbase"?
>
> ii. what relevance is NZS 6805:1992 and FAA Integrated Noise Model (INM) to this determination?
>
> iii. does section 16 of the Resource Management Act 1991 apply to a designation (and Designation 4310 in particular) when considering aircraft noise and engine testing noise effects?
>
> iv. Are there any other methods available to the Council for the control of engine testing on NZDF land?

[24] We understand that this application by Neil represents the way in which the parties intend to meet at least the first part of the Commissioners' direction, at least to the extent that we may make declarations in respect of the interpretation of the RMA or the designation.

Issues

[25] The parties filed a joint Statement of Issues dated 24 May 2019. This joint statement includes the following paragraphs:

> 5. In respect of section 4(2) of the RMA, the second respondent advises that the Minister of Defence has no intention of issuing a certificate under that section prior to the resolution of these declaration proceedings.
>
> 6. The parties agree that the following issues are relevant to the determination of the application:
>
> (a) Whether aircraft engine testing Is an activity that falls within the meaning of "aircraft operations" in condition 1 of Designation 4310;
>
> (b) Whether aircraft engine testing is within the purpose of Designation 4310; and
>
> (c) Whether the Auckland-wide rules in the AUP apply to activities on RNZAF Base Auckland that are not within the purpose of Designation 4310.
>
> 7. The parties also agree that the interpretation of condition 1 of the Designation is also relevant. The first and second respondents have different views as to how the issue should be expressed:
>
> (a) First respondent: What is the relevance of the requirement in condition 1 of Designation 4310 to measure noise in accordance with NZS6805:1992 and calculate it using FAA Integrated Noise Model to the interpretation and application of Designation 4310; and
>
> (b) Second respondent: Whether the requirement in condition 1 to measure noise



in accordance with NZS6805:1992, and calculate it using the FAA Integrated Noise Model, determines what noise is subject to the noise limits specified in condition 1.

8. In light of the second respondent's advice regarding section 4(2), the applicant also considers that the following issue is relevant:

   (a) Whether the duties in section 16 and 17 of the RMA apply to aircraft engine testing at RNZAF Base Auckland, and all other activities undertaken at RNZAF Base Auckland pursuant to Designation 4310.

[26] By the time of the hearing, the parties were generally agreed that the second and third issues in paragraph 6 of their Joint Statement were no longer contested: there was acceptance that aircraft engine testing is within the purpose of Designation 4310 and that the Auckland-wide rules would apply to activities not within the purpose of the designation.

[27] Thus, the primary issue between the parties is whether aircraft engine testing is an activity that falls within the meaning of "aircraft operations" in condition 1 of Designation 4310. As indicated in paragraph 7 of the Joint Statement, there were various views about how that interpretive exercise should be undertaken. There are also subsidiary issues consequential to and depending on the decision on the primary issue.

Interpretation

[28] All counsel were agreed on the relevant legal principles applicable to the interpretation of Designation 4310. Counsel were also agreed that Designation 4310 must be interpreted in its own terms and that the provisions of other designations or of the AUP generally were not determinative of the issue before the Court.

[29] A designation should be considered as an enactment for the purposes of the Interpretation Act 1999 because:

(a) It is included in the relevant district plan and any proposed district plan as if it were a rule (s 175(2)(a) RMA);

(b) A rule in a district plan has the force and effect of a regulation in force under the RMA (s 76(2) RMA);

(c) A district plan is an instrument made under the RMA that extends the provisions of the RMA, in terms of the second element of the definition of *regulations* in s 29 Interpretation Act 1999; and

(d) The whole or a portion of regulations are an *enactment* in terms of the

definition in s 29 Interpretation Act 1999.

[30] The starting point for the interpretation of Designation 4310 is therefore s 5(1) Interpretation Act 1999:

> The meaning of an enactment must be ascertained from its text and in the light of its purpose.

[31] As an enactment akin to a rule, the interpretation of a designation is a matter of law and not a matter of evidence.[1] In ascertaining the meaning of the text of a designation, the well-established test laid down by the Court of Appeal in *Waimairi County Council v Hogan* is to ask what the plain ordinary meaning of the words used in the District Plan in designating the use of the land is, being what an ordinary, reasonable member of the public, examining the District Plan, would take from the designation.[2] The key passage from the Court of Appeal's decision reads:

> What then is the meaning to be given to that designation? It is of the essence of district schemes that they provide notice to the world of the use to which the land in the district may be put. This is important both at the stage when the district scheme is open to objection, and later when it is operative. And the manner of designation of reserves in the district scheme serves the important public purpose of giving public notice of the different purposes for which the various reserves within the district are to be used so as to promote the general objectives of the district scheme under s 18. Indeed, the statutory rights of objection apply to objections to designations in district schemes. For these reasons it is critically important that a district scheme should convey in unambiguous terms the uses to which the land in question may be put. In *Maunsell v Olins* [1975] AC 373, 391; [1975] 1 All ER 16, 25-26 Lord Simon of Glaisdale pointed out that where a statute is dealing with people in their everyday lives, the language is presumed to be used in its ordinary sense, unless this stultifies the purpose of the statute, or otherwise produces some injustice, absurdity, anomaly or contradiction. The question then is, what is the plain ordinary meaning of the words used in the scheme in designating the use of this reserve land? What would an ordinary, reasonable member of the public, examining the scheme, have taken from the designation?

[32] This test was recently followed by the High Court in *Titirangi Protection Group Inc v Watercare Services Limited*.[3] The High Court said that the purpose of a designation is to be ascertained having regard to the whole of the designation[4] and the conditions attaching to it are relevant.[5] The High Court summarised the applicable principles as

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1 *Toy Warehouse Ltd v Hamilton City Council* (1986) 11 NZTPA 465 at 467-8 (HC).

2 *Waimairi County Council v Hogan* [1978] 2 NZLR 587 at 590 (CA).

3 *Titirangi Protection Group Inc v Watercare Services Limited* [2018] NZHC 1026.

4 *Titirangi Protection Group Inc*, fn3, at [49].

5 *Titirangi Protection Group Inc*, fn3, at [50].

follows:

> [52] As the Environment Court correctly observed, the ultimate test in the present context is what the ordinary, reasonable person would understand the designation to mean. The hypothetical person must be taken to have the level of knowledge about the factual context likely to be possessed by any ordinary and reasonable person who takes the trouble to examine a designation.

[33] Designation 4310 includes a lengthy purpose statement. The first line states:

> Defence purposes (as defined by section 5 of the Defence Act 1990) - air base

[34] The statement then sets out s 5 Defence Act 1990, which enacts the Governor-General's power to raise armed forces for a range of purposes including the defence of New Zealand, the protection of its interests, the provision of assistance to the civil power in time of emergency and the provision of any public service. The statement goes on to list the functions of the New Zealand Defence Force, notably including air operations, repair and maintenance, and lists a number of types of facilities to support these functions including those for the repair and maintenance of aircraft. The length of this statement stands in contrast to earlier cases where the stated purpose was limited to "defence purposes"[6] although one might still question whether a statutory reference or extended descriptive material fully meets the requirement for a clear statement of purpose for a particular designation.

[35] As already noted, by the time of the hearing there was no longer any issue among the parties as to whether engine testing is within the purpose of Designation 4310. We consider that acceptance to be well-founded: the evidence before us is clear (as one might expect) that repair and maintenance are essential to ensuring that an aircraft is airworthy prior to take-off, that engine testing is a standard component of repair and maintenance work and consequently that such testing is within the purpose of a Defence airbase.

Meaning of "aircraft operations"

[36] For the applicant Neil, Mr Bartlett argued that aircraft engine testing is an "aircraft operation", at least for the purposes of Designation 4310, and that condition 1 of that Designation accordingly applies to it.

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6 See *Ngataringa Bay 2000 Inc v Minister of Defence (3)* (1992) 2 NZRMA 318 (PT) and *Waitakere City Council v Minister of Defence* [2006] NZRMA 253.

[37] Noting the specific reference to the New Zealand Standard NZS6805:1992 which is entitled *Airport Noise Management and Land Use Planning* (**NZS6805**), Mr Bartlett pointed out that the foreword to that standard says it is concerned with:

> Land use planning and the management of aircraft noise in the vicinity of an airport, or aerodrome, for the protection of community health and amenity values... the control is based on the noise actually received – not what is predicted.

[38] He argued that the text of the standard referred generally to "aircraft noise" (and in at least one instance to "airport noise") without any indication that the standard is only intended to apply to some types of noise produced by aircraft.

[39] He also made submissions in respect of the reference to the Integrated Noise Model (**INM**) produced by the United States Federal Aviation Administration. This is a lengthy technical document. Notwithstanding the statement in condition 1 of Designation 4310 that the INM sets out a method for calculation of noise in NZS6805, it is not clear to us exactly what the relationship is between NZS6805 and the INM. As far as can be seen, there is one reference to the INM in NZS6805, at clause 1.4.3.1, in relation to use of the INM or other appropriate models to locate projected sound exposure contours for future aircraft operations. As best as we can understand it, that is a different exercise to the calculation of noise levels from actual aircraft operations.

[40] Notwithstanding that reference to the INM, the list of related documents at the beginning of NZS6805 does not include it, while it does list several publications of the International Electrotechnical Commission (IEC) and three standards of the International Organisation for Standardization (ISO).

[41] Interestingly, in the sections of the INM relating to computation of exposure-based noise level metrics and the computation of maximum noise level metrics, the INM distinguishes between "fixed wing aircraft flight operations" and "fixed wing aircraft runup operations". In its section on terminology, the INM defines these terms as follows:

> **Flight operation.** A moving (or dynamic) aircraft operation. There are five kinds of flight operations for fixed wing aircraft in INM: approach, departure, touch-and-go, circuit flight, and overflight...
>
> **Runup.** An activity in which an aircraft is in a stationary position on the ground, with aircraft thrust held constant for a time period.

[42] Mr Bartlett argued that both of these fell within the broader meaning of "aircraft operations". He drew support from the affidavit of Group Captain D J Hunt, until recently

the airbase commander, who said that the term "flight operations" is more commonly used by NZDF than "aircraft operations" to refer to activities associated with flights (start-up, taxiing, power-up, take-off and ascent, and descent and landing). He also stated that aircraft operations are conducted by 'operators' (aircrew) as distinct from maintenance and repair activities conducted by 'technical' staff (maintenance engineers).

[43] Counsel noted that the affidavits of all three of the experts on noise measurement and assessment stated that the use of NZS6805, and in particular the 90-day average, would be inappropriate as a basis for control of engine testing. This is because such testing occurs relatively infrequently and consequently the 90-day average would produce an unrealistically low result. Even so, counsel submitted that none of the experts had stated that the standard could not be used for this purpose. Further, he submitted that as the Minister, as the requiring authority, was the author of the condition in Designation 4310 and had the power to give notice to alter the designation under s181 RMA, this question of interpretation should not be determined by the preferences of expert witnesses.

[44] Counsel for the Council, Ms Buchanan, submitted that the text of the purpose of Designation 4310 provided a context for drawing a distinction between air operations and the repair and maintenance of aircraft. She noted that the three exceptions to the noise limits plainly referred to flight operations. She also submitted that the air noise contours shown in figure 9A attached to the designation were, according to the expert witnesses, obviously related to flight operations and not to engine testing. She laid stress on the evidence of the experts that NZS6805 was inappropriate for measuring or otherwise controlling engine testing noise.

[45] Counsel for the Minister made similar submissions to those for the Council and also submitted that "aircraft operations" connotes activity and, in a military context, active deployment. He submitted that the purpose of the designation identified "air operations" and "repair and maintenance" as separate activities and that this is how an ordinary, reasonable member of the public would understand such terms. He also laid stress on the expert evidence that neither NZS6805 nor the INM were used for the measurement and assessment of engine testing noise, although he acknowledged that the standard could be used for this purpose. He pointed out that the INM does not define "aircraft operations", so that the distinction drawn by counsel for Neil between "flight operations" and "runup operations" was not determinative.

Evaluation

[46] We are guided by the legal test of what an ordinary, reasonable person would take from the text of the designation, bearing in mind the things relied on by the Court of Appeal in *Waimairi County Council v Hogan*, quoted above. As explained by the High Court in the *Titirangi* case, this hypothetical person must be taken as having a reasonable knowledge of the manner in which designations operate[7] and also how the designated activity would generally be undertaken.[8]

[47] In our judgment, we also think that the same point of view of the hypothetical ordinary reasonable person should be adopted in terms of considering any effect that the conditions of the designation address, rather than the point of view of the requiring authority or, in this case, of aircrew or maintenance engineers. The clear purpose of condition 1 of Designation 4310 is to control levels of noise produced by aircraft operations, which we infer is to protect the neighbours of the airbase from the effects of such noise. Those neighbours will be affected by what they can hear when aircraft operations occur. What they may or may not know about the nature of such operations on the airbase, including what they may or may not be able to see of the operations, is likely to be secondary to what they can hear. At a fundamental level, what they will hear will be noise from engines. In that sense, if one were to ask the neighbours how they were aware of aircraft operations, they would likely say that it was when they could hear aircraft engines operating.

[48] There is no evidence before us that would support the proposition that an ordinary, reasonably knowledgeable neighbour would perceive a material difference in such engine noise depending on whether the aircraft was moving as part of flight operations or was static for engine testing. From our own experience we appreciate that there may be some perceptible differences, such as changes in the perceived noise level or a doppler effect (a change in the perceived frequency of the noise) if an aircraft were moving as compared to if it were static. While perceptible, we do not have any evidence to show, nor can we see any other reason, why such differences would be material to the overall effect of noise on the neighbours: whatever the purpose behind operating the aircraft engine, the noise effect would still occur. On that basis there would be no reason

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7 *Titirangi Protection Group Inc*, fn3, at [55].

8 *Titirangi Protection Group Inc*, fn3, at [57] – [60].

why such differences should be material to an assessment of such effects.

[49] In our view, in the absence of any specificity in condition 1 of Designation 4310, the relevant effect controlled by that condition is the overall exposure to noise of land outside the shaded areas on the Airbase Noise map or Noise Control Area shown in Diagram 9A-2. Any immaterial difference in the noise does not offer a reason for reading down the broad terms of condition 1, nor does it offer a reason for distinguishing between noise produced by engines on moving aircraft and noise produced by engines that are operating in a static location.

[50] We understand that a broad interpretation of "aircraft operations" as used in condition 1 may have a very restrictive effect given the levels set by that condition, the method of using a 90-day average to measure such levels and the extent of the noise controls in Diagram 9A-2. A consequence of our interpretation appears to be that the Minister may not have the same ability to operate aircraft at Whenuapai Airbase as other requiring authorities do at other airports. We note that other designations deal with noise at airports differently, in particular by setting different limits for flight operations and engine testing. If the text of Designation 4310 were similar to the designations for those other airports, then the extent of permitted operations would be similar. It is not an appropriate use of the Court's power of interpretation of a designation effectively to amend it by reference to another designation.

[51] We also note that the text of a designation is largely within the control of a requiring authority through its drafting of the notice of requirement[9] and its power of decision on the territorial authority's recommendation,[10] so that the reasonableness of the restriction should not unduly sway the approach to interpretation. It is open to the Minister to give notice of a requirement to alter the designation at any time.[11]

[52] As well as the text, we have also taken into account diagram 9A-2 attached to Designation 4310. We accept the inferential evidence of the expert witnesses on noise that the noise contours shown in that diagram were based on the use of the main runway 03/21 for flight operations. We do not, however, see a basis on which the interpretation of the ordinary meaning of "aircraft operations" can be altered by such a diagram. It is not appropriate to amend those words of the text of the designation based on inferences

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9 Section 168 RMA.

10 Section 171 RMA.

11 Section 181 RMA.

drawn from the diagram. To put it another way, we do not think that an ordinary, reasonably knowledgeable neighbour would read the noise condition in the designation restrictively so as to exclude engine testing noise based on that diagram.

[53] The evidence of the expert witnesses on noise as to preferable methods of measuring and assessing noise generated at airports, including noise from flight operations and noise from engine testing, clearly indicates that condition 1 of Designation 4310 is not worded as comprehensively or effectively as it could be. That evidence suggests that the Minister may wish to review the Designation. It is not a proper basis on which to interpret the clear words of a statutory instrument by reading them down as if they were in some preferable form.[12]

[54] We have considered what appear to be the most relevant portions of NZS6805 and the INM in the course of our deliberations. As is often the case with non-statutory material imported by reference into a Plan, their contents do not appear to us to provide a true foundation for or great assistance in the interpretation of condition 1 of Designation 4310. Again, we do not think that an ordinary, reasonably knowledgeable neighbour could read the noise condition in the designation restrictively based on those other documents, especially as the neighbour would be unlikely to have access to those documents.

Form of Declarations

[55] The declarations sought, as set out at [1] above, were in terms acknowledged by all parties not to fully reflect the principal issue between them. The joint Statement of Issues, quoted at [22] above, likewise was acknowledged to go further than strictly necessary in stating additional considerations.

[56] As we have discussed, the central question is whether aircraft engine testing is within the meaning of "aircraft operations" as that term is used in condition 1 to Designation 4310, so that condition 1 applies to noise generated by aircraft engine testing. In our view, it is. An amended form of possible declaration that would address that would be:

> Condition 1 to Designation 4310 – Whenuapai Airbase by the Minister of Defence in the Auckland Unitary Plan applies to all noise generated from aircraft operations on the Airbase including noise from engine testing.

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12 *Toy Warehouse*, fn 1.

[57] That appears to us to be a clearer and more direct way of expressing the answer to the central question than what is set out at [1](a) above. It is also closer to the first issue at paragraph 6(a) of the joint Statement of Issues quoted at [22] above.

[58] The statements set out at [1](b) and (c) above appear to us to be consequential to the answer to the central question. It necessarily follows that an exceedance of a limit in a condition of a designation will be a contravention of the RMA through the combined effect of ss 9(3) and 176 RMA. It also follows that a condition which specifies the manner in which something "will" be measured requires that method to be used even if, as here, it may not be possible to follow that method to the letter. It is therefore unnecessary to make such declarations.

[59] In terms of the second issue, in paragraph 6(b) of the joint Statement of Issues, the parties all accepted at the hearing that engine testing is within the purpose of Designation 4310 and we have already said that we think that is correct. The amended form of possible declaration set out above deals with this issue also.

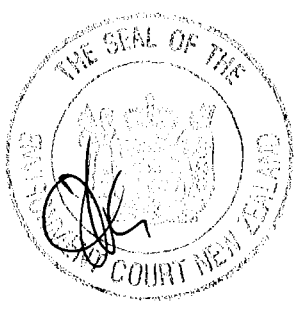
[60] In terms of the third issue in paragraph 6(c) of the joint Statement of Issues, this is little more than a restatement of s 176(2) RMA and accordingly does not need to be stated in a declaration.

[61] The further issues in paragraph 7 of the joint Statement of Issues raise questions as to the relevance of the external documents in NZS9805 and the INM to the interpretation of Designation 4310. We have considered the relevant portions of those documents in our evaluation of the central question and concluded that they are not of great assistance to central question in this case, especially in light of the test of what an ordinary, reasonable person would take from the text of the designation. We do not consider it necessary to say anything further about those documents.

[62] The issue in paragraph 8 of the joint Statement of Issues was not addressed before us at the hearing. No argument was advanced about the applicability of ss 16 and 17 RMA in this case or in relation to designations generally. We therefore will not address the issue either.

Discretion

[63] The conclusions reached in the preceding sections of this decision are not by themselves determinative of Neil's application for declarations. Under s 313 RMA, the Court has a discretion whether to make the declaration sought with or without



modifications, or to make any other declaration that it considers necessary or desirable, or to decline to make a declaration. As submitted by counsel for the Minister, it has been held that this Court is obliged to determine the meaning of disputed conditions placed before it unless there is a sound reason why a declaration should be refused.[13]

[64] The fundamental principles as to the making of declarations in public law cases in New Zealand have been stated by the Court of Appeal in *Wool Board Disestablishment Co Ltd v Saxmere Co Ltd* as follows:[14]

> First, there must be an actual controversy between the parties (or as it is sometimes put, a real and not a theoretical question to be answered). As part of that concern there must be a proper contradictor. That is, there must be someone before the court with a true interest to oppose the declaration sought. Secondly, there is the question of whether a declaration may have a practical effect on non-parties. Thirdly, it is generally accepted that a declaration must have utility, which can encompass a wide range of factors. Fourthly, declarations should not normally pre-empt or somehow supplant findings which would need to be made in a criminal prosecution. Fifthly, the availability of other remedies is a relevant factor. But sixthly, and perhaps most importantly, the rule of law itself requires that if a law has been contravened that should be publicly enunciated and formally made known. In that respect it is to be noted that the emphasis in the discretionary exercise has recently shifted somewhat to a consideration of whether there are grounds to refuse relief following a finding of error of law.

[65] On behalf of the Minister, counsel submitted that there is a sound reason to decline to make a declaration to the effect that aircraft operations includes engine testing, namely the adverse impact of such a declaration on the operations of the New Zealand Defence Force. Counsel noted the history of the airbase, the establishment of which preceded residential development around it. He referred to the notion of "coming to the nuisance", although he properly acknowledged that priority in time is not a defence to a claim of nuisance.[15]

[66] More pertinently, counsel for the Minister referred to the decision of this Court in *Koha Trust Holdings Limited v Marlborough District Council*[16] where the Court declined to make a declaration on the basis that it would be wrong to exercise the discretion in a way that could affect the rights of a third party which has legitimately organised its affairs

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13 *Wellington Regional Council v Burrell Demolition Limited*, unreported, High Court Wellington AP25/01, 30 April 2001 at [30] – [32] per Doogue J.

14 *Wool Board Disestablishment Co Ltd v Saxmere Co Ltd* [2010] NZCA 513; [2011] 2 NZLR 442 at [141] per Hammond J (citations omitted).

15 *Sturges v Bridgman* (1878) 9 CHD 852; *Ports of Auckland Limited v Auckland City Council* [1999] 1 NZLR 601; [1998] NZRMA 48 (HC); *Coventry v Lawrence* [2014] UKSC 13.

16 *Koha Trust Holdings Limited v Marlborough District Council* [2016] NZEnvC 152.

and made considerable investments. This is a very similar consideration to the second principle listed in the *Saxmere* case.

[67] While accepting that the NZDF is not a third party in this proceeding, counsel submitted that nonetheless it had organised its affairs and made investments in the airbase over a considerable period of time based on a longstanding understanding of the designation and, in particular, the absence of a restriction on engine testing noise. In that context, counsel submitted that it would be a disproportionate outcome for this Court to make a declaration which had the effect of terminating engine testing, with, according to Group Captain Hunt, the consequential effect of terminating flight operations. Counsel submitted that this would mean that NZDF would not achieve its obligations under the Defence Act 1990, at least in respect of RNZAF operations based at Whenuapai.

[68] This is an important submission. The Court must respect the importance, both constitutionally and in terms of the wellbeing of New Zealand, of the Crown's defence of New Zealand as well as the role of the NZDF in assisting the civil power and the provision of public service. Even in the absence of an immediate external threat or civil emergency, the importance of the roles of the NZDF in peacetime activities such as search and rescue, maritime patrol and assistance to New Zealand's neighbours are all matters of very high importance.

[69] In response, counsel for Neil did not challenge the significance of those considerations: rather he submitted that the making of a declaration would not have such consequences because the declaration itself would not require any immediate change in activities. In emergencies, the three exceptions to condition 1 are clearly available. Even outside those exceptions, counsel noted that the impetus for Neil's application was not an immediate effect on amenity values, but the resolution of a dispute that had arisen in the course of hearing submissions on proposed Plan Change 5 to the AUP. Counsel estimated that it would be 2-3 years before residential development began to occur in the vicinity of the airbase. He repeated that the Minister had the power to initiate amendments to the designation.

[70] We doubt that there is a basis on which the effect of any declaration could be treated by a party as deferred. The RMA binds the Crown, except as provided in s 4 RMA. No injunction may be granted against the Crown but orders may be made declaratory of the rights of the parties.[17] The Court's declarations have no direct

[17] Section 17 Crown Proceedings Act 1950. See also s 15(3) Judicial Review Procedure Act 2016.

enforcement effect, in that they neither command nor restrain action,[18] but by convention the Crown obeys such declarations.[19] While one might say that justice should be done though the heavens fall,[20] nonetheless when exercising a discretionary power the Court should generally be mindful of any effect its decision might have outside the immediate scope of the proceeding. On that basis we will treat the ramifications of the amended form of possible declaration as relevant to the exercise of our discretion.

[71] It may be that, separate from these proceedings, the parties could reach their own agreement as to some process which would lead to compliance of all aircraft operations with the conditions of the designation. That might include amending the designation to deal with the noise of engine testing separately from other operations and in a manner that could practicably be achieved, possibly in the manner set out in or similar to the Minister's withdrawn submission point on the proposed AUP.

[72] Alternatively, the Minister may, under s 4(2)(b) RMA, certify that engine testing, either generally or in some particular way, is necessary for reasons of national security so that the RMA would not apply to that activity. This was raised with counsel for the Minister during a pre-hearing conference and led to the statement in paragraph 5 of the joint statement of issues, quoted at [22] above, that the Minister of Defence has no intention of issuing a certificate under that section prior to the resolution of these declaration proceedings.

[73] At the hearing, counsel noted that any such certificate might be challenged and appeared doubtful about the utility of this possibility. He may have been mindful of the decision in *Ngataringa Bay 2000 v Minister of Defence (2)*[21] where such a certificate was declared invalid. The High Court found two errors of law: that the Minister wrongly decided that the certificate could not be given in restricted terms confined to a particular work or activity and therefore framed it in an unacceptably wide manner; and that the Minister wrongly had regard to the irrelevant consideration of the financial consequences of delay rather than confining his decision to reasons of national security.

[74] We must be careful not to venture beyond the issues that are properly before this

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18 *Sisters of Mercy (Roman Catholic Diocese of Auckland Trust Board) v Attorney-General* HC Auckland, CP219/99, 6 June 2001, Randerson J at [51], citing Aronson, *Judicial Review of Administrative Action* (1996), 861.

19 *Commerce Commission v Fletcher Challenge Ltd* [1989] 2 NZLR 554 (HC) at 610.

20 *Somerset v. Stewart* (1772) Lofft 1; 98 ER 499 at 509 per Lord Mansfield.

21 *Ngataringa Bay 2000 v Minister of Defence (2)* (1992) 2 NZRMA 308 (HC).

Court for determination, and so we cannot contemplate the likely validity of a certificate that has not yet been given. We note that the evidence that the Minister has led before us, particularly that of Group Captain Hunt, and the submissions of his counsel are to the effect that aircraft operations at Whenuapai Airbase would have to cease if engine testing were unable to be carried out and that this would result in the RNZAF squadrons based there being unable to pursue their purposes in terms of s 5 Defence Act 1990 or otherwise achieve their statutory obligations. At least on their face, these matters appear capable of meeting the threshold for consideration as reasons of national security.

[75] What we do conclude is that the Minister's power under s 4(2) RMA is a reason why the making of a declaration is not necessarily a disproportionate outcome. That power is a check and balance to the Crown generally being bound by the RMA and a means of ensuring that considerations of national security can be addressed and may prevail over plan provisions if the Minister thinks that is appropriate. In that context, the important principle that the law can be formally stated by the Court, itself a check and balance to the powers of the Executive, is in our view the determining principle on which we decide that our discretion should be exercised to make the first declaration sought in the amended form set out above.

Suspension

[76] Having determined that we should exercise our discretion to make a declaration, we remain concerned that a consequence of making one could disrupt the purpose of the designation. While doubting the submission that a declaration could be treated by a party as deferred, our research shows that the Court may suspend its decision on a declaration pending the outcome of an appeal.

[77] In *Manukau City Council v Minister of Social Welfare*[22] the Planning Tribunal made a declaration that the designation of the Weymouth Residential Centre as a "Girls Training Centre" did not authorise the use of the property as a place for the care and protection of boys and young men, or for the provision of secure care for young persons or for custodial detention in secure care of persons on remand or for custodial detention of persons serving sentences of imprisonment. Relying on the authority of *Waimairi County Council v Hogan,*[23] the Tribunal held that there was nothing in the words of the designation that would convey the actual purpose of the institution and that the words did

22 *Manukau City Council v Minister of Social Welfare* (1992) 1A ELRNZ 1, (1992) 1 NZRMA 197.
23 *Waimairi CC v Hogan* fn 2.

not faithfully represent the activities of the centre.

[78] An appeal was filed against that decision. The Minister applied concurrently to the Tribunal for a stay of proceedings in the form of a declaration that the Minister was not required to cease using the Centre for any of the uses in question pending determination of the appeal to the High Court.[24]

[79] The jurisdiction to grant such a stay was identified by the Tribunal as being pursuant to what is now Rule 20.10 of the High Court Rules 2016 and s 299 RMA. It is relevant for the purposes of this case that the Tribunal had previously held, in *Electricity Corporation of New Zealand Ltd v Minister for the Environment*,[25] that it had inherent power to grant a stay of proceedings in light of the general provision in s 149(1) Town and Country Planning Act 1977 to regulate its own procedure in such manner as it thinks fit. That general provision now exists under s 269(1) RMA.

[80] In its decision, the Tribunal concluded that there was no reason why it should not be able to grant a stay in the sense of suspending its decision until the outcome of the appeal was known. It assessed the application for stay in terms of the criteria identified and the overall test stated in the *Electricorp* case,[26] being:

(a) Whether the appeal would be rendered nugatory if proceedings were not stayed;

(b) Whether the successful party would be injuriously affected by a stay;

(c) Whether there is a bona fide intention to prosecute the appeal with due diligence;

(d) The novelty or importance of the question on appeal; and

(e) Whether there is a possible misuse of the appeal procedure as a device to delay.

Having considered those criteria, the application should then be considered on the balance of convenience, the ultimate decision being not a question of fairness but of rights.

[81] The Council opposed the application, essentially on the basis that there was

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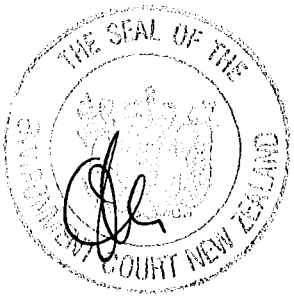
24 *Manukau City Council v Minister of Social Welfare* Decision A57/92, 12 June 1992.

25 *Electricity Corporation of New Zealand Ltd v Minister for the Environment* (1991) 1 NZRMA 125 at 128 (PT).

26 *Electricity Corporation of New Zealand Ltd v Minister for the Environment* fn 25 at 128.



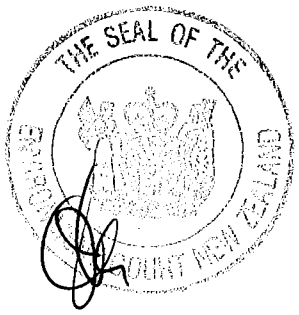
nothing to be stayed as the declaration did not require anything to be done. Further, the Council submitted that a stay would run counter to the declaration already made and that if a different order was sought, then that should be applied for in the appeal. It submitted that it would be affected by being deprived of its credibility in the enforcement of the RMA.

[82] The Tribunal held that the grant of a stay in the context of an appeal would reflect the Minister's respect for the declaration while seeking to test its correctness on appeal. It found that a consequence of the declaration would be that the Minister would need to cease to use the Centre unless the designation were altered and that this would cause considerable inconvenience to the Minister and to the residents of the Centre. On that basis the Tribunal found that the Minister should be entitled to continue the status quo pending the outcome of the appeal, granting the application by suspending its substantive decision pending the outcome of the Minister's appeal.

[83] There does not appear to be any substantive decision of the High Court in respect of the appeal. There is a brief procedural decision in respect of production of documents under s 303 RMA,[27] in which Temm J offered the expressly *obiter* observation that the Tribunal's strict interpretation seemed to him not to be unreasonable in the circumstances of the relevant legislation. It may be noted that the stay decision records the evidence on behalf of the Minister that steps were being taken to issue a new notice of requirement under s 168 RMA. We also note that the current designation of the site in the AUP is for a *Care and Protection Residential Centre* which expressly includes providing secure care for children and young persons.

[84] The Tribunal's stay decision provides a comparable example of how the potential rigour of a declaration may be reduced by interim suspension, providing time for its correctness to be challenged and considered on appeal. As noted above, that time may also afford an opportunity for the requiring authority to consider any available alternative method of addressing any issue to do with the accuracy, comprehensiveness or efficacy of the designation.

[85] There has been no formal application for a stay made by any party in the proceeding before us. We have identified this as a way to address the Minister's submissions as to the immediate potential consequences of making a declaration and the submissions of counsel for Neil that time is not of the essence to it. Rather than



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27 *Minister of Social Welfare v Manukau City Council* High Court Wellington, HC 16/92, 13 August 1992, Temm J.

require a further application, it seems to us to be in the interests of justice to incorporate a suspension during the period when this decision may be under appeal. If there is no appeal, then the suspension will be limited in time.

Decision

[86] For the foregoing reasons the Court declares:

> Condition 1 to Designation 4310 – Whenuapai Airbase by the Minister of Defence in the Auckland Unitary Plan applies to all noise generated from aircraft operations on the Airbase including noise from engine testing.

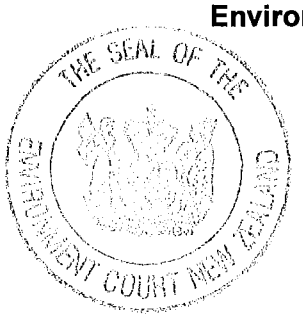
[87] The Court further orders that this declaration is suspended for 20 working days from the date of issue and, if an appeal be filed against this decision within that time, such suspension shall continue pending the ultimate outcome of that appeal.

[88] Leave is reserved to any party to apply for further directions or orders in the meantime.

[89] This application arising from a plan change process, in accordance with the Court's general practice[28] there is no order as to costs.

For the Court:

D A Kirkpatrick
Environment Judge



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28 Environment Court Practice Note 2014, clause 6.6(b).

Appendix 1 – Designation 4310

4310 Whenuapai Airbase

Designation Number	4310
Requiring Authority	Minister of Defence
Location	Brigham Creek Road, Kowhai Road, Kauri Road and Bristol Road, Whenuapai as shown on Figure 9A-1.
Rollover Designation	Yes
Legacy Reference	Designation MD1, Auckland Council District Plan (Waitakere Section) 2003
Lapse Date	Given effect to (i.e. no lapse date)

Purpose

Defence purposes (as defined by section 5 of the Defence Act 1990) - air base.

The Defence Areas are administered by the New Zealand Defence Force (NZDF) and are currently occupied by NZDF, its contractors and licensees. The Areas are a Defence Work and may be utilised for any or every purpose required by section 5 of the Defence Act 1990, which are as follows:

a. The defence of New Zealand, and of any area for the defence of which New Zealand is responsible under any Act;

b. The protection of the interests of New Zealand, whether in New Zealand or elsewhere;

c. The contribution of forces under collective security treaties, agreements or arrangements;

d. The contribution of forces to, or for any of the purposes of, the United Nations, or in association with other organisations or States and in accordance with the principles of the Charter of the United Nations;

e. The provision of assistance to the civil power either in New Zealand or elsewhere in time of emergency; and

f. The provision of any public service.

The Governor-General of New Zealand, continues to raise and maintain Armed Forces on behalf of Her Majesty the Queen. Given the obligations placed on the New Zealand Defence Force by the Crown to meet the Crown's military defence needs, including those imposed by any enactment or by the policies of the government, the function of the Defence Areas include, at all times, to provide for the following functions of the New Zealand Defence Force (including visiting forces and third parties contracted to the New Zealand Defence Force):

i. Defence Force command, land operations, sea operations, air operations, training, logistic support, ship berthing and docking, construction, repair, maintenance, munitions handling and storage, administration, and communication, and for the acquisition and improvement of the skills necessary for such functions;

ii. Resources, accommodation and facilities for these functions;

iii. Accommodation for members of the New Zealand Defence Force and any visiting force, training, recreational, welfare and medical facilities for them;

iv. Facilities for the storage of matériel, food and fuel, and the conservation and display of historic material;

v. Facilities for the construction, repair and maintenance of vessels, aircraft, vehicles and other equipment, including the vessels, aircraft, vehicles and equipment of forces of other nations;

vi. To provide for the rapid and efficient deployment of the New Zealand Defence Force; and

vii. Any other activity required in the delivery of New Zealand Defence Force outputs as described annually in the Departmental Forecast Report: New Zealand Defence Force.

Conditions

Aircraft Noise

1. Aircraft operations on the RNZAF Airbase shall not exceed a day/night (Ldn) level of:

   a. 65dBA outside the Airnoise Boundary (Ldn 65 dBA Contour) shown on the Airbase Noise map; and

   b. 55dBA outside the Outer Control Boundary (Ldn 55 dBA Contour) shown on the AirbaseNoise map.

   For the purpose of this control noise will be measured in accordance with the NZS 6805:1992 and calculated, as stated in NZS 6805:1992, using FAA Integrated Noise Model (INM) and records of actual aircraft operations and calculated as a 90 day rolling logarithmic average.

Exceptions to noise limits:

a. The aircraft is landing in an emergency;

b. The aircraft is landing at the Airbase as an alternative in adverse weather conditions; or

c. The aircraft is using the airfield as part of a search and rescue operation or civil emergency.

Administration

2. Works and projects that comply with the permitted activity rules of the underlying zoning are incorporated into this designation and, in accordance with section 176A(2)(b) of the Resource Management Act 1991, no outline plan is required for those activities.

3. For the avoidance of doubt, maintenance activities do not require an outline plan.

Historic Heritage

4. Where any construction works for a project involve the total or substantial demolition of, or modifications to, a scheduled historic heritage place, any outline plan that is required shall, pursuant to s176A(3)(f), include:

   a. an assessment of the effects on the historic heritage values of theplace;

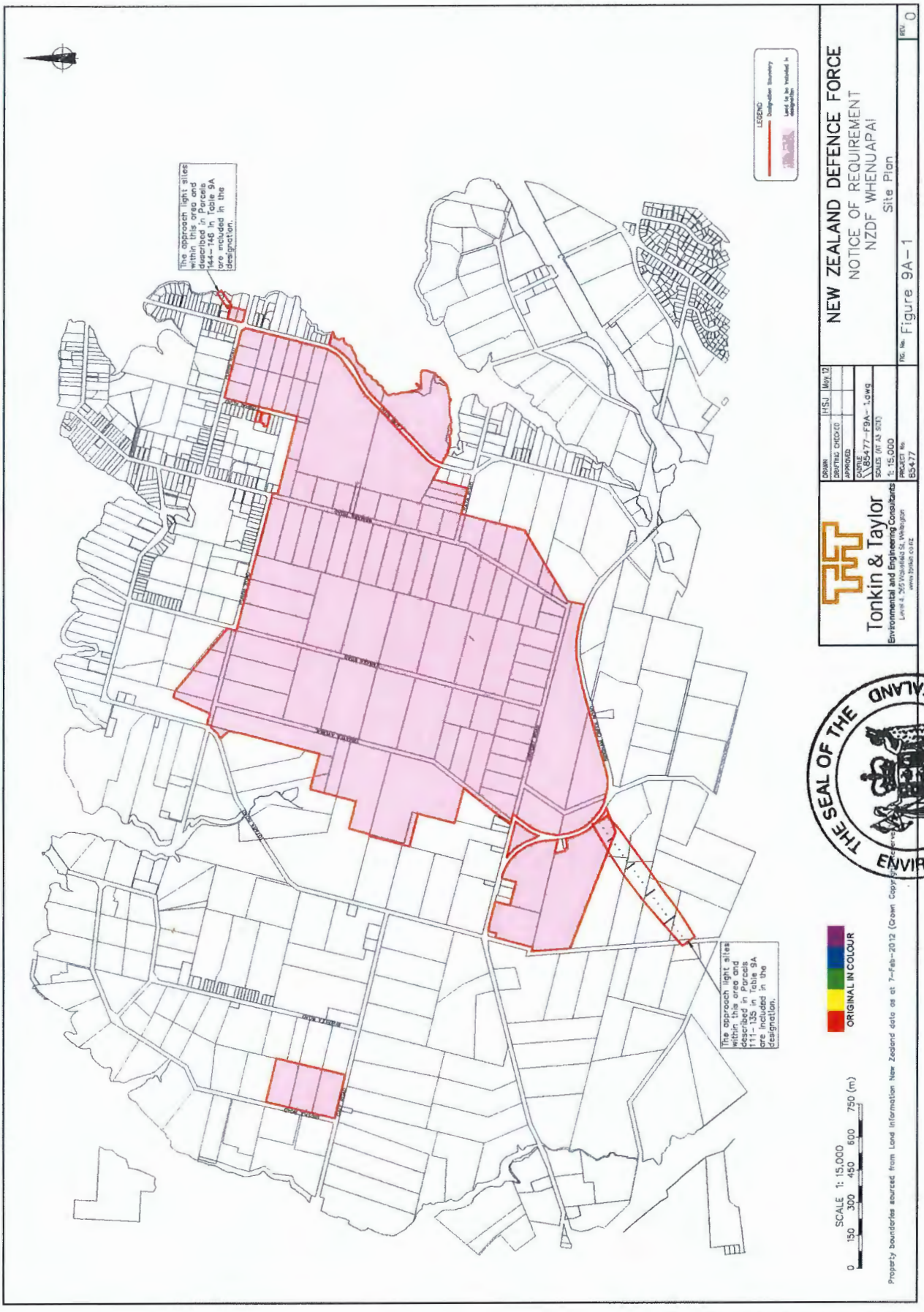
   b. a consideration of alternative methods and/or appropriate mitigation to prevent or avoid damage, loss or destruction of the values of the scheduled historic heritage place.

This condition shall not apply in respect of repair or maintenance of the scheduled historic heritage place.

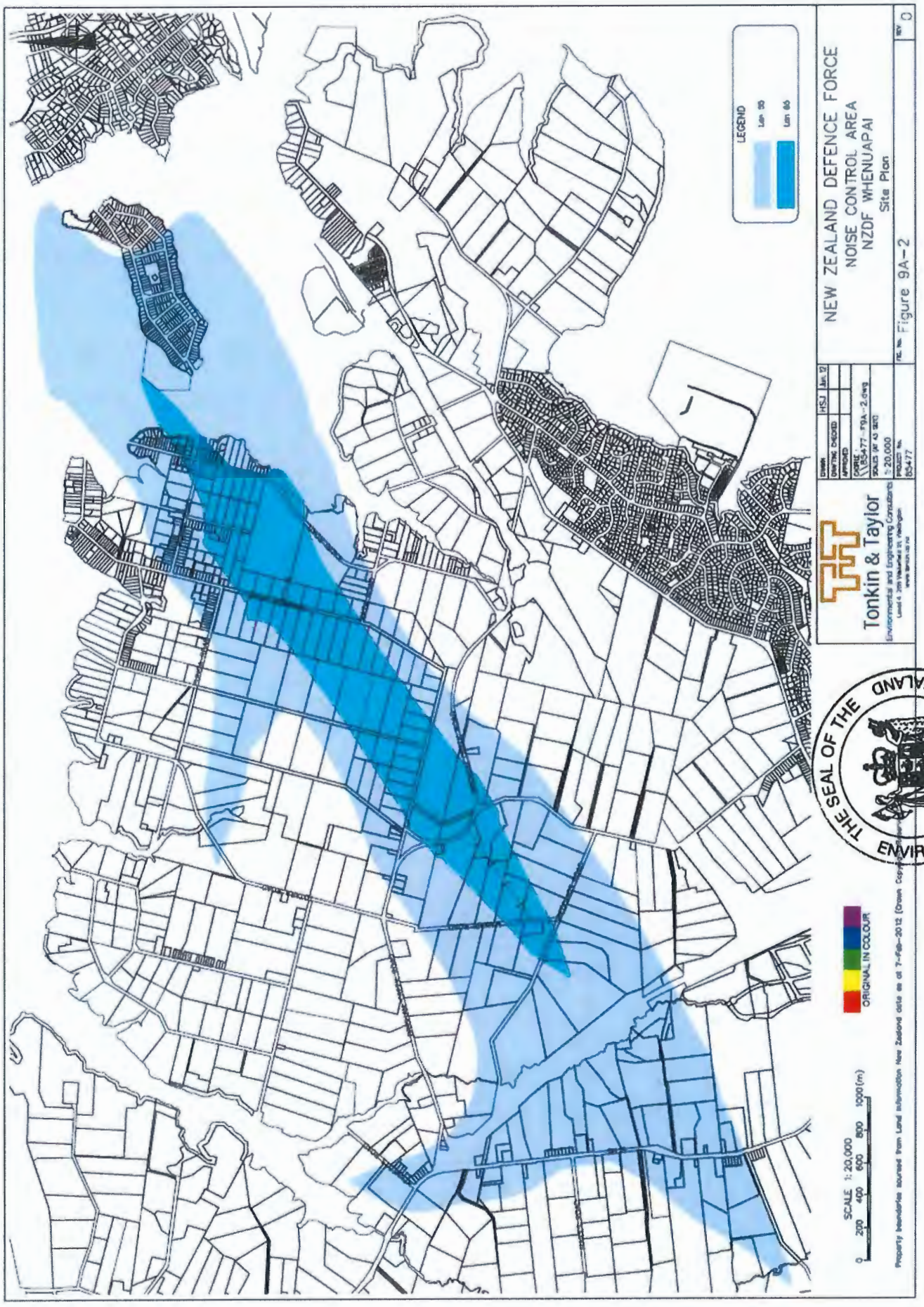
This condition shall not apply where there is a conservation plan or similar plan (such as a NZDF Heritage Management Plan) for the management of the scheduled historic heritage place and the proposed construction works are in accordance with this plan.

Attachments

Drawing 9A-1 - Notice of Requirement Whenuapai Site Plan



Drawing 9A-2 - Noise Control Area Whenuapai Site Plan



Appendix 5c: Minister of Defence Certificate issued under section 4 of the Resource Management Act 1991

Certificate by Minister of Defence Issued Pursuant to Section 4(2) of the Resource Management Act 1991

I, the Honourable Ron Mark, Minister of Defence, am advised that:

a. The Environment Court declared on 16 September 2019 that Condition 1 to Designation 4310 – Whenuapai Airbase in the Auckland Unitary Plan applies to all noise generated from aircraft operations on Whenuapai Airbase including noise from engine testing.

b. Currently noise from engine testing at Whenuapai Airbase does not comply with Condition 1, exposing the NZDF to the risk of enforcement action under the Resource Management Act 1991.

c. New Zealand's national security would be compromised if current engine testing practices at Whenuapai Airbase were unable to be continued as this would preclude the aircraft operations necessary to provide essential military capability;

and therefore hereby certify that:

1. the activity of aircraft engine testing at RNZAF Base Whenuapai (shown on the attached plan) is a necessary component of aircraft maintenance and is required to be undertaken for reasons of national security; and

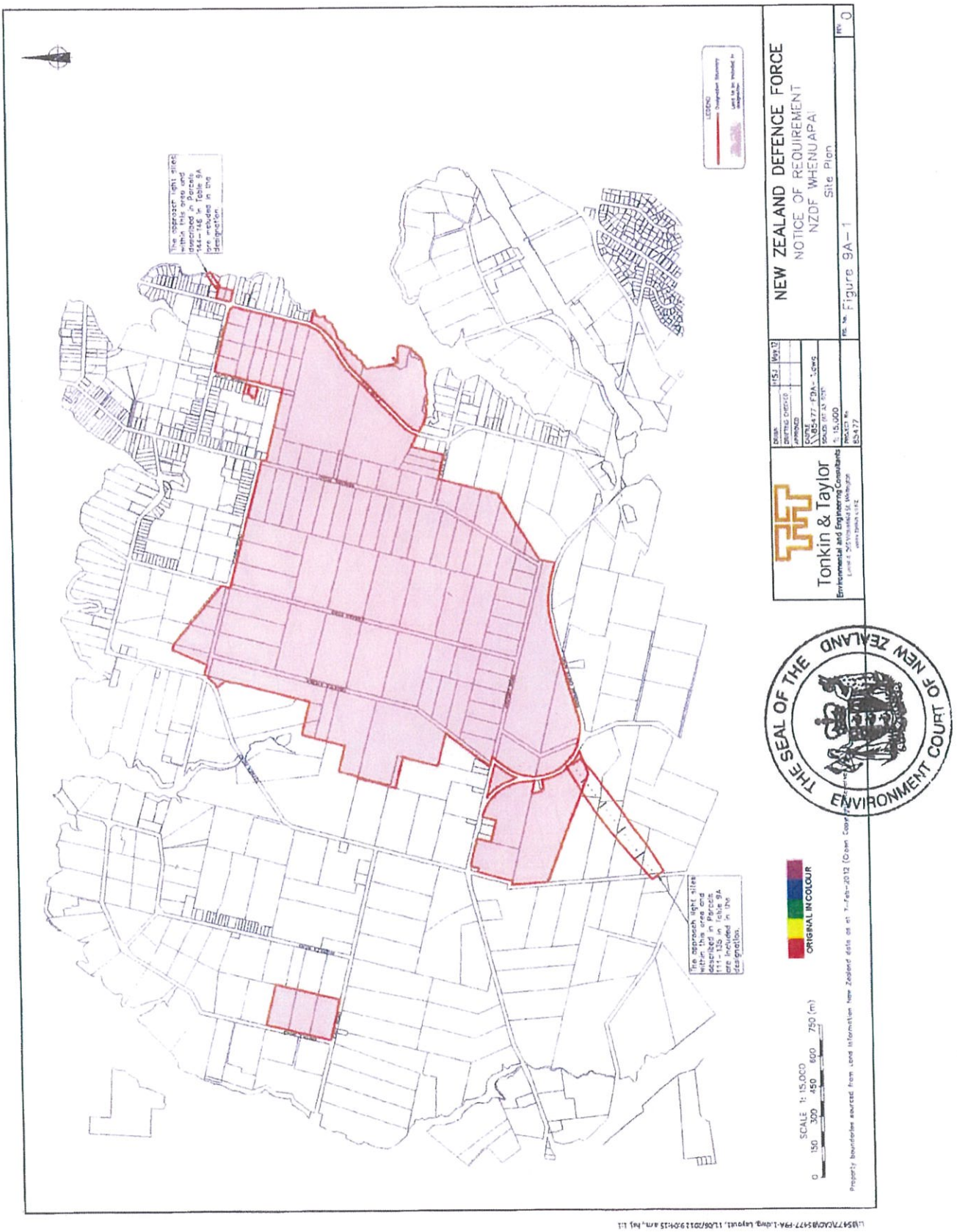
2. national security reasons require that the activity of aircraft engine testing at RNZAF Base Whenuapai is exempt from the Resource Management Act 1991.

Signed at Wellington this 14 day of October 2019

The Honourable Ron Mark
Minister of Defence

Attachments

Drawing 9A-1 - Notice of Requirement Whenuapai Site Plan



Appendix 6: Agreement for sale of land at 161 and 167 Brigham Creek Road, Whenuapai, Auckland

Parties

HER MAJESTY THE QUEEN
for use in connection with a road and stopped Government road

AUCKLAND COUNCIL

AGREEMENT FOR
SALE OF LAND AT 161 AND 167 BRIGHAM CREEK ROAD, WHENUAPAI, AUCKLAND

MEMORANDUM OF AGREEMENT

Parties

1. **Her Majesty the Queen** for use in connection with a road and stopped Government road **(the Crown)**

2. **Auckland Council (the Council)**

Background

A. The Crown holds the land described in **Schedule 1** and as shown in the Survey Office Plans attached as **Schedule 2** and **Appendix 4**, located at 161 and 167 Brigham Creek Road, Whenuapai, for use in connection with a road **(the Land)** pursuant to the Public Works Act 1981 **(PWA)**. The Land was acquired for the State Highway 16/18 Hobsonville Connection project and is administered for the Crown by the New Zealand Transport Agency **(the Transport Agency)**.

B. The Council wishes to acquire the Land for another public work, namely recreation purposes. In addition to this the Crown is negotiating with the Council to acquire land held as a recreation reserve described as Lot 1 Deposited Plan 98275 and comprised in Computer Freehold Register 422165 and known as Constellation Park, Upper Harbour Highway, Rosedale, Auckland **(the Constellation Drive Land)**. The parties have not yet reached agreement on the Constellation Drive Land however it is anticipated that the agreement for the Constellation Drive Land will provide for an advance payment pending a final determination of the purchase price for the acquisition of the Constellation Drive Land **(the Constellation Agreement)**.

C. The parties intend that acquisition of the Land is conditional on execution of the Constellation Agreement, such that settlement of that agreement will be contemporaneous with settlement of this agreement. Further the parties have agreed to a full and final purchase price for the Land (refer **clause 3.3**).

D. This agreement records the terms of the parties' agreement for the acquisition by the Council of the Land in accordance with section 50 of the PWA.

THE PARTIES AGREE:

1.0 Conditional Agreement

1.1 This agreement is conditional on the parties ~~executing~~ entering into an unconditional agreement for acquisition of the Constellation Drive Land.

1.2 If the condition in **clause 1.1** is not satisfied within three months of signing this agreement then either party may cancel this agreement by providing written notice to the other party.

2.0 Sale of Land

2.1 The Crown agrees to sell and the Council agrees to acquire the Land for recreation purposes on the terms and conditions set out in this agreement.

2.2 This agreement has been entered into under section 50 of the PWA and the land will be transferred to Council for recreation purposes by declaration under section 20 of the PWA **(Declaration)** and on the terms set out in this agreement.

3.0 Settlement and Possession

3.1 Vacant possession of the Land shall be given to the Council on the Settlement Date, being the date that settlement occurs pursuant to the Constellation Agreement between the Crown and the Council (being within one month of the date the Crown notifies the Council that a compensation certificate is registered against the Constellation Drive Land) (the **Settlement Date**).

3.2 Council will pay the sum of **Nineteen Million Dollars** ($19,000,000.00) plus GST, if any **(the Purchase Price)** by way of full and final payment, subject to the terms of this agreement.

3.3 The Crown acknowledges and agrees that the Council will tender the Purchase Price as follows:

(a) on the Settlement Date, the Council shall tender part of the Purchase Price by way off-set against the advance compensation agreed to by the parties for the Constellation Drive Land pursuant to the Constellation Agreement (being the Crown's valuation of **$15,292,000.00, plus GST, if any**); and

(b) on or before 20 June 2019 (Final Payment Date), the Council shall tender the balance of the Purchase Price, if any, together with interest calculated from the Settlement Date until the Final Payment Date, by way of cheque drawn on the account of the Council or by way of electronic transfer of funds drawn on the account of the Council pursuant to any protocol subsequently agreed between the parties. Interest will be calculated in accordance with Schedule 2 of the Interest on Money Claims Act 2016.

3.4 Rates shall be apportioned on the date following registration of the Declaration.

3.5 As soon as practicable after registration of the Declaration the Crown must forward a notice to the relevant territorial local authorities advising of the change of owner of the Land.

4.0 Goods and Services Tax

4.1 The parties agree that the supply of the Land pursuant to this agreement is subject to the provisions of the GST Act and zero rated by virtue of section 11(1)(mb) of the GST Act.

(a) The Crown warrants that:

(i) At the date of this agreement it is a registered person as required by the GST Act.; and

(ii) The Crown will still be a registered person at the Settlement Date and the Final Payment Date.

(b) The Council warrants that:

(i) At the date of this agreement it is a registered person as required by the GST Act;

(ii) It is acquiring the Land for the purpose of making a taxable supply;

(iii) It is not acquiring the Land for a principal place of residence by it or a person associated with it under section 2A(1)(c) of the GST Act; and

(iv) The warranties provided in sub-clauses 2(b)(i)-(iii) above will remain correct up until and including the Settlement Date and the Final Payment Date.

5.0 No Insurance

5.1 The Land shall remain at the sole risk of the Crown until settlement.

5.2 The Crown has no insurance over the Land.

6.0 No Warranties and Other Disclosures

6.1 The Crown accepts no liability for any inaccuracy in the description of the Land.

6.2 Any and all warranties or representations as to the order, contamination and condition of the Land made on behalf or implied by law against the Crown are expressly negated. Council shall be deemed to have purchased the Land in full reliance on Council's own skill and knowledge and Council shall make no claim thereof to the Crown.

6.3 Any and all warranties or representations as to the fitness of the Land for any particular use made on behalf of or implied by law against the Crown are expressly negatived and Council shall make no claims in respect thereof. Council shall be deemed to have purchased the Land in full reliance on the Council's own skill and knowledge. In particular Council shall satisfy itself as to all planning requirements, matters pertaining to the Building Act 1991, the Building Act 2004 and the Resource Management Act 1991 insofar as they affect the Land.

6.4 For the avoidance of doubt the parties acknowledge:

(a) The Crown has provided to Council a copy of the contamination report disclosing that the Land may be contaminated; and

(b) The Land has been valued taking into account the possible existence of contamination.

6.5 The Council acknowledges that the report discloses that parts of the Land have low levels of contamination, the level being below the safe level for residential development, and does not require remediation of the Land for the proposed use.

6.6 The Council acknowledges that the Crown has disclosed that those parts of the Land where fill has been placed as part of the adjacent State highway works are shown as the area marked "A" in the Fill Encumbrance attached as Appendix 1.

6.7 The risk in respect of the Land (including any risk in relation to contamination) shall pass to Council upon possession of the Land being given to Council and the Crown shall have no further responsibility in this regard.

7.0 Right of First Refusal

7.1 The parties acknowledge:

(a) The Land is RFR Land within the meaning of the Ngati Whatua o Kaipara Claims Settlement Act 2013 (**Settlement Act**) but is exempt from an offer to Ngati Whatua o Kaipara pursuant to section 106 of the Settlement Act as the transfer of the Land is made pursuant to section 50 PWA;

(b) The Council will become an RFR landowner pursuant to section 95 of the Settlement Act; and

(c) The Crown will give 20 working days notice to Ngati Whatua o Kaipara before the Settlement Date in accordance with clause 118 of the Settlement Act and will provide a copy of the notice to the Council (**working day** is defined in **clause 18** of this agreement).

8.0 Survey and Legalisation

8.1 As soon as practicable following the date of this agreement (if it has not already done so) the Crown shall, at its cost, survey those parts of the Land as required, and provide a copy of the approved survey plan to the Council.

8.2 A reasonable time prior to the Settlement Date, the Crown shall undertake the following actions to complete the transfer of ownership of the Land to the Council:

(a) Prepare and procure execution by the Minister for Land Information a gazette notice pursuant to sections 20 and 50 of the PWA (**the Gazette Notice**);

(b) Notify the Council that the actions described in **clause 8.2 (a)** are complete.

8.3 The Crown shall, on or as soon as reasonably practicable following the Settlement Date (and receipt of the executed Gazette Notice) and the expiry of the notice period referred to in **clause 7.1(c)** above, publish the Gazette Notice in the New Zealand Gazette and subsequently register the Gazette Notice in Landonline. The Crown shall notify the Council once the Gazette Notice has been registered.

8.4 The Council authorises the Crown, on the Council's behalf, to prepare and register orders for new computer freehold registers for the land referred to in the Gazette Notice (the **New CFRs**).

8.5 The parties agree that each shall, if requested by the other, do all such acts and other things and execute all documents that are necessary for the survey and legalisation actions in this **clause 9**.

9.0 Drainage Easement

9.1 The Crown reserves the right to register a stormwater drainage easement over the area marked "C" on **Survey Office plan 516731** (see plan attached as **Schedule 2**) and in accordance with the rights and powers set out in **Appendix 3**. The parties acknowledge the

purpose of the stormwater drainage easement is to preserve the use of the existing culvert along the boundary of the Land for the benefit of the adjoining state highway (including rights of access to the culvert).

9.2 The Crown shall be fully responsible for all repairs and maintenance of the culvert subject to **clause 9.3**.

9.3 The Council has disclosed its future requirements for the Land which may affect the stormwater drainage easement. The Council agrees that it will consult and obtain the approval of the Transport Agency prior to carrying out any works affecting the stormwater drainage easement and any such alterations to the easement area shall not adversely affect the operation of the stormwater drainage. The Council will meet all costs in relation to any alteration of the terms of the easement, if such alteration is at Council's request.

10.0 Fill and Reverse Sensitivity Encumbrance

10.1 The Council covenants with the Crown to enter into and register on issue of the New CFRs a fill encumbrance in favour of Her Majesty the Queen for use in connection with a road and stopped Government road in the form attached at **Appendix 1 (the Fill Encumbrance)**.

10.2 The Council covenants with the Crown to enter into and register on issue of the New CFRs a reverse sensitivity encumbrance in favour of New Zealand Transport Agency in the form attached at **Appendix 2 (the Reverse Sensitivity Encumbrance)**.

10.3 The Council will provide evidence to the Crown that the Fill Encumbrance and the Reverse Sensitivity Encumbrance will be registered against the New CFRs by the Council's solicitor in a Landonline workspace with the following priority:

(a) Firstly, the Fill Encumbrance; and

(b) Secondly, the Reverse Sensitivity Encumbrance;

(together the "Encumbrances"),

and except for the order priority of registration outlined above the Encumbrances will have priority as set out above over any other encumbrance or charges whatsoever.

10.4 The Council will provide the Crown with written evidence of the registration of the Fill Encumbrance and the Reverse Sensitivity Encumbrance with the priority set out in **clause 10.3.**

10.5 Further, the Council hereby irrevocably appoints the Crown as the Council's attorney to do all things necessary including without limitation executing all documents and obtaining all consents necessary to register the Fill Encumbrance and the Reverse Sensitivity Encumbrance should the Council default in any obligation in respect of the grant and registration of the Fill Encumbrance and the Reverse Sensitivity Encumbrance.

10.6 The Crown shall sign and produce all consents to enable the Encumbrances to be registered against the New CFRs in a Landonline workspace.

11.0 Crown Minerals

11.1 The parties acknowledge the transfer of the Land to the Council is subject to section 11 of the Crown Minerals Act 1991, and Part IVA of the Conservation Act 1987.

12.0 Merger

12.1 The terms and conditions of this agreement shall not merge with settlement or the transfer of title to the Land.

13.0 Boundaries, Fencing and Licence

13.1 The Crown shall grant the Council a grazing licence to use the rest of the land contained in CIRs 525375 and 525376 at a licence fee of $1.00 plus GST (**Licence**). The Licence shall be terminable by either party providing the other with three (3) months written notice.

13.2 The parties acknowledge and agree that the fence that runs along the southern most part of the Land does not run along the legal boundary of the Land (**Southern Fence**). If, at any stage either party requires that the Southern Fence is removed and reconstructed along the boundary, then the parties agree to share equally the cost of reconstructing an adequate 7 or 8 wire rural fence (as that term is defined in the Fencing Act 1978) (**Adequate Fence**) along the boundary. If either party requires a fence that is anything more than an Adequate Fence due to a public work requirement (**Public Work Fence**), then the difference between the cost of an Adequate Fence and the cost of the Public Work Fence shall be borne entirely by the party that requires the Public Work Fence.

13.3 The Crown shall not be bound to point out the boundaries of the Land.

14 Agreement not binding until signed

14.3 This agreement shall not be binding on either party until it has been executed on behalf of both parties.

15 Default

15.3 In the event of any material default by either party (Defaulting Party) arising out of this agreement, the other party shall be entitled to exercise its lawful rights including without limitation the right to sue for specific performance and take whatever other action is available under and arising out of this agreement and otherwise at law, but before taking any such action shall serve 12 working days notice on the Defaulting Party specifying the breach and giving the Defaulting Party the opportunity of remedying such breach.

16 Capacity of Auckland Council

16.3 Council has entered into this agreement in its non-regulatory capacity. This agreement does not bind the Council in its capacity as a regulatory authority in any way, and any consent or agreement Council gives under this agreement is not an agreement or consent in its regulatory capacity and vice versa. When acting in its regulatory capacity, Council will not be liable to the Crown or any other party or, in its regulatory capacity,

Council declines or imposes conditions or any consent or permission the Crown or any other party seeks for any purpose associated with this agreement.

17 Costs

17.3 The Parties agree that each party shall be responsible for their costs incurred in this transaction, excepting costs that have been agreed in the Constellation Agreement.

18 General

18.3 The parties agree to do all such acts and other things and execute all documents as may be necessary to give effect to this agreement and which might reasonably be required of them pursuant to this agreement.

18.4 The parties agree and acknowledge that where the context requires, references in this agreement to the Crown include the New Zealand Transport Agency.

18.5 For the purposes of this Agreement "working day" means any day of the week other than:

(a) Saturday, Sunday, Good Friday, Easter Monday, Anzac Day, Labour Day, the Sovereign's birthday, and Waitangi Day;

(b) if Waitangi Day or Anzac Day falls on a Saturday or a Sunday, the following Monday; and

(c) a day in the period commencing with 25 December in any year and ending with 15 January in the following year.

19 Electronic Execution

19.3 The parties agree that:

(a) This Agreement may be executed in two or more counterparts, all of which will together be deemed to constitute one and the same agreement. A party may enter into this Agreement by signing a counterpart copy and sending it to the other party, including by facsimile or email.

(b) The production of an emailed copy or copies of the agreement signed by all parties shall be deemed to be sufficient to satisfy the requirements of the Property Law Act 2007.

(c) In the case of email, any notice or document is deemed to have been received when acknowledged by the party or by the lawyer orally or by return email or otherwise in writing, except that return emails generated automatically shall not constitute an acknowledgement.

(d) In accordance with Section 224 of the Contract and Commercial Law Act 2017, the parties agree that any notice or document that must be given in writing by one party to the other may be given in electronic form and by means of electronic communication.

20 Notices

20.3 All notices and other communications required or permitted under this Agreement shall be in writing and shall be delivered personally, sent by post (within New Zealand), by electronic mail (e-mail) or by facsimile transmission to the address set out below (or at such address as may be directed in writing from time to time by the parties).

20.4 Where notice or communications are sent by facsimile transmission notice shall be deemed served when sent to a notified facsimile number prior to 5.00 pm on any working day. Where sent after 5.00 pm notice shall be deemed served on the next working day. The sender shall retain and if required:

(a) provide the recipient with the tracing report evidencing the number of pages sent and the time of transmission; and

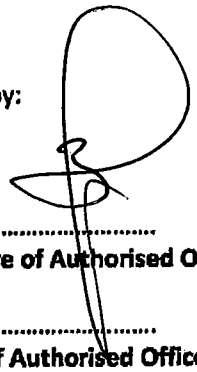
(b) promptly confirm the same by post.

20.5 Where notice or communications are sent by email notice shall be deemed served when sent to a notified email address and receipt is acknowledged orally by the recipient or by writing including return email.

20.6 Where notice or communications are personally delivered notice shall be deemed served when received at the recipients notified address prior to 5.00 pm on any working day. Where sent after 5.00pm notice shall be deemed served on the next working day.

20.7 Where notice or communications are sent by post notice shall be deemed served within New Zealand on the second working day following the posting by the sender to the recipient's notified address.

Signed by:



.....

Signature of Authorised Officer

ZAK SUN

.....

Name of Authorised Officer

For and on behalf of Her Majesty the Queen and acting pursuant to delegated authority from the Chief Executive of Land Information New Zealand pursuant to section 41 of the State Sector Act 1988

In the presence of:

.....

(signature)

Name of Witness:
Address of Witness:
Occupation of Witness:

Signed for and on behalf of **Auckland Council** pursuant to delegated authority by:

K. Maki

.....

Signature of Authorised Officer

Katalaina Helen Maki

.....

Name of Authorised Officer

In the presence of:

.....

(signature)

Name of Witness: MACE FRECKLEWARD
Address of Witness: 36 Lode Pl, Birkenhead
Occupation of Witness: Public Servant.

SCHEDULE 1 – The Land

161 Brigham Creek Rd
3.0491 hectares more or less being Lot 2 DP 182711, comprised in Computer Freehold Register NA113D/468

167 Brigham Creek Rd
9.0857 hectares more or less being Section 1 SO Plan 516731, being part of the land comprised in Computer Interest Register 525375

3.9875 hectares more or less being Section 2 SO Plan 505845, being part of the land comprised in Computer Interest Register 525376

SCHEDULE 2

Survey Office Plan 516731 for Stormwater Drainage Easement - Area "C"

Title Plan - SO 516731

Survey Number	SO 516731
Surveyor Reference	1359 Brigham Creek Rd
Surveyor	Bruce MacLeod Frith
Survey Firm	SurveyPro Limited
Surveyor Declaration	I Bruce MacLeod Frith, being a licensed cadastral surveyor, certify that: (a) this dataset provided by me and its related survey are accurate, correct and in accordance with the Cadastral Survey Act 2002 and the Rules for Cadastral Survey 2010, and (b)the survey was undertaken by me or under my personal direction. Declared on 29 Nov 2017 03:08 PM

Survey Details

Dataset Description	SECTIONS 1 AND 2		
Status	Approved as to Survey		
Land District	North Auckland	**Survey Class**	Class B
Submitted Date	29/11/2017	**Survey Approval Date**	05/12/2017
		Deposit Date	

Territorial Authorities

Auckland Council

Comprised In

GN 8513768.4

CT 525375

Created Parcels

Parcels	Parcel Intent	Area	CT Reference
Section 1 Survey Office Plan 516731	Legalisation	9.0857 Ha	
Section 2 Survey Office Plan 516731	Legalisation	1.4954 Ha	
Area A Survey Office Plan 516731	Easement		
Area B Survey Office Plan 516731	Easement		
Area C Survey Office Plan 516731	Easement		
Total Area		10.5811 Ha	

Schedule / Memorandum

Land Registration District	Survey Number
North Auckland	SO 516731

Territorial Authority (the Council)

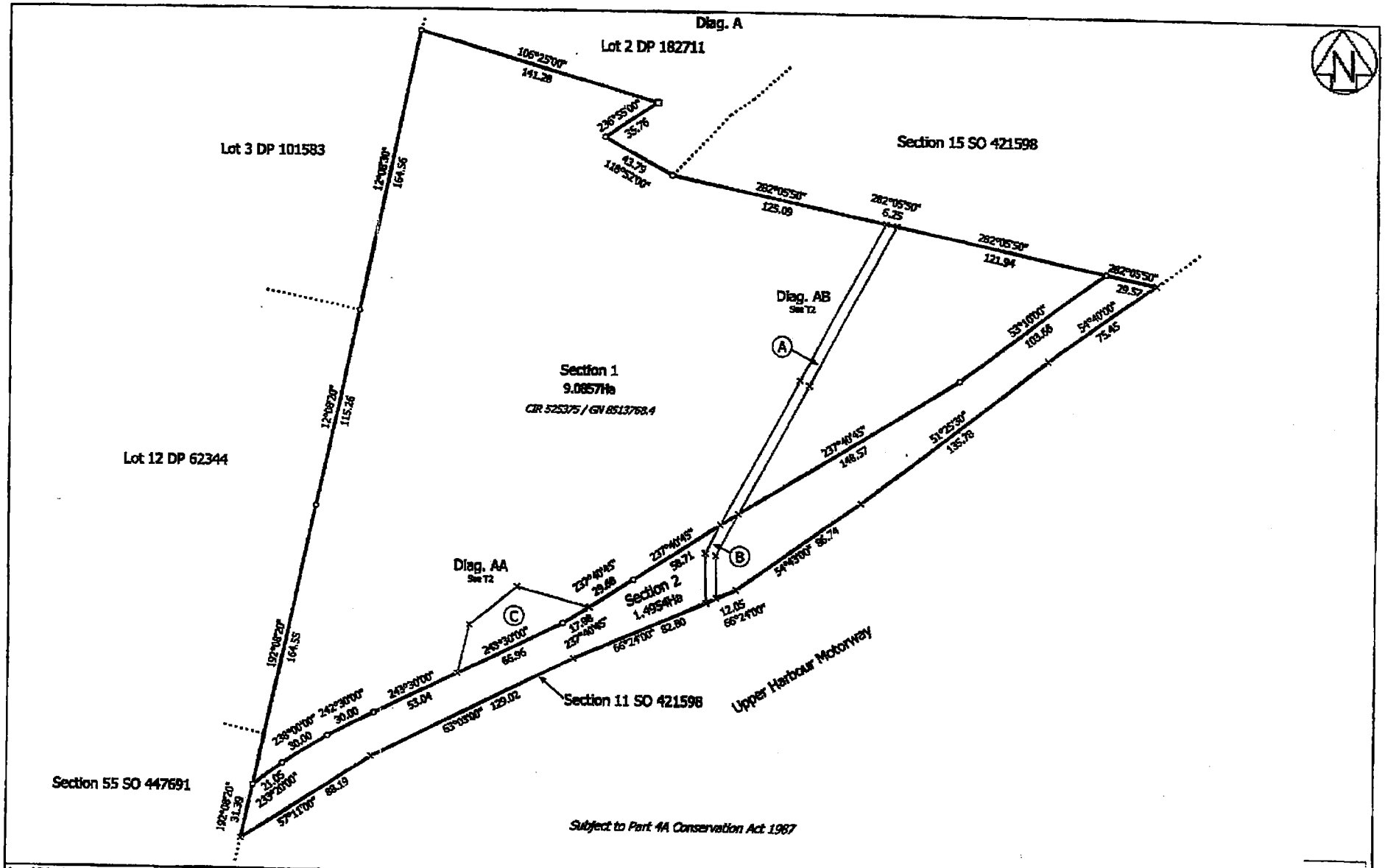
Auckland Council

Schedule of Existing Easements
Last Edited: 11 Oct 2017 09:39:32

Purpose	Shown	Servient Tenement	Creating Document Reference
Right to drain sewage	A	Sect 1	E 9764028.1
	B	Sect 2	E 9764028.1

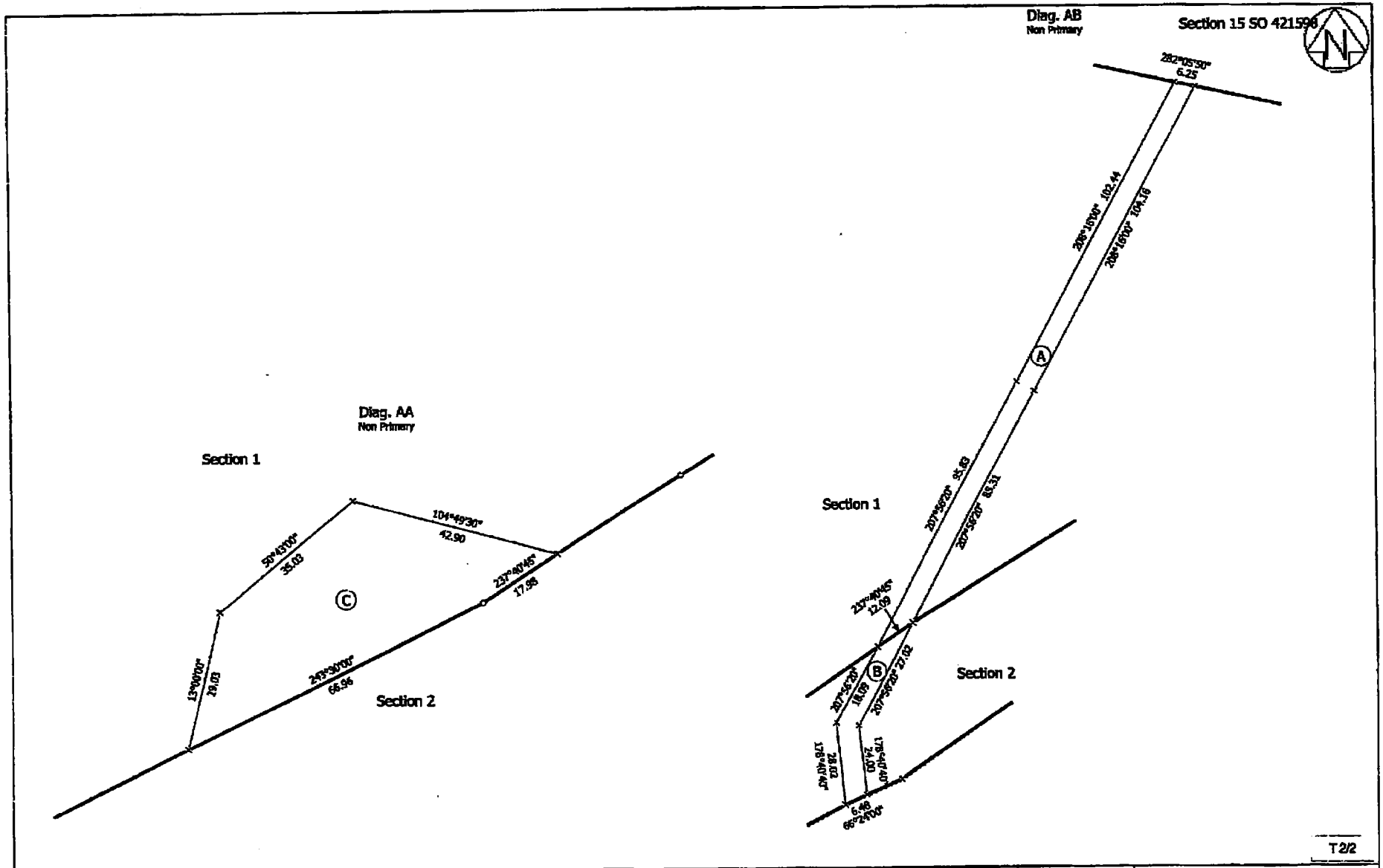
Schedule of Easements in Gross
Last Edited: 11 Oct 2017 12:31:36

Purpose	Shown	Servient Tenement	Grantee
Right to drain storm water	C	Sect 1	Her Majesty the Queen



Land District: North Auckland **Digitally Generated Plan** Generated on: 05/12/2017 2:00pm Page 3 of 4	SECTIONS 1 AND 2	Surveyor: Bruce MacLeod Frith Firm: SurveyPro Limited	Title Plan SO 516731 Approved on: 5/12/2017

T 1/2



Land District: North Auckland Digitally Generated Plan Generated on: 05/12/2017 2:00pm Page 4 of 4	SECTIONS 1 AND 2	Surveyor: Bruce MacLeod Frith Firm: SurveyPro Limited	Title Plan SO 516731 Approved on: 5/12/2017

Appendix One – Fill Encumbrance

Form E

Encumbrance Instrument

(Section 101 Land Transfer Act 1952)

Affected instrument Identifier and type (if applicable)	All/part	Area/Description of part or stratum
	All	

Encumbrancer

[LANDOWNER]

Encumbrancee

HER MAJESTY THE QUEEN acting through the Minister of Lands pursuant to Section 4B of the Public Works Act 1981 ("the Crown")

Estate or interest to be encumbered *Insert e.g. Fee simple; Leasehold in Lease No. etc.*

Fee simple

Encumbrance Memorandum Number

Not applicable

Nature of security *State whether sum of money, annuity or rentcharge and amount*

Rent charge of TEN DOLLARS ($10.00) per annum, and such other sums of money as are payable by the Encumbrancer to the Encumbrancee pursuant to this Encumbrance Instrument.

Encumbrance *Delete words in [ ], as appropriate*

The Encumbrancer encumbers for the benefit of the Encumbrancee the land in the above computer register(s) with the above sum of money, annuity or rentcharge, to be raised and paid in accordance with the terms set out in the Annexure Schedule(s) and so as to incorporate in this Encumbrance the terms and other provisions set out in the Annexure Schedule(s) for the better securing to the Encumbrancee the payment(s) secured by this Encumbrance, and compliance by the Encumbrancer with the terms of this encumbrance.

Annexure Schedule

Insert instrument type

Encumbrance

Continue in additional Annexure Schedule, if required

Terms

1 Length of term **999 years**

2 Payment date(s) **see below**

3 Rate(s) of interest **Nil**

4 Event(s) in which the sum, annuity or rentcharge becomes payable **See below**

Covenants and conditions *Continue in Annexure Schedule(s), if required*

Payment date(s) and event(s) in which the sum, annuity, or rentcharge becomes payable:

(a) In respect of the rent charge, 1 January in each year; and

(b) In respect of other sums of money, ten working days after written demand is made by the Encumbrancee to the Encumbrancer.

Continued on the attached annexure schedule.

Modification of statutory provisions *Continue in Annexure Schedule(s), if required*

Sections 154 and 156 of the Land Transfer Act 1952, Sections 23, 203-205, 289-290 and 301-302 of the Property Law Act 2007 and Section 4 of the Contracts (Privity) Act 1982 shall apply to this Encumbrance instrument but otherwise (and without prejudice to the Encumbrancee's rights of action at common law as a rent-chargee) the Encumbrancee shall not be entitled to any of the powers and remedies given to encumbrancees by the Land Transfer Act 1952 and the Encumbrancee and its successors and assigns shall not be entitled to any of the powers and remedies given to mortgagees under the Land Transfer Act 1952 or the Property Law Act 2007.

Annexure Schedule

Insert Instrument type

Encumbrance

Continue in additional Annexure Schedule, if required

BACKGROUND

A. [ ] (together with his successors, assignees, tenants, lessees and persons under his control) ("the Encumbrancer") is registered as proprietor of an estate in fee simple in all that parcel of land described on the front page of this Encumbrance Instrument ("the Land").

B. The Land fronts State Highway 18 ("State Highway").

C. Under sections 61(1) and 80(1) of the Government Roading Powers Act 1989, the Encumbrancee has sole powers of control for all purposes of all State highways and motorways.

D. The Land is part of the land originally acquired by the Crown for State Highway 1 Northern Gateway. During construction of the State Highway, the Land was used as a dumpsite to dispose of unsuitable material and as a result certain restrictions and conditions on the erection of any building or structure, or the carrying out of any earthworks on the Land are required.

E. For valuable consideration the Encumbrancer has agreed to encumber the Land for the benefit of the Encumbrancee with the security specified on the front page of this Encumbrance Instrument, and to covenant with the Encumbrancee to secure compliance by the Encumbrancer with certain covenants and agreements.

OPERATIVE PROVISIONS

1. If, on the due date for payment (as set out in Annexure Schedule 1) of the rent charge imposed under this Encumbrance Instrument, the Encumbrancer has fully complied with all of the obligations imposed pursuant to this Encumbrance Instrument, then the rent charge payable on that day shall not be required to be paid by the Encumbrancer.

2. The Encumbrancer acknowledges that the covenants in this Encumbrance Instrument are of a permanent nature, and the Encumbrancer shall not be entitled to a discharge of the Encumbrance Instrument during the term, whether by payment of the total security or otherwise.

Continue in additional Annexure Schedule, if required

3. The Encumbrancer covenants with the Crown as follows:

   3.1 That the Encumbrancer shall not erect or permit to be erected any building or structure on the Land and shall not carry out any earthworks on the Land otherwise being in accordance with the recommendations of a registered engineer experienced in soil mechanics.

   3.2 Any building or structure erected on the Land or any earthworks carried out on the Land shall be erected or carried out at the sole risk of the Encumbrancer and the Encumbrancer shall have no recourse to the Crown in respect of the Land.

   3.3 In commissioning a report in accordance with sub clause 2.1 the Encumbrancer shall advise the Registered Engineer of the existence of this Encumbrance.

   3.4 The Encumbrancer will not erect any buildings or structures on the Land or carry out any earthworks on the Land in a manner that will adversely affect the structural integrity of the State Highway.

   3.5 The Encumbrancer agrees to indemnify the Crown against any loss suffered by the Crown as a direct result of the Encumbrancer breaching the terms of this Encumbrance.

   3.6 The words "building or structure" mean any improvement erected or constructed, deposited or installed on the Land, and include concrete, asphalt, tarseal, fences, walls, tunnels, culverts, drains, pipes, poles and lines, roads, service lanes, and driveways.

   The word "erect" includes modify and redevelop.

4. Before any building or structure is erected on the Land, or any earthworks are carried out on the Land, the Encumbrancer shall submit plans and specifications in respect of same in commercial confidence to the NZ Transport Agency for its approval, such approval not to be unreasonably or arbitrarily withheld where:

   4.1 The plans and specifications specifically address and accommodate any particular engineering requirements for the Land; and,

   4.2 The proposed building or structure will be erected on the Land or the earthworks will be carried out in line with the recommendations of a registered engineer experienced in soil mechanics; and,

   4.3 The NZ Transport Agency is reasonably satisfied such building or structure or such earthworks will not create any hazard to the State Highway or adversely affect the structural integrity of the State Highway.

   The Crown shall cause the NZ Transport Agency to provide its approval, or reasons for its disapproval, of the plans and specifications for the proposed building or structure on the Land or the proposed earthworks to be carried out on the Land within two weeks of receipt of the foregoing from the Encumbrancer, or such longer time as the parties may agree.

Annexure Schedule

Insert instrument type

Encumbrance

Continue in additional Annexure Schedule, if required

General

5. This Encumbrance instrument shall be binding on all transferees, tenants, lessees, mortgagees, chargeholders and their respective successors in title and assigns of any estate or interest in the land.

6. Where this Encumbrance instrument binds or benefits a party, it shall bind or benefit that party jointly and severally.

7. In the event of any dispute arising between the parties in respect of or in connection with this Encumbrance, the parties shall, without prejudice to any other right or entitlement they may have under this Encumbrance or otherwise

   5.1 Explore whether the dispute can be resolved by use of the alternative dispute resolution technique of mediation. The rules governing such techniques shall be agreed between the parties or as recommended by the New Zealand Law Society or as selected by the Chairman of the New Zealand Chapter of LEADR (Lawyers Engaged in Alternative Dispute Resolution), and

   5.2 In the event the dispute is not resolved within twenty eight days of written notice by one party to the other of the dispute (or such further period agreed in writing between the parties), either party may refer the dispute to arbitration under the provisions of the Arbitration Act 1996 or any amendment or re-enactment of it. The arbitrator shall be agreed between the parties within 10 days of written notice of the referral by the referring party to the other or failing agreement appointed by the President of the New Zealand Law Society. In either case, the arbitrator shall not be a person who has participated in any informal dispute resolution procedure in respect of the dispute.

8. All notices and communications under this Encumbrance shall be deemed to have been received when delivered personally, sent by prepaid post or by facsimile to such address as either party shall notify.

9. The Encumbrancer shall not at any time do, permit or suffer to be done any act whereby the rights, powers, licences and liberties granted to the Crown under this Encumbrance may be interfered with or affected in any way.

10. The Encumbrancer shall ensure that all third parties permitted by it to occupy the Land from time to time, do so subject to and at all times in compliance with the Crown's rights and privileges under this Encumbrance. The Crown acknowledges and agrees that the Land is recreation land and that notwithstanding the provisions of clause 10; the Land is open for use by the public at all times and the Encumbrancer has no obligations to the Crown in respect of the actions of members of the public using the Land, whether lawfully or not.

11. No delay or failure by the Crown to enforce performance of any of the covenants set out in the Fourth Schedule and no indulgence granted to the Encumbrancer by the Crown shall prejudice the rights of the Crown to enforce any of the covenants or provisions of this Memorandum.

12. This rent charge shall determine and the Encumbrancer shall be entitled to a discharge of this Memorandum of Encumbrance if the Crown in its absolute discretion considers that the covenants set out herein become entirely obsolete or are no longer enforceable, or in the case of continuing covenants have been performed, and in particular the erection of any building or structure on the Land in accordance with clause 3.1 herein shall not of itself entitle the Encumbrancer to a discharge of this Encumbrance.

Annexure Schedule

Insert instrument type

Encumbrance

Continue in additional Annexure Schedule, if required

Exceptions

13. Geotechnical investigation by Coffey Services (NZ) Limited was completed and a report prepared dated 23 March 2017. This geotechnical report, attached hereto, advises where fill is located on the Land. If any building or structure or any earthworks on the Land is constructed outside the fill area identified as "**A**" in the report and are in accordance with normal building standards none of the provisions of this encumbrance will apply.

Level 11, 7 City Road, Grafton
Auckland 1010
PO Box 8261, Symonds Street
Auckland 1150
New Zealand

t: +64 9 379 9463
f:

coffey.com

23 March 2017

Our ref: AKLGE202204

New Zealand Transport Agency
C/- The Property Group Limited
PO Box 104 Shortland Street
Auckland 1140

Attention: Mr D Manson

Dear David

Geotechnical Investigation for Assessment of Extent of Pre-existing Uncertified Fill at 161 to 167 Brigham Creek Road, Hobsonville, Auckland

1. Introduction and Scope of Report

This report has been prepared for the New Zealand Transport Agency (NZTA) in accordance with our offer of service dated 13 February 2017 to provide geotechnical services to assess the extent of pre-existing uncertified fill for a property located at 161-167 Brigham Creek Road.

Coffey Services (NZ) Limited 20 December 2016 report referenced 773-ALKGE199545, identified existing fill was encountered at various locations across the site to depths of up to 2.1 metres from ground level. These materials varied depending on the origin of the fill. Areas identified as being occupied by fill included a stockpile arising from the construction of State Highway 18 (SH18), a building platform fill associated with a Watercare Pump Station facility and filling associated with a stormwater outlet installation.

2. Site Description and Development Proposals

The site is located at 161 – 167 Brigham Creek Road, Hobsonville. The site consists of an irregular shaped block of land with an area of 16.45ha. The site is bounded by SH18 Upper Harbour Motorway to the south, with access from Brigham Creek Road in the north running between the two countryside lots. The western boundary is situated against agricultural/farmland land with associated rural dwellings.

The future development is proposed to be for low to medium density housing and associated access ways, private underground services and landscaping.

3. Site Investigation

Our site investigation for this report was carried out between 20 and 22 February 2017 and involved the excavation of 36 trial pits (numbered TP01 to TP36) to depths of up to 3.60 metres below ground level and 10 hand auger boreholes (numbered HA01 to HA10) to depths of up to 4.20 metres below ground level at the positions indicated on the site plan (Figure 1).

The excavation of the trail pits were undertaken by AC Diggers Limited under the observation of a Coffey Engineering Geologist. The trial pits were excavated using a 20 tonne excavator and backfilled with the excavated spoil. All trial pits and hand augers were logged to assist with the preparation of site investigation logs provided in Appendix A.

4. Summary of Fill Extent

Based on the information from the subsurface investigation the inferred extent of pre-existing uncertified fill was assessed. This is shown on Figures 1 and 2 Appended in this report. Pre-existing uncertified fill was encountered between depths of 0.00 to 4.00 metres below ground level at localised areas across the site and can be split into three distinct areas:

- Fill associated with the stockpile of SH18 construction, seen in the north-east of site (Area A - refer to Figure 1) had fill observed to depths up to 2.60 metres below ground level and covered an area of approximately 13,380m^2. The 2011 as-built fill contours drawing for the Brigham Creek Stockpile derived from the SH18 construction has been overlaid onto our site investigation plan, refer to Figure 2.
- Fill associated with the Watercare Pump Station facility (Area B - north of the above mentioned stockpile) was observed to depths up to 1.80 metres below ground level, this covered an area of approximately 10,690m^2.
- The fill associated with the stormwater outlet installation seen in the south-west of site, Area C, encountered fill between depths of 0 meters to 4.00 metres below ground level, of which some of this is likely also associated with the bounding SH18 embankment the approximate area of land covered by this fill is 5,820m^2.

Existing underground services across site will also encounter fill, approximate inferred fill boundaries can be seen in the above mentioned figures.

The fill generally comprised silts and clays, of variable plasticity. It was generally mottled in colour, brown, grey and orange, it also contained trace fine to coarse gravel and horizons of gravel in some areas.

Overall an inferred area of 33,930m^2 (including areas associated with existing underground services) has been assessed being underlain by uncertified fill.

5. Limitations

The opinions, recommendations and comments given in this report result from the application of normal methods of site investigation. As factual evidence has been obtained solely from boreholes and trial pits, which by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site which have not been disclosed by the investigation and which have not been taken into account in our report. Design, inspections and additional investigations will be required at later stages of the proposed land development.

This report has been prepared solely for the use of our client, New Zealand Transport Agency and their professional advisers in relation to the specific project described herein. No liability is accepted

In respect of its use for any other purpose or by any other person or entity. All future owners of this property should seek professional geotechnical advice to satisfy themselves as to its ongoing suitability for their intended use.

For and on behalf of Coffey

Prepared By:

Chris Armstrong
Auckland Team Leader

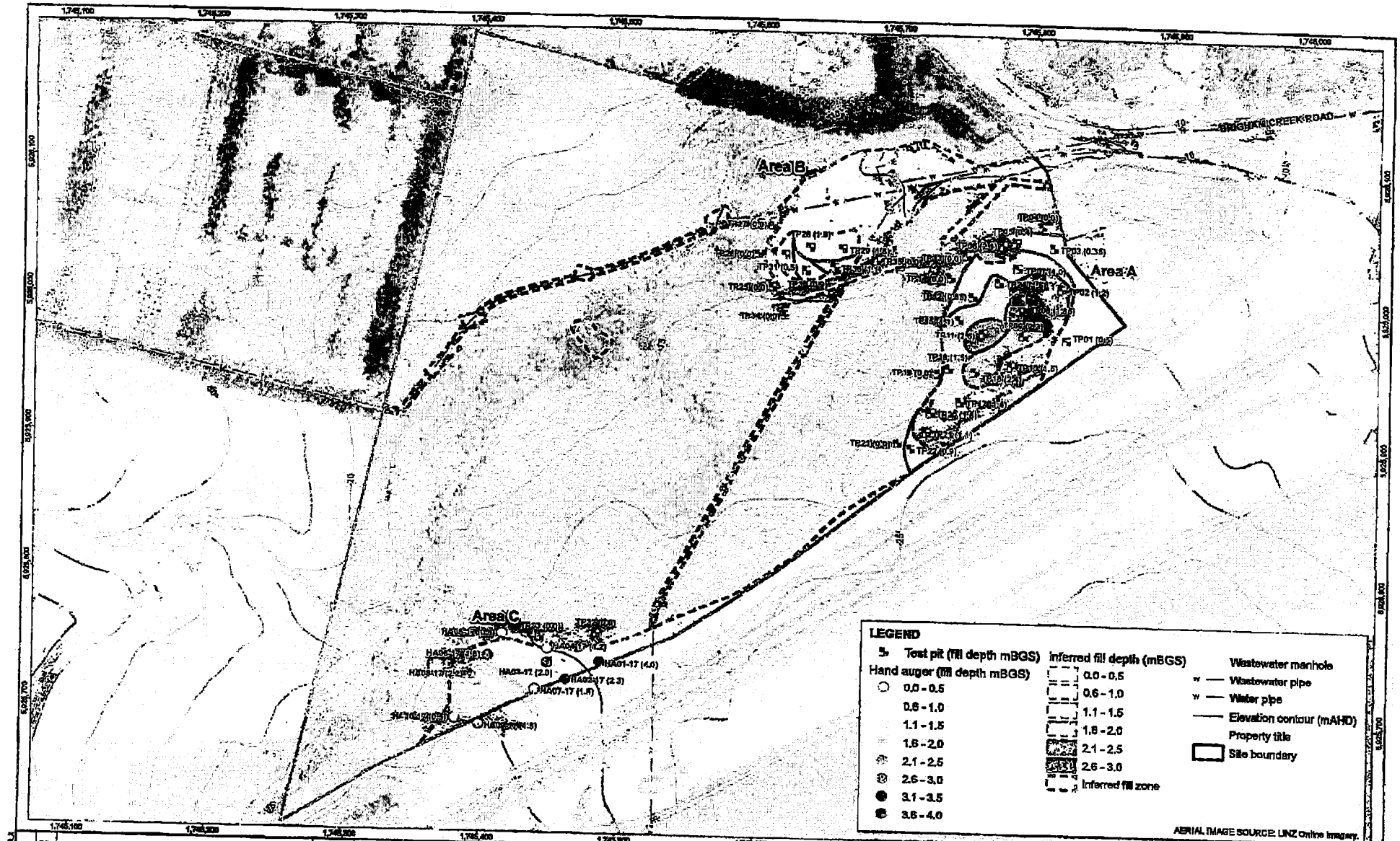
Reviewed and Authorised by:

Peter Marchant
Principal Geotechnical Engineer

Important Information about your Coffey Report

Attachments: Figure 1 – Fill Contour Plan
Figure 2 – State Highway 18 Stockpiles As Built Contours (2011)
Appendix A – Site Investigation Data

Figure 1 – Fill Contour Plan



no.	description	drawn	approved	date
B	ADD AREA LABELS	HU	CA	23.03.17
A	ORIGINAL ISSUE	HU	CP	06.03.17

revision

SCALE 1:2,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	HU
approved	CP
date	23.03.2017
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: NZTA

project: 161-167 BRIGHAM CREEK ROAD DUE DILIGENCE

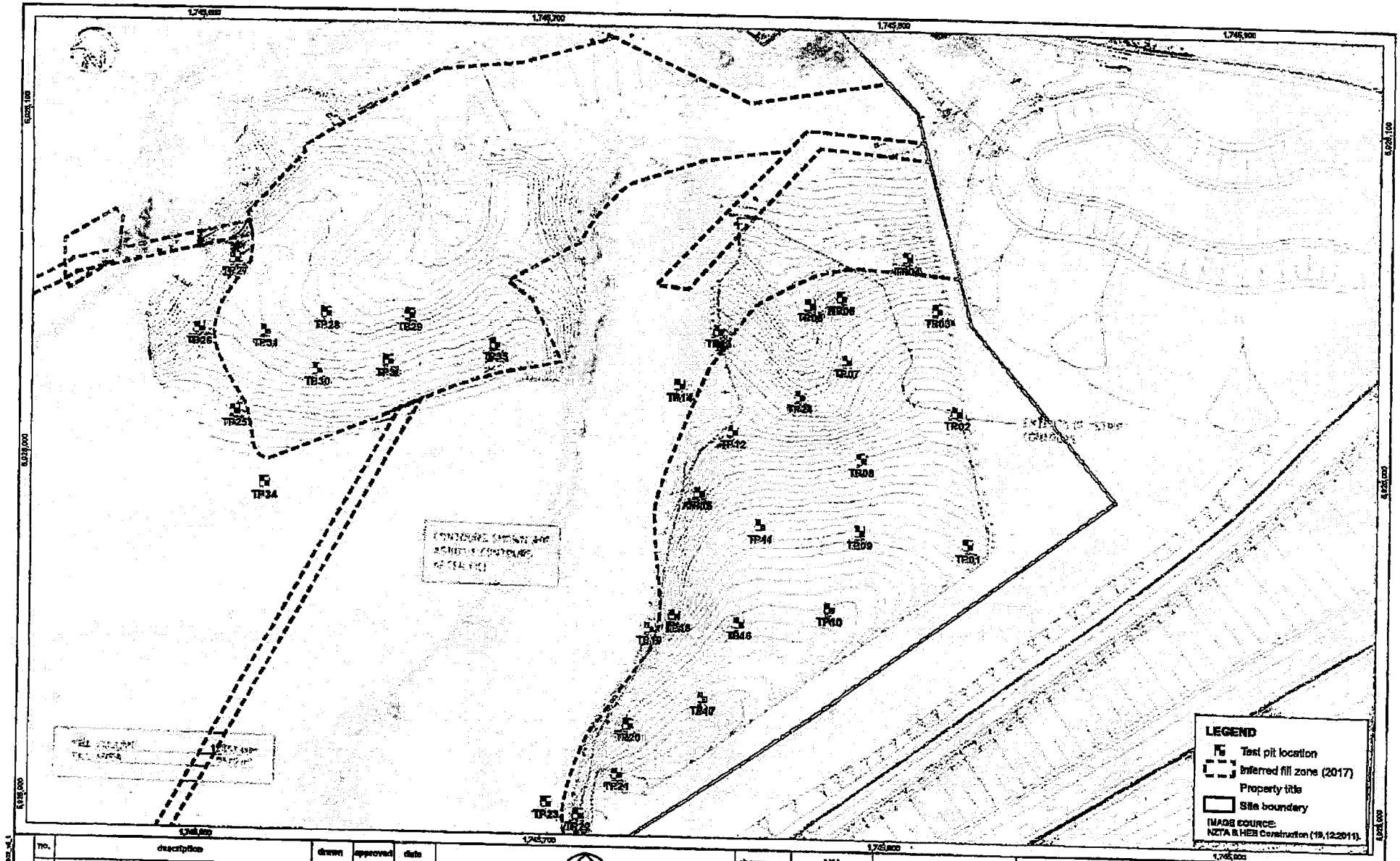
title: FILL CONTOUR PLAN

project no: 773-AKLGE-202204

figure no: FIGURE 1

rev: B

Figure 2 – State Highway 18 Stockpiles As Built Contours (2011)



no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	CP	01.03.17

SCALE 1:1,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	HU
approved	CP
date	01.03.2017
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client:	NZTA
project:	161-167 BRIGHAM CREEK ROAD DUE DILIGENCE
title:	STATE HIGHWAY 16 STOCKPILES AS BUILT CONTOURS (2011)
project no:	773-AKLGE-202204
figure no:	FIGURE 2
rev:	A

Appendix A - Site Investigation Data

coffey

Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are broadly described in accordance with the Unified Soil Classification System (UCS) as shown in the table on Sheet 2. However, there are some departures from this and reference should be made to the New Zealand Geotechnical Society 'Field Description of Soil and Rock' 2005 for clarification.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		60 mm to 200 mm
Gravel	coarse	20 mm to 60 mm
	medium	6 mm to 20 mm
	fine	2 mm to 6 mm
Sand	coarse	600 µm to 2 mm
	medium	200 µm to 600 µm
	fine	60 µm to 200 µm

MOISTURE CONDITION

Dry	Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.
Moist	Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	Easily exudes between fingers when squeezed.
Soft	12 - 25	Easily indented by fingers.
Firm	25 - 50	Indented by strong finger pressure & can be indented by thumb pressure.
Stiff	50 - 100	Cannot be indented by thumb pressure.
Very Stiff	100 - 200	Can be indented by thumb nail.
Hard	200 - 500	Difficult to indent by thumb nail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)	SPT N-value (Blows / 300mm)
Very loose	Less than 15	Less than 4
Loose	15 - 35	4 - 10
Medium Dense	35 - 65	10 - 30
Dense	65 - 85	30 - 50
Very Dense	Greater than 85	Greater than 50

MINOR COMPONENTS

FRACTION	TERM	% OF SOIL MASS	EXAMPLE
Major	(...) [UPPER CASE]	≥ 50 [major constituent]	GRAVEL
Subordinate	(...)y [lower case]	20 - 50	Sandy
Minor	with some... with minor...	12 - 20 5 - 12	with some sand with minor sand
	with trace of (or slightly) ...	< 5	with trace of sand (slightly sandy)

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS	
Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS	
Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

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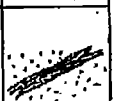
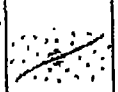
Soil Description Explanation Sheet (2 of 2)

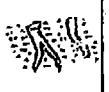
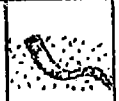
SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)							USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 60 mm is larger than 0.06 mm	(A 0.06 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.			GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.			GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)			GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)			GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.			SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).			SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 60 mm is smaller than 0.05 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
				DRY STRENGTH	DILATANCY	TOUGHNESS		
		SILTS & CLAYS Liquid limit less than 50		None to Low	Quick to slow	None	ML	SILT
				Medium to High	None	Medium	CL	CLAY
				Low to medium	Slow to very slow	Low	OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50		Low to medium	Slow to very slow	Low to medium	MH	SILT
				High	None	High	CH	CLAY
				Medium to High	None	Low to medium	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS		Readily identified by colour, odour, spongy feel and frequently by fibrous texture.					Pt	PEAT

• Low plasticity – Liquid Limit w_L less than 35%. • Medium plasticity – w_L between 35% and 50%. • High plasticity – w_L greater than 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter.	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

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Engineering Log - Hand Auger

Borehole ID.	HA01-17
sheet:	1 of 1
project no.	773-ALKLGE202204
date started:	22 Feb 2017
date completed:	22 Feb 2017
logged by:	JF
checked by:	CP

client: NEW ZEALAND TRANSPORT AGENCY

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745487; N: 5925738 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter: 50 mm vane id.: 1356

drilling information							material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
HA	N	Not Encountered			0.0		CI	FILL: Silty CLAY: medium plasticity, grey mottled brown orange, minor fine grained sand, trace fine to coarse grained gravel clasts.	M	VSt		FILL
					0.5			0.4 m: becoming grey		St	90 / 40	VS 90/40 kPa
					1.0						79 / 34	VS 79/34 kPa
											58 / 37	VS 58/37 kPa
					1.5			1.6 m: becoming brown			71 / 44	VS 71/44 kPa
					2.0						66 / 31	VS 66/31 kPa
					2.5			2.4 m: becoming grey mottled brown			71 / 38	VS 71/38 kPa
					3.0						71 / 40	VS 71/40 kPa
											91 / 44	VS 91/44 kPa
					3.5						79 / 48	VS 79/48 kPa
					4.0		ML-MH	Clayey SILT: medium plasticity, grey brown streaked orange.		VSt	106 / 47	PUKETOKA FORMATION VS 106/47 kPa
								Hand Auger HA01-17 terminated at 4.2 m Target depth				
					4.5							

CDF_0_9_08_LIBRARY.GLB rev:AI Log COF BOREHOLE-NON CORED_HAND AUGERS 22/02/2017.GPJ <<DrawingFile>> 27/02/2017 08:04

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
no resistance
ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U63 undisturbed sample 63mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
S saturated
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Hand Auger

Borehole ID.	HA02-17
sheet:	1 of 1
project no.	773-ALKLGE202204
date started:	22 Feb 2017
date completed:	22 Feb 2017
logged by:	SBG
checked by:	CP

client: NEW ZEALAND TRANSPORT AGENCY

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745462; N: 6925723 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter: vane id.:

drilling information						material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
HA N		Not Encountered			0.5		CI	FILL: Silty CLAY: medium plasticity, brown mottled orange yellow and black, minor fine to coarse grained, sub angular gravel clasts.	M	VSt		FILL VS UTP
					1.0			0.9 to 1.2 m: trace organics 1.11 m: becoming brown mottled grey yellow 1.2 m: carbonaceous inclusions		St		
					1.5							
					2.0		CI-CH	Silty CLAY: medium to high plasticity, brown streaked yellow grey.				PUKETOKA FORMATION
					2.5			Hand Auger HA02-17 terminated at 2.5 m Target depth				

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
CL-ML: no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear: peak/remoulded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
S saturated
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Hand Auger

Borehole ID.	**HA03-17**
sheet:	1 of 1
project no.	**773-ALKLGE202204**
date started:	**22 Feb 2017**
date completed:	**22 Feb 2017**
logged by:	**SBG**
checked by:	**CP**

client: ***NEW ZEALAND TRANSPORT AGENCY***

principal:

project: ***161-167 Brigham Creek Road***

location: ***161-167 Brigham Creek Road, Hobsonville***

position: E: 1745449; N: 5925735 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter: vane id.: 1316

drilling information						material substance					
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
HA N		Not Encountered			0.5 1.0 1.5 2.0 2.5		CI	**Silty CLAY:** medium plasticity, brown mottled yellow orange and grey, trace fine to coarse grained sub angular gravel clasts.	M	VSt St		**FILL** VS 116/ 40 kPa VS 88/ 40 kPa VS 88/ 35 kPa VS 77/ 40 kPa
							ML-MH	**Clayey SILT:** low to medium plasticity, grey streaked yellow.		VSt		**PUKETOKA FORMATION** VS 98/ 40 kPa
								Hand Auger HA03-17 terminated at 2.2 m Target depth				

CDF_0_5_05_LIBRARY.GLB rev:AI Log_COF BOREHOLE: NON CORED HAND AUGERS 23/02/2017.GPJ <<DrawingTitle>> 27/02/2017 08:14

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
no resistance
rapping to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bounding

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
S saturated
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Hand Auger

Borehole ID.	HA04-17
sheet:	1 of 1
project no.	773-ALKLGE202204
date started:	22 Feb 2017
date completed:	22 Feb 2017
logged by:	JF
checked by:	CP

client: NEW ZEALAND TRANSPORT AGENCY

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745449; N: 5925745 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter : vane id.: 1356

drilling information							material substance							
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
HA N		Not Encountered			0.5 1.0		CI	FILL: Silty CLAY: medium plasticity, brown mottled grey orange, trace fine to coarse grained angular gravel clasts.	M	St		FILL VS 63/ 41 kPa VS 58/ 34 kPa
							CI	Silty CLAY: medium plasticity, grey streaked orange, trace fine grained sand.		VSt		PUKETOKA FORMATION VS 181/ 74 kPa
					1.5 2.0 2.5			Hand Auger HA04-17 terminated at 1.4 m Target depth				

CDF_9_6_06_LIBRARY/GLB Ver4 Log CDF BOREHOLE NON CORED HAND AUGERS 22.02.2017.GPJ <<DrawingFiles>> 27/02/2017 08:04

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration: no resistance; ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SB split spoon sample
- UW## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- No SPT with solid cone
- VS vane shear; peak/remoulded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Hand Auger

Borehole ID.	HA05-17
sheet:	1 of 1
project no.	773-ALKLGE202204
date started:	22 Feb 2017
date completed:	22 Feb 2017
logged by:	JF
checked by:	CP

client: NEW ZEALAND TRANSPORT AGENCY

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1746416; N: 5925756 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter: vane id.: 1356

drilling information						material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
HA / N		Not Encountered			0.5		CL-CI	FILL: Silty CLAY: low to medium plasticity, brown mottled grey, dark brown and orange, trace fine to coarse grained gravel clasts.	M	St	90 / 39	FILL VS 90/ 39 kPa
					1.0		CI-CH	Silty CLAY: medium to high plasticity, grey streaked orange.		VSt	184 / 74	PUKETOKA FORMATION VS 184/ 74 kPa
					1.5			Hand Auger HA05-17 terminated at 1.2 m Target depth				
					2.0							
					2.5							

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
no resistance
ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VB vane shear; peak/remoulded (kPa)
R refusal
HB hammer bounding

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
S saturated
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Hand Auger

Borehole ID.	**HA06-17**
sheet:	1 of 1
project no.	**773-ALKLGE202204**
date started:	**22 Feb 2017**
date completed:	**22 Feb 2017**
logged by:	**JF**
checked by:	**CP**

client: **NEW ZEALAND TRANSPORT AGENCY**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1746405; N: 5625740 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter: vane id.: 1358

drilling information							material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊕ peak (kPa)	structure and additional observations
HA N	1 2 3	Not Encountered			0.0		CI	FILL: Silty CLAY: medium plasticity, brown mottled grey orange, trace fine to coarse gravel clasts, trace fine to coarse grained sand.	M	VSt to St		FILL
											⊕ ⊕	VS 156/ 60 kPa
					0.5						⊕ ⊕	VS 79/ 30 kPa
					1.0						⊕ ⊕	VS 141/ 55 kPa
					1.5						⊕ ⊕	VS 91/ 35 kPa
							CL-CI	Silty CLAY: low to medium plasticity, grey brown streaked orange, trace fine to medium grained sand.				PUKETOKA FORMATION
					2.0			Hand Auger HA06-17 terminated at 2.0 m Target depth			⊕	VS 78/ 47 kPa
					2.5							

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
N = nil
no resistance
ranging to
refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
S saturated
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

COF_0_8_05 LIBRARY/GLB rev/Al Log COF BOREHOLE NON CORED HAND AUGERS 22/02/2017.GPJ <<DrawingFile>> 27/02/2017 08:05

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Engineering Log - Hand Auger

Borehole ID.	HA07-17
sheet:	1 of 1
project no.	773-ALKLGE202204
date started:	22 Feb 2017
date completed:	22 Feb 2017
logged by:	SBG
checked by:	CP

client: NEW ZEALAND TRANSPORT AGENCY

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745427; N: 5925721 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter: vane id.: 1316

drilling information							material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ⊕ peak (kPa)	structure and additional observations
HA N		Not Encountered			0.5 1.0 1.5 2.0 2.5		CI	FILL: Silty CLAY: medium plasticity, brown mottled yellow grey and black, trace fine to coarse sub angular gravel clasts.	M	VSt		FILL VS 160 kPa VS 160 kPa VS 116/ 62 kPa
							CL-CH	Silty CLAY: medium to high plasticity, brown mottled yellow.				PUKETOKA FORMATION VS 119/ 50 kPa
								Hand Auger HA07-17 terminated at 2.0 m Target depth				

C:\F_S_95_LIBRARY.GLB [new/Al Log] COF BOREHOLE: NON CORED HAND AUGERS 22.02.2017.GPJ <<DrawingFile>> 27/02/2017 09:25

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
no resistance
ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
No SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

classification symbols & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
S saturated
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Hand Auger

Borehole ID.	**HA08-17**
sheet:	1 of 1
project no.	**773-ALKLGE202204**
date started:	**22 Feb 2017**
date completed:	**22 Feb 2017**
logged by:	**SBG**
checked by:	**CP**

client: **NEW ZEALAND TRANSPORT AGENCY**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1745393; N: 5925726 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter: vane id.: 1316

drilling information					material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ⊕ peak (kPa)	structure and additional observations
HA	N	Not Encountered			0.5 1.0 1.5 2.0 2.5		CL-CI	**FILL:** Silty CLAY: low to medium plasticity, brown mottled yellow orange.	M	VSt St		FILL VS 93/ 17 kPa VS 144/ 43 kPa VS 90/ 34 kPa VS 85/ 41 kPa VS 88/ 38 kPa
							CI-CH	Silty CLAY: medium to high plasticity, brown streaked grey orange.				PUKETOKA FORMATION
								Hand Auger HA08-17 terminated at 2.4 m Target depth				

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
no resistance
resistance increasing
refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
S saturated
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Hand Auger

Borehole ID.	HA09-17
sheet:	1 of 1
project no.	773-ALKLGE202204
date started:	22 Feb 2017
date completed:	22 Feb 2017
logged by:	JF
checked by:	CP

client: NEW ZEALAND TRANSPORT AGENCY

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745399; N: 5925690 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter: vane id.: 1356

drilling information							material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
HA N		Not Encountered			0.5 1.0 1.5 2.0 2.5		CL-CI	FILL: Silty CLAY: low to medium plasticity, brown mottled grey orange, trace fine to coarse angular gravel clasts, trace rootlets.	M	VSt		FILL VS 143/ 27 kPa
								0.6 to 1.1 m: with minor fine to medium grained angular gravel				
							CI-CH	Silty CLAY: medium to high plasticity, pale grey brown streaked orange.				PUKETOKA FORMATION VS 184 kPa
								Hand Auger HA09-17 terminated at 1.8 m Target depth				

CDF_8_9_08_LIBRARY.GLB rev:AI Log COF BOREHOLE: NON CORED HAND AUGERS 22/02/2017.GPJ <<DrawingFile>> 27/02/2017 09:05

method		support		samples & field tests		classification symbol & soil description based on Unified Classification System		consistency / relative density	
AD	auger drilling*	M	mud	N	nil	B	bulk disturbed sample	moisture		VS	very soft		
AS	auger screwing*	C	casing			D	disturbed sample	D	dry	S	soft		
HA	hand auger	penetration		water		E	environmental sample	M	moist	F	firm		
W	washbore		no resistance		10-Oct-12 water level on date shown	ES	split spoon sample	W	wet	St	stiff		
HA	hand auger		rapidly to refusal		water inflow	U##	undisturbed sample ##mm diameter	S	saturated	VSt	very stiff		
*	bit shown by suffix				water outflow	HP	hand penetrometer (kPa)	Wp	plastic limit	H	hard		
e.g.	AD/T					N	standard penetration test (SPT)	Wl	liquid limit	Fb	friable		
B	blank bit					N*	SPT - sample recovered			VL	very loose		
T	TC bit					Nc	SPT with solid cone			L	loose		
V	V bit					VS	vane shear; peak/remoulded (kPa)			MD	medium dense		
						R	refusal			D	dense		
						HB	hammer bounding			VD	very dense		

coffey

Engineering Log - Hand Auger

Borehole ID.	HA10-17
sheet:	1 of 1
project no.	773-ALKLGE202204
date started:	22 Feb 2017
date completed:	22 Feb 2017
logged by:	JF
checked by:	CP

client: NEW ZEALAND TRANSPORT AGENCY

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745382: N: 5925694 (NZTM) surface elevation: Not Specified angle from horizontal: 90°

drill model: Hand Auger hole diameter : vane id.: 1356

drilling information							material substance					
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
HA N		Not Encountered			0.5		ML	FILL: Clayey SILT: low plasticity, brown mottled grey orange, trace fine to coarse angular gravel clasts, minor fine to coarse grained sand.	M	VSt		FILL VS UTP
					1.0		CL-CI	Silty CLAY: low to medium plasticity, pale grey streaked orange.				PUKETOKA FORMATION VS UTP
					1.5			Hand Auger HA10-17 terminated at 1.2 m Target depth				VS UTP
					2.0							
					2.5							

CDF_0_0_08 LIBRARY.GLB revA1 Log CDF BOREHOLE NON CORED HAND AUGERS 22.02.2017.GPJ <<DrawingFile>> 27/02/2017 08:05

method
AD auger drilling*
AB auger screwing*
HA hand auger
W washbore
HA hand auger

* alt shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bounding

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
S saturated
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP01_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745823; N: 5925978 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak ⊕ remoulded	structure and additional observations
N	N		Not Encountered			0.0			FILL: Sandy SILT: non plastic to low plasticity, brown, with trace rootlets.	D			TOPSOIL
									FILL: Clayey SILT: low to medium plasticity, grey - brown, with some fine to coarse grained sand, minor to trace fine to coarse angular gravel.	M			FILL
						0.5		ML	SILT: low plasticity, brown streaked dark brown.		VSt		PUKETOKA FORMATION
								CH	Silty CLAY: medium to high plasticity, pale grey stained orange.			⊕	VS 200 kPa
						1.0			1.2 m: becoming pale grey				
						1.5			Test pit TP01_2017.02.21 terminated at 1.5 m Target stratum				
						2.0							

Image

TP01_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP02_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: **New Zealand Transport Agency**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1745820; N: 5926016 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method: | excavation dimensions: | vane id.: 1356

excavation information							material substance					
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / rem	structure and additional observations
E	N		Not Encountered			0.5			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	M			TOPSOIL
									FILL: Silty CLAY: medium plasticity, pale grey mottled orange - brown, with minor fine to coarse angular gravel.				FILL
						1.0			Sandy GRAVEL: fine to coarse grained, angular, grey, sand is fine to coarse, with some silt.				
								CH	Silty CLAY: medium to high plasticity, pale grey streaked orange, pale brown.		VSt		PUKETOKA FORMATION VS UTP
						1.5			Test pit TP02_2017.02.21 terminated at 1.5 m Target stratum				VS / 200 kPa
						2.0							

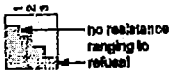
Image

TP02_2017.02.21

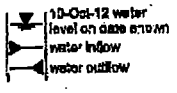
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP03_2017.02.21
sheet	1 of 1
project no.	773-ALKLGE202204
client:	New Zealand Transport Agency
principal:	
project:	161-167 Brigham Creek Road
location:	161-167 Brigham Creek Road, Hobsonville
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	GP

position: E: 1745814; N: 5926046 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
N	N		Not Encountered						FILL: SILT: non plastic, brown, with trace rootlets.	M			TOPSOIL
									FILL: Sandy GRAVEL: fine to coarse grained, angular, grey, sand is fine to coarse grained.				FILL
								ML	0.34 m: Geotextile Cloth				
						0.5		CH	SILT: non plastic to low plasticity, brown, with trace rootlets.		VSt		PUKETOKA FORMATION
									Silty CLAY: medium to high plasticity, pale grey streaked orange, dark brown.				
									Test pit TP03_2017.02.21 terminated at 0.8 m Target stratum			○	VS 200 kPa
						1.0							
						1.5							
						2.0							

image

TP03_2017.02.21

CDF_0.9_86_LIBRARY.GLB rec4i Log CDF EXCAVATION + PHOTO 202204_2017.02.23.GPJ <<DrawingFiles>> 6/03/2017 10:29

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N* standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP04_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745805; N: 6926061 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method: | excavation dimensions: | vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
E	N		Not Encountered			0.0		ML	TOPSOIL: SILT: non plastic to low plasticity. brown, with trace rootlets.	M			TOPSOIL
								CH	Silty CLAY: medium plasticity, pale grey mottled orange.		VSt		PUKETOKA FORMATION VS 200 kPa
						0.5			Test pit TP04_2017.02.21 terminated at 0.5 m Target stratum				
						1.0							
						1.5							
						2.0							

image

TP04_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 19-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample 50mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

COF_0_9_06 LIBRARY.GLB mcAl Log COF EXCAVATION + PHOTO 202204 2017.02.23.GPJ <<Drawing File>> 08/03/2017 10:59

coffey

Engineering Log - Excavation

Excavation ID.	TP05_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745786; N: 5926049 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear @ peak (kPa)	structure and additional observations
E	N		Not Encountered			0.0			FILL: Gravelly SILT: non plastic, brown, gravel is fine to coarse, angular, grey, with trace rootlets.	M			TOPSOIL
								ML	SILT: non plastic, brown.				
						0.5		ML	Clayey SILT: low plasticity, pale grey - brown stained orange.		VSt	200	PUKETOKA FORMATION VS 200 kPa
									Test pit TP05_2017.02.21 terminated at 0.6 m Target stratum				
						1.0							
						1.5							
						2.0							

Image

TP05_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP06_2017.02.21
sheet:	1 of 2
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745777; N: 5926047 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method: | excavation dimensions: | vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
E	N		Not Encountered			0.5 1.0 1.5 2.0			**FILL: Clayey SILT**: low to medium plasticity, brown mottled dark brown, grey, with trace fine to coarse angular gravel, trace concrete fragments up to 500mm in length.	M			FILL
								CL	**Silty CLAY**: medium plasticity, grey, with minor fine to medium grained sand.	W	St to VSt	PP	PUKETOKA FORMATION VS 107/ 57 kPa
								ML					

Image

TP06_2017.02.21

method
- N natural exposure
- X excavating excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP06_2017.02.21
sheet:	2 of 2
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

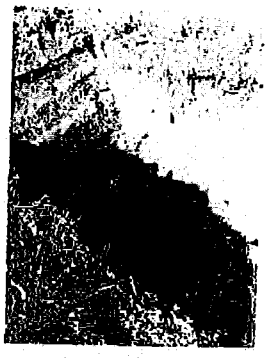
location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1746777; N: 5926047 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
E	N							ML	Sandy SILT: low plasticity, pale grey - brown, with some to minor clay, sand is fine to medium grained. *(continued)*	W			PUKETOKA FORMATION
						3.0			Test pit TP06_2017.02.21 terminated at 2.6 m Target stratum				
						3.5							
						4.0							
						4.5							

Image



TP06_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VB vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP07_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: **New Zealand Transport Agency**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1745788; N: 5926031 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20: Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
	N		Not Encountered			0.0			FILL: Sandy SILT: non plastic to low plasticity, brown, with minor clay, minor rootlets.	M			TOPSOIL
									FILL: Clayey SILT: low plasticity, brown mottled pale brown, grey, with trace fine to coarse angular gravel, with trace rubbish (plastics).	D			FILL
						0.5				M			
						1.0		CH	Silty CLAY: medium plasticity, pale grey streaked dark brown.		VSt		PUKETOKA FORMATION VS 200 kPa
						1.5			Test pit TP07_2017.02.21 terminated at 1.9 m Target stratum				
						2.0							

Image

TP07_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- No SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

CDF_G_E_06_LIBRARY.GLB [m2d Log_CDF EXCAVATION + PHOTO 2022/04_2017.02.23.GPJ <<DrawingFiles>> 08/05/2017 10:51

coffey

Engineering Log - Excavation

Excavation ID.	TP08_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745782; N: 5926002 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ⊕ peak (kPa)	structure and additional observations
N	N		Not Encountered			0.0			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D			TOPSOIL
						0.5			FILL: Sandy SILT: non plastic, brown mottled grey, orange, with minor fine to coarse angular gravel, trace concrete fragments up to 300mm.	M			FILL
						1.0			FILL: Silty CLAY: low to medium plasticity, brown mottled orange, grey, with trace fine to coarse angular gravel, trace sub-rounded fine grained sandstone boulders.				
						1.5		CH	Silty CLAY: medium to high plasticity, pale grey - brown.		St		PUKETOKA FORMATION
						2.0			Test pit TP08_2017.02.21 terminated at 2.3 m Target stratum			⊕ ●	VS 88/33 kPa

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Image

TP08_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- ↔ (N ↕) no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U39 undisturbed sample 39mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- No SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP09_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

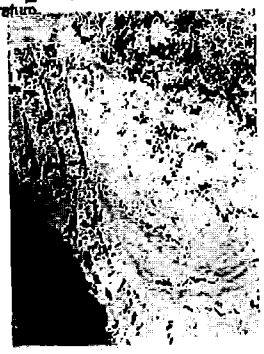
position: E: 1745792; N: 5926981 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (peak and remoulded) (kPa)	structure and additional observations
N	N		Not Encountered			0.0			FILL: SILT: non plastic, brown, with trace fine to coarse angular gravel, trace rootlets.	D			TOPSOIL
						0.5			FILL: Silty CLAY: low to medium plasticity, brown mottled pale yellow - brown, orange, with trace fine to coarse angular gravel.	M			FILL
						1.0							
						1.5			1.5 to 1.6 m: Sandy GRAVEL; fine to coarse grained, angular, grey, sand is fine to coarse, Dense to Very Dense				
						2.0		CH	Silty CLAY: medium plasticity, pale grey streaked orange.		VSt		PUKETOKA FORMATION VS 106/ 43 kPa

Test pit TP09_2017.02.21 terminated at 2.5 m
Target stratum

Image



TP09_2017.02.21

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration: no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP10_2017.02.21
sheet:	1 of 2
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745783; N: 5925959 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1358

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ⊕ peak (kPa)	structure and additional observations
A	N	1 2 3	Not Encountered			0.0			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D			TOPSOIL
						0.5			FILL: Clayey SILT: non plastic to low plasticity, brown, with trace fine to coarse angular gravel.	M			FILL
						1.0							
						1.5		CH	1.4 to 1.5 m: Sandy GRAVEL: fine to coarse grained, angular, grey, sand is fine to coarse. Dense to Very Dense Silty CLAY: medium to high plasticity, grey streaked pale orange - brown.		VSt	⊕ ●	PUKETOKA FORMATION VS 158/ 46 kPa
						2.0			2.4 m: becoming pale grey streaked orange				

Image

TP10_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample 50mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP10_2017.02.21
sheet:	2 of 2
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745783; N: 6925959 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa)	structure and additional observations
E	N							CH		M	VSt		PUKETOKA FORMATION
									Test pit TP10_2017.02.21 terminated at 2.6 m Target stratum				
						3.0							
						3.5							
						4.0							
						4.5							

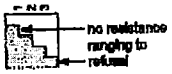
Image

TP10_2017.02.21

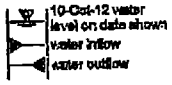
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP11_2017.02.21
sheet:	1 of 2
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745783; N: 5925983 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.:

excavation information							material substance					
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded 50 100 150 200	structure and additional observations
A	N		Not Encountered			0.0			FILL: SILT: non plastic, brown, with trace rootlets.	D			TOPSOIL
						0.5			FILL: Silty CLAY: medium plasticity, brown mottled grey, orange streaked dark brown.	M			FILL
						1.0							
						1.5							
						2.0							

Image

TP11_2017.02.21

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP11_2017.02.21
sheet:	2 of 2
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745763; N: 5925983 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method: | excavation dimensions: | vane id.:

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
E	N		Not Encountered			0.0				M			FILL
								ML	SILT: low plasticity, brown, with trace rootlets.		St to VSt		PUKETOKA FORMATION
						3.0		ML	SILT: non plastic to low plasticity, orange - brown, with some fine grained sand, trace clay.				
						3.5			Test pit TP11_2017.02.21 terminated at 3.6 m Target stratum				
						4.0							
						4.5							

image

TP11_2017.02.21

method		penetration	water	samples & field tests		classification symbol & soil description based on Unified Classification System	consistency / relative density	
N	natural exposure		10-Oct-12 water level on date shown	UNS	undisturbed sample ##mm diameter	moisture	VS	very soft
X	existing excavation	no resistance	water inflow	D	disturbed sample	D dry	S	soft
BH	backhoe bucket	ranging to	water outflow	B	bulk disturbed sample	M moist	F	firm
B	bulldozer blade	refusal		E	environmental sample	W wet	St	stiff
R	ripper			HP	hand penetrometer (kPa)	W_P plastic limit	VSt	very stiff
E	excavator			N	standard penetration test (SPT)	W_L liquid limit	H	hard
support				N*	SPT - sample recovered		Fb	friable
N	none			Nc	SPT with solid cone		VL	very loose
S	shoring			VS	vane shear peak/remoulded (uncorrected kPa)		L	loose
				R	refusal		MD	medium dense
							D	dense
							VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP12_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745755; N: 5926010 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance					
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
EX	N		Not Encountered			0.5			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D			TOPSOIL
									FILL: Clayey SILT: medium plasticity, brown mottled grey, orange, with trace fine to coarse angular gravel.				FILL
						1.0			Silty CLAY: medium to high plasticity, pale grey - brown mottled orange.	M	VSt		PUKETOKA FORMATION VS UTP
						1.5			Test pit TP12_2017.02.21 terminated at 1.3 m Target stratum				
						2.0							

image

TP12_2017.02.21

method		penetration	samples & field tests	classification symbol & soil description based on Unified Classification System	consistency / relative density
N	natural exposure	no resistance	U## undisturbed sample ##mm diameter	moisture	VS very soft
X	existing excavation	ranging to	D disturbed sample	D dry	S soft
BH	backhoe bucket	refusal	B bulk disturbed sample	M moist	F firm
B	bulldozer blade	water	E environmental sample	W wet	St stiff
R	ripper	10-Oct-12 water level on date shown	HP hand penetrometer (kPa)	W_p plastic limit	VSt very stiff
E	excavator	water inflow	N standard penetration test (SPT)	W_L liquid limit	H hard
support		water outflow	N* SPT - sample recovered		Fb friable
N	none		Nc SPT with solid cone		VL very loose
S	shoring		VB vane shear peak/remoulded (uncorrected kPa)		L loose
			R refusal		MD medium dense
					D dense
					VD very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP13_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745750; N: 6926039 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1358

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
B	N		Not Encountered			0.0		ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	VSt		TOPSOIL
								CH	Silty CLAY: medium plasticity, grey - brown stained orange.				PUKETOKA FORMATION
						0.5			Test pit TP13_2017.02.21 terminated at 0.5 m Target stratum				VS UTP
						1.0							
						1.5							
						2.0							

Image

TP13_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration: no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_l liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP14_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745739; N: 5926023 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
A BE	N		Not Encountered			0.0		ML	**TOPSOIL: SILT:** non plastic to low plasticity, brown, with trace rootlets.	D	VSt		**TOPSOIL**
								CH	**Silty CLAY:** medium plasticity, grey - brown stained orange.				**PUKETOKA FORMATION**
						0.5			Test pit TP14_2017.02.21 terminated at 0.5 m Target stratum				VS UTP
						1.0							
						1.5							
						2.0							

Image

TP14_2017.02.21

method		penetration	water	samples & field tests		classification symbol & soil description based on Unified Classification System	consistency / relative density	
N	natural exposure	no resistance	10-Oct-12 water level on date shown	U##	undisturbed sample ##mm diameter	moisture	VS	very soft
X	existing excavation	ranging to	water inflow	D	disturbed sample	D dry	S	soft
BH	backhoe bucket	refusal	water outflow	B	bulk disturbed sample	M moist	F	firm
B	bulldozer blade			E	environmental sample	W wet	St	stiff
R	ripper			HP	hand penetrometer (kPa)	W_P plastic limit	VSt	very stiff
E	excavator			N	standard penetration test (SPT)	W_L liquid limit	H	hard
support				N*	SPT - sample recovered		Fb	friable
N	none			Nc	SPT with solid cone		VL	very loose
S	shoring			VS	vane shear peak/remoulded (uncorrected kPa)		L	loose
				R	refusal		MD	medium dense
							D	dense
							VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP15_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745745; N: 5825982 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1358

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
E	N		Not Encountered			0.0			FILL: SILT: non plastic, brown, with trace rootlets.	D			TOPSOIL
									FILL: Silty CLAY: medium plasticity, brown mottled grey, dark brown, orange, with trace fine to coarse angular gravel.				FILL
						0.5				M			
						1.0		CH	Silty CLAY: medium to high plasticity, pale grey streaked orange.		VSt		PUKETOKA FORMATION
						1.5			Test pit TP15_2017.02.21 terminated at 1.5 m Target stratum				VS 170/ 78 kPa
						2.0							

Image

TP15_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration: no resistance; ranging to; refusal

water: 10-Oct-12 water level on date shown; water inflow; water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP16_2017.02.21
sheet:	1 of 2
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: **New Zealand Transport Agency**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1745757; N: 5925955 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
E	N		Not Encountered			0.5 1.0 1.5 2.0			FILL: SILT: non plastic, brown, with trace rootlets.	D			TOPSOIL
									FILL: Silty CLAY: medium plasticity, grey - brown, streaked dark brown, with trace fine to coarse angular gravel, trace organic inclusions, trace plastics (nova coils pieces, plastic strips).	M			FILL
										W			
								ML	SILT: low plasticity, brown.				PUKETOKA FORMATION

Image

TP16_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VB vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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coffey

Engineering Log - Excavation

Excavation ID.	TP16_2017.02.21
sheet:	2 of 2
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745757; N: 5925955 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear peak/remoulded (kPa)	structure and additional observations
E	N							ML	SILT: low plasticity, brown. *(continued)*	W	St to VSt		PUKETOKA FORMATION
								CH	Silty CLAY: medium to high plasticity, grey streaked orange.				VS 103/ 39 kPa
									Test pit TP16_2017.02.21 terminated at 2.7 m Target stratum				
						3.0							
						3.5							
						4.0							
						4.5							

image

TP16_2017.02.21

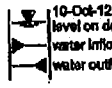
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration

no resistance
ranging to
refusal

water



10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

CUE_0_9_rls_LIBRARY.GLB rev34 Log COF EXCAVATION + PHOTO 202204_2017.02.21.GPJ <<Drawing Date>> 08/03/2017 10:55

coffey

Engineering Log - Excavation

Excavation ID.	TP17_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: **New Zealand Transport Agency**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1745747; N: 5925932 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa) 0 50 100 200	structure and additional observations
E	N		Not Encountered			0.0			**FILL: SILT:** non plastic to low plasticity, brown, with trace rootlets.	D			TOPSOIL
									FILL: Silty CLAY: low to medium plasticity, brown mottled dark brown, grey, orange.				FILL
						0.5				M			
						1.0							
						1.5		CH	**Silty CLAY:** medium to high plasticity, pale grey streaked orange.				PUKETOKA FORMATION
						2.0			Test pit TP17_2017.02.21 terminated at 2.0 m Target stratum			PP	VS 118/64 kPa

Image

TP17_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW# undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID:	TP18_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745738; N: 6926957 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method: | excavation dimensions: | vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (peak & remoulded) kPa	structure and additional observations
N	N		Not Encountered			0.0			FILL: SILT: non plastic, brown, with trace rootlets.	D			TOPSOIL
						0.5			FILL: Silty CLAY: low to medium plasticity, brown mottled grey, dark brown, orange - brown, with trace fine to coarse angular gravel, trace concrete and fine grey sandstone fragments up to 400mm in length.	M			FILL
						1.0							
						1.5		CH	Silty CLAY: medium to high plasticity, pale grey streaked orange.		VSt		PUKETOKA FORMATION
						2.0			Test pit TP18_2017.02.21 terminated at 2.2 m Target stratum				VS 143/ 56 kPa

image

TP18_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP19_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1746731; N: 6926953 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1358

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description	moisture condition	consistency / relative density	vane shear (kPa)	structure and additional observations
E	N	1 2 3	Not Encountered			0.0		ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	VSt		TOPSOIL
								MH	Clayey SILT: low plasticity, pale grey.				PUKETOKA FORMATION
						0.5			Test pit TP19_2017.02.21 terminated at 0.5 m Target stratum				VS UTP
						1.0							
						1.5							
						2.0							

Image

TP19_2017.02.21

CEF_0_9_36 LIBRARY.GLB [new]| Log COF EXCAVATION + PHOTO 202204 2017.02.25.GPJ <<Drawing/Date>> 08/03/2017 10:55

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 (L) 2 3 (H) — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- No SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP20_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	20 Feb 2017
date completed:	20 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745725; N: 5925924 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method: | excavation dimensions: | vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
	N								FILL: SILT: non plastic, brown, with trace rootlets.	D			TOPSOIL
						0.5			FILL: Clayey SILT: low to medium plasticity, brown mottled dark brown, orange, grey.				FILL
						1.0				M			
						1.5		ML	SILT: low plasticity, brown.		VSt		PUKETOKA FORMATION
								CH	Silty CLAY: medium to high plasticity, pale grey streaked orange.				
						2.0			Test pit TP20_2017.02.21 terminated at 2.1 m Target stratum			⊕ ⊕	VS 152/ 48 kPa

Not Encountered

image

TP20_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration: no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample 63mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N * standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP21_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745722; N: 5925910 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear s'reduced @ peak (kPa)	structure and additional observations
			Not Encountered			0.5			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D			TOPSOIL
									FILL: Clayey SILT: low plasticity, brown mottled dark brown, orange, grey, with trace fine to coarse angular gravel, trace fine to coarse grained sand, trace rubbish (plastic wrap).				FILL
						1.0				M			
						1.5		CH	Silty CLAY: high plasticity, pale grey streaked orange.		VSt		PUKETOKA FORMATION
						2.0			Test pit TP21_2017.02.21 terminated at 1.8 m Target stratum				VS 162/ 64 kPa

Image

TP21_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample 50mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP22_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1746711; N: 5925898 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
			Not Encountered			0.0			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D			TOPSOIL
						0.5			FILL: Clayey SILT: low plasticity, brown mottled grey, dark brown, orange, with trace fine to coarse angular gravel.				FILL
						1.0		CH	Silty CLAY: high plasticity, pale grey streaked orange.	M	VSt		PUKETOKA FORMATION
						1.5			Test pit TP22_2017.02.21 terminated at 1.3 m Target stratum				VS UTP
						2.0							

Image

TP22_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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coffey

Engineering Log - Excavation

Excavation ID.	TP23_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745702; N: 5925901 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
			Not Encountered			0.0		ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	VSt		TOPSOIL
								CH	Silty CLAY: medium plasticity, grey stained orange.				PUKETOKA FORMATION
						0.5			Test pit TP23_2017.02.21 terminated at 0.5 m Target stratum				VS UTP
						1.0							
						1.5							
						2.0							

Image

TP23_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP24_2017.02.21
sheet:	1 of 2
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

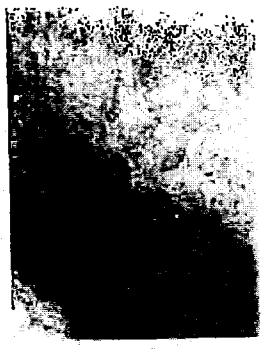
location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745774; N: 5926020 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance							
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane sheer (remoulded) @ peak (kPa)		structure and additional observations
						0.0			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D				TOPSOIL
						0.5			FILL: Silty CLAY: low plasticity, brown mottled grey, dark brown, orange, with minor fine to coarse angular gravel, trace concrete fragments up to 300mm, trace rubbish (geotextile fragments, rubber and plastic).	M				FILL
						1.0								
						1.5		ML	SILT: low plasticity, brown, with minor fine grained sand, trace clay, trace wood fragments and fibrous organics.	W	St			MULLOCK
						2.0						BG		VS 77/ 23 kPa

image



TP24_2017.02.21

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method		penetration	water	support
N	natural exposure	no resistance	10-Oct-12 water level on date shown	N none
X	existing excavation	ranging to	water inflow	S shoring
BH	backhoe bucket	refusal	water outflow	
B	bulldozer blade			
R	ripper			
E	excavator			

samples & field tests	
U##	undisturbed sample ##mm diameter
D	disturbed sample
B	bulk disturbed sample
E	environmental sample
HP	hand penetrometer (kPa)
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
VS	vane sheepeak/remoulded (uncorrected kPa)
R	refusal

classification symbol & soil description based on Unified Classification System

moisture: D dry; M moist; W wet; W_p plastic limit; W_L liquid limit

consistency / relative density	
VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP24_2017.02.21
sheet:	2 of 2
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745774; N: 5926020 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear remoulded @ peak (kPa)	structure and additional observations
E	N		21/02/17			0.0		ML	SILT: low plasticity, brown, with minor fine grained sand, trace clay, trace wood fragments and fibrous organics. *(continued)*	W	St	83 / 32	MULLOCK
						3.0			Test pit TP24_2017.02.21 terminated at 3.0 m Target stratum				VS 83/32 kPa
						3.5							
						4.0							
						4.5							

Image

TP24_2017.02.21

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- ← N vs → — no resistance / ranging to / refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP25_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745610; N: 6926013 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method. | excavation dimensions: | vane id.:

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane sheet ● remoulded ○ peak (kPa) 100 200	structure and additional observations
			Not Encountered					ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	St		TOPSOIL
								CH	Silty CLAY: medium to high plasticity, pale grey - brown streaked orange.		VSt		PUKETOKA FORMATION
						0.5			Test pit TP25_2017.02.21 terminated at 0.5 m Target stratum				
						1.0							
						1.5							
						2.0							

Image

TP25_2017.02.21

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration: no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VB vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_l liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP26_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: *New Zealand Transport Agency*

principal:

project: *161-167 Brigham Creek Road*

location: *161-167 Brigham Creek Road, Hobsonville*

position: E: 1745599; N: 5926037 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
			Not Encountered			0		ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	St		TOPSOIL
								CH	Silty CLAY: medium to high plasticity, orange - brown.		VSt		PUKETOKA FORMATION
						0.5			Test pit TP26_2017.02.21 terminated at 0.5 m Target stratum				VS UTP
						1.0							
						1.5							
						2.0							

Image

TP26_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- easy
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample 88mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- No SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP27_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745810; N: 5826058 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1368

excavation information							material substance					
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear @ remoulded @ peak (kPa)	structure and additional observations
			Not Encountered					ML	TOPSOIL: SILT: non plastic to low plasticity. brown. with trace rootlets.	D	St		TOPSOIL
								CH	Silty CLAY: medium to high plasticity, orange - brown.		VSt		PUKETOKA FORMATION
						0.5			Test pit TP27_2017.02.21 terminated at 0.5 m Target stratum				VS UTP
						1.0							
						1.5							
						2.0							

Image

TP27_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

CDF_0_0_08_LIBRARY.GLB new8 Log COF EXCAVATION + PHOTO 22224A 2017.02.23.GPJ <<DrawingTime>> 08/03/2017 10:27

coffey

Engineering Log - Excavation

Excavation ID.	TP28_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745637; N: 5926042 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa) 0 100 200	structure and additional observations
			Not Encountered			0.0			FILL: SILT: non plastic, brown, with trace rootlets.	D			TOPSOIL
						0.5			FILL: Silty CLAY: medium plasticity, brown mottled dark brown, grey, orange, with trace fine to coarse angular gravel, trace concrete fragments , 300mm in length, trace rubbish (plastics).				FILL
						1.0				M			
						1.5							
						2.0		CL	Silty CLAY: low plasticity, brown.		VSt		PUKETOKA FORMATION
									Test pit TP28_2017.02.21 terminated at 2.2 m Target stratum			○	VS 200 kPa

Image

TP28_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample 50mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- No SPT with solid cone
- VB vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_l liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP29_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

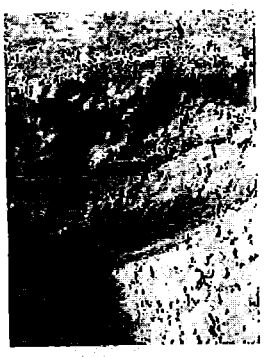
location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745661; N: 5926042 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance					
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
			Not Encountered			0.6			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D		TOPSOIL
						1.0			FILL: Silty CLAY: medium plasticity, brown mottled dark brown, grey, orange, with trace fine to coarse angular gravel, trace concrete fragments , 300mm in length.	M		FILL
						1.5		ML	Clayey SILT: low plasticity, pale grey - brown, with trace fine grained sand.		VSt	PUKETOKA FORMATION VS 177/ 60 kPa
						2.0			Test pit TP29_2017.02.21 terminated at 1.8 m Target stratum			

Image



TP29_2017.02.21

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration: no resistance ranging to refusal

water: 10-Oct-12 water level on date shown; water inflow; water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- No SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP30_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: **New Zealand Transport Agency**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1745834; N: 5928028 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1358

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
			Not Encountered			0.5			**FILL: Silty CLAY:** low to medium plasticity, orange - brown, with trace fine to coarse angular gravel.	D M			FILL
						1.0		ML	**Clayey SILT:** low plasticity, dark brown.		VSt		PUKETOKA FORMATION
						1.5		CH	**Silty CLAY:** medium to high plasticity, pale grey streaked orange.				
						2.0			Test pit TP30_2017.02.21 terminated at 1.7 m Target stratum			P / R	VS 193/ 63 kPa

Image

TP30_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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coffey

Engineering Log - Excavation

Excavation ID.	TP31_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1745619; N: 6928037 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method: | excavation dimensions: | vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
			Not Encountered			0.5			FILL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D			TOPSOIL.
									FILL: Clayey SILT: low plasticity, brown mottled dark brown, grey, orange, with trace fine to coarse angular gravel, trace brick fragments up to 100mm in length.				FILL
								ML	Clayey SILT: low plasticity, brown, with trace rootlets.		St		PUKETOKA FORMATION
						1.0		CI	Silty CLAY: medium plasticity, pale grey streaked orange flecked brown.		VSt		
									0.8 to 1.3 m: stained pale orange	M			
						1.5			Test pit TP31_2017.02.21 terminated at 1.6 m Target stratum				VS 185/ 77 kPa
						2.0							

Image

TP31_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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coffey

Engineering Log - Excavation

Excavation ID.	TP32_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: **New Zealand Transport Agency**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1745484; N: 5925757 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.:

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane sheet ● remoulded ○ peak (kPa) 50 100 150 200	structure and additional observations
			Not Encountered					ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	VSt		TOPSOIL
								CH	Silty CLAY: medium plasticity, pale grey streaked orange, with trace fine grained sand.				PUKETOKA FORMATION
						0.5			Test pit TP32_2017.02.21 terminated at 0.5 m Target stratum				
						1.0							
						1.5							
						2.0							

image

TP32_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample 50mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

CDF_0_9_05_LIBRARY.GLB [v2.4] Log COF EXCAVATION + PHOTO 202204_2017.02.28.GPJ <<DrawingFile>> 08/03/2017 11:47

coffey

Engineering Log - Excavation

Excavation ID.	TP33_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1746444; N: 5925764 (NZTM) | surface elevation: Not Specified | pit orientation:

equipment type: 20t Excavator Track | excavation method: | excavation dimensions: | vane id.:

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane sheat (kPa) peak / remould	structure and additional observations
			Not encountered			0.0		ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	VSt		TOPSOIL
								CH	Silty CLAY: medium to high plasticity, pale grey streaked orange, with trace fine grained sand.				PUKETOKA FORMATION
						0.5			Test pit TP33_2017.02.21 terminated at 0.5 m Target stratum				
						1.0							
						1.5							
						2.0							

image

TP33_2017.02.21

CEF_9_06_LINWAY/GLB.mcd Log CEF EXCAVATION+PHOTO 2022M_2017.02.23.GPJ <<DrawingFrame 06/03/2017 11:57

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP34_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: **New Zealand Transport Agency**

principal:

project: **161-167 Brigham Creek Road**

location: **161-167 Brigham Creek Road, Hobsonville**

position: E: 1745619; N: 5925993 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.:

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ● remoulded ○ peak (kPa)	structure and additional observations
			Not Encountered					ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	VSt		TOPSOIL
								CH	Silty CLAY: medium plasticity, pale grey streaked orange, with trace fine grained sand.				PUKETOKA FORMATION
						0.5			Test pit TP34_2017.02.21 terminated at 0.5 m Target stratum				
						1.0							
						1.5							
						2.0							

Image

TP34_2017.02.21

CDF 0.9_05_LIBRARY.GLB revA1 Log COF EXCAVATION + PHOTO 222204_2017.02.21.GPJ <<Drawing File>> 6/03/2017 11:47

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP35_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1746688; N: 5926034 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.:

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak / remoulded	structure and additional observations
			Not Encountered			0.0		ML	TOPSOIL: SILT: non plastic to low plasticity, brown, with trace rootlets.	D	VSt		TOPSOIL
								CH	Silty CLAY: medium plasticity, pale grey streaked orange, with trace fine grained sand.				PUKETOKA FORMATION
						0.5			Test pit TP35_2017.02.21 terminated at 0.5 m Target stratum				
						1.0							
						1.5							
						2.0							

Image

TP35_2017.02.21

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- VL L M H VH
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- UW undisturbed sample 63mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	TP36_2017.02.21
sheet:	1 of 1
project no.	773-ALKLGE202204
date excavated:	21 Feb 2017
date completed:	21 Feb 2017
logged by:	JCF
checked by:	CP

client: New Zealand Transport Agency

principal:

project: 161-167 Brigham Creek Road

location: 161-167 Brigham Creek Road, Hobsonville

position: E: 1746655; N: 5926028 (NZTM) surface elevation: Not Specified pit orientation:

equipment type: 20t Excavator Track excavation method: excavation dimensions: vane id.: 1356

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear (kPa) peak ● remoulded ○	structure and additional observations
			Not Encountered			0.5			FILL: Clayey SILT: low to medium plasticity, brown mottled orange, with trace fine to coarse angular gravel, trace cobble sized clasts of fine grained angular sandstone.	D			FILL
						1.0		CL	Silty CLAY: medium plasticity, pale grey - brown streaked orange.		VSt		PUKETOKA FORMATION
						1.5			Test pit TP36_2017.02.21 terminated at 1.2 m Target stratum				VS 200 kPa
						2.0							

image

TP36_2017.02.21

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- No SPT with solid cone
- VS vane shear peak/remoulded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_p plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

Appendix Two – Reverse Sensitivity Encumbrance

Form E

Encumbrance Instrument

(Section 101 Land Transfer Act 1952)

Affected instrument Identifier and type (if applicable)	All/part	Area/Description of part or stratum

Encumbrancer

Encumbrancee

NEW ZEALAND TRANSPORT AGENCY

Estate or interest to be encumbered *Insert e.g. Fee simple; Leasehold in Lease No. etc.*

Fee simple

Encumbrance Memorandum Number

Not applicable

Nature of security *State whether sum of money, annuity or rentcharge and amount*

Rent charge of TEN DOLLARS ($10.00) per annum, and such other sums of money as are payable by the Encumbrancer to the Encumbrancee pursuant to this Encumbrance Instrument.

Encumbrance *Delete words in [ ], as appropriate*

The Encumbrancer encumbers for the benefit of the Encumbrancee the land in the above computer register(s) with the above sum of money, annuity or rentcharge, to be raised and paid in accordance with the terms set out in the Annexure Schedule(s) and so as to incorporate in this Encumbrance the terms and other provisions set out in the Annexure Schedule(s) for the better securing to the Encumbrancee the payment(s) secured by this Encumbrance, and compliance by the Encumbrancer with the terms of this encumbrance.

Annexure Schedule

Insert instrument type

Encumbrance

Continue in additional Annexure Schedule, if required

Terms

1 Length of term **999 years**

2 Payment date(s) **see below**

3 Rate(s) of interest **Nil**

4 Event(s) in which the sum, annuity or rentcharge becomes payable **See below**

Covenants and conditions *Continue in Annexure Schedule(s), if required*

Payment date(s) and event(s) in which the sum, annuity, or rentcharge becomes payable:

(a) In respect of the rent charge, 1 January in each year; and

(b) In respect of other sums of money, ten working days after written demand is made by the Encumbrancee to the Encumbrancer.

Continued on the attached annexure schedule.

Modification of statutory provisions *Continue in Annexure Schedule(s), if required*

Sections 154 and 156 of the Land Transfer Act 1952, Sections 23, 203-205, 289-290 and 301-302 of the Property Law Act 2007 and Section 4 of the Contracts (Privity) Act 1982 shall apply to this Encumbrance Instrument but otherwise (and without prejudice to the Encumbrancee's rights of action at common law as a rent-chargee) the Encumbrancee shall not be entitled to any of the powers and remedies given to encumbrancees by the Land Transfer Act 1952 and the Encumbrancee and its successors and assigns shall not be entitled to any of the powers and remedies given to mortgagees under the Land Transfer Act 1952 or the Property Law Act 2007.

Annexure Schedule
Insert instrument type

Encumbrance

Continue in additional Annexure Schedule, if required

BACKGROUND

A (together with its successors, assignees, tenants, lessees and persons under its control) ("Encumbrancer") is registered as proprietor of an estate in fee simple in all that parcel of land described on the front page of this Encumbrance Instrument ("Land").

B The Land adjoins/is in the vicinity of ("State Highway").

C Under sections 61(1) and 80(1) of the Government Roading Powers Act 1989, the Encumbrancee has sole powers of control for all purposes of all State highways and motorways.

D For valuable consideration the Encumbrancer has agreed to encumber the Land for the benefit of the Encumbrancee with the security specified on this front page of this Encumbrance Instrument, and to covenant with the Encumbrancee to secure compliance by the Encumbrancer with the agreements set out in this Encumbrance Instrument.

OPERATIVE PROVISIONS

1 If, on the due date for payment (as set out in Annexure Schedule 1) of the rent charge imposed under this Encumbrance Instrument, the Encumbrancer has fully complied with all of the obligations imposed pursuant to this Encumbrance Instrument, then the rent charge payable on that day shall not be required to be paid by the Encumbrancer.

2 The Encumbrancer acknowledges that the covenants in this Encumbrance Instrument are of a permanent nature, and the Encumbrancer shall not be entitled to a discharge of the Encumbrance Instrument during the term, whether by payment of the total security or otherwise.

3 The Encumbrancer covenants with the Encumbrancee that the Encumbrancer will ensure that any new dwellings constructed on the Land within 30 metres of the boundary between any part of the Land and the State Highway will satisfy the following standards for noise and vibration: noise AS/NZ2107:2000, and vibration ISO2631-2:2003, or any amended or replacement standards addressing the same subject matter.

Continue in additional Annexure Schedule, if required

4 The Encumbrancer acknowledges and accepts that the Land is capable of being adversely affected by effects (including without limitation noise, vibration, dust, emissions, and visual, landscape or amenity effects) ("Effects") arising from the construction, operation, upgrading and maintenance of the State Highway ("State Highway Activities"), whether such Effects arise during or after such State Highway Activities, and accordingly the Encumbrancer, in consideration of having received valuable consideration, agrees:

(a) Not to object to, hinder, or otherwise obstruct, on the grounds of any such Effects, the grant, confirmation or alteration pursuant to the Resource Management Act 1991 ("RMA") of any authorisations under the RMA which in any way relate to the State Highway Activities, and to sign written approvals in relation to any such authorisation if requested to by the Encumbrancee.

(b) Not to do, permit to be done, or omit to do, any act, matter or thing where that act, matter, thing or omission is intended to restrict, or has the effect of restricting, the State Highway Activities in any way whatsoever, including taking any civil action and/or any enforcement proceedings pursuant to the RMA or any other statute or common law, whether for nuisance, damage to Land, negligence, or interference with Land or otherwise, but only where such act, matter or thing relates to any such Effects.

(c) Not to claim any compensation in relation to any such Effects arising from State Highway Activities;

(d) Not to fund, encourage or otherwise be involved in, any act, matter or thing that if carried out by the Encumbrancer itself would breach paragraphs (a) to (c) above; and

(e) To provide a copy of this Encumbrance to all tenants, lessees, and holders of unregistered interests in the Land (each a "third party") who acquire rights in the Land while the Encumbrancer is the registered proprietor of the Land:

(i) where the Encumbrancer grants the rights in the Land to that third party, prior to the Encumbrancer doing so; or

(ii) in all other cases, as soon as practicable after the Encumbrancer becomes aware of that third party acquiring any rights in the Land.

Encumbrance

Continue in additional Annexure Schedule, if required

General

5 This Encumbrance Instrument shall be binding on all transferees, tenants (to the extent permitted by law), lessees, mortgagees, chargeholders and their respective successors in title and assigns of any estate or interest in the Land.

6 Where this Encumbrance Instrument binds or benefits a party, it shall bind or benefit that party jointly and severally.

7 The Encumbrancer covenants with the Encumbrancee:

7.1 to pay all legal costs and disbursements in the, execution, registration, enforcement and any ultimate release of this Encumbrance Instrument, in respect of any consents sought by the Encumbrancer from the Encumbrancee to the registration of any instrument, and in respect of the performance and observance by the Encumbrancer of this Encumbrance Instrument including legal costs on a solicitor/client basis; and

7.2 to otherwise indemnify the Encumbrancee against any claims, loss and expense of whatever kind incurred by the Encumbrancee as a consequence of the Encumbrancer failing to comply with this Encumbrance Instrument.

8 Each Encumbrancer will only be liable for breaches actually committed by that Encumbrancer itself, and not by any successor or other party, unless those breaches arise wholly or partly due to a breach by the Encumbrancer of clause 4(e).

9 No delay or failure by the Encumbrancee to enforce performance of any of the covenants set out in this Encumbrance Instrument and no indulgence granted to the Encumbrancer by the Encumbrancee shall prejudice the rights of the Encumbrancee to enforce any of the covenants or provisions of the Encumbrance Instrument.

10 In this Encumbrance Instrument a reference to legislation or to a provision of legislation includes a modification or re-enactment of it, a legislative provision substituted for it, and a regulation or statutory instrument issued under it.

11 In this Encumbrance Instrument, "working day" means a day on which registered banks are open for business in Auckland, excluding Saturdays, Sundays, public holidays, and any day in the period commencing on the 23rd day of December in any year and ending on the 10th day of January in the following year, both days included.

Continue in additional Annexure Schedule, if required

12 If at any time any part or provision of this Encumbrance Instrument is or becomes invalid, void, illegal or unenforceable in any respect whatsoever, then:

(a) that part or provision shall be severed from this Encumbrance Instrument;

(b) such invalidity and severing shall not in any way affect or impair the validity, legality and enforceability of any other part or provision of this Encumbrance Instrument; and

(c) the parties shall enter into appropriate substitute instrument(s) to give full and proper effect to the agreements and understandings in this Encumbrance Instrument.

13 The Encumbrancer:

13.1 acknowledges that this Encumbrance Instrument:

(a) has been granted for valuable consideration received, in full compensation for the grant of this Encumbrance Instrument; and

(b) is intended to charge the Land and bind the Encumbrancer (and successors) to perform the Encumbrancer's obligations for the period of time set out in this Encumbrance Instrument; and

13.2 therefore covenants with the Encumbrancee:

(a) not to seek to discharge, surrender, lapse, vary, amend, withdraw or remove in any manner whatsoever this Encumbrance Instrument prior to the expiry of that period of time, whether by payment of the total security or otherwise;

(b) to preserve for the period of time set out in this Encumbrance Instrument the integrity of the agreements in this Encumbrance Instrument; and

(c) always to act in good faith and do all acts and things and enter into and execute all documents, instruments (including any replacement encumbrance) and/or easement or land covenant whenever reasonably required by the Encumbrancee and otherwise obtain any necessary consents all of which may be reasonably necessary and appropriate to give full force and effect to the intentions and understandings of the Encumbrancer and the Encumbrancee.

Encumbrance

Continue in additional Annexure Schedule, if required

14. The Encumbrancee will without delay upon request by the Encumbrancer discharge this encumbrance from any land to be vested as road or reserve in the relevant local authority.

15 For the purposes of the property Law Act 2007 and the Land Transfer Act 1952, the Encumbrancee consents to the following dealings affecting the computer freehold register identifier :

(a) creation, variation or surrender of an easement or covenant but not including any covenants contained in this Encumbrance;

(b) registration of a mortgage instrument, variation of a mortgage instrument or priority of mortgages where the priority of mortgages does not involve or concern this Encumbrance;

(c) registration of a lease, lease variation instrument or surrender of a lease;

(d) any other dealing which is expressed as being subject to this encumbrance,

and the Encumbrancee's further consent to any such dealings shall not be required.

Appendix Three - Rights and Powers of Drainage Easement

The drainage easement shall have the rights, powers and obligations implied into such easements by the Fifth Schedule to the Property Law Act 2007 and the Fourth Schedule of the Land Transfer Regulations 2002.

Appendix Four – Survey Office Plan 505845

Title Plan - SO 505845

Survey Number	SO 505845
Surveyor Reference	1215
Surveyor	Bruce MacLeod Frith
Survey Firm	SurveyPro Limited
Surveyor Declaration	I Bruce MacLeod Frith, being a licensed cadastral surveyor, certify that: (a) this dataset provided by me and its related survey are accurate, correct and in accordance with the Cadastral Survey Act 2002 and the Rules for Cadastral Survey 2010, and (b)the survey was undertaken by me or under my personal direction. Declared on 18 Apr 2017 09:06 PM

Survey Details

Dataset Description	SECTIONS 1 - 4		
Status	Approved as to Survey		
Land District	North Auckland	**Survey Class**	Class B
Submitted Date	18/04/2017	**Survey Approval Date**	19/04/2017
		Deposit Date	

Territorial Authorities

Auckland Council

Comprised In

CT 525376

CT 525375

Created Parcels

Parcels	Parcel Intent	Area	CT Reference
Area G Survey Office Plan 505845	Easement		
Section 4 Survey Office Plan 505845	Legalisation	0.2300 Ha	
Area D Survey Office Plan 505845	Easement		
Section 1 Survey Office Plan 505845	Legalisation	7.5748 Ha	
Section 3 Survey Office Plan 505845	Legalisation	3.0058 Ha	
Area E Survey Office Plan 505845	Easement		
Area F Survey Office Plan 505845	Easement		
Area A Survey Office Plan 505845	Easement		
Area B Survey Office Plan 505845	Easement		
Area C Survey Office Plan 505845	Easement		
Section 2 Survey Office Plan 505845	Legalisation	3.9875 Ha	
Total Area		14.7981 Ha	

Schedule / Memorandum

SURVEYPRO
LAND SURVEY CONSULTANTS

SURVEYPRO LIMITED
PO Box 15-1100
New Lynn
Auckland 0640
PH: 0800 600 500

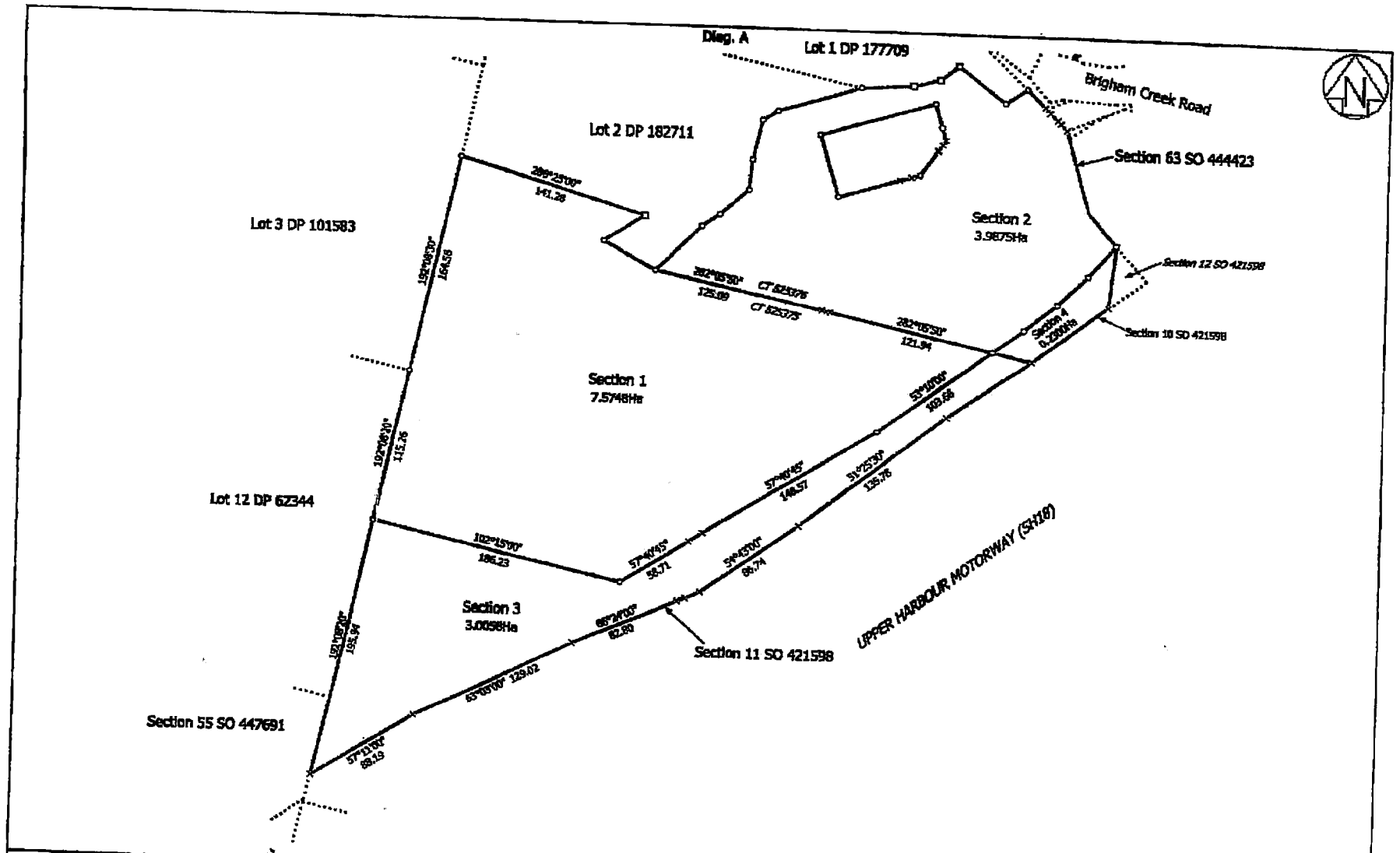
Land Registration District
NORTH AUCKLAND

Plan Number
SO 505845

Territorial Authority (the Council)
AUCKLAND COUNCIL

SCHEDULE OF EXISTING EASEMENTS IN GROSS			
PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
RIGHT OF WAY, RIGHT TO CONVEY SEWAGE, WATER, TELECOMMUNICATIONS & COMPUTER MEDIA	A, B, C, G	SECTION 2 SO 505845	EI 9430274.1
RIGHT TO CONVEY ELECTRICITY	G	SECTION 2 SO 505845	EI 10226968.1

SCHEDULE OF EXISTING EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
RIGHT TO DRAIN WASTEWATER	E	SECTION 1 SO 505845	EI 9764028.1
	F	SECTION 3 SO 505845	
RIGHT TO DRAIN WASTEWATER	D	SECTION 2 SO 505845	EI 9764028.1



Land District: North Auckland Digitally Generated Plan Generated on: 18/04/2017 08:35am Page 3 of 7	SECTIONS 1 - 4	Surveyor: Bruce MacLeod Frith Firm: SurveyPro Limited	Title Plan SO 505845 Approved on: 18/04/2017

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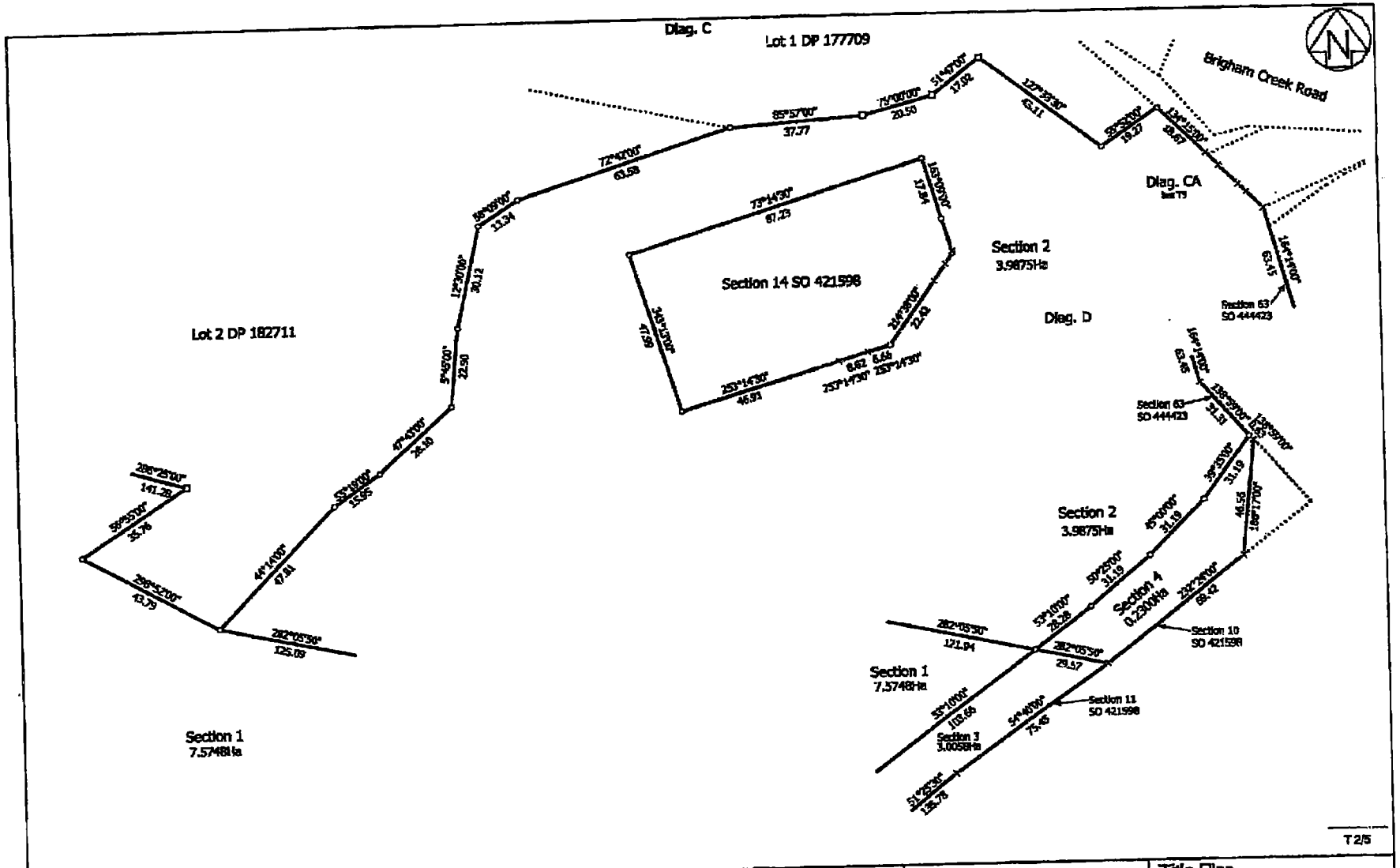
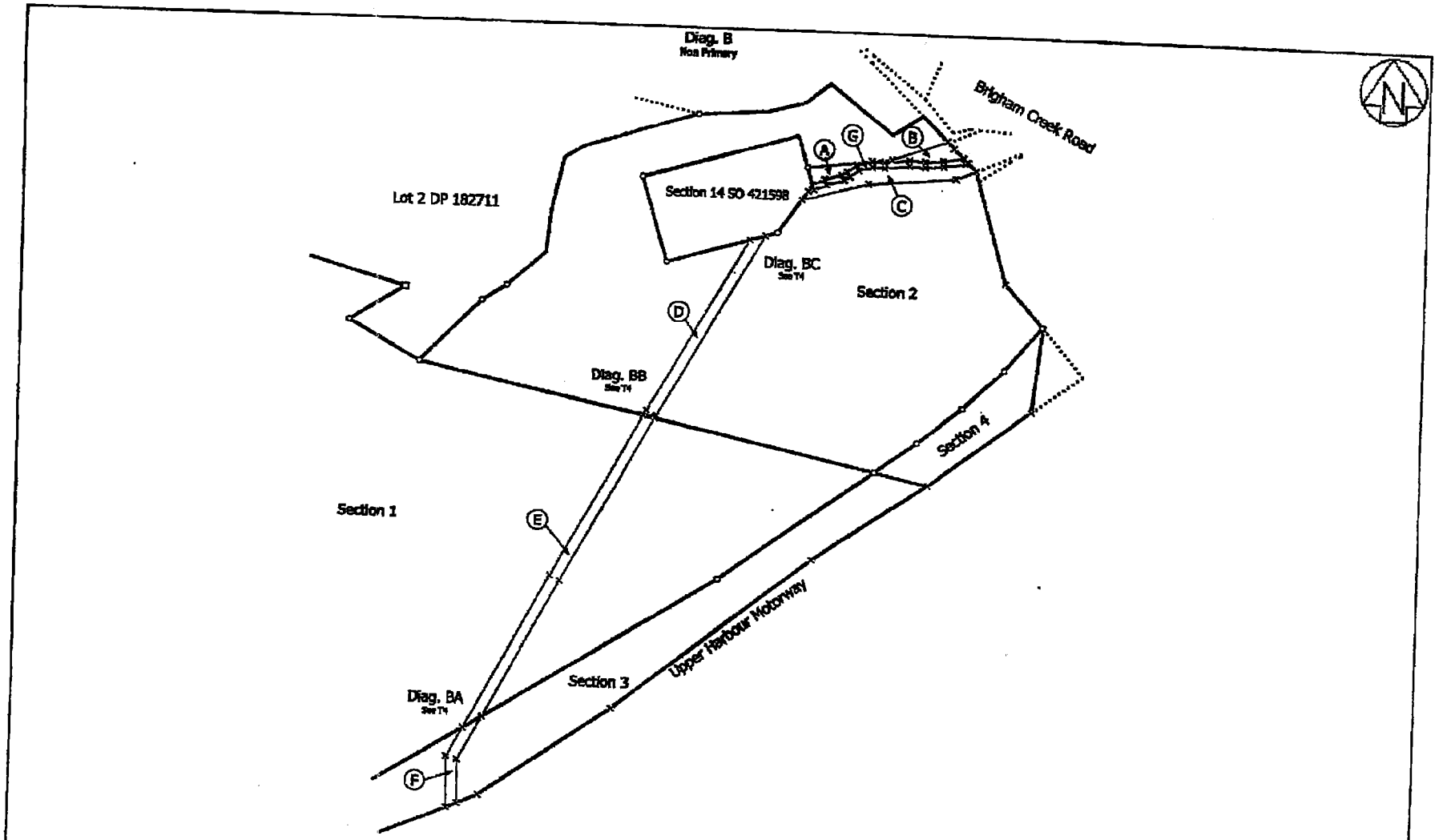


Land District: North Auckland Digitally Generated Plan Generated on: 19/04/2017 08:35am Page 4 of 7	SECTIONS 1 - 4	Surveyor: Bruce MacLeod Frith Firm: SurveyPro Limited	Title Plan SO 505845 Approved on: 19/04/2017



Land District: North Auckland **Digitally Generated Plan** Generated on: 19/04/2017 08:35am Page 5 of 7	SECTIONS 1 - 4	Surveyor: Bruce MacLeod Frith Firm: SurveyPro Limited	Title Plan SO 505845 Approved on: 19/04/2017

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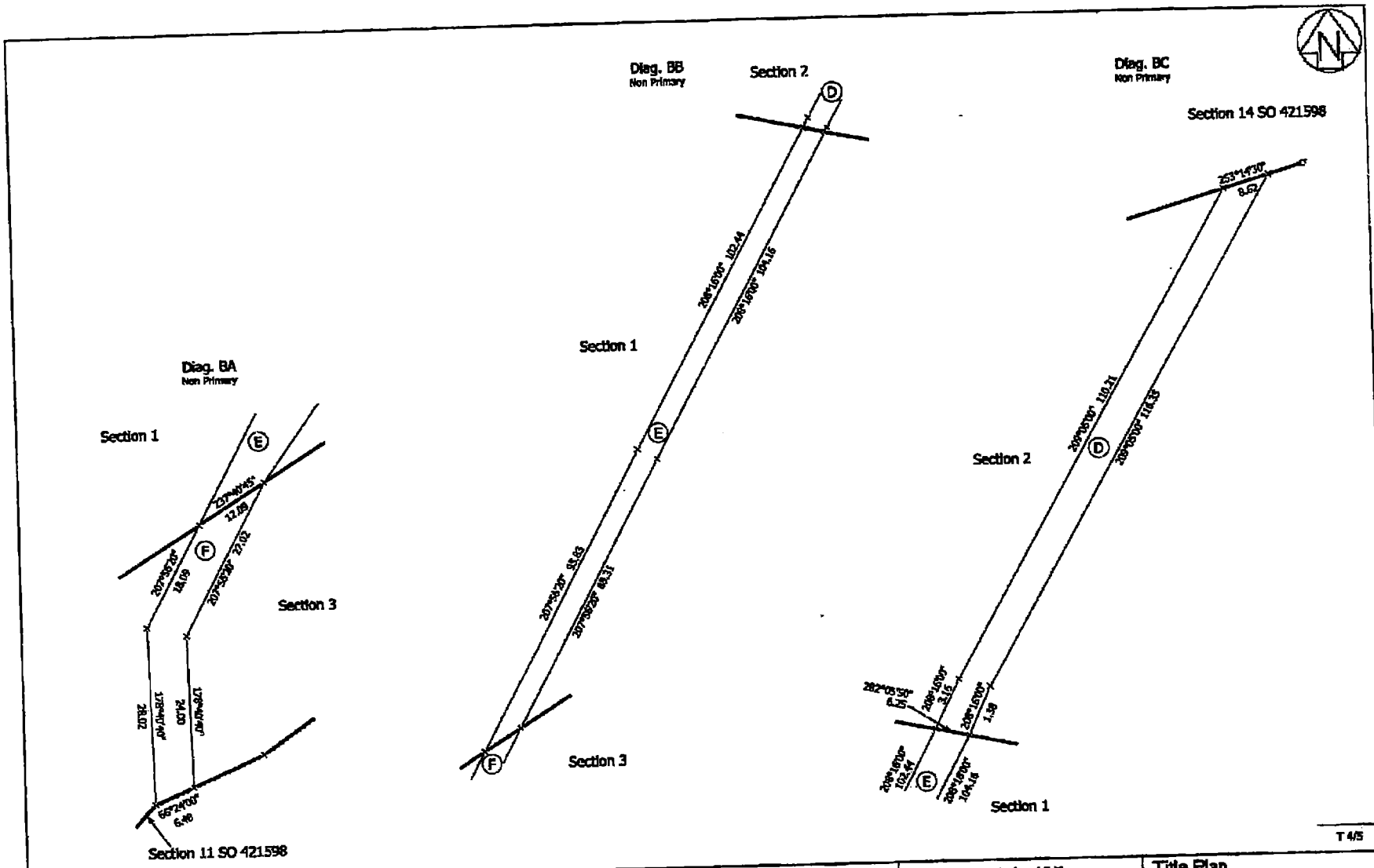
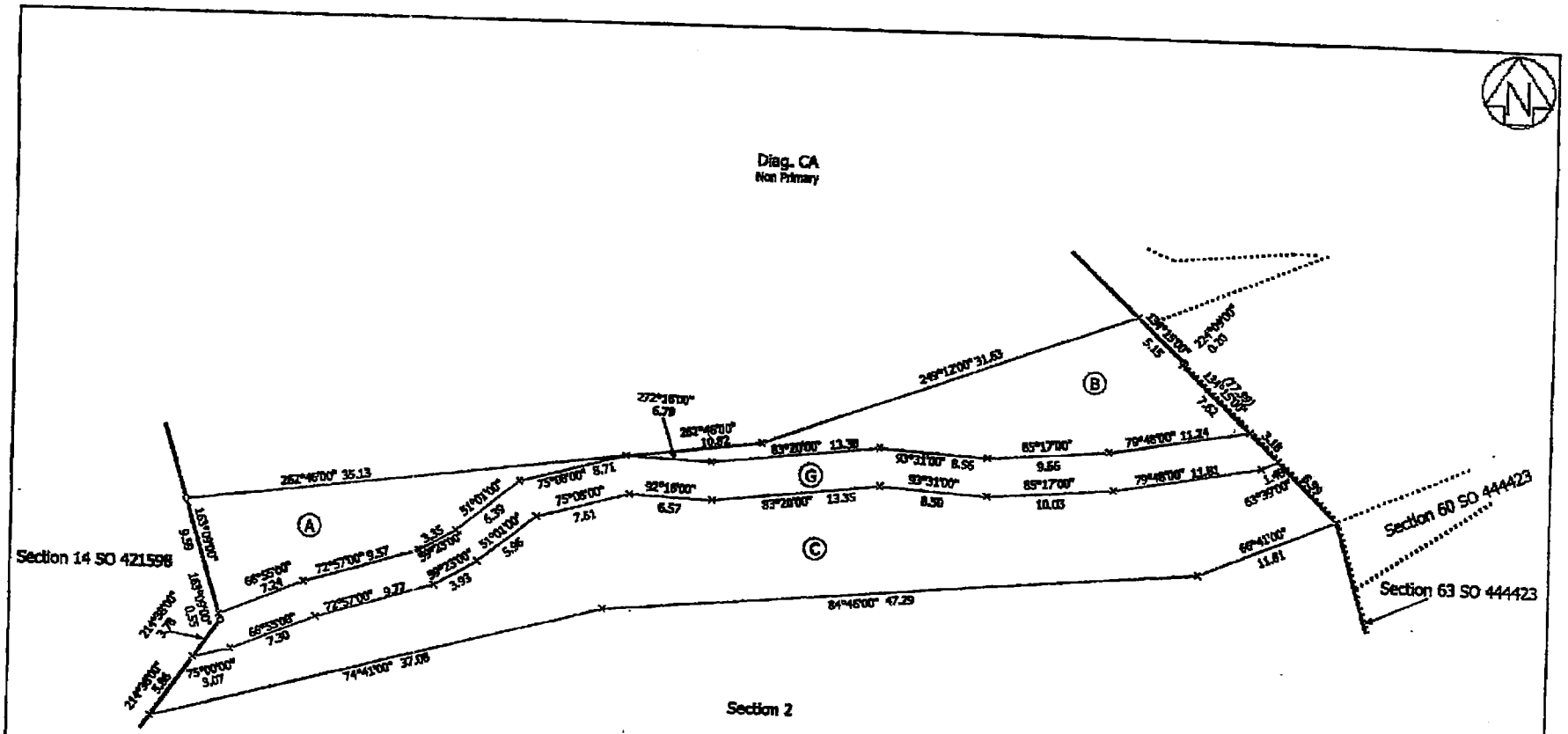


Land District: North Auckland Digitally Generated Plan Generated on 19/04/2017 08:35:en Page 6 of 7	SECTIONS 1 - 4	Surveyor: Bruce MacLeod Frith Firm: SurveyPro Limited	Title Plan SO 505845 Approved on: 19/04/2017



Land District: North Auckland **Digitally Generated Plan** Generated on: 19/04/2017 08:35am Page 7 of 7	SECTIONS 1 - 4	Surveyor: Bruce MacLeod Frith Firm: SurveyPro Limited	T 5/5 Title Plan SO 505845 Approved on: 19/04/2017

Appendix 7: Whenuapai Proposed Plan Change 5 – Transport Alterations
Prepared by Flow Transportation Specialists
5 March 2021

flow
TRANSPORTATION SPECIALISTS

5 March 2021

Eryn Shields
Auckland City Council
AUCKLAND

Via email: Eryn.Shields@aucklandcouncil.govt.nz
cc: Warren Maclennan Warren.Maclennan@aucklandcouncil.govt.nz
Todd Elder todd.elder@aucklandcouncil.govt.nz
Wayne Siu Wayne.Siu@aucklandcouncil.govt.nz

Dear Eryn

WHENUAPAI PROPOSED PLAN CHANGE 5– TRANSPORT ALTERATIONS

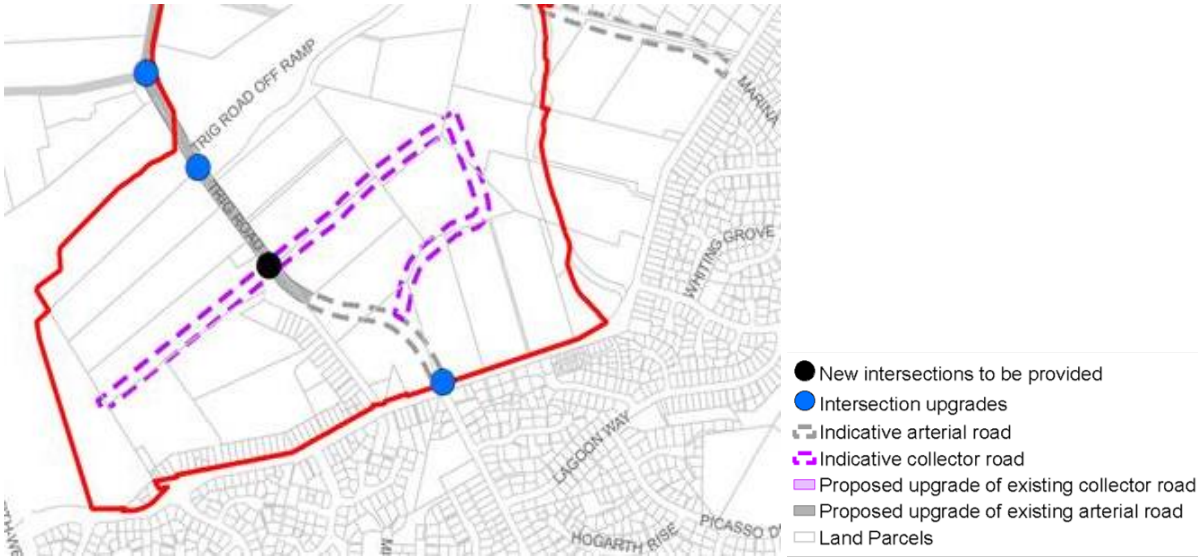
Thank you for approaching Flow Transportation Specialists Limited (Flow) with respect to providing transport planning and traffic engineering advice in relation to potential changes to Whenuapai Proposed Plan Change 5.

We have completed the analysis as discussed in our letter proposal of 3 September 2020, along with consideration of the proposed land use by the Neil Group in relation to 2-10 Kauri Road. These matters are addressed in the order presented in your memo of 21 August 2020.

1 TRIG ROAD ALIGNMENT AND AREA 1A EASTERN COLLECTOR ROADS

Previously, Trig Road between SH18 and Hobsonville was proposed to be re-aligned, with the existing intersection of Trig Road and Hobsonville Road being aligned with the existing Hobsonville Road/Luckens Road intersection, forming a cross-road intersection (as shown in the figure below).

Figure 1: Proposed Plan Change 5 - Trig Road Re-alignment and Collector Roads



Work undertaken by the Supporting Growth Alliance (SGA) has identified that the proposed re-alignment would require significant earthworks due to steep topography and the Waiarohia Stream east of Trig Road. The SGA assessment also identifies that the existing Trig Road alignment could be retained, provided that the existing Hobsonville Road/Trig Road and Hobsonville Road/Luckens Road intersections were signalised and road sections between and on the approaches to the intersections were widened.

Figure 2: Auckland Council GEOMAPS extract[1]

As such, the proposed Collector Road layout east of Trig Road has been re-considered, along with retaining the current Trig Road alignment.

Trig Road alignment

Our high level assessment of the staggered T arrangement of Trig/Hobsonville and Hobsonville/Luckens is that this layout would be acceptable with future traffic volumes provided that both intersections were signal controlled and provided a safe layout for pedestrians, people cycling, bus priority and vehicles. Coordination between the signal phasing and timings would be necessary to minimise queuing between the intersections. Access to properties in the vicinity of the intersections may need to be left in/left out only and driveways connecting at the intersections would need to be appropriately controlled.

The proposed staggered T layout will accommodate a large north-south movement between Trig Road and Luckens Road (and vice versa), resulting in lane changing behaviour on Hobsonville Road between the two roads. We however note that the SGA assessment indicates that with proper signal co-ordination, the dog-leg movements are unlikely to cause significant delays/queuing on Hobsonville Road.

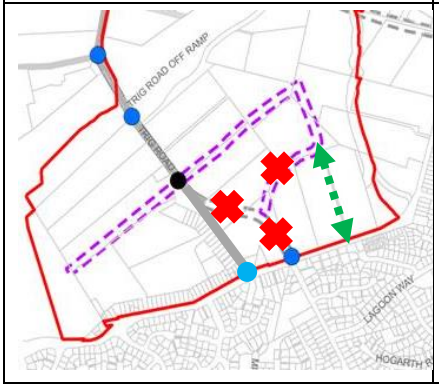
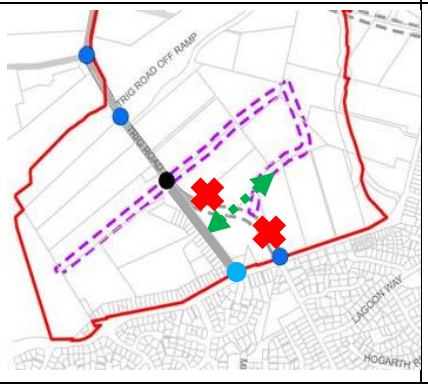
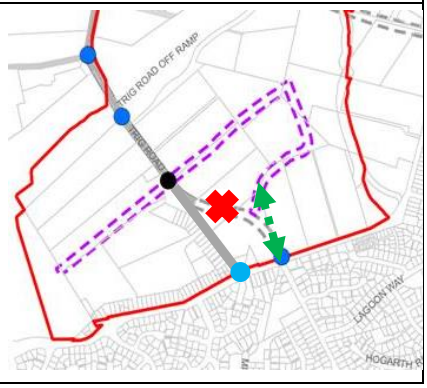
Collector roads east of Trig Road

Three options have been considered for the Collector roads east of Trig Road:

[1] Source: https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html

- Option 1: proposes to extend the Collector Road south and connect to Hobsonville Road east of the Hobsonville Road/Luckens Road intersection, possibly with a Left In Left Out (LILO) layout, instead of the southern east-west connection back to Trig Road
- Option 2: has a similar intent to the alignment in proposed PC5, and includes a connection back onto Trig Road north of Hobsonville Road
- Option 3: proposes to extend the Collector Road south and connect to Hobsonville Road at the Hobsonville Road/Luckens Road intersection, noting the intersection will be signalised in future

Table 1: Suggested Collector Road Alignments

Option 1	Option 2	Option 3
		

Our assessment in relation to transport planning matters is as follows:

- **Option 1**
  - The proposed north-south alignment in Option 1 would provide access to areas east of Trig Road and resilience to the Collector Road network but with access via Hobsonville Road and Trig Road rather than just Trig Road.
  - The proposed LILO arrangement with Hobsonville Road would have limited adverse impacts on Hobsonville Road however its function of providing access within the Trig Road area would therefore also be limited and would mean that any local bus service for the area east of Trig Road using the Collector Road could be compromised by not being able to turn right to or from Hobsonville Road.
  - This option would involve crossing the stream network that runs east west through the properties at 80 and 82 Hobsonville Road.
  - A review of the traffic modelling indicates that the majority of traffic generated by development in this area (Area 1A) is to/from the west and will travel towards the SH16/Hobsonville Road interchange. The proposed LILO intersection on Hobsonville Road would not enable this traffic to turn right onto Hobsonville Road and instead travel a longer distance back via Trig Road.
  - An additional intersection on Hobsonville Road close to the Hobsonville Village development proposed north of Area 1A may attract rat-run traffic from the SH18/Trig Road interchange

- **Option 2**
  - Option 2 has a similar alignment to the existing proposed PC5 layout, but with the southern end of the Collector Road being extended west to intersect the existing Trig Road north of Hobsonville Road (rather than a realigned Trig Road).
  - The 'loop' layout could provide for a local bus service, which would pass near the proposed school.
  - We note that SGA has identified that the proposed layout would likely require significant engineering effort to overcome the steepness and would also impact on a permanent wetland and intermittent stream
- **Option 3**
  - Connecting the Collector Road as an additional arm at the Hobsonville Road/Luckens Road intersection will impact on the operation of the Hobsonville/Trig-Hobsonville/Luckens staggered T arrangement because of the way that the signal phasing at these two intersections needs to be co-ordinated
  - Extra queuing could also affect the operation and safety along Hobsonville Road and at adjacent intersections
  - The additional access point on Hobsonville Road, allowing all movements, is likely to introduce rat-running traffic through Area 1A (between SH18 and Hobsonville Village)

Overall, from a transport planning point of view, we consider that Option 2 would be preferable if Trig Road is not realigned to meet Luckens Road.

2 CHANGES TO COLLECTOR ROADS AROUND AREAS 1B, 1C, 1D

2.1 What we've investigated

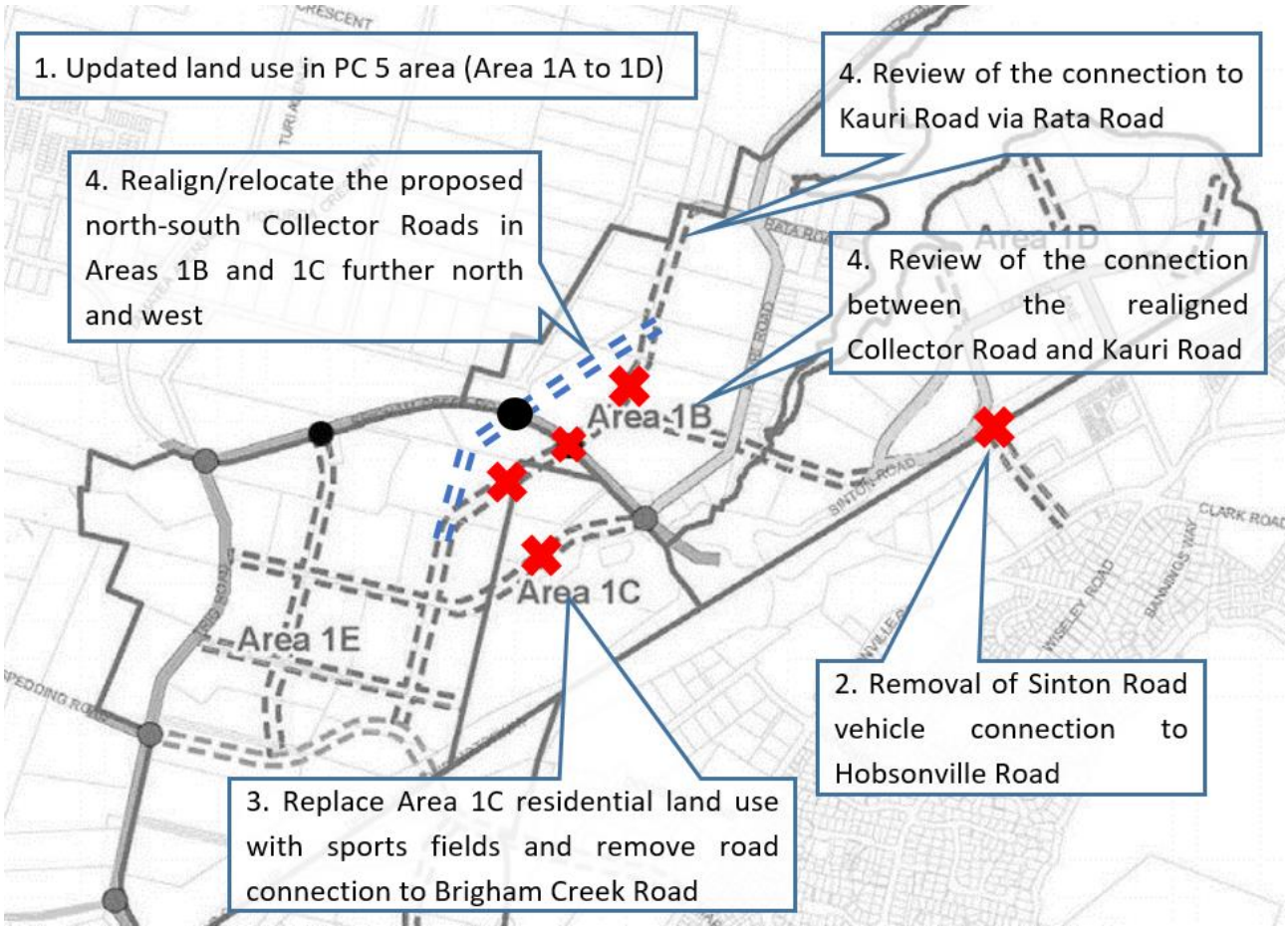
We have considered the transport effects of the following changes based on the information provided (by Auckland Council), relative to what we have assessed previously.

1. An updated land use in the PC5 area, based on advice from Auckland Council where light industry/business development could be developed in Area 1E and Area 1B west of Kauri Road, except the land owned by NZRAF, which is assumed will not be developed. A total of some 5,710 households and 3,890 Full Time Employees (FTE) have been included in the traffic modelling, as advised by Council (compared to the previously assumed 6,050 households and 3,720 FTEs)
2. Removal of the proposed Sinton Road connection for vehicles between the Sinton Road area (Area 1D) and Hobsonville Road.
3. Replacing residential development in the area west of Brigham Creek Road (Area 1C) with sports fields, and removal of the vehicle connection to the Brigham Creek Road/Kauri Road intersection
4. Changes to the Collector Road network including:
   - Realign/relocate proposed north-south Collector Roads in Areas 1B and 1C further north and west
   - Review of the realigned Collector Road connection to Kauri Road via Rata Road

- Review of the need for the Collector Road connection between Kauri Road and the realigned northern Collector Road

The above changes are illustrated in Figure 3.

Figure 3: Proposed Plan Change 5 Variation (Area 1B to 1E)



In addition to the above changes (termed "Scenario 1"), we have considered a further two scenarios to help understand the transport effects of different land use/access for the Neil Group owned land at 2-10 Kauri Road

- Scenario 2: same background traffic/land use assumptions in the Kauri Road and Sinton Road area as Scenario 1, but with residential development in the land owned by Neil Group. Vehicle access is assumed to be onto Kauri Road, with no vehicle access to Brigham Creek Road
- Scenario 3: same as Scenario 2, but with vehicle access to 2-10 Kauri Road being provided via the realigned Collector Road to the north of the site, with no vehicle access onto Kauri Road nor Brigham Creek Road

We have used SATURN traffic model outputs to inform further testing in SIDRA traffic models to help understand the likely future operation of the intersections along Brigham Creek Road and the SH18/Brigham Creek Road interchange intersections.

We developed the SATURN model for the earlier PC 5 transport assessment. We have updated it with the latest background forecast demands predicted by Auckland Forecast Centre's Macro Strategic Model (MSM) with land use predictions as per Auckland Council's Scenario I11.6 and the transport

infrastructure included in the Auckland Transport Alignment Project (August 2019). The modelled forecast year for our assessment has changed from 2026 to 2028 to align with the regional model. The MSM model update has resulted in changes in background traffic demands in the northwest area, with slightly lower traffic demands on SH18 and higher traffic demands in the Kumeu/Huapai area compared to the previous MSM demands used in the earlier PC5 assessment.

An inherent and important assumption in this, and our previous work was that existing local schools could accommodate extra students and that new local schools would be provided to accommodate students living within Whenuapai. These assumptions are important as school trips form a significant part of peak time traffic, particularly during the morning peak and if local schools are not able to accommodate local residents, there will be a greater demand for travel to locations further afield. Schools assumed to accommodate students living in Whenuapai include:

- Existing primary schools in Whenuapai and Hobsonville
- A new primary school in the Trig Road area south of SH18
- New primary and secondary schools in Whenuapai (Riverlea Road)
- A new primary school in Whenuapai (Kauri Road)

The anticipated future transport provisions rely on the above schools being provided and if these do not eventuate, there will likely be the need for more transport investment.

Likewise, employment areas within Whenuapai help to reduce the number and length of private vehicle trips and are an assumption relied upon in this and previous studies.

2.2 Our assessment

2.2.1 Kauri Road/Brigham Creek Road Intersection

For all three scenarios, the removal of the Sinton Road vehicle connection (#2 in the list above) will result in additional traffic volumes through the Kauri Road/Brigham Creek Road and the Brigham Creek Road/SH18 Eastbound Ramps intersections compared to the earlier proposed PC5 assumptions.

We note that a pedestrian/cyclist connection should still be provided to connect to the proposed RTN station in the Sinton Road area, which will also be used as a connection to/from local schools and local amenities. The existing pedestrian/cyclist bridge connection at Clark Road/Memorial Park lane (some 320 m east of the previously anticipated Sinton Road bridge) is narrow and unlikely to be adequate to serve future pedestrian/cyclist demand.

All traffic travelling to and from the Sinton Road area will need to travel via the new Collector Road that will connect to Kauri Road across several properties and the Waiarohia Inlet. Our earlier work on staging suggests that up to 550 dwellings could be developed in the Sinton Road area before the connection to the SH18 Eastbound Ramps roundabout would need to be stopped, and a new connection provided to Kauri Road. (Waka Kotahi may require earlier closure of this connection to the roundabout if it makes significant changes to the State Highway interchange)

The removal of the Collector road west of Brigham Creek Road (#3 in the list above) changes the Kauri Road/Brigham Creek Road intersection from a future crossroad intersection to remain as a T-intersection, operating as a signalised intersection. The predicted northbound queue lengths on

Brigham Creek Road in the evening peak are summarised in Table 1 below (the summary model outputs are provided in Appendix A of this technical note). We have assumed that a fourth leg would not be connected (eg a local road to the sports fields), as this would affect the phasing and therefore adversely affect the operation of the intersection.

Table 2: Predicted 95th percentile right turn queues length (metres) from Brigham Creek Road/Kauri Road, assuming modelled 2028 evening peak traffic

Land Use Scenario	Evening Peak Queue Length
Scenario 1	235 m
Scenario 2	305 m
Scenario 3	215 m

We note:

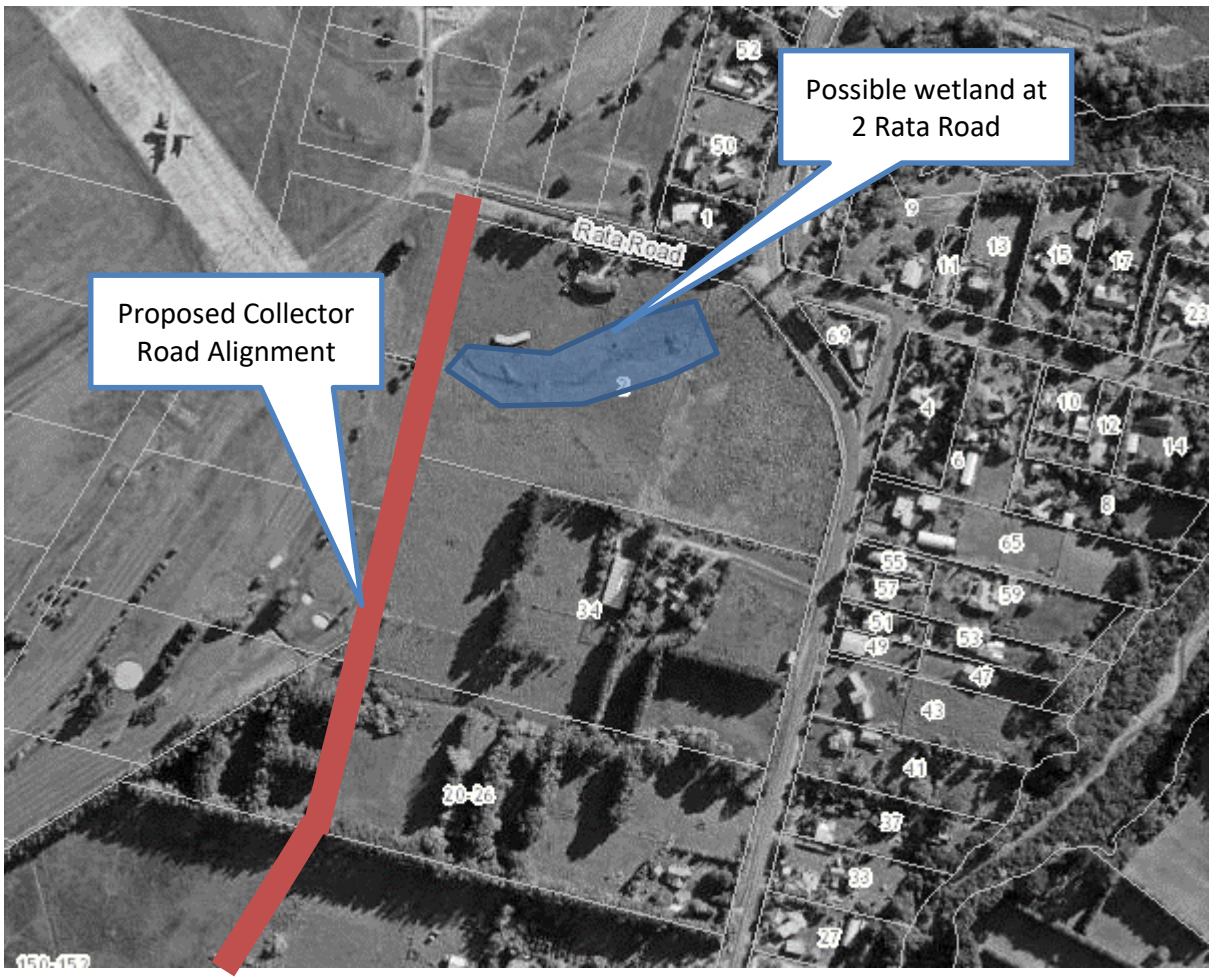
- For both Scenarios 1 and 2, the northbound queue lengths on Brigham Creek Road are predicted to extend beyond the distance available between the roundabout at the SH18 Eastbound Ramps and the Brigham Creek/Kauri Road intersection (225 metres). This may adversely affect the operation of the SH18 Eastbound off ramp, more so with Scenario 2
- With Scenario 3, 95th percentile queues of 215 metres are predicted on Brigham Creek Road, indicating that they are unlikely to affect the operation of the motorway off-ramp most of the time
- Based on our assessment, if the Neil Group development proceeds, we recommend that vehicle access for 2-10 Kauri Road not be permitted to/from Kauri Road and Brigham Creek Road (ie as assumed in Scenario 3), but pedestrian and cycle connections should be permitted, to facilitate access to the transport network, and in particular, public transport.

2.2.2 Relocated Collector Roads

We have reviewed the proposed Collector Road connections and support relocation of the northern Collector roads between areas 1B and 1C.

With regard to the connection at the northern end to Kauri Road via Rata Road, we understand that a wetland has been identified on the property of 2 Rata Road (shown in the below figure), and that it is not possible to provide the Collector Road connection through the property to Rata Road. While traffic volumes on this section of the Collector Road are predicted to be only some 2,000 vehicles per day based on the model outputs, we consider a Collector Road connection important in this vicinity to provide resilience to the transport network, particularly because of the exclusion of the Sinton Road bridge connection to Hobsonville Road. The connection could either be to Kauri Road (depending on where safe intersection sight distance requirements can be met), or further north on Rata Road.

Figure 4: Collector Road connection to Rata Road



With regard to the need for the Collector Road connection between Kauri Road and the realigned northern Collector Road, we consider that this connection is not necessary as part of the Collector Road network, and it would be preferable to remove it to reduce the amount of traffic attracted to Kauri Road from the northern parts of Area 1B, therefore preserving the capacity of the Kauri Road/Brigham Creek Road intersection.

2.2.3 Brigham Creek Road/Relocated Collector Road intersection

We have investigated the performance of the relocated Brigham Creek Road/Collector Road intersection (further north) using the predicted traffic volumes in Scenario 3 above, including the re-routed traffic that would have previously accessed Brigham Creek Road at the Brigham Creek Road/Kauri Road intersection. The intersection will be located approximately 300 metres north of Kauri Road and some 500 metres away from the next intersection along Brigham Creek Road.

Traffic signals would be necessary and modelling indicates a layout could be provided that would operate as an overall LOS C for the intersection for the morning and evening peak hours.

We have investigated queuing between this intersection and the Brigham Creek Road/Kauri Road intersection. The predicted 95th percentile queue lengths on Brigham Creek Road are provided in the following table (the assumed intersection layouts and summary model outputs are provided in Appendix A of this technical note).

Table 3: Predicted 95th percentile queue length (metres) on Brigham Creek Road between the relocated Connector crossroads and Kauri Road, assuming modelled 2028 peak period traffic

Approach	Morning Peak	Evening Peak
Brigham Creek Road south, approaching relocated Connector crossroads	180	210
Brigham Creek Road north, approaching Kauri Road T intersection	210	210

2.2.4 SH18/Brigham Creek Road interchange

Eastbound Ramps Roundabout

We have investigated the predicted operation of the roundabout at the SH18 Eastbound Ramps/Brigham Creek Road intersection using the layouts previously assumed to support the original proposed PC5 land use, including

- an additional dedicated left-turn lane on the SH18 eastbound off-ramp to Brigham Creek Road (north)
- widening of Brigham Creek Road beneath SH18
- removal of Sinton Road connection to the roundabout.

With all three land use scenarios, degrees of saturation above 94% are predicted on the Brigham Creek Road southbound approach, as summarised in Table 4 below. These indicate that the roundabout will operate close to its theoretical capacity, and variances in traffic flows at the roundabout may result in significant increases in traffic congestion. The summary SIDRA outputs of the roundabout operation and the modelled layout are provided in the appendix of this technical note.

Table 4: Brigham Creek Road southbound approach at the SH18 Eastbound Ramps/Brigham Creek Road roundabout, assuming modelled 2028 morning peak period traffic

Land Use Scenarios	Degree of Saturation
Scenario 1	94%
Scenario 2	99%
Scenario 3	98%

Our assessment indicates that further capacity improvements will be required at the roundabout, and our assessment using SATURN and SIDRA modelling suggests this can be achieved by providing an additional lane as a dedicated left turn lane from Brigham Creek Road (southbound approach) onto the SH18 Eastbound on ramp. With this additional lane, the modelling predicts that the Brigham Creek Road southbound approach would operate with at much lower degree of saturation (63% to 65%) for all three scenarios, with an overall intersection degree of saturation of 65% to 83%.

Westbound Ramps Roundabouts

We have also investigated the performance of the SH18 Westbound Ramps roundabouts with Brigham Creek Road with the traffic flows associated with the new PC5 land use/network. Previously, we had

suggested that the following layout changes would be needed at these intersections (in addition to the layout changes proposed at the SH18 Eastbound Ramps/Brigham Creek Road intersection above):

- Double right turn lanes on the SH18 westbound off-ramp and a dedicated left turn lane from the southbound off-ramp to Brigham Creek Road
- Widening of Brigham Creek Road between the roundabouts to include two lanes per direction
- Additional dedicated left turn lane from Brigham Creek Road (mid-roundabout section) to SH18 westbound on-ramp

Our assessment indicates that the above infrastructure changes would still be required, except that the first item, the additional dedicated left turn lane from the SH18 westbound off ramp, would not be necessary. This is due to the removal of the proposed Sinton Road connection across SH18, which is anticipated to result in a lower left turn demand from the SH18 Westbound off-ramp for traffic heading towards the Sinton Road bridge via Hobsonville Road, albeit that instead, right turn movements from the Westbound off-ramp will increase. Without the dedicated left turn lane from the SH18 westbound off ramp to Brigham Creek Road south, the left turn movement can be accommodated by a shared left turn/right turn lane on the SH18 westbound off-ramp.

3 SUMMARY

Based on our assessment, we summarise our conclusions and recommendations as follows.

Transport Alteration 1 - Trig Road Alignment

- The proposed staggered-T layout of Hobsonville Road/Trig Road and Hobsonville Road/Luckens Road is acceptable provided that both intersections are signal controlled with signal phasing/timings coordinated to minimise queueing between the intersections and that the design provides a safe facility for pedestrians, people cycling, bus priority and vehicles (including access to affected driveways).
- For the Collector Road network within Area 1A east of Trig Road, we recommend a loop that connects back to Trig Road

Transport Alterations 2 to 4 - Collector Roads in Areas 1B, 1C, 1D

- The Sinton Road vehicle connection to Hobsonville Road can be removed as a Collector Road if:
    - Vehicle access for 2-10 Kauri Road is not permitted from Kauri Road nor Brigham Creek Road (pedestrian and cycle connections to these roads should be encouraged to facilitate access to the pedestrian, cycle and public transport network)
    - The Brigham Creek Road/Kauri Road intersection be a T-intersection with no vehicle access to the west
    - Additional changes over those already identified for Proposed PC5 to the SH18 Eastbound Ramps Roundabout include an additional lane as a dedicated left turn lane from Brigham Creek Road (southbound approach) onto the SH18 Eastbound on ramp
    - Changes to those already identified for Proposed PC5 for the SH18 Westbound Ramps Roundabouts include not needing an additional left turn lane on the westbound off ramp, with the existing two lanes providing a shared left/right and right turn lane

- The Collector roads north/west of Kauri Road can be realigned further north with a signalised crossroads some 300 m north of Kauri Road/Brigham Creek Road
- We consider a Collector Road connection to Kauri Road in the vicinity of or via Rata Road important to provide resilience to the transport network, particularly because of the exclusion of the Sinton Road bridge connection to Hobsonville Road. The connection could either be to Kauri Road (depending on where safe intersection sight distance requirements can be met), or further north on Rata Road
- A Collector Road between Kauri Road and the realigned northern Collector Road is not necessary as part of the Collector Road network, and it would be preferable to remove it to reduce the amount of traffic attracted to Kauri Road from the northern parts of Area 1B, therefore preserving the capacity of the Kauri Road/Brigham Creek Road intersection.

It is important to note that we have implicitly assumed in the traffic modelling that as well as schools being provided locally, that an RTN station will be provided in the Sinton Road area to support lower private vehicle trip generation rates in the Sinton Road and Kauri Road areas and provide accessibility for those living in the area.

Yours sincerely

Qing Li
PRINCIPAL TRANSPORTATION ENGINEER

Angie Crafer
DIRECTOR

Reference: P:\ACXX\334 Whenuapai\Reporting\L1A210226_PC5 Variaion.docx - Qing Li

APPENDIX A SIDRA Model Results

Figure A1: Modelled Intersection Layout – Kauri Road/Brigham Creek Road

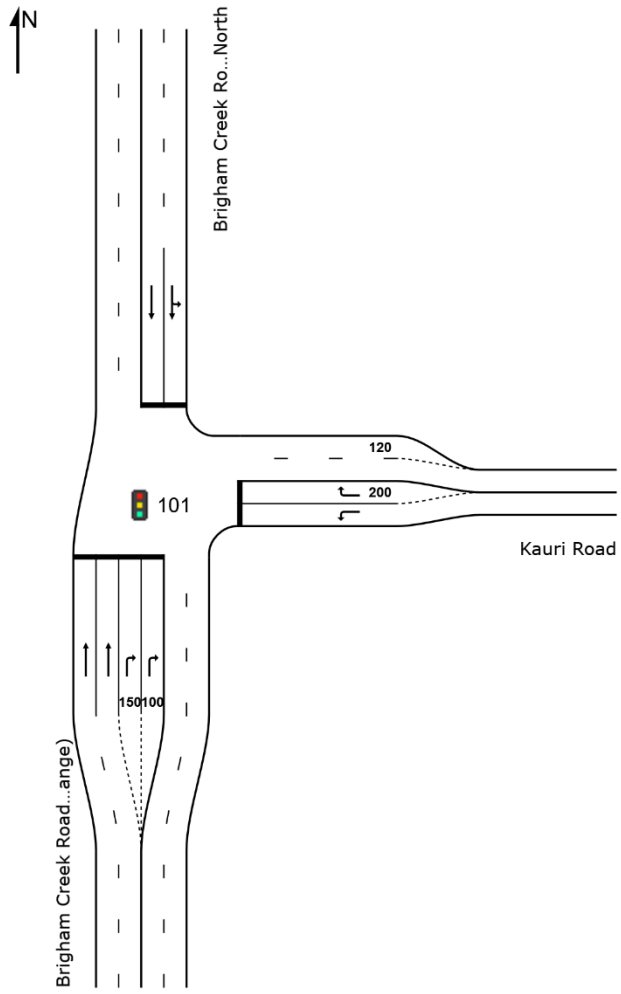


Figure A2: Predicted Intersection Performance – Kauri Road/Brigham Creek Road Scenario 1, AM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brigham Creek Road South												
5	T1	1325	5.0	0.462	4.7	LOS A	11.7	85.7	0.40	0.36	0.40	47.0
6	R2	362	5.0	0.284	24.0	LOS C	6.9	50.4	0.68	0.74	0.68	37.3
Approach		1687	5.0	0.462	8.8	LOS A	11.7	85.7	0.46	0.44	0.46	44.5
East: Kauri Road												
7	L2	991	5.0	0.891	32.2	LOS C	49.0	357.3	0.92	0.96	1.04	34.5
9	R2	71	5.0	0.281	47.3	LOS D	3.2	23.2	0.94	0.75	0.94	30.2
Approach		1061	5.0	0.891	33.2	LOS C	49.0	357.3	0.92	0.94	1.04	34.1
North: Brigham Creek Road North												
10	L2	63	5.0	0.890	54.0	LOS D	26.2	191.0	1.00	1.07	1.26	29.5
11	T1	875	5.0	0.890	49.4	LOS D	26.3	192.2	1.00	1.08	1.26	29.8
Approach		938	5.0	0.890	49.7	LOS D	26.3	192.2	1.00	1.08	1.26	29.8
All Vehicles		3686	5.0	0.891	26.2	LOS C	49.0	357.3	0.73	0.75	0.83	36.7

Figure A3: Predicted Intersection Performance – Kauri Road/Brigham Creek Road Scenario 1, PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brigham Creek Road South												
5	T1	1116	5.0	0.349	1.8	LOS A	6.0	44.1	0.23	0.21	0.23	48.8
6	R2	1165	5.0	0.906	30.4	LOS C	32.3	236.1	0.92	0.92	1.05	35.0
Approach		2281	5.0	0.906	16.4	LOS B	32.3	236.1	0.58	0.57	0.65	40.6
East: Kauri Road												
7	L2	720	5.0	0.680	20.3	LOS C	25.0	182.4	0.74	0.81	0.74	38.8
9	R2	51	5.0	0.493	60.4	LOS E	2.7	19.8	1.00	0.74	1.00	27.2
Approach		771	5.0	0.680	22.9	LOS C	25.0	182.4	0.76	0.81	0.76	37.8
North: Brigham Creek Road North												
10	L2	96	5.0	0.920	60.0	LOS E	33.6	245.6	1.00	1.11	1.31	28.1
11	T1	992	5.0	0.920	55.3	LOS E	33.9	247.5	1.00	1.12	1.31	28.4
Approach		1087	5.0	0.920	55.7	LOS E	33.9	247.5	1.00	1.12	1.31	28.4
All Vehicles		4139	5.0	0.920	28.0	LOS C	33.9	247.5	0.73	0.76	0.84	36.0

Figure A4: Predicted Intersection Performance – Kauri Road/Brigham Creek Road Scenario 2, AM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brigham Creek Road South												
5	T1	1218	5.0	0.422	3.7	LOS A	8.6	63.1	0.37	0.34	0.37	47.6
6	R2	426	5.0	0.340	22.0	LOS C	7.2	52.7	0.70	0.75	0.70	38.1
Approach		1644	5.0	0.422	8.4	LOS A	8.6	63.1	0.46	0.44	0.46	44.7
East: Kauri Road												
7	L2	1055	5.0	0.980	63.1	LOS E	68.8	502.2	1.00	1.16	1.50	26.7
9	R2	73	5.0	0.344	43.6	LOS D	2.9	21.2	0.96	0.76	0.96	31.1
Approach		1127	5.0	0.980	61.9	LOS E	68.8	502.2	1.00	1.14	1.46	26.9
North: Brigham Creek Road North												
10	L2	40	5.0	0.950	62.3	LOS E	28.8	210.4	1.00	1.28	1.52	27.7
11	T1	972	5.0	0.950	57.7	LOS E	28.9	211.1	1.00	1.28	1.52	27.9
Approach		1012	5.0	0.950	57.9	LOS E	28.9	211.1	1.00	1.28	1.52	27.9
All Vehicles		3783	5.0	0.980	37.6	LOS D	68.8	502.2	0.76	0.88	1.04	32.9

Figure A5: Predicted Intersection Performance – Kauri Road/Brigham Creek Road Scenario 2, PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brigham Creek Road South												
5	T1	1111	5.0	0.350	1.9	LOS A	6.0	43.9	0.24	0.22	0.24	48.7
6	R2	1265	5.0	0.965	40.7	LOS D	41.6	303.4	0.92	0.99	1.19	31.9
Approach		2376	5.0	0.965	22.6	LOS C	41.6	303.4	0.60	0.63	0.75	38.0
East: Kauri Road												
7	L2	782	5.0	0.703	18.3	LOS B	25.5	186.0	0.73	0.81	0.73	39.7
9	R2	39	5.0	0.362	56.9	LOS E	2.0	14.3	1.00	0.73	1.00	27.9
Approach		821	5.0	0.703	20.1	LOS C	25.5	186.0	0.74	0.81	0.74	38.9
North: Brigham Creek Road North												
10	L2	93	5.0	0.964	73.9	LOS E	34.1	248.9	1.00	1.25	1.51	25.4
11	T1	922	5.0	0.964	69.2	LOS E	34.4	251.0	1.00	1.27	1.51	25.6
Approach		1015	5.0	0.964	69.7	LOS E	34.4	251.0	1.00	1.27	1.51	25.6
All Vehicles		4212	5.0	0.965	33.4	LOS C	41.6	303.4	0.73	0.82	0.93	34.2

Figure A6: Predicted Intersection Performance – Kauri Road/Brigham Creek Road Scenario 3, AM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brigham Creek Road South (to SH18 Interchange)												
5	T1	1197	5.0	0.407	3.6	LOS A	8.8	64.4	0.35	0.32	0.35	47.7
6	R2	448	5.0	0.342	22.8	LOS C	8.2	60.2	0.68	0.74	0.68	37.8
Approach		1645	5.0	0.407	8.8	LOS A	8.8	64.4	0.44	0.43	0.44	44.5
East: Kauri Road												
7	L2	1044	5.0	0.954	51.7	LOS D	65.0	474.4	1.00	1.08	1.32	29.1
9	R2	69	5.0	0.335	48.0	LOS D	3.1	22.6	0.96	0.76	0.96	30.0
Approach		1114	5.0	0.954	51.4	LOS D	65.0	474.4	1.00	1.06	1.30	29.2
North: Brigham Creek Road North												
10	L2	33	5.0	0.927	59.5	LOS E	29.0	211.4	1.00	1.17	1.39	28.3
11	T1	961	5.0	0.927	54.9	LOS D	29.0	212.0	1.00	1.18	1.39	28.5
Approach		994	5.0	0.927	55.1	LOS E	29.0	212.0	1.00	1.18	1.39	28.5
All Vehicles		3753	5.0	0.954	33.7	LOS C	65.0	474.4	0.75	0.82	0.94	34.1

Figure A7: Predicted Intersection Performance – Kauri Road/Brigham Creek Road Scenario 3, PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brigham Creek Road South (to SH18 Interchange)												
5	T1	1198	5.0	0.378	2.0	LOS A	6.7	48.9	0.25	0.23	0.25	48.7
6	R2	1164	5.0	0.893	27.8	LOS C	29.8	217.3	0.92	0.91	1.04	35.9
Approach		2362	5.0	0.893	14.7	LOS B	29.8	217.3	0.58	0.57	0.64	41.4
East: Kauri Road												
7	L2	783	5.0	0.728	19.8	LOS B	26.9	196.4	0.77	0.83	0.77	39.0
9	R2	38	5.0	0.352	56.8	LOS E	1.9	13.9	0.99	0.73	0.99	28.0
Approach		821	5.0	0.728	21.5	LOS C	26.9	196.4	0.78	0.82	0.78	38.3
North: Brigham Creek Road North												
10	L2	93	5.0	0.894	53.6	LOS D	28.3	206.3	1.00	1.07	1.26	29.5
11	T1	916	5.0	0.894	48.9	LOS D	28.5	208.0	1.00	1.08	1.26	29.9
Approach		1008	5.0	0.894	49.3	LOS D	28.5	208.0	1.00	1.08	1.26	29.9
All Vehicles		4192	5.0	0.894	24.4	LOS C	29.8	217.3	0.72	0.74	0.82	37.4

Figure A8: Modelled Intersection Layout –Brigham Creek Road/Collector Road Intersection

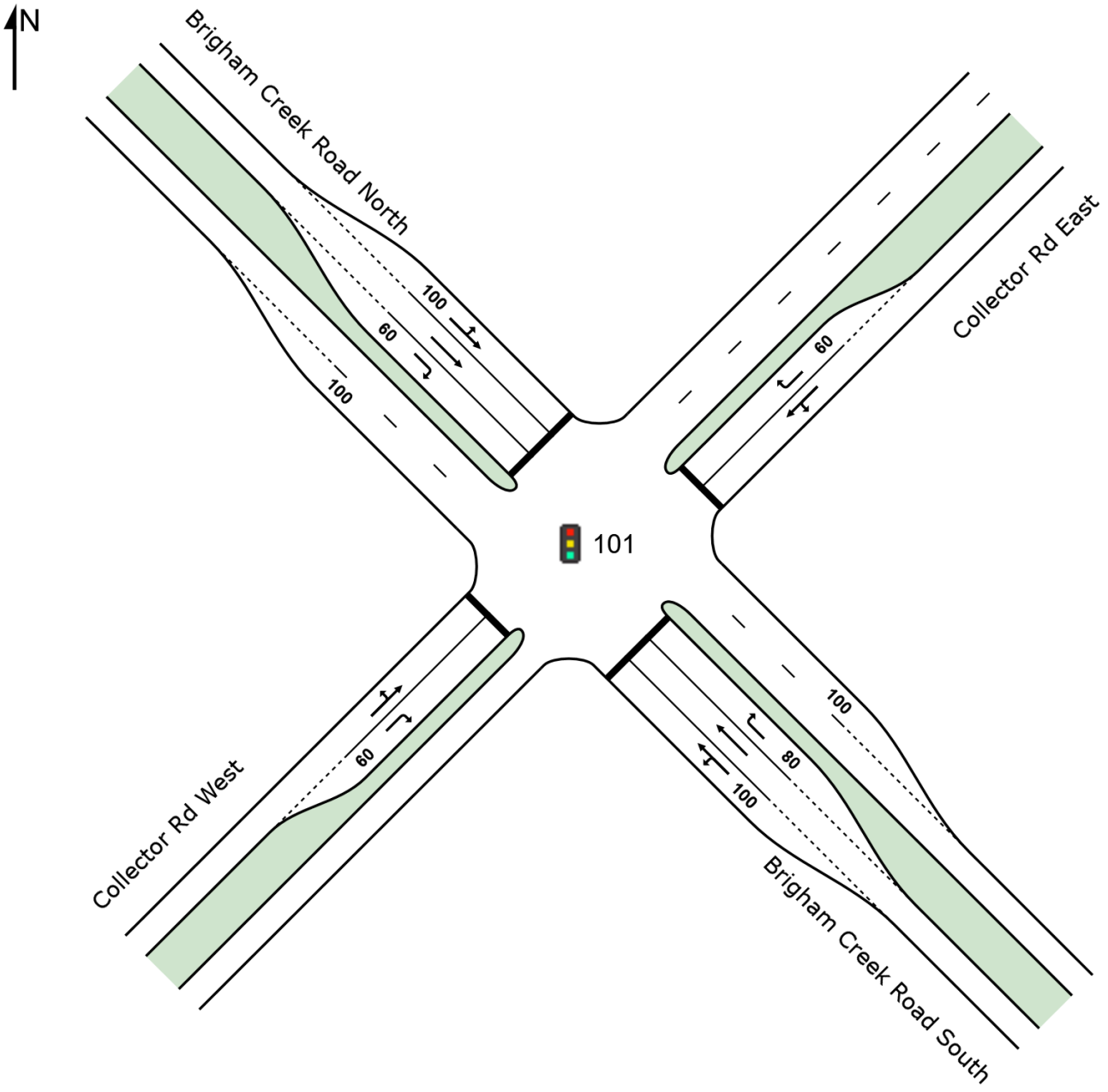


Figure A9: Predicted Intersection Performance – Brigham Creek Road/Collector Road Scenario 3, AM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Brigham Creek Road South												
4	L2	701	5.0	0.709	21.6	LOS C	24.5	179.2	0.78	0.83	0.78	38.3
5	T1	317	5.0	0.300	12.3	LOS B	8.1	58.9	0.57	0.49	0.57	42.8
6	R2	249	5.0	0.696	46.5	LOS D	11.8	86.2	0.98	0.85	1.03	30.4
Approach		1267	5.0	0.709	24.2	LOS C	24.5	179.2	0.77	0.75	0.78	37.3
NorthEast: Collector Rd East												
7	L2	105	5.0	0.279	38.3	LOS D	4.7	34.3	0.86	0.76	0.86	32.7
8	T1	12	5.0	0.279	33.7	LOS C	4.7	34.3	0.86	0.76	0.86	33.0
9	R2	68	5.0	0.477	54.9	LOS D	3.4	24.8	1.00	0.76	1.00	28.5
Approach		185	5.0	0.477	44.2	LOS D	4.7	34.3	0.91	0.76	0.91	31.0
NorthWest: Brigham Creek Road North												
10	L2	101	5.0	0.385	26.1	LOS C	10.1	73.7	0.74	0.68	0.74	37.7
11	T1	742	5.0	0.694	24.3	LOS C	21.5	157.2	0.84	0.75	0.84	37.4
12	R2	12	5.0	0.108	55.3	LOS E	0.6	4.1	0.97	0.68	0.97	28.3
Approach		855	5.0	0.694	25.0	LOS C	21.5	157.2	0.83	0.74	0.83	37.2
SouthWest: Collector Rd West												
1	L2	26	5.0	0.399	51.1	LOS D	3.8	28.0	0.97	0.76	0.97	30.0
2	T1	55	5.0	0.399	46.5	LOS D	3.8	28.0	0.97	0.76	0.97	30.2
3	R2	93	5.0	0.646	56.5	LOS E	4.7	34.6	1.00	0.82	1.10	28.1
Approach		174	5.0	0.646	52.6	LOS D	4.7	34.6	0.99	0.79	1.04	29.0
All Vehicles		2481	5.0	0.709	27.9	LOS C	24.5	179.2	0.81	0.75	0.82	36.0

Figure A10: Predicted Intersection Performance – Brigham Creek Road/Collector Road Scenario 3, PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Brigham Creek Road South												
4	L2	316	5.0	0.434	22.3	LOS C	12.1	88.2	0.69	0.74	0.69	38.3
5	T1	738	5.0	0.781	22.3	LOS C	26.4	192.6	0.84	0.78	0.86	38.2
6	R2	96	5.0	0.254	40.6	LOS D	4.0	28.9	0.88	0.76	0.88	31.9
Approach		1149	5.0	0.781	23.8	LOS C	26.4	192.6	0.80	0.77	0.81	37.6
NorthEast: Collector Rd East												
7	L2	227	5.0	0.779	49.0	LOS D	14.3	104.3	1.00	0.92	1.13	30.0
8	T1	59	5.0	0.779	44.4	LOS D	14.3	104.3	1.00	0.92	1.13	30.2
9	R2	62	5.0	0.289	49.4	LOS D	2.9	20.9	0.95	0.75	0.95	29.8
Approach		348	5.0	0.779	48.3	LOS D	14.3	104.3	0.99	0.89	1.10	30.0
NorthWest: Brigham Creek Road North												
10	L2	69	5.0	0.393	31.7	LOS C	9.3	67.6	0.81	0.71	0.81	35.7
11	T1	622	5.0	0.707	29.7	LOS C	18.7	136.8	0.89	0.78	0.89	35.4
12	R2	20	5.0	0.186	55.9	LOS E	1.0	7.2	0.98	0.70	0.98	28.2
Approach		712	5.0	0.707	30.7	LOS C	18.7	136.8	0.88	0.77	0.88	35.2
SouthWest: Collector Rd West												
1	L2	13	5.0	0.328	47.7	LOS D	3.7	27.2	0.94	0.74	0.94	31.1
2	T1	69	5.0	0.328	43.1	LOS D	3.7	27.2	0.94	0.74	0.94	31.3
3	R2	166	5.0	0.773	55.6	LOS E	8.6	62.9	1.00	0.90	1.19	28.2
Approach		248	5.0	0.773	51.7	LOS D	8.6	62.9	0.98	0.85	1.11	29.2
All Vehicles		2458	5.0	0.781	32.1	LOS C	26.4	192.6	0.87	0.79	0.90	34.7

Figure A11: Modelled Intersection Layout –Brigham Creek Road/SH18 Northbound Ramps Intersection

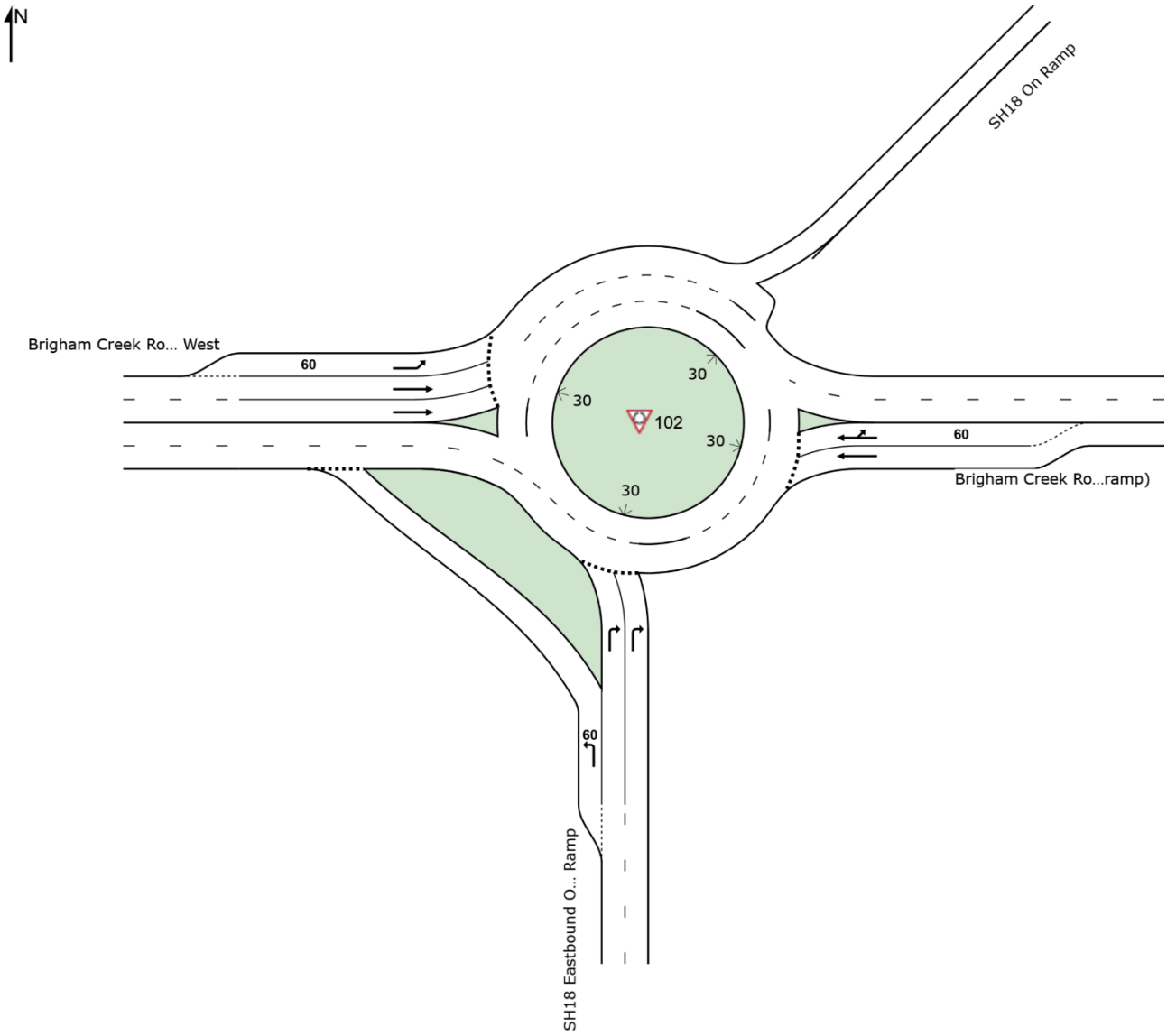


Figure A12: Predicted Intersection Performance – Brigham Creek Road/SH18 Northbound Ramps Scenario 3, AM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH18 Eastbound Off Ramp												
1	L2	743	5.0	0.551	5.8	LOS A	3.8	27.7	0.66	0.81	0.80	46.8
3	R2	344	5.0	0.152	9.8	LOS A	0.6	4.6	0.55	0.78	0.55	46.4
Approach		1087	5.0	0.551	7.0	LOS A	3.8	27.7	0.63	0.80	0.72	46.7
East: Brigham Creek Road East (to southbound on ramp)												
5	T1	881	5.0	0.349	2.0	LOS A	0.0	0.0	0.00	0.31	0.00	50.1
6b	R3	262	5.0	0.349	8.5	LOS A	0.0	0.0	0.00	0.48	0.00	49.9
Approach		1143	5.0	0.349	3.5	LOS A	0.0	0.0	0.00	0.35	0.00	50.0
West: Brigham Creek Road West												
10a	L1	883	5.0	0.648	4.9	LOS A	5.7	41.4	0.71	0.71	0.85	47.6
11	T1	1076	5.0	0.524	5.2	LOS A	3.5	25.4	0.67	0.64	0.76	48.0
Approach		1959	5.0	0.648	5.1	LOS A	5.7	41.4	0.69	0.67	0.80	47.8
All Vehicles		4189	5.0	0.648	5.2	LOS A	5.7	41.4	0.49	0.62	0.56	48.1

Figure A13: Predicted Intersection Performance – Brigham Creek Road/SH18 Northbound Ramps Scenario 3, PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH18 Eastbound Off Ramp												
1	L2	1020	5.0	0.828	13.4	LOS B	11.5	84.1	0.86	1.32	1.80	42.6
3	R2	522	5.0	0.261	11.3	LOS B	1.3	9.7	0.69	0.86	0.69	45.8
Approach		1542	5.0	0.828	12.7	LOS B	11.5	84.1	0.80	1.17	1.42	43.7
East: Brigham Creek Road East (to southbound on ramp)												
5	T1	1341	5.0	0.487	2.0	LOS A	0.0	0.0	0.00	0.30	0.00	50.2
6b	R3	255	5.0	0.487	8.5	LOS A	0.0	0.0	0.00	0.42	0.00	50.6
Approach		1596	5.0	0.487	3.1	LOS A	0.0	0.0	0.00	0.32	0.00	50.2
West: Brigham Creek Road West												
10a	L1	548	5.0	0.602	6.5	LOS A	4.6	33.5	0.78	0.92	0.98	47.3
11	T1	1151	5.0	0.535	5.4	LOS A	4.0	29.1	0.74	0.67	0.85	47.8
Approach		1699	5.0	0.602	5.7	LOS A	4.6	33.5	0.76	0.75	0.89	47.6
All Vehicles		4837	5.0	0.828	7.1	LOS A	11.5	84.1	0.52	0.74	0.77	47.1

Figure A14: Modelled Intersection Layout –Brigham Creek Road/SH18 Southbound On Ramp Intersection

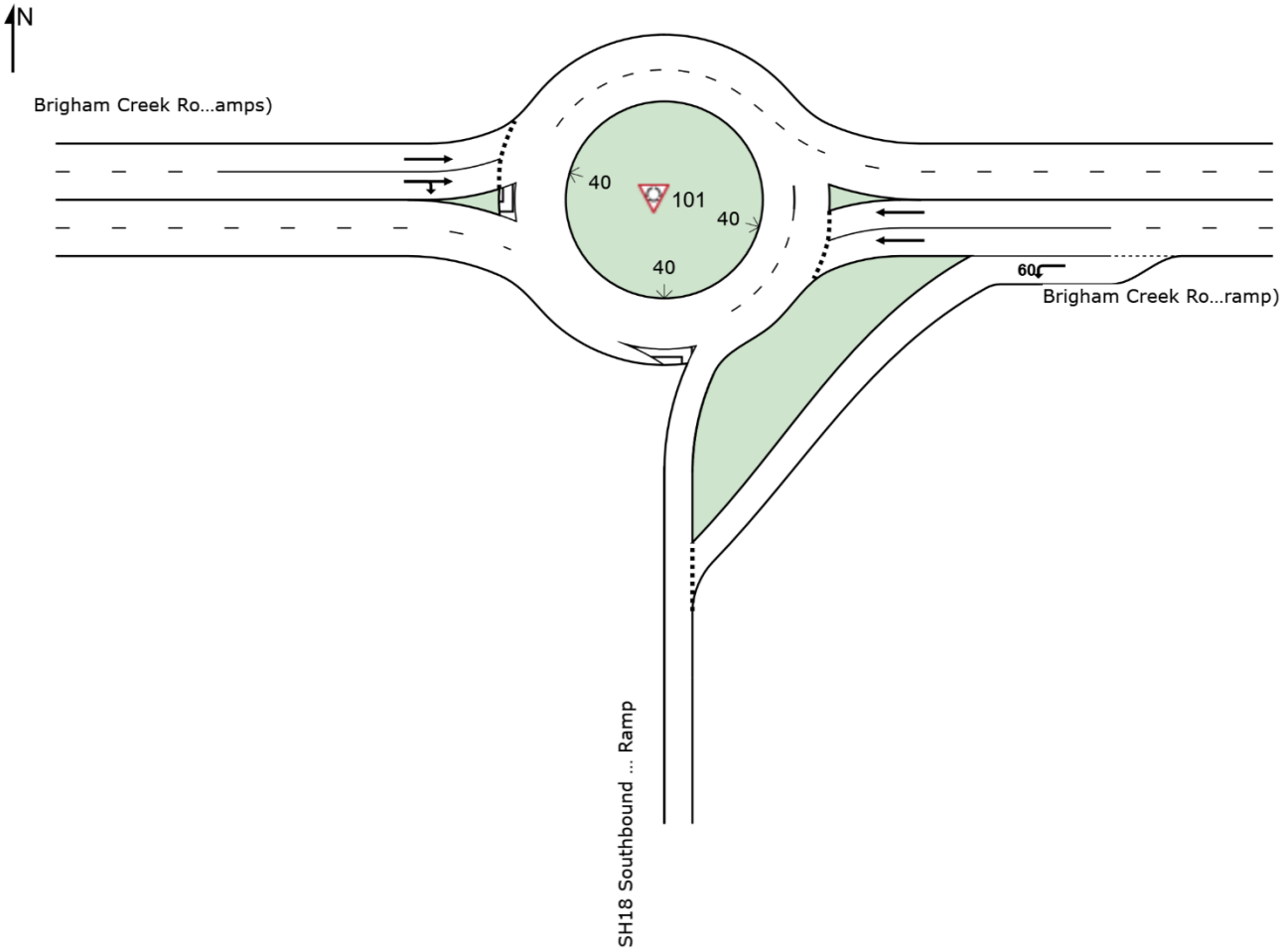


Figure A15: Predicted Intersection Performance – Brigham Creek Road/SH18 Southbound On Ramp Scenario 3, AM Peak

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Brigham Creek Road (to southbound off ramp)												
4	L2	631	5.0	0.485	6.0	LOS A	3.7	27.0	0.73	0.73	0.76	46.8
5	T1	1144	5.0	0.508	6.0	LOS A	4.1	29.9	0.74	0.75	0.84	48.1
Approach		1775	5.0	0.508	6.0	LOS A	4.1	29.9	0.74	0.74	0.81	47.6
West: Brigham Creek Road (to northbound ramps)												
11	T1	701	5.0	0.410	0.4	LOS A	0.0	0.0	0.00	0.09	0.00	52.0
12	R2	719	5.0	0.410	7.5	LOS A	0.0	0.0	0.00	0.56	0.00	49.0
Approach		1420	5.0	0.410	4.0	LOS A	0.0	0.0	0.00	0.33	0.00	50.4
All Vehicles		3195	5.0	0.508	5.1	LOS A	4.1	29.9	0.41	0.56	0.45	48.8

Figure A16: Predicted Intersection Performance – Brigham Creek Road/SH18 Southbound On Ramp Scenario 3, PM Peak

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Brigham Creek Road (to southbound off ramp)												
4	L2	312	5.0	0.232	4.6	LOS A	1.4	10.1	0.59	0.59	0.59	47.4
5	T1	1608	5.0	0.687	8.2	LOS A	8.3	60.2	0.81	0.93	1.13	47.1
Approach		1920	5.0	0.687	7.7	LOS A	8.3	60.2	0.78	0.87	1.04	47.1
West: Brigham Creek Road (to northbound ramps)												
11	T1	1061	5.0	0.497	0.4	LOS A	0.0	0.0	0.00	0.11	0.00	51.9
12	R2	660	5.0	0.497	7.5	LOS A	0.0	0.0	0.00	0.54	0.00	49.4
Approach		1721	5.0	0.497	3.1	LOS A	0.0	0.0	0.00	0.27	0.00	50.9
All Vehicles		3641	5.0	0.687	5.5	LOS A	8.3	60.2	0.41	0.59	0.55	48.8

Figure A17: Modelled Intersection Layout –Brigham Creek Road/SH18 Southbound Off Ramp Intersection

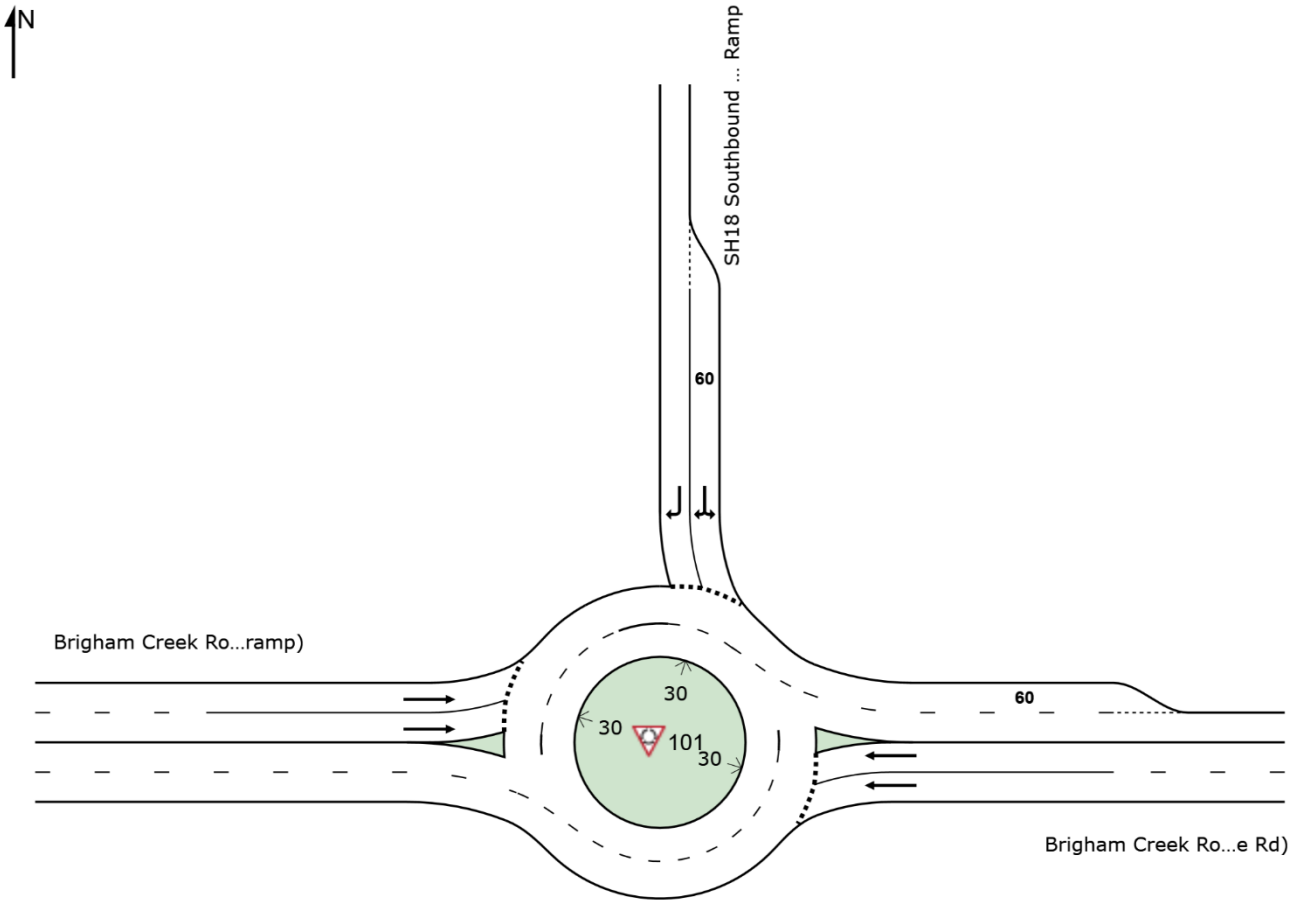


Figure A18: Predicted Intersection Performance – Brigham Creek Road/SH18 Southbound Off Ramp Scenario 3, AM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Brigham Creek Road East (to Hobsonville Rd)												
5	T1	1361	5.0	0.636	4.3	LOS A	5.1	37.5	0.69	0.62	0.79	48.3
Approach		1361	5.0	0.636	4.3	LOS A	5.1	37.5	0.69	0.62	0.79	48.3
North: SH18 Southbound Off Ramp												
7	L2	131	5.0	0.271	4.7	LOS A	1.2	8.7	0.53	0.72	0.53	45.8
9	R2	412	5.0	0.271	10.0	LOS A	1.2	8.7	0.54	0.76	0.54	46.9
Approach		542	5.0	0.271	8.7	LOS A	1.2	8.7	0.54	0.75	0.54	46.6
West: Brigham Creek Road West (to southbound on ramp)												
11	T1	701	5.0	0.288	2.2	LOS A	0.0	0.0	0.00	0.25	0.00	50.4
Approach		701	5.0	0.288	2.2	LOS A	0.0	0.0	0.00	0.25	0.00	50.4
All Vehicles		2604	5.0	0.636	4.7	LOS A	5.1	37.5	0.47	0.55	0.53	48.5

Figure A19: Predicted Intersection Performance – Brigham Creek Road/SH18 Southbound Off Ramp Scenario 3, PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Brigham Creek Road East (to Hobsonville Rd)												
5	T1	1081	5.0	0.677	6.7	LOS A	5.3	39.0	0.83	0.94	1.09	47.6
Approach		1081	5.0	0.677	6.7	LOS A	5.3	39.0	0.83	0.94	1.09	47.6
North: SH18 Southbound Off Ramp												
7	L2	148	5.0	0.574	8.3	LOS A	4.1	29.6	0.74	1.00	1.01	43.6
9	R2	840	5.0	0.574	14.1	LOS B	4.1	29.6	0.75	1.01	1.03	44.6
Approach		988	5.0	0.574	13.2	LOS B	4.1	29.6	0.75	1.01	1.03	44.5
West: Brigham Creek Road West (to southbound on ramp)												
11	T1	1061	5.0	0.436	2.2	LOS A	0.0	0.0	0.00	0.25	0.00	50.4
Approach		1061	5.0	0.436	2.2	LOS A	0.0	0.0	0.00	0.25	0.00	50.4
All Vehicles		3131	5.0	0.677	7.2	LOS A	5.3	39.0	0.52	0.73	0.70	47.4