I hereby give notice that a hearing by commissioners will be held on:

Date:	**Mondays through Thursdays from 18 September until 12 October 2023**
Time:	**9:30am**
Meeting Room:	**Council Chambers**
Venue:	**Level 2, Henderson Civic, 3 Smythe Road, Henderson, Auckland 0612**

NOTIFICATION MATERIAL

VOLUME 06

NORTH-WEST LOCAL PROJECTS

TE TUPU NGĀTAHI SUPPORTING GROWTH

AUCKLAND TRANSPORT & WAKA KOTAHI NZ TRANSPORT AGENCY

COMMISSIONERS

Chairperson	**Richard Blakey (Chairperson)**
Commissioners	**Mark Farnsworth**
	Vaughan Smith

Patrice Baillargeon
Kaitohutohu Mataamua Whakawā /
Senior Hearings Advisor

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Note: The reports contained within this agenda are for consideration and should not be construed as a decision of Council. Should Commissioners require further information relating to any reports, please contact the Team Leader Hearings.

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North-West Local: Whenuapai and Redhills – Part 4

ATTACHMENT 42

NORTH-WEST LOCAL ARTERIALS
ASSESSMENT OF ALTERNATIVES

TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West Local Arterials
Assessment of Alternatives

Appendix A

December 2022

Version 1

WAKA KOTAHI NZ TRANSPORT AGENCY

AT

New Zealand Government

Document Status

Responsibility	Name
Author	Jade Ansted
Reviewer	John Daly
Approver	Chris Scrafton

Revision Status

Version	Date	Reason for Issue
1	16/12/22	Notice of Requirement Lodgement

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Figures

Tables

Glossary

Acronym / Term	Description
AUP:OP	Auckland Unitary Plan - Operative in Part
AT	Auckland Transport
Auckland Council, Council or the Council	Auckland Council
CFAF	Corridor Form and Function
DBC	Detailed Business Case
FTN	Frequent Transit Network
FULSS	Future Urban Land Supply Strategy
FUZ	Future Urban Zone
HIF	North West Housing Infrastructure Fund
IBC	Indicative Business Case
IFA	Infrastructure Funding Agreement
ISTN	Indicative Strategic Transport Network
Local Arterials Package	The eight NORs that make up the North West Local Arterials Package
LOS	Level of Service
MOD	Ministry of Defence
MCA	Multi-Criteria Assessment
NOR	Notice of Requirement
NZDF	New Zealand Defence Force
Partners	Collectively refers to Auckland Transport, Waka Kotahi NZ Transport Agency, Manawhenua and Auckland Council
PBC	Programme Business Case
RUB	Rural-urban boundary
RTC	Rapid Transit Corridor
RMA	Resource Management Act 1991
SEA	Significant Ecological Area
SH16	State Highway 16
SH18	State Highway 18
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth Alliance

Acronym / Term	Description
TFUG	Transport for Urban Growth
Waka Kotahi	Waka Kotahi NZ Transport Agency

1 Introduction

1.1 Purpose of this Report

This report supports Auckland Transport's (AT) Notices of Requirements (NORs) to designate land for each of the extended and / or upgraded corridors within the North West Local Arterials Package (Local Arterials Package).

The Local Arterials Package includes eight NORs divided into two assessment areas, Whenuapai as detailed in Table 1-1 and Figure 1-1, Redhills as detailed in Table 1-2 and Figure 1-2 and Riverhead in Table 1-3 and Figure 1-3. The NORs seek to protect land to enable the construction, operation and maintenance of transport infrastructure.

Table 1-1: Local Arterials – Whenuapai

Ref	Project	Requiring Authority
W1	Trig Road North	Auckland Transport
W2	Māmari Road	Auckland Transport
W3	Brigham Creek Road	Auckland Transport
W4	Spedding Road	Auckland Transport
W5	Hobsonville Road	Auckland Transport

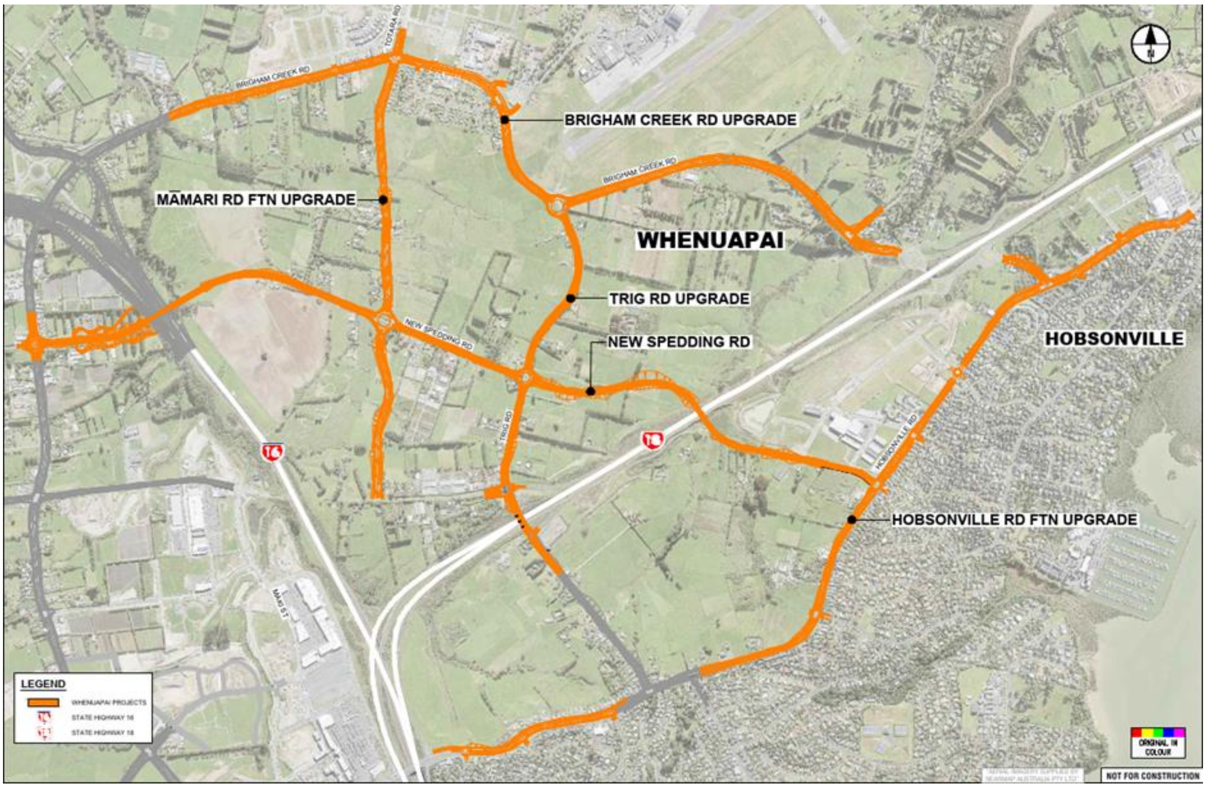


Figure 1-1: Whenuapai Package Overview

Table 1-2: Local Arterials – Redhills

Ref	Project	Requiring Authority
RE1	Don Buck Road Frequent Transit Network (FTN)	Auckland Transport
RE2	Fred Taylor Drive FTN	Auckland Transport

Figure 1-2: Redhills Package Overview

Table 1-3: Local Arterials – Riverhead

Ref	Project	Requiring Authority
R1	Coatesville-Riverhead Highway	Auckland Transport

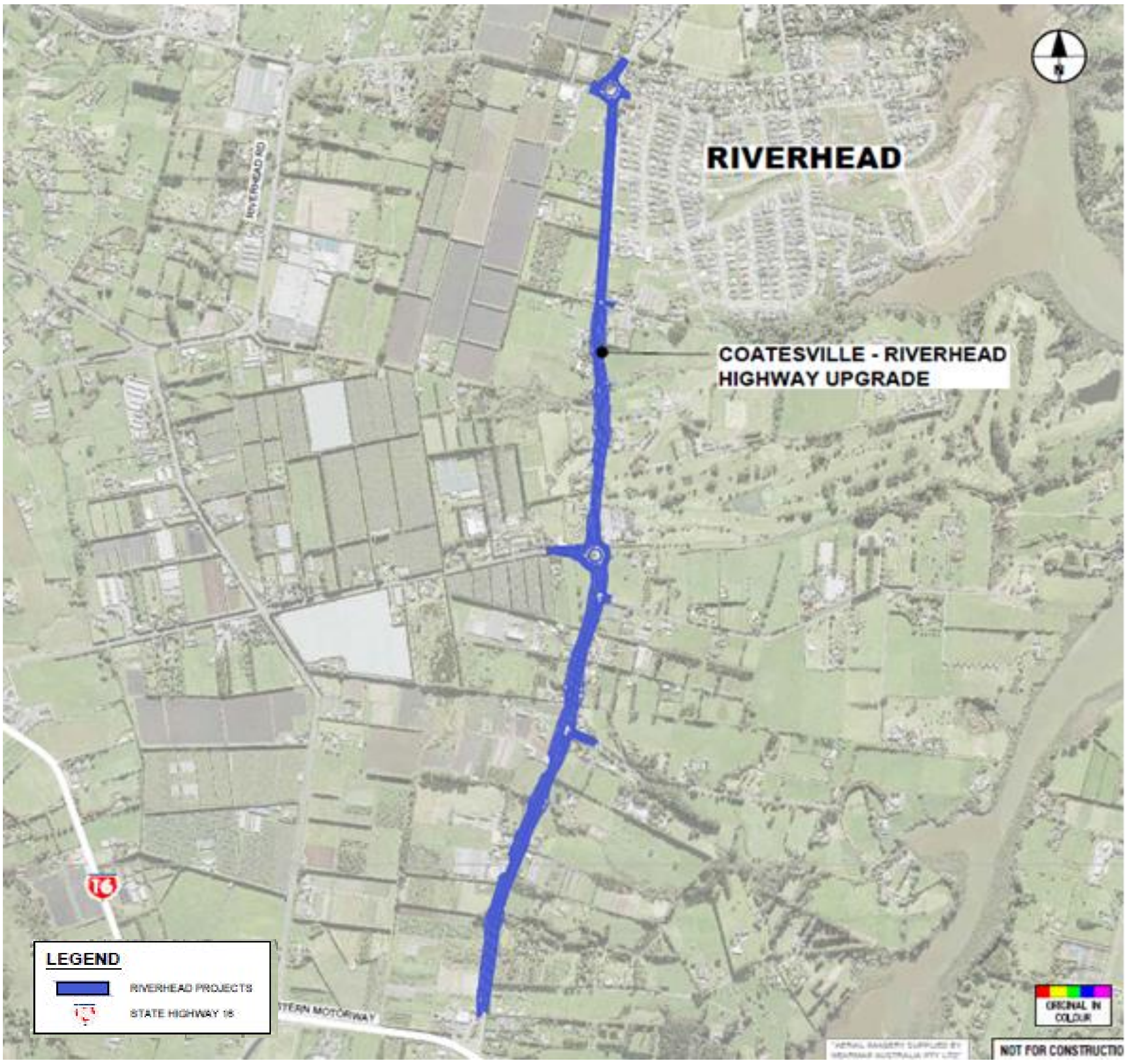


Figure 1-3: Riverhead Package Overview

Under section 171(1)(b) of the Resource Management Act 1991 (RMA), a territorial authority making a recommendation on a NOR must consider whether adequate consideration has been given to alternative sites, routes or methods of undertaking the work if the requiring authority does not have an interest in the land sufficient for undertaking the work, or it is likely that the work will have a significant adverse effect on the environment.

AT does not currently have an interest in all of the land required for the construction and operation of the Local Arterials Package of projects and so consideration of alternative sites, routes and methods has been undertaken. The purpose of this report is to document the development of alternative options to undertake the works and the process used to assess and compare those options.

This report provides an overview of the corridor options considered during the North West long list and short list phases and describes the assessment of alternative alignment options undertaken including the route refinement process through to recommendation of a preferred transport network. This report also provides a summary of the alternative statutory methods considered for implementing the Local Arterials Package.

Figure 1-4 outlines the process undertaken through the corridor and route refinement assessment of alternatives.

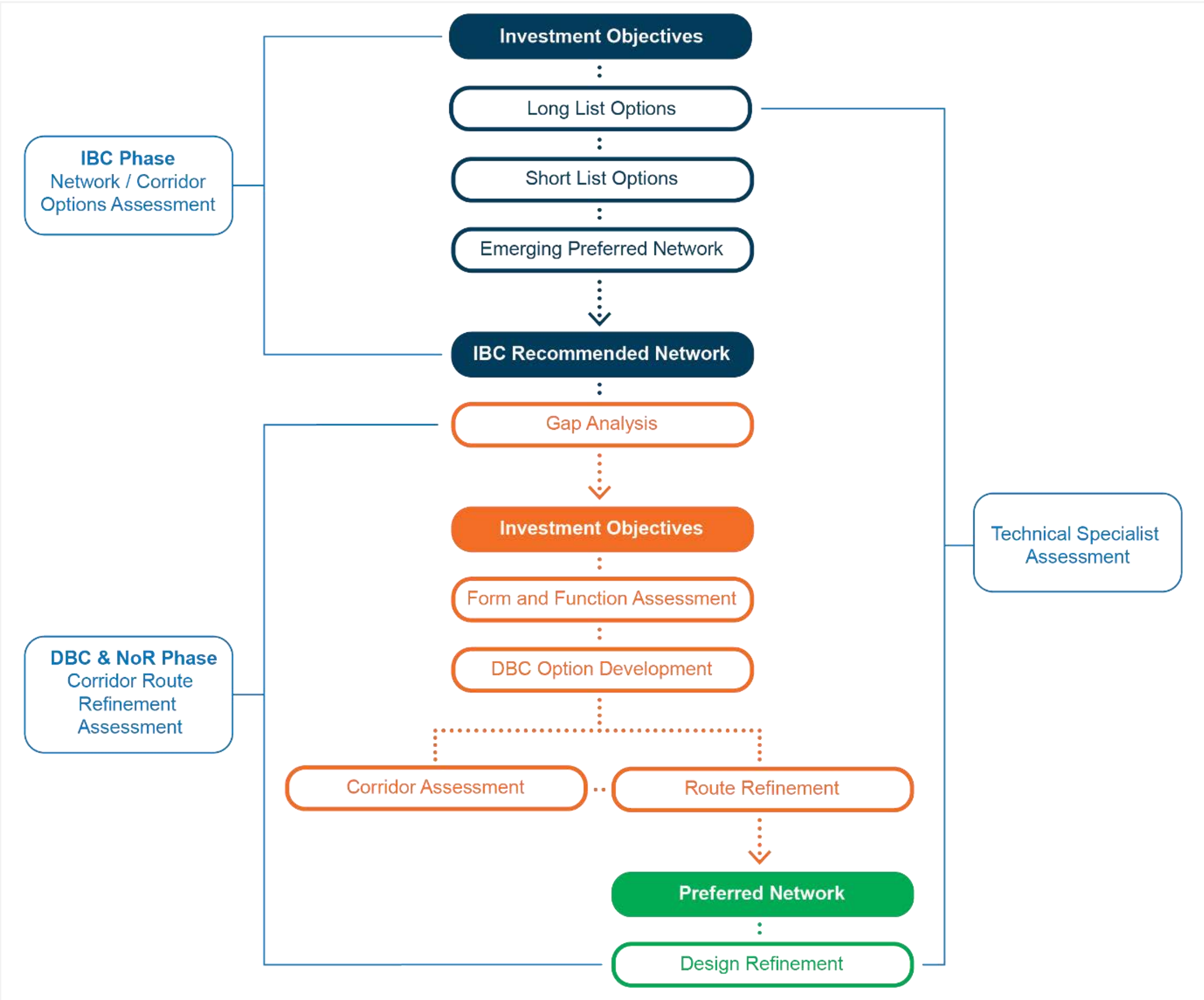


Figure 1-4: Summary of Assessment of Alternatives Process

1.2 Background

Auckland is New Zealand's largest city, home to approximately 1.69 million people and is growing rapidly; driven by both natural growth, (more births than deaths) and migration from overseas and from other parts of New Zealand. In 2017, Auckland attracted 36,800 new residents; more than the rest of the country combined. The Auckland Plan Development Strategy (2050) signals that Auckland could grow by another 720,000 people to reach 2.4 million over the next 30 years.

The Auckland Plan anticipates that this growth will generate demand for an additional 313,000 dwellings and require land for approximately 263,000 additional employment opportunities. In response to this demand, the Auckland Unitary Plan – Operative in Part (AUP:OP) identified 11,000 hectares of predominantly rural land for future urbanisation. This land is equivalent to an area 1.5 times the size of urban Hamilton.

To enable urban development on this land, appropriate transport infrastructure needs to be planned and enabled. To provide clarity and certainty about when the land identified in the AUP:OP will be 'development ready', Auckland Council developed the Future Urban Land Supply Strategy (FULSS) in 2015. The FULSS provides for sequenced and accelerated greenfield growth in the following areas of Auckland:

- Warkworth
- North: Orewa-Silverdale, Dairy Flat
- North-west: Whenuapai-Redhills, Westgate, Kumeū, and Huapai (**subject of this report**)
- South: Takaanini, Drury – Ōpāheke and Pukekohe – Paerata.

In July 2017, the FULSS was updated in line with the AUP:OP zoning, with an increase to 15,000 hectares of land allocated for future urbanisation.

In response to the FULSS, AT, Waka Kotahi NZ Transport Agency (Waka Kotahi), and the Council identified a need to determine the most appropriate transport responses to support this envisioned urban growth. A tripartite governance group was formed to develop a response to two key issues:

1. Inability to respond in a timely way to the pace and scale of greenfield development will restrict access to jobs, education and other core services around and in growth areas.
2. Inability of the regional transportation system to cope with the growing demand of greenfield expansion will reduce travel choice and efficient movement of people and goods.

This joint approach recognised that:

> *The proposed growth is likely to require significant new additions to the arterial, local, and public transport network, and integration of such networks with new and existing urban form and will likely have impacts on and require improvements to the existing arterial, public transport, and state highway network, and to planning frameworks and / or policy.*

The Te Tupu Ngātahi Programme is a collaboration between AT and Waka Kotahi to plan transport investment in Auckland's future urban zoned (FUZ) areas over the next 10 to 30 years. AT and Waka Kotahi have partnered with Auckland Council, Manawhenua and KiwiRail Holdings Limited and are working closely with stakeholders and engaging with the community to develop the strategic transport network to support Auckland's growth areas. North West Local is within the North West growth area. Auckland's growth areas including the North West growth area are shown in Figure 1-5.

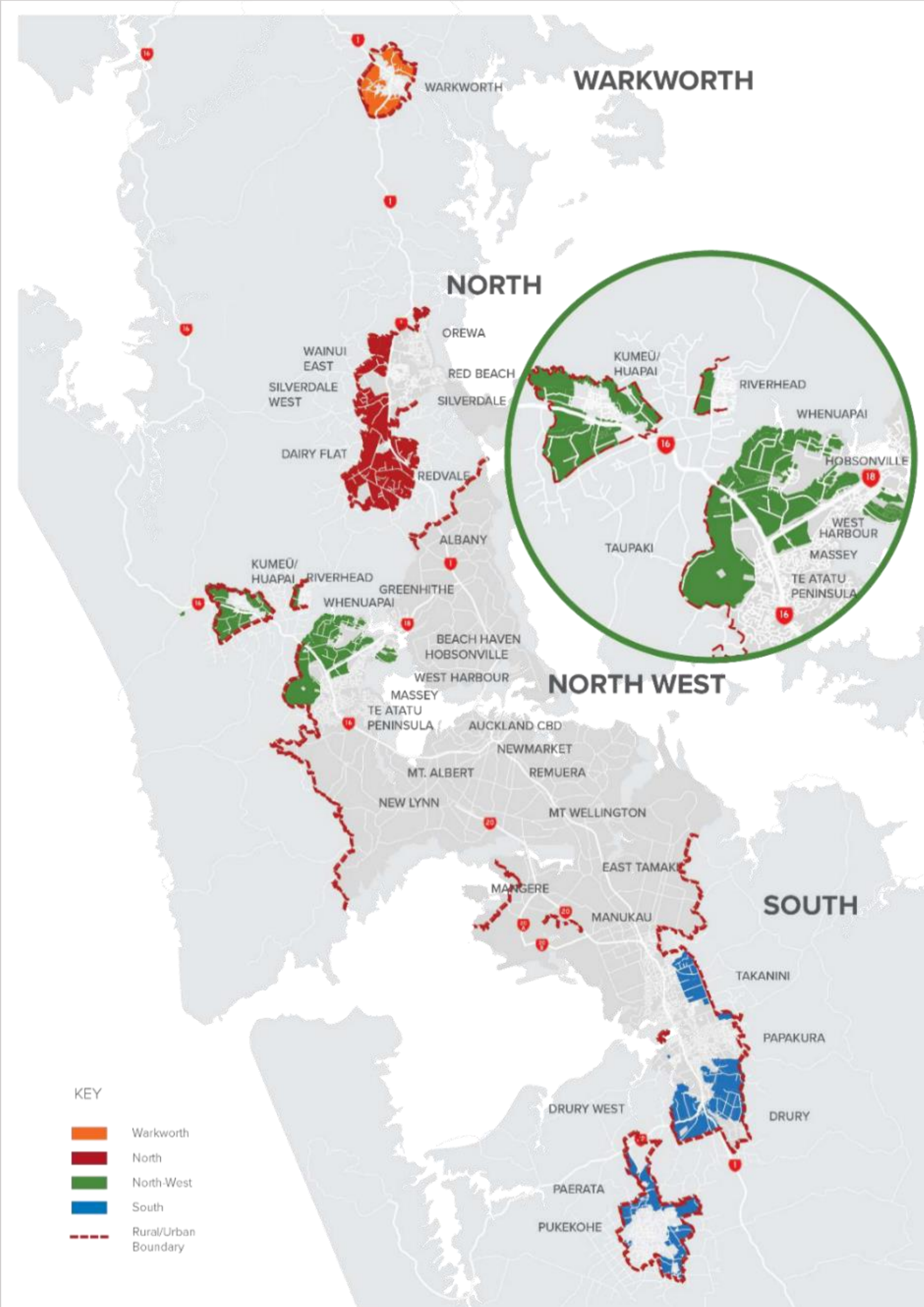


Figure 1-5: Future Urban Areas of Auckland, highlighting the North West Growth Area

1.3 North West – Overview and Issues

The North West growth area is approximatively 30 kilometres north west of Auckland's central city. It makes a significant contribution to the future growth of Auckland's population by providing for approximately 42,355 new dwellings and employment activities that will contribute 13,000 new jobs across the North West.

A summary of planned growth, timing and the current AUP:OP zoning status for each growth area in the North West is set out in Table 1-4 below.

Table 1-4: Summary of North West Local planned growth

Area	Growth summary (approx.)	AUP:OP zoning	FULSS development timing
Whenuapai	Land 50 hectares, 1,150 dwellings	Live zoned	2012-2017
Whenuapai Stage 1	Land 401 hectares approx., 6,000 dwellings	FUZ	Decade One 1st half 2018 – 2022
Whenuapai Stage 2	Land 745 hectares approx., 11, 600 dwellings, Expanding local centres	FUZ	Decade Two 1st half 2028 – 2032
Redhills	Land 594 hectares, 10,650 dwellings, Expanding local centres	Live Zoned	2012 - 2017
Redhills North	Land 191 hectares, 1,400 dwellings, 1 local centre	FUZ	Decade Two 1st half 2028 – 2032
Kumeū-Huapai Riverhead	Land 992 hectares, 8,000 dwellings 1 local centre	FUZ	Decade Two 1st half 2028 – 2032

The urgency to route protect the preferred transport network in the North West Local area is driven by the rate and scale of committed development within the Hobsonville Corridor and the development anticipated to occur in Whenuapai, Redhills, and Riverhead. In addition, land under pressure from developers who are preparing private plan within Whenuapai and submitting resource consents on live zoned land adjacent to existing urban corridors.

Failure to protect the network ahead of these development plans risks a combination of fragmentation of the future transport network, prohibitively expensive property acquisition costs for transport connections, a lack of certainty around private development investment, and a loss of ability to influence good urban form. Over-reliance on the existing strategic transport corridors combined with rapid population growth in and around the North West growth area will reduce the ability of the transport system to move people and goods safely and efficiently.

Specifically, existing demand causes network constraints during peak periods indicating that as future growth occurs in the North West, the network will be unable to sustain an acceptable level of service. If not addressed, the existing transport system will constrain the levels of access for residents in both the existing and future urbanised areas, limit development potential, decrease regional productivity and undermine the quality of life for residents and employees in the area. Failure to integrate transport planning with pace, scale and form of urban development will limit the opportunity for the transport system to positively contribute to quality, connected urban and natural environments in the North West growth area as a whole.

2 Methodology for Assessing Alternatives

The following sections provide an overview of the alternative sites and routes that have been considered for undertaking the works.

In developing options, the project team and specialist first considered options that integrated with land use planning and reduced the need to travel, options that increased network capacity were considered last. This approach aligns with the intervention hierarchy approach of prioritising lower impact and cost-effective options first, see Figure 2-1.

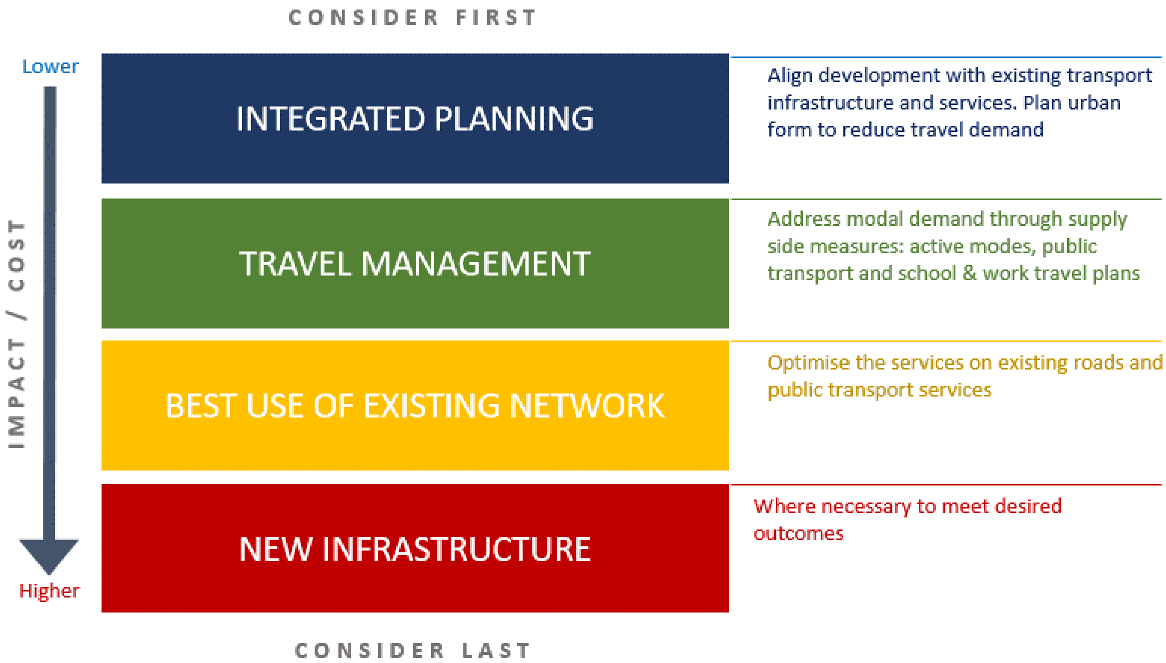


Figure 2-1: Options development – intervention hierarchy approach

A summary of long list and short list approach is set out in Section 3. The fundamental outcome of the long list and short list process for the local arterials network was the decision to make best use of the existing network, with new infrastructure upgrades as required, to achieve the identified transport outcomes. This resulted in refinement options to widen existing corridors, either left, right or both sides, and to extend some corridors to form an integrated network.

2.1 Approach Overview

The assessment of alternatives for the Local Arterials Package involved the following stages:

Corridor Assessment

- Through a long list and short list assessment process, the identification of Indicative Strategic Transport Networks (ISTN) (corridors) required to support Auckland's North West growth areas through the Indicative Business Case (IBC);
- Grouping the corridors within the North West ISTN into eight packages including subsequent grouping into a strategic and local set, including the Local Arterials Package (subject of this report);

Route Refinement Assessment

- Undertaking a gap analysis of the IBC, a constraint mapping exercise, an AUP:OP map review and a form and function assessment to develop options for the Detailed Business Case (DBC) local and strategic projects;
- Development and consideration of alternative route alignment for the options including stormwater and intersection treatment;

Preferred Alignment Refinement

- Further refinement of each route in the Whenuapai, Redhills and Riverhead Packages in order to determine the extent of the designations necessary for each transport corridor; and
- Confirmation of the corridors for route protection.

A summary of the long list and short list approach is set out in Section 3. Route refinement option development and evaluation is described in each project chapter, Sections 6 to 14 of this Report.

2.2 Assessment Framework

In order to evaluate and compare options, an assessment framework for the alternatives assessment which included a Multi-Criteria Assessment (MCA), was developed by the Project Team in consultation with AT, Waka Kotahi and Manawhenua, for use in the corridor and route refinement assessment processes.

The MCA was developed for use across the Te Tupu Ngātahi Programme and has been used in both the IBC and DBC option evaluation process. At the route refinement phase, this option evaluation process was tailored to make it specific to the requirements of the North West area.

The MCA framework is a common tool that is often used to assist in the alternatives assessment decision-making process and provides an opportunity to understand how different options compare against a set of standard and grouped criteria. The MCA framework developed and adopted by the Project Team involved the following:

- **Assessment criteria**: Transport outcomes and the four well-beings: Cultural, Social, Environmental and Economic. Several sub-criteria were developed under each wellbeing grouping which were assessed by technical specialists
- **Opportunities:** identifying opportunities that can be taken forward in developing the options. These were identified by the relevant technical specialist
- **Additional inputs:** Partners, stakeholders, the community and landowner feedback, policy analysis, value for money and resilience.

Options were assessed, and where appropriate, scored as summarised in Table 2-2 at each stage by a multi-disciplinary team, using the MCA framework set out in Table 2-1. Constraints mapping and existing evidence from desktop research were the main sources of information to assist with assessment. In assessing the criteria, guidance was provided by the policy direction of the AUP:OP (e.g. overlays), which could place constraints on the various options identified.

Assessment of the options against the criteria was not the sole means of assessing options but was a tool that informed and was complementary to the decision-making process for the preferred option. The process incorporated Manawhenua input, feedback from the consultation and engagement process and technical experts. Manawhenua representatives have expressed views, provided specialist advice and raised key issues though workshops and hui held throughout the process.

Table 2-1: MCA Framework

#	Transport Outcomes			Measure
	Transport Outcomes vary for each Project as identified in the sections below			Options assessed against the transport outcomes. For example, key themes include: • Access • Reliability • Mode choice • Integration
Wellbeing	**MCA topic**	**#**	**Criteria**	**Measure**
Cultural	**1. Heritage**	1a	Heritage	Extent of effects on: • Sites and places of valued heritage buildings, scheduled trees (with heritage value) and places. • Sites and places of archaeological value. • Sites and places of European cultural heritage value
		1b	Manawhenua	Feedback on cultural values was sought from Manawhenua at the constraint mapping stage, the options considered in the MCA and on the preferred option.
Social	**2. Socio– economic impacts**	2a	Land use futures / integration with planned landuse	To what extent will the option impact on the future development of land (within the corridor, adjacent to it and impacted by it – i.e. consider all 3 scales), in relation to: • Integration with the future land use scenario (including any Structure Plans or Plan Changes). • Size and shape of potential development parcels to enable appropriate building typologies • Ability to consolidate residual land • Access that does not prevent neighbouring development
		2b	Urban design	To what extent does the option support a quality urban environment (both current and future planned state)? particularly relating to: • Context and planned place making considerations • An inviting, pleasant and high amenity public realm • Open space integration • Active interface between public and private realm • Scale of long-term impact on the amenity and character of the surrounding environment.
		2c	Land requirement	Scale of public / private land (m^2 / number of properties / special status of impacted property) required to deliver the option.

		2d	Social cohesion	Impact on, use, connectivity / accessibility for and to the existing urban areas including use and access to: • Employment • Other communities or within the same community • Shops / services / other community and cultural facilities / 'attractors' • Severance of the existing community (including consented) • Scale of effect on existing community facilities community and open space • Public access to the coast, rivers and lakes
		2e	Human Health and Wellbeing	Will the option potentially affect any sensitive land uses nearby or consented (adjacent residential, childcare centres, hospitals, rest homes, marae and schools)? particularly relating to: • Air Quality • Contaminated land • Noise and vibration
Environment	**3. Natural Environment**	3a	Landscape / visual	The extent of effects on: • The natural landscape and features such as streams, coastal edges, natural vegetation and underlying topography – acknowledging planned changes to area in light of urban land use / zoning • Natural character and outstanding natural features / landscapes including geological features (mapped and protected features)
		3b	Stormwater	Impact of operational stormwater (both quantity and quality) on the receiving environment, including: • Potential flooding effects of the option within the catchment • Extent and consequences of likely mitigation measures
		3c	Ecology	Extent of effects on: • Significant indigenous flora; • Significant habitats of indigenous fauna; • Indigenous biodiversity; • Stream / waterway ecology • Marine ecology
		3d	Natural Hazards	Extent of effect on adverse geology; steep slopes; seismic impacts; other resilience risks (low level infrastructure near coastlines, inundation areas)
Economic	**4. Transport**	4a	Transport system integration	This criteria was considered as part of the assessment against the Transport Outcomes for each corridor.
		4b	User safety	Extent of safety effects on all transport users, including: • People in public transport • people walking or cycling • People in private vehicles
	5. Construction impacts	5a	Construction impacts on utilities / infrastructure	Requirements for relocation / design of existing infrastructure, including: • Consideration of safety impacts

				• Risk of continuity of service over construction • Opportunities for integration with other bulk infrastructure
		5b	Construction Disruption	Construction impacts on people and businesses regarding: • Traffic & noise • Earthworks related effects including dust • Quality of life and amenity • Economic impacts on businesses / community / town centres
	6. Cost & Construction Risk	6a	Construction costs / risk / value capture	Assessed cost for construction of options including: • Complexity and risk in construction (including consideration of constructability) • Complexity in programme • Cost and complexity of safely undertaking works (including works on contaminated land) • Extent to which the option can utilise a value capture mechanism to offset construction costs.

Table 2-2: MCA Scoring Scale

Effects criteria	Scoring
Very high adverse impact	-5
High adverse impact	-4
Moderate adverse impact	-3
Low adverse impact	-2
Very low adverse impact	-1
Neutral impact	0
Very low positive impact	1
Low positive impact	2
Moderate positive impact	3
High positive impact	4
Very high positive impact	5
-	Not scored

Assessment of the options against the criteria was completed by subject matter experts and discussed at several MCA workshops. In addition to the MCA framework, several additional (and important) inputs were included in the assessment framework (refer Table 2-3).

Table 2-3: Other inputs in MCA framework

Project Partners, including manawhenua, and landowner feedback	Project Partner feedback for each option identifying scale / validity of objections; identified preference / proposed changes to options etc. Feedback provided by other key stakeholders, the community and landowners.
Policy Analysis	Options alignment with the strategic policy framework including the AUP:OP, the Auckland Plan and the Whenuapai Structure Plan where it assisted in differentiating between options.
Indicative costs	High level indication of costs (including construction and property purchase) where it assisted in differentiating between options.

3 Corridor Assessment

The options assessment process commenced with an assessment of the various network and corridor options to achieve an ISTN to support Auckland's North West growth area. This section summarises the process relevant to the Local Arterials Package and the outcomes of that assessment, taken forward to the route refinement stage.

The corridor assessment process included both long list and short list assessment phases to identify an ISTN for the North West growth areas.

3.1 Longlist Corridor Assessment

The long list assessment phase included development and assessment of a wide range of options against transport outcomes and MCA framework, using the MCA framework described in Section 2. Key project Partners (Auckland Council, Manawhenua and KiwiRail) were involved in the development and evaluation of long list options. Section 2.2 provides further details on the long list development and assessment.

3.1.1 Longlist Option Development

For the North West growth area approximately 140 options were initially identified. These options were filtered down to exclude those that were: outside scope, already part of a designated / consented or funded project, considered business as usual, not feasible or duplicates of other options.

Out of 140 options, 75 were taken forward to the North West area long list MCA. These options were categorised and grouped according to their function. Those groups of options which led to the Local Arterials Package are as follows:

Whenuapai / Redhills / Riverhead

- **Rapid Transit (RTI / RTR-R)** – new or upgraded corridor to enable significant mode shift to public transport in the Whenuapai and Redhills area
- **Strategic Sub-Regional Connections (SR-W / SR-R)** – new or upgraded corridor providing interregional connections between the Whenuapai and Redhills area
- **Strategic Sub-Regional Connections (SR-K) –** new or upgraded corridor providing interregional connections between the Kumeū-Huapai and Riverhead area
- **Whenuapai Arterial Routes (AR-W)** – new or upgraded arterial roads providing both north-south connections and east-west connections through Whenuapai
- **Redhills Arterial Routes (AR-R)** - new or upgraded arterial roads providing both north-south connections and east-west connections through Redhills.

For the purposes of this report, only those options that would later form part of the Local Arterials Package are included here.

3.1.2 Longlist Option Assessment

At the commencement of the long list assessment phase, the MCA framework was adapted to the North West context and specific growth area. This involved distilling the MCA framework (see Table 2-1) to relevant criteria to enable distinctions to be made (described in Section 2).

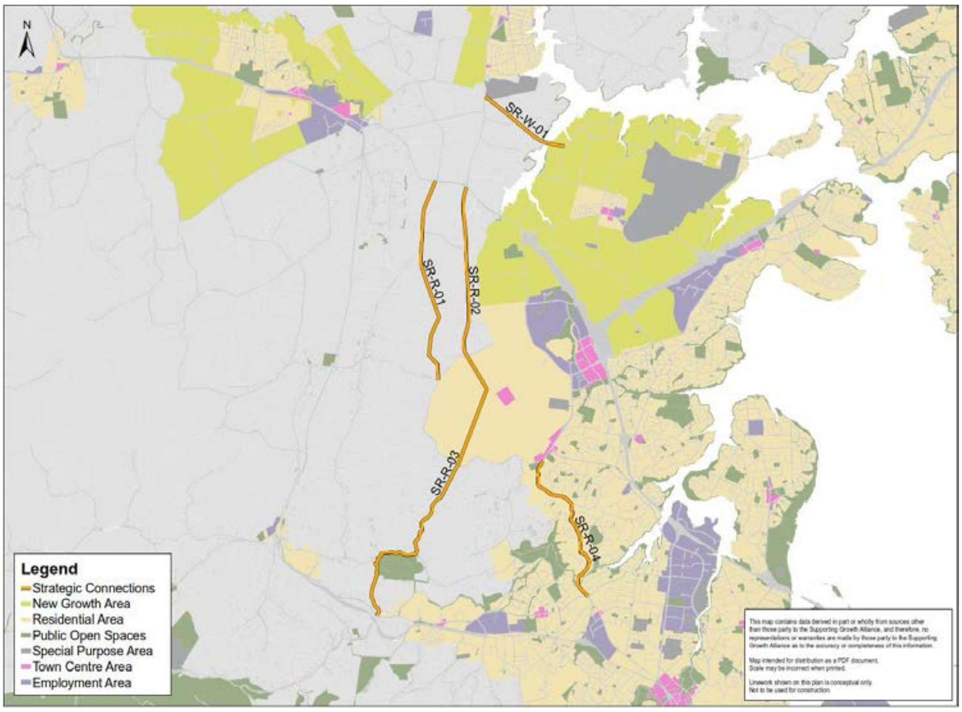
Each of the long list options were assessed using the MCA framework, in some cases the MCA criteria were specified to differentiating factors or omitted irrelevant assessment criteria. Key steps in the options assessment included:

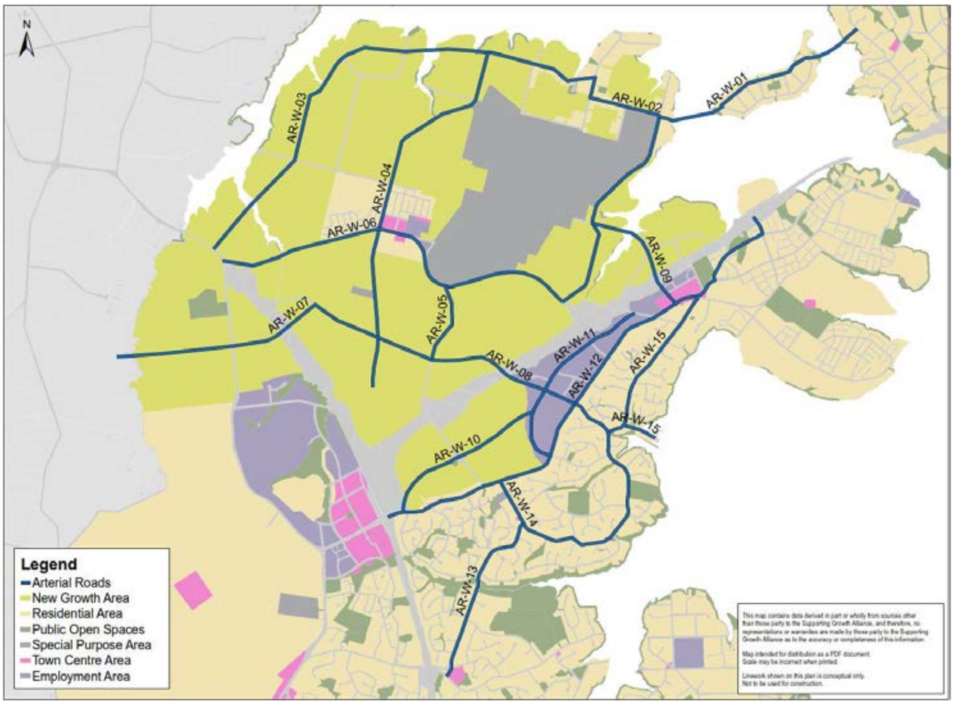
- Initial long list scoring and assessment of non-scored criteria by subject experts
- Manawhenua hui and discussion
- Workshops – collaborative evaluation of options and feedback from Partners
- Scores and preferences refined
- Long list refinement (amended and additional options) and assessment
- Identification of the short list.

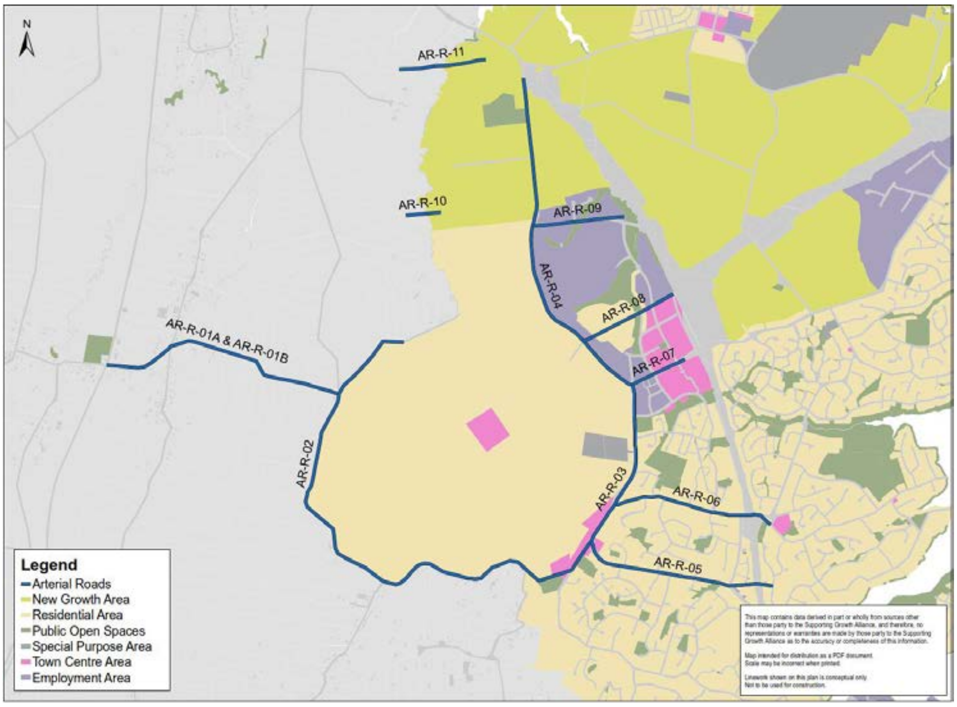
3.1.3 Recommendations

Table 3-1 provides an overview of the options assessed, recommendations and reasoning for progressing options to the short list.

Table 3-1: Long List Corridor Assessment Recommendations

Options	Assessment Recommendation
Strategic Sub-Regional Connections (Whenuapai and Redhills)	
5 Options	• SR-W-01: Riverhead to Whenuapai connection • SR-R-01: North / south route via existing roads (Taupaki Road and Nixon Road) • SR-R-02: North / south via new road • SR-R-03: Sunnyvale Road upgrade • SR-R-04: Upgrade of Don Buck Road to Rānui Station
Options progressed	**4 Options: SR-W-01** was recommended for the short list as it provides a strategic inter-regional connection between Riverhead and Whenuapai area. **SR-R-01, SR-R-02** and **SR-R-04** were recommended for the short list as they provide better strategic inter-regional connection.
Option Discarded	**1 Option:** While **SR-R-03** and **SR-R-04** would improve public transport service**, SR-R-04** catchment and adjacent urban land use is better suited for that function. **SR-R-03:** was discarded as it attracted a smaller catchment which would not benefit a priority bus service and was located near SEA.

Options	**Assessment Recommendation**
Whenuapai Arterial Routes	
16 Options	• AR-W-01: Herald Island to Greenhithe Bridge • AR-W-02: Kauri Road and Pūriri Road • AR-W-03: Arterial between Tōtara Road and Brigham Creek Road • AR-W-04: Tōtara Road and Māmari Road • AR-W-05: Extension of Trig Road to Brigham Creek Road • AR-W-06: Brigham Creek Road • AR-W-07: Extend Spedding Road (Trig Road to Hailes Road) • AR-W-08: Rāwiri Road bridge • AR-W-09: Sinton Road • AR-W-10: Parallel route to Hobsonville Road • AR-W-11: West Point Drive • AR-W-12: Hobsonville Road • AR-W-13: Moire Road to State Highway 16 (SH16) • AR-W-14: Luckens Road • AR-W-15: Wiseley Road • AR-W-16: Riverhead to Whenuapai
Options Progressed	**10 Options:** It was recommended **AR-W-02, AR-W-03, AR-W-04, AR-W-05, AR-W-06, AR-W-07, AR-W-08, AR-W-12, AR-W-13** and **AR-W-16** were taken into the short list for further investigation as the routes opened up opportunity for resilient and reliable public transport, freight and intra-regional trips.
Options Discarded	**6 Options: AR-W-01** was disregarded due to a low strategic significance and high construction cost with the provision of a harbour crossing. **AR-W-09, AR-W-10** and **AR-W-11** were disregarded as they were considered to perform a collector function and therefore did not meet the strategic objectives. **AR-W-14** and **AR-W-15** were not taken forward to the short list due to their limited strategic benefits and high property impacts.

<table>
<tr><th>Options</th><th>Assessment Recommendation</th></tr>
<tr><td>Redhills Arterial Routes</td><td>


</td></tr>
<tr><td>12 Options</td><td>

<u>Existing Taupaki Road and Nelson Road upgrade</u>

- R-R-01A: without Taupaki Station
- AR-R-01B: with Taupaki Station
- AR-R-02: Red Hills Road (Don Buck to Henwood)
- AR-R-03: Don Buck Road
- AR-R-04: Fred Taylor Drive
- AR-R-05: Triangle Road and proposed bridge over SH16
- AR-R-06: Royal Road and bridge over SH16
- AR-R-07: Fred Taylor Drive east
- AR-R-08: Fred Taylor Drive / Dunlop Road intersection to northeast towards SH16
- AR-R-09: Northside Drive from Fred Taylor Drive to SH16
- AR-R-10: Northside Drive to Redhills route
- AR-R-11: Brigham Creek roundabout to new north / south road

</td></tr>
<tr><td>Options Progressed</td><td>

10 Options: AR-R-01B to **AR-R-10** were recommended to progress to the short list as those arterial roads enhance transport connectivity to the Rapid Transit Corridor (RTC) project corridor, employment zones and social infrastructure.

</td></tr>
<tr><td>Discarded Options</td><td>

2 Options: AR-R-01A and **AR-R-11** were disregarded for respectively providing low value to the strategic network.

AR-R-11 was to be included in Kumeū bypass considerations and **AR-R-01A** would only be required if Taupaki heavy rail station was activated, otherwise could remain a collector.

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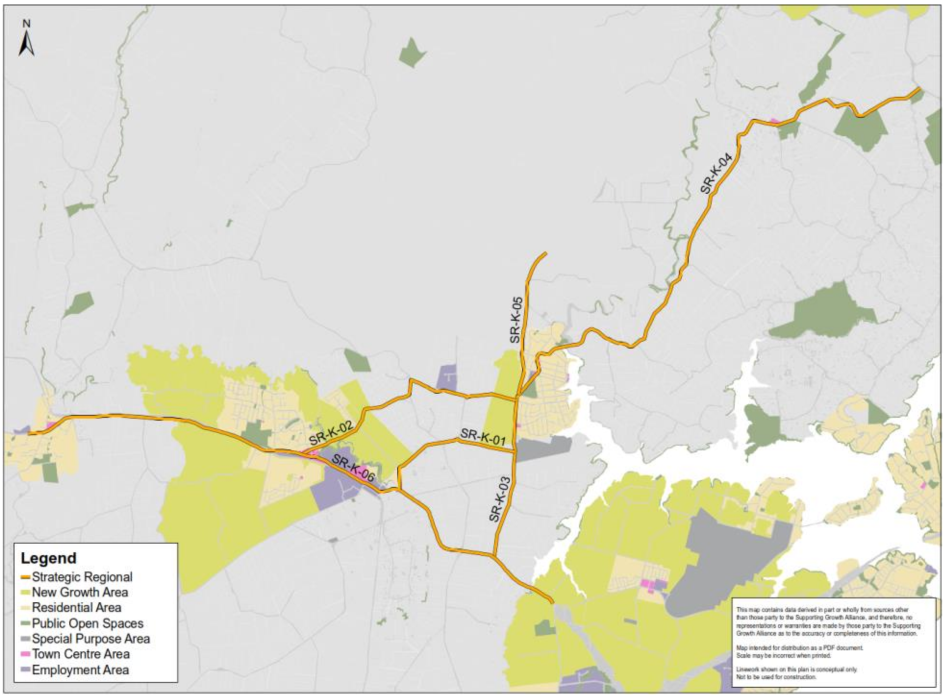
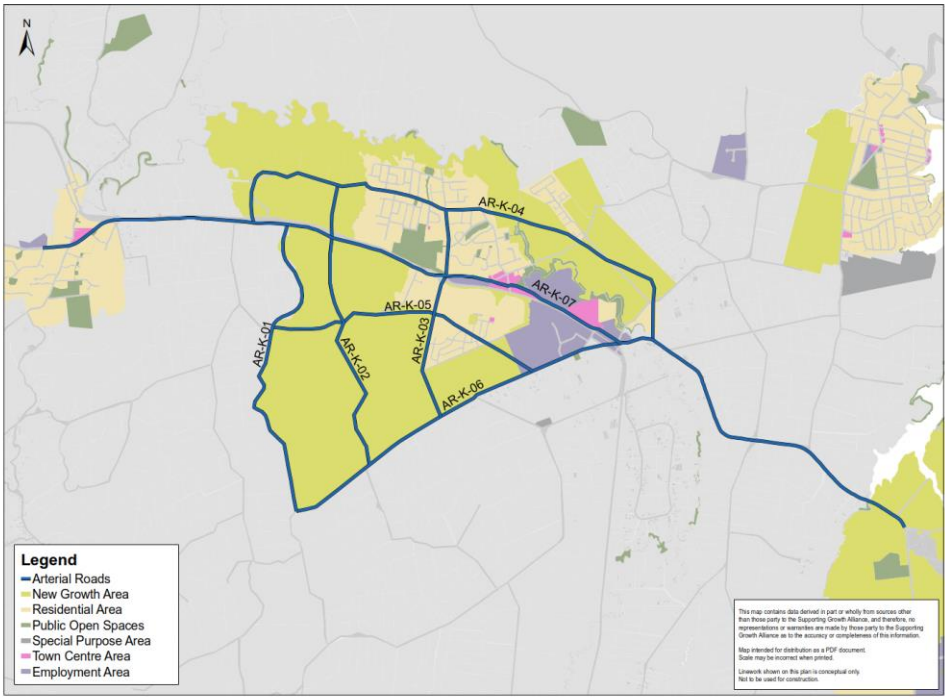
<table>
<tr><th>Options</th><th>Assessment Recommendation</th></tr>
<tr><td>Strategic Sub-Regional Connections (Riverhead)</td><td>


</td></tr>
<tr><td>6 Options</td><td>

- SR-K-01: Kumeū-Riverhead southern alignment
- SR-K-02: Kumeū-Riverhead northern alignment
- SR-K-03: SH16 to Riverhead
- SR-K-04: Upgrade of Coatesville-Riverhead Highway to Dairy flats
- SR-K-05: Riverhead to Dairy flats new alignment
- SR-K-06: Existing SH16 alignment

</td></tr>
<tr><td>Options Progressed</td><td>4 Options: SR-K-01, SR-K-02, SR-K-03 and SR-K-04 were recommended to progress into the short list for further investigation.</td></tr>
<tr><td>Options Discarded</td><td>2 Options: SR-K-05 was disregarded due to its potential impact on sensitive vegetation located within a SEA (SEA_T_6540).

SR-K-06 scored comparatively poorly against all transport outcomes. It was expected the proposed corridor would not cope with the increase in demand. The option was therefore disregarded.</td></tr>
</table>

<table>
<tr><th>Options</th><th>Assessment Recommendation</th></tr>
<tr><td>Kumeū Huapai / Riverhead Arterial Routes</td><td>
</td></tr>
<tr><td>7 Options</td><td>

AR-K-01: Upgrade Puke Road
AR-K-02: Upgrade Motu Road to the northern Huapai catchment
AR-K-03: Upgrade of Station Road and Tapu Road
AR-K-04: Upgrade of Matua Road
AR-K-05: Central East-West arterial (south of existing SH16)
AR-K-06: Upgrade Tawa / Access Road along FUZ boundary
AR-K-07: Existing SH16 alignment

</td></tr>
<tr><td>Options Progressed</td><td>7 Options: All options were recommended to progress to the short list. The upgrade of arterials is critical in this growth area as they will provide improved traffic safety and transport connectivity to the future rapid transit network, employment zones and social infrastructure.</td></tr>
</table>

3.2 Shortlist Corridor Assessment

At the short list stage options underwent a refinement and grouping process. Public consultation was undertaken, and feedback was considered in the short list evaluation. Key project Partners were involved in a short list evaluation to recommend an ISTN for the North West growth areas. Section 3.2 provides further details on the short list development and assessment.

3.2.1 Shortlist Option Development

Of the options considered at long list phase, 41 were recommended for the initial local short list, and the Project Team further developed the options to enable testing and evaluation. Based on workshop feedback and a gap analysis, additional refinement occurred, including, addition of variations, amalgamating options to rationalise the assessment, and removal of some options due to new information. The process is shown Figure 3-1 and results are summarised in Table 3-2.

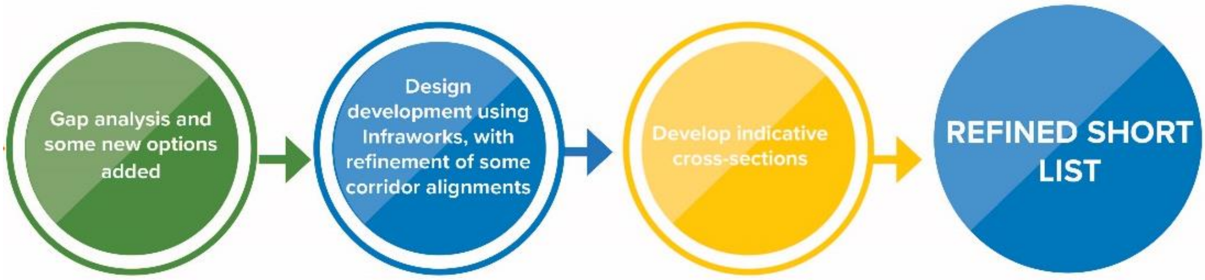


Figure 3-1: Short List Development Process

Table 3-2: Initial short list refinement outcomes

Option reference & Description	Initial refinement outcome
AR-W-06 Brigham Creek Road	Development of a variation which includes a partial realignment of Brigham Creek Road to straighten the road and deviate arterial traffic around Whenuapai village. This was a potential option in the Whenuapai Structure Plan. <u>New variations:</u> **AR-W-06A:** Arterial upgrade of Brigham Creek Road. **AR-W-06B**: Arterial upgrade of Brigham Creek Road (Whenuapai Village realignment).
AR-W-09 Sinton Road	The strategic State Highway 18 (SH18) bridge connection was included in another SH18 rapid transit project. The remaining section was considered a local connection, so was disregarded. <u>Option discarded.</u>
AR-W-09 / SR-W-01 Riverhead to Whenuapai	These options both form new connections to Whenuapai (AR-W-09 is an arterial, SR-W-01 is a sub-regional connection). The options were considered together in later analysis. <u>Options amalgamated into:</u> **SR-W-01**: Riverhead to Whenuapai connection.

Option reference & Description	Initial refinement outcome
SR-K-01 / SR-K-02 Kumeū to Riverhead	Two options were initially shortlisted a northern option and a southern option. Through review and public engagement, a hybrid was added to the shortlist which followed Riverhead Road. <u>New variation:</u> **SR-K-01A**: Third option for the Kumeū to Riverhead connection following Riverhead Road.
SR-K-06 Existing SH16 option – Brigham Creek to Kumeū	This longlist option included the full length of SH16 from Brigham Creek Road to Waimauku and was not carried forward. However, the shortlist still included a strategic regional route in part, between Brigham Creek Road and Access Road. <u>New variation</u> **SR-K-06a:** SH16 as a strategic route only between Access Road and Brigham Creek Road, not in Kumeū-Huapai.

3.2.2 Shortlist Option Assessment

The same general approach was used throughout the long list and short list corridor assessment. However, a greater level of design detail, technical assessment and specialist input was applied at the short list assessment phase (relative to the long list assessment) and additional consideration of stakeholder and public feedback. The short list process included:

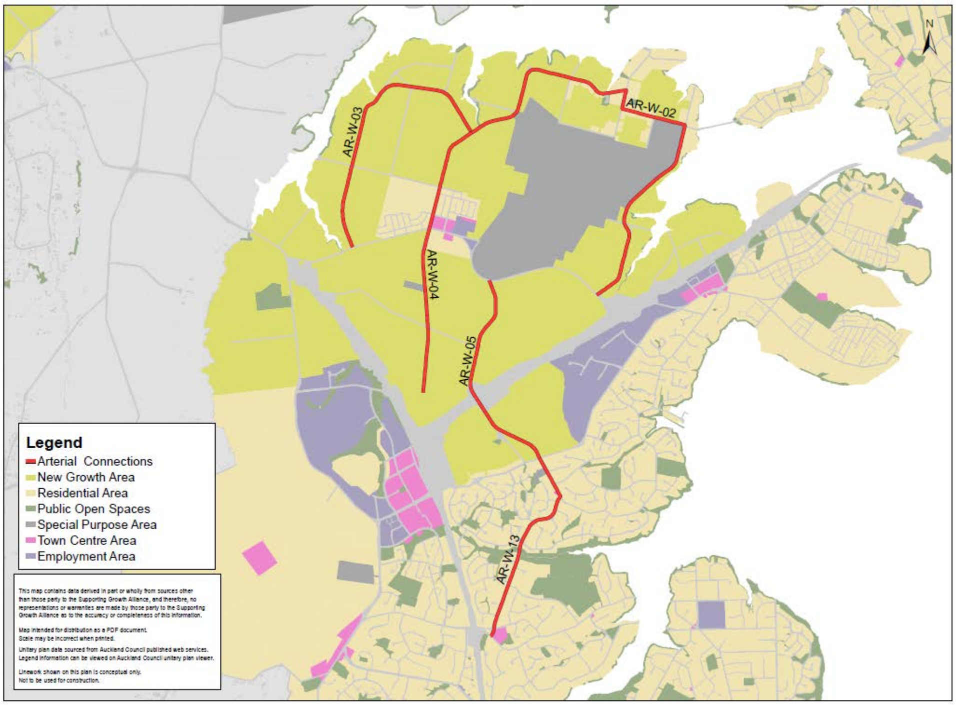
1. Initial draft assessment of criteria by subject experts
2. Pre-scoring workshop (challenge workshop) by subject experts
3. Manawhenua hui to discuss experts scores and an opportunity to score Manawhenua criteria
4. Project Partner input, stakeholders and public feedback
5. Recommendation on the ISTN.

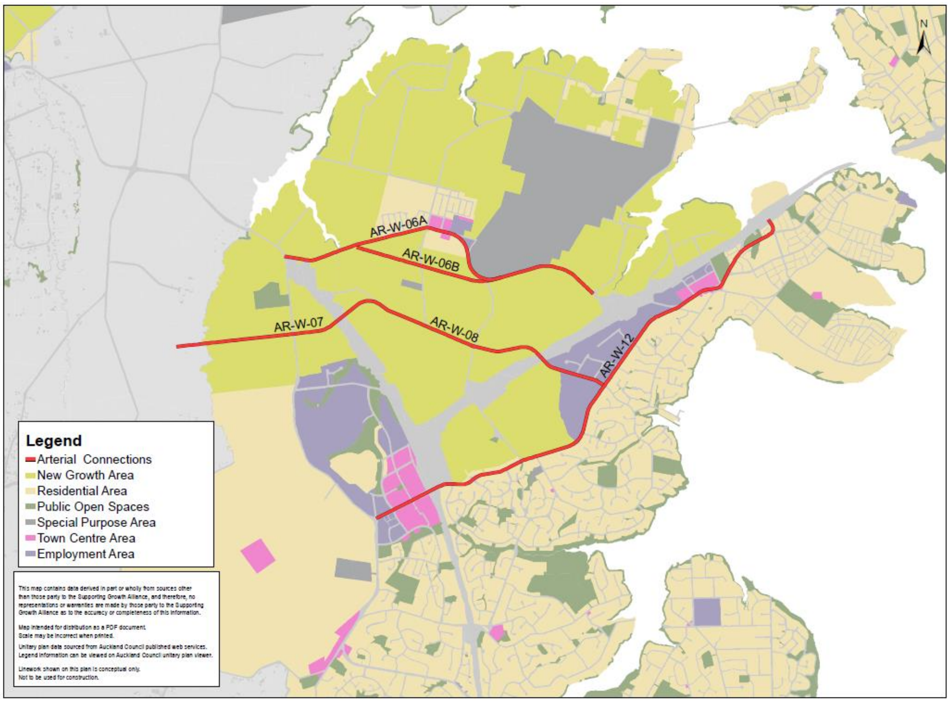
The same MCA process was applied at the short list option assessment, however at a more detailed level. Transport outcomes were assessed by the Project Team transport planners using quantitative and qualitative evaluation against key performance indicators and measures. Technical specialists scoring the MCA were fully briefed on the options and MCA process.

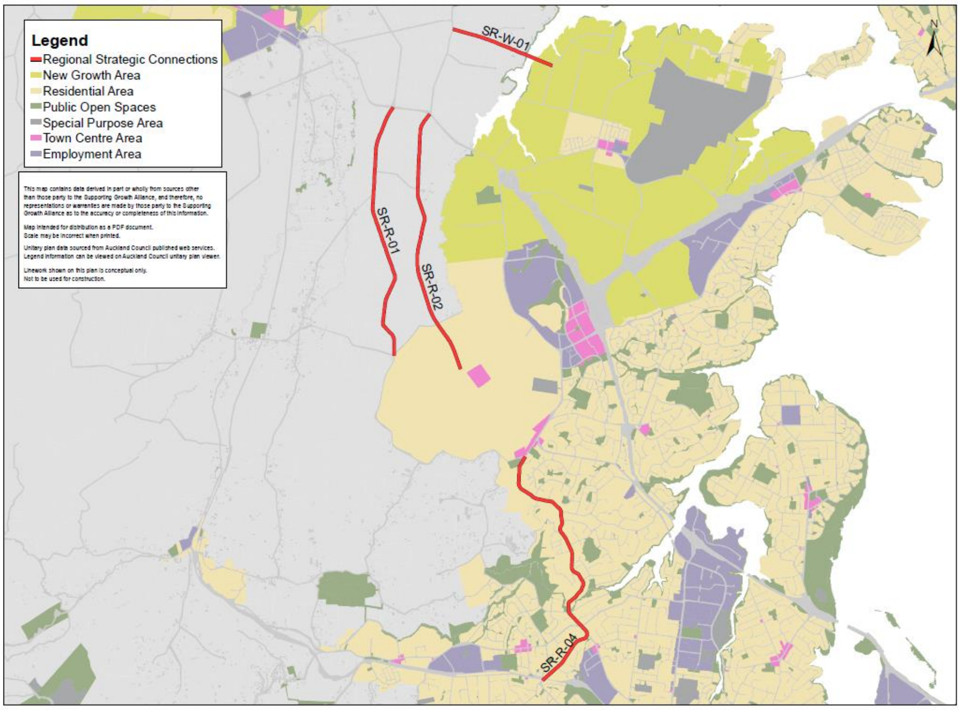
3.2.3 Recommendations

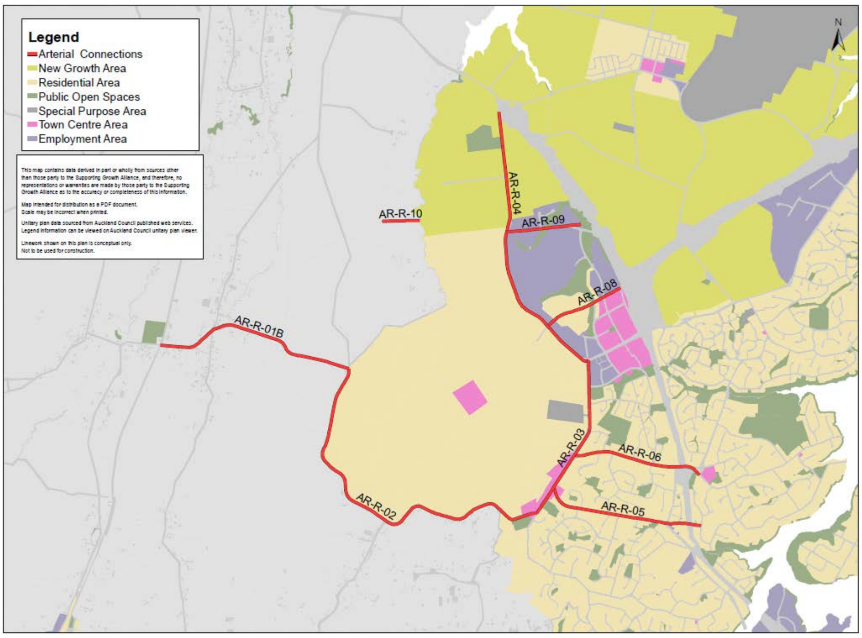
Table 3-3 provides an overview of the options assessed, recommendations and reasoning for identifying the preferred corridors and discarding options. The Short List assessment resulted in local arterial options being taken forward in the ISTN identified in Section 3.3.

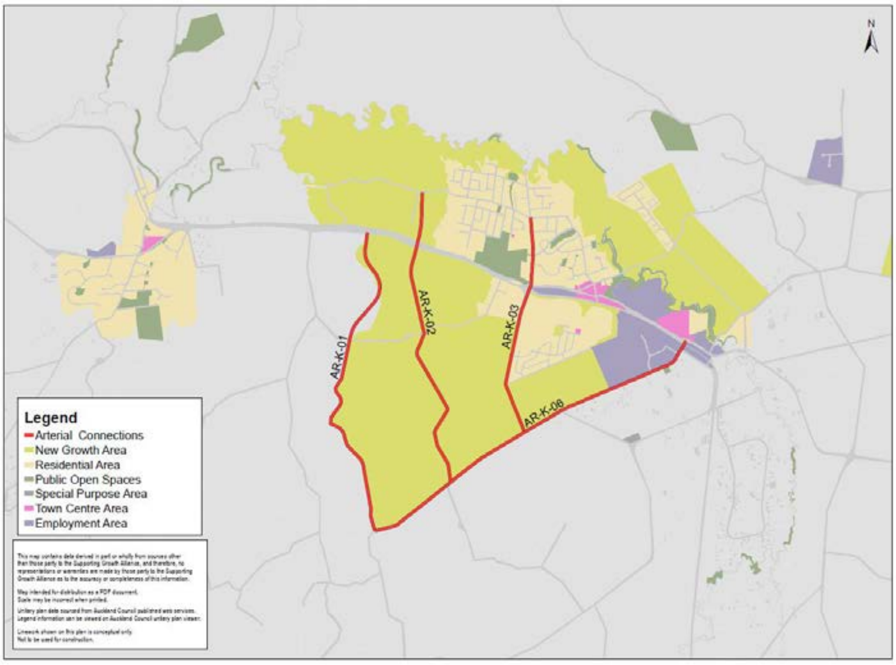
Table 3-3: Short List Corridor Assessment Recommendations

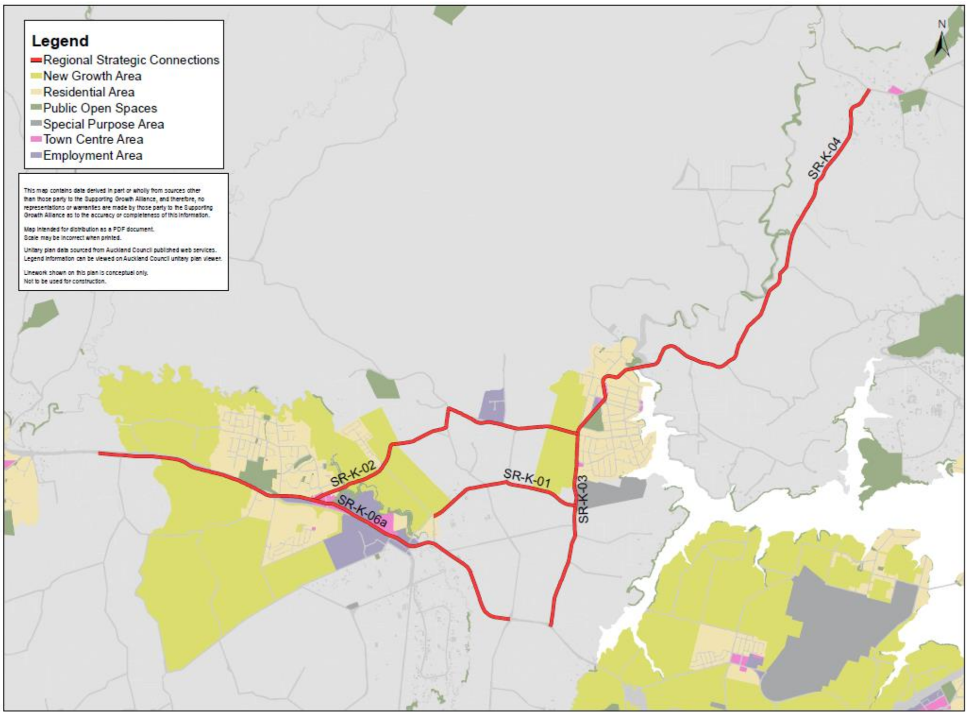
Options	Assessment Recommendation
Whenuapai North-South Arterial Routes	
5 Options	• AR-W-02: Kauri Road and Pūriri Road upgrade • AR-W-03: North western arterial between Tōtara and Brigham • AR-W-04: Tōtara Road and Māmari Road upgrade • AR-W-05: Extension of Trig Road to Brigham Creek Road • AR-W-13: Moire Road to SH16.
Options Progressed	**2 Options: AR-W-04** was recommended as traffic flows on Māmari Road south of the Whenuapai village are estimated to be 25,000 vehicle per day (vpd) supporting the need for potential bus priority and enhanced active mode infrastructure along this corridor. **AR-W-05** was recommended as it is estimated to carry 15,000 – 20,000 vpd north of SH18 by 2046. Trig Road plays an important role in connecting the future zoned business area with the Trig Road interchange and also the Brigham Creek Road interchange for additional resilience.
Options Discarded	**3 Options: AR-W-02:** Disregarded, as it didn't serve a strategic public transport purpose. **AR-W-03**: Reduced traffic on SH however increased traffic on local roads. **AR-W-13**: Discarded as it had lower potential for serving urban growth due to the largely urban areas. It also had potential adverse impacts on streams and a SEA.

Options	Assessment Recommendation
Whenuapai East-West Arterial Routes	
5 Options	• AR-W-07: Proposed route (Spedding Road West, Crossing SH18 from Trig Road to Hailes Road) • AR-W-08: Rāwiri Bridge upgrade (Spedding Road East) • AR-W-12: Hobsonville Road upgrade *<u>AR-W-06a: Brigham Creek Road upgrade variations</u>* • AR-W-06a: New variation - Brigham Creek Road upgrade • AR-W-06b: New variation - Brigham Creek Upgrade with realignment.
Options Progressed	**4 Options: AR-W-06a, AR-W-07, AR-W-08** and **AR-W-12** were recommended for further investigation as they provide an arterial network serving both business and residential land use, improve resilience and support mode shift through improved access to RTC and new active mode links.
Option Discarded	**1 Option: AR-W-06b**: New variation of Brigham Creek Upgrade with deviation from town centre was disregarded, as the Spedding Road alignment (AR-W-08) would reduce pressure through the town centre meaning the deviation was no longer required.

Options	Assessment Recommendation
Whenuapai / Redhills Strategic Sub-Regional Connections	
4 Options	• SR-R-01: North-South Route via existing roads (Taupaki Rd and Nixon Road) • SR-R-02: North-South Route via new road • SR-R-04: Upgrade of Don Buck Road to Rānui Station • SR-W-01: Riverhead to Whenuapai connection.
Option Progressed	**1 Option: SR-R-01** was the only strategic sub-regional connection recommended for the area as it best integrates with future Brigham Creek Road interchange, with relatively minor social and environmental impact.
Options Discarded	**3 Options: SR-R-02:** was disregarded as although it provided a more direct bus route to the Riverhead area, the alignment could create a new road corridor surrounded by rural land encouraging urban sprawl between growth areas. It also had a more significant land take impact. **SR-R-04:** Was disregarded as it was in an existing urban area and was not identified to be necessary to support the growth areas, particularly as Redhills South has more convenient access to rapid transit at Westgate. **SR-W-01**: Was disregarded as it did not provide strategic connection to wider transport network. The option requires a new crossing with the potential for cultural and ecological impacts.

Options	Assessment Recommendation
Redhills Arterials Routes	
9 Options	• AR-R-01b: Existing Taupaki Road and Nelson Road upgrade, with Taupaki station activated • AR-R-02: Red Hills Road upgrade (from Don Buck Road to Henwood Road) • AR-R-03: Don Buck Road upgrade • AR-R-04: Fred Taylor Drive - upgrade to existing roads. Urban form on both sides • AR-R- 05: Existing Triangle Rd upgrade and proposed bridge over SH16 • AR-R-06: Royal Road and bridge over SH16 upgrade • AR-R-08: Dunlop Extension - from intersection of Fred Taylor Drive and Dunlop Road to Northeast towards SH16 • AR-R-09: Northside from Fred Taylor Drive to SH16 • AR-R-10: Northside to N-S Redhills route.
Options Progressed	**5 Options: AR-R-03, AR-R-04, AR-R-06, AR-R-08** and **AR-R-09** were all recommended. **AR-R-03** provides a north-south alternative to SH16 with public transport access to Massey High School. **AR-R-04** provides a north-south alternative to SH16 with no notable natural environment constraints or social constraints. **AR-R-06** provides a strategic connection from Redhills to a future SH16 RTC station and future SH16 cycleway with 4 lanes provided including walking and cycling facilities. **AR-R-08** provides improved Primary Public Transport / active mode connections between Redhills and Westgate and will help carry frequent bus services from Redhills Town Centre and off Fred Taylor Drive into Westgate. **AR-R-09** improves resilience as it provides an alternative to Hobsonville Road and Brigham Creek Road to cross SH16.
Options Discarded	**4 Options: AR-R-01b, AR-R-02, AR-R-05** and **AR-R-10** were discarded, these options did not serve a strategic public transport function. **AR-R-02** and **AR-R-01b** also had potential for high adverse visual amenity, including impacts on SEA_T_6336 and SEA_T_2648. **AR-R-01b** also had potential impacts on heritage building at Taupaki Road. **AR-R-05** also had potential for high impacts on property.

Options	Assessment Recommendation
North South Arterial Routes (Kumeū / Huapai)	
4 Options	• AR-K-01: Upgrade Puke Road • AR-K-02: Upgrade Motu Road to the northern Huapai catchment • AR-K-03: Upgrade of Station Road and Tapu Road • AR-K-06: Upgrade of Access Road.
Options Progressed	**2 Options: AR-K-03** and **AR-K-06** are both recommended to be part of the emerging network as they provide this growth area with multi-modal access to both the RTC and ASH options.
Options Discarded	**2 Options: AR-K-01** and **AR-K-02** were discarded as they are located west of the existing growth area and due to lack of structure planning, there is high uncertainty of land use and centre location for these corridors. As there is no clear justification for a third spine road at this point, they were discounted.

Options	Assessment Recommendation
Kumeū-Huapai / Riverhead - Strategic Sub-Regional Connections	
6 Options	• SR-K-01: Kumeū-Riverhead Southern Option • SR-K-02: Kumeū-Riverhead Northern Option • SR-K-03: SH16 to Riverhead • SR-K-04: Upgrade of Coatesville Riverhead Highway to Dairy Flat • SR-K-06a: Existing SH16 alignment *SR-K-01 & SR-K-02 Variation* • SR-K-01a: New variation for the Kumeū to Riverhead connection on Riverhead Road.
Options Progressed	**2 Options: SR-K-01a** was recommended for the growth area to gain access to a potential future City Centre to Westgate RTC Station at Westgate (along Riverhead Road, not shown). **SR-K-03** was also recommended to provide a critical social and economic connection between Riverhead and Kumeū.
Options Discarded	**4 Options: SR-K-01**: Provided potential benefits in terms of direct public transport routes, but this was offset by potential increase in private vehicles using the route. **SR-K-02:** had similar access advantages and topographical challenges as SR-K-01 but did not perform as well as the hybrid SR-K-01a. **SR-K-04**: Option disregarded as although it performed average on criteria, it had high impacts on threatened habitats and SEA_T_6303 and SEA-M2-57b. **SR-K-06a**: had potentially high impacts on established residential property through construction and required grade separation at some intersections, substantially increasing construction costs.

3.3 Indicative Strategic Transport Network

Following the short list assessment, the North West IBC recommended the ISTN (including corridors that form part of the North West Strategic Package and those which did not progress to route protection). The indicative network was endorsed by the AT and Waka Kotahi boards in December 2018 to progress to route refinement (DBC), see Figure 3-2 below.

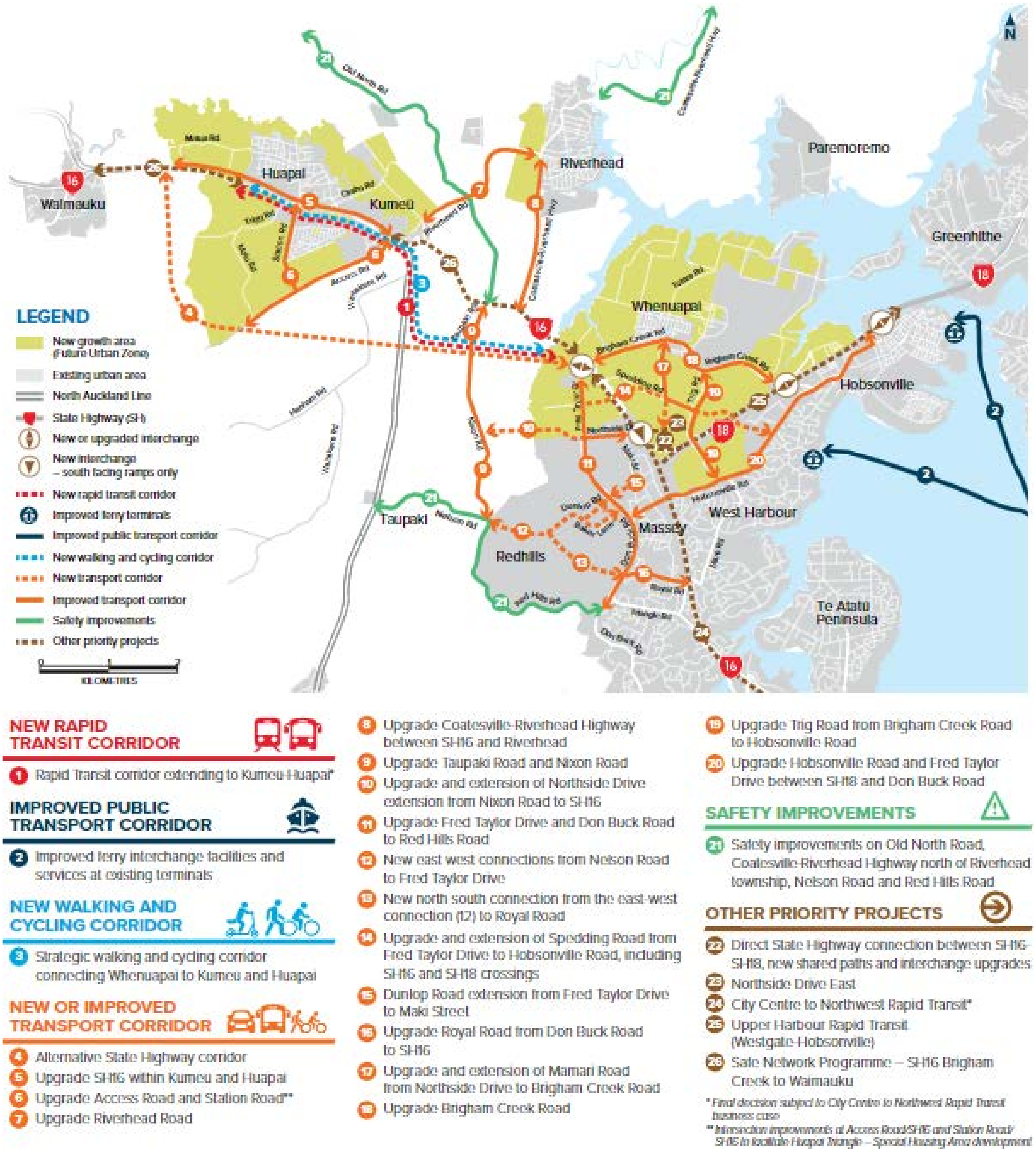


Figure 3-2: Indicative Strategic Transport Network

The corridors identified in the ISTN were assessed and grouped into two packages for the route refinement. These were the Local Arterials Package (subject of this report) and the North West Strategic Package (a separate package).

The North West Local Projects identify an integrated systems of arterials that connect sub regions into existing and proposed transport systems. The network enables greater travel choice, enhanced access to the wider Auckland network and supports travel behaviour change for existing and new communities.

The ISTN corridors which progressed to route refinement and which form part of the Local Arterials Package are outlined in Table 3-4. For the sake of brevity and relevance, ISTN corridors which went to route refinement but did not progress to route protection are not further discussed.

Table 3-4: Corridor Assessment Outcomes – North West Local Arterials

Shortlist reference & name	Description
Whenuapai	
AR-W-12: Hobsonville Road FTN Upgrade	Hobsonville Road upgrade from the Dunlop Road extension (AR-R-08) to the SH18 north of Squadron Drive.
AR-W-04: Māmari Road FTN Upgrade	This corridor upgrade extends from Tōtara Road in the north to Māmari Road in the south. The proposed route intersects with Brigham Creek Road and links Māmari north and south to form a north south continuous corridor.
AR-W-05: Trig Road North Upgrade	Trig Road upgrade extending the North West Housing Infrastructure Fund (HIF) Trig Road project to Brigham Creek Road.
AR-W-06A: Brigham Creek Road Upgrade	This variation of the Brigham Creek Road upgrade follows the existing corridor from the Brigham Creek roundabout at its western end to the Brigham Creek Road / Sinton Road roundabout.
AR-W-07: New Spedding Road West	This proposed route extends Spedding Road to the west crossing the SH16 from Trig Road to Hailes Road.
AR-W-08: New Spedding Road East	This option extends Spedding Road on the eastern side to Hobsonville Road via the Rāwiri Bridge.
Redhills	
AR-R-04: Fred Taylor Drive FTN Upgrade	This option proposes an upgrade to the existing Fred Taylor Drive from the Don Buck Road intersection up to the SH16. The upgrade is looking to provide an urban form on both sides of the corridor.
AR-R-03: Don Buck Road North FTN Upgrade and Don Buck Road South FTN Upgrade	Don Buck Road upgrade from the intersection with Red Hills Road to the entrance of Fred Taylor Drive at the roundabout located in west Westgate.
Riverhead	
SR-K-03: Coatesville-Riverhead Highway Upgrade	North-south upgrade from SH16 to Riverhead via the existing Coatesville-Riverhead Highway.

4 Route Refinement Development and Assessment Methodology

4.1 Overview

The corridors identified in the ISTN were assessed and grouped into two packages for the DBC. These were the Local Arterials Package (subject of this report) and the North West Strategic Package (a separate package). The progression from corridor assessment to route refinement saw the identification of the preferred network at a ‘macro’ level during corridor assessment to ‘micro’ detail at the route refinement phase.

Refinement involved a gap analysis being undertaken to confirm the recommendations, this included a review of the IBC assessment, policy updates, developer aspirations and project interdependencies. Following gap analysis, a land use and constraints mapping exercise and corridor form and function assessment were undertaken to develop refined routes. Assessment of refined routes used the MCA framework (see Table 2-1), with adaptions to suit the option context. Key stages are explained in Sections 4.2 to Section 4.6.2 below and refinement process shown in Figure 4-1.

The outcome of route refinement was recommended alignments, these confirmed by Waka Kotahi and AT to establish the preferred projects for route protection.

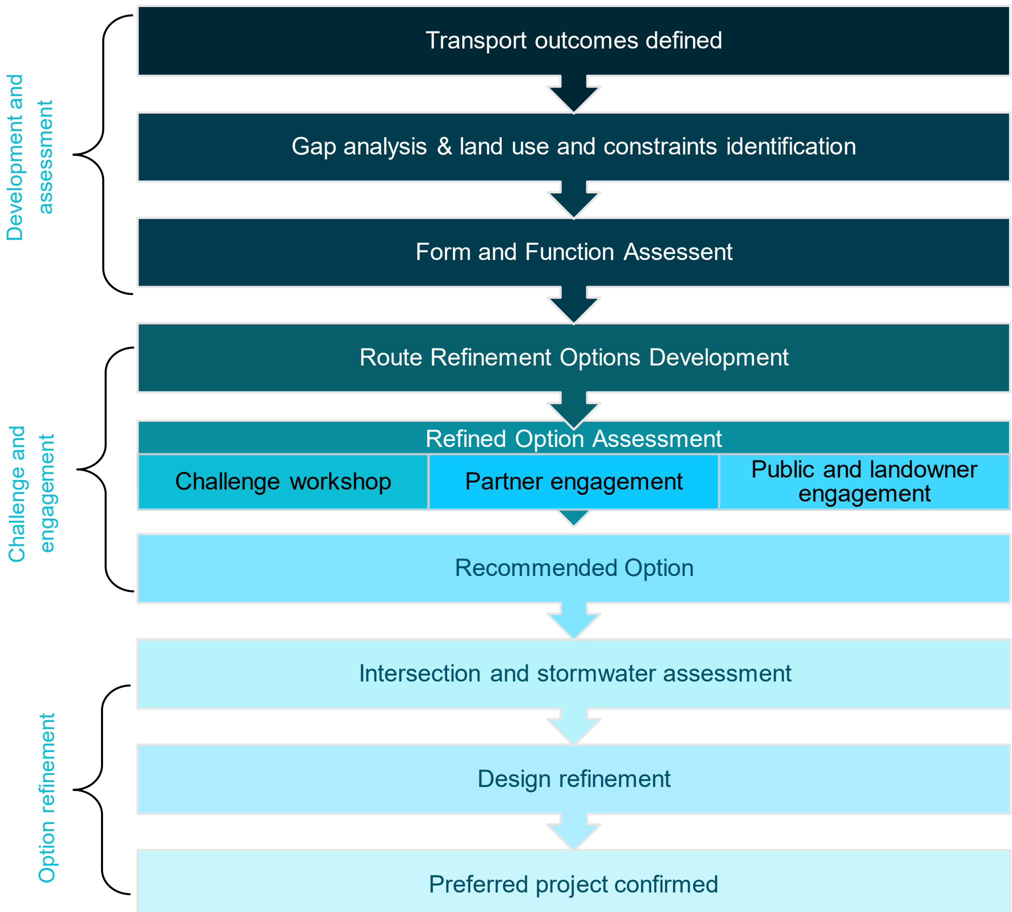


Figure 4-1: Route refinement process following corridor identification

4.2 Gap Analysis, Land Use Review and Constraint Mapping

4.2.1 Gap Analysis

A background review was undertaken of how the ISTN was identified, to check if any information or assumptions had changed since the corridor assessment. This included policy direction and statutory documents (for example, plan changes), and any issues that required further consideration. The gap analysis included the following:

- Review of Te Tupu Ngātahi Programme Business Case (PBC) (formerly Transport for Urban Growth (TFUG)) recommendations
- Review of the corridor assessment undertaken and the North West IBC (main document and Options Assessment Report), including the long list and the short list options, and the reasons why options were recommended or discounted
- The alignment of the recommended options with relevant policy documents (for example, Government Policy Statement on Transport, AUP:OP). In particular, to see if anything has changed since the North West IBC and corridor assessment recommendations
- Alignment with strategic plans other statutory documents and developer aspirations that may have progressed from the IBC. For example, structure plans, plan changes (or appeals), recent NORs and developer plans
- Consideration of other projects planned in the area.

A summary of the analysis undertaken for each Project is summarised the Project specific sections.

4.2.2 Land Use Review and Constraint Mapping

Following gap analysis, a review of the AUP:OP land use and constraints was undertaken. The review purpose was to identify potential constraints, inform design refinement and identify whether additional corridor options should be developed. A study area was identified for each local arterial project. This study area was informed by the gap analysis and an initial review of key constraints, including:

- Geological conditions
- Natural hazards such as flooding
- Cultural values – as identified by Manawhenua
- Contours and likely project earthworks requirements
- Strategic land use plans including live zoning, future urban areas and structure plans
- Identified sensitive areas through the AUP:OP overlays, conflicts with critical services and special purpose zones.

Study areas were 100m wide either side of the corridor, with extensions as prudent or identified by specialists. Constraints were mapped on Te Tupu Ngātahi GIS and discussed at a workshop with the Project Team and specialists.

4.3 Form and Function Assessment

To determine the desired function, and therefore the future form of alternative options, a form and function assessment process was undertaken in early 2020.

4.3.1 Corridor Assessment Principles

A Corridor Form and Function (CFAF) assessment tool was developed to support consistent decision making. The intent of the tool was to encourage well-rounded thinking about both the place and movement function of corridors and ensure all modes are considered, see Figure 4-2.

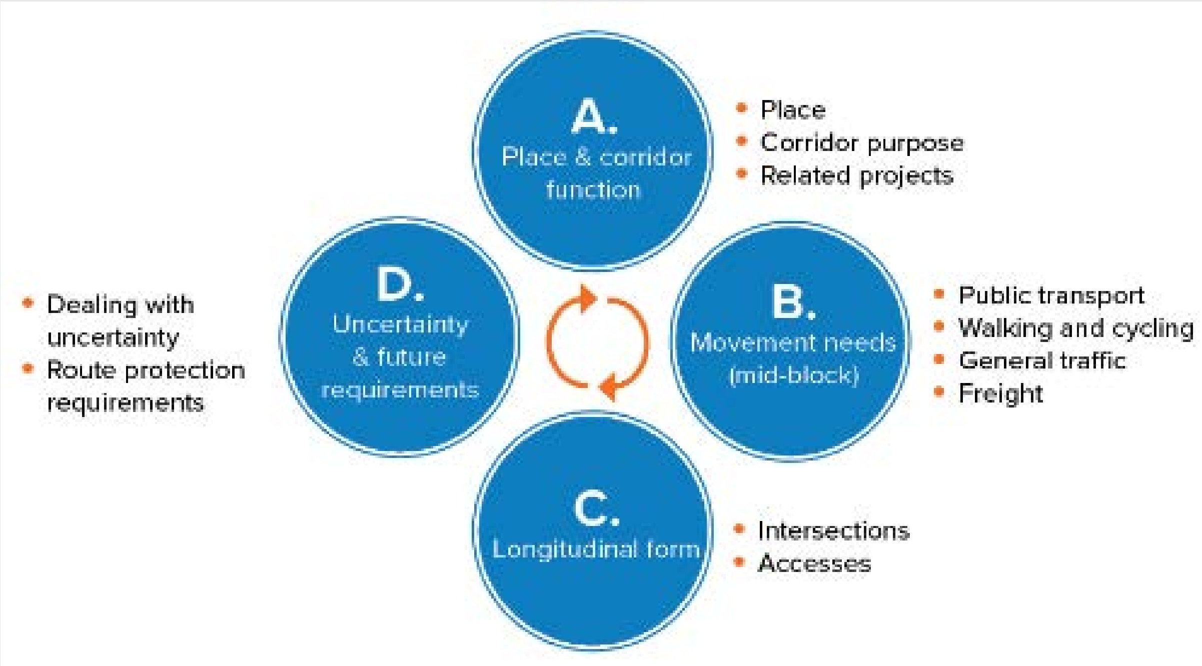


Figure 4-2: Corridor Assessment Principles, from A to D.

Both active and vehicular transport modes were considered in cross section development, however the form and function outcome may not necessarily provide facilities for all modes considered. The resulting cross section forms the basis for route protection of the corridor. The key principles of the assessment include:

- **Place factors**: Surrounding existing and future land use and expected future landuse density, including proximity of key trip generators and attractors such as metro stations and schools
- **Movement factors:** Considering the hierarchy of the corridor in the regional network, the corridor modal priorities for the existing and future traffic volumes. Movement is considered at both local and network levels to ensure duplication of route functions is avoided and corridors have targeted modal functions.

These are identified on a scale from Low P1 M1 to High P3 M3, see Figure 4-3.

Figure 4-3: Place and Movement – Low to High scale

- **Priority**: Under CFAF, general traffic should only be provided with two lanes up to an approximate daily flow of 15,000 vehicles per day, or less than 1,500 vehicles per hour each lane in the peak periods. Four general traffic lanes should only be considered when:
  a) daily flow exceeds 15,000 vehicles per day;
  b) where the Level of Service (LOS) for two general traffic lanes is less than LOS C in the interpeak;
  c) where it can be demonstrated that bus / high occupancy vehicle lanes have been considered first; and
  d) where it can be demonstrated that two general traffic lanes will not be appropriate.

The 'target' level of service for general traffic is LOS C in the interpeak. LOS D or E in the peak is considered acceptable and can encourage a shift to active modes or public transport for journeys at these times.

The CFAF assessment output informed the footprint of each corridor.

Options discarded

For existing corridors, an assessment of their current function was used to compare the available facilities with the assessment recommendation. This considered whether re-allocation of existing corridor space would achieve the outcomes sought by Te Tupu Ngātahi.

The assessment considered:

- Land use adjacent to the corridor and certainty of that land use being realised
- Current facilities versus those proposed (by non-Te Tupu Ngātahi project), compared to those recommended by Te Tupu Ngātahi
- Whether sufficient width already existed in the corridor to reallocate space to achieve outcomes sought by Te Tupu Ngātahi.

For each of the projects utilising the existing corridor was discounted. This is because there was not sufficient width in the carriageway to support the re-allocation of space or provide adequate provision for all modes to achieve the desired outcomes.

Figure 4-4 provides an overview of the form and function for the North West Local Arterials.

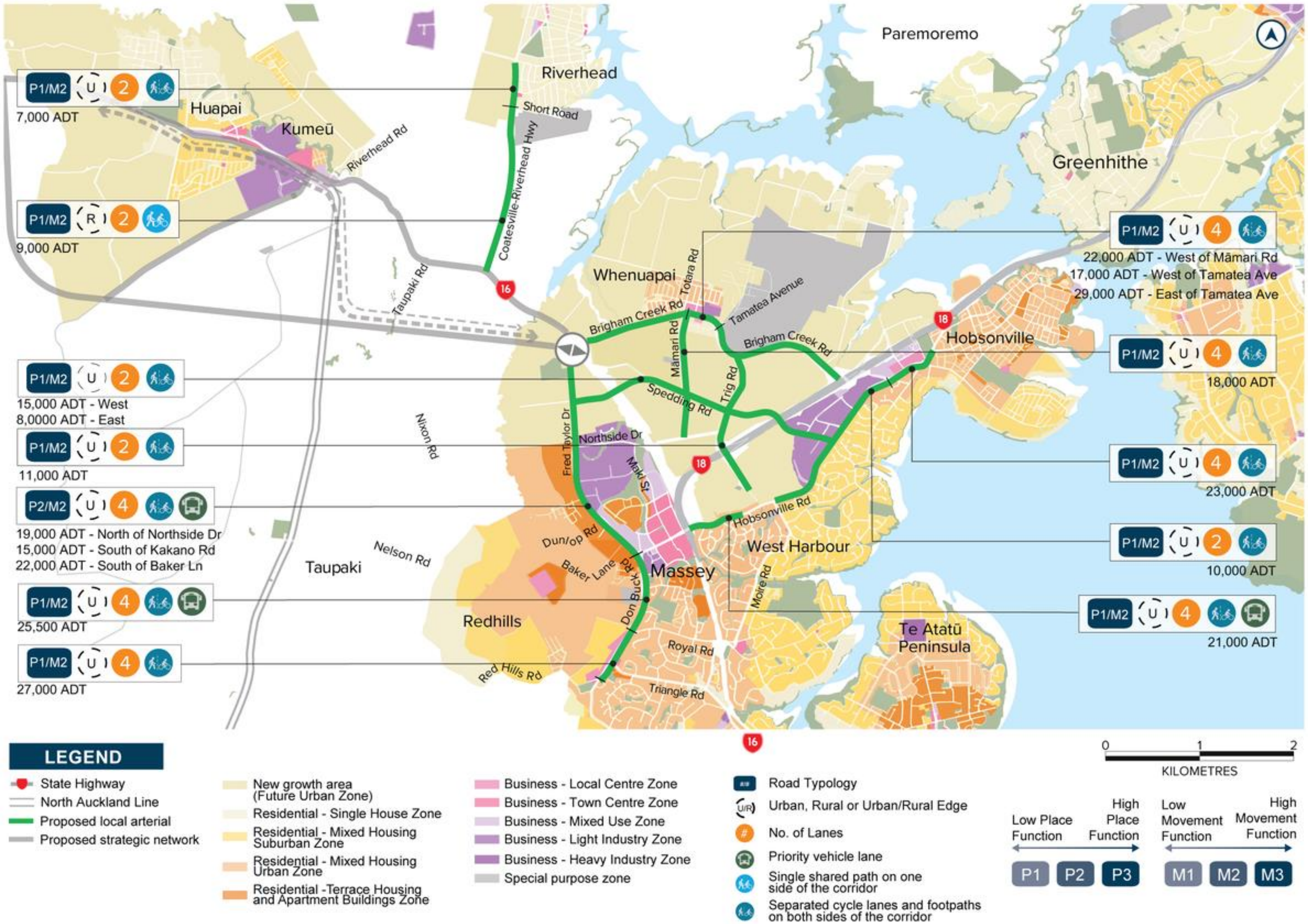


Figure 4-4: North West Local Arterials – CFAF Outcome

4.4 Route Refinement Options Development

The gap analysis (Section 4.2) identified whether the recommended option for each corridor required reconsideration due to relevant new information. For example, land use assumption changes, new growth projections (population, housing etc) and any constraints identified through engagement with stakeholders. The gap analysis also identified whether the corridor assessment had sufficiently considered alternatives proportional to the scale of potential effects of each Project. Where new information was identified, or the corridor assessment did not sufficiently consider alternatives proportional to potential effects, additional options assessment was undertaken.

To achieve the level of options assessment detail required to progress route protection, three approaches to developing route refinement alternatives were used:

- **Corridor Assessment** – options occupying different locations within a defined study area and potentially connecting to the ISTN at different points
- **Route Refinement** – options based on an IBC recommended option but with refinement based on the effects, constraints and opportunities from corridor widening on either side, both sides, or a combination
- **No Further Options Developed** – project corridor is fit for purpose, or has existing potential to meet needs (e.g., existing designation in place, mode space can be reallocated). Therefore, project not recommended for route protection.

Some project corridors were split into sections to allow specific consideration, this resulted in some of the three approaches being used along the alignment. Where greater outside specialist input was required Subject matter experts used in assessment, where the team had required skill, project team undertook the assessment, this is shown as SME input or Project Team input.

Table 4-1 provides an overview of the recommended alternatives assessment approach for each North West Local project. The assessment for each Project (or element) is discussed further in the Project specific section.

Table 4-1: Overview of refined alternative assessment approach and options

Project assessed	Development of Refined Alternatives - Approach
Whenuapai	
Trig Road	Route Refinement Project Team Option Assessment
Māmari Road	Route Refinement (Segment 1) Project Team Option Assessment in Segment 1 Corridor Assessment (Segment 2) Option Assessment with SME input in Segment 2
Brigham Creek Road	Route Refinement Option Assessment with SME input

Project assessed	Development of Refined Alternatives - Approach
Spedding Road East	Corridor Assessment Option Assessment with SME input
Spedding Road West	Corridor Assessment Option Assessment with SME input
Hobsonville Road (SH16 to Hobsonville Point Road)	Route Refinement Project Team Option Assessment
Redhills	
Don Buck Road (Fred Taylor Drive to Royal Road)	Route Refinement Project Team Option Assessment
Don Buck Road (Royal Road to Redhills Road)	No Options Developed due to potential land use impacts and as widening would have limited transport benefit
Fred Taylor Drive	Route Refinement Project Team Option Assessment
Riverhead	
Coatesville-Riverhead Highway Upgrade	Route Refinement Project Team Option Assessment

4.5 Refined Option Assessment

4.5.1 Expert Briefing and Technical Input

SMEs from the following disciplines were involved in the options assessment for the North West Local Arterials:

- Planning Impact
- Archaeology and Built Heritage
- Ecology
- Landscape and Visual
- Urban Design
- Transport
- Stormwater / Flooding
- Construction / Engineering
- Geotechnical / Natural Hazards.

Site visits to North West Auckland were undertaken by the Project Team on 11 February 2020 and SMEs on 21 July 2020 to understand the subject environment. Experts were then provided with a briefing pack, containing the MCA framework and assessment guidelines, an overview of the project and options and a template for a summary report to record their approach, assumptions, findings and recommendations. A specialist briefing with the Project Team was also held on the options and assessment process.

The refined options for each Project (from Table 4-1) were loaded into the Te Tupu Ngātahi GIS constraints viewer for experts' assessment.

SMEs were given access to the GIS viewer which showed the options against environmental, heritage, and social layers. The viewer mapped constraints and local site information to assist assessment. GIS information was sourced from the Auckland Council GIS datasets and those identified during the constraints mapping exercise in Section 4.2.2. The GIS viewer was also an interactive tool where information could be displayed in different combinations by the user alongside the options. Specialists were asked to add comments, identify features or areas of concern, so they could be shared with other SMEs and the Project Team. Where appropriate, scoring, and qualitative analysis was completed by the SMEs and discussed at MCA workshops.

4.5.2 MCA Framework in the Route Refinement Assessment

There were two approaches to using the MCA framework in the option assessment process: scoring the options or identifying a preference for one of the options. Both approaches used the same MCA framework but tailored to suit the North West projects.

Tailoring involved the removal of criteria where it would result in double counting due to the criteria repeating themes assessed under the transport outcomes. This applied to criteria for '*transport system integration'* and '*user safety'*[1]. Some measures relating to parcels size and shape and access were removed from the '*land use futures'* criterion to instead focus on the existing and future use and developability of the land being in line with the AUP:OP Zoning. Manawhenua provided qualitative feedback as part of the Project Partner workshops.

Options scoring was undertaken when it assisted in differentiating between the options. Scoring was not undertaken for the *Route Refinement* options (see Table 4-1) due to the options only being a shift in the alignment, e.g., left side, right side or both sides, instead preferences were stated. The exception for *Route Refinement* options was where constraints were identified and scores assisted with differentiation.

Experts qualitatively assessed the options in Table 4-1 against the relevant MCA framework criteria and where relevant scored options on their potential effects, identified or suggested design amendments to reduce adverse effects. Following assessments, scoring and / or preferences were discussed options challenge workshops with the Project Team and other SMEs. Following challenge workshops, options requiring further assessment were considered at a Project Partner workshop.

4.5.3 Option Challenge Workshops

Throughout the options assessment process, workshops were held to discuss findings and undertake decision making. Two key types of workshops were held: Options Assessment Workshops and Te Tupu Ngātahi Project Team Workshops. The workshops process and purpose are detailed below.

Options Assessment Findings Workshops, with SMEs - The purpose of these workshops was to discuss and challenge initial options assessment findings with specialists and the Project Team. During these workshops the scores (where applicable) and /or findings of each specialist was shared with the Project Team and discussed and respectfully challenged. Based on discussions in the workshop, changes to scores or assessments were made where appropriate prior to assessments being confirmed.

[1] Exception was '*user safety'* for Hobsonville Road which was retained as criteria.

Options Assessments workshops, with Te Tupu Ngātahi Project Team - The purpose of these workshops was to discuss and assess each option on a qualitative basis and challenge Project Team commentary. Assessments were confirmed at the workshop unless additional information or input was required. The workshop outcomes are detailed in the project specific sections. Post option workshops the Project Team identified the recommended options.

4.5.4 Project Partner and Landowner Engagement

Throughout route refinement, a range of engagement was undertaken with Project Partners (Auckland Council and Manawhenua). This included evaluation of the options and feedback at workshops and hui. The workshops are identified in this section and the outcomes for each Project described in corridor specific sections. Engagement with the public and landowners was undertaken in 2020 and 2021, and targeted engagement for route protection in 2022.

Ngā Manawhenua

The Project Team provided regular updates on the option assessment and sought input from manawhenua. Specific North West Local engagement included:

- **March 2020** –Introduction to the North West projects located in Whenuapai, Riverhead, Redhills and Kumeū-Huapai and overview of the assessment process
- **May 2020** –Update and outcomes from the constraint mapping process
- **February 2021** – Presentation on Spedding Road East and approach to the Rāwiri Stream
- **June 2021** - A North West site visit with manawhenua and the Project Team.

Manawhenua were also invited to constraints mapping exercise for the corridors and attended post option assessment Project Partner workshops in 2020 and 2021 to seek feedback and option support.

Auckland Council

The Project Team has met with Council on a regular basis to discuss land use integration opportunities along each project corridor and to seek views on the proposed transport network.

Council's view has also been sought on the future use of FUZ land which has not been Structure Planned, in Riverhead and Redhills North, a structure plan is in place for Whenuapai. Council has prepared the Spatial Land Use Strategy - North West in response, this was adopted in May 2021. The Strategy identified potential future centres and business land that the Te Tupu Ngātahi transport network will support. Council also attends Project Partner workshops and the monthly Te Tupu Ngātahi and Council Integration meetings.

AT and Waka Kotahi

Five workshops specific to the North West options assessment were held between September 2020 and May 2021 with AT and Waka Kotahi to discuss options and identify issues to be addressed, Manawhenua and Council also attended these workshops.

- **September 2020** – The following projects were presented at two consecutive workshops: Fred Taylor Drive, Don Buck Road (North), Brigham Creek Road, Māmari Road and Trig Road
- **September 2020** – The following projects were presented at two consecutive workshops: Whenuapai arterial corridors (Spedding Road East, Spedding Road West and Hobsonville Road) and Riverhead arterial corridors (Coatesville-Riverhead Highway)
- **May 2021** – The projects were presented and discussed with sustainability specialists from Waka Kotahi, outlining agreement to approach adopted in optioneering the project corridors.

Community and Landowners

Community engagement on the proposed network took place between 30 November 2020 and 1 February 2021. Approximately 650 pieces of feedback were received across all channels between 30 November 2020 and 1 February 2021. Feedback items included comments on Social Pinpoint, online surveys, mailed feedback, landowner meetings, emails and phone calls and official information requests and subscriptions to the North West newsletter.

Following the engagement period, feedback was collated and reviewed by the Project Team and resulted in further options being developed for Māmari Road (see Section 7). Other options feedback did not result in additional assessment.

4.6 Intersection and Stormwater Approach

4.6.1 Intersection Form Assessment Methodology

Once the preferred route refinement option for the project was identified, an assessment of the alignment intersections form and function was undertaken to determine the route protection footprint. Intersection design adopts a Safe System approach in line with AT's Vision Zero Policy.

Intersection treatments for the North West network included:

- Maintaining existing vehicle access to private property where practicable, but not in a way that precluded efficient movement along the corridor, particularly for public transport and active modes
- Adequate consideration of modal needs at intersections, for example priority intersection requirements for FTN and safe and efficient crossing opportunities for active modes
- Intersection size (determined by SiDRA modelling), particularly in more constrained existing urban areas
- Ensuring each intersection had sufficient space for queuing length and the level of service is acceptable.

The assessment of intersection form adopts a Safe System approach by recommending well-designed roundabouts as the first choice for intersections due to the safety benefits for road users resulting from slowing down through traffic and reducing the number of conflict points. Site Specific constraints are also considered which may prompt design change to meet the needs of different users. In some cases, roundabouts are not preferred, and signalised intersection forms are proposed. Both typologies have been designed to meet the needs of users safely and respond to site factors as summarised in Figure 4-5.

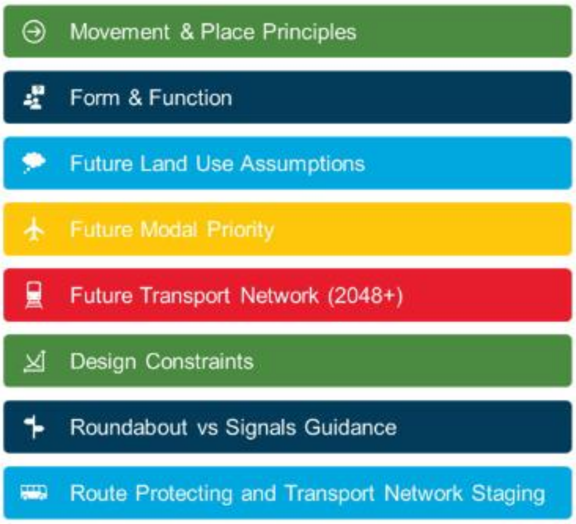


Figure 4-5: Intersection design considerations

The design for route protection allows sufficient flexibility to design and implement safety measures consistent with Vision Zero principles in the future. There is also flexibility in terms of staging and implementing with NORs overlapping at intersections.

4.6.2 Stormwater Infrastructure Design

As part of route protection, the projects are required to identify and appropriately protect the land necessary to enable the future construction, operation and maintenance of required transport corridors. The design has therefore considered the appropriate stormwater management methods to meet likely catchment needs and achieve the future regulatory requirements, the process for identifying stormwater treatment form and location is summarised in Figure 4-6.

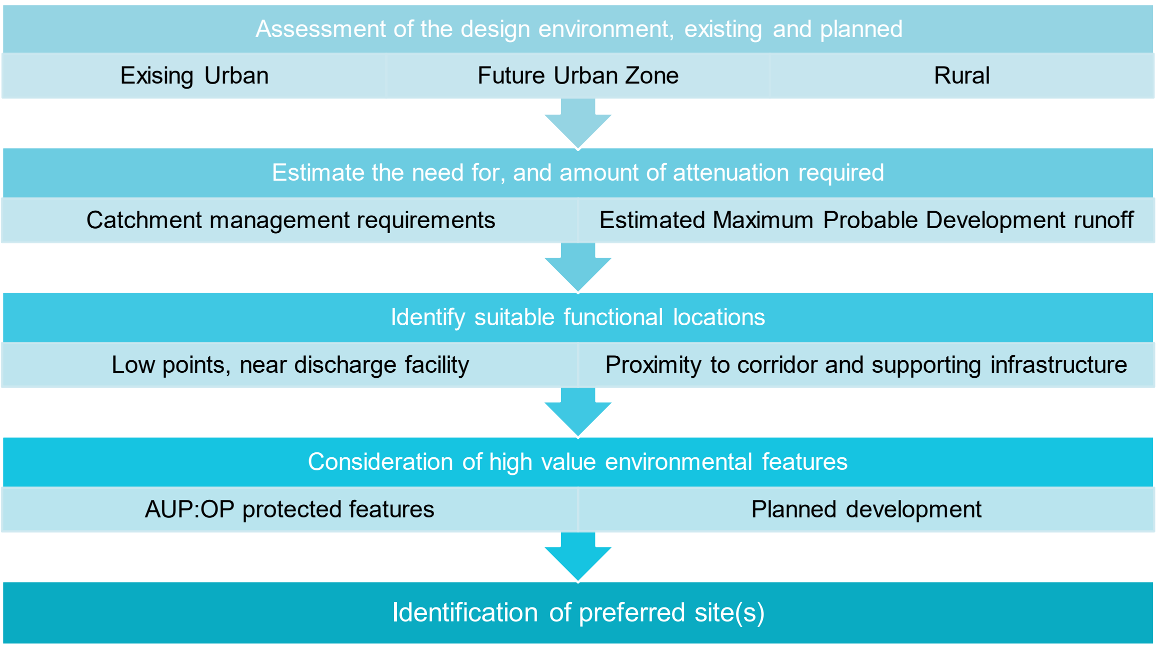


Figure 4-6: Stormwater infrastructure design and location approach

Alternative stormwater solutions were considered for the North West Local Arterials to inform the boundaries for each Project.

Design Environment Assessment

The type of stormwater management device was identified based on the Te Tupu Ngātahi design framework which considered:

- The surrounding existing and planned land-use;
- Form of the transport route;
- Road hierarchy; and
- How connectivity to adjacent properties would be provided.

This approach is summarised in Table 4-2.

Table 4-2: Stormwater System Design Approach

Design Environment	Conveyance	Treatment	Retention/s	Detention (Attenuation)	Diversion
Existing Urban – footpath and cycleway within existing road reserve	Pits and pipes	Discharge across berm	Raingarden	Wetland / pond	N/A
Existing Urban – increased road reserve and road upgrade	Pits and pipes	Raingardens or treatment wetland / pond, or as a lesser preference, proprietary treatment devices	Raingarden	Wetland / pond	N/A
Future Urban Zone	Pits and pipes preferred	Raingardens or treatment wetland / pond	Raingardens	Wetland / pond	Diversion drain or cut-off channels as required
Rural	Conveyance channels	Treatment swales or treatment wetland / pond	Retention swales	Attenuation swale or wetland / pond	Diversion drain or cut-off channels as required

Need and scale of attenuation required

Design of attenuation devices was undertaken at a high level to determine the need for, and amount of attenuation required, the design approach considered the following:

- Evaluate the overall catchment management plan requirements as approved by Auckland Council to determine if attenuation or a "pass it forward" approach was proposed for the catchment
- Determine the road runoff discharge conditions for any tie ins to existing systems or discharge to overland flow paths
- Estimate runoff from maximum probable development in the catchment (i.e., maximum expected impervious areas).

This information was used in the design of:

- Design of a primary (10-year) network to cater for the estimated runoff

  - Location and sizing of primary (10-year) attenuation devices (if required) to address any capacity constraints in the downstream network, or to reduce the size of stormwater infrastructure (e.g., pipes) required.
- Identification of secondary (100-year) flow paths and floodplains
  - Location and sizing of secondary (100-year) attenuation devices to reduce floodplain and overland flow path extents.

Suitable Functional Location

If a pond was required, the location was selected by identifying a suitable functional location. The functional location considered off-line low points along the alignment, in sufficient proximity to the corridor for ongoing maintenance access, and suitably located for supporting infrastructure such as pipes and discharge outlets to nearby natural streams.

Where there were opportunities to upgrade or share existing public stormwater assets these were preferred and have been selected in various places along the corridor. Co-locating or upgrading existing assets has the benefit of reducing project land requirements and more effectively managing ongoing maintenance requirements with larger stormwater facilities, rather than providing multiple smaller devices. If practicable, across the Local Arterials, new ponds were designed to service multiple Projects, to achieve co-location efficiencies.

Consideration of high value environmental features

Once functional locations were identified the design then sought to avoid high value environmental features and where practicable minimise impacts on existing residential or business development.

Where new information or opportunities became available, the Project Team refined the stormwater solutions design and location. For example, where consents were approved for new development, the team made efforts to reconfigure ponds or discharge outlets to reduce impacts on developer aspirations and private property. However, this is not always practicable in constrained corridors.

Summary

The stormwater solution is generally the use of centralised wetlands. Wetlands have the benefit of being both more effective to operate and maintain, serve as both attenuation and treatment, and reduce the overall corridor cross section width. Swales and raingardens for example would impact many owners along the corridor, in existing urban areas where development is built up this would be particularly undesirable. Additionally, the North West Local Arterials are seeking to support growth and developable land adjacent to the corridors should therefore be maximised. Wider corridors for open channel systems and swales would not be as supportive of this objective in urban contexts, like Whenuapai and Redhills. This approach is appropriate in rural areas such as Coatesville-Riverhead Highway which are not identified for urbanisation and will largely remain rural.

5 Explanation of the Project Specific Sections

The routes in the refined North West network went to the AT and Waka Kotahi Boards in December 2021. Refined routes considered to be high strategic priority were endorsed to proceed to route protection (see Table 5-1). The following sections provide a summary of the route refinement assessment for each endorsed Project being route protected in the Local Arterials Package, including:

- Corridor assessment outcomes
- Gap analysis undertaken
- Land use review and constraints mapping
- Corridor form and function assessment
- Route refinement options developed
- Assessment summary including engagement outcomes
- Preferred and discounted options rationale.

Table 5-1: North West Local Arterials

Reference	Project	Requiring Authority
Whenuapai		
W1	Trig Road North	Auckland Transport
W2	Māmari Road	Auckland Transport
W3	Brigham Creek Road	Auckland Transport
W4	Spedding Road	Auckland Transport
W5	Hobsonville Road	Auckland Transport
Redhills and Riverhead		
RE1	Don Buck Road	Auckland Transport
RE2	Fred Taylor Drive	Auckland Transport
R1	Coatesville-Riverhead Highway	Auckland Transport

The Local Arterials Package corridors progressing to route protection are illustrated in Figure 5-1.

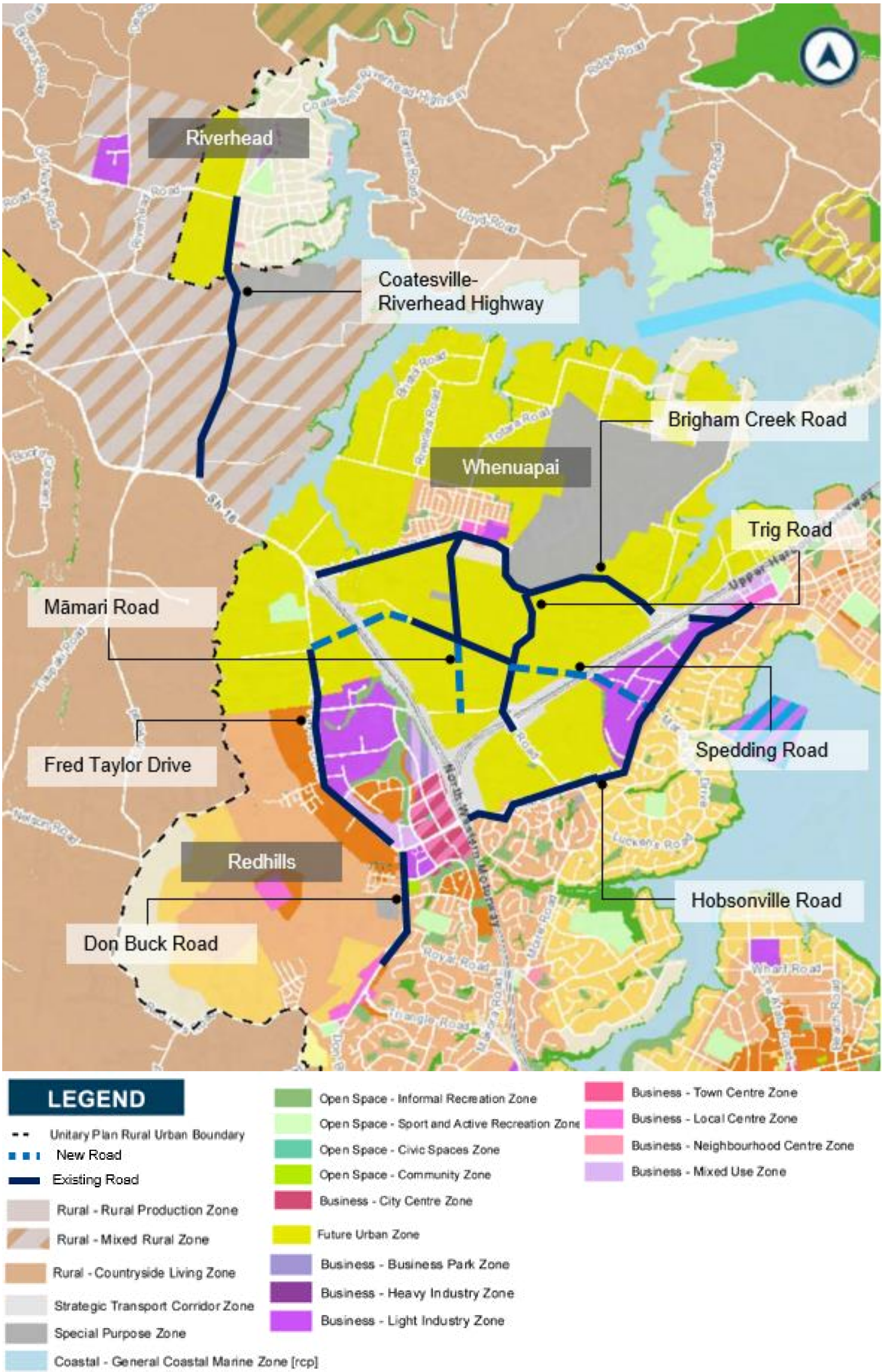


Figure 5-1: Indicative Transport Network – North West Local Arterials

6 W1: Trig Road North

6.1 Corridor Overview

The Trig Road corridor upgrade formed part of the TFUG PBC preferred transport network plan prepared in 2016. The upgrade of Trig Road, extended from the SH18 intersection to Brigham Creek Road and was referred to as *AR-W-05* and assessed as one of the Whenuapai north-south connections at IBC stage. The existing corridor can be upgraded to meet requirements, so no alternative north south alignments were considered at IBC stage, see Figure 6-1.

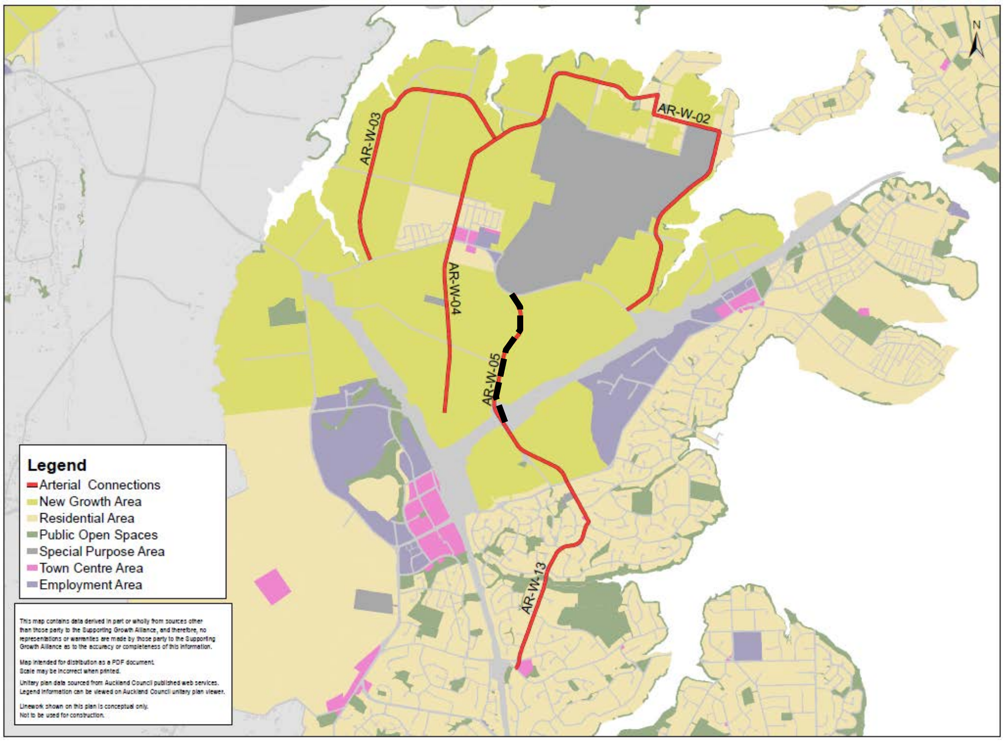


Figure 6-1: Trig Road North IBC Option AR-W-05

This arterial upgrade will connect the Whenuapai future business area at Brigham Creek Road with SH18 intersection providing strategic network resilience. The Trig Road upgrade includes widening the SH18 motorway bridge to include cycling and walking facilities which will enhance mode choice and active mode access. The upgrade also allows for priority vehicle access across SH18, which will enhance the public transport network's connectivity.

During the North West IBC progression, funding for the North West Housing Infrastructure Fund (HIF) projects was approved. Conditional to this funding was the preparation of a specific DBC (North West HIF DBC), which was completed by Te Tupu Ngātahi in 2018-19. The North West HIF DBC identified priority elements to be accelerated and built in the Whenuapai and Redhills area. This included upgrading part of Trig Road, located south of SH18, called Trig Road HIF. This section of the corridor forms part of the North West Local network but forms part of a separate project. The Trig Road north upgrade will need to tie into Trig Road HIF (southern section), between Hobsonville Road and SH18.

6.2 Gap Analysis

The gap analysis identified the key issues for this corridor as being uncertainty of future land use due to Plan Change 5, which proposed to re-zone the southern part of the Whenuapai FUZ to a mix of business and residential, this Plan Change has now been withdrawn.

Gap analysis confirmed that:

- Adequate corridor assessment of Trig Road North was undertaken at the IBC, and analysis did not trigger further corridor assessment
- Route refinement assessment should be undertaken to respond to identified constraints (see Section 6.3).

6.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out on the Trig Road corridor environment, this identified that:

- **Extent and Zoning:** The Trig Road North corridor extends from Brigham Creek Road to the bridge over SH18, the land either side of the corridor is zoned FUZ
- **Future Land use:** The Whenuapai Structure Plan shows the land as being intended for Business zoning
- **Special uses and constraints**:
  - SH18 is designated by Waka Kotahi (Designation 6741) for transport purposes and has been given effect to
  - Watercare Northern Interceptor designation 9377 shares the corridor with SH16 / 18
  - AT existing Northside Drive designation 1473
- **Environment / social constraints**: Trig Road is a rural corridor with limited environmental constraints, however there are several overland flood paths and potential for wetlands.

The review identified that key project impacts were on property and existing or planned transport infrastructure.

6.4 Corridor Form and Function Assessment

An assessment was undertaken for Trig Road North, following the CFAF methodology in Section 4.3.1. The recommendation informed the route refinement options developed and assessed in Section 6.5. Figure 6-2 shows the CFAF cross section outcome.

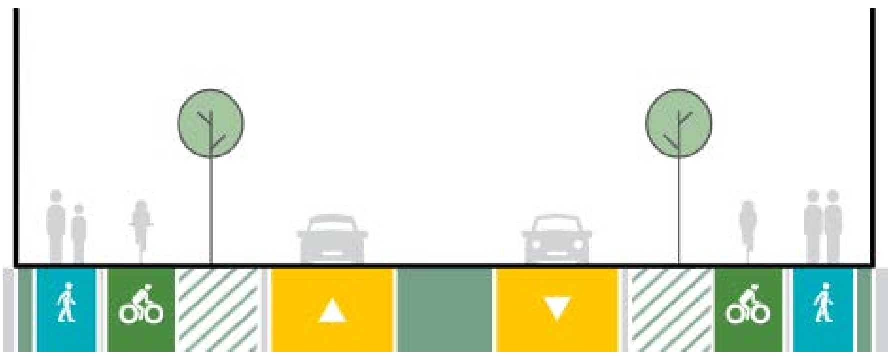


Figure 6-2: CFAF Outcome – Trig Road North indicative 24m cross section

6.5 Route Refinement Option Development

The Trig Road North corridor is an important connection between Whenuapai and West Harbour and provides a connection to east facing ramps for SH18, and to Hobsonville Road a key east-west arterial. Three options using the 24m wide cross section were workshopped, these were:

- **Option 1 / Both**: Hold the existing centreline and widen the road on the eastern and western side
- **Option 2 / Widen West:** Hold the eastern boundary and widen the road to the west
- **Option 3 / Widen East:** Hold the western boundary and widen the road to the east.

6.6 Route Refinement Assessment

6.6.1 Assessment

The assessment undertaken for Trig Road North upgrade follows the process outlined in Section 4.4. Options 1, 2 and 3 were assessed qualitatively against the MCA framework by the Project Team. Options were also assessed against the ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities by providing an integrated multi-modal corridor between Whenuapai and Hobsonville*
- *Reliability: Enable reliable people movement between Whenuapai and Hobsonville*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people along Trig Road*
- *Safety: Provide improvements on Trig Road that contribute to a transport network that is free from deaths and serious injuries.*

All options performed well against the Transport Outcomes, with no differentiation.

Under the MCA, impacts on wellbeing criteria scored similarly, with the key differentiator being *Land Requirement*, where Option 1 was considered more equitable and thus preferred. The remaining criteria did not have any key differentiators.

Option considerations and constraints identified are shown in Figure 6-3, Table 6-1 provides a summary of the qualitative assessment undertaken.

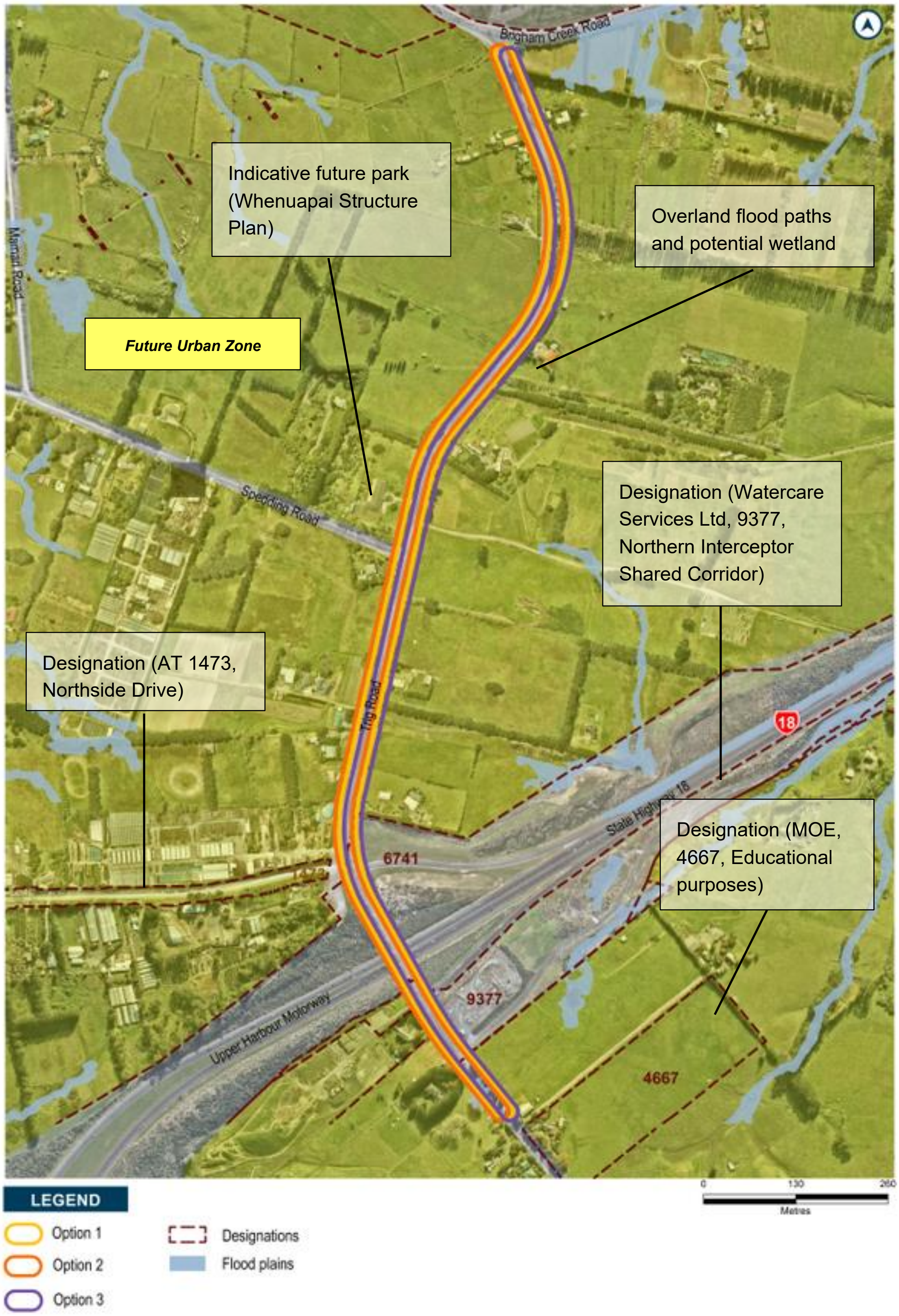


Figure 6-3: Trig Road options and identified constraints

Table 6-1: Trig Road North Upgrade Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: No significant heritage or archaeological constraints were identified along the route, and this criterion was not considered to differentiate between the options.
Social	Future land use integration: The options will have a minor impact on land within the FUZ. There is no differentiation between the options on this criterion. Social: There is no existing social infrastructure on Trig Road north. Council has identified parcels of Council land at 92 and 94a Trig Road for re-zoning to Open Space – Sport and Active Recreation Zone. The options widening to the west are not considered to have impacts in terms of social cohesion as the impacts are limited and it is not yet in park use. All options will improve accessibility to the future Open Space – Sport and Active Recreation Zone. There is no differentiation between the options on this criterion. Urban Design: All options will integrate with the character of future development. There is no differentiation between the options on this criterion. Land Requirement: All three options will have broadly similar and minor property impacts**.** Option 1 is preferred as it will result in a more equitable outcome in terms of requiring land on both sides of the road. Human Health and Wellbeing: All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing, and this criterion was not considered to differentiate between the options.
Environment	Landscape and Visual: No significant landscape features were identified on Trig Road, and this criterion was not considered to differentiate between the options. Stormwater: All options will require stormwater infrastructure to be provided either within the road corridor or on adjacent property. This criterion was not considered to differentiate between the options. Ecology: No significant ecological constraints were identified along or in close proximity to the options. This criterion was not considered to differentiate between the options. Natural Hazards: No significant geotechnical constraints or instability issues were identified along the alignment. This criterion was not considered to differentiate between the options.
Economics	Utilities: All options will have a similar level of impact on existing utilities and infrastructure, and this criterion was not considered to differentiate between the options. Construction: All options will have a similar level of construction disruption, and this criterion was not considered to differentiate between the options.

6.6.2 Refinement through Engagement

The Project Team engaged with Project Partners including Manawhenua and Auckland Council to discuss the options. Feedback was received regarding Auckland Councils plans for a future sports park adjacent to Trig Road, the team confirmed the impacts on this site were limited. Feedback was also received on the potential for queuing on Trig Road bridge to access the south facing ramps onto SH18. The Project Team tested this and confirmed the upgraded corridor could adequately accommodate queuing.

SH18 is designated for Transport Purposes by Waka Kotahi, Designation 6741 provides sufficient space for bridge widening to include active modes or a new bridge. Therefore, no options for the bridge connection to Trig Road HIF were developed.

6.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Project Partners and the community, a preferred option for the Trig Road North upgrade was identified. The preferred option was:

'Option 1 / Both holding centreline and widening to both sides' was preferred because:

- There were no significant constraints identified along the corridor to favour or preclude widening east or west
- Although the centreline approach affects a greater number of properties, the effects on the adjacent land are less extensive for each site (i.e., as they are limited to partial / frontage impacts) whereas an east / west only alignment would have more extensive property impact.

Through the assessment, it was noted that there were no evident differentiators between the three options on most wellbeing criteria, see Table 6-1.

All route refinement options provided the same level of achievement against the transport outcomes as outlined in Section 6.6.1. Throughout route refinement specific consideration was made to minimise the Project footprint and associated impact on private properties.

There will be further opportunities to minimise any impacts within the Project alignment during the detailed design of the Projects. As a result, no further design refinement is required at this stage.

6.6.4 Discounted Options

Table 6-2 summarises the reasons for discounting the two options individually.

Table 6-2: Trig Road North Discounted Options

Option	Reasoning
Option 2 / Widen West	• Greater footprint extent into adjacent property with more significant impacts (i.e., greater than frontage impacts).
Option 3 / Widen East	• Greater footprint extent into adjacent property with more significant impacts (i.e., greater than frontage impacts).

6.7 Trig Road North Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Trig Road North Upgrade is Option 1, holding the centreline and widening to the east and west to enable an equitable land requirement with less extensive impacts on individual properties.

7 W2: Māmari Road Upgrade

7.1 Corridor Overview

The Māmari Road corridor formed part of the TFUG in the PBC preferred transport network plan prepared in 2016. The IBC original corridor *AR-W-04* extended from the southern intersection with the future Northside Drive (a separate non-Te Tupu Ngātahi project) to the end of Totara Road to provide Whenuapai with a North-South intra-regional connection, see Figure 7-1. The arterial's primary function was to support residential access to Whenuapai village and frequent bus network to access Westgate and the future rapid transit network.

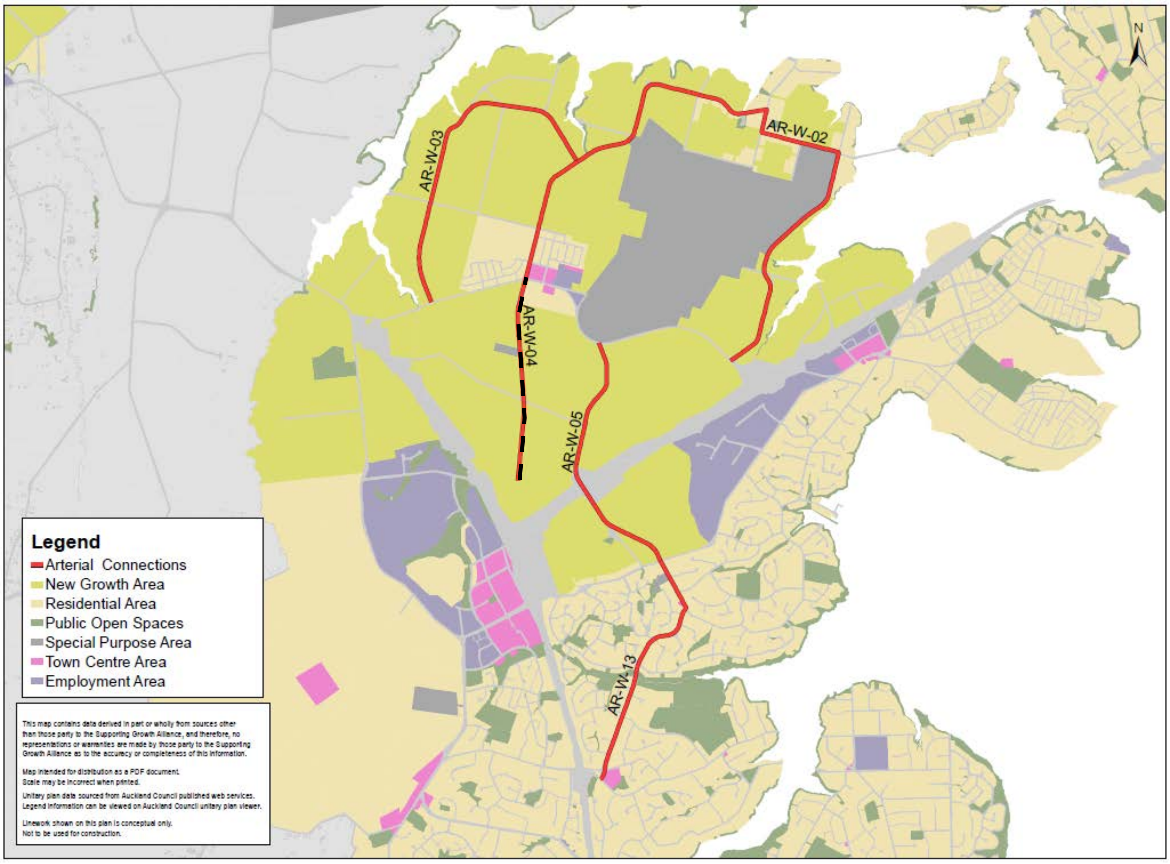


Figure 7-1: Māmari Road IBC Option AR-W-04

However, the traffic volume forecast anticipates the section south of the Whenuapai village would experience significantly higher traffic volumes compared to the northern section (Brigham Creek Road to the end of Totara Road). With Totara Road best suited as a collector road, the IBC recommended restricting the arterial upgrade to the southern section of Māmari Road from Brigham Creek Road to the future Northside Drive intersection. The Māmari Road upgrade was recommended to be a four-lane urban arterial.

7.2 Gap Analysis

Gap analysis identified key issues as the uncertainty of land use due to developer plan changes (Plan Change 69 (now approved)), which has indicated they will bring private plan changes for land adjacent to SH16. Ongoing discussion with Council is needed to inform the assessment.

Gap analysis confirmed that:

- Adequate Corridor Assessment was undertaken at IBC, and analysis did not trigger further corridor assessment.
- Route Refinement assessment should be undertaken to respond to constraints.

7.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out on the Māmari Road corridor environment. This exercise identified that:

- **Extent and zoning**: Māmari Road corridor extends from the intersection of Māmari Road and Brigham Creek Road to future Northside Drive. The northern section of Māmari Road to Spedding Road is an existing corridor, and a section is 'paper road'
- **Future Land use**: The eastern side of the Māmari Road is *Residential – Single House Zone* and FUZ. The western section of Māmari Road, north of Spedding Road is FUZ except for a *Special Purpose – School Zone*. The southern extension to Māmari Road will extend through the FUZ to the south of Spedding Road
- **Special uses and constraints:**
  - The *Residential – Single House Zone* and a section of the FUZ is within Ministry of Defence (MOD) Designation 4310. A small area of land used for 'landing lights' is also designated by MOD
- **Environmental constraints**: Sinton Stream, flood plains and potential wetlands are along the corridor.

Key outcomes of the review was the decision to:

- Split the route into two segments for option assessment, to localise the assessment and consider constraints within each segment
  - Segment 1: Limited environmental constraints, Project team to carry out route refinement optioneering and assessment
  - Segment 2: Greater environmental constraints, develop options for a localised corridor refinement and assess options with SMEs input.

7.4 Corridor Form and Function Assessment

An assessment was undertaken for the Māmari Road upgrade following the CFAF methodology in Section 4.3.1. This recommendation informed the route refinement options developed and assessed in Section 7.5. Figure 7-2 shows the CFAF cross section outcome.

Figure 7-2: CFAF Outcome – Māmari Road Indicative 30m cross section

7.5 Route Refinement Option Development

Māmari Road forms an important connection between Whenuapai town centre and Northside Drive, it will also provide connectivity to proposed SH16 / SH18 Connections project and the Westgate metropolitan centre to the west. The route was split into two segments as shown in Figure 7-3, five options were workshopped based on the indicative 30m cross section.

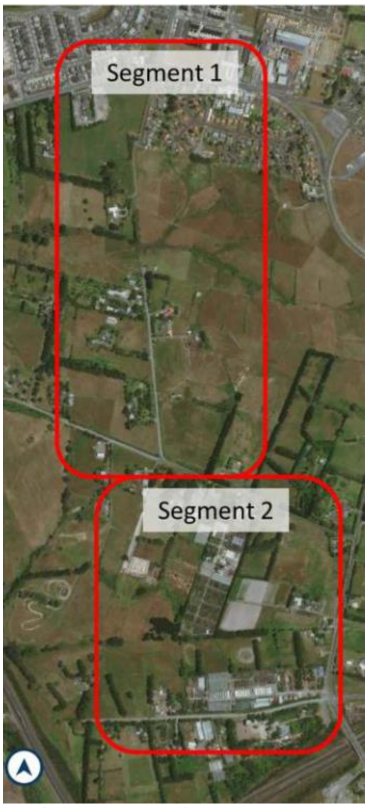


Figure 7-3: Māmari Road segments for option refinement

Segment 1 (Brigham Creek Road to Spedding Road intersection)

- **Option A1 / Both**: Hold the existing centreline and widen the road on the eastern and western side
- **Option A2 / Widen West**: Hold the eastern boundary and widen the road to the west
- **Option A3 / Widen East**: Hold the western boundary and widen the road to the east.

Segment 2 (Spedding Road to future intersection with Northside Drive)

- **Option B1 / West connection:** With a western connection on Northside Drive
- **Option B2 / East connection**: With an eastern connection on Northside Drive and connecting with the intersection proposed as part of the Northside Drive upgrade.

7.6 Route Refinement Assessment

7.6.1 Assessment

A route refinement assessment was undertaken in Segment 1 and a localised corridor assessment in Segment 2. Segment 1 options were considered by the Project Team and Segment 2 by SMEs. The assessment undertaken for the Māmari Road upgrade follows the process outlined in Section 4.4.

The options were assessed qualitatively against the MCA framework including the ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities by providing an integrated multi-modal corridor from Whenuapai to Redhills*
- *Reliability: Enable reliable people and freight movement between Whenuapai and Redhills*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people along Māmari Road*
- *Safety: Provide improvements on Māmari Road that contribute to a transport network that is free from deaths and serious injuries.*

Segment 1

All Segment 1 options achieved the transport outcomes sought with no differentiation. Considerations and constraints identified are shown in Figure 7-4. Table 7-1 provides a summary of the qualitative assessment undertaken by the Project Team using the MCA framework, scoring was not undertaken in Segment 1, instead preferences between options were identified.

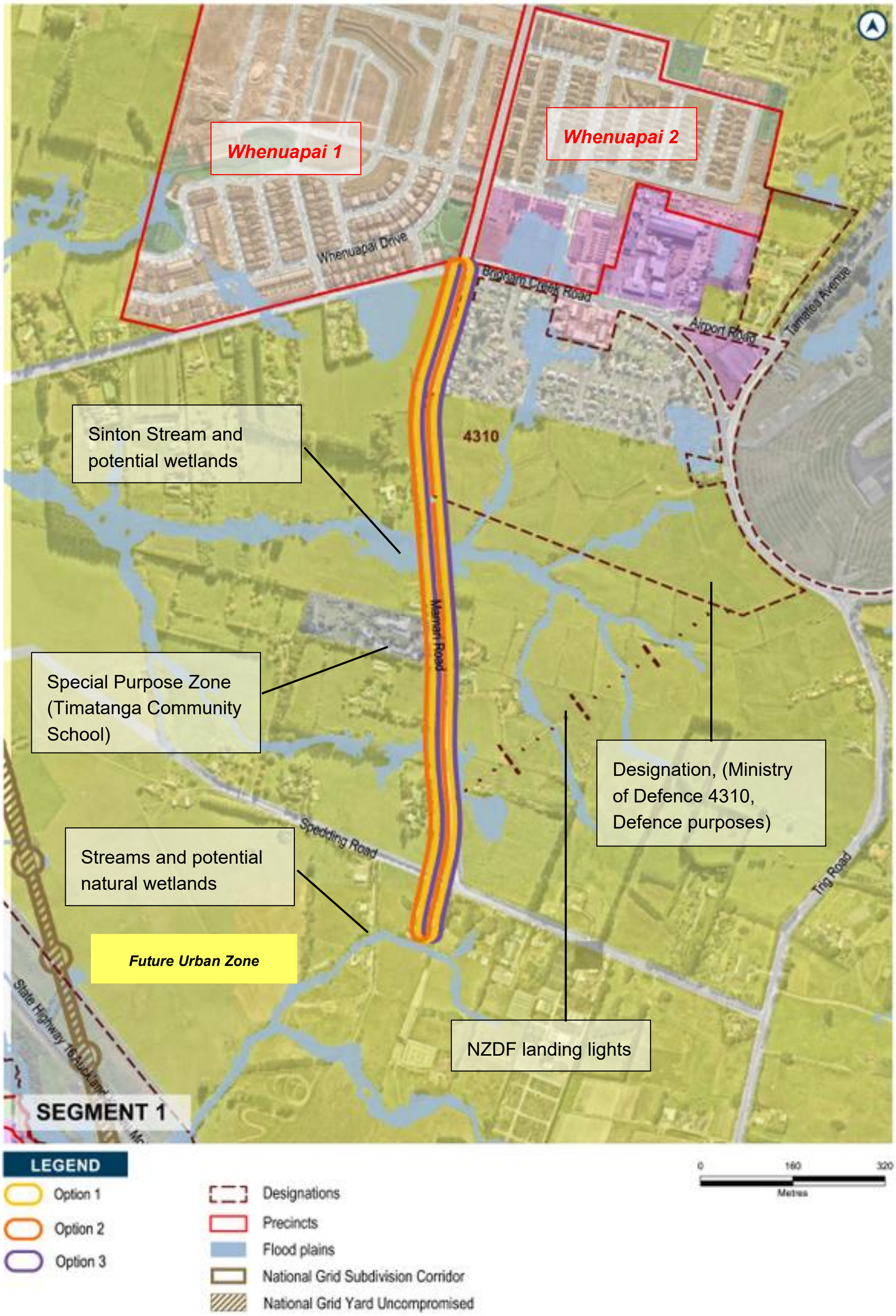


Figure 7-4: Māmari Road Segment 1 options and identified constraints

Table 7-1: Māmari Road Segment 1 – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: No significant constraints were identified along the route for heritage, therefore this criterion was not a differentiator.
Social	Future land use integration: Option A1 is least preferred as it impacts upon both the MOD Designation (both New Zealand Defence Force (NZDF) housing and landing lights) and the Special Purpose School Zone. Option A2 impacts upon the Special Purpose School Zone (Timatanga Community School) in but avoids the MOD Designation. This option is preferred in the northern and southern sections of Segment 1. Option A3 impacts upon the MOD Designation but avoids the Special Purpose School Zone. This option is preferred in the middle section of Segment 1. A hybrid of Options A2 and A3 is the preferred option, as it would avoid these key constraints and would be the best option to allow the road to be integrated into a future development scenario on land currently zoned FUZ. Social: Options A1 and A2 are least preferred as they impact upon the existing Timatanga Community School. Option A3 is preferred as it avoids the school. Urban Design: Options A2 avoids impacting upon the established character of the NZDF housing / Residential – Single House Zone and is preferred. Land Requirement: Option A1 is least preferred as it will impact on properties on both sides of Māmari Road increasing the land requirement. The MoD Designated land and Timatanga Community School pose challenges for the acquiring the required land for Options A2 and A3. A hybrid of Options A2 and A3 which avoids this land is preferred. Human Health and wellbeing: Health and wellbeing were not a differentiator with all options resulting in similar levels of traffic.
Environment	Landscape and Visual: No significant landscape features were identified on Māmari Road, and this criterion was not considered to differentiate between the options. Stormwater: Appropriate stormwater infrastructure can be provided within or adjacent to the Te Tupu Ngātahi cross-section for all options. No significant constraints were identified. This criterion was not considered to differentiate between the options. Ecology: No significant ecological constraints were identified along or in close proximity to any of the options, and this criterion was not considered to differentiate between the options. Natural Hazards: No significant geotechnical constraints or instability issues were identified along the alignment, and this criterion was not considered to differentiate between the options.
Economics	Utilities: Options A1 and A3 impact on the NZDF landing lights, which are important to the safe and continued operation of the NZDF airbase, and these options are least preferred. Option A2 is preferred. Construction: All options will have a similar level of construction disruption to the MOD designated land, residential properties, rural activities and Timatanga Community School. This criterion was not considered to differentiate between the options.

Following the options assessment workshop, and as identified in the table above, the Project Team identified a revised option – a hybrid of options A2 and A3. The hybrid option was designed to avoid the key constraints being the MOD Designation and the Special Purpose Zone, along the route and was preferred by the Project Team over Options A1, A2 and A3. The hybrid option is called Option A2/3-H.

Segment 2

Both options in Segment 2 perform well against the Transport Outcomes, however Option B1 does not perform as well as Option B2 against 'Reliability'. This differentiation is due to Option B2 having more separation between Northside Drive and the proposed SH16 / 18 Connection's interchange to manage queuing and traffic.

Considerations and constraints identified are shown in Figure 7-5. Table 7-2 sets out the MCA scores for the two options developed in Segment 2. Table 7-3 sets out a summary of the qualitative assessment undertaken by SMEs against the MCA framework.

Table 7-2: Māmari Road Segment 2 MCA Assessment

Options	Option B1	Option B2
IO1. Access	4	4
IO2. Reliability	3	4
IO3. Mode Choice	4	4
IO5. Safety	3	3
Criteria		
Heritage	-1	-1
Land use futures	2	2
Urban Design	2	2
Land Requirement	-1	-1
Social Cohesion	2	2
Human Health and Wellbeing	-1	-1
Landscape / Visual	-1	-1
Stormwater	-1	-1
Ecology	-2	-3
Natural Hazard	-1	-1
Construction impacts on utilities / infrastructure	-1	-1
Construction Disruption	-1	-1
Construction costs / risk / value capture	-2	-2

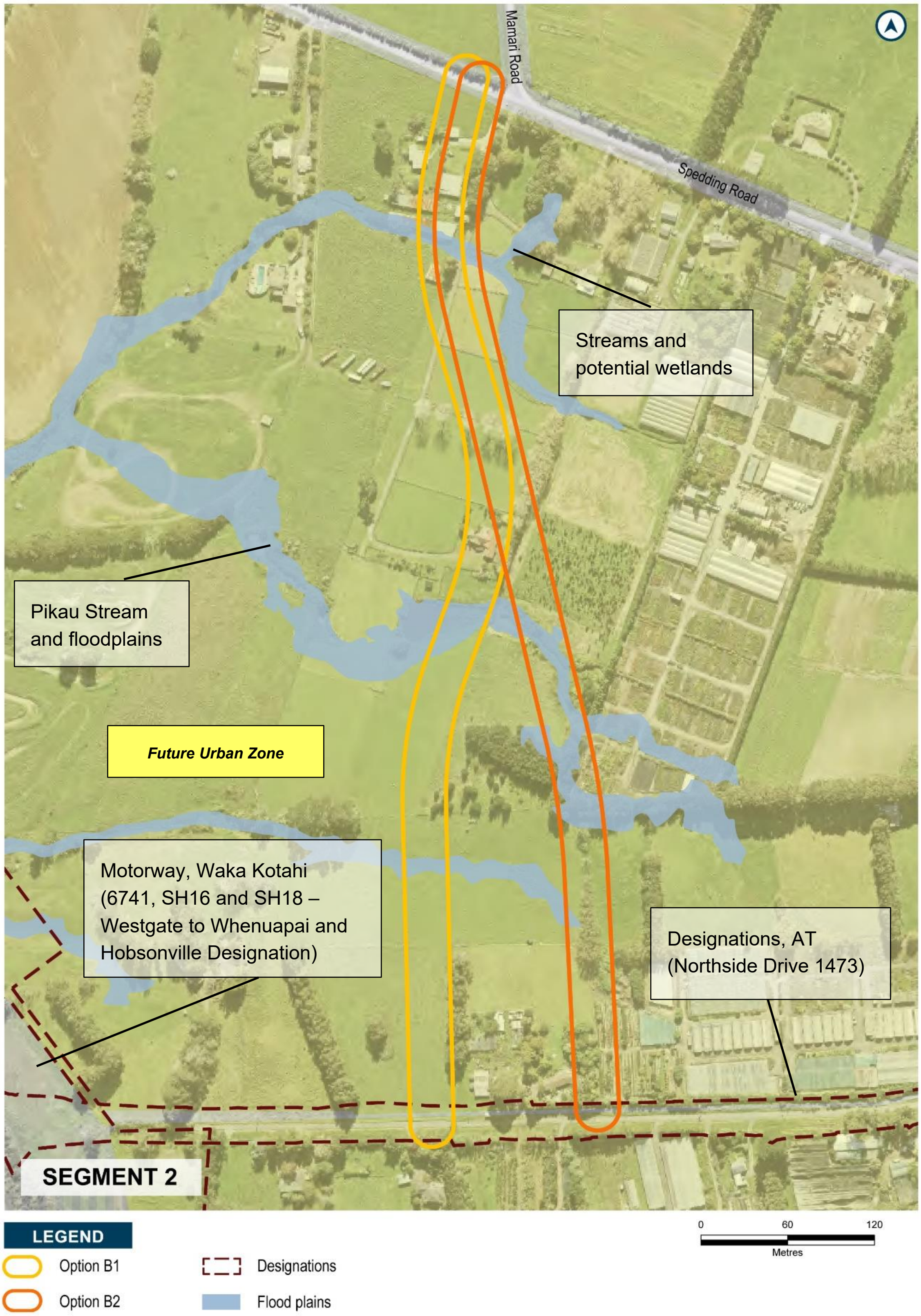


Figure 7-5: Māmari Road Segment 2 options and identified constraints

Table 7-3: Māmari Road Segment 2 – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: There are no known heritage constraints within the extent of either of the options. Both options pass through a similar number of streams and there is potential for discovering unrecorded subsurface archaeological sites at these points. There is however no differentiation between the options.
Social	Future land use integration: Both options are located within the FUZ and will support growth within Whenuapai. There is no differentiation between the options on this criterion. Social: Both will provide increased accessibility and connectivity to employment, community and shops. There is no differentiation on this criterion. Urban Design: There is no significant differentiation between options in terms of urban design, both perform minor positive. Land Requirement: Given the limited number of properties involved both have low adverse impacts; however, there is a preference for Option B1 due to the reduced number of properties impacted. Human health and wellbeing: Both options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing. There is no differentiation between the options on this criterion.
Environment	Landscape and Visual: No significant landscape features were identified within Segment 2, and any landscape or visual impacts, which do occur, will be viewed in the context of future development. There is no differentiation between the options on this criterion. Stormwater: Both have adverse impacts due to impacts on streams, flood plain and overland floodpath effects and embankment erosions. To optimise the route alignment the recommendation from the stormwater / flooding perspective would be to combine the two options in the following way: Option B1 alignment for the southern and central areas – avoids Pikau Stream realignment and flood attenuation. Additional culvert is required at the southern end however not significant impact. Option B2 alignment for the northern area – minimise stream compensation and erosion control measures. Ecology: Option B1 is preferred as it will have less impact on the Pikau Stream and floodplains. Option B2 is not preferred due to the extent of impact on the Pikau Stream and is considered to have a less direct (and poorer) alignment running nearly parallel with the Pikau Stream. Natural Hazards: No significant geotechnical constraints, instability issues or inundation were identified along the alignment. Geology is Puketoka Formation alluvium with key risks being settlement, liquefaction, stability. There are no differentiating factors between options.
Economics	Utilities: As a greenfield site there is limited impacts on infrastructure. There is no differentiation between options. Construction: Options can be constructed off road and will give rise to a similar level of construction disruption. There is no differentiation between options.

Following the options assessment workshop, there was little notable differentiation identified between the options on many criteria. Option B1 performed better for property impacts and ecological criteria, however B2 performed better against the transport outcomes.

7.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners including Manawhenua and Auckland Council, to discuss the options. The key outcome of Project Partner engagement was agreement on the post MCA revised options for both Segments 1 and 2.

In 2020 and 2021 Te Tupu Ngātahi sought feedback from community and landowners on the corridor. The Project Team engaged with landowners at 80 Trig Road, where the owner proposed an amendment to the Māmari Road option, to allow the land to be split into more regular shaped parcels. Specialists from Stormwater, Flooding and Ecology considered the refinement, and confirmed it would:

- Avoid an area of potentially native vegetation
- Result in better alignment with Pikau Stream floodplain
- Not adversely impact the proposed SH16 / 18 Connections Interchange, due to the proposed intersection location being closer to Option B2 intersection. Previous option performance difference was due to Option B2 allowing more separation for queuing between Northside Drive and proposed SH16 / 18 interchange. The refined option therefore removed that difference.

This option incorporated the B2 intersection with Northside Drive (which scored higher on Transport Outcomes for 'Reliability') and a revised alignment which minimised environmental effects, particularly on the Pikau Stream. The revised option was called Option B2-H and was adopted by the Project Team.

Landowner Engagement 2022

During boundary confirmation, the northern end of Māmari Road (in Segment 2) was adjusted to reduce private property impacts in the north, this resulted in a western shift of the southern end near Northside Drive. Following engagement with the southern landowner (as above) feedback affirmed that evenly splitting the southern parcel was strongly preferred, the design was aligned to run more centrally through the lot, to enable more even sized parcels.

A further change was made based on feedback to the middle of Segment 2 to reduce direct building impacts at 7 Spedding Road, whilst holding the southern and northern intersections. This substantially reduced impacts at the site whilst still achieving the required transport outcomes.

7.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Project Partners and the community, a preferred option for Māmari Road was identified.

Segment 1: The preferred is a hybrid of Options A2 and A3, Option A2/3-H was preferred because:

- It avoids key planning constraints along the corridor, including the MOD designations and the *Special Purpose – School Zone* (Timatanga Community School), in the segment mid-section
- It minimises the land requirement and property impacts to the MOD housing and Timatanga Community School.

Segment 2: The preferred is a refined Option B2, informed by landowner feedback. Option B2-H is preferred because:

- The refined alignment will reduce environmental effects on existing streams and wetlands. Reducing need for future stream compensation and reducing extent of erosion and sediment controls required during construction
- It performs better against Transport Outcome 'Reliability'. This is due to the option proposed providing more separation to manage queuing and traffic onto SH16 / 18 Connections Interchange on Northside Drive.

The Māmari Road preferred corridor option was a combination of the options considered. The preferred option will reduce impacts on sensitive environmental features and responds to feedback from a landowner. The selected route refinement option achieves the transport outcomes identified. There will be further opportunities to minimise impacts during detailed design, as a result, no further design refinement is required at this stage.

7.6.4 Discounted Options

Table 7-4 summarises the reasons for discounting the remaining options.

Table 7-4: Māmari Road Discounted Options

Option	Reasoning
Segment 1	
Option A1	• Impacts on the Special Purpose – School Zone (Timatanga Community School) • Impacts on MOD designation – Whenuapai Airbase landing lights and NZDF housing • Increased property impacts on NZDF housing within the Ministry of Defence designation.
Option A2	Discounted at the northern and southern section of Segment 1 due to: • Impacts on MOD designation – Whenuapai Airbase landing lights and NZDF housing and associated property impacts.
Option A3	Discounted at mid-section of Segment 1 due to: • Impacts on the Special Purpose – School Zone (Timatanga Community School) and associated property impacts.
Segment 2 *Note these options were rejected when applied in entirety for Segment 2, however both informed the hybrid preferred option.*	
Option B1	• Proximity to the proposed SH16 / 18 Connections Interchange providing less separation to manage queues and traffic operations.
Option B2	• Impacts upon steams and wetland habitats.

7.7 Māmari Road Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Māmari Road upgrade is a hybrid option for both Segment 1 and Segment 2 that involves widening along the west and east and in some places widening on both sides to ensure impacts on environmental constraints are minimised and transport network operations are optimised.

8 W3: Brigham Creek Road Upgrade

8.1 Corridor Overview

The Brigham Creek Road Upgrade was initially identified in the TFUG PBC preferred transport network plan prepared in 2016. This east-west corridor was identified to support residential access to the Whenuapai village and to provide frequent bus network access to Westgate and the proposed city centre to Westgate RTC.

Assessed as part of the Whenuapai arterial east-west connections, the IBC corridor considered two options, with one deviating from the town centre (AR-W-06B). While this option had improved urban design outcomes; it was later confirmed to have limited traffic redistribution benefits and was discounted as cost inefficient. The upgrade of the existing route, Option *AR-W-06A* as a four-lane urban arterial upgrade was recommended, see Figure 8-1.

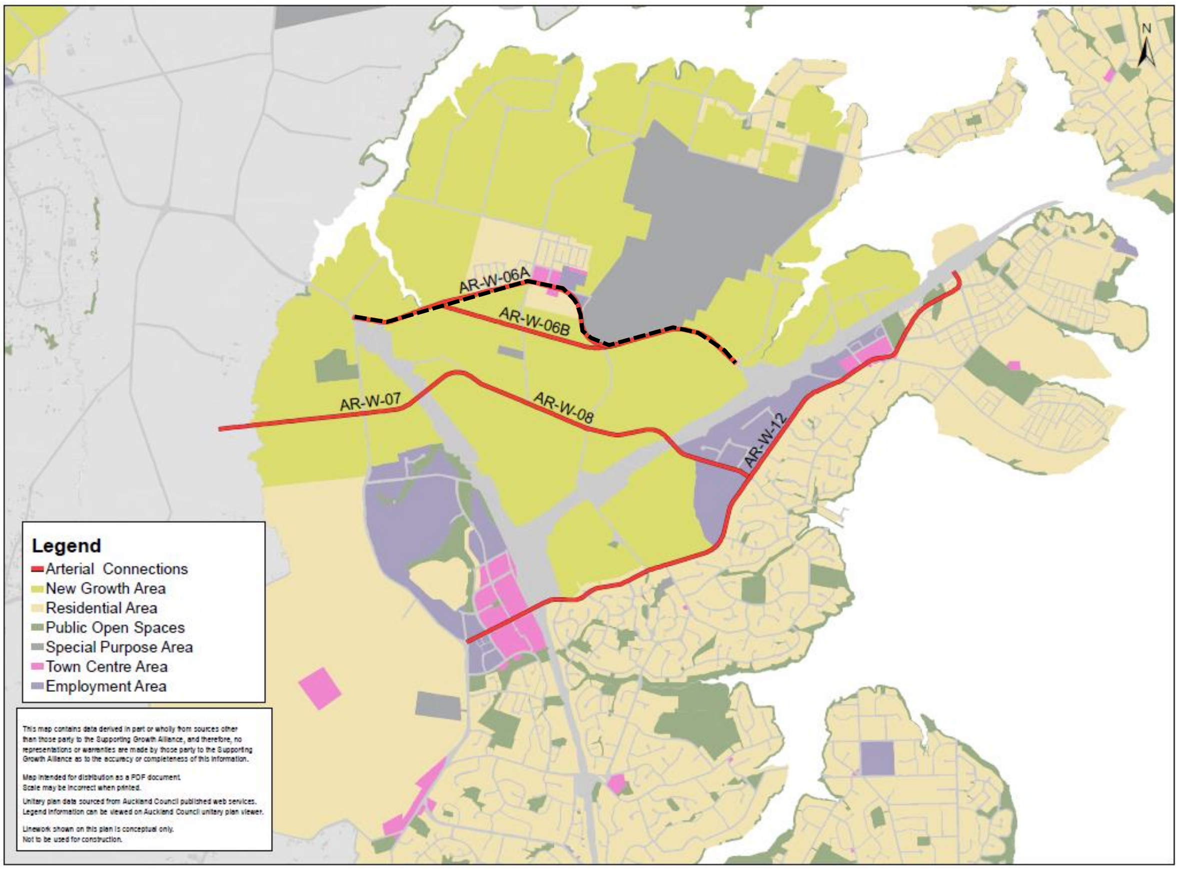


Figure 8-1: Brigham Creek Road IBC Option AR-W-06A

The preferred option refocused Brigham Creek Road on distributing the northern residential catchment to the SH16 and SH18 connections.

8.2 Gap Analysis

Gap analysis identified that land use uncertainty for the corridor was derived from the FUZ and plan changes along the corridor, such as Proposed Plan Change 5, (which has now been withdrawn). Oyster Capital Ltd has submitted a private Plan Change (PC 69 (now approved)) for land adjacent to SH16 within Whenuapai. Engagement with Council and developers was identified as necessary to understand whether plan changes would alter land use expectations as set through the Whenuapai Structure Plan and to inform assessment.

Gap analysis confirmed that:

- Adequate Corridor Assessment was undertaken at IBC and analysis did not trigger further corridor assessment
- Route Refinement assessment should be undertaken to respond to constraints (see Section 8.5).

8.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Brigham Creek Road corridor environment. The exercise identified that:

- **Extent and zoning:** Brigham Creek Road is an existing corridor which extends from the interchange with SH16 in the west to the Interchange with SH18 in the east. The land adjacent to the road corridor is zoned FUZ, except within Whenuapai and the NZDF airbase which consists of.
  - On the corridor's southern side *Residential – Single House Zone* and *Business – Neighbourhood Centre Zone*. The north side of the corridor is *Residential - Mixed Housing Urban Zone*, *Business – Local Centre Zone* and *Business – Light Industry*
- **Future land use:** The Whenuapai Structure Plan (2016) identifies a mix of high and medium density residential and business land use on the south side of the corridor. Medium density residential is identified on the north side of the corridor
- **Special uses and constraints:** NZDF site is *Special Purpose – Airports and Airfields Zone* and designated for 'Defence Purposes' (Designation 4310). Designation 4310 extends beyond the Special Purpose Zone and includes NZDF housing (*Residential – Single House Zone*) on the southern side of Whenuapai. Key infrastructure such as Spark's telecommunication site at 153 Brigham Creek Road
- **Environmental constraints**: The corridor includes several SEAs and streams such as Waiarohia Stream, public open space reserve, and topography restrictions resulting in potentially large embankments.

Key outcomes of the review was decision to:

- Divide the route into three segments for option assessment, to localise the assessment and consider constraints within each segment
  - Segment 1: Brigham Creek Interchange to Totara Road intersection
  - Segment 2: Totara Road to Tamatea Avenue intersection
  - Segment 3: Tamatea Avenue to SH18 interchange
- Have SME input for all segment options assessment due to the varying land use and complexities along the corridor.

8.4 Corridor Form and Function Assessment

An assessment was undertaken for the Brigham Creek Road upgrade following the CFAF methodology in Section 4.3. This recommendation informed the route refinement options developed and assessed in Section 8.5. Figure 8-2 to Figure 8-4 summarises the CFAF outcomes. The function of Brigham Creek Road is to go through the centre of the Whenuapai area and link SH16 to Hobsonville Road.

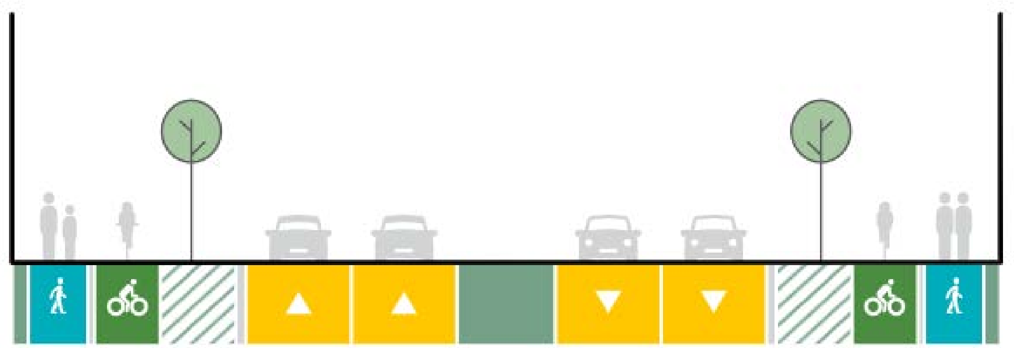


Figure 8-2: CFAF Outcome S1 (BCR interchange to Totara Road segment*)* Indicative 30m cross section

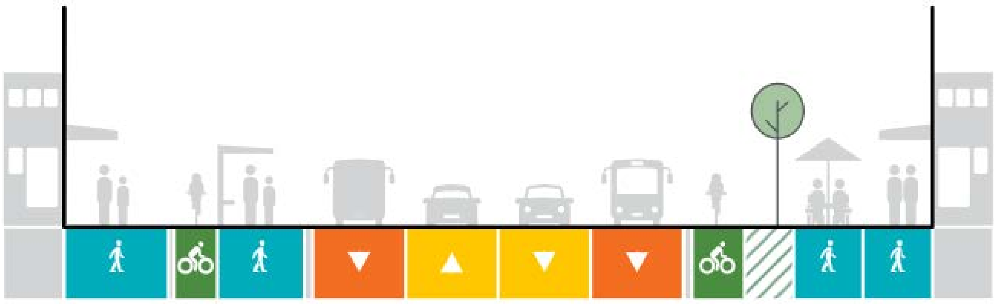


Figure 8-3: CFAF Outcome S2 (Totara Road to Tamatera Avenue) Indicative 30m cross section

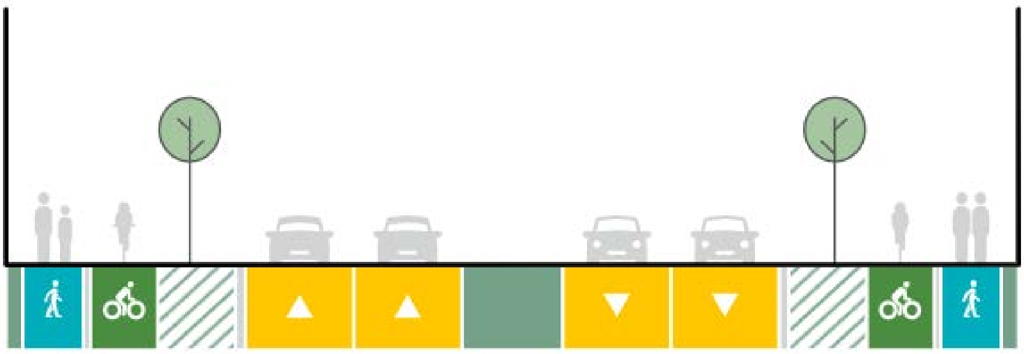


Figure 8-4: CFAF Outcome S3 (Tamatera Avenue to SH18 interchange) Indicative 30m cross section

8.5 Route Refinement Option Development

Brigham Creek Road forms a key link through the Whenuapai area connecting to SH16 and Hobsonville Road. The route was split into segments to allow consideration of each of the Whenuapai Precincts, i.e., Whenuapai Precinct 1 (Segment 1) and Whenuapai Precinct 2 (Segment 2) and the eastern section (Segment 3) adjacent to the FUZ. A further segment (Segment 1A) was later added and is discussed at Section 8.6.2, see Figure 8-5. These options were workshopped based on the indicative 30m wide cross sections.

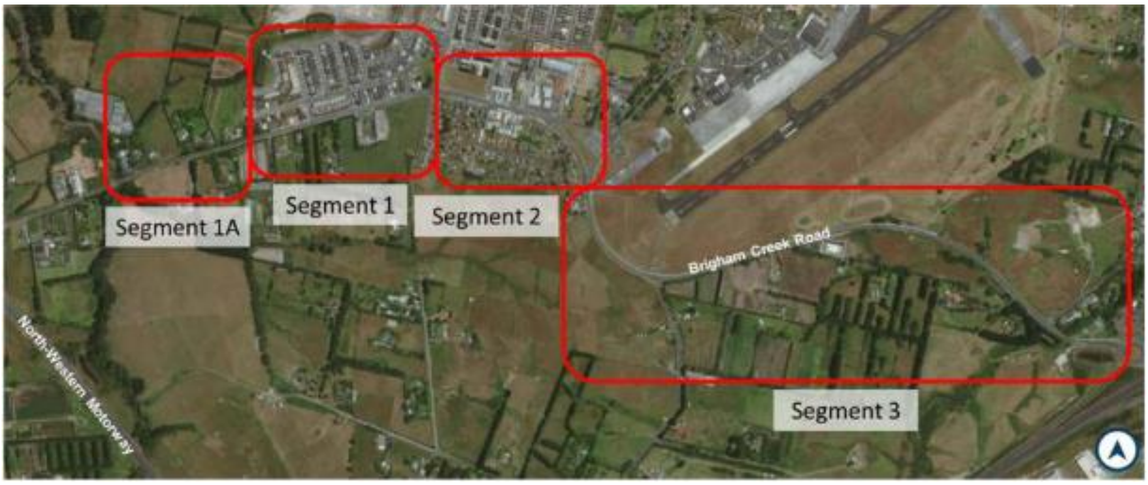


Figure 8-5: Brigham Creek Road segments for route refinement

The same options were assessed for each segment.

- **Option 1 / Widen both**: Widen both the northern and southern side of the road and retain the centreline
- **Option 2 / Widen south**: Widen road on the south and retain the northern boundary
- **Option 3 / Widen North:** Widen road on the north and retain the southern boundary.

8.6 Route Refinement Assessment

8.6.1 Assessment

A Route Refinement assessment was undertaken for the Brigham Creek Road upgrade. The assessment follows the process outlined in Section 4.4. The three options were assessed against the MCA framework including the ability to achieve the corridor Transport Outcomes.

The Brigham Creek Road upgrade aims to achieve the following outcomes:

- *Access: Improve access to economic and social opportunities along Brigham Creek Road*
- *Reliability: Enable reliable people and freight movement on Brigham Creek Road*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people along Brigham Creek Road*
- *Integration: Provide a transport system that is integrated with land use enabling a more sustainable, high quality, connected urban form, and supports growth in Whenuapai*
- *Safety: Provide improvements on Brigham Creek Road that contribute to a transport network that is free from deaths and serious injuries.*

All options achieved the transport outcomes sought with no differentiation.

Considerations and constraints identified are shown in Figures below for each Segment. Table 8-1 provides the MCA performance in each segment and Figure 8-6 to Figure 8-9 show the options against constraints. Table 8-2, Table 8-3 and Table 8-4 summarise the assessment undertaken by SMEs for each Segment using framework.

Table 8-1: Brigham Creek Road MCA Assessment

	Segment 1			Segment 2			Segment 3		
	1	2	3						
Option scoring									
Access	3	3	3	3	3	3	3	3	3
Reliability	3	3	3	3	3	3	3	3	3
Mode Choice	2	2	2	2	2	2	2	2	2
Integration	3	3	3	3	3	3	3	3	3
Safety	3	3	3	3	3	3	3	3	3
Criteria									
Heritage	0	0	0	0	0	0	0	0	0
Land use futures	-3	-2	-3	-2	-2	-2	-3	-3	-3
Urban Design	-3	3	-3	2	-3	-3	2	1	1
Land Requirement	-3	-2	-3	-2	-3	-3	-1	-1	-1
Social Cohesion	-3	0	3	-2	-2	-2	2	2	2
Human Health and Wellbeing	-1	-1	-1	-1	-1	-1	-1	-1	-1
Landscape / Visual	-2	-1	-2	-2	-2	-2	-1	-1	-1
Stormwater	-1	-1	-2	0	0	0	-2	-3	-1
Ecology	-2	-2	-2	0	0	0	-2	-2	-2
Natural Hazard	-2	-1	-2	-1	-1	-1	-2	-1	-2
Construction impacts on utilities / infrastructure	-3	-2	-3	-3	-3	-3	-3	-3	-2
Construction Disruption	-2	-2	-2	-2	-2	-2	-3	-3	-3
Construction costs / risk / value capture	-3	-2	-3	-2	-2	-2	-3	-3	-2

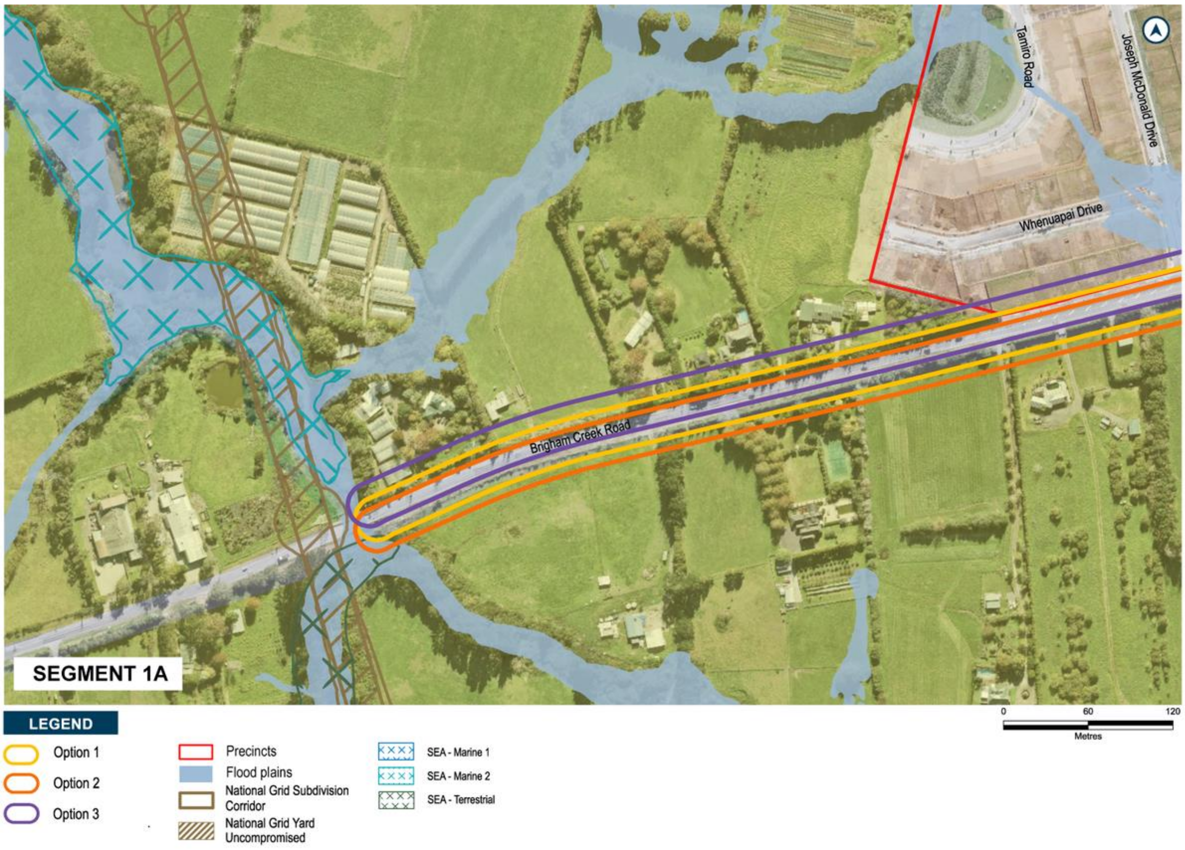


Figure 8-6: Brigham Creek Road Segment 1A Options and identified constraints

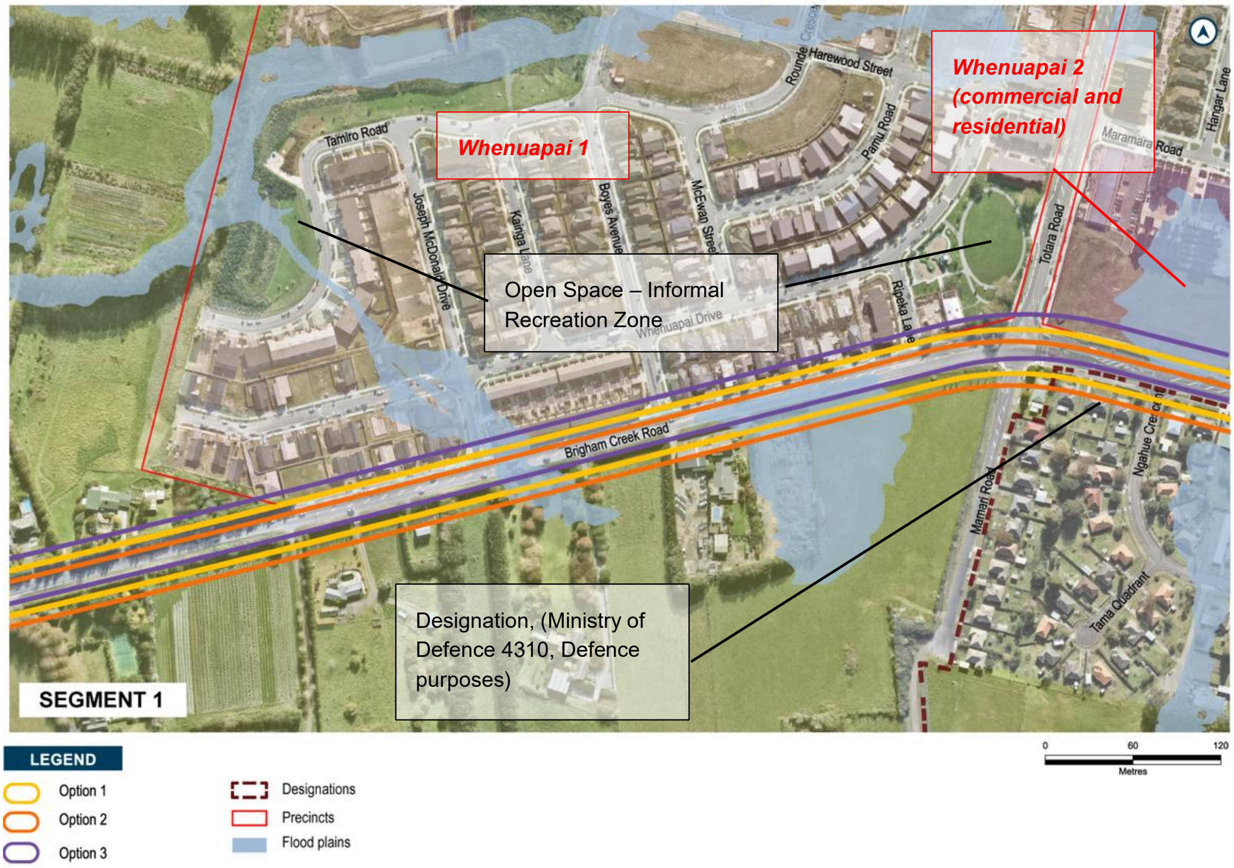


Figure 8-7: Brigham Creek Road Segment 1 Options and identified constraints

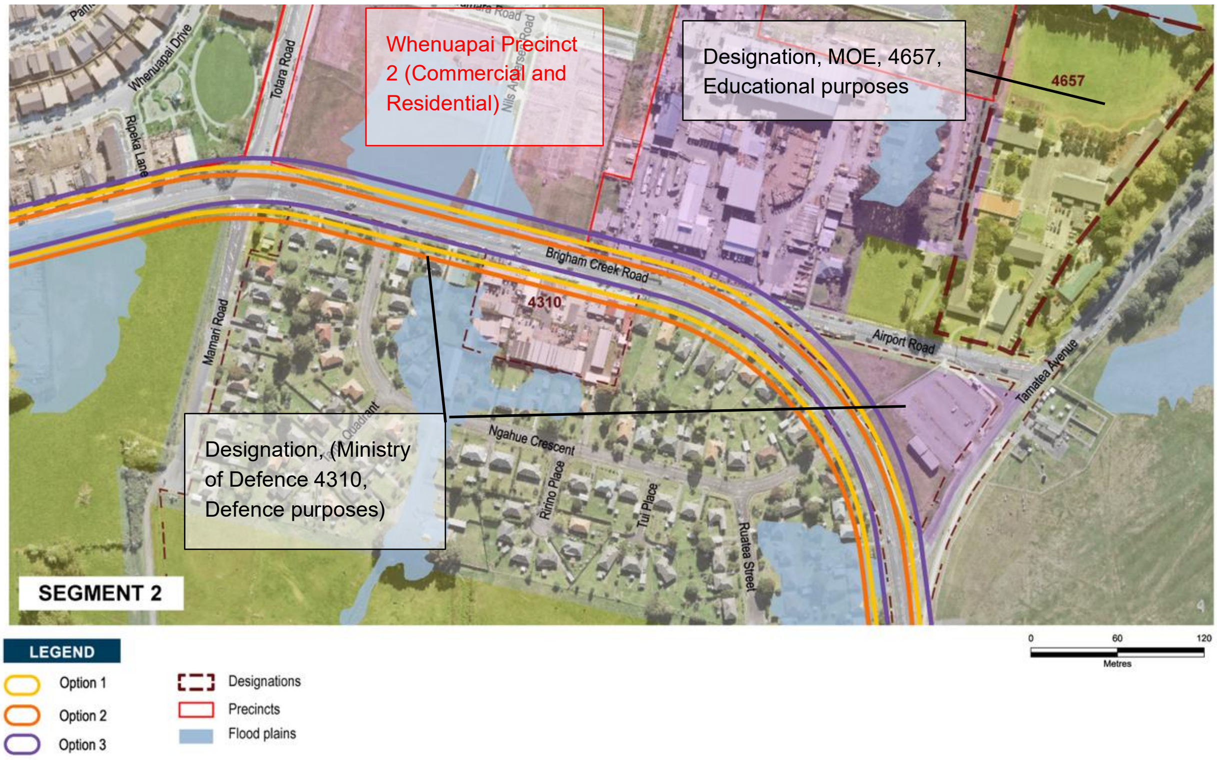


Figure 8-8: Brigham Creek Road Segment 2 Options and identified constraints

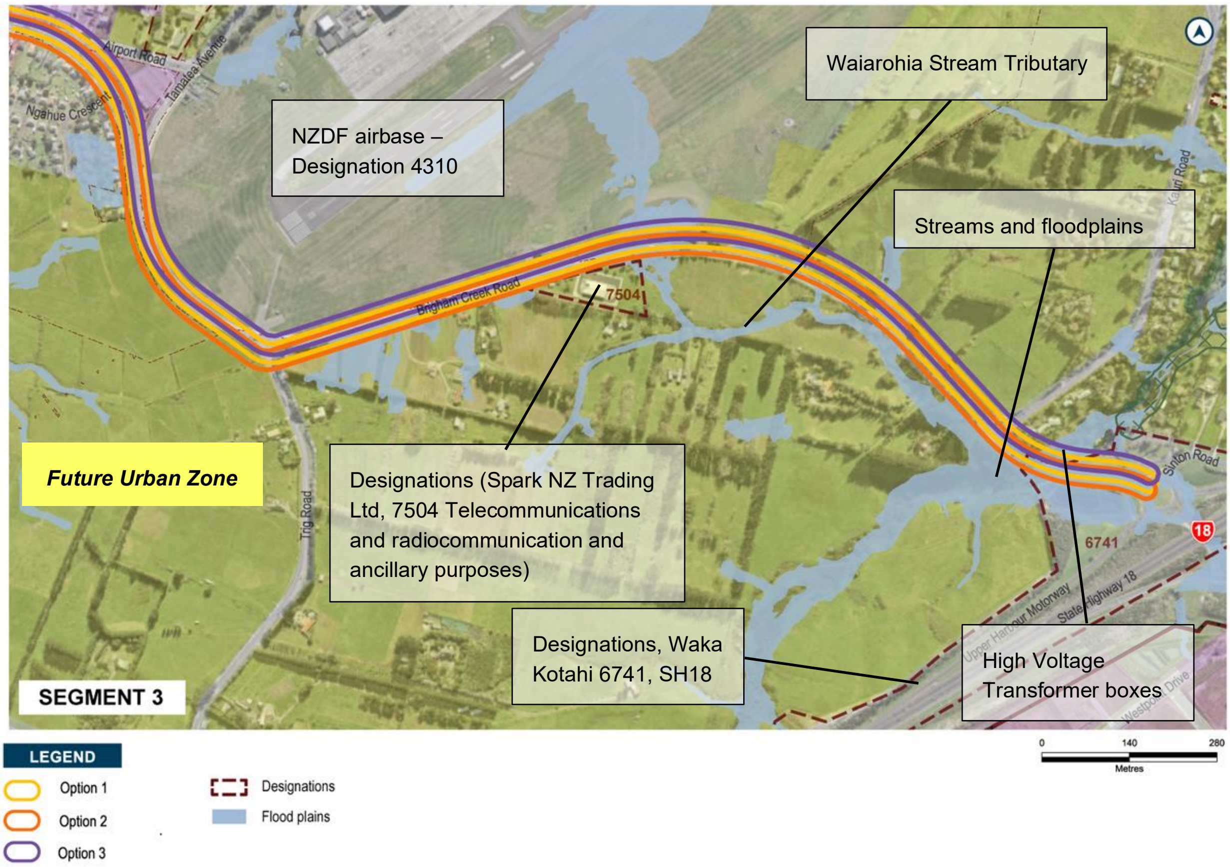


Figure 8-9: Brigham Creek Road Segment 3 Options and identified constraints

Table 8-2: Brigham Creek Road Segment 1 – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: No heritage constraints were identified along the corridor, therefore it was not a differentiator.
Social	Future land use integration: Option 2 (South widening) performed better than Option 1 or 3 and is preferred. This is because Option 2 widens into the FUZ, which will allow for integration with future development and avoid existing high-density housing in Whenuapai Precinct 1 (Residential – Mixed Housing Urban Zone). Option 1 and 3 performed worse, with Option 1 slightly better than 3, requiring less land on the northern side. Both options created residual land that would be harder to integrate the corridor into. Social: Option 2 performed best as it has the least impact on the resident community within Precinct 1 by avoiding existing high-density zone, the Hobsonville Road frontage of Whenuapai Settlement playground / Park (Open Space – Informal Recreation Zone) and a neighbouring café. Option 1 and 3 did impact the residential area, playground and café and so performed worse. Urban Design: Option 2 is preferred as it will retain the character of the existing small lot medium density housing within Whenuapai Precinct 1. The road widening will occur within the FUZ where it can be more readily integrated with the future design outcomes for the area. Land Requirement: Option 2 was preferred as it had less impact on the existing smaller residential lots. Human Health and wellbeing: Human health and wellbeing impacts from additional traffic performed similarly across the three options, therefore this criterion was not a differentiator.
Environment	Landscape and Visual: All options will create adverse visual effects for existing residents and visitors. Option 2 performs best and is preferred as the extent of visual effects on residents within Whenuapai Precinct 1 is limited. Options 1 and 3 will extend into the Precinct and will have greater visual effects on remaining residents. Stormwater: Options 1 and 2 will have a low to moderate effect on the existing stormwater system and environment. Option 3 will have a greater impact on the existing stormwater system and may require increased flood attenuation or upsized culvert(s) due to the increased stormwater catchment needing to be conveyed to Slaughterhouse Stream. Ecology: All options have the potential to create adverse ecological effects. Option 2 is however preferred as the widening occurs to the south and effects will largely be on the Sinton Steam which has a greater ability to buffer the receiving Totara Creek (and its SEA's) from catchment modification. The Slaughterhouse Stream which would be impacted by Options 1 and 3 has less ability to buffer Totara Creek and therefore these options are less preferred. Natural Hazards: Option 2 is the preferred option. Widening to the south involves less cutting into the slope and this has a reduced instability risk. Options 1 and 3 involve the filling of embankments which have increased risk of instability and settlement on the soft alluvial material.
Economics	Utilities: Option 2 is the preferred option as there are fewer services which would be impacted by widening to the south of the existing road corridor. Construction: All options will result in construction disruption. Option 2 is however preferred as it will limit the extent of disruption within the Whenuapai 1 Precinct as construction will occur within and to the south of the road corridor.

Table 8-3: Brigham Creek Road Segment 2 – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: No significant constraints were identified along the route for heritage; therefore it wasn't a differentiator.
Social	Future land use integration: All options impact on developable land adjacent to the road corridor. However, Option 1 is preferred as the extent of impacts on the mix of residential and business zoned land is more equitably split and as a result reduces the quantum of land lost for urbanisation within the respective zones. Option 2 is the second preference. It will have a greater impact on the Neighbourhood / Local Centre and industrial land but the area of land still available will not limit future development. Option 3 is least preferred as it will have the greatest impact on the Local Centre land, which is a comparatively small zone, and so this option will have a more notable reduction in the land available for Neighbourhood / Local Centre development. Impacts on the residential land are also greatest under Option 3. Social: All options will impact on the existing shops, services and employment opportunities for the community located in the Neighbourhood / Local Centre (located in Segment 2). There is a preference for Option 2 as the centreline approach has greater potential for refinement to minimise impacts. Urban Design: Option 1 is the preferred option. Option 2 balances the loss of frontages on both sides of the road corridor and will enable the road corridor to have a good interface between the road and the shops and services within surrounding land uses. Option 2 will also largely retain the character of the Residential – Single House Zone. Options 2 and 3 have a less positive interface between the road and surrounding land uses and perform worse. Land Requirement: All options will result in significant property impacts. Options 2 and 3 will have greater impacts on the respective side of the road corridor that is being widened and have reduced opportunities for refinement. The property impacts from Option 1 are more evenly split along the corridor and have greater opportunities for refinement to minimise the land requirement. Human Health and wellbeing: Human health and wellbeing impacts from additional traffic performed similarly across the three options, therefore the criterion was not a differentiator.
Environment	Landscape and Visual: All options will create adverse visual effects for existing residents and visitors to the Neighbourhood / Local Centre. Option 3 is preferred as it avoids / reduces the proximity of the road to the residential properties within the Residential – Single House Zone. Stormwater: All options will require stormwater infrastructure to be provided either within the road corridor or on adjacent property. There is no differentiation between the options in terms of stormwater or flooding constraints. Ecology: Segment 2 is an urban corridor with no notable ecological features. There is no differentiation between the options in terms of stormwater or flooding constraints. Natural Hazards: All options have a similarly low level of geo-technical risk associated with settlement, liquefaction and slope instability issues. Therefore there is no differentiation between the options.
Economics	Utilities: All options will impact on the existing utilities and infrastructure located within the road corridor. Therefore there is no differentiation between the options. Construction: All options will result in construction disruption to residents, businesses and visitors. However Option 1 is preferred as the option will limit the extent of disruption to the residents within the Residential – Single House Zone.

Table 8-4: Brigham Creek Road Segment 3 – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: No significant constraints where were identified along the route for heritage, it was not a differentiator.
Social	Future land use integration: Option 2 involves widening to the south. This is the preferred option adjacent to the NZDF runway as it would widen the road further away from the runway, although the widening would still extend into MoD designated land. Option 3 involves widening to the north impacting on land within the Special Purpose – Airports Zone. This is the preferred option adjacent to the Spark Designation as it will avoid impacts on telecommunication infrastructure associated with the Southern Cross Cable. Option 1 is not a preferred option as it still involves some widening towards the runway and within the Spark designation. All Options have drawbacks; however, a preference was identified for a hybrid of Options 2 and 3 that would minimise impacts on the designations along the corridor. Social: There is a golf course located within the MoD designation. Option 3 will widen the road corridor to the north but will not have any significant impact on the golf course (nor the benefits this provides to the community). There is no other social infrastructure located along the route and the options will not give rise to any severance issues. All options perform well as they will increase accessibility and connectivity for the existing and future communities within Whenuapai. Urban Design: Option 1 is the preferred option. This option will allow for greater integration with the urban character anticipated in the FUZ located on both sides of the road corridor. Options 2 and 3 have less integration with the character of future development by only widening on one side of the corridor. Land Requirement: The property impacts from all three options are mostly minor, as existing buildings and activities are generally set back from the road corridor. The key differentiators are that Option and 1 and 2 would significantly impact the Spark designated site, and for Option 3 the additional complexity of requiring MOD land close to the NZDF runway. A hybrid approach between Options 1 and 3 is therefore preferred. Human Health and wellbeing: Health and wellbeing were not a differentiator with all options resulting in similar levels of traffic.
Environment	Landscape and Visual: All options will result in very low adverse impacts on the existing vegetation found along the road corridor. There is a slight preference for Option 3 as this will have the least cumulative effects on the landscape due to the alignment being further from the wetland, stream and vegetative features (located to the south of the road). However, these features are located within the FUZ and visibility from the road is likely to change as development occurs. Stormwater: Option 3 is the preferred option. Option 3 will widen the road corridor to the north reducing the flood risk on the Spark designated land (which is close to an overland flow path). Option 3 will impact upon the Waiarohia Stream; however, will likely require the least amount of potential stream compensation and re-alignment. Option 2 widens the road corridor to the south closer to the overland flow path and stream giving rise to greater flood risk. Option 1 sits between Options 1 and 3 in terms of flood risk and effects on the stream. Ecology: In Segment 3 a tributary of the Waiarohia Stream can be found on the south side of the corridor and to the east of the Spark designation. There are also wetlands and riparian and floodplain features associated with the Stream. Options 1 and 3 involve widening to the road closer to these features and have the potential to give rise to greater ecological effects. Option 2 widens to the north and will have lower effects on the ecological features found in the area and is therefore the preferred option. However Option 2 performs similarly due to the potential

Wellbeing Assessment	
	for effects elsewhere along the segment. Note there is no differentiation between the options in the western section of Segment 3 (west of Spark designation). Natural Hazards: Option 2 is the preferred option. Option 2 will involve cutting into the existing slope on the north; however, this has a lower level of instability risk compared filling embankments (as required by Option 3). Due to the complexity associated with filling embankments Option 3 performs worse. Option 1 also performs worse and is the least preferred option with a higher geo-technical risk due to needing both cut and fill widening on both sides of the road corridor.
Economics	Utilities: Option 3 is the preferred option. By widening north, Option 3 will avoid existing telecommunication infrastructure, including the Southern Cross Cable Station, located within the Spark Designation site. There are also fewer utilities located on the northern side of the corridor. Options 1 and 2 perform worse as they both involve widening to the south and would impact the Spark designation. Additionally, there are more utilities located on the southern side of the corridor which will likely require relocation. Opportunities exist for all options to relocate the existing services into a common utility trench. The differentiation between the options is therefore limited to the area adjacent to the Spark designation. Construction: Construction associated with Options 1 and 2 have the potential to have a greater impact on the Spark designation, which contains the service station for a nationally important piece of infrastructure. Option 3 has the potential to have greater impacts on the NZDF runway. All options therefore have drawbacks. A Hybrid Option of Options 2 and 3 which would minimise the construction disruption on the Spark designation and the NZDF runway is preferred.

8.6.2 Refinement through Engagement

Throughout the option assessment the Project Team engaged with Project Partners, to discuss the options. Key engagement outcomes were agreement on an Option 2 hybrid in Segment 1 and 2, and an Option 2 and 3 hybrid in Segment 3 being the early emerging preferred option.

Project Partners also challenged whether a reduced cross section of two lanes would be more suitable through the Whenuapai town centre and wider corridor. Two lanes were discounted because the predicted traffic volumes support four lanes within the existing Whenuapai town centre and on the extended section of Brigham Creek Road. Furthermore, the 2048 traffic volumes predicted are conservative based on other projects being implemented including:

- A parallel Spedding Road connection
- SH16 / 18 Connections, providing motorway alternatives
- RTC stations being operative at Westgate / Brigham Creek Road to enhance the public transport network.

The traffic volumes could also increase if land use changes are made to the Whenuapai Airbase, which although designated for defence is partly FUZ. The existing Whenuapai Local Centre is live zoned; however, there is potential for redevelopment as the population around the Local Centre grows. The Whenuapai Structure Plan also shows the centre as being the location of a 'Potential Multi-purpose Community Facility'. Redevelopment will create land use integration and urban design opportunities within Whenuapai Local Centre which can respond to a 30m cross section. Four lanes along the corridor length also provides consistency and resilience.

In 2020 and 2021 Te Tupu Ngātahi sought feedback from community and landowners. Oyster Capital Ltd which has land interests south of Segment 1 provided feedback on the early preferred option

(*Option 2 / Widen south*) and extent of property impact. This resulted in the Project Team refining the alignment to adopt more equitable land requirement by widening on both sides of the road, this resulted in new Segment 1A (see Figure 8-6).

The Project Team met with affected requiring authorities along the corridor, including NZDF. NZDFs key feedback was that it did not support widening north closer to the runway due to potential adverse operational effects on the runway. The Project Team also met with Spark. Key feedback was that the Southern Cross Cable is a significant piece of infrastructure which forms part of a trans-Pacific network of telecommunications cables connecting New Zealand with Australia and the west coast of America. Impacts on the cable should be avoided to protect it, and any relocation of the cable would be significantly complex.

8.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Partners and community, a preferred option for Brigham Creek Road was identified. The preferred option is a combination of the options assessed, widening portions to either the north and south or both sides. This hybrid approach ensures impacts on sensitive features are reduced where possible.

Segment 1 and 1A: 'Option 1 hold the centreline and widen on both sides' was preferred because:

- Option 1 avoids the small lot residential properties within the Whenuapai Precinct 1 development, which is being developed to scale and density that supports growth within Whenuapai. The road widening can be better integrated into the FUZ located on the southern side of the road corridor
- The property impacts and land requirement for Option 1 will largely be limited to the south side of the road corridor
- Option 1 construction costs and risks will be low as there are less properties that will require to be demolished. There are also less utilities located on the southern side of the road corridor
- Option 1 allows for a greater buffer between the widened road and the Totara Creek reducing the potential for adverse ecological effects
- The option resulted in more equitable land requirement and responds to feedback received from Oyster Capital Ltd.

Segment 2: 'Option 1 to widen both sides and retain the centreline' was preferred because:

- Option 1 will allow the widened road corridor to have an enhanced interface between the road and surrounding land uses on both sides of the corridor
- Option 1 has the greatest opportunity for refinement to minimise property impacts and the land requirement.

Segment 3: The preferred option is a hybrid of Options 2 (widen on south) and 3 (widen on north) which avoids the NZDF and Spark designations. A hybrid was chosen because:

- It responds to key constraints along the corridor by widening to the south to avoid the NZDF runway and widening to the north to avoid the Spark Designation. This approach is supported by the respective Requiring Authorities
- Widening north in the eastern section of the segment minimises the potential for ecological and stormwater effects due to be further from the Waiarohia Stream and associated features.

There will be further opportunities to minimise impacts during detailed design, as a result, no further design refinement is required at this stage.

8.6.4 Discounted Options

Table 8-5 summarises reasons for discounting the three options along each segment.

Table 8-5: Brigham Creek Road Discounted Options

Option	Reasoning
Segment 1 and 1A	
Option 2	• Significant impacts on the properties located within the Whenuapai Precinct 1 and impacts on the southern side of the road corridor and an encroachment into the Open Space • Less ability to integrate the road corridor into the FUZ • Adverse effects on the existing urban design character of Whenuapai Precinct 1 • Potential for more significant ecological effects due to less buffer between the widened road corridor and Totara Creek.
Option 3	• Significant impacts on the properties located within the Whenuapai Precinct 1 and an encroachment into the Open Space • Less ability to integrate the road corridor into the FUZ and adverse effects on the existing urban design character of Whenuapai Precinct 1 • Potential for more significant ecological effects due to less buffer between the widened road corridor and Totara Creek • Greater impact upon the existing stormwater system and potential requirement for increased flood attenuation.
Segment 2	
Option 2	• Significant property impacts on the NZDF residential properties and the Neighbourhood / Local Centre properties • Reduced urban design outcomes in terms of the interface with the street and impacts on the character of the Residential – Single House Zone / NZDF residential properties • Less preferred in terms of Construction Cost / Risk criteria due to works be located close and requiring demolition of NZDF properties.
Option 3	• Significant impacts on the NZDF properties / land located within the Neighbourhood / Local Centre and industrial land • Reduced urban design outcomes in terms of the interface with the street and impacts on the character of future development within Business – Local Centre Zone.
Segment 3	
Option 1	This option was discounted for the full length of Segment 3 for the following reasons: • Significant impacts upon the Spark Designation and the potential for impacts on the NZDF airbase by widening towards the runway • Potential for greater ecological and stormwater effects due to proximity to the Waiarohia Stream and associated features.
Option 2	This option was discounted in the eastern section of Segment 3 for the following reasons: • Significant impacts upon the Spark Designation • Potential for greater ecological and stormwater effects due to proximity to the Waiarohia Stream and associated features.

Option	Reasoning
Option 3	This option was discounted in the western section of Segment 3 for the following reasons: • Potential for impacts on the NZDF airbase by widening towards the runway • Less opportunity to integrate the road widening with the FUZ located on the southern side of the road corridor.

8.7 Brigham Creek Road Upgrade Summary

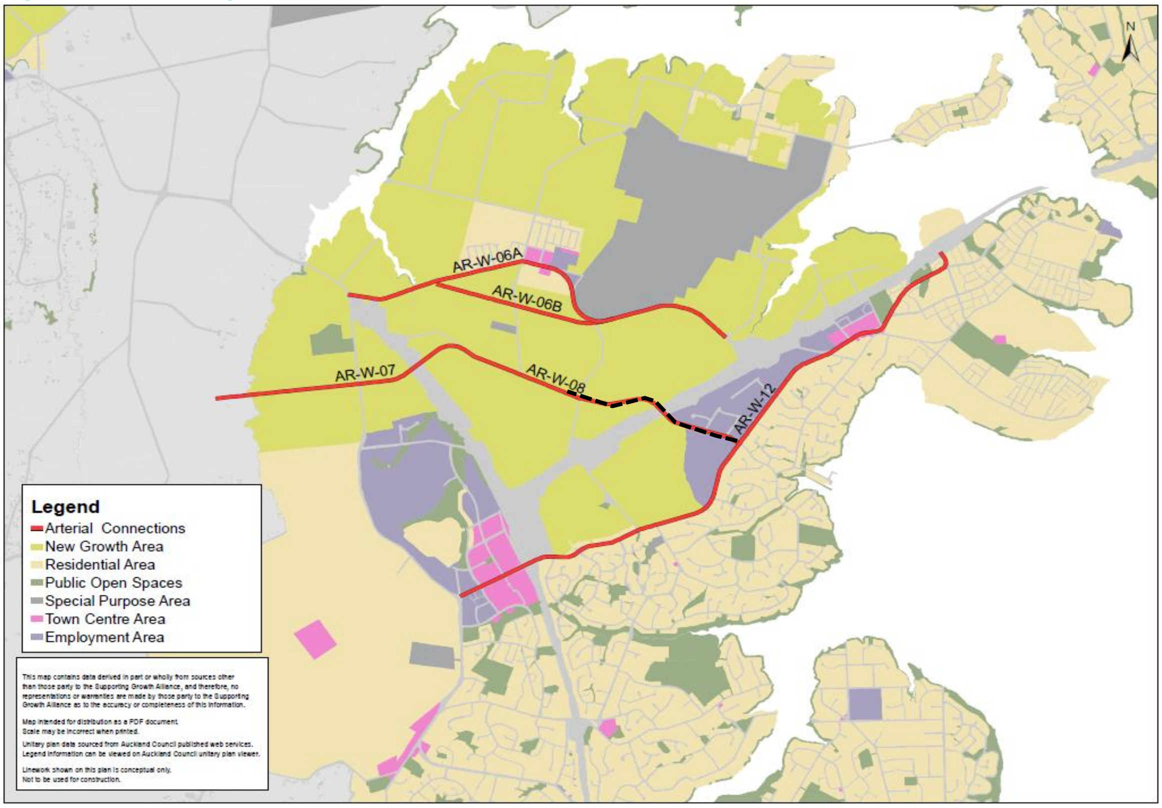
As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Brigham Creek Road upgrade is a centreline option in Segment 1A, widening both sides in Segment 1 and 2, and a hybrid of Option 2 and 3 (north and south) in Segment 3. This combination of widening on both sides, to the north or south ensures impacts on environmental constraints are minimised where possible.

9 W4: Spedding Road – East

9.1 Corridor Overview

The Spedding Road East corridor was included in the TFUG PBC preferred transport network plan prepared in 2016. Spedding Road West was added to the TFUG recommended transport network at the IBC stage and included an overbridge crossing of SH16 from Trig Road to Fred Taylor Drive. The two options form one route, but were divided into two sections for assessment, refer to Section 10 for the Spedding Road West assessment. Spedding Road East spans across eastern Whenuapai from Trig Road to Hobsonville Road and was referenced as *AR-W-08* at the IBC stage, see Figure 9-1.

Figure 9-1: Spedding Road East IBC Option AR-W-08



This new connection was assessed as one of the Whenuapai east-west arterials and will support access to the light industrial and business zoning adjacent to SH18. It will enable fast, reliable freight access to the motorway network. The eastern (and western) extensions of Spedding Road provide resilience for Whenuapai through additional state highway crossings that avoid interchanges and improve access for connector bus services to the future rapid transit network. The project will improve local walking and cycling journeys safety and connectivity and contribute to travel choice.

Project Partners and public consultation indicated strong support for both Spedding Road connections (east and west) and that upgrade of the existing section of Spedding Road would make the best use of existing infrastructure. Manawhenua raised concerns as the SH18 crossing could affect the Rāwiri Stream Ecological Restoration Project. However, manawhenua also indicated an option minimising adverse effect on this site would be acceptable.

9.2 Gap Analysis

The gap analysis for Spedding Road East confirmed that the key consideration was the uncertainty of future land use. Uncertainty was derived from proposed Plan Change 5 to the AUP:OP, which proposed to re-zone the southern part of the Whenuapai FUZ to a mix of business and residential zones[2]. There is also potential for private plan changes within Whenuapai which propose different zoning from the Whenuapai Structure Plan (Auckland Council, 2016). Manawhenua raised concerns for the Rāwiri Stream restoration project at the IBC stage and indicated a need to reduce impacts on this site.

Gap analysis confirmed that:

- Adequate Corridor Assessment for existing alignment was undertaken at IBC and analysis did not trigger further corridor assessment; however
- Further assessment of corridor options within a focused study area was warranted as:
  - Spedding Road East is extending across greenfield land
  - There are potential impacts on Rāwiri Stream and associated ecology values
  - There is innate complexity of a new crossing over SH18.

9.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Spedding Road East corridor environment. The exercise identified that:

- **Extent and zoning**: The land to the south of SH18 is currently zoned FUZ in the AUP:OP
- **Future Land use:** The Whenuapai Structure Plan shows the land as being intended for Business zoning
- **Special uses and constraints**: The corridor crosses Waka Kotahi SH16 / 18 in Designation 6741 in the AUP:OP, and Watercare Service Ltd Designation 9377 for the Northern Interceptor. Existing infrastructure such as roading and stormwater ponds informed the options developed
- **Environmental Constraints**: There is a CHI World War II gun emplacement located near 4 Spedding Road. Spedding Road east of Trig Road has no significant constraints identified, and adjacent land is FUZ.

Key outcomes of the review were:

- The decision to upgrade the existing Spedding Road corridor (between Māmari Road and Trig Road) and not to consider new alignment options
- To widen this section of Spedding Road on both sides as there were no significant environmental constraints and this was the most equitable land requirement approach
- For the section through greenfield (east of Trig Road) proceeded to a localised corridor assessment.

[2] As noted Plan Change 5 has now been withdrawn.

9.4 Corridor Form and Function Assessment

An assessment was undertaken for the Spedding Road East upgrade following the CFAF methodology in Section 4.3. This recommendation informed the corridor options developed and assessed in Section 9.5. Figure 9-2 shows the CFAF cross section outcome.

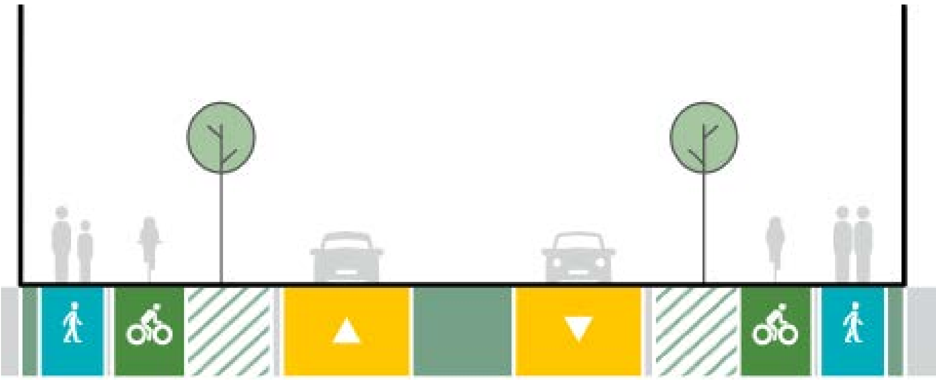


Figure 9-2: CFAF Outcome – Spedding Road East Indicative 24m cross section

9.5 Route Refinement Option Development

Spedding Road East forms an important strategic connection across SH16 / 18 for resilience, improves walking and cycling connections and connects Whenuapai and Hobsonville. Three options based on the indicative 24m wide cross section in Figure 9-2 were workshopped for the greenfield section of the corridor. All three options tie into existing Spedding Road, west of Trig Road and connect into Hobsonville Road opposite Marina View Drive.

- **Option 1 / Northern**: A northern alignment crossing over SH18
- **Option 2 / Central:** A 'central' alignment crossing over SH18
- **Option 3 / Southern**: A southern alignment crossing over SH18.

9.6 Route Refinement Assessment

9.6.1 Assessment

A Corridor Assessment was undertaken for Spedding Road East, the assessment follows the process outlined in Section 4. The three options above were assessed against the MCA framework including the ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities by providing an integrated multi-modal corridor between Whenuapai and Hobsonville*
- *Reliability: Enable reliable people movement between Whenuapai and Hobsonville*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people between Whenuapai and Hobsonville*
- *Safety: Contribute to a transport network between Whenuapai and Hobsonville that is free from deaths and serious injuries.*

Option 3 / Southern performed slightly less well on 'Access', however there was no significant differentiation, and therefore all options were considered to perform well against the Transport Outcomes. Option considerations and constraints are identified in Figure 9-3. Table 9-1 and Table 9-2 provides a summary of the assessment undertaken by SMEs using the MCA framework.

Table 9-1: Spedding Road East MCA Assessment

Options	Option 1	Option 2	Option 3
IO1. Access	4	4	4
IO2. Reliability	3	3	3
IO3. Mode Choice	3	3	3
IO4. Safety	3	3	3
Criteria			
Heritage	-2	-2	-2
Land use futures	1	2	1
Urban Design	2	2	1
Land Requirement	-2	-2	-2
Social Cohesion	3	3	3
Human Health and Wellbeing	1	1	1
Landscape / Visual	-1	-1	-1
Stormwater	-2	-2	-1
Ecology	-3	-3	-3
Natural Hazard	-2	-1	-1
Construction impacts on utilities / infrastructure	-1	-1	-1
Construction Disruption	-2	-2	-2
Construction costs / risk / value capture	-2	-2	-2

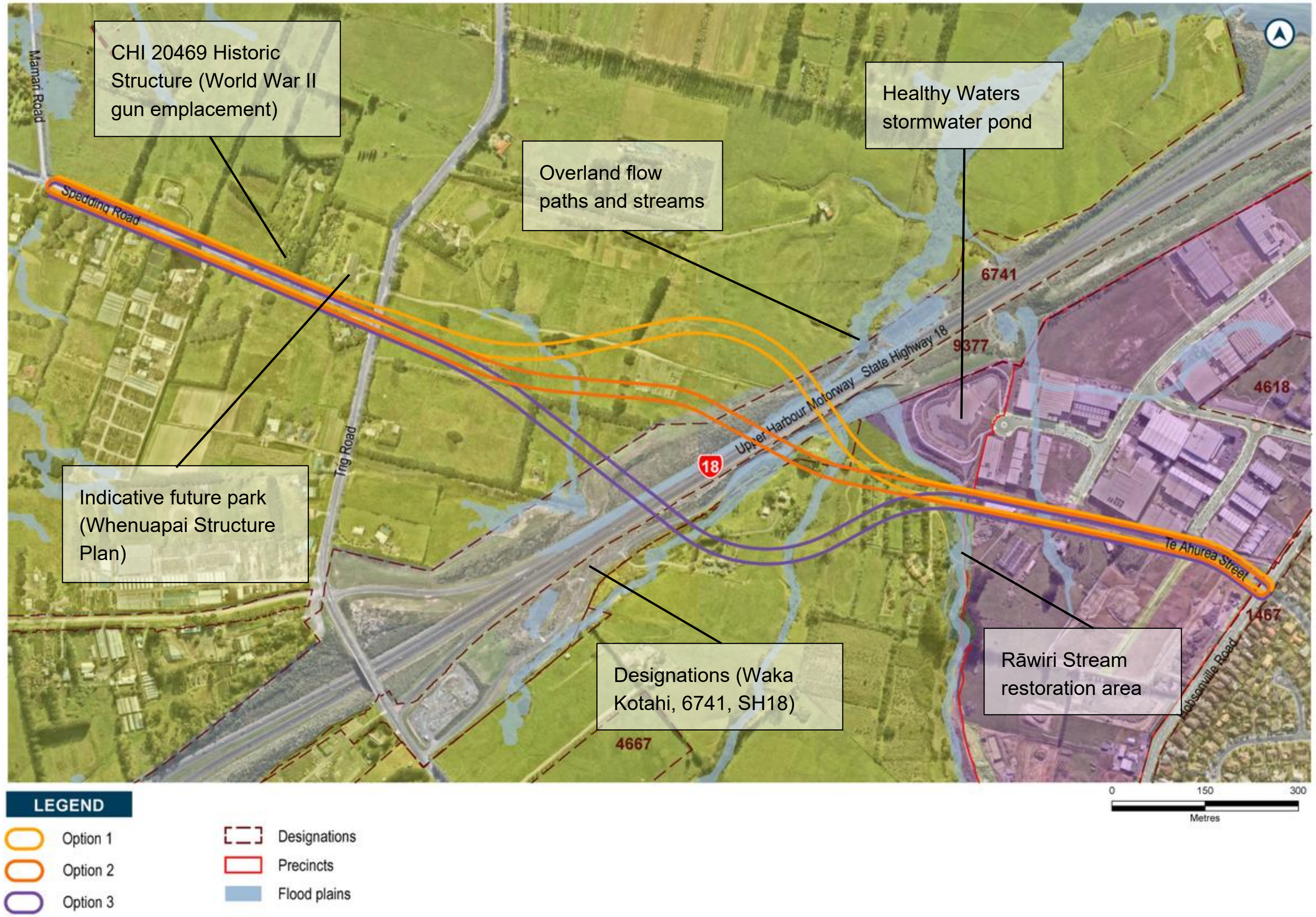


Figure 9-3: Spedding Road East Options and identified constraints

Table 9-2: Spedding Road East – Option Assessment Summary

Wellbeing assessment	
Cultural	Heritage: All three options cross three streams (Waiarohia, Trig and Rāwiri Streams), where there is potential for unexpected archaeological discoveries. The options have similar effects on CHI site 20469. There is therefore no differentiation between the options in terms of the heritage criteria.
Social	Future land use integration: Option 2 is the most direct alignment across SH18 resulting in the creation of less residual land along the proposed corridor. Option 1 curves to the north and will result in the creation of small lots of residual land adjacent to the corridor. These lots have potential to be integrated / amalgamated with future land use / lots surrounding the corridor. Option 3 curves to the south and will create residual land. Some of the residual land will be severed from the FUZ land. This would make the residual land more difficult to integrate into future land use scenarios. Both Options 1 and 3 will better support the wider growth of Whenuapai. There is a preference for Option 1 given the greater ability to integrate the residual land. Social: There is no existing social infrastructure located along New Spedding Road East. All options will increase accessibility between Whenuapai and Hobsonville Road. There is no differentiation on this criterion. Urban Design: Options 1 and 2 act as a defining edge between different land uses on the southern side of SH18. Option 2 provides a more direct route for active mode users compared to Option 1 and is preferred. The difference between the options performance is not substantial. Option 3 does not provide as defining an edge on the south side of SH18 and also does less positively as it would result in a parcel of FUZ being located on the east side of the road corridor. This land would not integrate as well with the character of surrounding Business land uses. Land Requirement: All options will impact a similar number of properties to a similar extent. There is no differentiation on this criterion. Human Health and Wellbeing: All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing, and this criterion was not considered to differentiate between the options.
Environment	Landscape and Visual: The landscape features include the Rāwiri Stream, Waiarohia Stream, Trig Stream and surrounding wetlands. All options will impact on these features with some adverse effect. Option 3 is the preferred option due to its avoidance of the Rāwiri Stream wetland. However, the differences between the proposed options are not substantial enough to result in a preferred or discounted option. Stormwater: Option 1 is preferred due to having the least impact on the Rāwiri Stream, the associated flood plain, and impacts on wetlands. Options 2 and 3 will have greater effects on these features. Option 3 is least preferred as it will also require deeper cuttings which will in turn require more pits and a greater pipe network to convey any flow through the cutting. Option 3 will also have a slightly greater impervious area. Ecology: All options have impacts on streams, wetlands and riparian features. There is a preference for Option 2 due to the alignment with the Waiarohia Stream and the least impact

Wellbeing assessment	
	on the ecological features. However, the differences between the proposed options are not substantial enough to result in a differentiation or preference. Mitigation and refinement to the design can be adopted mitigates the effects of all options on the streams. Natural Hazards: Option 1 has higher geo-technical issues. This is due to the large embankment on the sloping ground / existing cut to the north of SH18, and the impact on the stormwater pond to the south of SH18. The geo-technical risks for Options 2 and 3 are not as great as Option 1. However it is noted that appropriate engineering solutions can be put in place to address the geo-technical issues associated will all options.
Economics	Utilities: There is potential for localised impacts upon utilities and infrastructure from all options. Therefore there is no differentiation between the options. Construction: There is no differentiation between the options as they will give rise to a similar level of construction disruption.

9.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners to discuss the options. The key engagement outcome was agreement on Option 1 / Northern being the emerging preferred.

Watercare has been engaged with on a regular basis in relation to their existing assets and plans for future urban growth in the North West growth area. Areas of interest to Watercare that relate to the Local Arterials Package include upgrades around Spedding Road and Watercare's Northern Interceptor and North Harbour Main 2. Engagement confirmed a workable solution could be achieved.

Manawhenua reiterated the importance of Rāwiri Stream and the associated restoration project at this site. Manawhenua sought that the impacts of any corridor in this area seek to avoid or minimise impacts on Rāwiri Stream. In response to this the Option 1 design was refined to include a bridge over the Rāwiri Stream.

AT and Waka Kotahi raised the need to integrate the option with the future SH18 RTC station (a non-Te Tupu Ngātahi project). The Option 1 design does not preclude a station being located at SH18 as part of any future RTC.

9.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Partners and the community, a preferred option for Spedding Road East was identified. The preferred option is Option 1 / Northern, which extends the current road via a northern alignment across SH18. This alignment ensured impacts on sensitive features were reduced where possible.

Option 1 / Northern was preferred because:

- Although resulting in residual land, there is potential for resulting lots to be integrated with surrounding land use
- Although Option 1 did not perform best against some MCA criteria (Landscape and Visual, Stormwater, Natural Hazards), following engagement and refinement to include a hydrologically

sensitive design and bridging over Rāwiri Stream, effects of the option can be suitably avoided or mitigated at detailed design.

All options provided the same general level of achievement against the transport outcomes. Throughout design refinement specific consideration was made to reducing effects on stormwater and natural hazards, and consideration of how the new alignment would impact private properties and how to integrate residual land into the future corridor environment.

There will be further opportunities to minimise any impacts within the Project alignment during the detailed design of the project, and as a result, no further design refinement is required at this stage.

9.6.4 Discounted Options

Table 9-3 summarises the reasons for discounting the other two options.

Table 9-3: Spedding Road East Discounted Options

Option	Reasoning
Option 2	• Resulted in increased construction costs and engineering complexity associated with the central alignment of the SH18 crossing • Has greater impacts on stormwater and Rāwiri stream with associate cultural significance.
Option 3	• There was less potential to integrate residual land with future land use scenarios and urban design outcomes as it splits an area of FUZ from the remainder of the zone • Has greater impacts on stormwater and Rāwiri stream with associate cultural significance.

9.7 Spedding Road East Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for Spedding Road existing section is widening to either side of the corridor and for Spedding Road East is Option 1 which is a northern alignment.

10 W4: Spedding Road - West

10.1 Corridor Overview

Spedding Road West was added to the TFUG recommended transport network plan at the IBC stage and included an overbridge crossing of SH16 from Trig Road to Fred Taylor Drive. Assessed as *AR-W-07* during the IBC (see Figure 10-1).

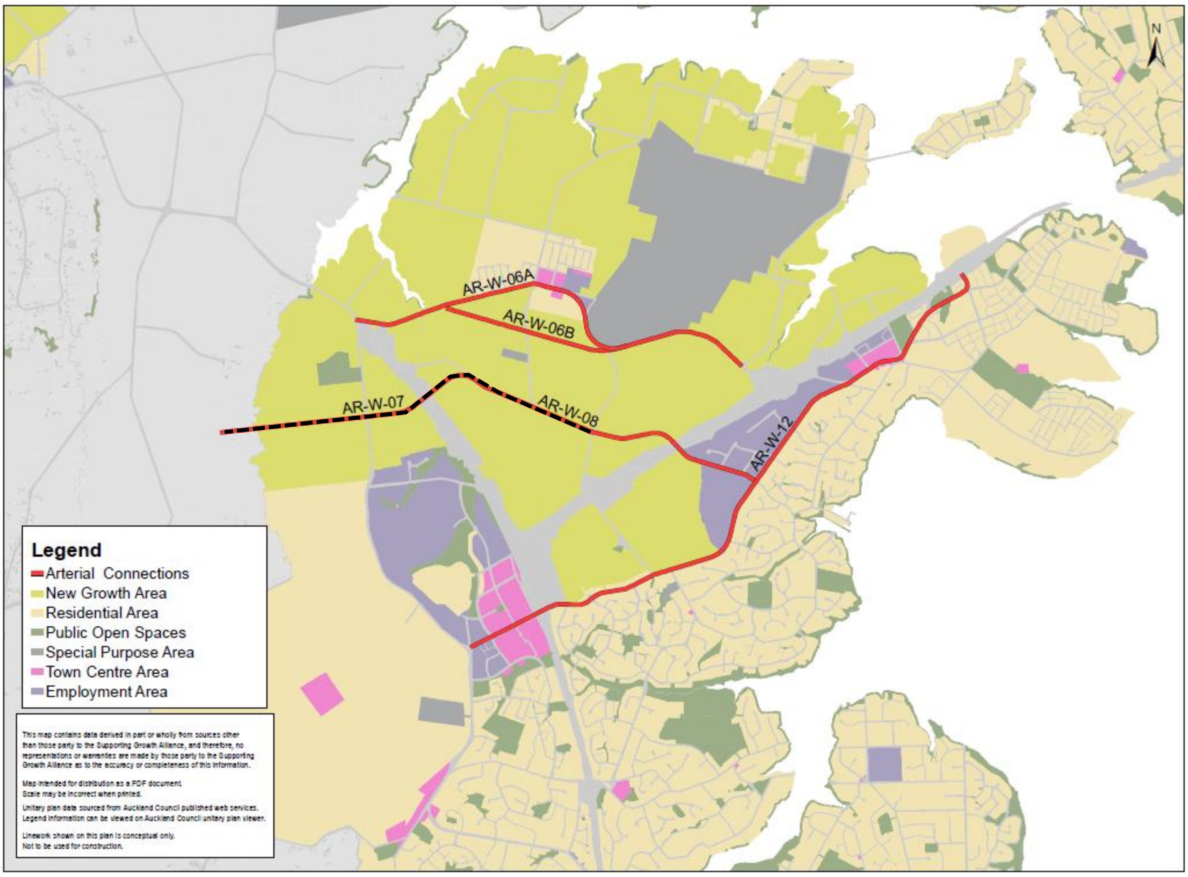


Figure 10-1: New Spedding Road West IBC Option AR-W-07

Spedding Road West is an urban arterial that provides resilience for Whenuapai through an additional state highway crossing that avoids interchanges and improves access for connector bus services to access the future RTC. The alternative crossings improve local walking and cycling safety and connectivity and contribute to travel choice.

Project Partners and public feedback indicated strong support for both Spedding Road connections (east and west). Spedding Road is partially existing, and feedback highlighted the upgrade and extension of this corridor was the best use of existing infrastructure. Although Spedding Road East and Spedding Road West form one transport corridor, they were assessed through the options development separately, refer to Section 9 for discussion on Spedding Road East.

10.2 Gap Analysis

The gap analysis for Spedding Road West identified that the key consideration was the uncertainty of future land use. Uncertainty of future land use was derived from Council not proposing to structure plan Redhills North prior to lodgement of this package. Local developer, Oyster Capital Ltd has and subsequently lodged private plan change (PC 69 (now approved)) for land adjacent to SH16 within the Whenuapai Structure Plan[3]. There is potential for private Plan Changes within Whenuapai to propose alternative zoning to the Whenuapai Structure Plan. Ongoing discussion with Council and the developer were identified as necessary to inform the option assessment.

The National Policy Statement on Urban Development (draft at the time of the gap analysis) supports the intensification of development around rapid transit stops. Discussions with AT and Waka Kotahi indicated that an RTC station, associated with the city centre to Westgate RTC, will potentially be located near Spedding Road West. Ongoing discussions with AT and Waka Kotahi are recommended given the early stage of the project. Closer consideration of the Brigham Creek SEA_T_2034 was also recommended.

Gap analysis confirmed that:

- Adequate Corridor Assessment was undertaken at IBC phase, and analysis did not trigger further corridor assessment; however
- A localised corridor assessment should be undertaken, given the SEA location, crossing of SH16 and potential property impacts.

10.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Spedding Road West environment. The exercise identified that.

- **Extent and zoning**: New Spedding Road West will be a corridor which extends from Spedding Road over SH16 to Fred Taylor Drive. The land on either side of the corridor is zoned FUZ
- **Future land use:** Land on the west of SH16 is within the Redhills North Growth Area and has not been structure planned. Council's draft Spatial Land Use Strategy for the North West identifies a location to the west of the corridor as a potential neighbourhood centre. For the land to the east of SH16 the Whenuapai Structure Plan shows the land being developed for business use, which corresponds with Plan Change 69
- **Special uses and constraints**: Existing transport designations include Waka Kotahi Designation 6741 for SH16, and AT Designation 1468 for road widening of Fred Taylor Drive which is not yet operative, and Designation 1433 for Fred Taylor Drive which is given effect to
- **Environmental Constraints:** A SEA is present along Totara Creek, there are also existing wetlands and overland flow paths along the alignment.

Key outcomes of the review was:

- Decision to develop local corridor options due to the various environmental constraints in the area
- Identification that SH16 and stormwater pond requirement was a constraint to options developed.

[3] Note that Oyster have now submitted a private plan change for the 'Spedding Block' Plan Change 69. This is still being processed, it aligns with the Whenuapai Structure Plan zones.

10.4 Corridor Form and Function Assessment

An assessment was undertaken for Spedding Road West following the CFAF methodology in Section 4.3. This recommendation informed the route refinement options developed and assessed in Section 10.5. Figure 10-2 shows the CFAF cross section outcomes.

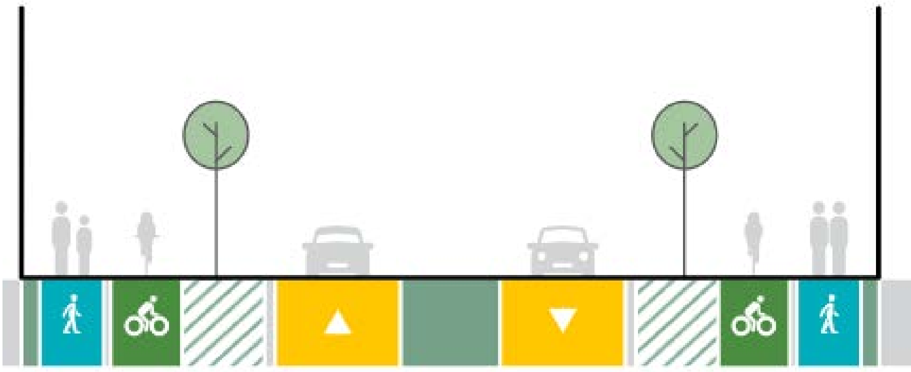


Figure 10-2: CFAF Outcome – Spedding Road West Indicative 24m cross section

10.5 Corridor Option Development

Spedding Road in its entirety forms a key link through Whenuapai connecting from Fred Taylor Drive through to SH18 and Hobsonville Road. Four route options were developed for Spedding Road West. These options were workshopped based on the indicative 24m wide cross section.

- **Option 1 / Central**: Central bridge alignment and connection to Fred Taylor Drive at Hailes Road
- **Option 2 / Northern T**: Northern bridge alignment and a T intersection connection to Fred Taylor Drive
- **Option 3 / Northern:** Northern bridge alignment and connect to Fred Taylor Drive at Hailes Road
- **Option 4 / Southern**: Southern bridge alignment and connect to Fred Taylor Drive at Hailes Road

10.6 Corridor Assessment

10.6.1 Assessment

A corridor assessment was undertaken for the Spedding Road West upgrade. The assessment follows the process outlined in Section 4.4. The four options were assessed with SME input against the MCA framework including their ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities by providing an integrated multi-modal corridor between Whenuapai and Hobsonville*
- *Reliability: Enable reliable people movement between Whenuapai and Hobsonville*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people between Whenuapai and Hobsonville*
- *Safety: Contribute to a transport network between Whenuapai and Hobsonville that is free from deaths and serious injuries.*

All options performed well against the Transport Outcomes identified, there was no differentiation in performance. Table 10-1 provides the MCA assessment against undertaken, considerations and constraints identified are shown in Figure 10-3 and Table 10-2 shows the options assessed by SMEs using the MCA framework.

Table 10-1: Spedding Road West MCA Assessment

Options	Option 1	Option 2	Option 3	Option 4
Access	4	4	4	4
Reliability	3	3	3	3
Mode Choice	3	3	3	3
Safety	2	2	2	2
Heritage	-1	-1	-1	-1
Land use futures	3	3	3	3
Urban Design	1	1	1	1
Land Requirement	-2	-2	-2	-2
Social Cohesion	3	3	3	3
Human Health and Wellbeing	-1	-1	-1	-1
Landscape / Visual	-1	-2	-2	-2
Stormwater	-1	-2	-1	-2
Ecology	-4	-4	-4	-4
Natural Hazard	-1	-1	-1	-1
Construction impacts on utilities / infrastructure	-1	-1	-1	-1
Construction Disruption	-2	-2	-2	-2
Construction costs / risk / value capture	-2	-2	-2	-2

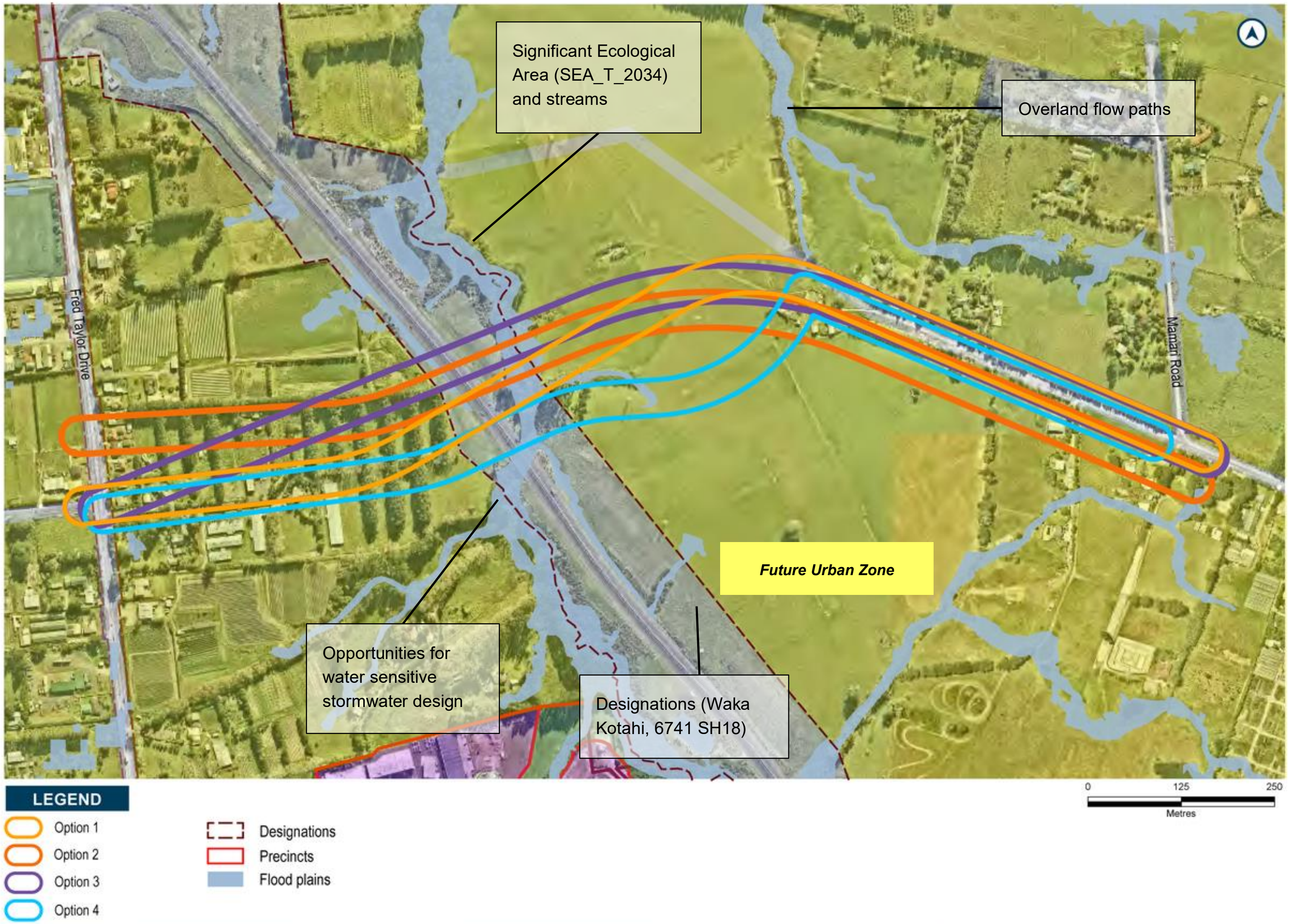


Figure 10-3: Spedding Road West Options and identified constraints

Table 10-2: Spedding Road West – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: All options have potential for adverse effects due to crossing the Totara Creek, where there is potential for unexpected archaeological discoveries. There is a slight preference for Option 4 as this will have the least impact / footprint within natural wetlands.
Social	Future land use integration: All options perform the same due to the options all being located within the FUZ and supporting future development. However Option 3 is least preferred as it does not follow the existing property boundaries on the west side of SH16 and it will split one lot impacting on development potential. Social: All options will increase accessibility and connectivity between existing and future communities located in Whenuapai and around Fred Taylor Drive. However Option 2 is least preferred as it does not connect directly to Hailes Road resulting in reduced connectivity for the future community. Urban Design: All options perform the same and will provide a visible connection across SH16. This creates legibility and connects land on both sides of SH16 (currently severed by SH16). However there is a preference for Option 1 as this provides a greater opportunity to interface with the stream area. Land Requirement: All options will impact a similar number of properties to a similar extent and have minor adverse impacts. However Option 3 is least preferred due to the amount of land requirement and the full requirement of land that is diagonally traversed on the west side of SH16. Human Health and Wellbeing: All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing. Therefore there is no differentiation between the options.
Environment	Landscape and Visual: Option 1 is the preferred option. It has the least impact on the Totara Creek water body and the surrounding riparian habitat. Options 2, 3 and 4 perform worse due to the greater impact that the pier locations of each of these options would have on the Totara Creek and the associated riparian strip. Stormwater: Options 1 and 3 have the least impact upon Totara Creek. Option 1 is preferred as it is located further away from the SEA and the soft soils will reduce the need for erosion control measures at the SH16 bridge. Option 2 and 4 are least preferred. Option 2 has the least impervious coverage and crosses Totara Creek at the narrowest location, however its proximity to the SEA is not desirable for stormwater treatment. Option 4 has the greatest impervious coverage and requires an additional culvert and stream compensation. Ecology: Option 1 is preferred as it is not situated within the SEA associated with Totara Creek and avoids potential surrounding wetlands. Options 2 and 3 impact upon the SEA and Option 4 potentially impacts on the wetlands / existing drainage features and associated landscaping. Natural Hazards: There is no differentiation between the options. This is due to all options crossing areas with the same geology and being typically flat.
Economics	Utilities: There is no differentiation between the options due to construction occurring offline and within a greenfield area except for the motorway overbridge crossing. Overhead transmission lines and towers are found within the vicinity of the options and there is no significant differentiation between the options. Note that Transpower have stated that these will be demolished and the AUP:OP Overlay reviewed. Construction: There is no differentiation between the options. Works above the SH16 can be managed with a robust Traffic Management Plan.

10.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners, to discuss the options. Key engagement outcomes were Project Partner agreement on Option 1 being the emerging preferred option. Project Partners confirmed that the emerging preferred option would not preclude a station associated with city centre to Westgate RTC nor an interim park and ride (neither are Te Tupu Ngātahi projects).

In 2020 and 2021 Te Tupu Ngātahi sought feedback from landowners. The Project Team met with Oyster Capital Ltd, and following discussions with Oyster, Option 4 was developed. Option 4 was assessed and later discounted, largely due to impacts on stormwater, ecology and construction.

In 2022, Oyster proposed a small change to the preferred (Option 1) Spedding Road alignment shifting the road and associated SH overbridge further north. This was considered but resulted in a greater intrusion into the SEA T_2034 and was therefore discounted.

10.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Partners and the community, a preferred option for Spedding Road West was identified. The preferred option is Option 1 / Central, widening both sides of the corridor, with variance to north or south in response to design and environment features. This allowed impacts to be reduced where possible and resulted in a fairer distribution of land requirement along the route, which was raised in feedback from Oyster Capital Ltd.

Option 1 / Central was preferred because it:

- Despite having the highest construction cost (due to the longer SH16 bridge crossing), it:
  - Has the least impact on the Totara Creek and associated riparian strip creating greater opportunity for enhancement
  - Does not directly impact on the SEA or potential surrounding wetlands.

All options provided the same level of achievement against the transport outcomes. Throughout design refinement consideration was made to minimise impacts on steams and minimise the Project footprint and associated impact on private properties. Interaction with future planned infrastructure projects was also a consideration (such as the RTC).

There will be further opportunities to minimise impacts within the Project alignment during the detailed design of the Projects. As a result, no further design refinement is required at this stage.

10.6.4 Discounted Options

Table 10-3 summarises the reasons for discounting the three options.

Table 10-3: Spedding Road West Discounted Options

Option	Reasoning
Option 2 / Northern T	• Reduced accessibility and connectivity as the option does not connect to Hailes Road • Proximity to the SEA is not desirable for stormwater treatment • Greater impact from bridge pier locations on the Totara Creek and the associated riparian strip.

Option	Reasoning
Option 3 / Northern	• Impacts upon the SEA • Greater impact from bridge pier locations on the Totara Creek and the associated riparian strip • Does not follow the existing property boundaries on the west side of SH16 and it will split one lot impacting on development potential.
Option 4 / Southern	• Has the greatest impervious coverage and requires an additional culvert and stream compensation • Greater impact from bridge pier locations on the Totara Creek and the associated riparian strip.

10.7 Spedding Road West Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Spedding Road West upgrade is Option 1, a centreline alignment along the existing Spedding Road West that crosses over SH16 and connects at Hailes Road and Fred Taylor Drive.

The preferred option reduces impact on identified streams and ecological areas, it has also considered landowner and developer aspirations and results in a more equitable land requirement impact than a southern or northern weighted widening option would.

11 W5: Hobsonville Road

11.1 Corridor Overview

Hobsonville Road was included in the TFUG recommended network and extended from Hobsonville Point to Westgate. TFUG identified a transport route which extended to the West Harbour Ferry, but this section was discarded at the IBC stage. The Hobsonville Road upgrade was assessed as *AR-W-12* during the IBC phase (see Figure 11-1).

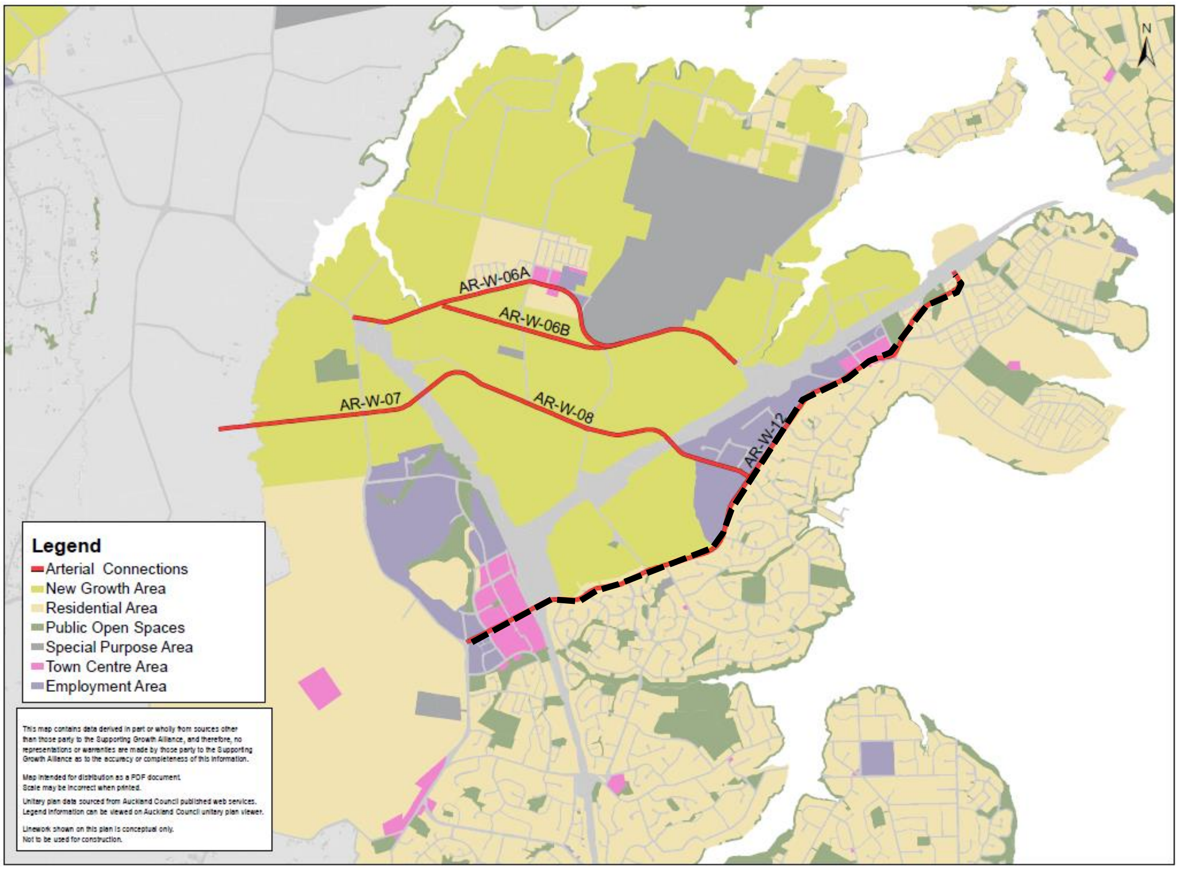


Figure 11-1: Hobsonville Road IBC Option AR-W-12

The option is one of the Whenuapai east-west arterial routes and a key link between Westgate and Hobsonville Point. The corridor provides resilience as an alternative to SH18. It is also an important multi-modal link that supports bus priority for local services, walking and cycling, and freight access to the future business zones.

Two alternatives to the Hobsonville Road upgrade were considered but were discarded at the long list stage as their primary functions were collector roads. Project Partners and engagement indicated strong support for improving walking and cycling facilities on Hobsonville Road.

Hobsonville Road was recommended as a four-lane, arterial corridor as it provides a key strategic connection to Westgate, the future rapid transit network, and the wider area.

11.2 Gap Analysis

The gap analysis for Hobsonville Road confirmed reasons for discounting an alternative route north of Hobsonville Road, between SH16 and Luckens Road (at IBC phase) were still valid. The alternative option required reduced land to upgrade the corridor, however, was discounted as:

- The route duplicated function of Hobsonville Road;
- It would provide a collector road function for the catchment north of Hobsonville Road and would not serve as an arterial; and
- The option had potential for greater adverse effects as a new route, compared to upgrading an existing corridor.

The gap analysis also noted there remained some future land use uncertainty due to developer interest and proposed consents on undeveloped land and the withdrawal of Proposed Plan Change 5. Gap analysis confirmed that:

- Adequate corridor assessment was undertaken at the IBC phase, and analysis did not trigger further corridor assessment
- Route refinement was recommended to respond to the constraints identified.

11.3 Corridor Form and Function Assessment

A CFAF assessment was undertaken following the methodology in Section 4.3. This resulted in Hobsonville Road being divided into five assessment segments, being: (1) Don Buck Road to SH16; (2) SH16 to Luckens Road; (3) Luckens Road to Brigham Creek Road; (4) Brigham Creek Road to Hobsonville Point Road and (5) Hobsonville Point Road to Squadron Drive. See Figure 11-2.

Figure 11-2: Hobsonville Road CFAF segments overview (Segments 1 and 5 determined fit for purpose)

The CFAF recommendation for Segment 1 and 5 identified that the existing road reserve was fit for purpose and should be retained. Segments 2-4 therefore informed the options developed and assessed in Section 11.5. Figure 11-3, Figure 11-4 and Figure 11-5 show the CFAF cross section outcomes for Sections 2, 3 and 4.

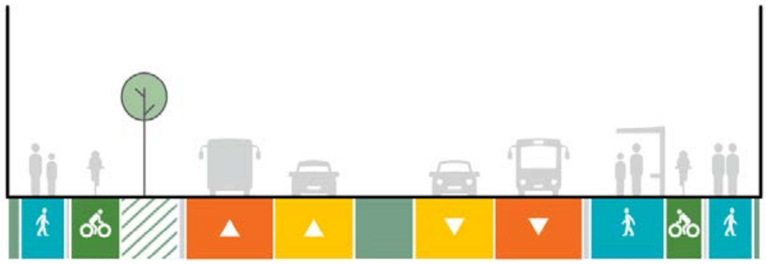


Figure 11-3: CFAF Outcome S2: SH16 Interchange to Luckens Road Indicative 30m cross section

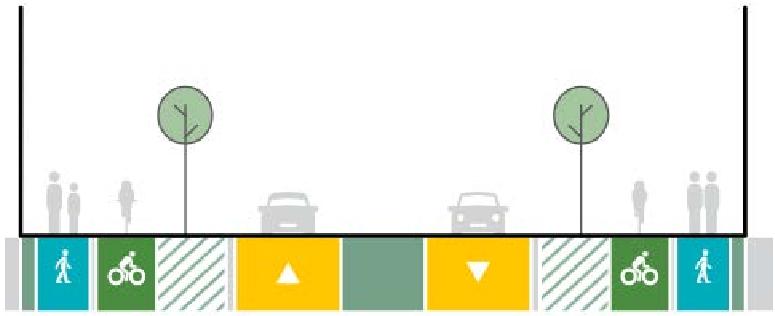


Figure 11-4: CFAF Outcome S3: Luckens Road to Brigham Creek Road Indicative 24m cross section

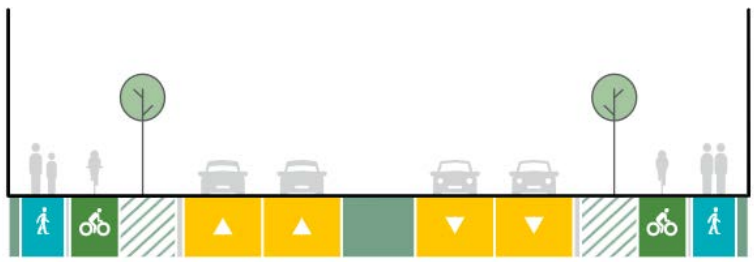


Figure 11-5: CFAF Outcome S4: Brigham Creek Road to Hobsonville Point Road Indicative 30m cross section

11.4 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Hobsonville Road corridor environment. The land use and constraints exercise identified that:

- **Extent and zoning:** Hobsonville Road is an urban corridor on the south side, landuse is identified as *Residential – Mixed Housing Zone*. There is also *Business – Local Centre Zone* in Segment 4 near the intersection of Hobsonville Road and Wisely Road. The northern side has a mix of zoning including *Residential – Mixed Housing Zone* to Trig Road with FUZ at the rear of a *Terraced Housing and Apartment Building Zone*. FUZ then fronts Hobsonville Road to the east of Trig Road

- **Future land use:** The Whenuapai Structure Plan indicates that the FUZ and an area currently zoned *Residential – Mixed Housing Zone* fronting Hobsonville Road will be re-zoned to high density residential
- **Special uses and constraints** The Hobsonville Corridor Precinct extends on the northern side of Hobsonville Road and identifies sub-precincts: Precinct C extends from Westpark Drive to Williams Road and is *Business – Light Industry Zone* with Precincts A and B located east of Brigham Creek Road and identified as *Business – Mixed Use Zone* and *Business – Local Centre Zone*
  - Hobsonville Road is under existing AT Designation 1437 for 'Transport purposes', there is also an existing AT NOR lodged in 2012 for road widening. The NOR proposed two widened lanes and four approach lanes at intersections. The NOR has not progressed to a hearing but has interim land protection effect under s178(2) of the RMA
  - Existing infrastructure constraints include Vector Designation 9956 and Watercare Services Ltd Northern Interceptor Designation 9375. There is also social infrastructure including an Ministry of Education school under Designation 4618, as well as churches and public parks / reserves
  - Hobsonville Road is a partly urbanised corridor and has the potential for impacts on existing building along the alignment.

Key outcomes of the review were the decisions to:

- Not discount widening the corridor either to the north or south at this stage
- Undertake a property impact assessment, as land requirements of widening were a constraint
- Adopt a narrower cross section at Hobsonville School which was seen as a key constraint
- Project Team lead route refinement as no major constraints were identified other than property
- Split the assessment to align with the CFAF segments and focus on specific constraints
- No further consideration required for Hobsonville Road Segments 1 and 5 (see Figure 11-2), as there was either:
  - Sufficient space in the existing carriageway to reallocate space; or
  - Provision for transport modes already existed, sufficient to achieve Transport Outcomes.
- 2012 NOR design was discounted as a Te Tupu Ngātahi option, because it would not provide the form and function requirements or achieve the identified Transport Outcomes.

11.5 Route Refinement Option Development

Hobsonville Road forms an important connection between Hobsonville Point and Westgate. Eight options based on the indicative cross sections were initially developed for Hobsonville Road, including four options with a reduced cross section for Segment 2 (indicated by an 'R') these are:

Segment 2 only options:

- **Option 2 / R:** 24.6m cross-section holding the existing centreline
- **Option 3 / R:** 27.1m cross-section holding the existing centreline
- **Option 4 / R:** 20.6m cross-section holding the existing centreline
- **Option 5 / R:** 21.4m cross-section holding the existing centreline.

Corridor Options:

- **Option 1 / both:** 30m cross-section in Segment 2 and 4, reducing to 24m in Segment 3. This Option holds the existing centreline and widens on both sides
- **Option 6 / south:** 30m cross-section in Segments 2 and 4 reducing to a 24m cross-section in Segment 3, holds the northern side and widens southern side

- **Option 7 / north:** 30m cross-section in Segments 2 and 4 reducing to 24m cross-section in Segment 3, holds the southern side and widens northern side
- **Option 8 / variant:** Variation of Option 6 which avoids Hobsonville School with no widening in front or immediately adjacent. Holds the northern side and widens southern side.

Segment 2 Options 2, 4 and 5 were determined to not achieve the Transport Outcomes sought and so were discounted and not taken to assessment. Segment 2s Option 3 was not taken forward to option assessment either but was retained as an option to be considered during option refinement to avoid or minimise effects on properties along the corridor. Options 1, 6, 7 and 8 proceeded to route refinement assessment.

11.6 Route Refinement Assessment

11.6.1 Assessment

Route refinement assessment was undertaken for Hobsonville Road corridor. Options were considered by the Project Team with specialist property input. The assessment follows the process outlined in Section 4.4. Options 1, 6, 7 and 8 were qualitatively assessed in each segment against the MCA framework, including their ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities along Hobsonville Road Reliability: Enable reliable people movement on Hobsonville Road*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people along Hobsonville Road*
- *Safety: Provide improvements on Hobsonville Road that contribute to a transport network that is free from deaths and serious injuries*
- *Integration: Provide a transport system that is integrated with land use enabling a more sustainable, high quality, connected urban form, and supports growth in Whenuapai.*

Figure 11-6 shows the options assessed and constraints.

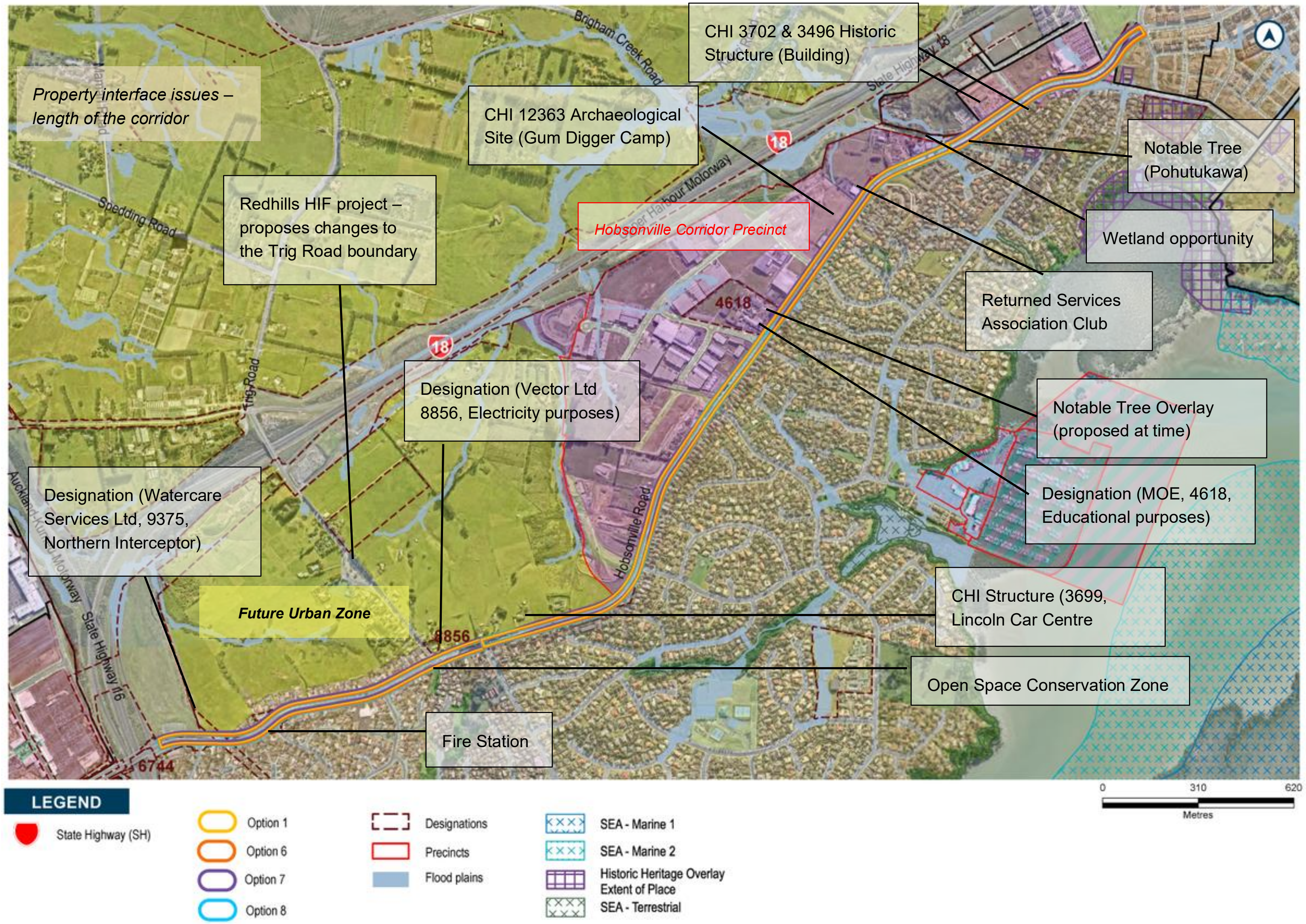


Figure 11-6: Hobsonville Road options and identified constraints

Segment 2 Assessment

All options perform well against the Transport Outcomes identified, there is no differentiation in performance for Segment 2. Considerations and constraints identified are shown in Figure 11-6. Table 11-1 provides a summary of the assessment undertaken using the MCA framework for Segment 2, options were not scored.

Table 11-1: Hobsonville Road Segment 2 – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: No significant heritage or archaeological constraints were identified along the route, and this criterion was not considered to differentiate between the options.
Social	Future land use integration: Options 6 and 8 will impact on the southern side of the Hobsonville Road. The southern side is zoned in the AUP:OP as Residential – Mixed Housing Zone consisting of multiple residential lots. As no change in zoning is anticipated and given the small lot size there is less ability to respond to and integrate the widened road into a future development scenario / redevelop the southern side. These options are therefore less preferred. Option 1, which will widen on both the northern and southern side, is also less preferred due to the impacts on the southern side. Option 7 avoids impacts on the Residential – Mixed Housing Zone to the south, impacting only on the FUZ and Residential – Mixed Housing Zone to the north. The Whenuapai Structure Plan indicated that the FUZ and the Residential – Mixed Housing Zone will be re-zoned to high density residential. Given the proposed re-zoning widening Hobsonville Road to the north (Option 7) is preferred as there is greater potential for the option to be integrated into the future land use scenarios facilitated by the re-zoning. Social: Social infrastructure includes a church located on the south side of the corridor and the area of open space. The open space will be avoided by all options. There is a preference for Option 7 as it will avoid the church. Urban Design: Options 1, 6 and 8 will impact upon the established character of residential development on the southern side of Hobsonville Road. Options 6 and 8 and to a lesser degree Option 1 will result in overshadowing of existing and redeveloped properties on the south side due to the topography / level difference. Character changes are anticipated on the northern side of Hobsonville Road due to the future urbanisation of FUZ land. Option 7 is preferred as it has the potential to integrate with the future urban design character. Land Requirement: Option 1 is least preferred as it will have a significant impact on properties on both sides of Hobsonville Road, increasing the land requirement. Options 6 and 8 limit property impacts primarily to the south. The property impacts and land requirement will be significant and will extend beyond properties immediately fronting Hobsonville Road due to the topography on the southern side. Option 7 will predominantly impact properties the northern side of Hobsonville Road. Whilst the northern side has potential for denser development (potentially increasing the number of properties impact than in the current environment) it is preferred as the extent of properties affected is less compared to Options 1, 6 and 8. Human health and wellbeing: All options will support additional traffic with a similar level of effects in terms of Human Health and Wellbeing. This criterion was not considered to differentiate between the options. Safety: Option 7 is preferred as it will avoid / minimise impacts on driveways / access arrangements to residential properties located on the south side of the corridor. All other options will have a greater impact on the residential driveways.

Wellbeing Assessment	
Environment	Landscape and Visual: No significant landscape features were identified within Segment 2 of Hobsonville Road. Note that no options impact upon the Open Space – Conservation Zone (and any associated landscape features) located opposite Trig Road (on the south side of Hobsonville Road). This criterion was not considered to differentiate between the options. Stormwater: Appropriate stormwater infrastructure can be provided within or adjacent to the proposed cross-section for all options. No significant constraints were identified. This criterion was not considered to differentiate between the options. Ecology: No significant ecological constraints were identified along or in close proximity to the alignment is Segment 2. This criterion was not considered to differentiate between the options. Natural Hazards: Option 7 is preferred as it will avoid the more challenging topography located on the south of the corridor. All other options involving widening to the south.
Economics	Construction: All options will require works within the road corridor. Option 7 is preferred as it will minimise impacts on the residential properties located on the south of the corridor. Construction will have a greater impact on the north where construction associated with future development is also anticipated.

Segment 3 Assessment

All options perform well against the Transport Outcomes with no differentiation for Segment 3. Segment 3. Considerations and constraints identified are shown in Figure 11-6. Table 11-2 provides a summary of the assessment undertaken using the MCA framework for Segment 3, options were not scored.

Table 11-2: Hobsonville Road Segment 3 – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: An Auckland Council's Cultural Heritage Indexed (CHI) Historic Structure (Lincoln Car Centre CHI 3699) and Archaeological Site (Gum Diggers Camp CHI 12363) were identified within Segment 3. Both are set back from the road corridor and will not be directly impacted by the options. This criterion was not considered to differentiate between the options.
Social	Future land use integration: Option 1 impacts on both the Residential – Mixed Housing Zone and the Light Industrial Zone land within the Hobsonville Road Corridor Precinct on both sides of the corridor. Options 6 and 8 primarily impact on the Residential – Mixed Housing Urban Zone to the south. The Residential – Mixed Housing Urban Zone is a long narrow strip consisting of small lots (widening at the eastern end of Segment 2). There is less ability to integrate south widening options (i.e., Option 6) with the remaining Residential – Mixed Housing Urban Zone and potential for residual land to be created with limited development potential. Option 7 avoids impacts on the Residential – Mixed Housing Urban Zone to the south and impacts on the Hobsonville Road Corridor Precinct to the north. The Precinct is large and widening the road north will only impact on the frontage, it will not prevent the future development of this part of the zone, nor create undevelopable residual land if existing buildings are impacted. Social: Option 8 was specifically designed to avoid impacts upon Hobsonville School. This is a preferred outcome; however, there is the potential for a reduced cross-section at the school to be applied to other options, and as such, avoiding impacts on the school is not a differentiator.

Wellbeing Assessment	
	Urban Design: Options 1, 6 and 8 are less preferred as they will impact upon the established character of residential development on the southern side of Hobsonville Road. Whilst the Hobsonville Road Corridor Precinct is currently being developed there is still greater potential to integrate into the design of development. Options 7 is therefore preferred. Land Requirement: Option 1 is least preferred as it will have increased property impacts on both sides of Hobsonville Road, increasing the land requirement. Options 6 and 8 limit property impacts primarily to the south, which is fully developed with residential properties with multiple ownership. Option 7 will predominantly impact on properties on the northern side of Hobsonville Road; however, given the size of the lots full property requirement is unlikely. Additionally, AT lodged an NOR for a separate road widening project with Auckland Council in 2012. The NOR has interim effect (under section 178 of the RMA). This results in a reduced land requirement for Option 7 as the NOR has generally protected the land from development into the NOR boundary. Option 7 is preferred. Human health and wellbeing: All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing. This criterion was not considered to differentiate between the options. Safety: Option 7 is preferred as it will avoid / minimise impacts on driveways / access arrangements to residential properties located on the south side of the corridor. All other options will have a greater impact on the residential driveways.
Environment	Landscape and Visual: No significant landscape features were identified within the segment. Note that the Rāwiri Stream which is the subject of a restoration project will not be impacted by any of the options. This criterion was not considered to differentiate between the options. Stormwater: Appropriate stormwater infrastructure can be provided within or adjacent to the Te Tupu Ngātahi cross-section for all options. No significant constraints were identified. This criterion was not considered to differentiate between the options. Ecology: No significant landscape features were identified along the road corridor. This criterion was not considered to differentiate between the options. Natural Hazards: Option 7 is preferred as it will avoid the more challenging topography located on the south of the corridor. All other options involving widening to the south are less preferred.
Economics	Construction: All options will require works within the road corridor. Option 7 is preferred as it will minimise impacts on the residential properties located on the south of the corridor. Construction will have a greater impact on the north where construction associated with future development is anticipated and existing buildings are generally less sensitive receptors to construction disruption.

Segment 4 Assessment

All options perform well against the Transport Outcomes and there is no differentiation for Segment 4 between the options. Segment 4 considerations and constraints identified are shown in Figure 11-6. Table 11-3 provides a summary of the assessment undertaken using the MCA framework, options were not scored.

Table 11-3: Hobsonville Road Segment 4 – Option Assessment Summary

Assessment Findings	
Cultural	Heritage: A Cultural Heritage Indexed Historic Structure (Hobsonville Hall CHI 3496) was identified on the south side of Hobsonville Road. Option 7 will avoid the Hall and is preferred.

Assessment Findings	
	However, the adoption of a reduced cross-section for all other options would avoid direct impacts on the Hall.
Social	Future land use integration: In the east of the segment Options 1 and 7 are least preferred as they impact on the consented and recent development within the Hobsonville Road Corridor Precinct. Options 6 and 8 impact on the Residential – Mixed Housing Zone to the south and a narrow strip of Business - Local Centre Zone; however, there is greater potential to refine these options to minimise effects to ensure the land remains developable. In the west of the segment Options 1, 6 and 8 are least preferred as they impact upon the Residential – Mixed Housing Zone. Option 7 has the greatest potential to be integrated into future development within the Hobsonville Corridor Precinct as site are currently vacant. There is also greater potential to influence development to respond to the proposed road widening. Social: There are a number of community facilities, shops and services located within Segment 4. In the western end of the Segment, Options 1 and 7 will impact on an existing supermarket and a retail parade which includes health related occupiers. Options 6 and 8 will impact upon the Hobsonville Hall, a dental practice and a veterinary practice. The buildings on the south have a staggered building line and so there is greater potential to avoid these facilities through a reduced cross section. A medical practice is located on the south side of Hobsonville Road within the western section of Segment 4. Options 1 and 7 are preferred as they will avoid social impacts from the loss of the medical practice. Urban Design: In the east of the segment all options will impact upon the existing character of the areas. Options 6 and 8 have greater potential to be refined to avoid character impacts and are preferred. In the west of the Segment Option 7 is preferred as it will avoid impacts on the residential character on the south side of the corridor. Land Requirement: Option 1 is not preferred as it will have increased property impacts on both sides of Hobsonville Road increasing the land requirement. In the east of the segment Options 6 and 8 are also not preferred as they will limit property impacts primarily to the south, which is fully developed with residential properties with multiple ownership. Option 7 will predominantly impact on properties on the northern side of Hobsonville Road; however, given the size of the lots the full properties are unlikely to be required. Additionally, AT has lodged a NOR for a separate road widening project with Auckland Council in 2012. The NOR has interim effect (under S. 178 of the RMA). This results in a reduced land requirement for Option 7 as the NOR has protected the land from development intruding into the NOR boundary. Option 7 is therefore preferred in the east of the segment. Options 6 and 8 are preferred in the west of the segment as this has the greatest potential to be refined to reduce property impact and impacting the properties located on the north. Human health and wellbeing: All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing. This criterion was not considered to differentiate between the options. Safety: In the west of the segment Option 7 is preferred as it will avoid / minimise impacts on driveways / access arrangements to residential properties located on the south side of the corridor. All other options will have a greater impact on the residential driveways. This criterion was not considered to differentiate between the options in the east of the segment.

Assessment Findings	
Environment	Landscape and Visual: No significant landscape features were identified within the Segment, and this criterion was not considered to differentiate between the options. Stormwater: Appropriate stormwater infrastructure can be provided within or adjacent to the Te Tupu Ngātahi cross-section for all options. No significant constraints were identified. This criterion was not considered to differentiate between the options. Ecology: No significant ecological constraints were identified along or in close proximity to the alignment. This criterion was not considered to differentiate between the options. Natural Hazards: No significant geotechnical constraints or instability issues were identified along the alignment. This criterion was not considered to differentiate between the options.
Economics	Construction: All options will require works within the road corridor. In the west of the Segment, Option 7 is preferred as it will minimise impacts on the residential properties located on the south of the corridor. Construction will have a greater impact on the north where construction associated with future development is anticipated and buildings are / will generally be less sensitive receptors to construction disruption due to the Business zoning. In the east of the segment Options 6 and 8 are preferred. The options have greater potential to be refined to avoid demolition of existing building and to avoid the associated disruption.

11.6.2 Post MCA Option Refinement

Following the MCA, the Project Team reviewed the highly constrained sections of the corridor where the preferred option had the potential to give rise to significant adverse effects and high property impacts including on heritage buildings. As a result, a reduced cross section was proposed at two specific points:

- Segment 3, adjacent to Hobsonville School, to avoid impacts on the school and the residential properties located on the south of the corridor
- Segment 4 (eastern end), to avoid impacts on businesses and community facilities located within the Business Local Centre Zone.

The reduced cross section retained capacity between closely spaced intersections and maintained suitable walking and cycling facilities on both sides of the road. The reduced cross section was considered at alternative locations along the corridor but discounted as it would affect the corridors' ability to achieve the Transport Outcomes sought.

11.6.3 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners, to discuss the options. Key engagement outcomes were Project Partner support on the early emerging preferred options, being:

- Option 7 in Segment 2 and 3;
- A refined version of Option 6 in Segment 4; and
- In Segments 1 and 5 to use the existing sufficient road corridor.

AT noted benefits of aligning the project land requirements with the existing 2012 NOR where practicable, which has interim effect of protecting land. Aligning the two will reduce further property requirement impacts along the corridor. AT also queried the operational efficiency of a two-lane corridor particularly for public transport; however, the Project Team transport forecasts prepared indicate two lanes is sufficient.

11.6.4 Preferred Option

Following the MCA assessment and consideration of feedback, a preferred option for the Hobsonville Road corridor was identified for each segment:

Segment 2: Option 7, to widen Hobsonville Road to the north and hold the southern edge is preferred in Segment 2 because it:

- Has greater potential to be integrated into the future land use scenarios and urban design outcomes.
- Impacts properties on the north, but the extent of impact is less than alternative options. There is also the potential to integrate the corridor with residual land fronting Hobsonville Road (indicated for high density residential in the Whenuapai Structure Plan).
- Maintains the residential character on the southern side of Hobsonville Road.
- Avoids the more challenging topography in the south, resulting in a less complex engineering construction solution, and requires less land to facilitate the widening.

Segment 3: Option 7, to widen Hobsonville Road to the north and hold the southern edge is preferred in Segment 3 because it:

- Has greater potential to be integrated into the future land use scenarios on adjacent sites which have not been developed or consented
- Will have a reduced land requirement due to the large size of the adjoining lots and as the 2012 NOR boundary means development has generally not occurred within the boundary
- Maintains the residential character on the southern side and has greater potential to be integrated into the emerging development character within the Hobsonville Road Corridor Precinct
- Can be refined through the use of a reduced cross-section to avoid impacting Hobsonville School without compromising safety.

Segment 4: A hybrid of 6 and 7 is the preferred option in Segment 4:

In Segment 4 eastern section, Option 7 to widen Hobsonville Road to the north and holds the southern edge is preferred because it:

- Has greater potential to integrate into the future land use scenarios on sites which have not been developed or consented
- Will have a reduced requirement for full acquisition of sites due to the large size of the lots and as the 2012 NOR boundary means development has generally been set back
- Maintains the residential character on the southern side and has greater potential to integrate into the development character of the Hobsonville Road Corridor Precinct
- Does not impact a local medical practice on the south of Hobsonville Road, which avoids social impacts.

In Segment 4 western section, a refined Option 6 with a reduced cross section is preferred. The option widens Hobsonville Road to the south and holds the northern side. This option was preferred because:

- The businesses and community facilities on the northern side of Hobsonville Road are avoided; and the reduced cross section will minimise property, land use, social cohesion and heritage impacts on the southern side of Hobsonville Road however it retained capacity between closely spaced intersections and maintained suitable walking & cycling facilities on both sides of the road.

Throughout design refinement specific consideration was made to minimising the Project footprint and associated impact on community features and private properties. There will be further opportunities to minimise impacts along the Project alignment during detailed design, as a result, no further option refinement is required at this stage.

11.6.5 Discounted Options

Table 11-4 summarises the reasons for discounting the remaining options for each segment.

Table 11-4: Hobsonville Road Discounted Options

Option	Reasoning
Segment 2:	
Option 1	• Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Increased property impacts and land requirement by widening the road on both the northern and southern side • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Option 6	• Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Extended property impacts on the southern side of the road due to topography • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Option 8	• Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Extended property impacts on the southern side of the road due to topography • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Segment 3	
Option 1	• Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Increased property impacts and land requirement by widening the road on both the northern and southern side • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Options 6	• Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Impacts on the established residential character of the southern side, where no character changes are anticipated • Extended property impacts on the southern side of the road due to topography • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Option 8	• Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side

Option	Reasoning
	• Impacts on the established residential character of the southern side, where no character changes are anticipated • Extended property impacts on the southern side of the road due to topography • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Segment 4	
Option 1	• Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Increased property impacts and land requirement by widening the road on both the northern and southern side • Poor social cohesion outcomes due to impacts on community facilities, shops and services, and heritage impacts.
Option 7 (eastern)	• Impacts on development which meets the Hobsonville Road Corridor Precinct Objectives with associated property impacts and land requirement • Poor social cohesion outcomes due to impacts on community facilities, shops and services.
Option 6 (western)	• Less ability to integrate the options with the remaining Residential - Mixed Housing Zone, there is the potential for residual land to be created with limited development potential • Impacts on the established residential character of the southern side, where no character changes are anticipated • Increase property impacts compared to Option 7 in the western segment • Poor social cohesion outcomes due to impacts on community facilities.

11.7 Hobsonville Road Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Hobsonville Road upgrade is:

- **Segment 1:** Retain existing corridor as fit for purpose
- **Segment 2 and 3:** Option 7 is preferred
- **Segment 4:** Option 7 in the eastern section and Option 6 in the western section
- **Segment 5:** Retain existing corridor as fit for purpose.

This involves a combination of widening to the north, to the south and in some places widening on both sides to ensure impacts on environmental constraints are minimised where possible.

12 RE1: Don Buck Road

12.1 Corridor Overview

TFUG did not recommend the Don Buck Road South FTN Upgrade in the PBC plan in 2016. The IBC recommended an arterial upgrade to the urban corridor referenced as *AR-R-03* extending from Fred Taylor Drive to Triangle Road. For the purposes of the assessment Don Buck Road was split and assessed as Don Buck Road (North) from Fred Taylor Drive to Royal Road and Don Buck Road (South) from Royal Road to Red Hills Road.

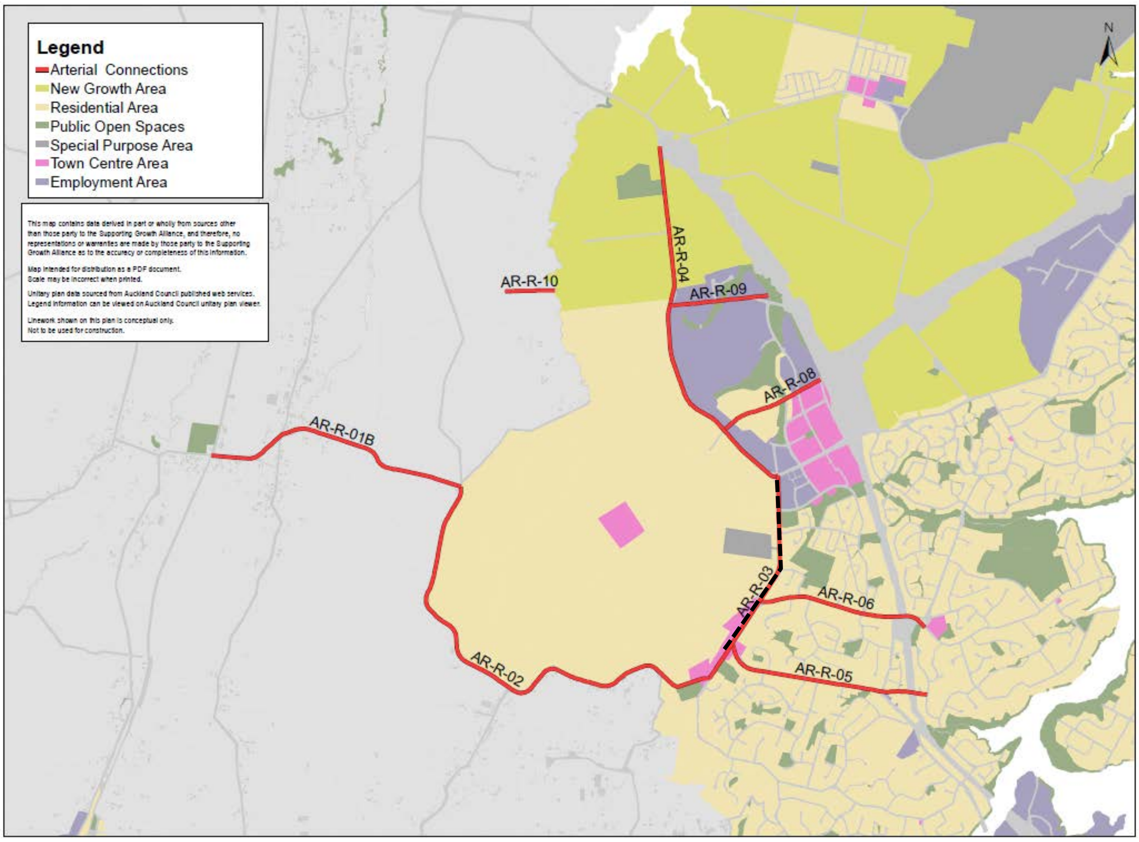


Figure 12-1: Don Buck Road IBC Option AR-R-03

Don Buck Road FTN South was assessed at route refinement by the Project Team and recommended not to proceed to route protection, as impacts on the town centre resulted in a reduced cross section with very little change to predicted traffic volumes. Whilst not widening Don Buck Road FTN South would delay the proposed FTN, in context of overall route it was not significant (only 0.4km). Section 12 therefore only reports on Don Buck Road FTN North (hereafter called Don Buck Road).

Don Buck Road forms a parallel spine to SH16 to connect people to future rapid transit nodes the strategic cycle network and SH16 motorway interchange. The existing corridor can be upgraded to meet requirements see Figure 12-1. It was recommended Don Buck Road be upgraded as a four-lane arterial providing strategic access, bus priority, and cycling and walking facilities. Upgrade of this corridor forms an effective use of existing assets.

12.2 Gap Analysis

Gap analysis identified existing urban development along Don Buck Road corridor as a constraint. This would require consideration of property impacts, including impacts on driveways. The corridor interacted with the North West HIF project (a separate Te Tupu Ngātahi project) which proposes new roading connections through Redhills basin with connections at Royal Road and Fred Taylor Drive.

Gap analysis confirmed that:

- Adequate corridor assessment of Don Buck Road was undertaken at the IBC, and analysis did not trigger further corridor assessment
- Route refinement assessment should be undertaken to respond to identified constraints.

12.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out on the Don Buck Road corridor environment, this identified that:

- **Extent and Zoning:** Don Buck Road urban corridor extends from Fred Taylor Drive to the Triangle Road intersection. East of the corridor and north of Westgate Drive is Business-Light Industry Zone. South of Westgate Drive is Open Space – Community Zone occupied by Massey Leisure Centre. The remainder of the east side is Residential – Mixed Housing Urban Zone
  - The Western side of Don Buck Road is zoned residential, primarily Residential - Mixed Housing Urban Zone, with a northern segment at Fred Taylor Drive also zoned Residential - Terraced Housing and Apartment Building Zone
- **Future Land use:** Land west of Don Buck Road is identified within the Redhills Precinct, this precinct undulates along the land use at Don Buck Road, forming an inconsistent frontage to the corridor
- **Special uses and constraints**: Access to St Pauls Primary School (Special Purpose – School Zone) and Westbridge residential school (Ministry of Education Designation 4646) is from the east side of Don Buck Road. Existing AT designation 1468 for Road Widening – SH16 (Westgate to Whenuapai) is present at the intersection with Fred Taylor Drive. Designation 9376 by Watercare Services Ltd is runs along Don Buck Road for the North Harbour No.2 Watermain
- **Environment / social constraints**: The existing urban corridor has public open space, educational facilities and services along the corridor including religious buildings and existing community centres. There are limited natural environment factors present given the urbanised form of the corridor.

Key project impacts were identified as being on topography, property and social infrastructure. The decision was made for the Project Team to undertake the assessment, rather than SMEs, due to the limited constraints along the corridor.

12.4 Corridor Form and Function Assessment

An assessment was undertaken for Don Buck Road, following the CFAF methodology in Section 4.3. The recommendation informed the route refinement options developed and assessed in Section 12.5. Figure 12-2 shows the CFAF cross section outcome.

Figure 12-2: CFAF Outcome – Don Buck Road Indicative 30m cross section

12.5 Route Refinement Option Development

The Don Buck Road corridor is an important parallel route to SH16 and provides north south resilience to the transport network, forming a key FTN arterial. Seven options were initially considered for the corridor, two options were based on reduced cross-sections which reduced project property impacts:

- **Option 4 / 20.6m**: A 20.6m cross section holding the existing centreline
- **Option 5 / 21.4m**: A 21.4m cross section holding the existing centreline.

Whilst reducing property impacts due to the reduced cross section these options did not meet the CFAF outcome and would not achieve the Transport Outcomes identified for the project. The options were therefore not taken forward.

Five options using variations on the cross section from Figure 12-2 were workshopped, these were:

- **Option 1 / 30m**: A 30m cross section holding the existing centreline and widen on both sides
- **Option 2 / 24.6m:** A constrained cross section of 24.6m with no flush median hold the existing centreline and widen both sides
- **Option 3 / 27.1m:** A constrained cross section of 27.1m with a flush median holding the existing centreline and widen both sides
- **Option 6 / 30m:** A 30m cross section holding the eastern boundary and widening west
- **Option 7 / 30m:** A 30m cross section holding the western boundary and widening east.

12.6 Route Refinement Assessment

12.6.1 Assessment

The assessment undertaken for Don Buck Road upgrade follows the process outlined in Section 4.4. The five options were assessed qualitatively against the MCA framework by the Project Team. Options were also assessed against the ability to achieve the following Transport Outcomes.

- Access: Improve access to economic and social opportunities along Don Buck Road
- Reliability: Enable reliable people and freight movement on Don Buck Road
- Mode Choice: Support transformational mode share in Redhills by providing a high quality, safe and attractive movement of people along Don Buck Road
- Safety: Provide improvements on Don Buck Road that contribute to a transport network that is free from deaths and serious injuries
- Integration: Provide a transport system that is integrated with land use enabling a more sustainable, high quality, connected urban form, and supports growth in Redhills.

All options performed well against the Transport Outcomes, however Options 1, 6 and 7 were preferred over Options 2 and 3. This was because Option 1, 6 and 7 had unconstrained cross sections which enabled better performance against the Transport Outcomes.

Option considerations and constraints identified are shown in Figure 12-3 and Table 12-1 provides a summary of the qualitative assessment undertaken.

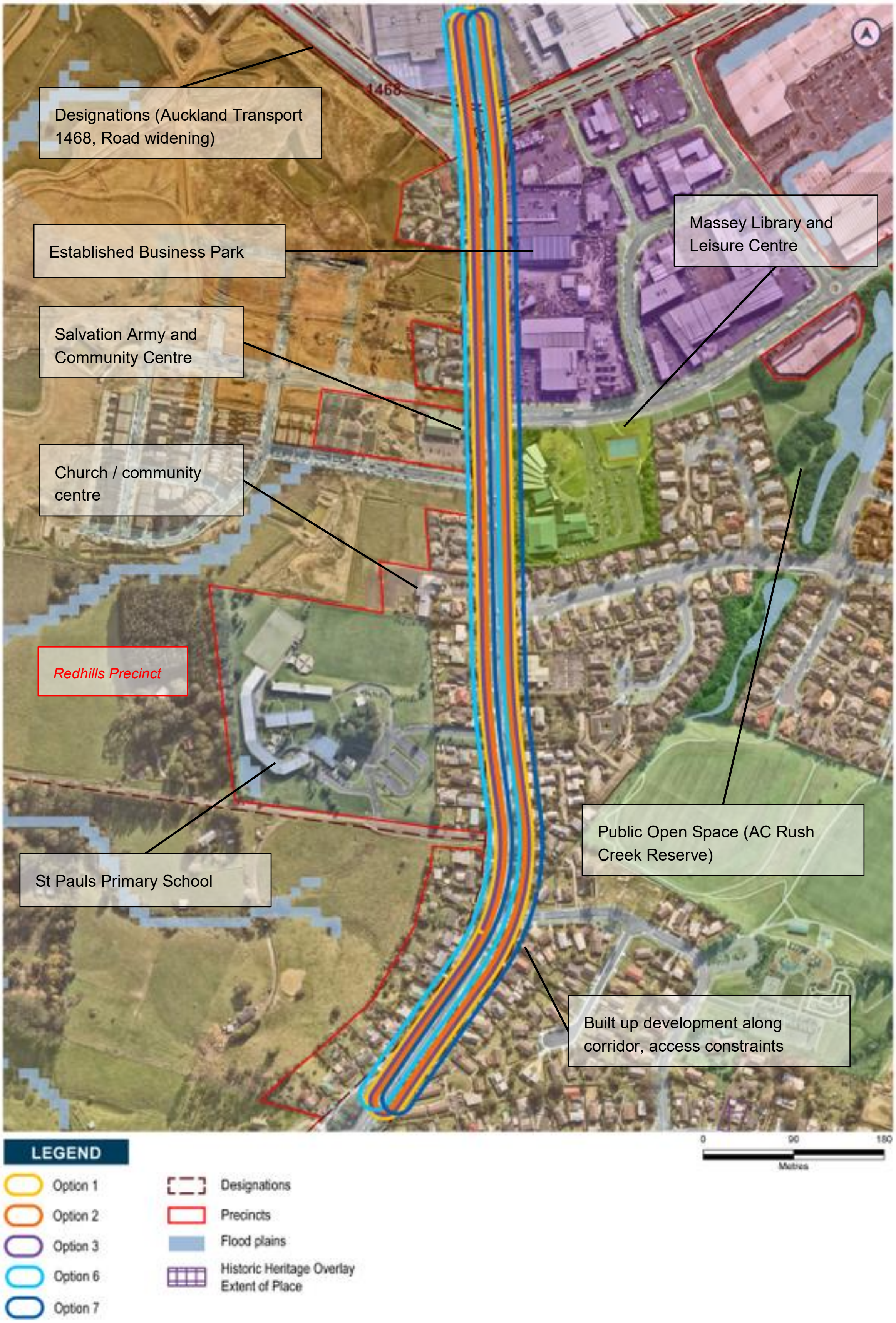


Figure 12-3: Don Buck Road Options and identified constraints

Table 12-1: Don Buck Road – Options Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: No significant heritage or archaeological constraints were identified along the route, and this criterion was not considered to differentiate between the options.
Social	Future land use integration: Options 1, 2, 3 and 7 involve widening to the east and would impact upon the Business – Light Industry Zone and the Open Space – Community Zone (occupied by Massey Leisure Centre). Given the role these zones have in providing employment opportunity and community facilities and the impact that encroachments would have on existing developments, these options are least preferred in northern section of the corridor. Option 6, which widens west and avoids the business park, is preferred. In the mid-section of the corridor, the preferred options are Options 1, 2 and 3, as these would have equitable and more limited impact on the land within the Residential – Mixed Housing Zone by widening on both sides of the road corridor. Options 6 and 7 would result in less equitable outcomes and are less preferred. Option 7 will tie in with the North West HIF project and will minimise the area of land impacted across both projects. In the southern section Option 7, widening to the east, is preferred. Social: Options 1, 2, 3 and 7 impact upon the Massey Leisure Centre site and are least preferred in the northern section. Option 6, widens west, and will impact on the existing Salvation Army building, however this allows for impacts upon the leisure centre to be minimised (although the side access will be impacted). In the mid-section of Don Buck Road there is a Jehovah's Witness Hall and the access to the Amberwood Rest Home. Option 6 will minimise impacts on the Jehovah's Witness Hall and Options 2 and 3 can be refined to minimise impacts on the site. Options 2, 3 and 6 are therefore preferred. Access to the Amberwood Rest Home can be maintained with all options. The Haumaru Housing (a community for older people) is located in the southern section of Don Buck Road and is impacted by all options. There is a preference for Option 6 as this option minimises the extent of impacts, however there is the potential to build a retaining wall or apply a reduced cross-section to minimise impacts with all options. Urban Design: All options will impact upon the existing residential character of Don Buck Road. Option 2 is less preferred as it will limit the potential for pedestrians to cross the road mid-block, reducing connectivity between both sides of the road. There is no differentiation between the preferred options (Options 1, 3, 6 and 7). Land Requirement: All options will impact on property along the corridor. In the northern section of the corridor there is the preference for Option 7 as this will avoid impacts on the properties within the Business and Open Space Zones. Avoiding the Open Space Zone, which contains, the Massey Leisure Centre will reduce the complexity associated with find alternatives sites. In the mid-section the preference is for the centreline options (1, 2 and 3) as these result in a more equitable impact on property on both sides of the corridor. In the southern section the preference is for Option 7 which will tie in with the North West HIF project and will minimise the number of properties impacted across both projects. Human Health and Wellbeing: All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing, and this criterion was not considered to differentiate between the options.
Environment	Landscape and Visual: No significant landscape features were identified on Don Buck Road as it is an urbanized road corridor, and this criterion was not considered to differentiate between the options. Stormwater: All options will require stormwater infrastructure to be provided either within the road corridor or on adjacent property. Options 2 and 3 have reduced potential to provide the

Wellbeing Assessment	
	required infrastructure within the corridor and as a consequence are least preferred. Options 1, 6 and 7 do not preclude the provision of stormwater within the corridor (if achievable) and are preferred. Ecology: No significant ecological constraints were identified along or in close proximity to any of the options, and this criterion was not considered to differentiate between the options. Natural Hazards: No significant geotechnical constraints or instability issues were identified along the alignment, and this criterion was not considered to differentiate between the options.
Economics	Utilities: Don Buck Road is designated for the North Harbour No.2 Watermain in the AUP:OP. There is however no differentiation in terms of construction impacts on the watermain. This criterion was not considered to differentiate between the options. Construction: All options will have a similar level of construction disruption, and this criterion was not considered to differentiate between the options.

12.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners including Manawhenua and Auckland Council to discuss the options. AT provided feedback that it was appropriate for active mode facilities to be progressed on urban arterials with existing development constraints.

The key outcome of engagement was support for the emerging preferred being a hybrid of Options 1, 6 and 7.

12.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Project Partners and the community, a preferred option for Don Buck Road was identified. The preferred option was a hybrid of the options considered, including Option 1, 6 and 7 with consideration of a reduced cross section (Option 3) at identified points to minimise impacts on property and social infrastructure.

The Hybrid Option was preferred because:

- By widening to west (Option 6) in the northern section of Don Buck Road, the Business – Light Industry Zone is avoided and impacts on the Open Space – Community Zone (occupied by Massey Leisure Centre) are minimised
- Widening on both sides of the road (Option 1) in the mid-section of Don Buck Road is more equitable has less significant property impacts
- Widening to the east (Option 7) in the southern section of Don Buck Road will tie in with the HIF proposal intersection at Don Buck Road and Royal Road. This minimises the number of properties impacted by both projects.

Options 1, 6 and 7 performed best against the transport outcomes. Throughout route refinement specific consideration was made to minimising the Project footprint and associated impact on private properties, resulting in a hybrid option that alternates along the corridor whilst still meeting the transport outcomes.

There will be further opportunities to minimise any impacts within the Project alignment during the detailed design of the Projects. As a result, no further design refinement is required at this stage.

12.6.4 Discounted Options

Table 12-2 summarises the reasons for discounting the options individually.

Table 12-2: Don Buck Road Discounted Options

Option	Reasoning
Option 1 / 30m	The option was discounted from the northern and southern sections of Don Buck Road North for the following reasons: • Impacts on the Business – Light Industry Zone and impacts on the Open Space - Community Zone (occupied by Massey Leisure Centre) in the northern section • Property impacts will occur on both sides of the road • Does not tie into the intersection works proposed as part of the HIF project in the southern section, and would increase the extent of property impacts across both projects.
Option 2 / 24.6m	This option was discounted from all of Don Buck Road for the following reasons: • Impacts on the Business – Light Industry Zone and on the Open Space - Community Zone (occupied by Massey Leisure Centre) in the northern section • Reduced transport and urban design outcomes as the absence of a flush median reduces access for vehicles and connectivity for pedestrians to cross the road • Does not tie into the intersection works proposed as part of the HIF project in the southern section, and would increase the extent of property impacts across both projects.
Option 3 / 27.1m	This option was discounted from all of Don Buck Road for the following reasons: • Impacts on the Business – Light Industry Zone and on the Open Space - Community Zone (occupied by Massey Leisure Centre) in the northern section • Does not tie into the intersection works proposed as part of the HIF project, and would increase the extent of property impacts across both projects.
Option 6 / 30m	This option was discounted from the mid and southern sections of Don Buck Road for the following reasons: • Increased property impacts on the western side of the corridor, and more significant impacts compared to widening on both sides • Does not tie into the intersection works proposed as part of the HIF project. And would increase the extent of property impacts across both projects.
Option 7 / 30m	This option was discounted from the northern and mid sections of Don Buck Road for the following reasons: • Impacts on the Business – Light Industry Zone and on the Open Space - Community Zone (occupied by Massey Leisure Centre) in the northern section • Increased property impacts on the eastern side, and more significant impacts compared to widening on both sides.

12.7 Don Buck Road Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Don Buck Road is a hybrid of Options 1, 6 and 7. Which enables tailored responses to constraints on the corridor.

13 RE2: Fred Taylor Drive

13.1 Corridor Overview

The Fred Taylor Drive corridor was recommended as part of the TFUG preferred network as an arterial upgrade. This upgrade was identified to improve the safety of active modes by providing separated walking and cycling facilities and increase the attractiveness of public transport through upgrades such as bus priority.

Fred Taylor Drive corridor was assessed at the IBC stage as one of Redhills' north-south arterial connections (referenced as *AR-R-04).* It forms a spine road running parallel to SH16 and serves a critical function to distribute future Redhills growth and connect people to rapid transit stations, the strategic cycle network and SH16 motorway interchange. The upgrade of the existing route, Option *AR-R-04* as a four-lane urban arterial upgrade was recommended, see Figure 13-1.

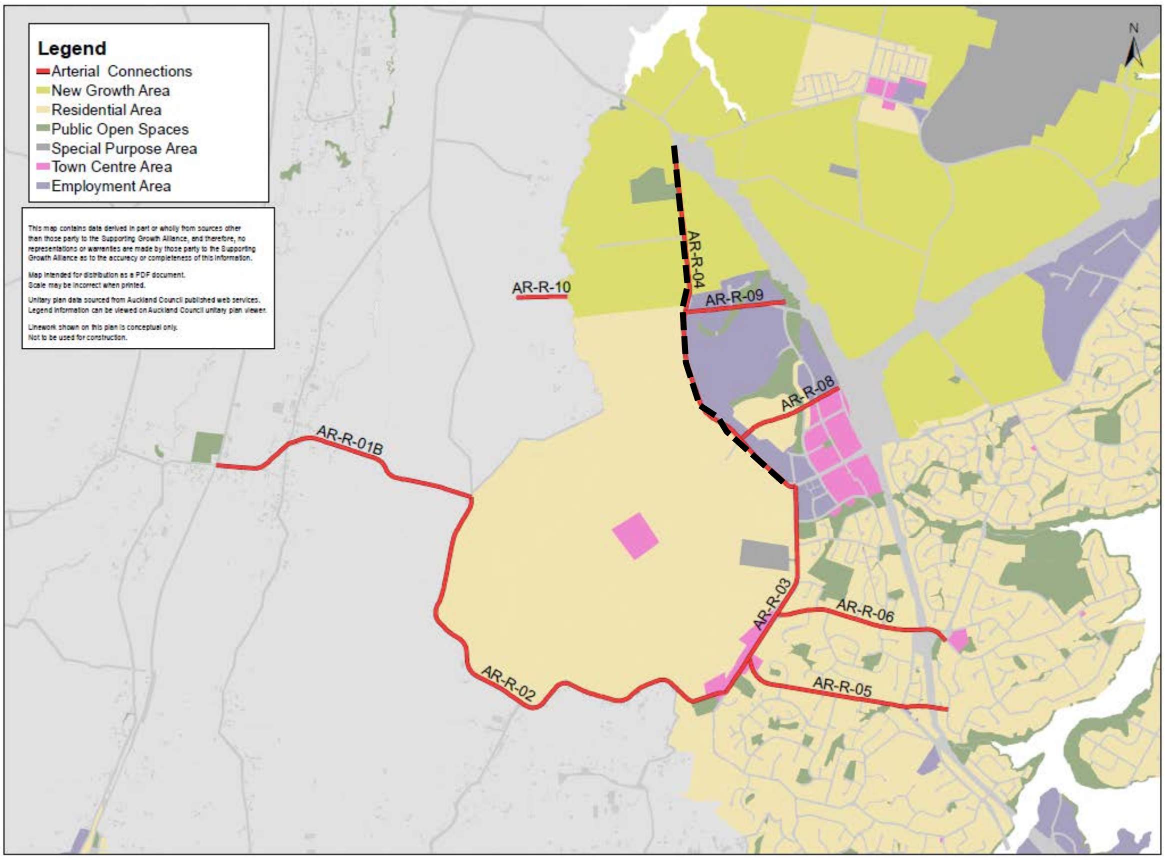


Figure 13-1: Fred Taylor Drive IBC Option AR-R-04

It will establish strategic access and bus priority and will support the Redhills collectors' network as well as improve cycling and walking facilities. The corridor was recommended as it will fulfil a north-south strategic function which provides resilience to public transport access between Westgate and Kumeū-Huapai.

13.2 Gap Analysis

Gap analysis confirmed the key consideration as the interface of the corridor with existing and planned projects and landuse. Future land use needed to be considered as Redhills North is currently zoned FUZ and AC is not proposing a structure plan in the short term. The proximity of the corridor to future RTN also needed to be considered in that adjacent development along the corridor may intensify in line with the National Policy Statement on Urban Development for rapid transit stops.

Social infrastructure including Fred Taylor Park is located adjacent to the corridor and would require work with AC to resolve impacts. Existing designations are also present along the corridor, with ATs Designation 1468 for road widening presenting an opportunity to utilise the currently designated area. The corridor also interacts with the North West HIF proposal onto Fred Taylor Drive.

Gap analysis confirmed that:

- Adequate Corridor Assessment was undertaken at IBC, and analysis did not trigger further corridor assessment
- Route refinement assessment should be undertaken to respond to constraints (see Section 13.5)
- The existing AT Designation 1468 should be investigated to confirm if the footprint is sufficient to upgrade Fred Taylor Drive and achieve the identified Transport Outcomes.

13.3 Corridor Form and Function Assessment

An assessment was undertaken for the Fred Taylor Drive upgrade following the CFAF methodology in Section 4.3. This recommendation informed the route refinement options developed and assessed in Section 13.5. Figure 13-2 shows the CFAF outcome.

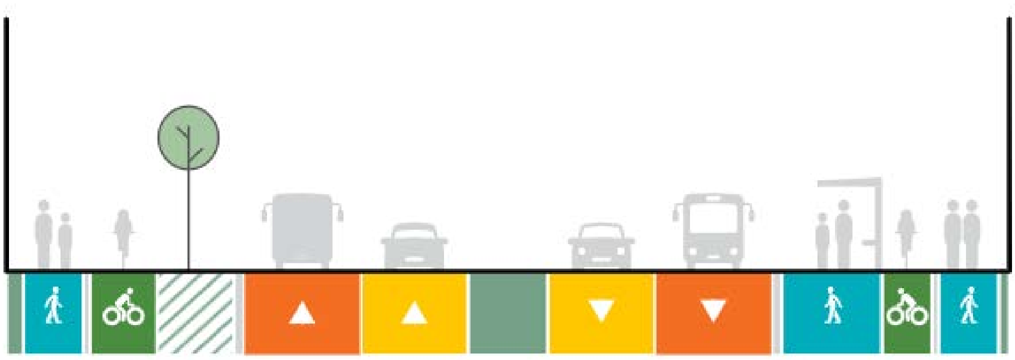


Figure 13-2: CFAF Cross Section Outcomes – Fred Taylor Drive Indicative 30m cross section

13.4 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Fred Taylor Drive corridor environment. The exercise identified that:

- **Extent and zoning:** Fred Taylor Drive is an existing road corridor that extends from the existing Brigham Creek Interchange in the north to the intersection with Don Buck Road in the south. The northern adjacent land use is FUZ, Fred Taylor Park is also adjacent and zoned Open Space-Sport and Active Recreation Zone. The Southern section of Fred Taylor Drive is live zoned residential, being Terraced Housing and Apartment Building Zone on the west within the Redhills

Precinct. The eastern side is zoned Business-Light Industry Zone and Business – Mixed Use Zone forming part of the Westgate Precinct
- **Future land use:** Although live zoned in the southern portion, the area is currently significantly greenfield
- **Special uses and constraints:** Two designations by AT (#1433 and #1468) are present along the full length of Fred Taylor Drive from SH16 (Brigham Creek Road) to SH16 (Hobsonville Road). Designation 1433 has been given effect to, and designation 1468 has been extended to March 2027 by AT. This would otherwise have lapsed in November 2021. The Whenuapai Ambulance station is adjacent to the corridor
- **Environmental Constraints**: Two botanical CHI sites (CHI 2164 and CHI 2165) at 121 Fred Taylor Drive for two trees. There is also riparian vegetation near the Totara Creek. CHI site 20445 is recorded at 81 Fred Taylor Drive (however this site has since been earthworked).

Key outcomes of the review were decision to:

- Utilise the existing AT designations (1433 and 1468) areas on Fred Taylor Drive as combined these were considered to have sufficient width (approximately 30m) to accommodate the desired corridor form and function cross section (see Section 13.1). Note this was subsequently reviewed (see Section 13.5)
- Assess their capability to provide for required construction and supporting infrastructure areas that enable the corridors delivery and tie in with landuse.

13.5 Route Refinement Option Development

It was initially confirmed at land use and constraint mapping stage that the road corridor and AT designation(s) provided sufficient width to accommodate the desired cross section for Fred Taylor Drive. However, it was subsequently identified, as the option developed, that to construct the upgraded corridor localised widening and construction works outside of the existing corridor and designations were needed to respond to:

- Construction areas, including laydowns, sediment retention ponds, and staging
- Existing road geometry at horizontal curves
- Supporting services, such as stormwater facilities
- Intersections with existing side roads
- Topography adjacent to the existing corridor.

As local widening was predominantly required for temporary works, a central running option was identified as an early preferred and alternative options not initially developed. However, given the need to designate outside of the existing corridor options were developed for assessment. These were:

- **Option 1:** Central running / both sides
- **Option 2:** Widening West
- **Option 3:** Widening East.

13.6 Route Refinement Assessment

13.6.1 Assessment

The assessment undertaken for Don Buck Road upgrade follows the process outlined in Section 4.4. The options were assessed qualitatively against the MCA framework by the Project Team. Options were also assessed against the ability to achieve the following Transport Outcomes.

- Access: Improve access to economic and social opportunities along an integrated Fred Taylor Drive
- Reliability: Enable reliable people and freight movement in Redhills
- Mode Choice: Support transformational mode share in Redhills by providing a high quality, safe and attractive movement of people along Fred Taylor Drive
- Safety: Provide improvements on Fred Taylor Drive that contribute to a transport network that is free from deaths and serious injuries
- Integration: Provide a transport system that is integrated with land use enabling a more sustainable, high quality, connected urban form and supports growth in Redhills.

All options performed well against the Transport Outcomes, however Option 1 was preferred in terms of integration. This was because it provided the greatest opportunity to utilise the existing road corridor and transport designations.

Option considerations and constraints identified are shown in Figure 13-3 and Table 13-1 provides a summary of the qualitative assessment undertaken.

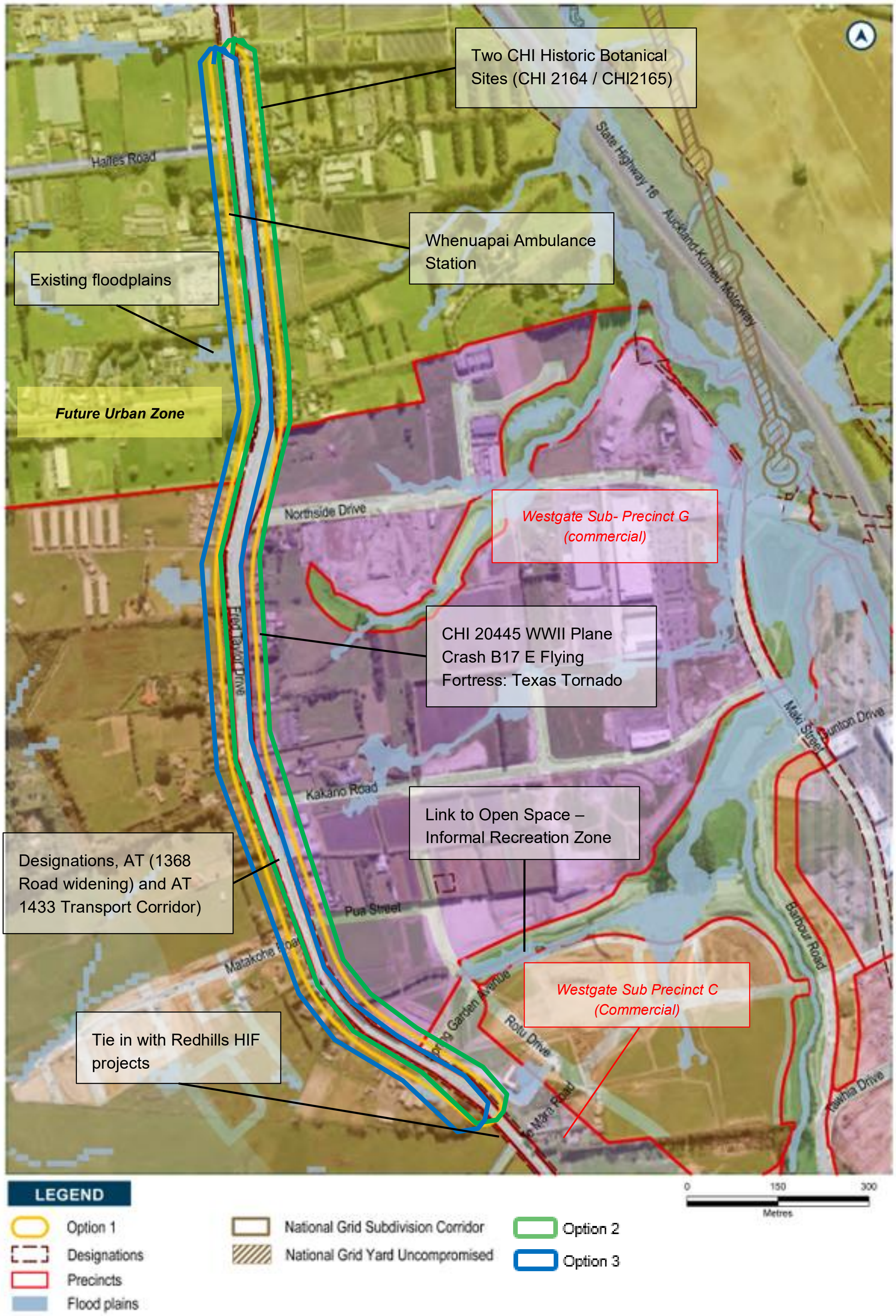


Figure 13-3: Fred Taylor Drive central option and identified constraints

Table 13-1: Fred Taylor Drive localised widening assessment

Assessment	
Cultural	Heritage: CHI site 'Flying Fortress Crash site' (CHI 20445) is located at 81 Fred Taylor Drive on the eastern side of the corridor, Whenuapai. There are also two CHI trees (CHI 2164 and 2165) at 121 Fred Taylor Drive. All options have works in the existing corridor and could have potential for discovery. Option 1 requires construction works along the frontage of both sites. Option 2 would encroach further into the site Option 3 would reduce impacts on this site and therefore be preferred. Note that 81 Fred Taylor Drive site has now been earth worked and cleared and therefore impacts at this site are not a differentiator.
Social	Future land use integration: All options integrate with proposed intersection at Redhills HIF for Dunlop Road and Spedding Road intersection opposite Hailes Road. Both sides of Fred Taylor Drive (south of Northside Drive) have development present along the corridor. Widening only to the east or west has greater potential to impact on the industrial or residential landuse, including smaller residential lots along the western frontage (Option 3), or commercial on the east (Option 2). North of Northside Drive is primarily zoned FUZ. There are some warehouses and dwellings located close to the corridor in larger lots. It is likely that an east or west alignment would have greater impacts on those buildings located close to the corridor, however Option 1 could be integrated into future landuse, given FUZ and expected landuse change. Social: Whenuapai Ambulance Station is located on the western side. Options should look to minimise impacts on this site, including the maintenance of access, so as to avoid adverse social effects. Option 3 would have greater potential for impacts at this site. There are limited open space areas along the corridor (the upgrade does not extend as far north as Fred Taylor Park). Urban Design: Urban design was not a differentiator. Land Requirement: An east or west only widening alignment would affect less properties and would be focused on one side of the corridor, however this would require more land and have more significant impacts on those sides. Option 1 would require a greater number of properties to be included in the footprint but will have a reduced extent and likely avoid full acquisitions by reducing demolition of buildings. In addition, the construction areas would be temporary and therefore upon finalisation. For this reason, Option 1 is preferred. Human Health and Wellbeing: An east (Option 2) or west (Option 3) aligned option would move the corridor closer to existing properties and / or to future development, this has the potential to increase adverse amenity impacts. Option 1 is therefore preferred.
Environment	Landscape and Visual: No differentiation. Stormwater: Being on a ridgeline, the route runs along the boundary of catchments. As such, there are no visible stream crossings or major flood plains along the route. Ecology: No SEA mapped along the alignment, a number of streams and wetlands were identified in the vicinity of the road however these were not noted as being of significant ecological value. Natural Hazards: There is limited exposure to flood hazard along the corridor, the western side of the corridor has an area of flooding at 160 Fred Taylor Drive. Option 3 would be greater affected by this and was less preferred to a central (Option 1) or eastern (Option 2) option.
Economics	Utilities: All options will impact on utilities to a similar extent.

Assessment	
	Construction: An eastern or western option would likely have greater building impacts and associated construction complexity and duration. An option which minimises impacts on buildings, such as Option 1, would have reduced construction disruption and cost.

13.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners, to discuss the options. Key engagement outcomes were Partners agreed with Option 1. AT extended the lapse date of Designation 1468 from November 2021 to March 2027 to allow future widening of the corridor.

Additional feedback was received on the impact of the National Policy Statement on Urban Development, specifically that once the proposed RTN is confirmed (non-Te-Tupu Ngātahi project) it will create intensification opportunities around Fred Taylor Drive. The Project Team confirmed that the preferred Option 1 will support this growth, as it will most effectively utilise the existing road corridor and transport designation.

13.6.3 Preferred Option

Following gap analysis and consideration of the land use and constraints, in addition to feedback received from Partners and community, the preferred option for Fred Taylor Drive was identified as:

- Option 1 / central, utilising the existing road reserve and designation areas with some widening to enable construction and tie ins.

The preferred option reduces new impacts on properties and receivers, makes best use of the existing road corridor and transport designations, and achieves the transport outcomes identified.

13.7 Fred Taylor Drive Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Fred Taylor Drive upgrade is Option 1, central widening. Option 1 allows localised widening to provide for tie ins at intersections and enable space for construction and stormwater facilities.

14 R1: Coatesville-Riverhead Highway

14.1 Corridor Overview

The Coatesville-Riverhead Highway upgrade was included in the TFUG recommended network and extended from SH16 northeast to the Riverhead live zoned area, see Figure 14-1. This corridor was split into two sections to assess separately at the IBC stage:

- **SR-K-03:** Coatesville-Riverhead Highway – South of Riverhead to SH16
- **SR-K-04:** Coatesville-Riverhead Highway – North of Riverhead to Dairy Flat.

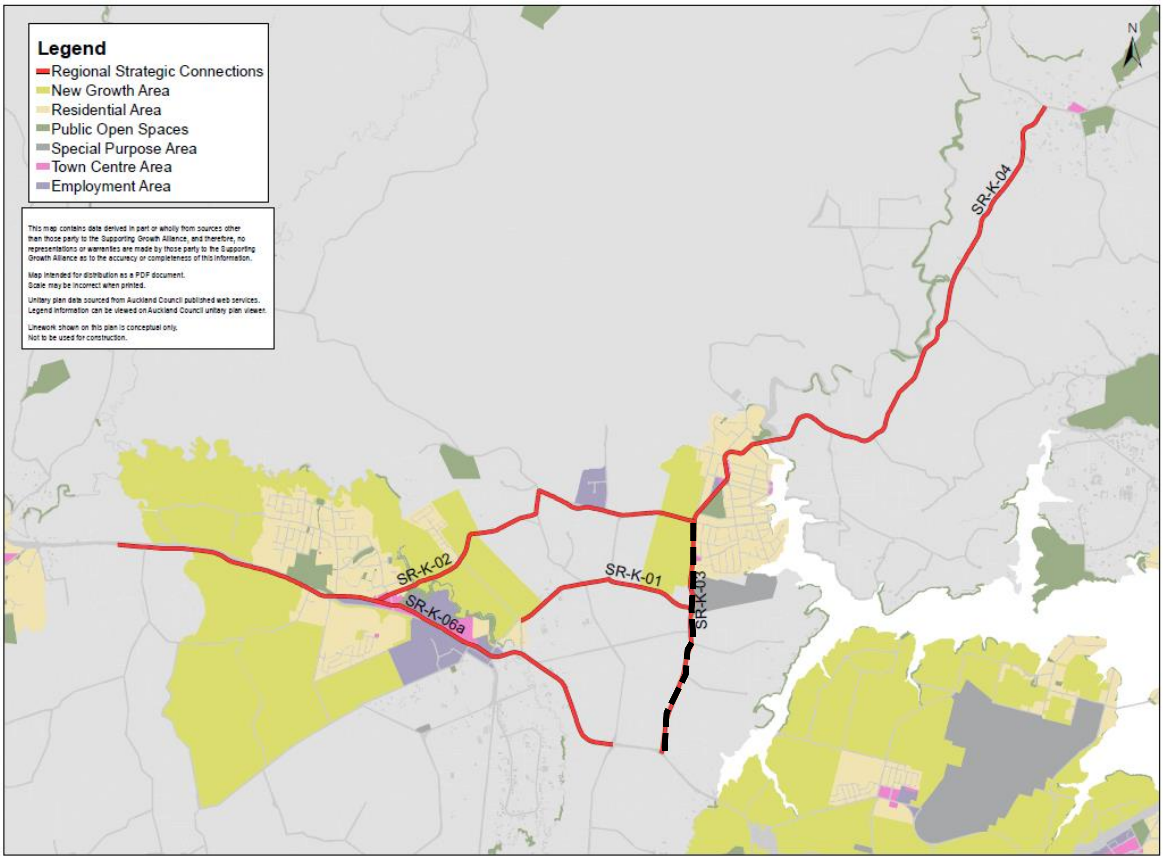


Figure 14-1: Coatesville-Riverhead Highway IBC Option SR-K-03

Both sections of Coatesville-Riverhead Highway were assessed as strategic sub-regional connections to service the Riverhead community. Coatesville-Riverhead Highway north of Riverhead to Dairy Flat (SR-K-04) would potentially result in significant environmental impacts, it was therefore discarded at the IBC stage. Project Partners and public feedback supported the section south of Riverhead and indicated support for safety improvements along the corridor.

Because Coatesville-Riverhead Highway is an existing corridor that can be upgraded to meet transport outcomes, no alternative routes were considered during the IBC. The Coatesville-Riverhead Highway (SR-K-03) southern section was therefore shortlisted for further development at DBC stage. The function of Coatesville-Riverhead Highway upgrade is to provide an important connection between Riverhead and the areas to the south such as Whenuapai and Westgate

14.2 Gap Analysis

Gap analysis identified that the SH16 Safety Improvements Project (a Non-Te Tupu Ngātahi project) will need to be considered in the design on the intersection.

Gap analysis confirmed that:

- Adequate corridor analysis of the Coatesville-Riverhead Highway was undertaken at the IBC phase, analysis did not trigger further corridor assessment
- Route refinement assessment should be undertaken to respond to identified constraints and for the project team to undertake the assessment, rather than SMEs.

14.3 Corridor Form and Function Assessment

An assessment was undertaken for Coatesville-Riverhead Highway following the CFAF methodology in Section 4.3, the recommendation informed the route refinement options developed and assessed in Section 14.5. Coatesville-Riverhead Highway was divided into two segments for the purposes of the assessment and Figure 14-2 and Figure 14-3 show the CFAF cross section outcomes.

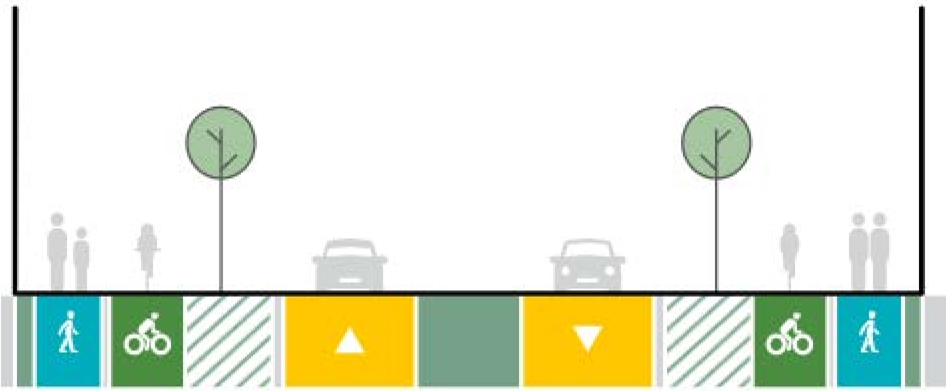


Figure 14-2: Coatesville-Riverhead Highway CFAF cross section outcome S1:SH16 to Short Road Indicative 24m cross section

Figure 14-3: Coatesville-Riverhead Highway CFAF cross section outcome S2: Short Road to Riverhead Road Indicative 24m cross section

14.4 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out on the Coatesville-Riverhead Highway corridor environment, this identified that:

- **Extent and Zoning:** The northern end of the corridor is located within the urban side of the rural-urban boundary (RUB). Within the RUB section, the east boundary has a mix of zones being Residential – Single House Zone and Business – Neighbourhood Centre Zone. The western side is FUZ and currently rural land use
- **Future Land use:** The corridors western side is within the RUB has not yet been structured plan and the future land use is not confirmed. Outside the RUB segment, the corridor traverses land primarily held in rural use zoned Rural-Mixed Rural Zone, and a portion on the east zoned Special Purpose – School Zone
- **Special uses and constraints:** The corridor has a number of uses along the alignment including a Hare Krishna Centre (Special Purpose School), social and community uses including a Monastery on the western side, and Huapai Golf Club on the east. A number of buildings have also located close to the corridor, which may result in property impacts
- **Environment / social constraints:** The corridor crosses a number of existing streams, including four in the rural zone. The area is a natural watershed between the Waitematā Harbour and the Kaipara.

It was decided to develop a centreline-based option that would address safety issues by improving road geometry deficiencies. It was also decided to develop two additional active mode options which could be applied should the geometric issues not warrant the wider upgrading of the corridor geometry.

14.5 Route Refinement Option Development

Coatesville-Riverhead Highway forms a key link between the Riverhead FUZ and SH16 and onwards to the RTC. Four options were initially developed, Option 1 a high-speed rural arterial of 90kph design speed was considered initially however following Partner engagement, was discounted as 90kph was considered inappropriate for the environment.

Three options using variations on the 24m cross sections were therefore workshopped, these were:

- **Option 2:** Upgrade to high-speed rural road, based on a 70kph design speed including walking and cycling facilities on western side
- **Option 3W:** Maintains the existing road alignment and adds walking and cycling facilities on the western side
- **Option 3E:** Maintains the existing road alignment and adds walking and cycling facilities on the eastern side.

14.6 Route Refinement Assessment

14.6.1 Assessment

The assessment undertaken for Coatesville-Riverhead Highway upgrade follows the process outlined in Section 4.5. The three options were qualitatively assessed against the MCA framework by the

Project Team. Options were also assessed against the ability to achieve the following Transport Outcomes.

- Access: Improve access to social and economic opportunities for active modes on Coatesville-Riverhead Highway
- Mode Choice: Support transformational mode share in Riverhead by providing a high quality and attractive active mode facility on Coatesville-Riverhead Highway
- Safety: Provide improvements on Coatesville-Riverhead Highway that contribute to a transport network that is free from deaths and serious injuries.

All options performed well in meeting the ‘Access’ outcome, however option performance varied against mode choice and safety. Options 2 and 3W had the least number of intersections and consequently performed better in providing a high-quality active mode facility along Coatesville-Riverhead Highway, Option 3E performed comparatively less well on mode choice.

Coatesville-Riverhead Highway is classified as a high-risk road due to its high crash rate and density of crashes being five serious injury crashes in the last five-year period. The increased traffic volumes predicted for this route are expected to exacerbate the safety concerns, with increases from 8,230 vehicles per day to 11,000 vehicles per day in 2048. Option 2 upgrading the existing vertical and horizontal alignment would address the current safety issues and is preferred on this outcome.

Option considerations and constraints identified are shown in Figure 14-4, Table 14-1 provides a summary of the qualitative assessment undertaken.

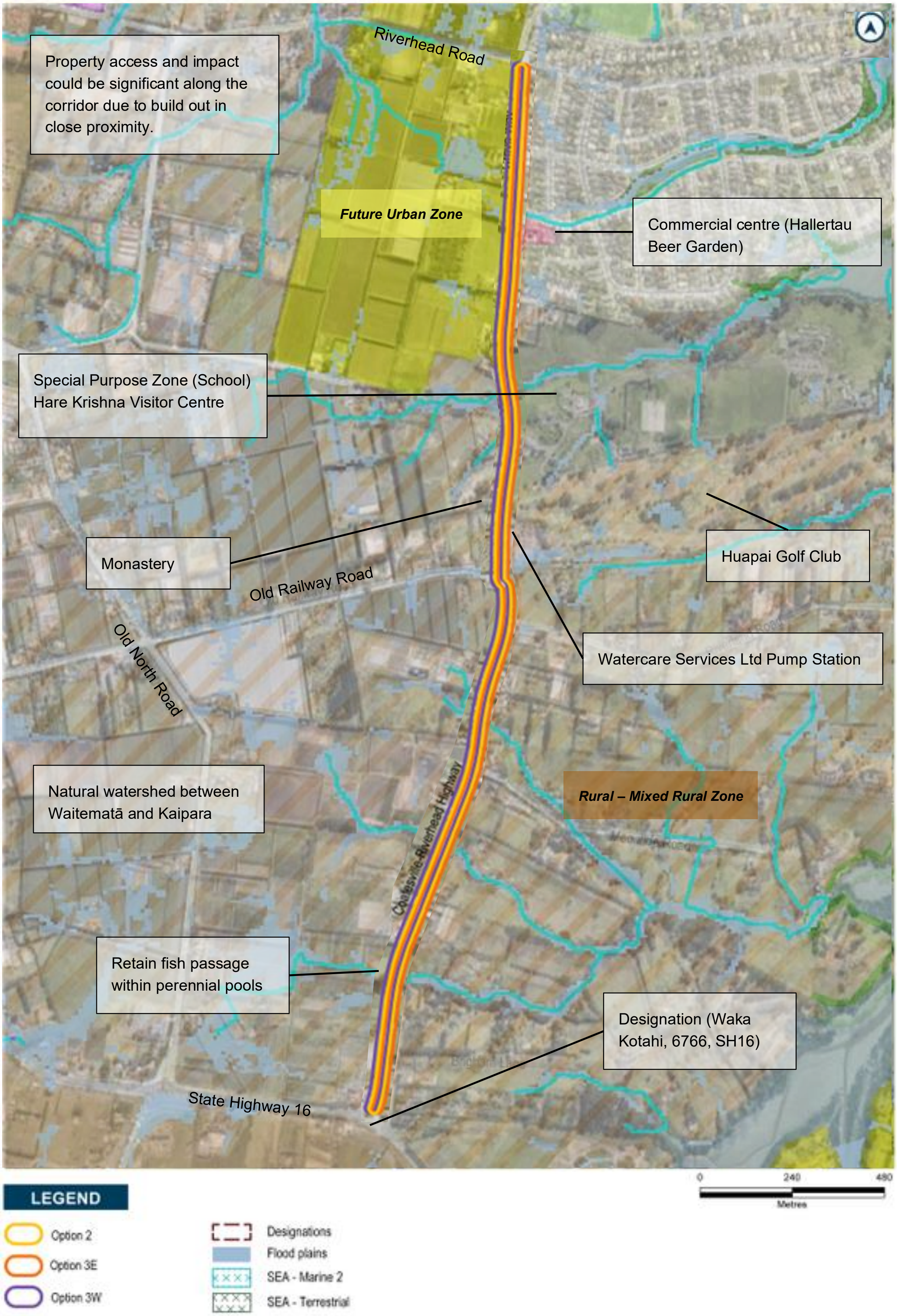


Figure 14-4: Coatesville-Riverhead Highway Options and identified constraints

Table 14-1: Coatesville-Riverhead Highway – Option Assessment Summary

Wellbeing Assessment	
Cultural	Heritage: No significant heritage or archaeological constraints were identified along the route, and this criterion was not considered to differentiate between the options.
Social	Future land use integration: Option 2 and 3W are preferred as they will integrate with FUZ on the west side of the corridor within Riverhead. There is no significant difference between the options within the rural southern section of the corridor. Option 2 and 3W have the potential to utilise existing active mode infrastructure on the east side within the urban section of the corridor; whilst providing facilities on the east side that integrate with future development in the FUZ. These options were preferred in the urban section over 3E. Social: Option 2 and 3W will encroach upon the existing Buddhist Monastery site, and Option 3E will encroach upon the Special Purpose School Zone. The impact is not so significant that the options will prevent the ongoing use of the school and monastery sites or the existing buildings within the sites. Consequently, there is no differentiation between the options with regard to this criterion. Urban Design: All options provide better legibility outcomes for cyclists. The northern sections of Option 2 and 3W can be integrated with the future urban design outcomes for the Riverhead FUZ. Land Requirement: Option 2 involves active modes and upgrading the road corridor. This option was developed as it would result in a more equitable outcome in terms of requiring land on both sides of the road. Options 3W and 3E; however, have a reduced land requirement as both options only propose the addition of active modes. Options 3W and 3E have similar impacts and are equally preferred and Option 2 is least preferred due to increased land requirement. Human Health and Wellbeing: No major impacts or effects on health and wellbeing were identified for any of the options, and this criterion was not considered to differentiate between the options.
Environment	Landscape and Visual: No significant landscape features were identified, and this criterion was not considered to differentiate between the options. Stormwater: The options will not significantly impact the steams / watercourses located along / in proximity Coatesville-Riverhead Highway. No other significant constraints from flooding or overland flow paths were identified along the route. All options will require stormwater infrastructure to be provided either within the road corridor or on adjacent property. This criterion was not considered to differentiate between the options. Ecology: No significant ecological constraints were identified in close proximity to the options. This criterion was not considered to differentiate between the options. Natural Hazards: No significant geotechnical constraints or instability issues were identified along the alignment. This criterion was not considered to differentiate between the options.
Economics	Utilities: Option 3E will impact upon impact upon an existing water pump station and pylons located on the eastern of the corridor. Option 2 can be refined to avoid or minimise impacts on the water pump and minimise impacts on the pylons. Option 3W will avoid impacts on these utilities as the eastern edge is held in this current position Option 3W is therefore preferred under this criterion. Construction: Option 2 is least preferred as it will require the greatest extent of work within the road corridor. Options 3E and 3W are equally preferred as most of the works can take place off road and will require less traffic management on the road corridor.

14.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners including Manawhenua and Auckland Council to discuss the options.

Engagement with Watercare Services Ltd has been regular and ongoing, Coatesville-Riverhead Highway upgrades have potential to affect the existing Watercare pump station which collects wastewater from surrounding area. The site is undesignated and located in front of the Huapai Golf Course at 1262 Coatesville-Riverhead Highway. Watercare highlighted construction and design challenges of impacting the pump station. Shifting the pump site would also add significant project costs. The key outcome of engagement was Partner support for the emerging preferred of Option 2.

14.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Project Partners and the community, a preferred option for the Coatesville-Riverhead corridor was identified. The preferred option was Option 2 which widens to both sides of the existing corridor.

Option 2 was preferred because it:

- Provides active modes on the western side of Coatesville-Riverhead Highway, which can then be integrated with the Riverhead FUZ land, which is preferable to locating in the existing urban zone
- The option cross section can be refined to only provide active modes on the west side and utilise existing active mode facilities on the east side of the urban section of the corridor
- Has a reduced number of intersections which will need to be crossed on the western side resulting in less potential conflicts for the active mode corridor
- Avoids shifting the pump station (Watercare Services Ltd asset) on the eastern side of Coatesville-Riverhead Highway
- Enables alteration to the road geometry enabling key corridor safety issues to be resolved on the primary access from Riverhead to Westgate and future employment areas in Whenuapai
- Whilst likely to be costlier to construct and has higher land requirements, this is required to achieve the safety outcomes identified.

The key differentiator through the assessment was that Option 2 outperformed the other options in terms of safety. Other impacts of the option on the environment and social infrastructure are able to be managed. There will be further opportunities to minimise impacts within the Project alignment during the detailed design of the Projects. As a result, no further refinement is required at this stage.

14.6.4 Discounted Options

Table 14-2 summarises the reasons for discounting the remaining two options.

Table 14-2: Coatesville-Riverhead Discounted Options

Option	Reasoning
Option 3E	• Impacts on the Watercare Services Ltd Pump Station and electricity pylons • Does not address the safety issues associated with the existing geometrical alignments on Coatesville-Riverhead Highway • Less integrated with future development within the FUZ and future urban design outcomes of the FUZ development.

Option	Reasoning
Option 3W	• Does not address the safety issues associated with the existing geometrical alignments on Coatesville – Riverhead Highway.

14.7 Coatesville-Riverhead Highway Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Coatesville-Riverhead Highway upgrade is Option 2, to widen to both sides of the existing corridor and locate the shared path on the western side of the corridor. Corridor Option 2 was the only option that satisfactorily addressed the geometrical safety issues along the alignment and locating the shared path to the west also reduces the number of intersections active mode users are exposed to, increasing their safety.

15 North West Local Arterials Conclusion

This report has set out the consideration of alternatives undertaken to identify the preferred alignments and set out the considerations for project elements along the alignment, including stormwater and flooding management.

Te Tupu Ngātahi on behalf of AT adopted a systematic approach to considering alternative sites, routes and statutory methods for undertaking the Projects. The MCA framework adopted to consider alternative options incorporated Part 2 RMA elements as well as matters appropriate to AT statutory functions. The Local Arterials Package for route protection comprises eight new extended and / or upgraded corridors as follows:

Whenuapai
- **W1:** Trig Road Upgrade
- **W2:** Māmari Road FTN Upgrade
- **W3:** Brigham Creek Road Upgrade
- **W4:** Spedding Road
- **W5:** Hobsonville Road.

Redhills and Riverhead
- **RE1:** Don Buck Road
- **RE2**: Fred Taylor Drive
- **R1:** Coatesville-Riverhead Highway.

The assessment of alternative methods to deliver the Projects is set out in Section 16.

16 Alternative Statutory Methods

This section provides an overview of the statutory methods considered to deliver the Local Arterials Package of works.

16.1 Assessment of Route Protection Methods

The principal objective is to identify, and route protect the strategic transport network for the Local Arterials Package. The corridors will support Auckland's projected growth over the next three decades. To achieve this a number of statutory methods have been considered (see Figure 16-1), to enable route protection and implementation in light of each project's strategic importance, delivery urgency / timing, complexity and risk profile.

Figure 16-1: Route Protection Methods Considered

Table 16-1 below summarises the strengths, weaknesses and suitability of each method for route protecting the Local Arterials Package. The planning context, key risks and considerations which may influence the preferred route protection method were reviewed and evaluated taking into account the planning environment and identified risks and considerations.

A package assessment is provided of the method, and where applicable, further commentary is provided on a route's unique characteristics.

Table 16-1: Summary of route protection methods considered

Methods	Summary of strengths and weaknesses within local context
Auckland Unitary Plan 'Corridor Overlay'	AUP:OP overlays can provide certainty to the community by publicly identifying the network, however they do not protect the land necessary for the works. Any overlays would require a plan change, this approach may not be accepted by Council as the AUP:OP overlays are generally focussed on RMA Section 6 and 5 matters (e.g., heritage, SEAs) rather than transport. There are existing infrastructure overlays in the AUP:OP for noise (e.g., Airport Noise Overlay, City Centre Port Noise Overlay) as well as the National Grid Corridor Overlay, which is most reflective of how an overlay may appear for transport. However, it is noted that the National Grid is also served by the National Policy Statement on Electricity Transmission which sets out key protections from adverse impacts of third-party development. There is currently no National Policy Statement which would provide the required protection for key transport corridors. Progressing a 'Transport Corridor Overlay' within the AUP:OP is therefore not considered a viable route protection method for the Local Arterials Package.
Resource Consents	A resource consent grants approval to use resources such as the land, water, air and coastal environment. A resource consent, if granted, is not shown publicly in a district plan and does not protect land or provide rights of exclusion that would hinder incompatible land use. Therefore resource consents are not an appropriate route protection method. It can be advantageous to seek resource consents (particularly for construction activities) under the RMA alongside route protection methods in instances where projects will proceed to construction once the route is secured. None of the Projects within the Local Arterials Package have funding for short term construction and delivery, therefore resource consents are not being sought.
Landowner / developer negotiation	Landowner or developer negotiations can include private parties purchasing land and vesting roads that support development, or development agreements whereby a developer agrees to "set aside land for future transport corridor" and / or construction at a future point. Infrastructure Funding Agreements (IFA) are the preferred form of landowner / developer agreement to enable delivery of transport infrastructure. IFAs provide route protection where a developer agrees to design and implement a project. For landowner agreements to be efficient, the aspirations and timing of each party must be aligned. There are several developers which are active in the wider Whenuapai area, however in most cases they do not own all the required land for a corridor. This then relies on individual property owners, who may not be developers (with sufficient capital or expertise) to enter into agreements. Private property owners with no development aspirations that are not part of a broader scheme may not have capacity or desire to negotiate such agreements. Where several independent properties and developers are involved, the final solution is likely to be delivered piecemeal due to the impracticalities and timeframes required to negotiate complex agreements with numerous landowners for each corridor, noting that there are a high number of property owners along the Local Arterials Package. IFAs with a large number of parties are generally impractical to implement and unlikely to protect the corridors within a reasonable time period. Additionally, it is not compulsory for landowners to enter into agreements. For linear corridors requiring a consistent network, agreement must be secured along the length of the route. A piecemeal approach significantly reduces the utility of this method for route protection purposes. Strategic routes (such as North West Local Arterials) are longer term and typically arterial corridors. These routes are usually delivered by the transport authority, due to their network

Methods	Summary of strengths and weaknesses within local context
	role. Provision of partial routes would not achieve the strategic network benefits the programme is seeking to protect. **Trig Road** The existing land ownership pattern adjacent to this section of Trig Road is fragmented, with the existing corridor predominantly surrounded by large rural lots or lifestyle block sections. There is therefore not sufficient certainty on the future ownership pattern at this stage. **Māmari Road** The existing land ownership pattern the Māmari Road corridor traverses is currently comprised of large rural and lifestyle block properties, with the exception of the NZDF housing and the Timatanga Community School. There is potential for an amalgamation of lots to enable the development of the FUZ. There is not however sufficient certainty on the future ownership pattern at this stage; and it is unlikely that there would be one owner / developer for the length of Māmari Road. **Brigham Creek Road** The existing land ownership pattern adjacent to Brigham Creek Road is fragmented, with the existing corridor predominantly surrounded by large rural lots or lifestyle block sections. The exception to this is in the Whenuapai town centre area. The surrounding land is constrained by smaller residential and commercial properties. **Spedding Road** Plan Change 69 has been submitted to Auckland Council for the Spedding Block and is now approved. It covers a portion of Spedding Road West. The team have commented on the proposal and worked with the developer to align the roading plans for Spedding Road West. There is opportunity to enter IFAs with developers for some portions of the Local Arterials Package where developers are active. Although opportunity for an agreement exists, the timing of the developer plans and the network are not confirmed and may not align. **Hobsonville Road** The existing land ownership pattern adjacent to Hobsonville Road is fragmented, with the existing corridor constrained by residential dwellings on the southern side, and commercial and industrial properties on the northern side. The fragmented nature of these land holdings suggests that there is a low likelihood that the upgrade of this road could be incorporated into a wider land development project. **Don Buck Road** The existing landowner pattern along Don Buck Road is fragmented with several smaller landowners, with mixed land use between business and residential uses with some full property acquisitions required. Reaching a successful IFA or agreement to deliver the upgrade is unlikely. **Fred Taylor Drive** Fred Taylor Drive has fragmented landownership along its length, with mixed land use including residential and business and open space. Land requirement is lower due to the existing Designation 1468 however this corridor is a strategic priority, and delivery under an IFA would rely on multiple individual owners and be susceptible to the weaknesses referred to above. **Coatesville-Riverhead Highway** The corridor runs primarily through a rural area, where urban development is not planned under the AUP:OP. Therefore, it is unlikely that a developer or landowner would progress this stretch outside of their development frontage.

Methods	Summary of strengths and weaknesses within local context
	The section of Coatesville-Riverhead Highway north within the RUB has active developers in the FUZ area. Although this area has not been subject to a plan change there is potential for the section to be delivered in part by landowners and Te Tupu Ngātahi. AT have been engaging with developers on this design, however these conversations are ongoing and no plan change has been confirmed or formal agreement to deliver this section reached yet.
Traditional Property acquisition	Traditional property acquisition to acquire the necessary land for each route was also considered. Land is typically purchased a few years before projects go to construction and delivery, based on detailed design plans. Purchasing property at this stage ahead of detailed design may result in more or less land being acquired than is required to deliver the project. It also may not enable construction areas to be protected which are required temporarily to construct the corridors. Like developer negotiations, traditional property purchase would not provide route protection until acquisition, where multiple owners are present this is unlikely to be achieved in a timely or consistent manner.
Designation	A NOR to designate land for a public work under the RMA provides a strong level of route protection from incompatible development particularly where development pressure is anticipated along the corridor. Once confirmed it also provides authorisation to undertake and maintain the works. A NOR has interim route protection effect as soon as the notice is lodged with Council which ensures the corridors will be protected from incompatible development from that date, enabling a cohesive interim protection for linear networks like roads. This effectively manages risk of development within the corridor that may otherwise hinder the proposed work. This is particularly important as there is keen developer interest in Whenuapai, particularly along Hobsonville Road and Brigham Creek Road. Developers have submitted private plan changes to Auckland Council indicating the intention to expedite growth in the area. A designation, if confirmed, is included in the relevant district plan as a publicly visible layer. This provides visibility to the public about the intended land use and project extent, it also provides certainty to other infrastructure providers and developers about the future network location, enabling integrated development planning. A designation enables faster construction and delivery of a corridor following detailed design, by consenting the project requirements under the district plan and allowing regional consents and Outline Plan of Works to be sought at a later date.
Alteration to existing designations	There are limited opportunities to rely on this method throughout the Local Arterials Package. Lodging a NOR for the alteration of an existing designation has the same strengths and potential risks as identified for a new designation. An alteration to an existing designation for the recommended network is only available for Hobsonville Road (Designation 1437) and Fred Taylor Drive (Designation 1468 or Designation 1433).The existing road corridor designation on Hobsonville Road (Designation 1437) and on Fred Taylor Drive (Designation 1433) are proposed to be altered. This approach represents an integrated approach with the existing designations. On Fred Taylor Drive altering Designation 1468 was discounted as this relates to relatively small areas along the corridor only and would have been a less integrated approach. However, Designation 1433 could be altered to provide for the proposed cross section.

16.2 Preferred Method(s)

Designations (new or alterations to existing) are the preferred method. Designations provide certainty to the public by identifying the long-term transport network, enable it to be implemented in stages as aligned with government funding and pace of growth, enabling effective investment. The method protects the required area by restricting activities or use that may prevent or hinder the project and allows detailed design to be undertaken prior to project delivery. Designations provide an efficient and effective route protection method for linear corridors in changing environments. Table 16-2 sets out the preferred method for each Project.

Table 16-2: Local Arterials Package Preferred Method

Ref	Project	Preferred Method
Whenuapai		
W1	Trig Road	Notice of Requirement
W2	Māmari Road	Notice of Requirement
W3	Brigham Creek Road	Notice of Requirement
W4	Spedding Road	Notice of Requirement
W5	Hobsonville Road	Alteration to existing AT Designation 1437
Redhills and Riverhead		
RE1	Don Buck Road	Notice of Requirement
RE2	Fred Taylor Drive	Alteration to existing AT Designation 1433
R1	Coatesville-Riverhead Highway	Notice of Requirement

16.3 Summary

The assessment of alternatives undertaken meets the statutory requirements set out in section 171(1)(b) of the RMA.

ATTACHMENT 43

NORTH-WEST LOCAL
PROPOSED CONDITIONS
PART 1 OF 2

North West Local

Proposed Conditions

Notice of Requirement Key

Reference	Project	Purpose
W1	Trig Road North	Construction, operation and maintenance of a transport corridor
W2	Mamari Road	Construction, operation and maintenance of a transport corridor
W3	Brigham Creek Road	Construction, operation and maintenance of a transport corridor
W4	Spedding Road	Construction, operation and maintenance of a transport corridor
R1	Coatesville-Riverhead Highway	Construction, operation and maintenance of a transport corridor
RE1	Don Buck Road	Construction, operation and maintenance of a transport corridor

Abbreviations and definitions

Acronym/Term	Definition
Activity sensitive to noise	Any dwelling, visitor accommodation, boarding house, marae, papakāinga, integrated residential development, retirement village, supported residential care, care centre, lecture theatre in a tertiary education facility, classroom in an education facility and healthcare facility with an overnight stay facility.
ARI	Annual Recurrence Interval
Average increase in flood hazard	Flow depth times velocity.
AUP	Auckland Unitary Plan
BPO or Best Practicable Option	Has the same meaning as in section 2 of the RMA 1991.
CEMP	Construction Environmental Management Plan
Certification	Confirmation from the Manager that a material change to a plan or CNVMP Schedule has been prepared in accordance with the condition to which it relates. A material change to a management plan or CNVMP Schedule shall be deemed certified: (a) where the Requiring Authority has received written confirmation from Council that the material change to the management plan is certified

Acronym/Term	Definition
	(b) ten working days from the submission of the material change to the management plan where no written confirmation of certification has been received (c) five working days from the submission of the material change to a CNVMP Schedule where no written confirmation of certification has been received.
CNVMP	Construction Noise and Vibration Management Plan
CNVMP Schedule or Schedule	A schedule to the CNVMP
Completion of Construction	When construction of the Project (or part of the Project) is complete and it is available for use.
Confirmed Biodiversity Areas	Areas recorded in the Identified Biodiversity Area Schedule where the ecological values and effects have been confirmed through the ecological survey under Condition **Error! Reference source not found.**.
Construction Works	Activities undertaken to construct the Project excluding Enabling Works.
Council	Auckland Council
CTMP	Construction Traffic Management Plan
EMP	Ecological Management Plan
EIANZ Guidelines	Ecological Impact Assessment: EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems, second edition, dated May 2018.
Enabling works	Includes, but is not limited to, the following and similar activities: • geotechnical investigations (including trial embankments) • archaeological site investigations • formation of access for geotechnical investigations • establishment of site yards, site entrances and fencing • constructing and sealing site access roads • demolition or removal of buildings and structures • relocation of services • establishment of mitigation measures (such as erosion and sediment control measures, temporary noise walls, earth bunds and planting).
Existing authorised habitable floor	The floor level of any room (floor) in a residential building which is authorised by building consent and exists at the time the outline plan is submitted, excluding a laundry, bathroom, toilet or any room used solely as an entrance hall, passageway or garage.
Flood prone area	A potential ponding area that relies on a single culvert for drainage and does not have an overland flow path.
HHMP	Historic Heritage Management Plan
HNZPT	Heritage New Zealand Pouhere Taonga
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
Identified Biodiversity Area	Means an area or areas of ecological value where the Project ecologist has identified that the project will potentially have a moderate or greater level of

Acronym/Term	Definition
	ecological effect, prior to implementation of impact management measures, as determined in accordance with the EIANZ guidelines.
Manager	The Manager – Resource Consents of the Auckland Council, or authorised delegate.
Mana Whenua	Mana Whenua as referred to in the conditions is considered to be (as a minimum but not limited to) the following (in no particular order), who at the time of Notice of Requirement expressed a desire to be involved in the Project: • Ngāti Whātua o Kaipara • Te Kawerau a Maki • Ngāti Whanaunga • Te Ākitai Waiohua
Maximum Probable Development	Design case for consideration of future flows allowing for development within a catchment that takes into account the maximum impervious surface limits of the current zone or, if the land is zoned Future Urban in the Auckland Unitary Plan, the probable level of development arising from zone changes.
Network Utility Operator	Has the same meaning as set out in section 166 of the RMA.
NOR	Notice of Requirement
NZAA	New Zealand Archaeological Association
Outline Plan	An outline plan prepared in accordance with section 176A of the RMA.
Pre-Project development	Existing site condition prior to the Project (including existing buildings and roadways).
Post-Project development	Site condition after the Project has been completed (including existing and new buildings and roadways).
Project Liaison Person	The person or persons appointed for the duration of the Project's Construction Works to be the main point of contact for persons wanting information about the Project or affected by the Construction Works.
Protected Premises and Facilities (PPF)	Protected Premises and Facilities as defined in New Zealand Standard NZS 6806:2010: Acoustics – Road-traffic noise – New and altered roads.
Requiring Authority	Has the same meaning as section 166 of the RMA and, for this Designation is Auckland Transport.
RMA	Resource Management Act (1991)
SCEMP	Stakeholder Communication and Engagement Management Plan
Stage of Work	Any physical works that require the development of an Outline Plan.
Start of Construction	The time when Construction Works (excluding Enabling Works) start.
Suitably Qualified Person	A person (or persons) who can provide sufficient evidence to demonstrate their suitability, experience and competence in the relevant field of expertise.
ULDMP	Urban and Landscape Design Management Plan

Acronym/Term	Definition
Urban Zoning	Land zoned residential or business, together with adjoining special purpose and open space zones.

NoR No.	No.	Condition
General Conditions		
All		**Activity in General Accordance with Plans and Information** (a) Except as provided for in the conditions below, and subject to final design and Outline Plan(s), works within the designation shall be undertaken in general accordance with the Project description and concept plan in Schedule 1 (b) Where there is inconsistency between: (i) the Project description and concept plan in Schedule 1 and the requirements of the following conditions, the conditions shall prevail (ii) the Project description and concept plan in Schedule 1, and the management plans under the conditions of the designation, the requirements of the management plans shall prevail.
All		**Project Information** (a) A project website, or equivalent virtual information source, shall be established within 12 months of the date on which this designation is included in the AUP. All directly affected owners and occupiers shall be notified in writing once the website or equivalent information source has been established. The project website or virtual information source shall include these conditions and shall provide information on: (i) the status of the Project (ii) anticipated construction timeframes (iii) contact details for enquiries (iv) a subscription service to enable receipt of project updates by email (v) how to apply for consent for works in the designation under s176(1)(b) of the RMA. (b) At the start of detailed design for a Stage of Work, the project website or virtual information source shall be updated to provide information on the likely date for Start of Construction, and any staging of works.
All		**Designation Review** (a) The Requiring Authority shall within 6 months of Completion of Construction or as soon as otherwise practicable: (i) review the extent of the designation to identify any areas of designated land that it no longer requires for the on-going operation, maintenance or mitigation of effects of the Project (ii) give notice to Auckland Council in accordance with section 182 of the RMA for the removal of those parts of the designation identified above.
W1 **W2** **W3** **W4** **RE1**		**Lapse** (a) In accordance with section 184(1)(c) of the RMA, this designation shall lapse if not given effect to within 15 years from the date on which it is included in the AUP.
R1		**Lapse** (a) In accordance with section 184(1)(c) of the RMA, this designation shall lapse if not given effect to within 20 years from the date on which it is included in the AUP.
All		**Network Utility Operators (Section 176 Approval)**

NoR No.	No.	Condition
		(a) Prior to the start of Construction Works, Network Utility Operators with existing infrastructure located within the designation will not require written consent under section 176 of the RMA for the following activities: (i) operation, maintenance and urgent repair works (ii) minor renewal works to existing network utilities necessary for the on-going provision or security of supply of network utility operations (iii) minor works such as new service connections (iv) the upgrade and replacement of existing network utilities in the same location with the same or similar effects as the existing utility. (b) To the extent that a record of written approval is required for the activities listed above, this condition shall constitute written approval.
Pre-construction Conditions		
All		**Outline Plan** (a) An Outline Plan (or Plans) shall be prepared in accordance with section 176A of the RMA (b) Outline Plans (or Plan) may be submitted in parts or in stages to address particular activities (e.g. design or construction aspects), or a Stage of Work of the Project (c) Outline Plans shall include any management plan or plans that are relevant to the management of effects of those activities or Stage of Work, which may include: (i) Network Utilities Management Plan (ii) Construction Environmental Management Plan (iii) Construction Traffic Management Plan (iv) Construction Noise and Vibration Management Plan (v) Urban and Landscape Design Management Plan (vi) Historic Heritage Management Plan (vii) Ecological Management Plan (viii) Tree Management Plan.
All		**Management Plans** (a) Any management plan shall: (i) Be prepared and implemented in accordance with the relevant management plan condition (ii) Be prepared by a Suitably Qualified Person(s) (iii) Include sufficient detail relating to the management of effects associated with the relevant activities and/or Stage of Work to which it relates (iv) Summarise comments received from Mana Whenua and other stakeholders as required by the relevant management plan condition, along with a summary of where comments have: a. Been incorporated; and b. Where not incorporated, the reasons why. (v) Be submitted as part of an Outline Plan pursuant to s176A of the RMA, with the exception of SCEMPs and CNVMP Schedules (vi) Once finalised, uploaded to the Project website or equivalent virtual information source. (b) Any management plan developed in accordance with Condition [Outline Plan] may:

NoR No.	No.	Condition
		(i) Be submitted in parts or in stages to address particular activities (e.g. design or construction aspects) a Stage of Work of the Project, or to address specific activities authorised by the designation (ii) Except for material changes, be amended to reflect any changes in design, construction methods or management of effects without further process (iii) If there is a material change required to a management plan which has been submitted with an Outline Plan, the revised part of the plan shall be submitted to the Council as an update to the Outline Plan or for Certification as soon as practicable following identification of the need for a revision (c) Any material changes to the SCEMPs, are to be submitted to the Council for information.
All		**Cultural Advisory Report** (a) At least six (6) months prior to the start of detailed design for a Stage of Work, Mana Whenua shall be invited to prepare a Cultural Advisory Report for the Project (b) The objective of the Cultural Advisory Report is to assist in understanding and identifying Ngā Taonga Tuku Iho ('treasures handed down by our ancestors') affected by the Project, to inform their management and protection. To achieve the objective, the Requiring Authority shall invite Mana Whenua to prepare a Cultural Advisory Report that: (i) Identifies the cultural sites, landscapes and values that have the potential to be affected by the construction and operation of the Project (ii) Sets out the desired outcomes for management of potential effects on cultural sites, landscapes and values (iii) Identifies traditional cultural practices within the area that may be impacted by the Project (iv) Identifies opportunities for restoration and enhancement of identified cultural sites, landscapes and values within the Project area (v) Taking into account the outcomes of (i) to (iv) above, identify cultural matters and principles that should be considered in the development of the Urban and Landscape Design Management Plan and Historic Heritage Management Plan, and the Cultural Monitoring Plan referred to in Condition [Cultural Monitoring Plan] (vi) Identifies and (if possible) nominates traditional names along the Project alignment. Noting there may be formal statutory processes outside the project required in any decision-making. (c) The desired outcomes for management of potential effects on cultural sites, landscapes and values identified in the Cultural Advisory Report shall be discussed with Mana Whenua and those outcomes reflected in the relevant management plans where practicable (d) Conditions [Cultural Advisory Report] (b) and (c) above will cease to apply if: (i) Mana Whenua have been invited to prepare a Cultural Advisory Report by a date at least 6 months prior to start of Construction Works; and (ii) Mana Whenua have not provided a Cultural Advisory Report within six months prior to start of Construction Works.
W1 **W2** **W4** **W5** **RE1**		**Urban and Landscape Design Management Plan (ULDMP)** (a) A ULDMP shall be prepared prior to the Start of Construction for a Stage of Work (b) Mana Whenua shall be invited to participate in the development of the ULDMP(s) to provide input into relevant cultural landscape and design matters including how desired outcomes for management of potential effects on cultural sites, landscapes and values identified and discussed in accordance with Condition

NoR No.	No.	Condition
RE2 R1		[Cultural Advisory Report] (c) may be reflected in the ULDMP. The objective of the ULDMP(s) is to: (i) Enable integration of the Project's permanent works into the surrounding landscape and urban context (ii) Ensure that the Project manages potential adverse landscape and visual effects as far as practicable and contributes to a quality urban environment. (c) The ULDMP shall be prepared in general accordance with: (i) Auckland Transport's Urban Roads and Streets Design Guide (ii) Waka Kotahi Urban Design Guidelines: Bridging the Gap (2013) or any subsequent updated version (iii) Waka Kotahi Landscape Guidelines (2013) or any subsequent updated version (iv) Waka Kotahi P39 Standard Specification for Highway Landscape Treatments (2013) or any subsequent updated version (v) Auckland's Urban Ngahere (Forest) Strategy or any subsequent updated version. (d) To achieve the objective, the ULDMP(s) shall provide details of how the project: (i) Is designed to integrate with the adjacent urban (or proposed urban) and landscape context, including the surrounding existing or proposed topography, urban environment (i.e. centres and density of built form), natural environment, landscape character and open space zones (ii) Provides appropriate walking and cycling connectivity to, and interfaces with, existing or proposed adjacent land uses, public transport infrastructure and walking and cycling connections (iii) Promotes inclusive access (where appropriate) (iv) Promotes a sense of personal safety by aligning with best practice guidelines, such as: a. Crime Prevention Through Environmental Design (CPTED) principles b. Safety in Design (SID) requirements c. Maintenance in Design (MID) requirements and anti-vandalism/anti-graffiti measures. (e) The ULDMP(s) shall include: (i) a concept plan – which depicts the overall landscape and urban design concept, and explain the rationale for the landscape and urban design proposals (ii) developed design concepts, including principles for walking and cycling facilities and public transport (iii) landscape and urban design details – that cover the following: a. Road design – elements such as intersection form, carriageway gradient and associated earthworks contouring including cut and fill batters and the interface with adjacent land uses, benching, spoil disposal sites, median width and treatment, roadside width and treatment b. Roadside elements – such as lighting, fencing, wayfinding and signage c. architectural and landscape treatment of all major structures, including bridges and retaining walls d. Architectural and landscape treatment of noise barriers e. Landscape treatment of permanent stormwater control wetlands and swales f. Integration of passenger transport

NoR No.	No.	Condition
		g. Pedestrian and cycle facilities including paths, road crossings and dedicated pedestrian/ cycle bridges or underpasses h. Historic heritage places with reference to the HHMP i. Re-instatement of construction and site compound areas, driveways, accessways and fences. (f) The ULDMP shall also include the following planting details and maintenance requirements: a. planting design details including: b. identification of existing trees and vegetation that will be retained with reference to the Tree Management Plan and Ecological Management Plan. Where practicable, mature trees and native vegetation should be retained c. street trees, shrubs and ground cover suitable for berms d. treatment of fill slopes to integrate with adjacent land use, streams, riparian margins and open space zones e. planting of stormwater wetlands f. identification of vegetation to be retained and any planting requirements under Conditions [Ecological Management Plan] and [Tree Management Plan] g. integration of any planting requirements required by conditions of any resource consents for the project h. re-instatement planting of construction and site compound areas as appropriate. (iv) a planting programme including the staging of planting in relation to the construction programme which shall, as far as practicable, include provision for planting within each planting season following completion of works in each Stage of Work; and (v) detailed specifications relating to the following: a. weed control and clearance b. pest animal management (to support plant establishment) c. ground preparation (top soiling and decompaction) d. mulching e. plant sourcing and planting, including hydroseeding and grassing, and use of eco-sourced species.
W3		**Urban and Landscape Design Management Plan (ULDMP)** (a) A ULDMP shall be prepared prior to the Start of Construction for a Stage of Work (b) Mana Whenua shall be invited to participate in the development of the ULDMP(s) to provide input into relevant cultural landscape and design matters including how desired outcomes for management of potential effects on cultural sites, landscapes and values identified and discussed in accordance with Condition [Cultural Advisory Report](c) may be reflected in the ULDMP. The objective of the ULDMP(s) is to: (i) Enable integration of the Project's permanent works into the surrounding landscape and urban context (ii) Ensure that the Project manages potential adverse landscape and visual effects as far as practicable and contributes to a quality urban environment. (c) The ULDMP shall be prepared in general accordance with: (i) Auckland Transport's Urban Roads and Streets Design Guide (ii) Waka Kotahi Urban Design Guidelines: Bridging the Gap (2013) or any subsequent updated version

NoR No.	No.	Condition
		(iii) Waka Kotahi Landscape Guidelines (2013) or any subsequent updated version (iv) Waka Kotahi P39 Standard Specification for Highway Landscape Treatments (2013) or any subsequent updated version (v) Auckland's Urban Ngahere (Forest) Strategy or any subsequent updated version. (d) To achieve the objective, the ULDMP(s) shall provide details of how the project: (i) Is designed to integrate with the adjacent urban (or proposed urban) and landscape context, including the surrounding existing or proposed topography, urban environment (i.e. centres and density of built form), natural environment, landscape character and open space zones (including Whenuapai Settlement Playground) (ii) Provides appropriate walking and cycling connectivity to, and interfaces with, existing or proposed adjacent land uses, public transport infrastructure and walking and cycling connections (iii) Promotes inclusive access (where appropriate) (iv) Promotes a sense of personal safety by aligning with best practice guidelines, such as: a. Crime Prevention Through Environmental Design (CPTED) principles b. Safety in Design (SID) requirements c. Maintenance in Design (MID) requirements and anti-vandalism/anti-graffiti measures. (e) The ULDMP(s) shall include: (i) a concept plan – which depicts the overall landscape and urban design concept, and explain the rationale for the landscape and urban design proposals (ii) developed design concepts, including principles for walking and cycling facilities and public transport (iii) landscape and urban design details – that cover the following: a. Road design – elements such as intersection form, carriageway gradient and associated earthworks contouring including cut and fill batters and the interface with adjacent land uses, benching, spoil disposal sites, median width and treatment, roadside width and treatment b. Roadside elements – such as lighting, fencing, wayfinding and signage c. architectural and landscape treatment of all major structures, including bridges and retaining walls d. Architectural and landscape treatment of noise barriers e. Landscape treatment of permanent stormwater control wetlands and swales f. Integration of passenger transport g. Pedestrian and cycle facilities including paths, road crossings and dedicated pedestrian/ cycle bridges or underpasses h. Historic heritage places with reference to the HHMP i. Re-instatement of construction and site compound areas, driveways, accessways and fences. (f) The ULDMP shall also include the following planting details and maintenance requirements: (i) planting design details including: a. identification of existing trees and vegetation that will be retained with reference to the Tree Management Plan and Ecological Management Plan. Where practicable, mature trees and native vegetation should be retained

NoR No.	No.	Condition
		b. street trees, shrubs and ground cover suitable for berms c. treatment of fill slopes to integrate with adjacent land use, streams, riparian margins and open space zones d. planting of stormwater wetlands e. identification of vegetation to be retained and any planting requirements under Conditions 23 and 24 f. integration of any planting requirements required by conditions of any resource consents for the project g. re-instatement planting of construction and site compound areas as appropriate. (ii) a planting programme including the staging of planting in relation to the construction programme which shall, as far as practicable, include provision for planting within each planting season following completion of works in each Stage of Work; and (iii) detailed specifications relating to the following: a. weed control and clearance b. pest animal management (to support plant establishment) c. ground preparation (top soiling and decompaction) d. mulching e. plant sourcing and planting, including hydroseeding and grassing, and use of eco-sourced species.
All		**Advice Note:** *This designation is for the purpose of construction, operation and maintenance of an arterial transport corridor and it is not for the specific purpose of “road widening”. Therefore, it is not intended that the front yard definition in the Auckland Unitary Plan which applies a set back from a designation for road widening purposes applies to this designation. A set back is not required to manage effects between the designation boundary and any proposed adjacent sites or lots.*
Specific Outline Plan Requirements		
All		**Flood Hazard** (a) The Project shall be designed to achieve the following flood risk outcomes: (i) no increase in flood levels for existing authorised habitable floors that are already subject to flooding (ii) no more than a 10% reduction in freeboard for existing authorised habitable floors (iii) no increase of more than 50mm in flood level on land zoned for urban or future urban development where there is no existing dwelling (iv) no new flood prone areas (v) no more than a 10% average increase of flood hazard (defined as flow depth times velocity) for main access to authorised habitable dwellings existing at time the Outline Plan is submitted. (b) Compliance with this condition shall be demonstrated in the Outline Plan, which shall include flood modelling of the pre-Project and post-Project 100 year ARI flood levels (for Maximum Probable Development land use and including climate change) (c) Where the above outcomes can be achieved through alternative measures outside of the designation such as flood stop banks, flood walls, raising existing authorised habitable floor level and new overland flow paths or varied through agreement with the relevant landowner, the Outline Plan shall include confirmation

NoR No.	No.	Condition
		that any necessary landowner and statutory approvals have been obtained for that work or alternative outcome.
Construction Conditions		
All		**Construction Environmental Management Plan (CEMP)** (a) A CEMP shall be prepared prior to the Start of Construction for a Stage of Work (b) The objective of the CEMP is to set out the management procedures and construction methods to be undertaken to, avoid, remedy or mitigate any adverse effects associated with Construction Works as far as practicable. To achieve the objective, the CEMP shall include: (i) the roles and responsibilities of staff and contractors (ii) details of the site or project manager and the Project Liaison Person, including their contact details (phone and email address) (iii) the Construction Works programmes and the staging approach, and the proposed hours of work (iv) details of the proposed construction yards including temporary screening when adjacent to residential areas, locations of refuelling activities and construction lighting (v) methods for controlling dust and the removal of debris and demolition of construction materials from public roads or places (vi) methods for providing for the health and safety of the general public (vii) procedures for incident management (viii) procedures for the refuelling and maintenance of plant and equipment to avoid discharges of fuels or lubricants to Watercourses (ix) measures to address the storage of fuels, lubricants, hazardous and/or dangerous materials, along with contingency procedures to address emergency spill response(s) and clean up (x) procedures for responding to complaints about Construction Works (xi) methods for amending and updating the CEMP as required.
All		**Stakeholder and Communication and Engagement Management Plan (SCEMP)** (a) A SCEMP shall be prepared prior to the Start of Construction for a Stage of Work The objective of the SCEMP is to identify how the public and stakeholders (including directly affected and adjacent owners and occupiers of land) will be engaged with throughout the Construction Works. To achieve the objective, the SCEMP shall include: (i) the contact details for the Project Liaison Person. These details shall be on the Project website, or equivalent virtual information source, and prominently displayed at the main entrance(s) to the site(s) (ii) the procedures for ensuring that there is a contact person available for the duration of Construction Works, for public enquiries or complaints about the Construction Works (iii) methods for engaging with Mana Whenua, to be developed in consultation with Mana Whenua (iv) a list of stakeholders, organisations (such as community facilities) and businesses who will be engaged with (v) Identification of the properties whose owners will be engaged with (vi) methods to communicate key project milestones and the proposed hours of construction activities including outside of normal working hours and on weekends and public holidays, to the parties identified in (iv) and (v) above (vii) linkages and cross-references to communication and engagement methods set out in other conditions and management plans where relevant.

NoR No.	No.	Condition
		(b) Any SCEMP prepared for a Stage of Work shall be submitted to Council for information ten working days prior to the Start of Construction for a Stage of Work.
All		**Complaints Register** (a) At all times during Construction Works, a record of any complaints received about the Construction Works shall be maintained. The record shall include: (i) The date, time and nature of the complaint (ii) The name, phone number and address of the complainant (unless the complainant wishes to remain anonymous) (iii) Measures taken to respond to the complaint (including a record of the response provided to the complainant) or confirmation of no action if deemed appropriate (iv) The outcome of the investigation into the complaint (v) Any other activities in the area, unrelated to the Project that may have contributed to the complaint, such as non-project construction, fires, traffic accidents or unusually dusty conditions generally. (b) A copy of the Complaints Register required by this condition shall be made available to the Manager upon request as soon as practicable after the request is made.
All		**Cultural Monitoring Plan** (a) Prior to the start of Construction Works, a Cultural Monitoring Plan shall be prepared by a Suitably Qualified Person(s) identified in collaboration with Mana Whenua (b) The objective of the Cultural Monitoring Plan is to identify methods for undertaking cultural monitoring to assist with management of any cultural effects during Construction works (c) The Cultural Monitoring Plan shall include: (i) Requirements for formal dedication or cultural interpretation to be undertaken prior to start of Construction Works in areas identified as having significance to Mana Whenua (ii) Requirements and protocols for cultural inductions for contractors and subcontractors (iii) Identification of activities, sites and areas where cultural monitoring is required during particular Construction Works (iv) Identification of personnel to undertake cultural monitoring, including any geographic definition of their responsibilities (v) Details of personnel to assist with management of any cultural effects identified during cultural monitoring, including implementation of the Accidental Discovery Protocol (d) If Enabling Works involving soil disturbance are undertaken prior to the start of Construction Works, an Enabling Works Cultural Monitoring Plan shall be prepared by a Suitably Qualified Person identified in collaboration with Mana Whenua. This plan may be prepared as a standalone Enabling Works Cultural Monitoring Plan or be included in the main Construction Works Cultural Monitoring Plan. ***Advice Note:*** *Where appropriate, the Cultural Monitoring Plan shall align with the requirements of other conditions of the designation and resource consents for the Project which require monitoring during Construction Works.*
All		**Construction Traffic Management Plan (CTMP)** (a) A CTMP shall be prepared prior to the Start of Construction for a Stage of Work

<table>
<tr><th>NoR No.</th><th>No.</th><th>Condition</th></tr>
<tr><td></td><td></td><td>
(b) The objective of the CTMP is to avoid, remedy or mitigate, as far as practicable, adverse construction traffic effects. To achieve this objective, the CTMP shall include:
(i) methods to manage the effects of temporary traffic management activities on traffic
(ii) measures to ensure the safety of all transport users
(iii) the estimated numbers, frequencies, routes and timing of traffic movements, including any specific non-working or non-movement hours to manage vehicular and pedestrian traffic near schools or to manage traffic congestion
(iv) site access routes and access points for heavy vehicles, the size and location of parking areas for plant, construction vehicles and the vehicles of workers and visitors
(v) identification of detour routes and other methods to ensure the safe management and maintenance of traffic flows, including pedestrians and cyclists, on existing roads
(vi) methods to maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be
(vii) the management approach to loads on heavy vehicles, including covering loads of fine material, the use of wheel-wash facilities at site exit points and the timely removal of any material deposited or spilled on public roads
(viii) methods that will be undertaken to communicate traffic management measures to affected road users (e.g. residents/public/stakeholders/emergency services).
</td></tr>
<tr><td>All</td><td></td><td>
Construction Noise Standards
(a) Construction noise shall be measured and assessed in accordance with NZS6803:1999 Acoustics – Construction Noise and shall comply with the noise standards set out in the following table as far as practicable:
Table 16.1: Construction noise standards
<table>
<tr><th>Day of week</th><th>Time period</th><th>$L_{Aeq(15min)}$</th><th>L_{AFmax}</th></tr>
<tr><td colspan="4">Occupied activity sensitive to noise</td></tr>
<tr><td rowspan="4">Weekday</td><td>0630h - 0730h</td><td>55 dB</td><td>75 dB</td></tr>
<tr><td>0730h - 1800h</td><td>70 dB</td><td>85 dB</td></tr>
<tr><td>1800h - 2000h</td><td>65 dB</td><td>80 dB</td></tr>
<tr><td>2000h - 0630h</td><td>45 dB</td><td>75 dB</td></tr>
<tr><td rowspan="4">Saturday</td><td>0630h - 0730h</td><td>55 dB</td><td>75 dB</td></tr>
<tr><td>0730h - 1800h</td><td>70 dB</td><td>85 dB</td></tr>
<tr><td>1800h - 2000h</td><td>45 dB</td><td>75 dB</td></tr>
<tr><td>2000h - 0630h</td><td>45 dB</td><td>75 dB</td></tr>
<tr><td rowspan="4">Sunday and Public Holidays</td><td>0630h - 0730h</td><td>45 dB</td><td>75 dB</td></tr>
<tr><td>0730h - 1800h</td><td>55 dB</td><td>85 dB</td></tr>
<tr><td>1800h - 2000h</td><td>45 dB</td><td>75 dB</td></tr>
<tr><td>2000h - 0630h</td><td>45 dB</td><td>75 dB</td></tr>
<tr><td colspan="4">Other occupied buildings</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>NoR No.</th><th>No.</th><th>Condition</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>All</td><td>0730h – 1800h
1800h – 0730h</td><td>70 dB
75 dB</td><td></td></tr>
</table>
(b) Where compliance with the noise standards set out in Table [above] is not practicable, and unless otherwise provided for in the CNVMP as required by Condition [Schedule to CNVMP](c)(x), then the methodology in Condition [Schedule to CNVMP] shall apply.
</td></tr>
<tr><td>All</td><td></td><td>
Construction Vibration Standards
(a) Construction vibration shall be measured in accordance with ISO 4866:2010 Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures and shall comply with the vibration standards set out in the following table as far as practicable
Table CNV2 Construction vibration criteria
<table>
<tr><th>Receiver</th><th>Details</th><th>Category A</th><th>Category B</th></tr>
<tr><td rowspan="2">Occupied Activities sensitive to noise</td><td>Night-time 2000h - 0630h</td><td>0.3mm/s ppv</td><td>2mm/s ppv</td></tr>
<tr><td>Daytime 0630h - 2000h</td><td>2mm/s ppv</td><td>5mm/s ppv</td></tr>
<tr><td>Other occupied buildings</td><td>Daytime 0630h - 2000h</td><td>2mm/s ppv</td><td>5mm/s ppv</td></tr>
<tr><td>All other buildings</td><td>At all other times</td><td colspan="2">Tables 1 and 3 of DIN4150-3:1999</td></tr>
</table>
*Category A criteria adopted from Rule E25.6.30.1 of the AUP
**Category B criteria based on DIN 4150-3:1999 building damage criteria for daytime
(b) Where compliance with the vibration standards set out in Table [above] is not practicable, and unless otherwise provided for in the CNVMP as required by Condition [Schedule to CNVMP] (c)(x), then the methodology in Condition [Schedule to CNVMP] shall apply.
</td></tr>
<tr><td>All</td><td></td><td>
Construction Noise and Vibration Management Plan (CNVMP)
(a) A CNVMP shall be prepared prior to the Start of Construction for a Stage of Work
(b) A CNVMP shall be implemented during the Stage of Work to which it relates
(c) The objective of the CNVMP is to provide a framework for the development and implementation of the Best Practicable Option for the management of construction noise and vibration effects to achieve the construction noise and vibration standards set out in Conditions [Construction Noise Standards] and [Construction Vibration Standards] to the extent practicable. To achieve this objective, the CNVMP shall be prepared in accordance with Annex E2 of the New Zealand Standard NZS6803:1999 'Acoustics – Construction Noise' (NZS6803:1999) and shall as a minimum, address the following:
(i) Description of the works and anticipated equipment/processes
(ii) Hours of operation, including times and days when construction activities would occur
(iii) The construction noise and vibration standards for the project
(iv) Identification of receivers where noise and vibration standards apply
</td></tr>
</table>

NoR No.	No.	Condition
		(v) A hierarchy of management and mitigation options, including any requirements to limit night works and works during other sensitive times, including Sundays and public holidays as far practicable (vi) Methods and frequency for monitoring and reporting on construction noise and vibration (vii) Procedures for communication and engagement with nearby residents and stakeholders, including notification of proposed construction activities, the period of construction activities, and management of noise and vibration complaints (viii) Contact details of the Project Liaison Person (ix) Procedures for the regular training of the operators of construction equipment to minimise noise and vibration as well as expected construction site behaviours for all workers (x) Identification of areas where compliance with the noise [Condition [Construction Noise Standards]] and/or vibration standards [Condition [Construction Vibration Standards] Category A or Category B] will not be practicable and the specific management controls to be implemented and consultation requirements with owners and occupiers of affected sites (xi) Procedures and requirements for the preparation of a Schedule to the CNVMP (Schedule) for those areas where compliance with the noise [Condition [Construction Noise Standards]] and/or vibration standards [Condition [Construction Vibration Standards] Category B] will not be practicable and where sufficient information is not available at the time of the CNVMP to determine the area specific management controls Condition [Schedule to CNVMP](c)(x) (xii) Procedures for: A. communicating with affected receivers, where measured or predicted vibration from construction activities exceeds the vibration criteria of Condition [Construction Vibration Standards] B. assessing, mitigating and monitoring vibration where measured or predicted vibration from construction activities exceeds the Category A vibration criteria of Condition [Construction Vibration Standards], including the requirement to undertake building condition surveys before and after works to determine whether any damage has occurred as a result of construction vibration (xiii) Requirements for review and update of the CNVMP.
All		**Schedule to a CNVMP** (a) Unless otherwise provided for in a CNVMP, a Schedule to the CNVMP (Schedule) shall be prepared prior to the start of the construction to which it relates by a Suitably Qualified Person, in consultation with the owners and occupiers of sites subject to the Schedule, when: (i) Construction noise is either predicted or measured to exceed the noise standards in Condition [Construction Noise Standards], except where the exceedance of the L_{Aeq} criteria is no greater than 5 decibels and does not exceed: A. 0630 – 2000: 2 period of up to 2 consecutive weeks in any 2 months, or B. 2000 - 0630: 1 period of up to 2 consecutive nights in any 10 days. (ii) Construction vibration is either predicted or measured to exceed the Category B standard at the receivers in Condition [Construction Vibration Standards. (b) The objective of the Schedule is to set out the Best Practicable Option measures to manage noise and/or vibration effects of the construction activity beyond those measures set out in the CNVMP. The Schedule shall include details such as:

NoR No.	No.	Condition
		(i) Construction activity location, start and finish dates (ii) The nearest neighbours to the construction activity (iii) The predicted noise and/or vibration level for all receivers where the levels are predicted or measured to exceed the applicable standards and predicted duration of the exceedance (iv) The proposed mitigation options that have been selected, and the options that have been discounted as being impracticable and the reasons why (v) The consultation undertaken with owners and occupiers of sites subject to the Schedule, and how consultation has and has not been taken into account (vi) Location, times and types of monitoring. (c) The Schedule shall be submitted to the Manager for certification at least 5 working days (except in unforeseen circumstances) in advance of Construction Works that are covered by the scope of the Schedule and shall form part of the CNVMP (d) Where material changes are made to a Schedule required by this condition, the Requiring Authority shall consult the owners and/or occupiers of sites subject to the Schedule prior to submitting the amended Schedule to the Manager for certification in accordance with (c) above. The amended Schedule shall document the consultation undertaken with those owners and occupiers, and how consultation outcomes have and have not been taken into account.
All		**Historic Heritage Management Plan (HHMP)** (a) A HHMP shall be prepared in consultation with Council, HNZPT and Mana Whenua prior to the Start of Construction for a Stage of Work (b) The objective of the HHMP is to protect historic heritage and to remedy and mitigate any residual effects as far as practicable. To achieve the objective, the HHMP shall identify: (i) Any adverse direct and indirect effects on historic heritage sites and measures to appropriately avoid, remedy or mitigate any such effects, including a tabulated summary of these effects and measures (ii) Methods for the identification and assessment of potential historic heritage places_within the Designation to inform detailed design (iii) Known historic heritage places and potential archaeological sites within the Designation, including identifying any archaeological sites for which an Archaeological Authority under the HNZPTA will be sought or has been granted (iv) Any unrecorded archaeological sites or post-1900 heritage sites within the Designation, which shall also be documented and recorded (v) Roles, responsibilities and contact details of Project personnel, Council and HNZPT representatives, Mana Whenua representatives, and relevant agencies involved with heritage and archaeological matters including surveys, monitoring of Construction Works, compliance with AUP accidental discovery rule, and monitoring of conditions (vi) Specific areas to be investigated, monitored and recorded to the extent these are directly affected by the Project (vii) The proposed methodology for investigating and recording post-1900 historic heritage sites (including buildings) that need to be destroyed, demolished or relocated, including details of their condition, measures to mitigate any adverse effects and timeframe for implementing the proposed methodology, in accordance with the HNZPT Archaeological Guidelines Series No.1: Investigation and Recording of Buildings and Standing Structures (November 2018), or any subsequent version (viii) Methods to acknowledge cultural values identified through Condition [Cultural Advisory Report] where archaeological sites also involve ngā taonga tuku iho

NoR No.	No.	Condition
		(treasures handed down by our ancestors) and where feasible and practicable to do so (ix) Methods for avoiding, remedying or mitigation adverse effects on historic heritage places and sites within the Designation during Construction Works as far as practicable. These methods shall include, but are not limited to: (x) security fencing or hoardings around historic heritage places to protect them from damage during construction or unauthorised access (xi) measures to mitigate adverse effects on historic heritage sites that achieve positive historic heritage outcomes such as increased public awareness and interpretation signage (xii) Training requirements and inductions for contractors and subcontractors on historic heritage places_within the Designation, legal obligations relating to accidental discoveries, the AUP Accidental Discovery Rule (E11.6.1). The training shall be undertaken prior to the Start of Construction, under the guidance of a Suitably Qualified Person and Mana Whenua representatives (to the extent the training relates to cultural values identified under Condition [Cultural Monitoring Plan]. (c) Electric copies of all historic heritage reports relating to historic heritage investigations (evaluation, excavation and monitoring), shall be submitted to the Manager within 12 months of completion.
All	***Accidental Discoveries*** ***Advice Note:*** *The Requiring Authority is advised of the requirements of Rule E11.6.1 of the AUP for "Accidental Discovery" as they relate to both contaminated soils and heritage items.* *The requirements for accidental discoveries of heritage items are set out in Rule E11.6.1 of the AUP [and in the Waka Kotahi Minimum Standard P45 Accidental Archaeological Discovery Specification, or any subsequent version].*	
W1 **W2** **W3** **W4** **R1** **RE1**		**Pre-Construction Ecological Survey** (a) At the start of detailed design for a Stage of Work, an updated ecological survey shall be undertaken by a Suitably Qualified Person. The purpose of the survey is to inform the detailed design of ecological management plan by: (i) Confirming whether the species of value within the Identified Biodiversity Areas recorded in the Identified Biodiversity Area Schedule [2] are still present (ii) Confirming whether the project will or may have a moderate or greater level of ecological effect on ecological species of value, prior to implementation of impact management measures, as determined in accordance with the EIANZ guidelines. (b) If the ecological survey in (a) above confirms the presence of ecological features of value in accordance with condition [Pre-Construction Ecological Survey] (a)(i) or [Pre-Construction Ecological Survey] (a)(ii) and that effects are likely in accordance with condition [Pre-Construction Ecological Survey] (a)(ii) then an Ecological Management Plan (or Plans) shall be prepared in accordance with Condition [Ecological Management Plan] for these areas (Confirmed Biodiversity Areas).
W1 **W2** **W3** **W4** **R1**		**Ecological Management Plan (EMP)** (a) An EMP shall be prepared for any Confirmed Biodiversity Areas (undertaken in Condition [Pre-Construction Ecological Survey]) prior to the Start of Construction for a Stage of Work. The objective of the EMP is to minimise effects of the Project on the ecological features of value of Confirmed Biodiversity Areas as far as

NoR No.	No.	Condition
		practicable. The EMP shall set out the methods that will be used to achieve the objective which may include: (i) If an EMP is required in accordance with condition [Pre-Construction Ecological Survey] (b) for the presence of long tail bats, the EMP may include: A. measures to minimise disturbance from construction activities within the vicinity of any active long tail bat roosts (including maternity) that are discovered through survey until such roosts are confirmed to be vacant of bats B. how the timing of any construction work in the vicinity of any maternity long tail bat roosts will be limited to outside the bat maternity period (between December and March) where reasonably practicable C. identifying areas where vegetation is to be retained for the purposes of connectivity of long tail bat D. details of how bat connectivity (including suitable indigenous or exotic trees or artificial alternatives) will be provided and maintained. This could include identification of areas and timeframes for establishment of advance restoration / mitigation planting taking into account land ownership, accessibility and the timing of available funding E. where mitigation to minimise effects is not practicable, details of any offsetting proposed. (b) The EMP shall be consistent with any ecological management measures to be undertaken in compliance with conditions of any regional resource consents granted for the Project. ***Advice Note:*** *Depending on the potential effects of the Project, the regional consents for the Project may include the following monitoring and management plans:* (a) Stream and/or wetland restoration plans; (b) Vegetation restoration plans; and *(c)* Fauna management plans (eg avifauna, herpetofauna, bats).
W3 **R1** **RE1**		**Ecological Management Plan (EMP)** (a) An EMP shall be prepared for any Confirmed Biodiversity Areas (undertaken in Condition [Pre-Construction Ecological Survey]) prior to the Start of Construction for a Stage of Work. The objective of the EMP is to minimise effects of the Project on the ecological features of value of Confirmed Biodiversity Areas as far as practicable. The EMP shall set out the methods that will be used to achieve the objective which may include: (ii) If an EMP is required in accordance with condition [Pre-Construction Ecological Survey] (b) for the presence of threatened or at risk wetland birds, the EMP may include: A. how the timing of any Construction Works shall be undertaken outside of the bird breeding season (September to February) where practicable B. where works are required within the Confirmed Biodiversity Area during the bird season, methods to minimse adverse effects on Threatened or At-Risk wetland birds C. undertaking a nesting bird survey of Threatened or At-Risk wetland birds prior to any Construction Works taking place within a 50m radius of any identified Wetlands (including establishment of construction areas adjacent to Wetlands). Surveys should be repeated at the beginning of each wetland bird breeding season and following periods of construction inactivity

NoR No.	No.	Condition
		D. what protection and buffer measures will be provided where nesting Threatened or At-Risk wetland birds are identified within 50m of any construction area (including laydown areas). Measures could include: i. a 20 m buffer area around the nest location and retaining vegetation. The buffer areas should be demarcated where necessary to protect birds from encroachment. This might include the use of marker poles, tape and signage ii. monitoring of the nesting Threatened or At-Risk wetland birds by a Suitably Qualified Person. Construction works within the 20m nesting buffer areas should not occur until the Threatened or At-Risk wetland birds have fledged from the nest location (approximately 30 days from egg laying to fledging) as confirmed by a Suitably Qualified Person iii. minimising the disturbance from the works if construction works are required within 50 m of a nest, as advised by a Suitably Qualified Person iv. adopting a 10m setback where practicable, between the edge of Wetlands and construction areas (along the edge of the stockpile/laydown area) v. minimising light spill from construction areas into Wetlands. (b) The EMP shall be consistent with any ecological management measures to be undertaken in compliance with conditions of any regional resource consents granted for the Project. ***Advice Note:*** *Depending on the potential effects of the Project, the regional consents for the Project may include the following monitoring and management plans:* *(a) Stream and/or wetland restoration plans;* *(b) Vegetation restoration plans; and* (c) *Fauna management plans (eg avifauna, herpetofauna, bats).*
W3 **R1**		**Ecological Management Plan (EMP)** (a) An EMP shall be prepared for any Confirmed Biodiversity Areas (undertaken in Condition [Pre-Construction Ecological Survey]) prior to the Start of Construction for a Stage of Work. The objective of the EMP is to minimise effects of the Project on the ecological features of value of Confirmed Biodiversity Areas as far as practicable. The EMP shall set out the methods that will be used to achieve the objective which may include: (i) If an EMP is required in accordance with condition [Pre-Construction Ecological Survey] (b) for the presence of long tail bats, the EMP may include: A. measures to minimise disturbance from construction activities within the vicinity of any active long tail bat roosts (including maternity) that are discovered through survey until such roosts are confirmed to be vacant of bats B. how the timing of any construction work in the vicinity of any maternity long tail bat roosts will be limited to outside the bat maternity period (between December and March) where reasonably practicable C. identifying areas where vegetation is to be retained for the purposes of connectivity of long tail bat D. details of how bat connectivity (including suitable indigenous or exotic trees or artificial alternatives) will be provided and maintained. This could include identification of areas and timeframes for establishment of

NoR No.	No.	Condition
		advance restoration / mitigation planting taking into account land ownership, accessibility and the timing of available funding E. where mitigation to minimise effects is not practicable, details of any offsetting proposed. (ii) If an EMP is required in accordance with condition X(b) for the presence of threatened or at risk wetland birds, the EMP may include: A. how the timing of any Construction Works shall be undertaken outside of the bird breeding season (September to February) where practicable B. where works are required within the Confirmed Biodiversity Area during the bird season, methods to minimse adverse effects on Threatened or At-Risk wetland birds C. undertaking a nesting bird survey of Threatened or At-Risk wetland birds prior to any Construction Works taking place within a 50m radius of any identified Wetlands (including establishment of construction areas adjacent to Wetlands). Surveys should be repeated at the beginning of each wetland bird breeding season and following periods of construction inactivity D. what protection and buffer measures will be provided where nesting Threatened or At-Risk wetland birds are identified within 50m of any construction area (including laydown areas). Measures could include: i. a 20 m buffer area around the nest location and retaining vegetation. The buffer areas should be demarcated where necessary to protect birds from encroachment. This might include the use of marker poles, tape and signage ii. monitoring of the nesting Threatened or At-Risk wetland birds by a Suitably Qualified Person. Construction works within the 20m nesting buffer areas should not occur until the Threatened or At-Risk wetland birds have fledged from the nest location (approximately 30 days from egg laying to fledging) as confirmed by a Suitably Qualified Person iii. minimising the disturbance from the works if construction works are required within 50 m of a nest, as advised by a Suitably Qualified Person iv. adopting a 10m setback where practicable, between the edge of Wetlands and construction areas (along the edge of the stockpile/laydown area) v. minimising light spill from construction areas into Wetlands. (b) The EMP shall be consistent with any ecological management measures to be undertaken in compliance with conditions of any regional resource consents granted for the Project. ***Advice Note:*** *Depending on the potential effects of the Project, the regional consents for the Project may include the following monitoring and management plans:* *(a) Stream and/or wetland restoration plans;* *(b) Vegetation restoration plans; and* (c) *Fauna management plans (eg avifauna, herpetofauna, bats).*
All		**Tree Management Plan** (a) Prior to the Start of Construction for a Stage of Work, a Tree Management Plan shall be prepared (b) The objective of the Tree Management Plan is to avoid, remedy or mitigate effects of construction activities on trees identified as protected or notable in the Auckland Unitary Plan

NoR No.	No.	Condition
		(c) The Tree Management Plan shall: (i) confirm the trees that will be affected by the project work and are identified as protected or notable in the Auckland Unitary Plan (ii) demonstrate how the design and location of project works has avoided, remedied or mitigated any effects on any tree identified in (i) above. This may include: A. planting to replace trees that require removal (with reference to the ULDMP planting design details in Condition **Error! Reference source not found.**) B. tree protection zones and tree protection measures such as protective fencing, ground protection and physical protection of roots, trunks and branches C. methods for work within the rootzone of trees that are to be retained in line with accepted arboricultural standards. (iii) demonstrate how the tree management measures (outlined in A – C above) are consistent with conditions of any resource consents granted for the project in relation to managing construction effects on trees.
Operational Conditions		
All		**Low Noise Road Surface** (a) The following condition only applies where an upgrade or extension to an existing road is within or adjacent to urban zoning (excluding open space and special purpose zones unless identified as mitigation within the relevant condition). (b) Asphaltic concrete surfacing (or equivalent low noise road surface) shall be implemented within 12 months of Completion of Construction of the project (c) Any future resurfacing works of the Project shall be undertaken in accordance with the Auckland Transport Reseal Guidelines, Asset Management and Systems 2013 or any updated version and asphaltic concrete surfacing (or equivalent low noise road surface) shall be implemented where: (i) The volume of traffic exceeds 10,000 vehicles per day; or (ii) The road is subject to high wear and tear (such as cul de sac heads, roundabouts and main road intersections); or (iii) It is in an industrial or commercial area where there is a high concentration of truck traffic; or (iv) It is subject to high usage by pedestrians, such as town centres, hospitals, shopping centres and schools. (d) Prior to commencing any future resurfacing works, the Requiring Authority shall advise the Manager if any of the triggers in Condition 26(b)(i) – (iv) are not met by the road or a section of it and therefore where the application of asphaltic concrete surfacing (or equivalent low noise road surface) is no longer required on the road or a section of it. Such advice shall also indicate when any resealing is to occur.
All	**Noise Condit ion 1**	**Traffic Noise** For the purposes of Conditions 1 to 14: (a) Building-Modification Mitigation – has the same meaning as in NZS 6806 (b) Design year has the same meaning as in NZS 6806 (c) Detailed Mitigation Options – means the fully detailed design of the Selected Mitigation Options, with all practical issues addressed (d) Habitable Space – has the same meaning as in NZS 6806 (e) Identified Noise Criteria Category – means the Noise Criteria Category for a PPF identified in Schedule 3: Identified PPFs Noise Criteria Categories

NoR No.	No.	Condition
		(f) Mitigation – has the same meaning as in NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads (g) Noise Criteria Categories – means the groups of preference for sound levels established in accordance with NZS 6806 when determining the Best Practicable Option for noise mitigation (i.e. Categories A, B and C) (h) NZS 6806 – means New Zealand Standard NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads (i) Protected Premises and Facilities (PPFs) – means only the premises and facilities identified in green, orange or red in Schedule 3: PPFs Noise Criteria Categories (j) Selected Mitigation Options – means the preferred mitigation option resulting from a Best Practicable Option assessment undertaken in accordance with NZS 6806 (k) Structural Mitigation – has the same meaning as in NZS 6806.
All	**Noise Condition 2**	The Noise Criteria Categories identified in Schedule 3: PPFs Noise Criteria Categories at each of the PPFs shall be achieved where practicable and subject to Conditions 1 to 14 (all traffic noise conditions). Achievement of the Noise Criteria Categories for PPFs shall be by reference to a traffic forecast for a high growth scenario in a design year at least 10 years after the programmed opening of the Project.
All	**Noise Condition 3**	As part of the detailed design of the Project, a Suitably Qualified Person shall determine the Selected Mitigation Options for the PPFs identified on Schedule 3 PPFs Noise Criteria Categories.
All	**Noise Condition 4**	Prior to construction of the Project, a Suitably Qualified Person shall develop the Detailed Mitigation Options for the PPFs identified in Schedule 3 PPFs Noise Criteria Categories, taking into account the Selected Mitigation Options.
All	**Noise Condition 5**	If the Detailed Mitigation Options would result in the Identified Noise Criteria Category changing to a less stringent Category, e.g. from Category A to B or Category B to C, at any relevant PPF, a Suitably Qualified Person shall provide confirmation to the Manager that the Detailed Mitigation Option would be consistent with adopting the Best Practicable Option in accordance with NZS 6806 prior to implementation.
All	**Noise Condition 6**	The Detailed Mitigation Options shall be implemented prior to completion of construction of the Project, with the exception of any low-noise road surfaces, which shall be implemented within twelve months of completion of construction.
All	**Noise Condition 7**	Prior to the Start of Construction, a Suitably Qualified Person shall identify those PPFs which, following implementation of all the Detailed Mitigation Options, will not be Noise Criteria Categories A or B and where Building-Modification Mitigation might be required to achieve 40 dB $L_{Aeq(24h)}$ inside Habitable Spaces ('Category C Buildings').
All	**Noise Condition 8**	Prior to the Start of Construction in the vicinity of each Category C Building, the Requiring Authority shall write to the owner of the Category C Building requesting entry to assess the noise reduction performance of the existing building envelope. If the building owner agrees to entry within three months of the date of the Requiring Authority's letter, the Requiring Authority shall instruct a Suitably Qualified Person to visit the building and assess the noise reduction performance of the existing building envelope.
All	**Noise**	For each Category C Building identified, the Requiring Authority is deemed to have complied with Condition 8 above if:

NoR No.	No.	Condition
	Condition 9	(a) The Requiring Authority's Suitably Qualified Person has visited the building and assessed the noise reduction performance of the building envelope; or (b) The building owner agreed to entry, but the Requiring Authority could not gain entry for some reason (such as entry denied by a tenant); or (c) The building owner did not agree to entry within three of the date of the Requiring Authority's letter sent in accordance with Condition 8 above (including where the owner did not respond within that period); or (d) The building owner cannot, after reasonable enquiry, be found prior to completion of construction of the Project. If any of (b) to (d) above apply to a Category C Building, the Requiring Authority is not required to implement Building-Modification Mitigation to that building.
All	Noise Condition 10	Subject to Condition 9 above, within six months of the assessment undertaken in accordance with Conditions 8 and 9, the Requiring Authority shall write to the owner of each Category C Building advising: (a) If Building-Modification Mitigation is required to achieve 40 dB LAeq(24h) inside habitable spaces (b) The options available for Building-Modification Mitigation to the building, if required (c) That the owner has three months to decide whether to accept Building-Modification Mitigation to the building and to advise which option for Building-Modification Mitigation the owner prefers, if the Requiring Authority has advised that more than one option is available.
All	Noise Condition 11	Once an agreement on Building-Modification Mitigation is reached between the Requiring Authority and the owner of a Category C Building, the mitigation shall be implemented, including any third party authorisations required, in a reasonable and practical timeframe agreed between the Requiring Authority and the owner.
All	Noise Condition 12	Subject to Condition 9, where Building-Modification Mitigation is required, the Requiring Authority is deemed to have complied with Condition 11 if: (a) The Requiring Authority has completed Building Modification Mitigation to the building; or (b) An alternative agreement for mitigation is reached between the Requiring Authority and the building owner; or (c) The building owner did not accept the Requiring Authority's offer to implement Building-Modification Mitigation within three months of the date of the Requiring Authority's letter sent in accordance with Condition 9 (including where the owner did not respond within that period); or (d) The building owner cannot, after reasonable enquiry, be found prior to completion of construction of the Project.
All	Noise Condition 13	The Detailed Mitigation Options shall be maintained so they retain their noise reduction performance as far as practicable
All	Noise Condition 14	The Noise Criteria Categories at the PPFs identified in Schedule 3: Identified PPFs Noise Criteria Categories do not need to be complied with where: (a) the PPF no longer exists; or (b) agreement of the landowner has been obtained confirming that the Noise Criteria Category level does not need to be met.

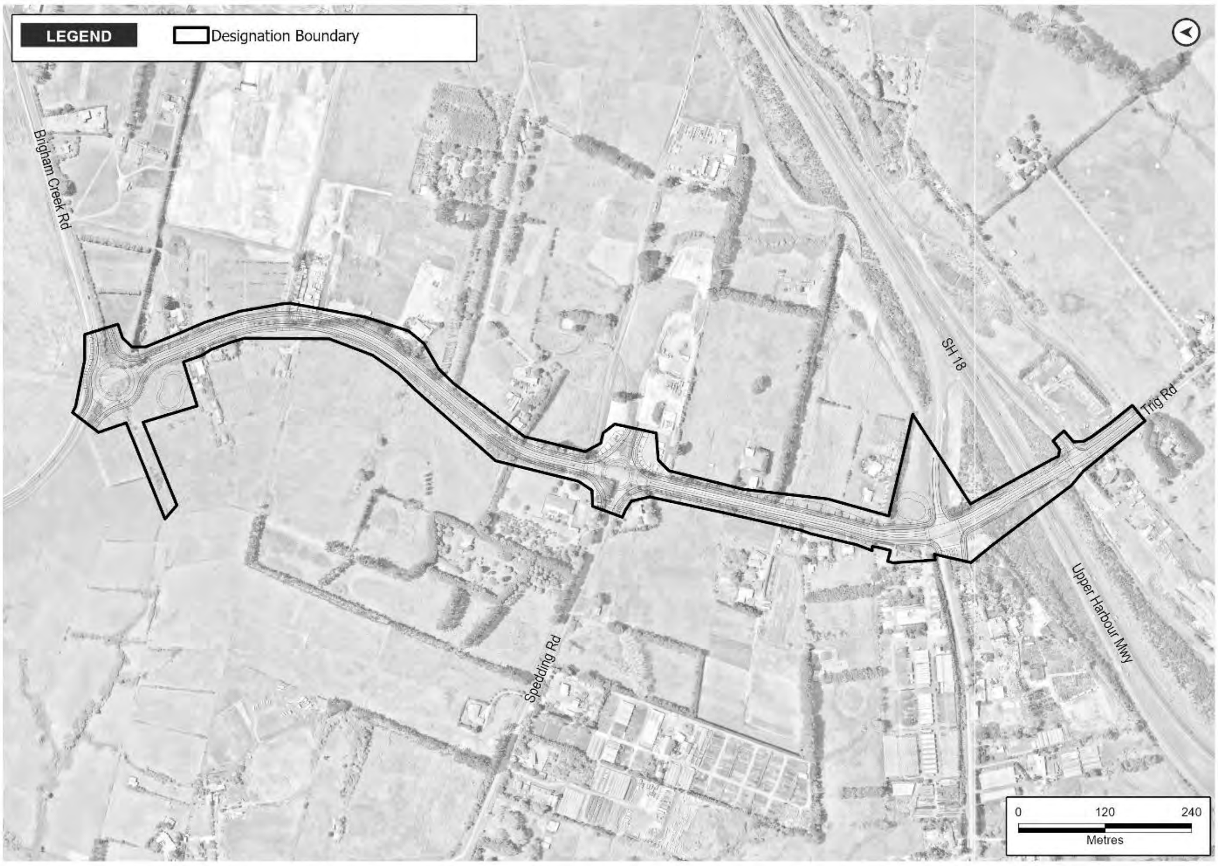
Schedule 1: General Accordance Plans and Information

Project Description

The proposed work is the construction, operation, and maintenance of a transport corridor in Whenuapai, from the Brigham Creek Road intersection to Trig Road (South), including active transport facilities and associated infrastructure. The proposed work is shown in the following Concept Plan and includes:

(a) An upgraded transport corridor and active transport facilities;
(b) Associated works including intersections, bridges, embankments, retaining, culverts, stormwater management systems;
(c) Changes to local roads, where the proposed work intersects with local roads; and
(d) Construction activities, including vegetation removal, construction compounds, laydown areas, bridge works area, construction traffic management and the re-grade of driveways.

Concept Plan

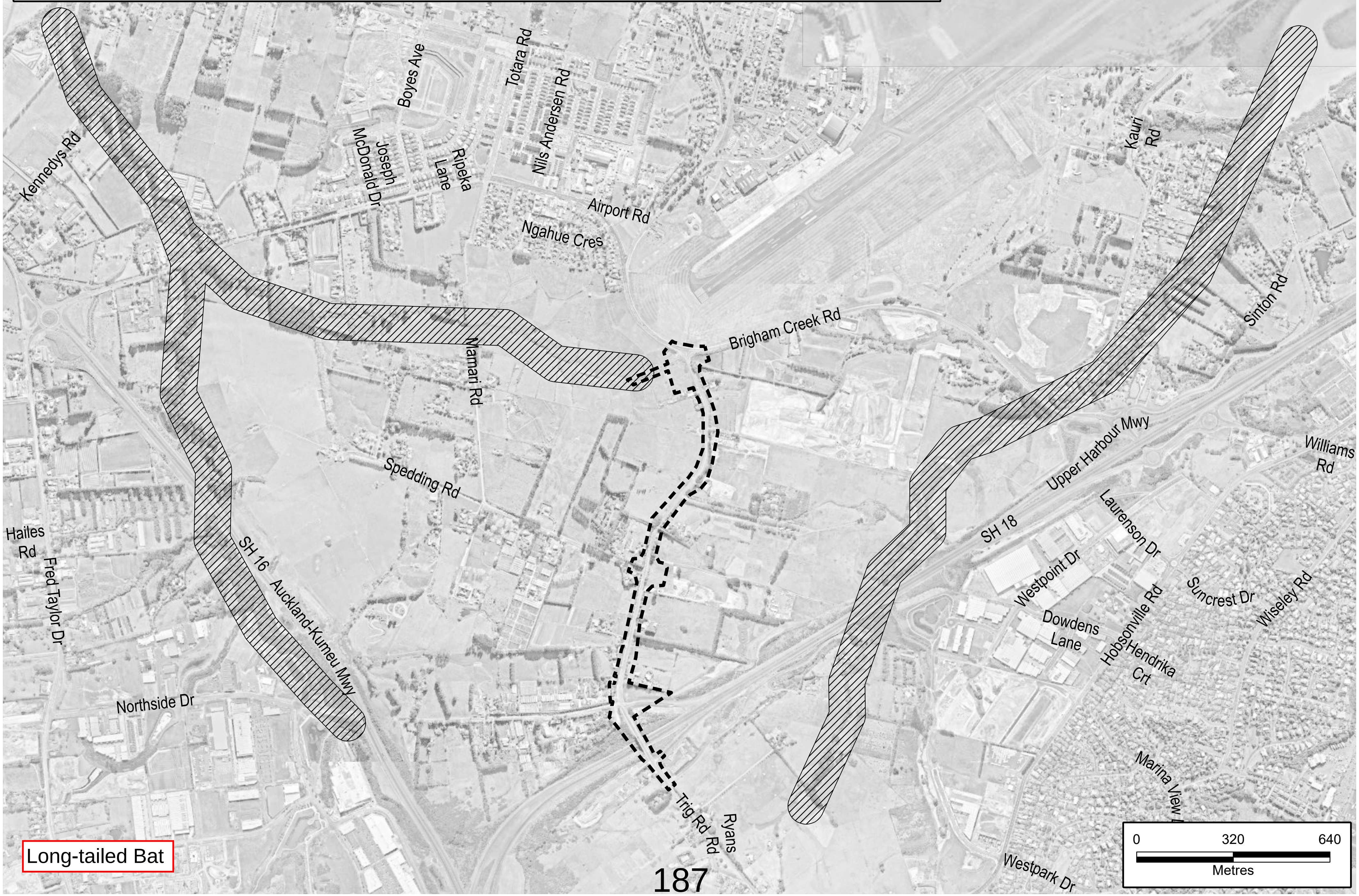


Schedule 2: Identified Biodiversity Areas

LEGEND

Designation Boundary

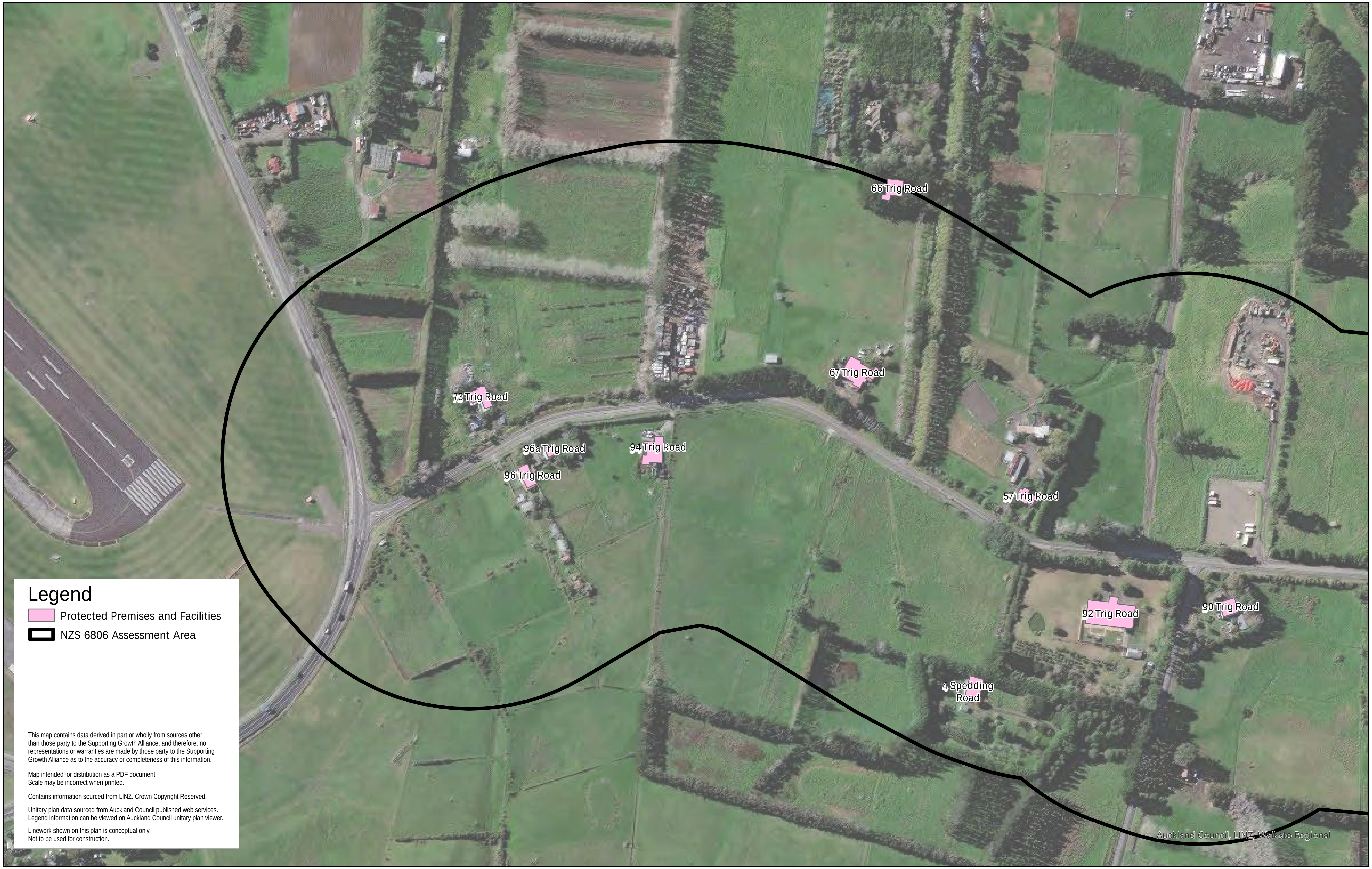
Identified Biodiversity Area



Long-tailed Bat

Schedule 3: Identified PPFs Noise Criteria Categories

Address	New or Altered Road	Noise Criteria Category
1/84 Trig Road	Altered Road	A
33 Trig Road	Altered Road	A
4 Spedding Road	Altered Road	A
43 Trig Road	Altered Road	A
46 Trig Road	Altered Road	A
52 Trig Road	Altered Road	A
57 Trig Road	Altered Road	B
64 Trig Road	Altered Road	A
66 Trig Road	Altered Road	A
67 Trig Road	Altered Road	A
73 Trig Road	Altered Road	A
82 Trig Road	Altered Road	B
84 Trig Road	Altered Road	A
86 Trig Road	Altered Road	A
88 Trig Road	Altered Road	A
90 Trig Road	Altered Road	A
92 Trig Road	Altered Road	A
94 Trig Road	Altered Road	A
96 Trig Road	Altered Road	A
96A Trig Road	Altered Road	B



Map Scale @ A3:

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Revision	Author	Verified	Approved	Date

Title:

Supporting Growth

NoR W1 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date

Title: Supporting Growth

NoR W1 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

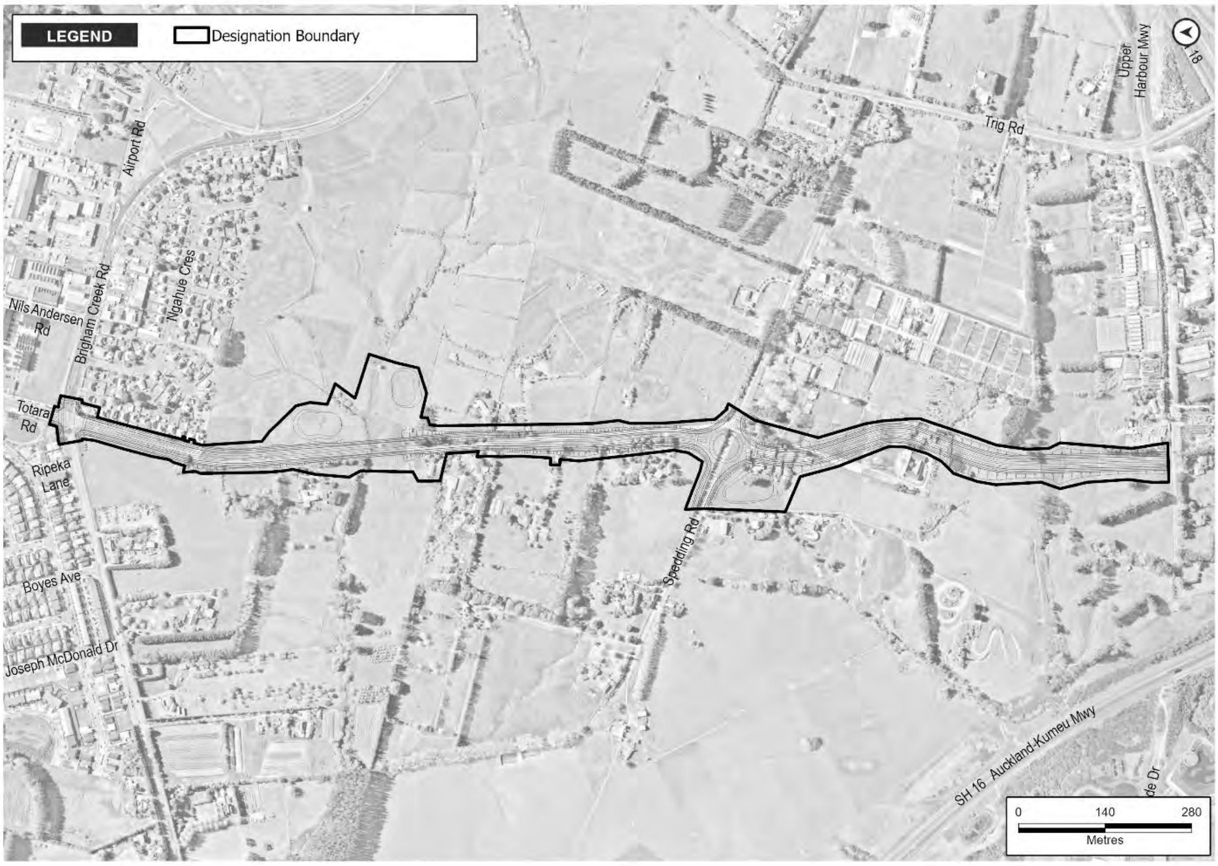
Schedule 1: General Accordance Plans and Information

Project Description

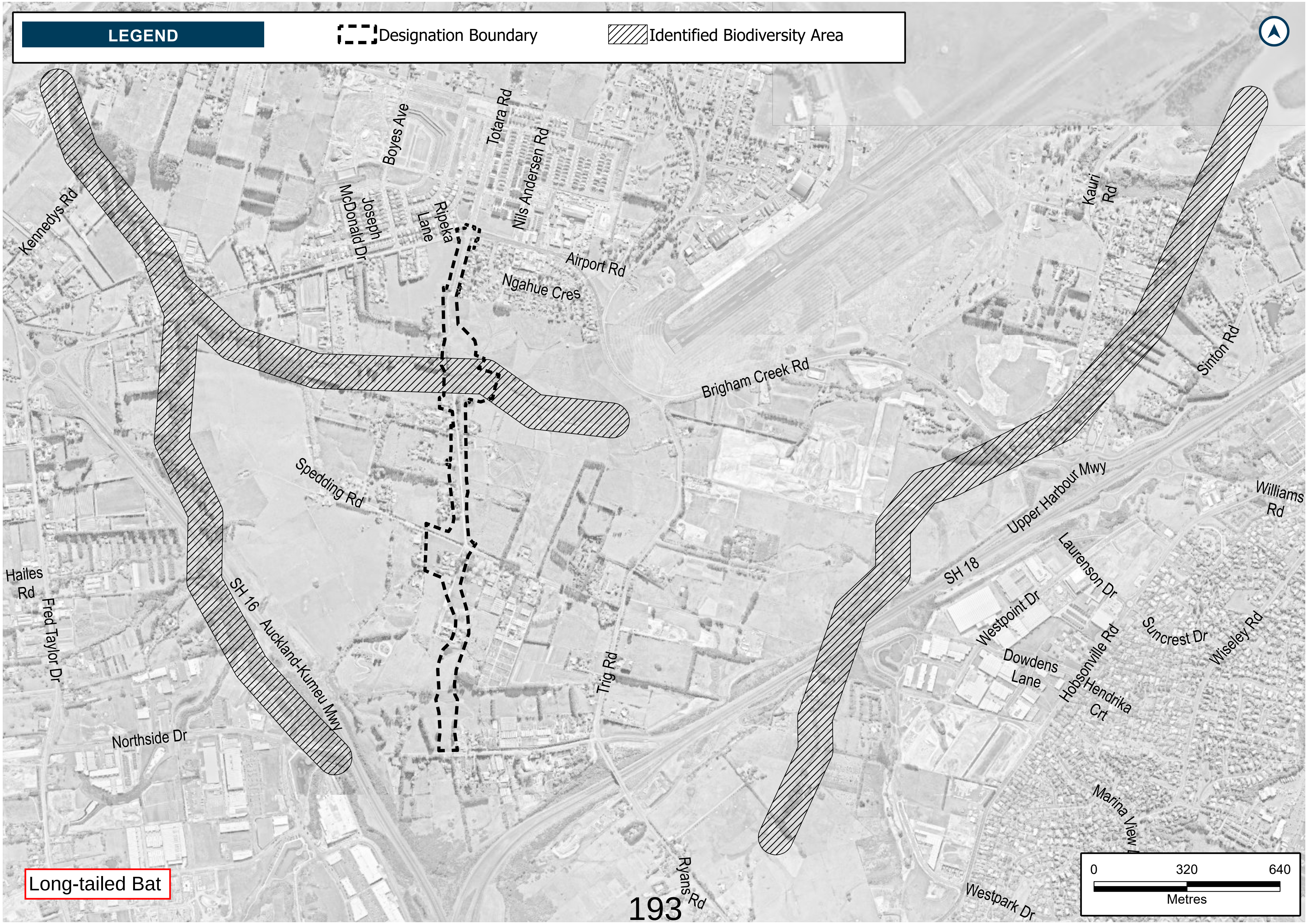
The proposed work is the construction, operation, and maintenance of a transport corridor in Whenuapai, from the Brigham Creek Road intersection to the intersection with Northside Drive, including active transport facilities and associated infrastructure. The proposed work is shown in the following Concept Plan and includes:

(a) An upgraded and new transport corridor, including public transport and active transport facilities;
(b) Associated works including intersections, bridges, embankments, retaining, culverts, stormwater management systems;
(c) Changes to local roads, where the proposed work intersects with local roads; and
(d) Construction activities, including vegetation removal, construction compounds, laydown areas, bridge works area, construction traffic management and the re-grade of driveways.

Concept Plan



Schedule 2: Identified Biodiversity Areas



LEGEND
Designation Boundary
Identified Biodiversity Area
Kennedys Rd
Boyes Ave
Totara Rd
Nils Andersen Rd
Joseph McDonald Dr
Ripeka Lane
Airport Rd
Ngahue Cres
Kauri Rd
Sinton Rd
Brigham Creek Rd
Spedding Rd
Upper Harbour Mwy
Williams Rd
SH 18
Laurenson Dr
Westpoint Dr
Suncrest Dr
Wiseley Rd
Dowdens Lane
Hobsonville Rd
Hendrika Crt
Hailes Rd
Fred Taylor Dr
SH 16
Auckland-Kumeu Mwy
Trig Rd
Northside Dr
Marina View
Ryans Rd
Westpark Dr
0
320
640
Metres
Long-tailed Bat

Schedule 3: Identified PPFs Noise Criteria Categories

Address	New or Altered Road	Noise Criteria Category
10 Spedding Road	Altered Road	A
11 Māmari Road	Altered Road	A
11a Spedding Road	Altered Road	A
15 Māmari Road	Altered Road	A
2-10 Ripeka Lane	Altered Road	C
28 Māmari Road	Altered Road	A
38 Whenuapai Drive	Altered Road	A
3 Ngahue Crescent	Altered Road	A
30 Māmari Road	Altered Road	B
42D Brigham Creek Rd	Altered Road	C
49 Brigham Creek Road	Altered Road	C
5 Ngahue Crescent	Altered Road	A
5 Spedding Road	Altered Road	A
51 Brigham Creek Road	Altered Road	B
53 Brigham Creek Road	Altered Road	C
5a Spedding Road	Altered Road	A
6 Spedding Road	Altered Road	A
7 Ngahue Crescent	Altered Road	A
8 Māmari Road	Altered Road	C
8 Spedding Road	Altered Road	A
9 Māmari Road	Altered Road	C
4 Māmari Road	Altered Road	C
6 Māmari Road	Altered Road	C
11 Spedding Road	New Road	A
7 Spedding Road	New Road	B
5 Māmari Road	New Road	B
66 Trig Road	New Road	A
68 Trig Road	New Road	A
70 Trig Road	New Road	B
72 Trig Road	New Road	A
78 Trig Road	New Road	A
80 Trig Road	New Road	A
10 Māmari Road	New Road	C
12 Māmari Road	New Road	C
14 Māmari Road	New Road	C
16 Māmari Road	New Road	C
18 Māmari Road	New Road	C
20 Māmari Road	New Road	C
22 Māmari Road	New Road	C

24 Māmari Road	New Road	C
1 Tama Quadrant	New Road	A
10 Tama Quadrant	New Road	A
3 Tama Quadrant	New Road	A
5 Tama Quadrant	New Road	A
7 Tama Quadrant	New Road	A
8 Tama Quadrant	New Road	A
9 Ngahue Crescent	New Road	A
9 Tama Quadrant	New Road	A
11 Ngahue Crescent	New Road	A

Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title: Supporting Growth
NoR W2 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

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0 30 60 120 Meters

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NoR W2 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

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Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title: Supporting Growth
NoR W2 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

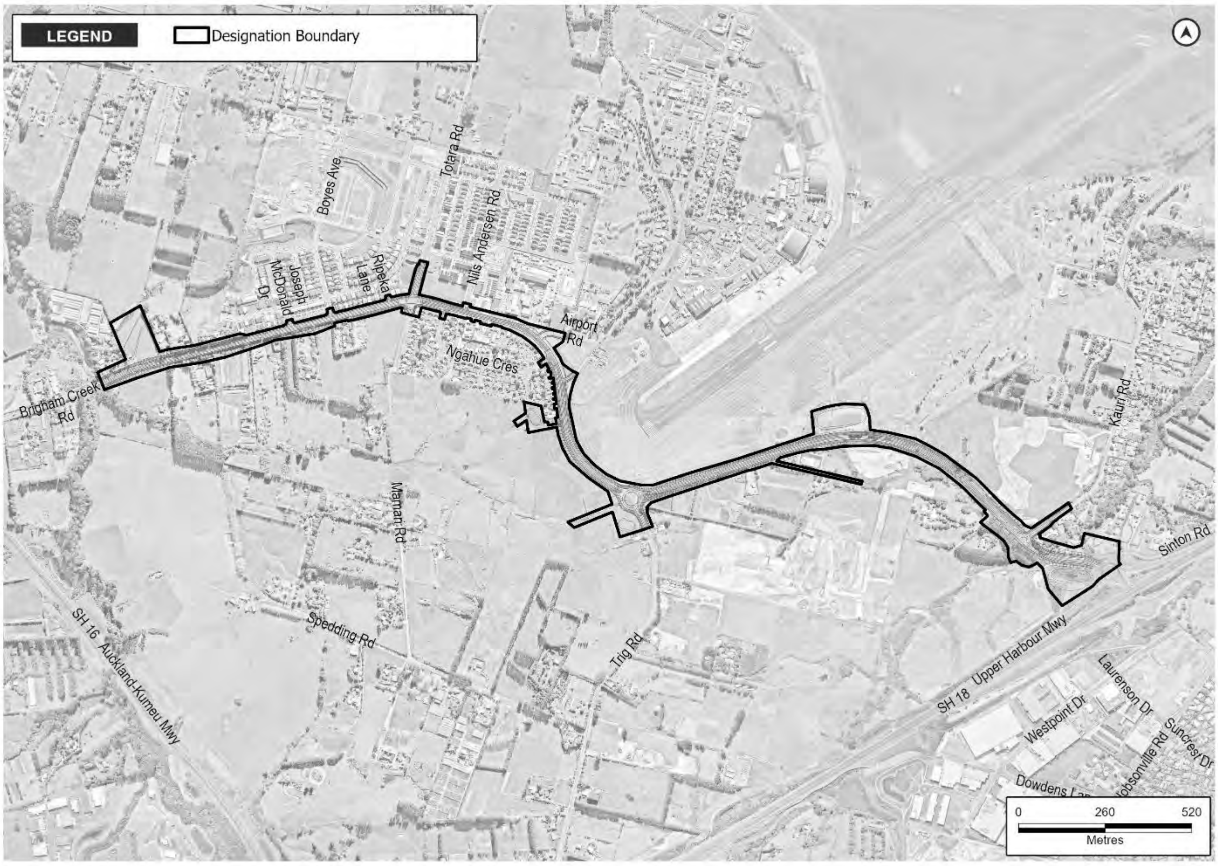
Schedule 1: General Accordance Plans and Information

Project Description

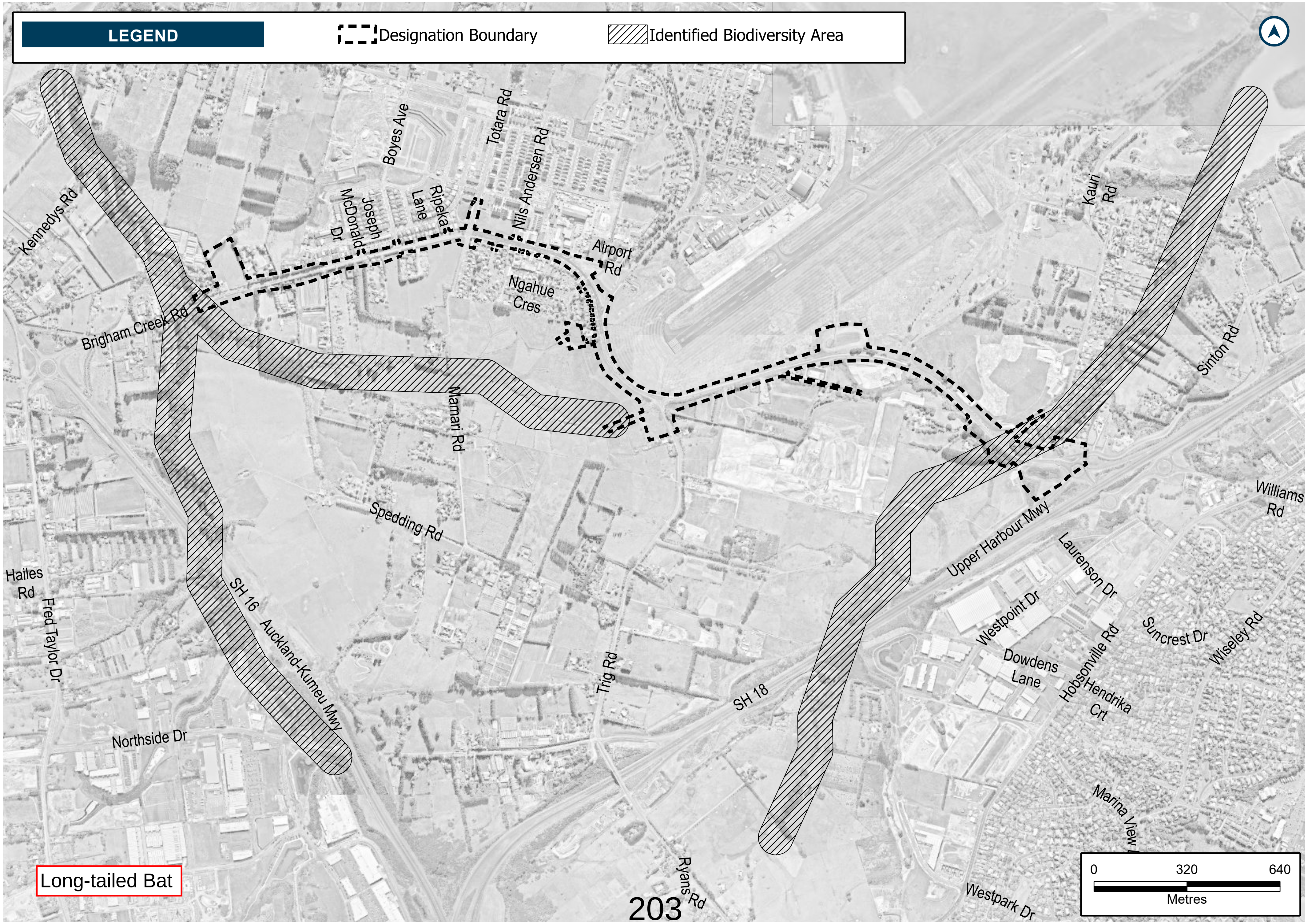
The proposed work is the construction, operation, and maintenance of a transport corridor in Whenuapai, from Totara Creek bridge to SH18 Brigham Creek Interchange, including active transport facilities and associated infrastructure. The proposed work is shown in the following Concept Plan and includes:

(a) An upgraded transport corridor and active transport facilities;
(b) Associated works including intersections, bridges, embankments, retaining, culverts, stormwater management systems;
(c) Changes to local roads, where the proposed work intersects with local roads; and
(d) Construction activities, including vegetation removal, construction compounds, laydown areas, bridge works area, construction traffic management and the re-grade of driveways.

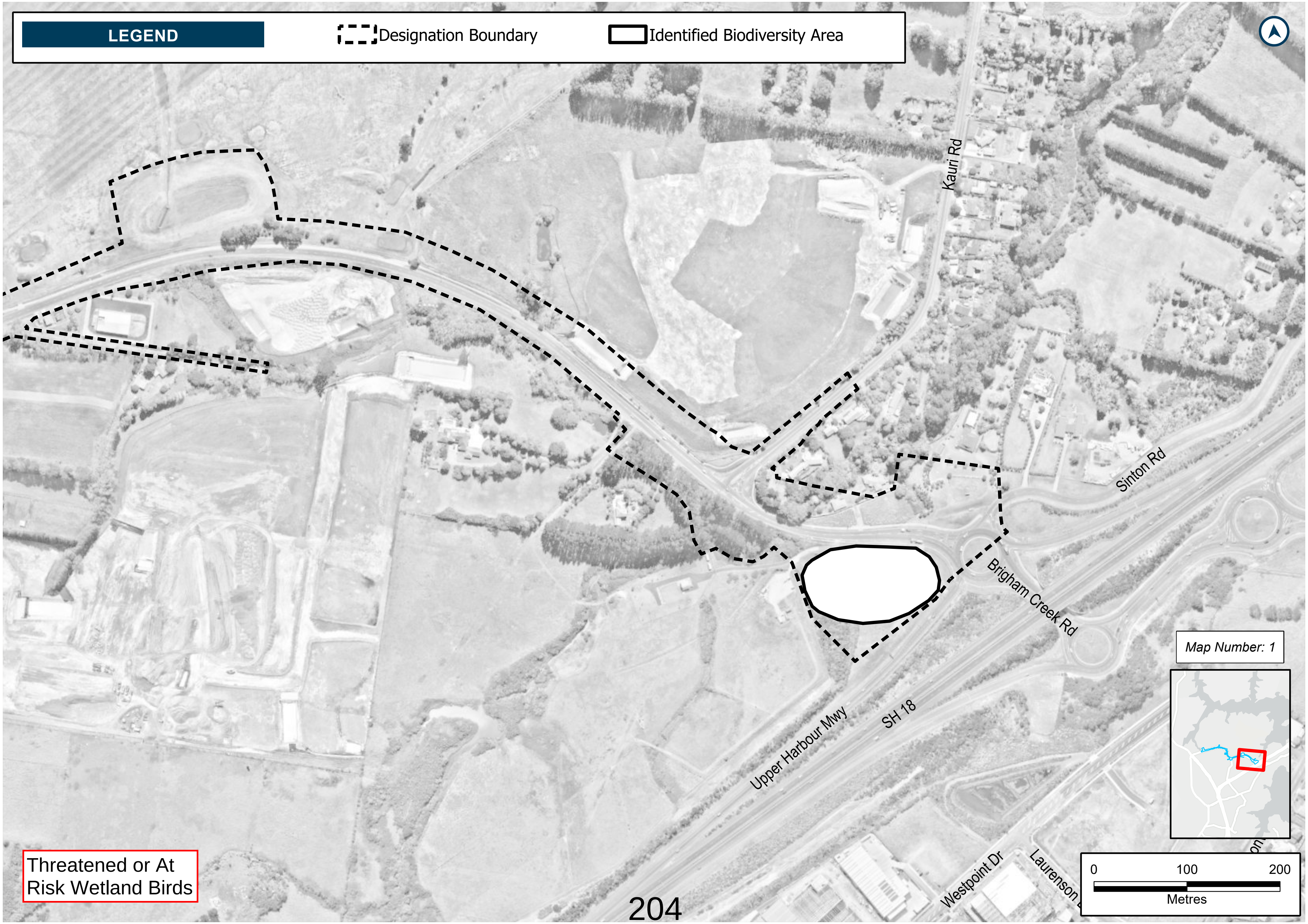
Concept Plan



Schedule 2: Identified Biodiversity Areas



LEGEND
Designation Boundary
Identified Biodiversity Area
Kennedys Rd
Brigham Creek Rd
Boyes Ave
Totara Rd
Nils Andersen Rd
McDonald Dr
Joseph
Lane
Ripeka
Airport Rd
Ngahue Cres
Kauri Rd
Sinton Rd
Mamari Rd
Spedding Rd
Upper Harbour Mwy
Williams Rd
Laurenson Dr
Westpoint Dr
Suncrest Dr
Wiseley Rd
Dowdens Lane
Hobsonville Rd
Hendrika Crt
Hailes Rd
Fred Taylor Dr
SH 16
Auckland-Kumeu Mwy
Trig Rd
SH 18
Northside Dr
Marina View
Ryans Rd
Westpark Dr
0
320
640
Metres
Long-tailed Bat



Threatened or At Risk Wetland Birds

Schedule 3: Identified PPFs Noise Criteria Categories

Address	New or Altered Road	Noise Criteria Category
32c Brigham Creek Road	Altered Road	C
32b Brigham Creek Road	Altered Road	C
34c Brigham Creek Rd	Altered Road	C
32a Brigham Creek Rd	Altered Road	C
34a Brigham Creek Road	Altered Road	C
32d Brigham Creek Road	Altered Road	C
34d Brigham Creek Road	Altered Road	C
26-34 Whenuapai Drive	Altered Road	C
34b Brigham Creek Road	Altered Road	B
1 Ripeka Lane	Altered Road	B
49 Brigham Creek Road	Altered Road	B
40b-42c Brigham Creek Road	Altered Road	B
3 Boyes Avenue	Altered Road	B
55 Brigham Creek Road	Altered Road	B
57 Brigham Creek Road	Altered Road	B
1-8/38 Brigham Creek Road	Altered Road	B
59 Brigham Creek Road	Altered Road	A
53 Brigham Creek Road	Altered Road	A
39a Brigham Creek Road	Altered Road	B
91 Brigham Creek Road	Altered Road	A
2-10 Ripeka Lane	Altered Road	A
26 Brigham Creek Road	Altered Road	B
51 Brigham Creek Road	Altered Road	A
113 Brigham Creek Road	Altered Road	A
42d Brigham Creek Road	Altered Road	A
123 Brigham Creek Road	Altered Road	A
93 Brigham Creek Road	Altered Road	A
2-10 Harewood Street	Altered Road	A
111 Brigham Creek Road	Altered Road	A
1-9 Maramara Road	Altered Road	A
105 Brigham Creek Road	Altered Road	A
1 Kauri Road	Altered Road	A
115 Brigham Creek Road	Altered Road	A
38 Ngahue Crescent	Altered Road	A
2 Kauri Road	Altered Road	A
145a Brigham Creek Road	Altered Road	A
99 Brigham Creek Road	Altered Road	A
108 Whenuapai Drive	Altered Road	A
103 Brigham Creek Road	Altered Road	A

101 Brigham Creek Road	Altered Road	A
109 Brigham Creek Road	Altered Road	A
46-60 Nils Andersen Road	Altered Road	A
117 Brigham Creek Road	Altered Road	A
28 Brigham Creek Road	Altered Road	A
119 Brigham Creek Road	Altered Road	A
162 Brigham Creek Road	Altered Road	A
3 Kauri Road Whenuapai	Altered Road	A
95 Brigham Creek Road	Altered Road	A
97 Brigham Creek Road	Altered Road	A
77-85 Nils Andersen Road	Altered Road	A
121 Brigham Creek Road	Altered Road	A
1-4/46a Nils Andersen Road	Altered Road	A
125-127 Brigham Creek Road	Altered Road	A
129 Brigham Creek Road	Altered Road	A
5-8/46a Nils Andersen Road	Altered Road	A
18 Brigham Creek Road	Altered Road	A
8 Airport Road	Altered Road	A
163 Brigham Creek Road	Altered Road	A
41-61 Nils Andersen Road	Altered Road	A
65-75 Nils Andersen Road	Altered Road	A
4 Māmari Road	Altered Road	A
110 Whenuapai Drive	Altered Road	A
39 Brigham Creek Road	Altered Road	A
11-17 Maramara Road	Altered Road	A
1-9 Harewood St	Altered Road	A
6 Māmari Road	Altered Road	A
145 Brigham Creek Road	Altered Road	A
5 Kauri Road Whenuapai	Altered Road	A
24 Brigham Creek Road	Altered Road	A
41-43 Whenuapai Drive	Altered Road	A
39 Whenuapai Drive	Altered Road	A
45 Whenuapai Drive	Altered Road	A
58-88 Whenuapai Drive	Altered Road	A
96 Trig Road	Altered Road	A
51 Whenuapai Drive	Altered Road	A
106 Whenuapai Drive	Altered Road	A
31 Brigham Creek Road	Altered Road	A
33-35 Whenuapai Drive	Altered Road	A
73 Trig Road	Altered Road	A
112 Whenuapai Drive	Altered Road	A
8 Māmari Road	Altered Road	A

36 Ngahue Crescent	Altered Road	A
199-201 Totara Rd	Altered Road	A
37 Ngahue Crescent	Altered Road	A
159 Brigham Creek Road	Altered Road	A
114 Whenuapai Drive	Altered Road	A
14 Airport Road	Altered Road	A
53-55 Whenuapai Drive	Altered Road	A
164 Brigham Creek Road	Altered Road	A
168-178 Totara Rd	Altered Road	A
3 Ngahue Crescent	Altered Road	A
2 Ngahue Crescent	Altered Road	A
90 Whenuapai Drive	Altered Road	A
96a Trig Road	Altered Road	A
4 Ruatea Street	Altered Road	A
32 Ngahue Crescent	Altered Road	A
5 Ngahue Crescent	Altered Road	A
2 Ruatea Street	Altered Road	A
31 Whenuapai Drive	Altered Road	A
8 Ruatea Street	Altered Road	A
6 Ruatea Street	Altered Road	A
24 Ngahue Crescent	Altered Road	A
10 Ruatea Street	Altered Road	A
28 Ngahue Crescent	Altered Road	A
26 Ngahue Crescent	Altered Road	A
40 Tamiro Road	Altered Road	A
34 Ngahue Crescent	Altered Road	A
20 Ngahue Crescent	Altered Road	A
1 Joseph Mcdonald Drive	Altered Road	A
4 Ngahue Crescent	Altered Road	A
168 Brigham Creek Road	Altered Road	A
30 Ngahue Crescent	Altered Road	A
104 Whenuapai Drive	Altered Road	A
1 Ruatea Street	Altered Road	A
170 Brigham Creek Road	Altered Road	A
9 Ngahue Crescent	Altered Road	A
7 Kauri Road Whenuapai	Altered Road	A
151 Brigham Creek Road	Altered Road	A
101 Whenuapai Drive	Altered Road	A
7 Ngahue Crescent	Altered Road	A
11 Kauri Road	Altered Road	A
38 Tamiro Road	Altered Road	A
10 Ngahue Crescent	Altered Road	A

10 Māmari Road	Altered Road	A
94 Trig Road	Altered Road	A
8 Ngahue Crescent	Altered Road	A
59 Whenuapai Drive	Altered Road	A
105 Whenuapai Drive	Altered Road	A
6 Ngahue Crescent	Altered Road	A
3 Ruatea Street	Altered Road	A
9 Kauri Road	Altered Road	A
99 Whenuapai Drive	Altered Road	A
98 Whenuapai Drive	Altered Road	A
99 Whenuapai Drive	Altered Road	A
5 Ruatea Street	Altered Road	A
100 Whenuapai Drive	Altered Road	A
97 Whenuapai Drive	Altered Road	A
12 Ngahue Crescent	Altered Road	A
92 Whenuapai Drive	Altered Road	A
14 Ngahue Crescent	Altered Road	A
96 Whenuapai Dr	Altered Road	A
18 Ngahue Crescent	Altered Road	A
107 Whenuapai Drive	Altered Road	A
85 Whenuapai Drive	Altered Road	A
7 Ruatea Street	Altered Road	A
141 Brigham Creek Road	Altered Road	A
26 Tamiro Road	Altered Road	A
102 Whenuapai Drive	Altered Road	A
3 Joseph Mcdonald Drive	Altered Road	A
61-63 Whenuapai Drive	Altered Road	A
46 Pamu Road	Altered Road	A
89 Whenuapai Drive	Altered Road	A
19-59 Maramara Road	Altered Road	A
29 Hangar Lane	Altered Road	A
40 Whenuapai Drive	Altered Road	A
31 Ngahue Crescent	Altered Road	A
65 Whenuapai Drive	Altered Road	A
29 Ngahue Crescent	Altered Road	A
93 Whenuapai Drive	Altered Road	A
69-71 Whenuapai Drive	Altered Road	A
94 Whenuapai Dr	Altered Road	A
5 Boyes Avenue	Altered Road	A
2 Kainga Lane	Altered Road	A
42 Whenuapai Drive	Altered Road	A
18 Kauri Road Whenuapai	Altered Road	A

73-75 Whenuapai Drive	Altered Road	A
44 Whenuapai Drive	Altered Road	A
38 Whenuapai Drive	Altered Road	A
2 Mcewan Street	Altered Road	A
27 Hangar Lane	Altered Road	A
4 Kainga Lane	Altered Road	A
8 Joseph Mcdonald Drive	Altered Road	A
6 Kainga Lane	Altered Road	A
1 Kainga Lane	Altered Road	A
2 Boyes Avenue	Altered Road	A
27 Whenuapai Dr	Altered Road	A
7 Boyes Avenue	Altered Road	A
25 Hangar Lane	Altered Road	A
50-52 Whenuapai Drive	Altered Road	A
5 Joseph Mcdonald Drive	Altered Road	A
48 Pamu Road	Altered Road	A
15 Kauri Road	Altered Road	A
54 Pamu Road	Altered Road	A
56 Pamu Road	Altered Road	A
4 Mcewan Street	Altered Road	A
52 Pamu Road	Altered Road	A
17 Kauri Road	Altered Road	A
25 Whenuapai Dr	Altered Road	A
62 Pamu Road	Altered Road	A
60 Pamu Road	Altered Road	A
58 Pamu Road	Altered Road	A
9 Boyes Avenue	Altered Road	A
6 Mcewan Street	Altered Road	A
24 Whenuapai Drive	Altered Road	A
50 Whenuapai Drive	Altered Road	A
22 Whenuapai Drive	Altered Road	A
150-164 Totara Rd	Altered Road	A
191-197 Totara Rd	Altered Road	A

Legend

- Protected Premises and Facilities
- NZS 6806 Assessment Area

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Map Scale @ A3:
0 30 60 120 Meters

Revision	Author	Verified	Approved	Date

Title: Supporting Growth
NoR W3 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Legend

- Protected Premises and Facilities
- NZS 6806 Assessment Area

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NoR W3 - Building Addresses

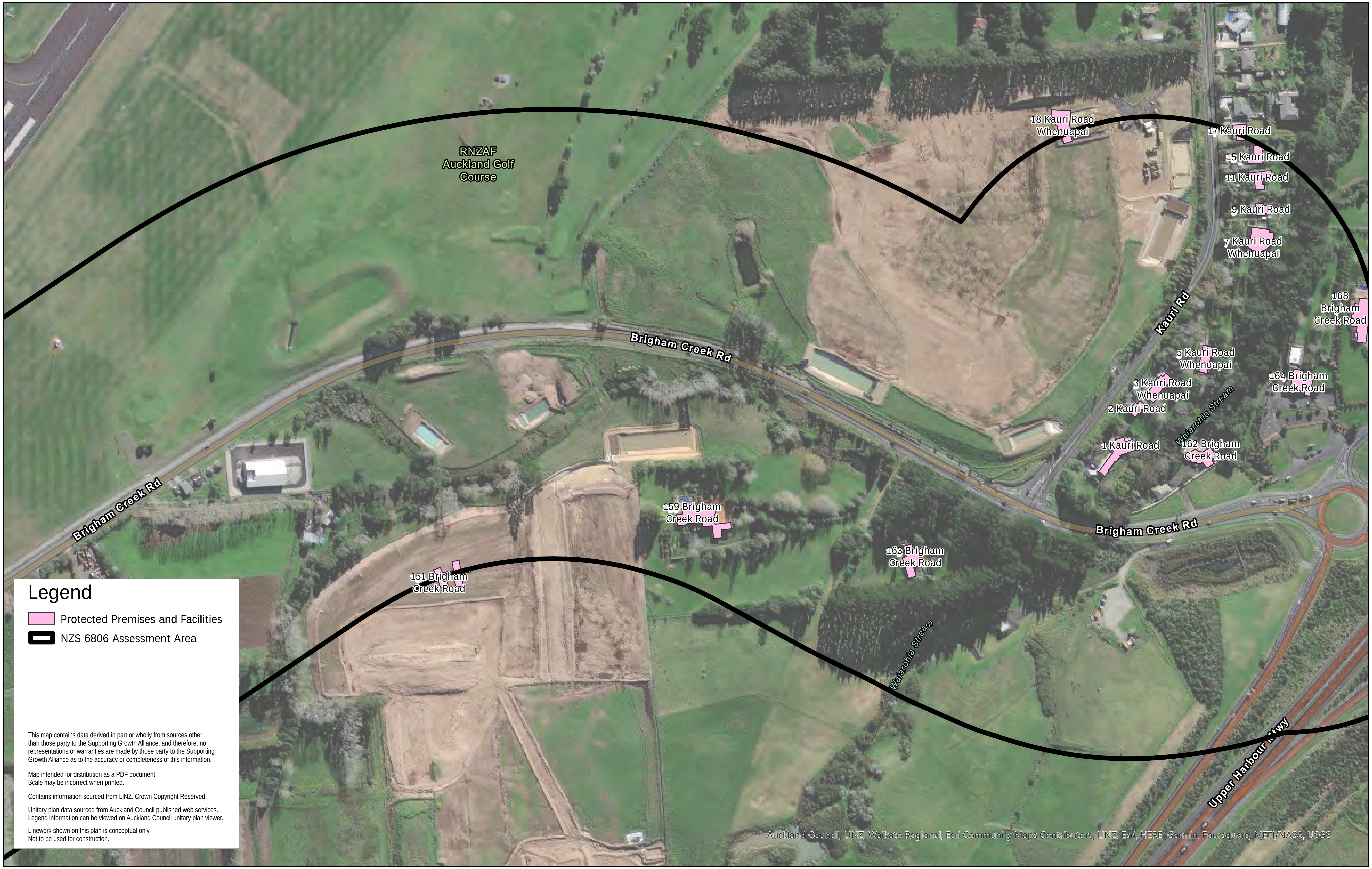
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



Legend

- Protected Premises and Facilities
- NZS 6806 Assessment Area

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Title:

Supporting Growth

NoR W3 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

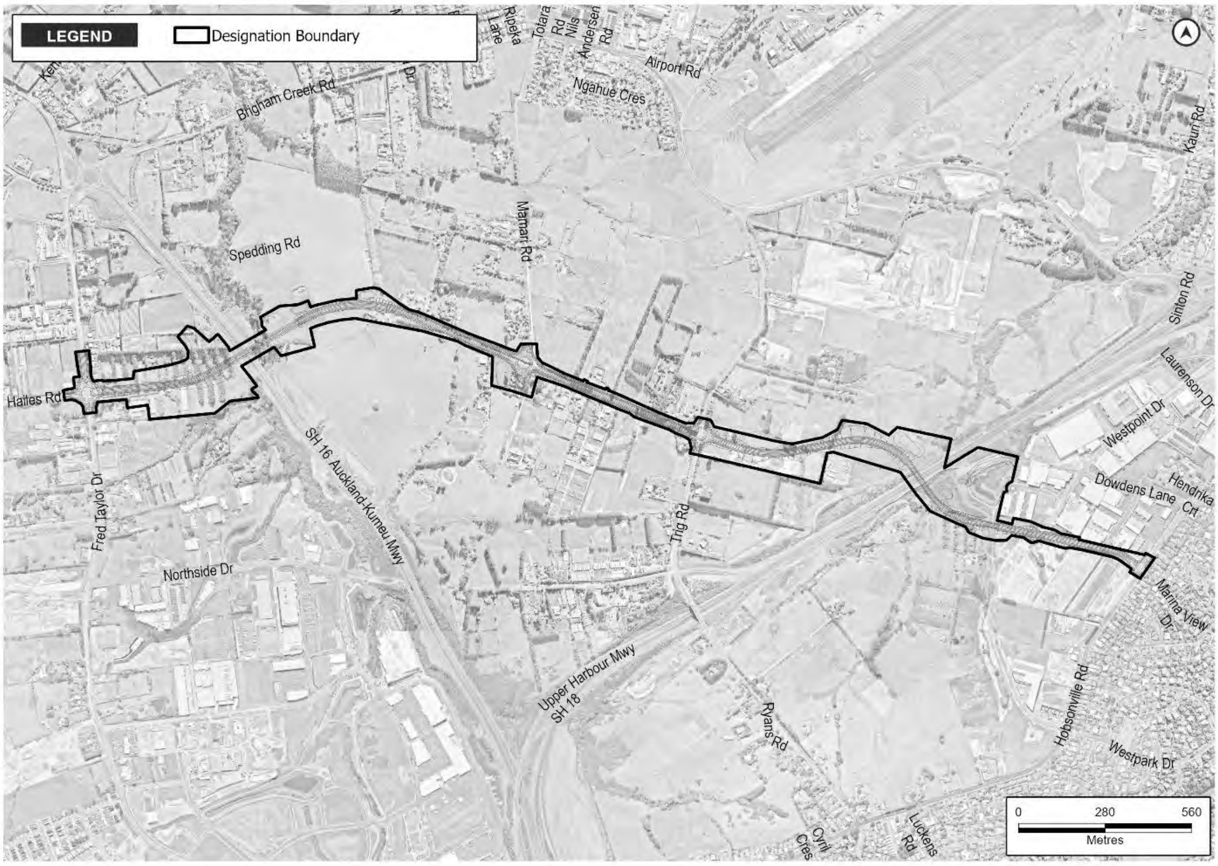
Schedule 1: General Accordance Plans and Information

Project Description

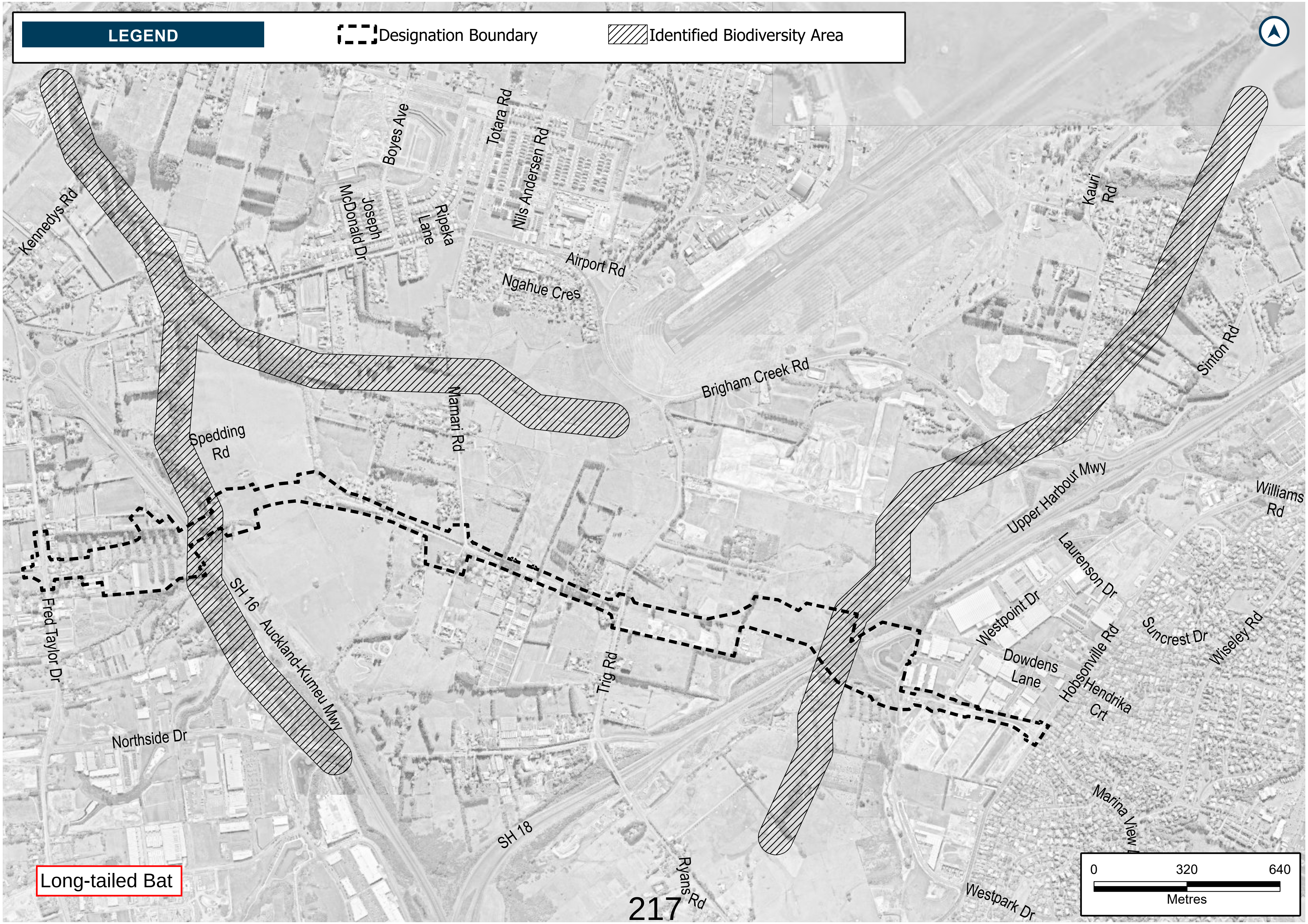
The proposed work is the construction, operation, and maintenance of a transport corridor in Whenuapai, from the Fred Taylor Drive intersection to the intersection with Hobsonville Road, including active transport facilities and associated infrastructure. The proposed work is shown in the following Concept Plan and includes:

(a) An upgraded and new transport corridor and active transport facilities;
(b) Associated works including intersections, bridges, embankments, retaining, culverts, stormwater management systems;
(c) Changes to local roads, where the proposed work intersects with local roads; and
(d) Construction activities, including vegetation removal, construction compounds, laydown areas, bridge works area, construction traffic management and the re-grade of driveways.

Concept Plan



Schedule 2: Identified Biodiversity Areas


LEGEND
Designation Boundary
Identified Biodiversity Area
Kennedys Rd
Boyes Ave
Totara Rd
Nils Andersen Rd
McDonald Dr
Joseph
Ripeka Lane
Airport Rd
Ngahue Cres
Kauri Rd
Sinton Rd
Brigham Creek Rd
Mamari Rd
Spedding Rd
Upper Harbour Mwy
Williams Rd
Laurenson Dr
Westpoint Dr
Suncrest Dr
Wiseley Rd
Dowdens Lane
Hobsonville Rd
Hendrika Crt
SH 16
Auckland-Kumeu Mwy
Fred Taylor Dr
Trig Rd
Northside Dr
SH 18
Marina View
Ryans Rd
Westpark Dr
0
320
640
Metres
Long-tailed Bat

Schedule 3: Identified PPFs Noise Criteria Categories

Address	New or Altered Road	Noise Criteria Category
1 Hailes Road	Altered Road	A
1 Marina View Drive	Altered Road	A
1/121 Fred Taylor Drive	Altered Road	A
1/28 Sailfish Drive	Altered Road	A
10 Spedding Road	Altered Road	A
102 Hobsonville Road	Altered Road	A
168 Fred Taylor Drive	Altered Road	B
131 Fred Taylor Drive	Altered Road	B
133 Fred Taylor Drive	Altered Road	B
135 Fred Taylor Drive	Altered Road	B
137 Fred Taylor Drive	Altered Road	B
139 Fred Taylor Drive	Altered Road	A
14 Spedding Road	Altered Road	A
141 Fred Taylor Drive	Altered Road	B
143a Fred Taylor Drive	Altered Road	A
143b Fred Taylor Drive	Altered Road	A
15 Māmari Road	Altered Road	A
15 Soling Place	Altered Road	A
164 Fred Taylor Drive	Altered Road	A
166 Fred Taylor Drive	Altered Road	B
166a Fred Taylor Drive	Altered Road	A
17 Soling Place	Altered Road	A
1a Marina View Drive	Altered Road	A
2 Marina View Drive	Altered Road	A
2/28 Sailfish Drive	Altered Road	A
223 Hobsonville Road	Altered Road	A
225 Hobsonville Road	Altered Road	A
227 Hobsonville Road	Altered Road	A
229 Hobsonville Road	Altered Road	A
231 Hobsonville Road	Altered Road	A
231a Hobsonville Road	Altered Road	A
233 Hobsonville Road	Altered Road	A
2a Marina View Drive	Altered Road	A
3 Marina View Drive	Altered Road	A
4 Spedding Road	Altered Road	A
43 Trig Road	Altered Road	A
4a Marina View Drive	Altered Road	A
5 Marina View Drive	Altered Road	A
5 Spedding Road	Altered Road	A

57 Trig Road	Altered Road	A
5a Spedding Road	Altered Road	B
6 Spedding Road	Altered Road	A
8 Spedding Road	Altered Road	A
86 Trig Road	Altered Road	A
88 Trig Road	Altered Road	A
90 Trig Road	Altered Road	A
92 Trig Road	Altered Road	A
2/22 Sailfish Drive	Altered Road	A
6a Marina View Drive	Altered Road	A
6b Marina View Drive	Altered Road	A
7 Marina View Drive	Altered Road	A
13 Soling Place	Altered Road	A
26 Sailfish Drive	Altered Road	A
30 Sailfish Drive	Altered Road	A
11a Spedding Road	Altered Road	A
1/98 Hobsonville Road	New Road	B
1/100 Hobsonville Road	New Road	B
25A Trig Road	New Road	B
41 Trig Road	New Road	A

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Legend information can be viewed on Auckland Council unitary plan viewer.

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Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date

Title: Supporting Growth
NoR W4 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Legend

- Protected Premises and Facilities
- NZS 6806 Assessment Area

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Title: Supporting Growth
NoR W4 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Legend

Protected Premises and Facilities

NZS 6806 Assessment Area

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Map Scale @ A3:

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Revision	Author	Verified	Approved	Date

Title: Supporting Growth

NoR W4 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Legend

- Protected Premises and Facilities
- NZS 6806 Assessment Area

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Title: Supporting Growth
NoR W4 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

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Map Scale @ A3:

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Revision	Author	Verified	Approved	Date

Title:

Supporting Growth
NoR W4 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

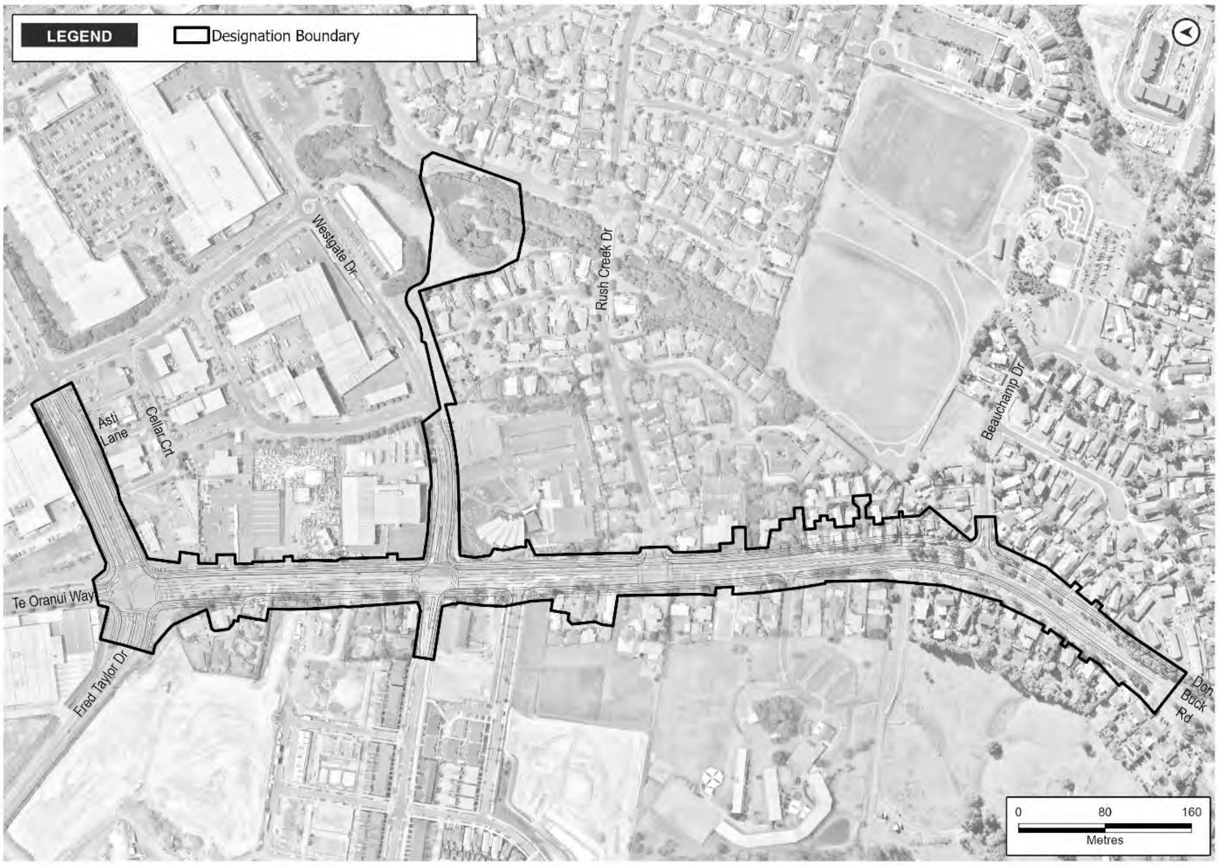
Schedule 1: General Accordance Plans and Information

Project Description

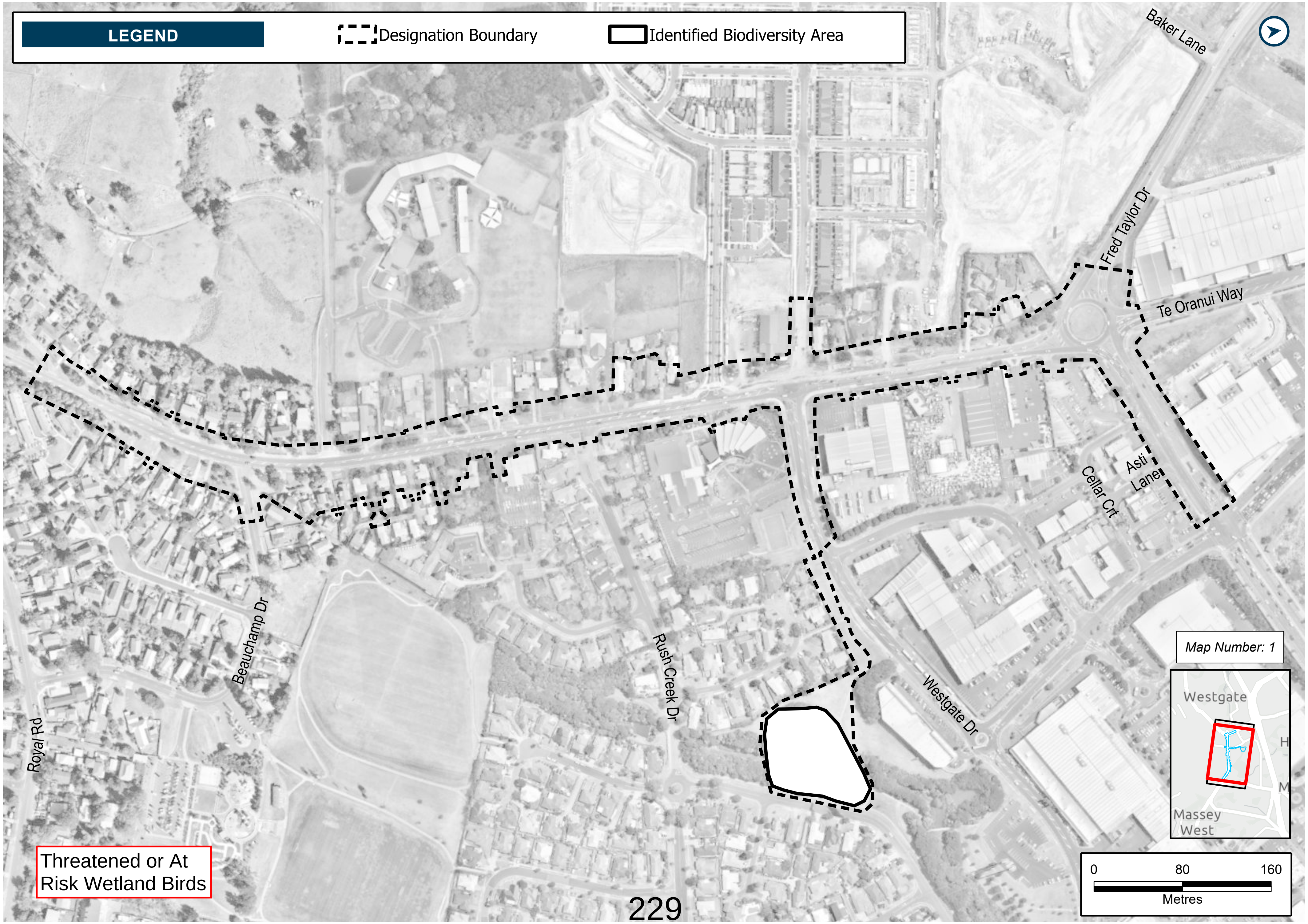
The proposed work is the construction, operation, and maintenance of a transport corridor in Redhills, From the Fred Taylor Drive and Te Oranui Way intersection to Redhills East-West Arterial Transport Corridor – Dunlop Road, including active transport facilities and associated infrastructure. The proposed work is shown in the following Concept Plan and includes:

(a) An upgraded transport corridor, including public transport and active transport facilities;
(b) Associated works including intersections, bridges, embankments, retaining, culverts, stormwater management systems;
(c) Changes to local roads, where the proposed work intersects with local roads; and
(d) Construction activities, including vegetation removal, construction compounds, laydown areas, bridge works area, construction traffic management and the re-grade of driveways.

Concept Plan



Schedule 2: Identified Biodiversity Areas



LEGEND
Designation Boundary
Identified Biodiversity Area
Baker Lane
Fred Taylor Dr
Te Oranui Way
Asti Lane
Cellar Crt
Westgate Dr
Rush Creek Dr
Beauchamp Dr
Royal Rd
Map Number: 1
Westgate
Massey West
0
80
160
Metres
Threatened or At Risk Wetland Birds

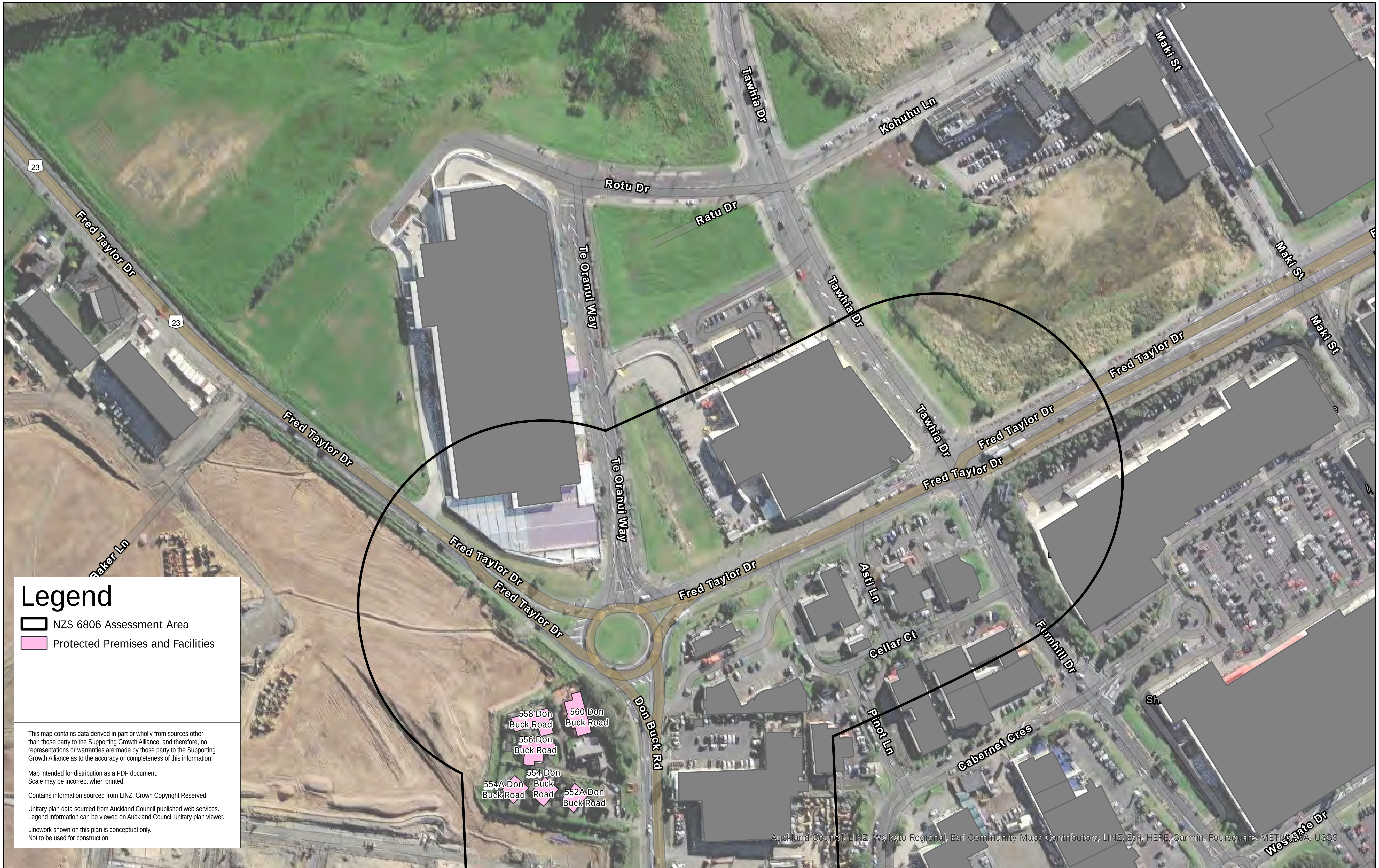
Schedule 3: Identified PPFs Noise Criteria Categories

Address	New or Altered Road	Noise Criteria Category
9/14 Royal Road	Altered Road	C
538 Don Buck Road	Altered Road	C
1 Rush Creek Drive	Altered Road	C
540 Don Buck Road	Altered Road	C
546 Don Buck Road	Altered Road	C
10/14 Royal Road	Altered Road	C
461 Don Buck Road	Altered Road	C
510 Don Buck Road	Altered Road	C
463 Don Buck Road	Altered Road	C
11/14 Royal Road	Altered Road	C
6/14 Royal Road	Altered Road	C
492 Don Buck Road	Altered Road	C
2 Rush Creek Drive	Altered Road	C
459 Don Buck Road	Altered Road	C
508 Don Buck Road	Altered Road	C
12/14 Royal Road	Altered Road	C
504 Don Buck Road	Altered Road	C
560 Don Buck Road	Altered Road	C
502 Don Buck Road	Altered Road	C
506 Don Buck Road	Altered Road	C
500 Don Buck Road	Altered Road	C
494 Don Buck Road	Altered Road	C
465 Don Buck Road	Altered Road	C
552A Don Buck Road	Altered Road	C
7/14 Royal Road	Altered Road	C
496 Don Buck Road	Altered Road	C
501 Don Buck Road	Altered Road	B
1/14 Royal Road	Altered Road	B
490 Don Buck Road	Altered Road	B
2/14 Royal Road	Altered Road	B
8/520 Don Buck Road	Altered Road	B
480 Don Buck Road	Altered Road	B
513 Don Buck Road	Altered Road	B
8/14 Royal Road	Altered Road	B
556 Don Buck Road	Altered Road	B
13/14 Royal Road	Altered Road	A
466 Don Buck Road	Altered Road	B
2 Royal Road	Altered Road	B
12/520 Don Buck Road	Altered Road	A

486 Don Buck Road	Altered Road	A
464 Don Buck Road	Altered Road	A
478 Don Buck Road	Altered Road	A
558 Don Buck Road	Altered Road	A
3/14 Royal Road	Altered Road	A
11/520 Don Buck Road	Altered Road	A
554 Don Buck Road	Altered Road	A
28 Beauchamp Drive	Altered Road	A
14/14 Royal Road	Altered Road	A
4 Rush Creek Drive	Altered Road	A
3 Rush Creek Drive	Altered Road	A
4 Royal Road	Altered Road	A
462 Don Buck Road	Altered Road	A
10/520 Don Buck Road	Altered Road	A
488 Don Buck Road	Altered Road	A
451 Don Buck Road	Altered Road	A
31 Beauchamp Drive	Altered Road	A
476 Don Buck Road	Altered Road	A
9/520 Don Buck Road	Altered Road	A
482 Don Buck Road	Altered Road	A
9/485 Don Buck Road	Altered Road	A
484 Don Buck Road	Altered Road	A
554A Don Buck Road	Altered Road	A
12/485 Don Buck Road	Altered Road	A
542 Don Buck Road	Altered Road	A
13/485 Don Buck Road	Altered Road	A
470 Don Buck Road	Altered Road	A
544 Don Buck Road	Altered Road	A
17/14 Royal Road	Altered Road	A
460 Don Buck Road	Altered Road	A
5 Rush Creek Drive	Altered Road	A
496 2 Don Buck Road	Altered Road	A
472 Don Buck Road	Altered Road	A
475 Don Buck Road	Altered Road	A
26 Beauchamp Drive	Altered Road	A
29 Beauchamp Drive	Altered Road	A
2/485 Don Buck Road	Altered Road	A
4/14 Royal Road	Altered Road	A
16/14 Royal Road	Altered Road	A
477 Don Buck Road	Altered Road	A
474 Don Buck Road	Altered Road	A
492A Don Buck Road	Altered Road	A

6 Rush Creek Drive	Altered Road	A
5/14 Royal Road	Altered Road	A
468 Don Buck Road	Altered Road	A
7 Rush Creek Drive	Altered Road	A
3B Reverie Place	Altered Road	A
24 Beauchamp Drive	Altered Road	A
25 Beauchamp Drive	Altered Road	A
15/14 Royal Road	Altered Road	A
10 Royal Road	Altered Road	A
28 Beauchamp Drive	Altered Road	A
6 Royal Road	Altered Road	A
8 Royal Road	Altered Road	A
31 Regents Park Place	Altered Road	A
13 Reverie Place	Altered Road	A
11 Reverie Place	Altered Road	A
24 Reverie Place	Altered Road	A
8 Rush Creek Drive	Altered Road	A
26 Reverie Place	Altered Road	A
8/485 Don Buck Road	Altered Road	A
19/14 Royal Road	Altered Road	A
5/485 Don Buck Road	Altered Road	A
9 Rush Creek Drive	Altered Road	A
41 Regents Park Place	Altered Road	A
43 Regents Park Place	Altered Road	A
27 Beauchamp Drive	Altered Road	A
3/485 Don Buck Road	Altered Road	A
7/485 Don Buck Road	Altered Road	A
6/485 Don Buck Road	Altered Road	A
20A Princes Street	Altered Road	A
22 Beauchamp Drive	Altered Road	A
33 Regents Park Place	Altered Road	A
12 Royal Road	Altered Road	A
4/485 Don Buck Road	Altered Road	A
15 Reverie Place	Altered Road	A
23 Beauchamp Drive	Altered Road	A
476A Don Buck Road	Altered Road	A
29 Regents Park Place	Altered Road	A
42 Regents Park Place	Altered Road	A
10 Rush Creek Drive	Altered Road	A
39 Regents Park Place	Altered Road	A
37 Regents Park Place	Altered Road	A
16 Royal Road	Altered Road	A

18 Royal Road	Altered Road	A
35 Regents Park Place	Altered Road	A
7 Reverie Place	Altered Road	A
22 Reverie Place	Altered Road	A
3A Reverie Place	Altered Road	A
27 Regents Park Place	Altered Road	A
9 Reverie Place	Altered Road	A
5 Reverie Place	Altered Road	A
20 Royal Road	Altered Road	A



Map Scale @ A3:

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Title: Supporting Growth

NoR R1 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No:

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Drawing No:

Legend

- NZS 6806 Assessment Area
- Protected Premises and Facilities

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Drawing No:

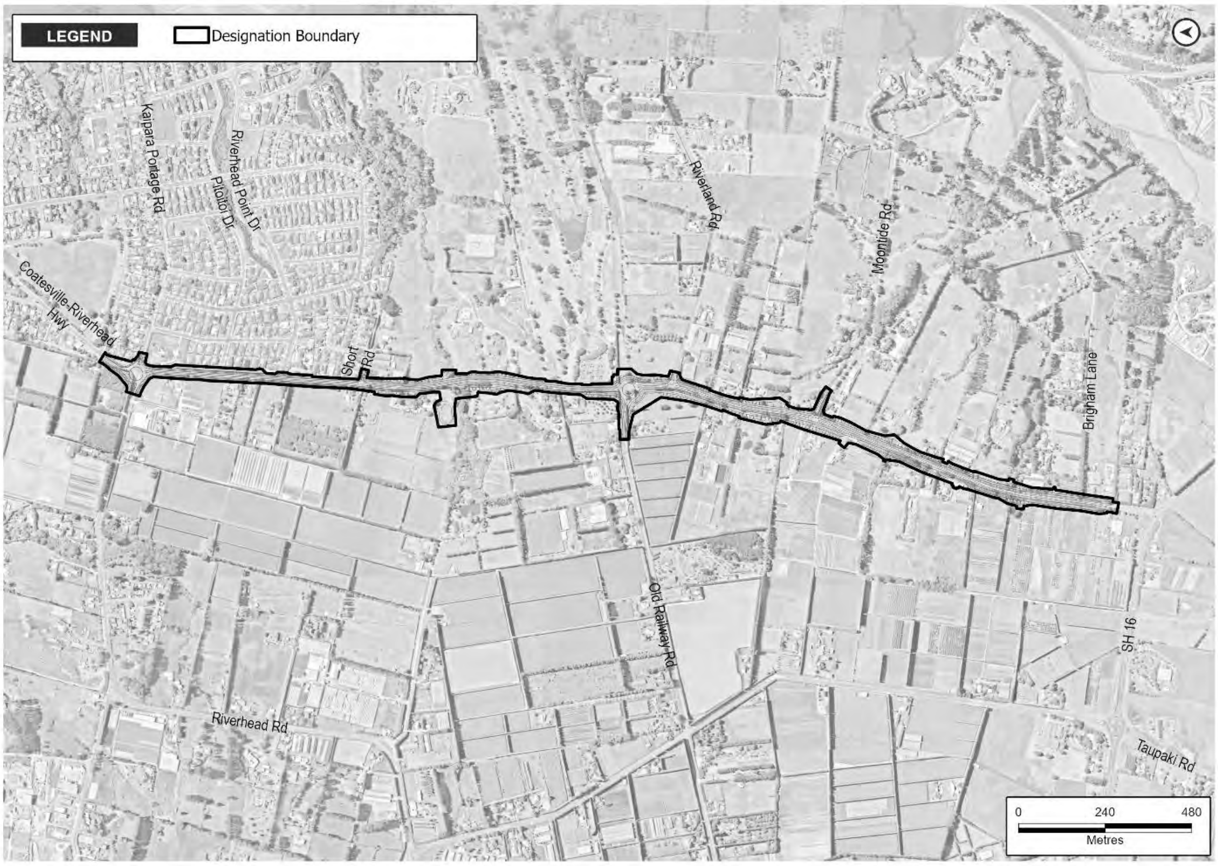
Schedule 1: General Accordance Plans and Information

Project Description

The proposed work is the construction, operation, and maintenance of a transport corridor in Riverhead, from the State Highway 16 intersection to the intersection with Riverhead Road, including active transport facilities and associated infrastructure. The proposed work is shown in the following Concept Plan and includes:

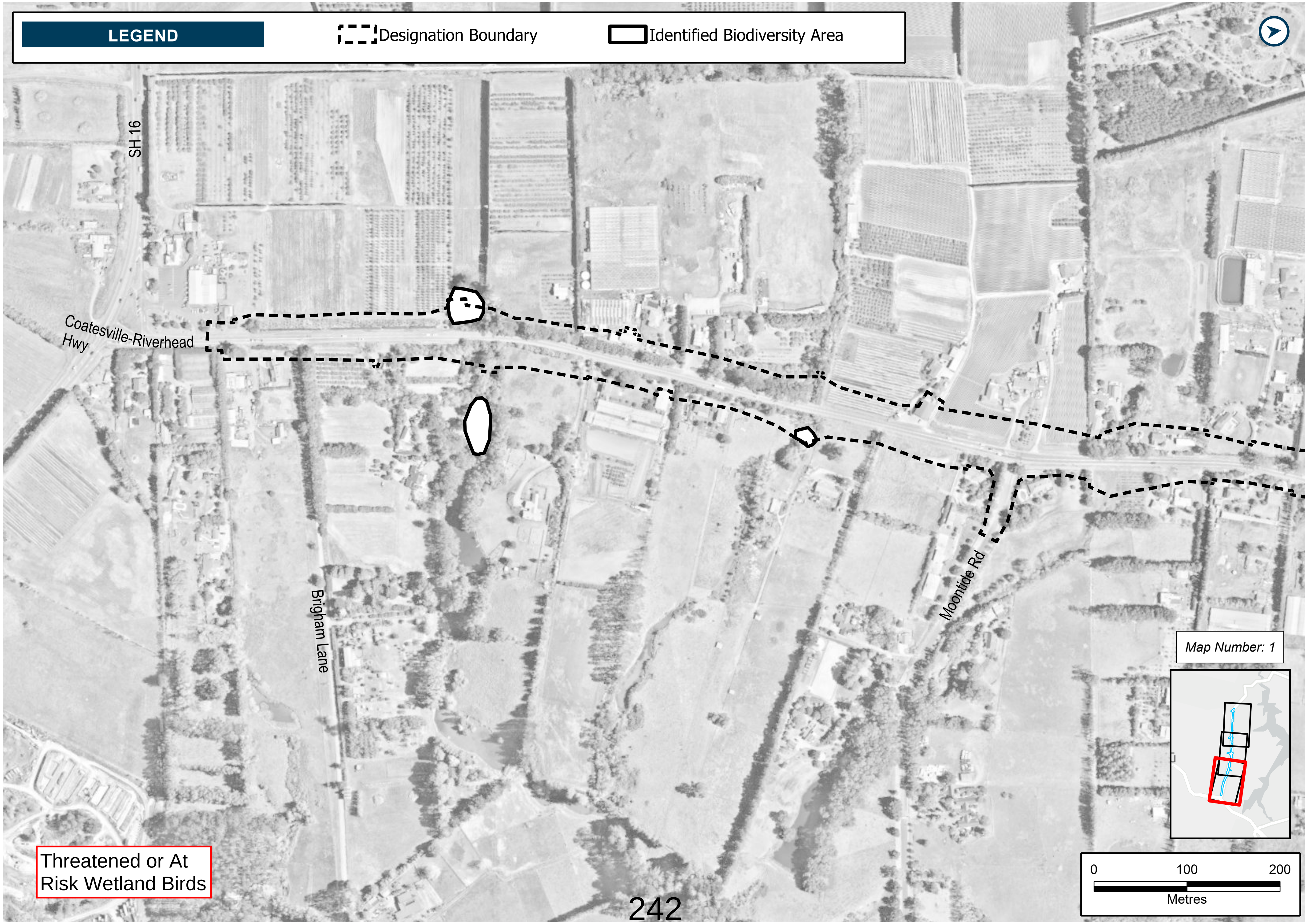
(a) An upgraded transport corridor and active transport facilities;
(b) Associated works including intersections, bridges, embankments, retaining, culverts, stormwater management systems;
(c) Changes to local roads, where the proposed work intersects with local roads; and
(d) Construction activities, including vegetation removal, construction compounds, laydown areas, bridge works area, construction traffic management and the re-grade of driveways.

Concept Plan



Schedule 2: Identified Biodiversity Areas


LEGEND
Designation Boundary
Identified Biodiversity Area
Oraha Rd
Riverhead Rd
Kaipara Portage Rd
Pitoitoi Dr
Riverhead Point Dr
Short Rd
Weza Lane
Old Railway Rd
Main Rd
Riverland Rd
Waitakere Rd
Trotting Course Dr
Moontide Rd
Coatesville-Riverhead Hwy
Brigham Lane
SH 16
Boord Cres
Taupaki Rd
Kennedys Rd
Boyes Ave
Totara Rd
Andersen Rd
Joseph McDonald Dr
Brigham Creek
0
400
800
Metres
Long-tailed Bat



Name of Map: SGA-EC-NW-038-Redhills-Riverhead-Coatesville-Riverhead-Hwy-Bird-Mitigation

Path: P:\381\3810934\TGI\02 Data\1 Data Processing 550 Plus\669_NW_Ecology_Mitigation\SGA_NW_Ecology_Mitigation.aprx


LEGEND
Designation Boundary
Identified Biodiversity Area
Old Railway Rd
Riverland Rd
Moontide Rd
Map Number: 2
0
100
200
Metres
Threatened or At Risk Wetland Birds

LEGEND
Designation Boundary
Identified Biodiversity Area
Riverhead Rd
Coatesville-Riverhead Hwy
Short Rd
Riverhead Point Dr
Pitoitoi Dr
Kaipara Portage Rd
Map Number: 3
0
100
200
Metres
Threatened or At Risk Wetland Birds

Schedule 3: Identified PPFs Noise Criteria Categories

Address	New or Altered Road	Noise Criteria Category
1090 Coatesville-Riverhead Highway	Altered Road	C
315 State Highway 16	Altered Road	A
1404 Coatesville-Riverhead Highway	Altered Road	B
1293 Coatesville-Riverhead Highway	Altered Road	B
1397 Coatesville-Riverhead Highway	Altered Road	B
1363 Coatesville-Riverhead Highway	Altered Road	B
1323 Coatesville-Riverhead Highway	Altered Road	B
1351 Coatesville-Riverhead Highway	Altered Road	B
1404 Coatesville-Riverhead Highway	Altered Road	A
2 Princes Street	Altered Road	A
1351 2 Coatesville-Riverhead Highway	Altered Road	A
1197 Coatesville-Riverhead Highway	Altered Road	A
1175 Coatesville-Riverhead Highway	Altered Road	A
1 Riverhead Point Drive	Altered Road	A
2 Pitoitoi Drive	Altered Road	A
1156 Coatesville-Riverhead Highway	Altered Road	A
1411 Coatesville-Riverhead Highway	Altered Road	A
15 Grove Way	Altered Road	A
1356 Coatesville-Riverhead Highway	Altered Road	A
5 Grove Way	Altered Road	A
1088 Coatesville-Riverhead Highway	Altered Road	A
1187 Coatesville-Riverhead Highway	Altered Road	A
1320 Coatesville-Riverhead Highway	Altered Road	A
1200 Coatesville-Riverhead Highway	Altered Road	A
1295 Coatesville-Riverhead Highway	Altered Road	A

19 Grove Way	Altered Road	A
1093 Coatesville-Riverhead Highway	Altered Road	A
1158 Coatesville-Riverhead Highway	Altered Road	A
1229 Coatesville-Riverhead Highway	Altered Road	A
1352 Coatesville-Riverhead Highway	Altered Road	A
21 Grove Way	Altered Road	A
7 Grove Way	Altered Road	A
1296 Coatesville-Riverhead Highway	Altered Road	A
1368 Coatesville-Riverhead Highway	Altered Road	A
9 Grove Way	Altered Road	A
11 Grove Way	Altered Road	A
1186 Coatesville-Riverhead Highway	Altered Road	A
1095 Coatesville-Riverhead Highway	Altered Road	A
1210 Coatesville-Riverhead Highway	Altered Road	A
1140 Coatesville-Riverhead Highway	Altered Road	A
1308 B3 Coatesville-Riverhead Highway	Altered Road	A
1328 Coatesville-Riverhead Highway	Altered Road	A
8 Jelas Drive	Altered Road	A
1308 B2 Coatesville-Riverhead Highway	Altered Road	A
1156 B2 Coatesville-Riverhead Highway	Altered Road	A
1230 Coatesville-Riverhead Highway	Altered Road	A
4 Princes Street	Altered Road	A
1385 B2Coatesville-Riverhead Highway	Altered Road	A
1288 Coatesville-Riverhead Highway	Altered Road	A
1335 Coatesville-Riverhead Highway	Altered Road	A
1229 2 Coatesville-Riverhead Highway	Altered Road	A
6 Princes Street	Altered Road	A
1 Pitoitoi Drive	Altered Road	A

1409 Coatesville-Riverhead Highway	Altered Road	A
1335 2 Coatesville-Riverhead Highway	Altered Road	A
14 Leebank Crescent	Altered Road	A
8 2 Riverland Road	Altered Road	A
3 Riverhead Point Drive	Altered Road	A
1293 2 Coatesville-Riverhead Highway	Altered Road	A
7 Short Road	Altered Road	A
18 Leebank Crescent	Altered Road	A
8 Princes Street	Altered Road	A
5 Riverhead Point Drive	Altered Road	A
1385 Coatesville-Riverhead Highway	Altered Road	A
1092 Coatesville-Riverhead Highway	Altered Road	A
1194 Coatesville-Riverhead Highway	Altered Road	A
10 Princes Street	Altered Road	A
16 Leebank Crescent	Altered Road	A
3A Riverhead Point Drive	Altered Road	A
1170 Coatesville-Riverhead Highway	Altered Road	A
12 Short Road	Altered Road	A
182 Old Railway Road	Altered Road	A
3 Kaipara Portage Road	Altered Road	A
1158 B2 Coatesville-Riverhead Highway	Altered Road	A
5 Kaipara Portage Road	Altered Road	A
1156 B3 Coatesville-Riverhead Highway	Altered Road	A
12 Jelas Drive	Altered Road	A
11 Leebank Crescent	Altered Road	A
3 Pitoitoi Drive	Altered Road	A
1229 3 Coatesville-Riverhead Highway	Altered Road	A
9 Leebank Crescent	Altered Road	A
12 Leebank Crescent	Altered Road	A
7 Kaipara Portage Road	Altered Road	A
20 Jelas Drive	Altered Road	A
26 Jelas Drive	Altered Road	A
30 Jelas Drive	Altered Road	A
28 Jelas Drive	Altered Road	A
24 Jelas Drive	Altered Road	A

16 Jelas Drive	Altered Road	A
14 Jelas Drive	Altered Road	A
22 Jelas Drive	Altered Road	A
13 Jelas Drive	Altered Road	A

Legend

- NZS 6806 Assessment Area
- Protected Premises and Facilities

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Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No:

Legend

NZS 6806 Assessment Area

Protected Premises and Facilities

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Drawing No:

ATTACHMENT 44

NORTH-WEST LOCAL PROPOSED CONDITIONS PART 2 OF 2

TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West – Conditions

Alteration to existing Designation Set

Reference	Project	Purpose
W5	Hobsonville Road – Alteration to Designation 1437	Transport Corridor
RE2	Fred Taylor Drive – Alteration to Designation 1433	Transport Corridor

Abbreviations and definitions

Acronym/Term	Definition
Activity sensitive to noise	Any dwelling, visitor accommodation, boarding house, marae, papakāinga, integrated residential development, retirement village, supported residential care, care centre, lecture theatre in a tertiary education facility, classroom in an education facility and healthcare facility with an overnight stay facility.
ARI	Annual Recurrence Interval
Average increase in flood hazard	Flow depth times velocity.
AUP	Auckland Unitary Plan
BPO or Best Practicable Option	Has the same meaning as in section 2 of the RMA 1991.
CEMP	Construction Environmental Management Plan
Certification	Confirmation from the Manager that a material change to a plan or CNVMP Schedule has been prepared in accordance with the condition to which it relates. A material change to a management plan or CNVMP Schedule shall be deemed certified: (a) where the Requiring Authority has received written confirmation from Council that the material change to the management plan is certified (b) ten working days from the submission of the material change to the management plan where no written confirmation of certification has been received (c) five working days from the submission of the material change to a CNVMP Schedule where no written confirmation of certification has been received.
CNVMP	Construction Noise and Vibration Management Plan
CNVMP Schedule or Schedule	A schedule to the CNVMP.
Completion of Construction	When construction of the Project (or part of the Project) is complete and it is available for use.

Acronym/Term	Definition
Construction Works	Activities undertaken to construct the Project excluding Enabling Works.
Council	Auckland Council
CTMP	Construction Traffic Management Plan
EMP	Ecological Management Plan
EIANZ Guidelines	Ecological Impact Assessment: EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems, second edition, dated May 2018.
Enabling works	Includes, but is not limited to, the following and similar activities: • geotechnical investigations (including trial embankments) • archaeological site investigations • formation of access for geotechnical investigations • establishment of site yards, site entrances and fencing • constructing and sealing site access roads • demolition or removal of buildings and structures • relocation of services • establishment of mitigation measures (such as erosion and sediment control measures, temporary noise walls, earth bunds and planting).
Existing authorised habitable floor	The floor level of any room (floor) in a residential building which is authorised by building consent and exists at the time the outline plan is submitted, excluding a laundry, bathroom, toilet or any room used solely as an entrance hall, passageway or garage.
Flood prone area	A potential ponding area that relies on a single culvert for drainage and does not have an overland flow path.
HHMP	Historic Heritage Management Plan
HNZPT	Heritage New Zealand Pouhere Taonga
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
Manager	The Manager – Resource Consents of the Auckland Council, or authorised delegate.
Mana Whenua	Mana Whenua as referred to in the conditions is considered to be (as a minimum but not limited to) the following (in no particular order), who at the time of Notice of Requirement expressed a desire to be involved in the Project: • Ngāti Whātua o Kaipara • Te Kawerau a Maki • Ngāti Whanaunga • Te Ākitai Waiohua
Maximum Probable Development	Design case for consideration of future flows allowing for development within a catchment that takes into account the maximum impervious surface limits of the current zone or, if the land is zoned Future Urban in the Auckland Unitary Plan, the probable level of development arising from zone changes.

Acronym/Term	Definition
Network Utility Operator	Has the same meaning as set out in section 166 of the RMA.
NOR	Notice of Requirement
NZAA	New Zealand Archaeological Association
Outline Plan	An outline plan prepared in accordance with section 176A of the RMA.
Pre-Project development	Existing site condition prior to the Project (including existing buildings and roadways).
Post-Project development	Site condition after the Project has been completed (including existing and new buildings and roadways).
Project Liaison Person	The person or persons appointed for the duration of the Project's Construction Works to be the main point of contact for persons wanting information about the Project or affected by the Construction Works.
Protected Premises and Facilities (PPF)	Protected Premises and Facilities as defined in New Zealand Standard NZS 6806:2010: *Acoustics – Road-traffic noise – New and altered roads.*
Requiring Authority	Has the same meaning as section 166 of the RMA and, for this Designation is Auckland Transport.
RMA	Resource Management Act (1991)
SCEMP	Stakeholder Communication and Engagement Management Plan
Stage of Work	Any physical works that require the development of an Outline Plan.
Start of Construction	The time when Construction Works (excluding Enabling Works) start.
Suitably Qualified Person	A person (or persons) who can provide sufficient evidence to demonstrate their suitability, experience and competence in the relevant field of expertise.
ULDMP	Urban and Landscape Design Management Plan
Urban Zoning	Land zoned residential or business, together with adjoining special purpose and open space zones.

Original Conditions

NoR No.	No.	Condition
General Conditions		
W5	**1**	Where an outline plan of works is submitted in accordance with s176A of the Act, prior to commencing the project of work, that plan shall be accompanied by: (a) a statement detailing the degree to which the works described in the outline plan meet the relevant objectives, policies and rules of the Plan; and (b) an assessment of the effects the works described in the outline plan will have on the environment. *Explanation:* White it is accepted that the project or works will be (or should be) in accordance with the designated purpose, the Council wishes to be reasonably assured that the specific works to be carried out will not unnecessarily compromise the objectives, policies and rules of the Plan or adversely affect the environment. The Council's principal opportunity to influence the works to assist the requiring authority to meet its environmental responsibilities is through the outline plan, and the assessment of compliance and effects will assist it in determining whether to request changes.
W5 **RE2**	**1**	Appropriate sedimentation and erosion control measures shall be employed for any earthworks on the designated site. *Explanation:* This Plan outlines erosion and sediment control measures for earthworks which are above a certain threshold, with that threshold varying according to the particular environment. Compliance with these measures would generally satisfy condition 2. *Note:* That major earthworks may require a regional consent from the Auckland Council.

Attachments

No attachments.

NoR No.	No.	Condition
General Conditions		
W5 RE2	**1.**	**Activity in General Accordance with Plans and Information** (a) Except as provided for in the conditions below, and subject to final design and Outline Plan(s), works within the designation shall be undertaken in general accordance with the Project description and concept plan in Schedule 1 (b) Where there is inconsistency between: (i) the Project description and concept plan in Schedule 1 and the requirements of the following conditions, the conditions shall prevail (ii) the Project description and concept plan in Schedule 1, and the management plans under the conditions of the designation, the requirements of the management plans shall prevail.
W5 RE2	**2.**	Conditions 1 – 36 of this designation shall only apply to the work described in the Project Description and the altered area identified in Concept Plan in Schedule 1.
W5 RE2	**3.**	**Project Information** (a) A project website, or equivalent virtual information source, shall be established within 12 months of the date on which this designation is included in the AUP. All directly affected owners and occupiers shall be notified in writing once the website or equivalent information source has been established. The project website or virtual information source shall include these conditions and shall provide information on: (i) the status of the Project (ii) anticipated construction timeframes (iii) contact details for enquiries (iv) a subscription service to enable receipt of project updates by email; and (v) how to apply for consent for works in the designation under s176(1)(b) of the RMA. (b) At the start of detailed design for a Stage of Work, the project website or virtual information source shall be updated to provide information on the likely date for Start of Construction, and any staging of works.
W5 RE2	**4.**	**Designation Review** (a) The Requiring Authority shall within 6 months of Completion of Construction or as soon as otherwise practicable: (i) review the extent of the designation to identify any areas of designated land that it no longer requires for the on-going operation, maintenance or mitigation of effects of the Project (ii) give notice to Auckland Council in accordance with section 182 of the RMA for the removal of those parts of the designation identified above.
W5 RE2	**5.**	**Network Utility Operators (Section 176 Approval)** (a) Prior to the start of Construction Works, Network Utility Operators with existing infrastructure located within the designation will not require written consent under section 176 of the RMA for the following activities: (i) operation, maintenance and urgent repair works (ii) minor renewal works to existing network utilities necessary for the on-going provision or security of supply of network utility operations (iii) minor works such as new service connections

<table>
<tr><th>NoR No.</th><th>No.</th><th>Condition</th></tr>
<tr><td></td><td></td><td>(iv) the upgrade and replacement of existing network utilities in the same location with the same or similar effects as the existing utility.
(b) To the extent that a record of written approval is required for the activities listed above, this condition shall constitute written approval.</td></tr>
<tr><td colspan="3">Pre-construction Conditions</td></tr>
<tr><td>W5 RE2</td><td>6.</td><td>Outline Plan
(a) An Outline Plan (or Plans) shall be prepared in accordance with section 176A of the RMA
(b) Outline Plans (or Plan) may be submitted in parts or in stages to address particular activities (e.g. design or construction aspects), or a Stage of Work of the Project
(c) Outline Plans shall include any management plan or plans that are relevant to the management of effects of those activities or Stage of Work, which may include:
(i) Network Utilities Management Plan
(ii) Construction Environmental Management Plan
(iii) Construction Traffic Management Plan
(iv) Construction Noise and Vibration Management Plan
(v) Urban and Landscape Design Management Plan
(vi) Historic Heritage Management Plan
(vii) Tree Management Plan.</td></tr>
<tr><td>W5 RE2</td><td>7.</td><td>Management Plans
(a) Any management plan shall:
(i) Be prepared and implemented in accordance with the relevant management plan condition
(ii) Be prepared by a Suitably Qualified Person(s)
(iii) Include sufficient detail relating to the management of effects associated with the relevant activities and/or Stage of Work to which it relates
(iv) Summarise comments received from Mana Whenua and other stakeholders as required by the relevant management plan condition, along with a summary of where comments have:
a. Been incorporated; and
b. Where not incorporated, the reasons why
(v) Be submitted as part of an Outline Plan pursuant to s176A of the RMA, with the exception of SCEMPs and CNVMP Schedules
(vi) Once finalised, uploaded to the Project website or equivalent virtual information source
(b) Any management plan developed in accordance with Condition 6 may:
(i) Be submitted in parts or in stages to address particular activities (e.g. design or construction aspects) a Stage of Work of the Project, or to address specific activities authorised by the designation
(ii) Except for material changes, be amended to reflect any changes in design, construction methods or management of effects without further process
(iii) If there is a material change required to a management plan which has been submitted with an Outline Plan, the revised part of the plan shall be submitted to the Council as an update to the Outline Plan or for Certification as soon as practicable following identification of the need for a revision
(c) Any material changes to the SCEMPs, are to be submitted to the Council for information.</td></tr>
</table>

NoR No.	No.	Condition
W5 RE2	8.	**Cultural Advisory Report** (a) At least six (6) months prior to the start of detailed design for a Stage of Work, Mana Whenua shall be invited to prepare a Cultural Advisory Report for the Project (b) The objective of the Cultural Advisory Report is to assist in understanding and identifying Ngā Taonga Tuku Iho ('treasures handed down by our ancestors') affected by the Project, to inform their management and protection. To achieve the objective, the Requiring Authority shall invite Mana Whenua to prepare a Cultural Advisory Report that: (i) Identifies the cultural sites, landscapes and values that have the potential to be affected by the construction and operation of the Project (ii) Sets out the desired outcomes for management of potential effects on cultural sites, landscapes and values (iii) Identifies traditional cultural practices within the area that may be impacted by the Project (iv) Identifies opportunities for restoration and enhancement of identified cultural sites, landscapes and values within the Project area (v) Taking into account the outcomes of (i) to (iv) above, identify cultural matters and principles that should be considered in the development of the Urban and Landscape Design Management Plan and Historic Heritage Management Plan, and the Cultural Monitoring Plan referred to in Condition 15 (vi) Identifies and (if possible) nominates traditional names along the Project alignment. Noting there may be formal statutory processes outside the project required in any decision-making (c) The desired outcomes for management of potential effects on cultural sites, landscapes and values identified in the Cultural Advisory Report shall be discussed with Mana Whenua and those outcomes reflected in the relevant management plans where practicable (d) Conditions 8(b) and (c) above will cease to apply if: (i) Mana Whenua have been invited to prepare a Cultural Advisory Report by a date at least 6 months prior to start of Construction Works (ii) Mana Whenua have not provided a Cultural Advisory Report within six months prior to start of Construction Works.
W5 RE2	9.	**Urban and Landscape Design Management Plan (ULDMP)** (a) A ULDMP shall be prepared prior to the Start of Construction for a Stage of Work (b) Mana Whenua shall be invited to participate in the development of the ULDMP(s) to provide input into relevant cultural landscape and design matters including how desired outcomes for management of potential effects on cultural sites, landscapes and values identified and discussed in accordance with Condition 8(c) may be reflected in the ULDMP. The objective of the ULDMP(s) is to: (i) Enable integration of the Project's permanent works into the surrounding landscape and urban context (ii) Ensure that the Project manages potential adverse landscape and visual effects as far as practicable and contributes to a quality urban environment (c) The ULDMP shall be prepared in general accordance with: (i) Auckland Transport's Urban Roads and Streets Design Guide (ii) Waka Kotahi Urban Design Guidelines: Bridging the Gap (2013) or any subsequent updated version (iii) Waka Kotahi Landscape Guidelines (2013) or any subsequent updated version

NoR No.	No.	Condition
		(iv) Waka Kotahi P39 Standard Specification for Highway Landscape Treatments (2013) or any subsequent updated version (v) Auckland's Urban Ngahere (Forest) Strategy or any subsequent updated version. (d) To achieve the objective, the ULDMP(s) shall provide details of how the project: (i) Is designed to integrate with the adjacent urban (or proposed urban) and landscape context, including the surrounding existing or proposed topography, urban environment (i.e. centres and density of built form), natural environment, landscape character and open space zones (ii) Provides appropriate walking and cycling connectivity to, and interfaces with, existing or proposed adjacent land uses, public transport infrastructure and walking and cycling connections (iii) Promotes inclusive access (where appropriate) (iv) Promotes a sense of personal safety by aligning with best practice guidelines, such as: a. Crime Prevention Through Environmental Design (CPTED) principles; b. Safety in Design (SID) requirements c. Maintenance in Design (MID) requirements and anti-vandalism/anti-graffiti measures (e) The ULDMP(s) shall include: (i) a concept plan – which depicts the overall landscape and urban design concept, and explain the rationale for the landscape and urban design proposals (ii) developed design concepts, including principles for walking and cycling facilities and public transport (iii) landscape and urban design details – that cover the following: a. Road design – elements such as intersection form, carriageway gradient and associated earthworks contouring including cut and fill batters and the interface with adjacent land uses, benching, spoil disposal sites, median width and treatment, roadside width and treatment b. Roadside elements – such as lighting, fencing, wayfinding and signage c. architectural and landscape treatment of all major structures, including bridges and retaining walls d. Architectural and landscape treatment of noise barriers e. Landscape treatment of permanent stormwater control wetlands and swales f. Integration of passenger transport g. Pedestrian and cycle facilities including paths, road crossings and dedicated pedestrian/ cycle bridges or underpasses h. Historic heritage places with reference to the HHMP i. Re-instatement of construction and site compound areas, driveways, accessways and fences (f) The ULDMP shall also include the following planting details and maintenance requirements: (i) planting design details including: a. identification of existing trees and vegetation that will be retained with reference to the Tree Management Plan. Where practicable, mature trees and native vegetation should be retained b. street trees, shrubs and ground cover suitable for berms c. treatment of fill slopes to integrate with adjacent land use, streams, riparian margins and open space zones d. planting of stormwater wetlands

NoR No.	No.	Condition
		e. identification of vegetation to be retained and any planting requirements under Conditions 23 and 24 f. integration of any planting requirements required by conditions of any resource consents for the project g. re-instatement planting of construction and site compound areas as appropriate (ii) a planting programme including the staging of planting in relation to the construction programme which shall, as far as practicable, include provision for planting within each planting season following completion of works in each Stage of Work (iii) detailed specifications relating to the following: a. weed control and clearance b. pest animal management (to support plant establishment) c. ground preparation (top soiling and decompaction) d. mulching e. plant sourcing and planting, including hydroseeding and grassing, and use of eco-sourced species.
W5 RE2		**Advice Note:** *This designation is for the purpose of construction, operation and maintenance of an arterial transport corridor and it is not for the specific purpose of "road widening". Therefore, it is not intended that the front yard definition in the Auckland Unitary Plan which applies a set back from a designation for road widening purposes applies to this designation. A set back is not required to manage effects between the designation boundary and any proposed adjacent sites or lots.*
Specific Outline Plan Requirements		
W5 RE2	**10.**	**Flood Hazard** (a) The Project shall be designed to achieve the following flood risk outcomes: (i) no increase in flood levels for existing authorised habitable floors that are already subject to flooding; (ii) no more than a 10% reduction in freeboard for existing authorised habitable floors; (iii) no increase of more than 50mm in flood level on land zoned for urban or future urban development where there is no existing dwelling; (iv) no new flood prone areas; and (v) no more than a 10% average increase of flood hazard (defined as flow depth times velocity) for main access to authorised habitable dwellings existing at time the Outline Plan is submitted. (b) Compliance with this condition shall be demonstrated in the Outline Plan, which shall include flood modelling of the pre-Project and post-Project 100 year ARI flood levels (for Maximum Probable Development land use and including climate change). (c) Where the above outcomes can be achieved through alternative measures outside of the designation such as flood stop banks, flood walls, raising existing authorised habitable floor level and new overland flow paths or varied through agreement with the relevant landowner, the Outline Plan shall include confirmation that any necessary landowner and statutory approvals have been obtained for that work or alternative outcome.
Construction Conditions		
W5 RE2	**11.**	**Construction Environmental Management Plan (CEMP)** (a) A CEMP shall be prepared prior to the Start of Construction for a Stage of Work

NoR No.	No.	Condition
		(b) The objective of the CEMP is to set out the management procedures and construction methods to be undertaken to, avoid, remedy or mitigate any adverse effects associated with Construction Works as far as practicable. To achieve the objective, the CEMP shall include: (i) the roles and responsibilities of staff and contractors (ii) details of the site or project manager and the Project Liaison Person, including their contact details (phone and email address) (iii) the Construction Works programmes and the staging approach, and the proposed hours of work (iv) details of the proposed construction yards including temporary screening when adjacent to residential areas, locations of refuelling activities and construction lighting (v) methods for controlling dust and the removal of debris and demolition of construction materials from public roads or places (vi) methods for providing for the health and safety of the general public (vii) procedures for incident management (viii) procedures for the refuelling and maintenance of plant and equipment to avoid discharges of fuels or lubricants to Watercourses (ix) measures to address the storage of fuels, lubricants, hazardous and/or dangerous materials, along with contingency procedures to address emergency spill response(s) and clean up (x) procedures for responding to complaints about Construction Works (xi) methods for amending and updating the CEMP as required.
W5 RE2	**12.**	**Stakeholder and Communication and Engagement Management Plan (SCEMP)** (a) A SCEMP shall be prepared prior to the Start of Construction for a Stage of Work. The objective of the SCEMP is to identify how the public and stakeholders (including directly affected and adjacent owners and occupiers of land) will be engaged with throughout the Construction Works. To achieve the objective, the SCEMP shall include: (i) the contact details for the Project Liaison Person. These details shall be on the Project website, or equivalent virtual information source, and prominently displayed at the main entrance(s) to the site(s) (ii) the procedures for ensuring that there is a contact person available for the duration of Construction Works, for public enquiries or complaints about the Construction Works (iii) methods for engaging with Mana Whenua, to be developed in consultation with Mana Whenua (iv) a list of stakeholders, organisations (such as community facilities) and businesses who will be engaged with (v) Identification of the properties whose owners will be engaged with (vi) methods to communicate key project milestones and the proposed hours of construction activities including outside of normal working hours and on weekends and public holidays, to the parties identified in (iv) and (v) above (vii) linkages and cross-references to communication and engagement methods set out in other conditions and management plans where relevant (b) Any SCEMP prepared for a Stage of Work shall be submitted to Council for information ten working days prior to the Start of Construction for a Stage of Work.
W5 RE2	**13.**	**Complaints Register** (a) At all times during Construction Works, a record of any complaints received about the Construction Works shall be maintained. The record shall include:

NoR No.	No.	Condition
		(i) The date, time and nature of the complaint (ii) The name, phone number and address of the complainant (unless the complainant wishes to remain anonymous) (iii) Measures taken to respond to the complaint (including a record of the response provided to the complainant) or confirmation of no action if deemed appropriate (iv) The outcome of the investigation into the complaint (v) Any other activities in the area, unrelated to the Project that may have contributed to the complaint, such as non-project construction, fires, traffic accidents or unusually dusty conditions generally (b) A copy of the Complaints Register required by this condition shall be made available to the Manager upon request as soon as practicable after the request is made.
W5 RE2	**14.**	**Cultural Monitoring Plan** (a) Prior to the start of Construction Works, a Cultural Monitoring Plan shall be prepared by a Suitably Qualified Person(s) identified in collaboration with Mana Whenua (b) The objective of the Cultural Monitoring Plan is to identify methods for undertaking cultural monitoring to assist with management of any cultural effects during Construction works (c) The Cultural Monitoring Plan shall include: (i) Requirements for formal dedication or cultural interpretation to be undertaken prior to start of Construction Works in areas identified as having significance to Mana Whenua (ii) Requirements and protocols for cultural inductions for contractors and subcontractors (iii) Identification of activities, sites and areas where cultural monitoring is required during particular Construction Works (iv) Identification of personnel to undertake cultural monitoring, including any geographic definition of their responsibilities (v) Details of personnel to assist with management of any cultural effects identified during cultural monitoring, including implementation of the Accidental Discovery Protocol (d) If Enabling Works involving soil disturbance are undertaken prior to the start of Construction Works, an Enabling Works Cultural Monitoring Plan shall be prepared by a Suitably Qualified Person identified in collaboration with Mana Whenua. This plan may be prepared as a standalone Enabling Works Cultural Monitoring Plan or be included in the main Construction Works Cultural Monitoring Plan. **Advice Note:** *Where appropriate, the Cultural Monitoring Plan shall align with the requirements of other conditions of the designation and resource consents for the Project which require monitoring during Construction Works.*
W5 RE2	**15.**	**Construction Traffic Management Plan (CTMP)** (a) A CTMP shall be prepared prior to the Start of Construction for a Stage of Work (b) The objective of the CTMP is to avoid, remedy or mitigate, as far as practicable, adverse construction traffic effects. To achieve this objective, the CTMP shall include: (i) methods to manage the effects of temporary traffic management activities on traffic (ii) measures to ensure the safety of all transport users

<table>
<tr><th>NoR No.</th><th>No.</th><th>Condition</th></tr>
<tr><td></td><td></td><td>
(iii) the estimated numbers, frequencies, routes and timing of traffic movements, including any specific non-working or non-movement hours to manage vehicular and pedestrian traffic near schools or to manage traffic congestion
(iv) site access routes and access points for heavy vehicles, the size and location of parking areas for plant, construction vehicles and the vehicles of workers and visitors
(v) identification of detour routes and other methods to ensure the safe management and maintenance of traffic flows, including pedestrians and cyclists, on existing roads
(vi) methods to maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be
(vii) the management approach to loads on heavy vehicles, including covering loads of fine material, the use of wheel-wash facilities at site exit points and the timely removal of any material deposited or spilled on public roads
(viii) methods that will be undertaken to communicate traffic management measures to affected road users (e.g. residents/public/stakeholders/emergency services).
</td></tr>
<tr><td>W5 RE2</td><td>16.</td><td>
Construction Noise Standards
(a) Construction noise shall be measured and assessed in accordance with NZS6803:1999 Acoustics – Construction Noise and shall comply with the noise standards set out in the following table as far as practicable:
Table 16.1: Construction noise standards
<table>
<tr><th>Day of week</th><th>Time period</th><th>$L_{Aeq(15min)}$</th><th>L_{AFmax}</th></tr>
<tr><td colspan="4">Occupied activity sensitive to noise</td></tr>
<tr><td>Weekday</td><td>0630h - 0730h
0730h - 1800h
1800h - 2000h
2000h - 0630h</td><td>55 dB
70 dB
65 dB
45 dB</td><td>75 dB
85 dB
80 dB
75 dB</td></tr>
<tr><td>Saturday</td><td>0630h - 0730h
0730h - 1800h
1800h - 2000h
2000h - 0630h</td><td>55 dB
70 dB
45 dB
45 dB</td><td>75 dB
85 dB
75 dB
75 dB</td></tr>
<tr><td>Sunday and Public Holidays</td><td>0630h - 0730h
0730h - 1800h
1800h - 2000h
2000h - 0630h</td><td>45 dB
55 dB
45 dB
45 dB</td><td>75 dB
85 dB
75 dB
75 dB</td></tr>
<tr><td colspan="4">Other occupied buildings</td></tr>
<tr><td>All</td><td>0730h – 1800h
1800h – 0730h</td><td>70 dB
75 dB</td><td></td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>NoR No.</th><th>No.</th><th>Condition</th></tr>
<tr><td></td><td></td><td>(b) Where compliance with the noise standards set out in Table [above] is not practicable, and unless otherwise provided for in the CNVMP as required by Condition 19(c)(x), then the methodology in Condition 19 shall apply.</td></tr>
<tr><td>W5 RE2</td><td>17.</td><td>Construction Vibration Standards
(a) Construction vibration shall be measured in accordance with ISO 4866:2010 Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures and shall comply with the vibration standards set out in the following table as far as practicable
Table CNV2 Construction vibration criteria
<table>
<tr><th>Receiver</th><th>Details</th><th>Category A</th><th>Category B</th></tr>
<tr><td rowspan="2">Occupied Activities sensitive to noise</td><td>Night-time 2000h - 0630h</td><td>0.3mm/s ppv</td><td>2mm/s ppv</td></tr>
<tr><td>Daytime 0630h - 2000h</td><td>2mm/s ppv</td><td>5mm/s ppv</td></tr>
<tr><td>Other occupied buildings</td><td>Daytime 0630h - 2000h</td><td>2mm/s ppv</td><td>5mm/s ppv</td></tr>
<tr><td>All other buildings</td><td>At all other times</td><td colspan="2">Tables 1 and 3 of DIN4150-3:1999</td></tr>
</table>
*Category A criteria adopted from Rule E25.6.30.1 of the AUP
**Category B criteria based on DIN 4150-3:1999 building damage criteria for daytime
(b) Where compliance with the vibration standards set out in Table [above] is not practicable, and unless otherwise provided for in the CNVMP as required by Condition 19(c)(x), then the methodology in Condition 19 shall apply.</td></tr>
<tr><td>W5 RE2</td><td>18.</td><td>Construction Noise and Vibration Management Plan (CNVMP)
(a) A CNVMP shall be prepared prior to the Start of Construction for a Stage of Work
(b) A CNVMP shall be implemented during the Stage of Work to which it relates
(c) The objective of the CNVMP is to provide a framework for the development and implementation of the Best Practicable Option for the management of construction noise and vibration effects to achieve the construction noise and vibration standards set out in Conditions 16 and 17 to the extent practicable. To achieve this objective, the CNVMP shall be prepared in accordance with Annex E2 of the New Zealand Standard NZS6803:1999 'Acoustics – Construction Noise' (NZS6803:1999) and shall as a minimum, address the following:
(i) Description of the works and anticipated equipment/processes
(ii) Hours of operation, including times and days when construction activities would occur
(iii) The construction noise and vibration standards for the project
(iv) Identification of receivers where noise and vibration standards apply
(v) A hierarchy of management and mitigation options, including any requirements to limit night works and works during other sensitive times, including Sundays and public holidays as far practicable
(vi) Methods and frequency for monitoring and reporting on construction noise and vibration
(vii) Procedures for communication and engagement with nearby residents and stakeholders, including notification of proposed construction activities, the</td></tr>
</table>

NoR No.	No.	Condition
		period of construction activities, and management of noise and vibration complaints (viii) Contact details of the Project Liaison Person (ix) Procedures for the regular training of the operators of construction equipment to minimise noise and vibration as well as expected construction site behaviours for all workers (x) Identification of areas where compliance with the noise [Condition 16] and/or vibration standards [Condition 17 Category A or Category B] will not be practicable and the specific management controls to be implemented and consultation requirements with owners and occupiers of affected sites (xi) Procedures and requirements for the preparation of a Schedule to the CNVMP (Schedule) for those areas where compliance with the noise [Condition 16] and/or vibration standards [Condition 17 Category B] will not be practicable and where sufficient information is not available at the time of the CNVMP to determine the area specific management controls Condition 18(c)(x) (xii) Procedures for: communicating with affected receivers, where measured or predicted vibration from construction activities exceeds the vibration criteria of Condition 17 assessing, mitigating and monitoring vibration where measured or predicted vibration from construction activities exceeds the Category A vibration criteria of Condition 17, including the requirement to undertake building condition surveys before and after works to determine whether any damage has occurred as a result of construction vibration (xiii) Requirements for review and update of the CNVMP.
W5 RE2	**19.**	**Schedule to a CNVMP** (a) Unless otherwise provided for in a CNVMP, a Schedule to the CNVMP (Schedule) shall be prepared prior to the start of the construction to which it relates by a Suitably Qualified Person, in consultation with the owners and occupiers of sites subject to the Schedule, when: (i) Construction noise is either predicted or measured to exceed the noise standards in Condition 16, except where the exceedance of the LAeq criteria is no greater than 5 decibels and does not exceed: 0630 – 2000: 2 period of up to 2 consecutive weeks in any 2 months, or 2000 – 0630: 1 period of up to 2 consecutive nights in any 10 days (ii) Construction vibration is either predicted or measured to exceed the Category B standard at the receivers in Condition 17. (b) The objective of the Schedule is to set out the Best Practicable Option measures to manage noise and/or vibration effects of the construction activity beyond those measures set out in the CNVMP. The Schedule shall include details such as: (i) Construction activity location, start and finish dates (ii) The nearest neighbours to the construction activity (iii) The predicted noise and/or vibration level for all receivers where the levels are predicted or measured to exceed the applicable standards and predicted duration of the exceedance (iv) The proposed mitigation options that have been selected, and the options that have been discounted as being impracticable and the reasons why (v) The consultation undertaken with owners and occupiers of sites subject to the Schedule, and how consultation has and has not been taken into account (vi) Location, times and types of monitoring

NoR No.	No.	Condition
		(c) The Schedule shall be submitted to the Manager for certification at least 5 working days (except in unforeseen circumstances) in advance of Construction Works that are covered by the scope of the Schedule and shall form part of the CNVMP (d) Where material changes are made to a Schedule required by this condition, the Requiring Authority shall consult the owners and/or occupiers of sites subject to the Schedule prior to submitting the amended Schedule to the Manager for certification in accordance with (c) above. The amended Schedule shall document the consultation undertaken with those owners and occupiers, and how consultation outcomes have and have not been taken into account.
W5 RE2	**20.**	**Historic Heritage Management Plan (HHMP)** (a) A HHMP shall be prepared in consultation with Council, HNZPT and Mana Whenua prior to the Start of Construction for a Stage of Work (b) The objective of the HHMP is to protect historic heritage and to remedy and mitigate any residual effects as far as practicable. To achieve the objective, the HHMP shall identify: (i) Any adverse direct and indirect effects on historic heritage sites and measures to appropriately avoid, remedy or mitigate any such effects, including a tabulated summary of these effects and measures (ii) Methods for the identification and assessment of potential historic heritage places within the Designation to inform detailed design (iii) Known historic heritage places and potential archaeological sites within the Designation, including identifying any archaeological sites for which an Archaeological Authority under the HNZPTA will be sought or has been granted (iv) Any unrecorded archaeological sites or post-1900 heritage sites within the Designation, which shall also be documented and recorded (v) Roles, responsibilities and contact details of Project personnel, Council and HNZPT representatives, Mana Whenua representatives, and relevant agencies involved with heritage and archaeological matters including surveys, monitoring of Construction Works, compliance with AUP accidental discovery rule, and monitoring of conditions (vi) Specific areas to be investigated, monitored and recorded to the extent these are directly affected by the Project (vii) The proposed methodology for investigating and recording post-1900 historic heritage sites (including buildings) that need to be destroyed, demolished or relocated, including details of their condition, measures to mitigate any adverse effects and timeframe for implementing the proposed methodology, in accordance with the HNZPT Archaeological Guidelines Series No.1: Investigation and Recording of Buildings and Standing Structures (November 2018), or any subsequent version (viii) Methods to acknowledge cultural values identified through Condition 8 where archaeological sites also involve ngā taonga tuku iho (treasures handed down by our ancestors) and where feasible and practicable to do so (ix) Methods for avoiding, remedying or mitigation adverse effects on historic heritage places and sites within the Designation during Construction Works as far as practicable. These methods shall include, but are not limited to: A. security fencing or hoardings around historic heritage places to protect them from damage during construction or unauthorised access) (x) measures to mitigate adverse effects on historic heritage sites that achieve positive historic heritage outcomes such as increased public awareness and interpretation signage

NoR No.	No.	Condition
		(xi) Training requirements and inductions for contractors and subcontractors on historic heritage places_within the Designation, legal obligations relating to accidental discoveries, the AUP Accidental Discovery Rule (E11.6.1). The training shall be undertaken prior to the Start of Construction, under the guidance of a Suitably Qualified Person and Mana Whenua representatives (to the extent the training relates to cultural values identified under Condition 14 (c) Electric copies of all historic heritage reports relating to historic heritage investigations (evaluation, excavation and monitoring), shall be submitted to the Manager within 12 months of completion.
	Accidental Discoveries ***Advice Note:*** *The Requiring Authority is advised of the requirements of Rule E11.6.1 of the AUP for "Accidental Discovery" as they relate to both contaminated soils and heritage items.* *The requirements for accidental discoveries of heritage items are set out in Rule E11.6.1 of the AUP [and in the Waka Kotahi Minimum Standard P45 Accidental Archaeological Discovery Specification, or any subsequent version].*	
W5 RE2	**21.**	**Tree Management Plan** (a) Prior to the Start of Construction for a Stage of Work, a Tree Management Plan shall be prepared (b) The objective of the Tree Management Plan is to avoid, remedy or mitigate effects of construction activities on trees identified as protected or notable in the Auckland Unitary Plan (c) The Tree Management Plan shall: (i) confirm the trees that will be affected by the project work and are identified as protected or notable in the Auckland Unitary Plan (ii) demonstrate how the design and location of project works has avoided, remedied or mitigated any effects on any tree identified in (i) above. This may include: A. planting to replace trees that require removal (with reference to the ULDMP planting design details in Condition 9) B. tree protection zones and tree protection measures such as protective fencing, ground protection and physical protection of roots, trunks and branches C. methods for work within the rootzone of trees that are to be retained in line with accepted arboricultural standards (iii) demonstrate how the tree management measures (outlined in A – C above) are consistent with conditions of any resource consents granted for the project in relation to managing construction effects on trees.
Operational Conditions		
W5 RE2	**22.**	**Low Noise Road Surface** (a) The following condition only applies where an upgrade or extension to an existing road is within or adjacent to urban zoning (excluding open space and special purpose zones unless identified as mitigation within the relevant condition) (b) Asphaltic concrete surfacing (or equivalent low noise road surface) shall be implemented within 12 months of Completion of Construction of the project (c) Any future resurfacing works of the Project shall be undertaken in accordance with the Auckland Transport Reseal Guidelines, Asset Management and Systems 2013 or any updated version and asphaltic concrete surfacing (or equivalent low noise road surface) shall be implemented where: (i) The volume of traffic exceeds 10,000 vehicles per day; or

NoR No.	No.	Condition
		(ii) The road is subject to high wear and tear (such as cul de sac heads, roundabouts and main road intersections); or (iii) It is in an industrial or commercial area where there is a high concentration of truck traffic; or (iv) It is subject to high usage by pedestrians, such as town centres, hospitals, shopping centres and schools (d) Prior to commencing any future resurfacing works, the Requiring Authority shall advise the Manager if any of the triggers in Condition 22(b)(i) – (iv) are not met by the road or a section of it and therefore where the application of asphaltic concrete surfacing (or equivalent low noise road surface) is no longer required on the road or a section of it. Such advice shall also indicate when any resealing is to occur.
W5 RE2	**23.**	**Traffic Noise** For the purposes of Conditions 24 to 36: (a) Building-Modification Mitigation – has the same meaning as in NZS 6806 (b) Design year has the same meaning as in NZS 6806 (c) Detailed Mitigation Options – means the fully detailed design of the Selected Mitigation Options, with all practical issues addressed (d) Habitable Space – has the same meaning as in NZS 6806 (e) Identified Noise Criteria Category – means the Noise Criteria Category for a PPF identified in *Schedule 2: Identified PPFs Noise Criteria Categories* (f) Mitigation – has the same meaning as in NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads (g) Noise Criteria Categories – means the groups of preference for sound levels established in accordance with NZS 6806 when determining the Best Practicable Option for noise mitigation (i.e. Categories A, B and C) (h) NZS 6806 – means New Zealand Standard NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads (i) Protected Premises and Facilities (PPFs) – means only the premises and facilities identified in green, orange or red in *Schedule 2: PPFs Noise Criteria Categories* (j) Selected Mitigation Options – means the preferred mitigation option resulting from a Best Practicable Option assessment undertaken in accordance with NZS 6806 (k) Structural Mitigation – has the same meaning as in NZS 6806.
W5 RE2	**24.**	The Noise Criteria Categories identified in *Schedule 2: PPFs Noise Criteria Categories* at each of the PPFs shall be achieved where practicable and subject to Conditions 24 to 36 (all traffic noise conditions). Achievement of the Noise Criteria Categories for PPFs shall be by reference to a traffic forecast for a high growth scenario in a design year at least 10 years after the programmed opening of the Project.
W5 RE2	**25.**	As part of the detailed design of the Project, a Suitably Qualified Person shall determine the Selected Mitigation Options for the PPFs identified on *Schedule 2 PPFs Noise Criteria Categories*.
W5 RE2	**26.**	Prior to construction of the Project, a Suitably Qualified Person shall develop the Detailed Mitigation Options for the PPFs identified in *Schedule 2 PPFs Noise Criteria Categories*, taking into account the Selected Mitigation Options.
W5 RE2	**27.**	If the Detailed Mitigation Options would result in the Identified Noise Criteria Category changing to a less stringent Category, e.g. from Category A to B or Category B to C, at any relevant PPF, a Suitably Qualified Person shall provide confirmation to the

NoR No.	No.	Condition
		Manager that the Detailed Mitigation Option would be consistent with adopting the Best Practicable Option in accordance with NZS 6806 prior to implementation.
W5 RE2	**28.**	The Detailed Mitigation Options shall be implemented prior to completion of construction of the Project, with the exception of any low-noise road surfaces, which shall be implemented within twelve months of completion of construction.
W5 RE2	**29.**	Prior to the Start of Construction, a Suitably Qualified Person shall identify those PPFs which, following implementation of all the Detailed Mitigation Options, will not be Noise Criteria Categories A or B and where Building-Modification Mitigation might be required to achieve 40 dB $L_{Aeq(24h)}$ inside Habitable Spaces ('Category C Buildings').
W5 RE2	**30.**	Prior to the Start of Construction in the vicinity of each Category C Building, the Requiring Authority shall write to the owner of the Category C Building requesting entry to assess the noise reduction performance of the existing building envelope. If the building owner agrees to entry within three months of the date of the Requiring Authority's letter, the Requiring Authority shall instruct a Suitably Qualified Person to visit the building and assess the noise reduction performance of the existing building envelope.
W5 RE2	**31.**	For each Category C Building identified, the Requiring Authority is deemed to have complied with Condition 30 above if: (a) The Requiring Authority's Suitably Qualified Person has visited the building and assessed the noise reduction performance of the building envelope; or (b) The building owner agreed to entry, but the Requiring Authority could not gain entry for some reason (such as entry denied by a tenant); or (c) The building owner did not agree to entry within three of the date of the Requiring Authority's letter sent in accordance with Condition 30 above (including where the owner did not respond within that period); or (d) The building owner cannot, after reasonable enquiry, be found prior to completion of construction of the Project If any of (b) to (d) above apply to a Category C Building, the Requiring Authority is not required to implement Building-Modification Mitigation to that building.
W5 RE2	**32.**	Subject to Condition 31 above, within six months of the assessment undertaken in accordance with Conditions 30 and 31, the Requiring Authority shall write to the owner of each Category C Building advising: (a) If Building-Modification Mitigation is required to achieve 40 dB LAeq(24h) inside habitable spaces (b) The options available for Building-Modification Mitigation to the building, if required (c) That the owner has three months to decide whether to accept Building-Modification Mitigation to the building and to advise which option for Building-Modification Mitigation the owner prefers, if the Requiring Authority has advised that more than one option is available.
W5 RE2	**33.**	Once an agreement on Building-Modification Mitigation is reached between the Requiring Authority and the owner of a Category C Building, the mitigation shall be implemented, including any third party authorisations required, in a reasonable and practical timeframe agreed between the Requiring Authority and the owner.
W5 RE2	**34.**	Subject to Condition 31, where Building-Modification Mitigation is required, the Requiring Authority is deemed to have complied with Condition 33 if: (a) The Requiring Authority has completed Building Modification Mitigation to the building; or

NoR No.	No.	Condition
		(b) An alternative agreement for mitigation is reached between the Requiring Authority and the building owner; or (c) The building owner did not accept the Requiring Authority's offer to implement Building-Modification Mitigation within three months of the date of the Requiring Authority's letter sent in accordance with Condition 31 (including where the owner did not respond within that period); or (d) The building owner cannot, after reasonable enquiry, be found prior to completion of construction of the Project.
W5 RE2	**35.**	The Detailed Mitigation Options shall be maintained so they retain their noise reduction performance as far as practicable.
W5 RE2	**36.**	The Noise Criteria Categories at the PPFs identified in Schedule 2: Identified PPFs Noise Criteria Categories do not need to be complied with where: (a) the PPF no longer exists (b) agreement of the landowner has been obtained confirming that the Noise Criteria Category level does not need to be met.

Schedule 1: General Accordance Plans and Information

Project Description

The proposed work is the construction, operation, and maintenance of an upgrade to a transport corridor in Whenuapai, from Oriel Avenue to Trig Road (South) and from Trig Road (South) to the intersection with Memorial Park Lane, including active transport facilities and associated infrastructure. The proposed work is shown in the following Concept Plan and includes:

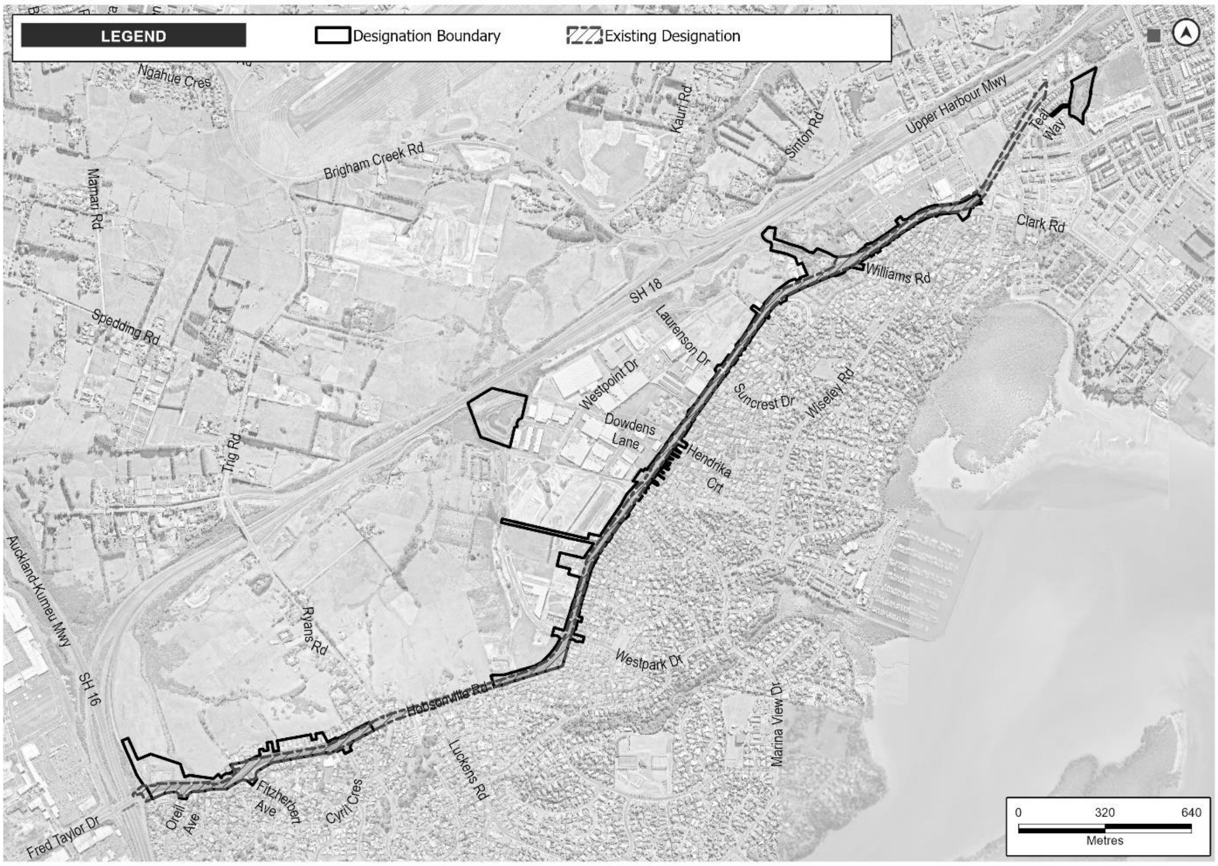
(a) An upgraded transport corridor and active transport facilities;

(b) Associated works including intersections, bridges, embankments, retaining, culverts, stormwater management systems;

(c) Changes to local roads, where the proposed work intersects with local roads; and

(d) Construction activities, including vegetation removal, construction compounds, laydown areas, bridge works area, construction traffic management and the re-grade of driveways.

Concept Plan



Schedule 2: Identified PPFs Noise Criteria Categories

Address	New or Altered Road	Noise Criteria Category
33 Hobsonville Road	Altered Road	C
39 Hobsonville Road	Altered Road	C
35 Hobsonville Road	Altered Road	C
1/383 Hobsonville Road	Altered Road	C
61 Hobsonville Road	Altered Road	C
31 Hobsonville Road	Altered Road	C
41 Hobsonville Road	Altered Road	C
369 Hobsonville Road	Altered Road	C
29 Hobsonville Road	Altered Road	B
24-25/18 Williams Road	Altered Road	B
321 Hobsonville Road	Altered Road	B
309 Hobsonville Road	Altered Road	B
64 Hobsonville Road	Altered Road	B
10 Hobsonville Road	Altered Road	B
19 Williams Road	Altered Road	B
23/18 Williams Road	Altered Road	B
305 Hobsonville Road	Altered Road	B
21-22/18 Williams Road	Altered Road	B
311 Hobsonville Road	Altered Road	B
291 Hobsonville Road	Altered Road	B
52 Hobsonville Road	Altered Road	B
62 Hobsonville Road	Altered Road	B
60 Hobsonville Road	Altered Road	B
75 Hobsonville Road	Altered Road	B
56 Hobsonville Road	Altered Road	B
53 Hobsonville Road	Altered Road	A
179 Hobsonville Road	Altered Road	B
149b Hobsonville Road	Altered Road	B
63 Hobsonville Road	Altered Road	B
147a Hobsonville Road	Altered Road	B
59 Hobsonville Road	Altered Road	A
27 Hobsonville Road	Altered Road	B
66 Hobsonville Road	Altered Road	B
303 Hobsonville Road	Altered Road	B
151d Hobsonville Road	Altered Road	B
½ Oreil Avenue	Altered Road	A
51 Hobsonville Road	Altered Road	A
307 Hobsonville Road	Altered Road	A
373 Hobsonville Road	Altered Road	B

151c Hobsonville Road	Altered Road	A
147c Hobsonville Road	Altered Road	A
151b Hobsonville Road	Altered Road	A
17 Williams Road	Altered Road	A
395 Hobsonville Road	Altered Road	A
289 Hobsonville Road	Altered Road	A
55 Hobsonville Road	Altered Road	A
381 Hobsonville Road	Altered Road	B
317 Hobsonville Road	Altered Road	A
195 Hobsonville Road	Altered Road	A
79 Hobsonville Road	Altered Road	A
26a Hobsonville Road	Altered Road	A
49 Hobsonville Road	Altered Road	A
287 Hobsonville Road	Altered Road	A
54 Hobsonville Road	Altered Road	A
369a Hobsonville Road	Altered Road	A
19/18 Williams Road	Altered Road	A
20 Hobsonville Road	Altered Road	A
199 Hobsonville Road	Altered Road	A
375 Hobsonville Road	Altered Road	A
1-2/279 Hobsonville Road	Altered Road	A
45 Suncrest Drive	Altered Road	A
8a Hobsonville Road	Altered Road	A
33/18 Williams Road	Altered Road	A
1-2/281 Hobsonville Road	Altered Road	A
319 Hobsonville Road	Altered Road	A
151a Hobsonville Road	Altered Road	A
22 Hobsonville Road	Altered Road	A
209 Hobsonville Road	Altered Road	A
181 Hobsonville Road	Altered Road	A
1/46 Hobsonville Road	Altered Road	A
1/275 Hobsonville Road	Altered Road	A
26-27/18 Williams Road	Altered Road	A
57 Hobsonville Road	Altered Road	A
229a Hobsonville Road	Altered Road	A
313 Hobsonville Road	Altered Road	A
81 Hobsonville Road	Altered Road	A
2a Park Drive	Altered Road	A
16 Hobsonville Road	Altered Road	A
58 Hobsonville Road	Altered Road	A
2a Fitzherbert Avenue	Altered Road	A
47 Hobsonville Road	Altered Road	A

391 Hobsonville Road	Altered Road	A
83 Hobsonville Road	Altered Road	A
241 Hobsonville Road	Altered Road	A
243 Hobsonville Road	Altered Road	A
251 Hobsonville Road	Altered Road	A
253 Hobsonville Road	Altered Road	A
104a Hobsonville Road	Altered Road	A
231 Hobsonville Road	Altered Road	A
2 Marina View Drive	Altered Road	A
283 Hobsonville Road	Altered Road	A
221 Hobsonville Road	Altered Road	A
215 Hobsonville Road	Altered Road	A
239 Hobsonville Road	Altered Road	A
299 Hobsonville Road	Altered Road	A
327 Bd1 Hobsonville Road	Altered Road	A
383 Hobsonville Road	Altered Road	A
323 Hobsonville Road	Altered Road	A
1/163 Hobsonville Road	Altered Road	A
197 Hobsonville Road	Altered Road	A
301 Hobsonville Road	Altered Road	A
85 Hobsonville Road	Altered Road	A
295 Hobsonville Road	Altered Road	A
213 Hobsonville Road	Altered Road	A
201 Hobsonville Road	Altered Road	A
211 Hobsonville Road	Altered Road	A
219 Hobsonville Road	Altered Road	A
233 Hobsonville Road	Altered Road	A
1/41 Hobsonville Road	Altered Road	A
14 Hobsonville Road	Altered Road	A
18 Hobsonville Road	Altered Road	A
2 Hendrika Court	Altered Road	A
45 Hobsonville Road	Altered Road	A
77 Hobsonville Road	Altered Road	A
217 Hobsonville Road	Altered Road	A
133 Hobsonville Road	Altered Road	A
247 Hobsonville Road	Altered Road	A
227 Hobsonville Road	Altered Road	A
189 Hobsonville Road	Altered Road	A
37 Hobsonville Road	Altered Road	A
1 Marina View Drive	Altered Road	A
1/191 Hobsonville Road	Altered Road	A
23 Hobsonville Road	Altered Road	A

2/87 Hobsonville Road	Altered Road	A
3 Fitzherbert Avenue	Altered Road	A
223 Hobsonville Road	Altered Road	A
157a Hobsonville Road	Altered Road	A
277 Hobsonville Road	Altered Road	A
1-2/2 Wiseley Road	Altered Road	A
26 Belleaire Court	Altered Road	A
34/18 Williams Road	Altered Road	A
1 Hendrika Court	Altered Road	A
165 Hobsonville Road	Altered Road	A
187 Hobsonville Road	Altered Road	A
207 Hobsonville Road	Altered Road	A
82 Hobsonville Road	Altered Road	A
72 Hobsonville Road	Altered Road	A
203, 203a Hobsonville Road	Altered Road	A
175 Hobsonville Road	Altered Road	A
205 Hobsonville Road	Altered Road	A
61a Hobsonville Road	Altered Road	A
267 Hobsonville Road	Altered Road	A
3 Oreil Avenue	Altered Road	A
1 Park Drive	Altered Road	A
1/39 Hobsonville Road	Altered Road	A
5 Bannings Way	Altered Road	A
327 Bd2 Hobsonville Road	Altered Road	A
2/2 Oreil Avenue	Altered Road	A
2 Fitzherbert Avenue	Altered Road	A
249 Hobsonville Rd	Altered Road	A
28/18 Williams Road	Altered Road	A
177 Hobsonville Road	Altered Road	A
1/87 Hobsonville Road	Altered Road	A
72c Hobsonville Road	Altered Road	A
70 Hobsonville Road	Altered Road	A
4 Wiseley Road	Altered Road	A
89 Hobsonville Road	Altered Road	A
1-2/259 Hobsonville Road	Altered Road	A
161 Hobsonville Road	Altered Road	A
167 Hobsonville Road	Altered Road	A
159 Hobsonville Road	Altered Road	A
127 Hobsonville Road	Altered Road	A
193 Hobsonville Road	Altered Road	A
169 Hobsonville Road	Altered Road	A
401 Hobsonville Road	Altered Road	A

185 Hobsonville Road	Altered Road	A
30/18 Williams Road	Altered Road	A
3a Bannings Way	Altered Road	A
1/18 Woodhouse Place	Altered Road	A
24 Belleaire Court	Altered Road	A
1/255 Hobsonville Road	Altered Road	A
3 Wiseley Road	Altered Road	A
14 Woodhouse Place	Altered Road	A
24a Hobsonville Road	Altered Road	A
1/18 Williams Road	Altered Road	A
73 Hobsonville Road	Altered Road	A
11 Magdalen Place	Altered Road	A
291a Hobsonville Road	Altered Road	A
16 Woodhouse Place	Altered Road	A
17-18/18 Williams Road	Altered Road	A
1-2/257 Hobsonville Road	Altered Road	A
327 Bd10 Hobsonville Road	Altered Road	A
10 Wiseley Road	Altered Road	A
225 Hobsonville Road	Altered Road	A
15 Williams Road	Altered Road	A
2park Drive	Altered Road	A
15 Wiseley Road	Altered Road	A
1/323 Hobsonville Road	Altered Road	A
15a Wiseley Road	Altered Road	A
5-6/18 Williams Road	Altered Road	A
5 Fitzherbert Avenue	Altered Road	A
16 Williams Road	Altered Road	A
303a Hobsonville Road	Altered Road	A
327 Bd3 Hobsonville Road	Altered Road	A
13 Williams Road	Altered Road	A
80 Hobsonville Road	Altered Road	A
15 Starlight Cove	Altered Road	A
18 Woodhouse Place	Altered Road	A
5 Wiseley Road	Altered Road	A
85a Hobsonville Road	Altered Road	A
6 Woodhouse Place	Altered Road	A
12 Woodhouse Place	Altered Road	A
387 Hobsonville Road	Altered Road	A
79a Hobsonville Road	Altered Road	A
20 Woodhouse Place	Altered Road	A
4 Oreil Avenue	Altered Road	A
3-4/18 Williams Road	Altered Road	A

21 Woodhouse Place	Altered Road	A
377a Hobsonville Road	Altered Road	A
9 Williams Road	Altered Road	A
12 Wiseley Road	Altered Road	A
155a Hobsonville Road	Altered Road	A
7 Fitzherbert Avenue	Altered Road	A
287a Hobsonville Road	Altered Road	A
40 Suncrest Drive	Altered Road	A
41/18 Williams Road	Altered Road	A
12 Hobsonville Road	Altered Road	A
23b Wiseley Road	Altered Road	A
183 Hobsonville Road	Altered Road	A
4 Fitzherbert Avenue	Altered Road	A
17 Oreil Avenue	Altered Road	A
17 Wiseley Road	Altered Road	A
10 Woodhouse Place	Altered Road	A
1/2 Wiseley Road	Altered Road	A
379 Hobsonville Road	Altered Road	A
1a Marina View Drive	Altered Road	A
43 Suncrest Drive	Altered Road	A
2/18 Williams Road	Altered Road	A
15 Magdalen Place	Altered Road	A
1 Bannings Way	Altered Road	A
9 Wiseley Road	Altered Road	A
68 Hobsonville Road	Altered Road	A
7-8/18 Williams Road	Altered Road	A
11 Starlight Cove	Altered Road	A
11 Williams Road	Altered Road	A
37 Suncrest Drive	Altered Road	A
7 Wiseley Road	Altered Road	A
8 Woodhouse Place	Altered Road	A
43/18 Williams Road	Altered Road	A
11 Wiseley Road	Altered Road	A
17 Magdalen Place	Altered Road	A
39/18 Williams Road	Altered Road	A
14 Williams Road	Altered Road	A
2 Trig Road	Altered Road	A
5a-c Woodhouse Place	Altered Road	A
3 Bannings Way	Altered Road	A
23a Wiseley Road	Altered Road	A
26 Peterhouse Place	Altered Road	A
147f Hobsonville Road	Altered Road	A

17a Magdalen Place	Altered Road	A
12 Williams Road	Altered Road	A
6 Park Drive	Altered Road	A
6 Fitzherbert Avenue	Altered Road	A
17b Oreil Avenue	Altered Road	A
24 Peterhouse Place	Altered Road	A
3 Woodhouse Place	Altered Road	A
315 Hobsonville Road	Altered Road	A
41 Suncrest Drive	Altered Road	A
72a Hobsonville Road	Altered Road	A
119 Hobsonville Road	Altered Road	A
125 Hobsonville Road	Altered Road	A
42-44 Suncrest Drive	Altered Road	A
17 Starlight Cove	Altered Road	A
327 Bd5 Hobsonville Road	Altered Road	A
4 Woodhouse Place	Altered Road	A
7 Starlight Cove	Altered Road	A
3a Wiseley Road	Altered Road	A
33 Cyril Crescent 0618	Altered Road	A
13 Magdalen Place	Altered Road	A
31 Cyril Crescent	Altered Road	A
12 Magdalen Place	Altered Road	A
1/18 Hobsonville Road	Altered Road	A
2a Marina View Drive	Altered Road	A
325 Hobsonville Road	Altered Road	A
285 Hobsonville Road	Altered Road	A
153a Hobsonville Road	Altered Road	A
9-10/18 Williams Road	Altered Road	A
1/25 Glucina Avenue	Altered Road	A
24 Connemara Court	Altered Road	A
6 Wiseley Road Hobsonville	Altered Road	A
15-16/18 Williams Road	Altered Road	A
19 Starlight Cove	Altered Road	A
21 Starlight Cove	Altered Road	A
39 Suncrest Drive	Altered Road	A
13 Wiseley Road Hobsonville	Altered Road	A
379a Hobsonville Road	Altered Road	A
36 Suncrest Drive	Altered Road	A
5 Starlight Cove	Altered Road	A
9 Fitzherbert Avenue	Altered Road	A
19 Oreil Avenue	Altered Road	A
7 Williams Road	Altered Road	A

145a – 145b Hobsonville Road	Altered Road	A
102 Hobsonville Road	Altered Road	A
11-12/18 Williams Road	Altered Road	A
1/31 Glucina Avenue	Altered Road	A
4 Hendrika Court	Altered Road	A
157b Hobsonville Road	Altered Road	A
20 Peterhouse Place	Altered Road	A
1/26 Peterhouse Place	Altered Road	A
10 Trig Road	Altered Road	A
35/18 Williams Road	Altered Road	A
6 Hendrika Court	Altered Road	A
29 Cyril Crescent	Altered Road	A
38/18 Williams Road	Altered Road	A
1/273 Hobsonville Road	Altered Road	A
327 Bd4 Hobsonville Road	Altered Road	A
7 Hanson Place	Altered Road	A
6 Louise Place	Altered Road	A
19 Magdalen Place	Altered Road	A
9 Magdalen Place	Altered Road	A
5a Hanson Place	Altered Road	A
5a Bannings Way	Altered Road	A
8 Hendrika Court	Altered Road	A
271 Hobsonville Road	Altered Road	A
23 Starlight Cove	Altered Road	A
13-14/18 Williams Road	Altered Road	A
127a Hobsonville Road	Altered Road	A
9 Starlight Cove	Altered Road	A
3 Starlight Cove	Altered Road	A
131 Hobsonville Road	Altered Road	A
4a Marina View Drive	Altered Road	A
22 Connemara Court	Altered Road	A
1/133a Hobsonville Road	Altered Road	A
17a Wiseley Road	Altered Road	A
20 Connemara Court	Altered Road	A
19 Bridgehead Cove	Altered Road	A
157c Hobsonville Road	Altered Road	A
129c Hobsonville Road	Altered Road	A
7 Optimist Place	Altered Road	A
3/1a Williams Road	Altered Road	A
2/1a Williams Road	Altered Road	A
129b Hobsonville Road	Altered Road	A
8 Louise Place	Altered Road	A

27 Suncrest Drive	Altered Road	A
229 Hobsonville Road	Altered Road	A
327 Bd9 Hobsonville Road	Altered Road	A
3 Park Drive	Altered Road	A
70a Hobsonville Road	Altered Road	A
21a Wiseley Road	Altered Road	A
2/31 Glucina Avenue	Altered Road	A
29 Glucina Avenue	Altered Road	A
3 Hendrika Court	Altered Road	A
10 Hendrika Court	Altered Road	A
26 Connemara Court	Altered Road	A
2/163 Hobsonville Road	Altered Road	A
25 Peterhouse Place	Altered Road	A
4a Hendrika Court	Altered Road	A
33 Cherub Place	Altered Road	A
20 Belleaire Court	Altered Road	A
1/19 Cherub Place	Altered Road	A
231a Hobsonville Road	Altered Road	A
10 Whiting Grove	Altered Road	A
131a Hobsonville Road	Altered Road	A
7a Bannings Way	Altered Road	A
5 Williams Road	Altered Road	A
145e Hobsonville Road	Altered Road	A
22 Belleaire Court	Altered Road	A
22 Peterhouse Place	Altered Road	A
38 Suncrest Drive	Altered Road	A
327 Bd8 Hobsonville Road	Altered Road	A
17 Soling Place	Altered Road	A
1/8 Oreil Avenue	Altered Road	A
23 Peterhouse Place	Altered Road	A
8 Park Drive	Altered Road	A
1/325 Hobsonville Road	Altered Road	A
123b Hobsonville Road	Altered Road	A
19 Belleaire Court	Altered Road	A
4/1a Williams Road	Altered Road	A
4 Louise Place	Altered Road	A
143c Hobsonville Road	Altered Road	A
8 Magdalen Place	Altered Road	A
6 Oreil Avenue	Altered Road	A
32 Suncrest Drive	Altered Road	A
3 Optimist Place	Altered Road	A
327 Bd6 Hobsonville Road	Altered Road	A

18 Connemara Court	Altered Road	A
28 Connemara Court	Altered Road	A
37 Cherub Place	Altered Road	A
12 Whiting Grove	Altered Road	A
10 Mona Vale	Altered Road	A
29 Suncrest Drive	Altered Road	A
7 Magdalen Place	Altered Road	A
6 Magdalen Place 0618	Altered Road	A
8 Oreil Avenue	Altered Road	A
8 Trig Road Whenuapai	Altered Road	A
16 Belleaire Court	Altered Road	A
10 Magdalen Place	Altered Road	A
18 Belleaire Court	Altered Road	A
13 Soling Place	Altered Road	A
1/22 Peterhouse Place	Altered Road	A
16 Peterhouse Place	Altered Road	A
8 Optimist Place	Altered Road	A
1 Seagrove Road	Altered Road	A
18 Peterhouse Place	Altered Road	A
2/133a Hobsonville Road	Altered Road	A
5 Optimist Place	Altered Road	A
8a Louise Place	Altered Road	A
129 Hobsonville Road	Altered Road	A
16 Whiting Grove	Altered Road	A
6 Trig Road Whenuapai	Altered Road	A
1/16 Peterhouse Place	Altered Road	A
5 Hanson Place	Altered Road	A
30 Suncrest Drive	Altered Road	A
14 Whiting Grove	Altered Road	A
1/4 Park Drive	Altered Road	A
35 Cherub Place	Altered Road	A
27 Glucina Avenue	Altered Road	A
2/4 Park Drive	Altered Road	A
3a Louise Place	Altered Road	A
1a Bannings Way	Altered Road	A
153d Hobsonville Road	Altered Road	A
6 Optimist Place	Altered Road	A
123 Hobsonville Road	Altered Road	A
1/32 Glucina Avenue	Altered Road	A
10 Oreil Avenue	Altered Road	A
23 Glucina Avenue	Altered Road	A
10 Soling Place	Altered Road	A

8a Hendrika Court	Altered Road	A
12 Soling Place	Altered Road	A
14 Hendrika Court	Altered Road	A
10 Louise Place	Altered Road	A
273 Hobsonville Road	Altered Road	A
34 Suncrest Drive	Altered Road	A
6b Marina View Drive	Altered Road	A
121b Hobsonville Road	Altered Road	A
5 Louise Place	Altered Road	A
35 Suncrest Drive	Altered Road	A
3 Marina View Drive	Altered Road	A
3/163 Hobsonville Road	Altered Road	A
30 Connemara Court	Altered Road	A
155c Hobsonville Road	Altered Road	A
157d Hobsonville Road	Altered Road	A
39 Cherub Place	Altered Road	A
10 Park Drive	Altered Road	A
16 Hendrika Court	Altered Road	A
155b Hobsonville Road	Altered Road	A
5 Seagrove Road	Altered Road	A
16-18 Clark Road	Altered Road	A
9 Hendrika Court	Altered Road	A
20a Belleaire Court	Altered Road	A
14 Belleaire Court	Altered Road	A
8 Whiting Grove	Altered Road	A
33 Suncrest Drive	Altered Road	A
12 Hendrika Court	Altered Road	A
16 Connemara Court	Altered Road	A
31 Cherub Place	Altered Road	A
72b Hobsonville Road	Altered Road	A
21 Cherub Place	Altered Road	A
123a Hobsonville Road	Altered Road	A
11 Hendrika Court	Altered Road	A
56 Cherub Place	Altered Road	A
17Ergrove Place	Altered Road	A
3 Seagrove Road	Altered Road	A
121a Hobsonville Road	Altered Road	A
27 Cherub Place	Altered Road	A
2-4 Workspace Drive	Altered Road	A
14 Connemara Court	Altered Road	A
29 Cherub Place	Altered Road	A
30 Glucina Avenue	Altered Road	A

2/19 Cherub Place	Altered Road	A
4 Whiting Grove	Altered Road	A
157e Hobsonville Road	Altered Road	A
15 Ergrove Place	Altered Road	A
18 Hendrika Court	Altered Road	A
15 Soling Place	Altered Road	A
7 Marina View Drive	Altered Road	A
6a Marina View Drive	Altered Road	A
1/13 Belleaire Court	Altered Road	A
13 Hendrika Court	Altered Road	A
12 Belleaire Court	Altered Road	A
5 Marina View Drive	Altered Road	A
2 Optimist Place	Altered Road	A
17 Cherub Place	Altered Road	A
14 Ergrove Place	Altered Road	A
153c Hobsonville Road	Altered Road	A
7 Hendrika Court	Altered Road	A
8 Soling Place	Altered Road	A
121 Hobsonville Road	Altered Road	A
4 Luckens Road	Altered Road	A
28 Glucina Avenue	Altered Road	A
20 Hendrika Court	Altered Road	A
7 Seagrove Road	Altered Road	A
17 Belleaire Court	Altered Road	A
153b Hobsonville Road	Altered Road	A
25 Cherub Place	Altered Road	A
18 Whiting Grove	Altered Road	A
11 Soling Place	Altered Road	A
2/25 Sailfish Drive	Altered Road	A
2/28 Sailfish Drive	Altered Road	A
6 Soling Place	Altered Road	A
15 Belleaire Court	Altered Road	A
23 Cherub Place	Altered Road	A
16 Ergrove Place	Altered Road	A
13 Ergrove Place	Altered Road	A
3a Hendrika Court	Altered Road	A
5 Hendrika Court	Altered Road	A
1/28 Sailfish Drive	Altered Road	A
1-2/38 Sailfish Drive	Altered Road	A
155d Hobsonville Road	Altered Road	A
36 Sailfish Drive	Altered Road	A
9 Belleaire Court	Altered Road	A

2/22 Sailfish Drive	Altered Road	A
26 Sailfish Drive	Altered Road	A
11 Belleaire Court	Altered Road	A
30 Sailfish Drive	Altered Road	A

Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date

Title: Supporting Growth
NoR W5 - Building Addresses

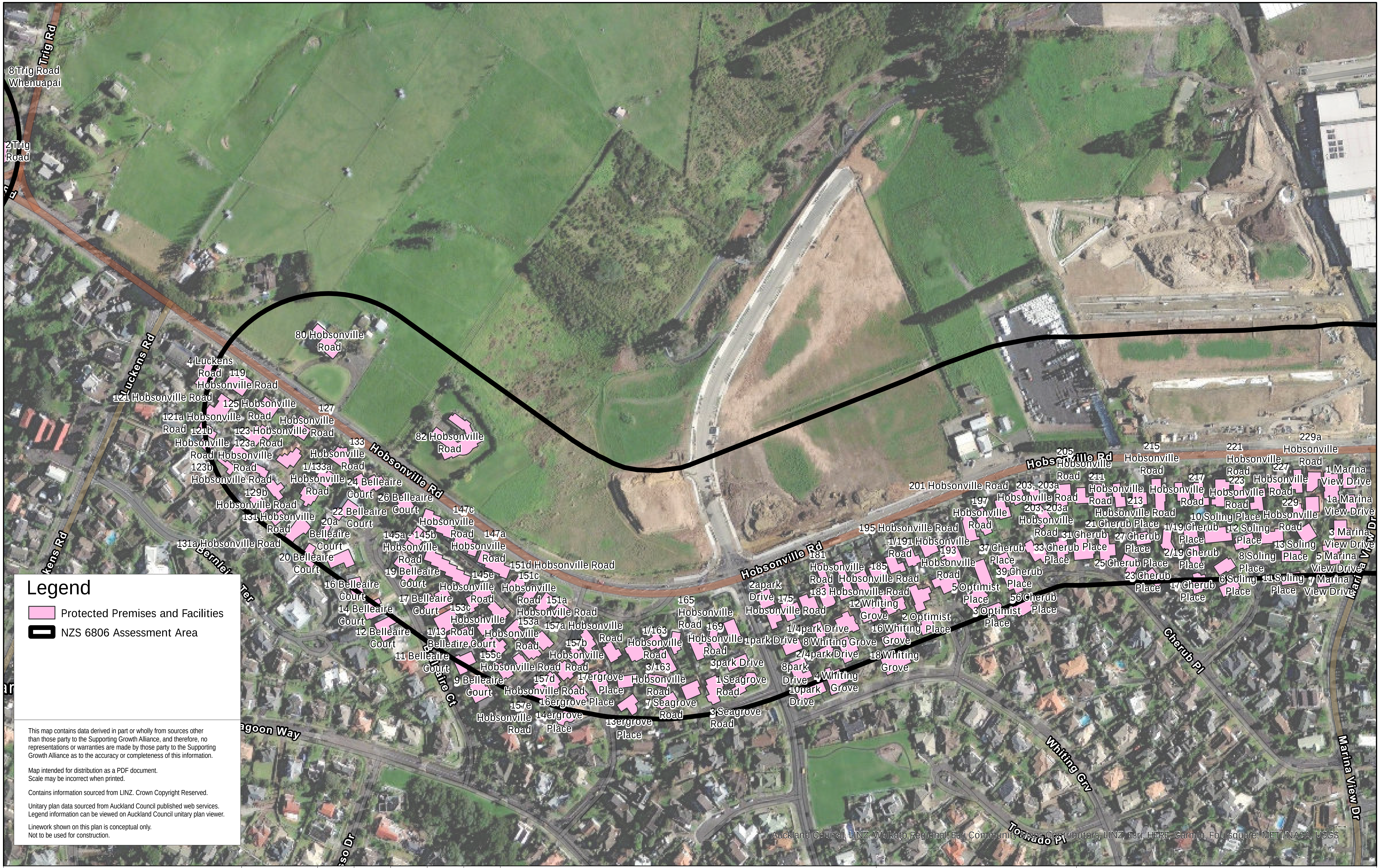
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date

Title: Supporting Growth

NoR W5 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

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Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date

Title: Supporting Growth
NoR W5 - Building Addresses

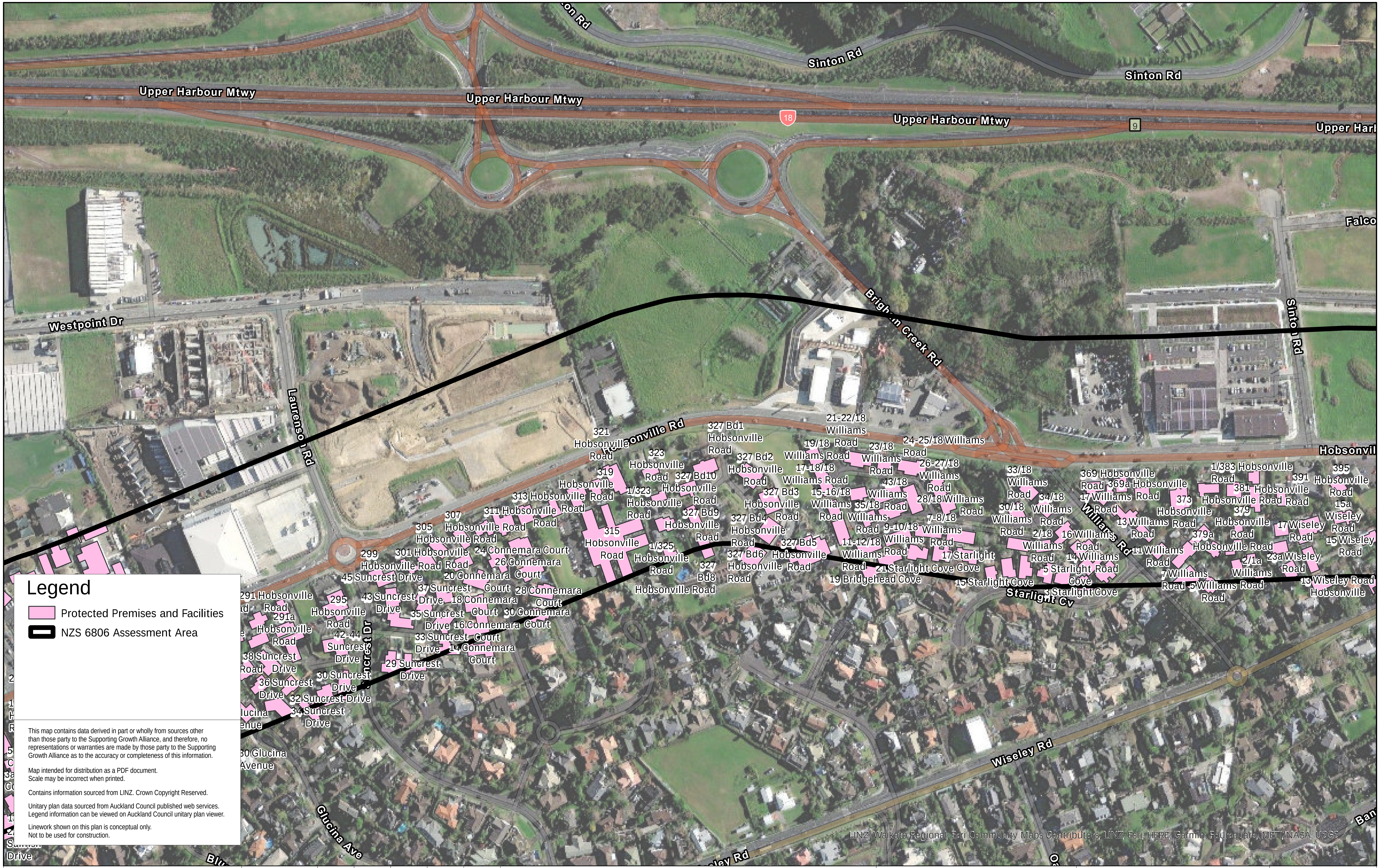
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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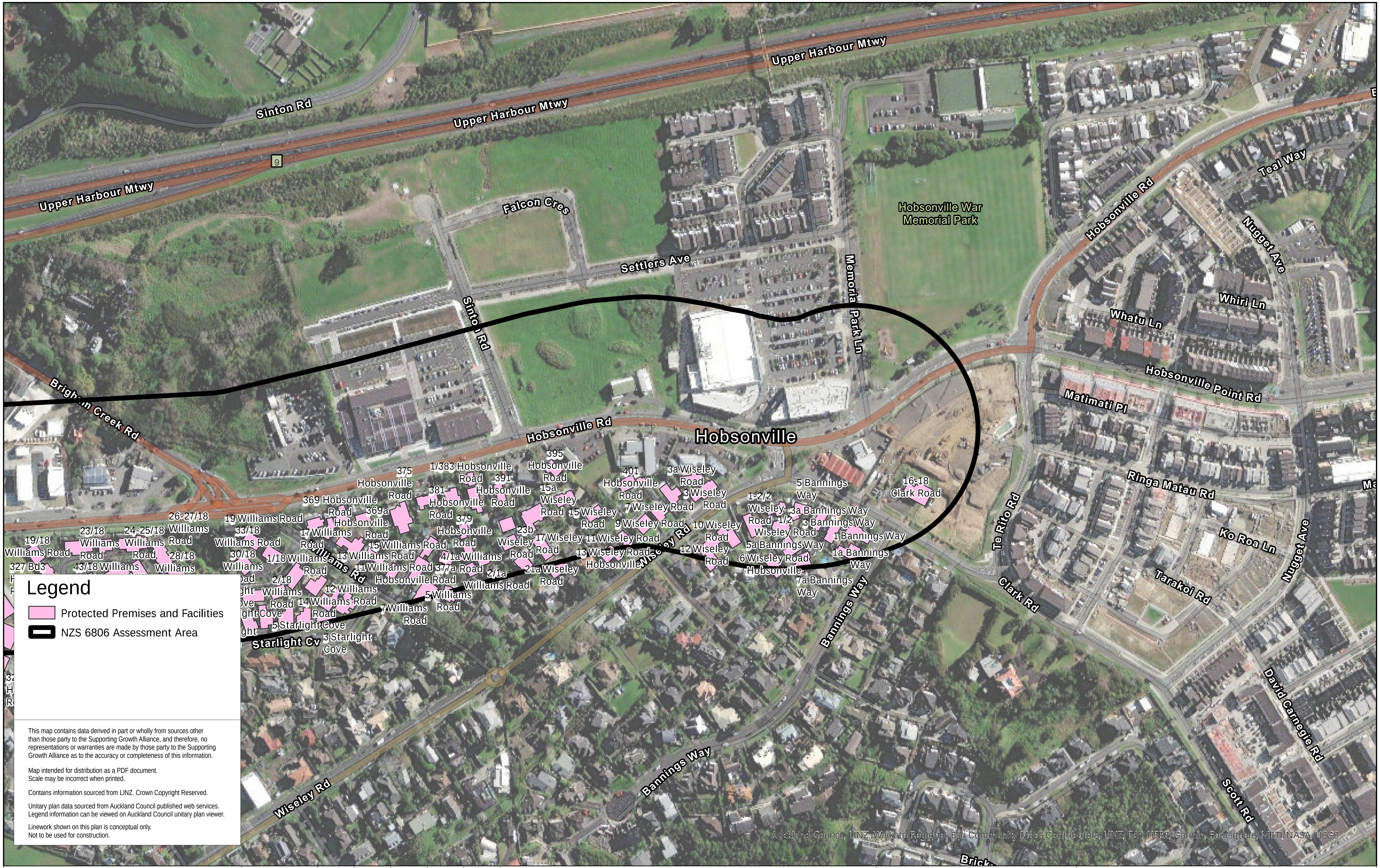

Legend

- Protected Premises and Facilities
- NZS 6806 Assessment Area

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Title: Supporting Growth

NoR W5 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

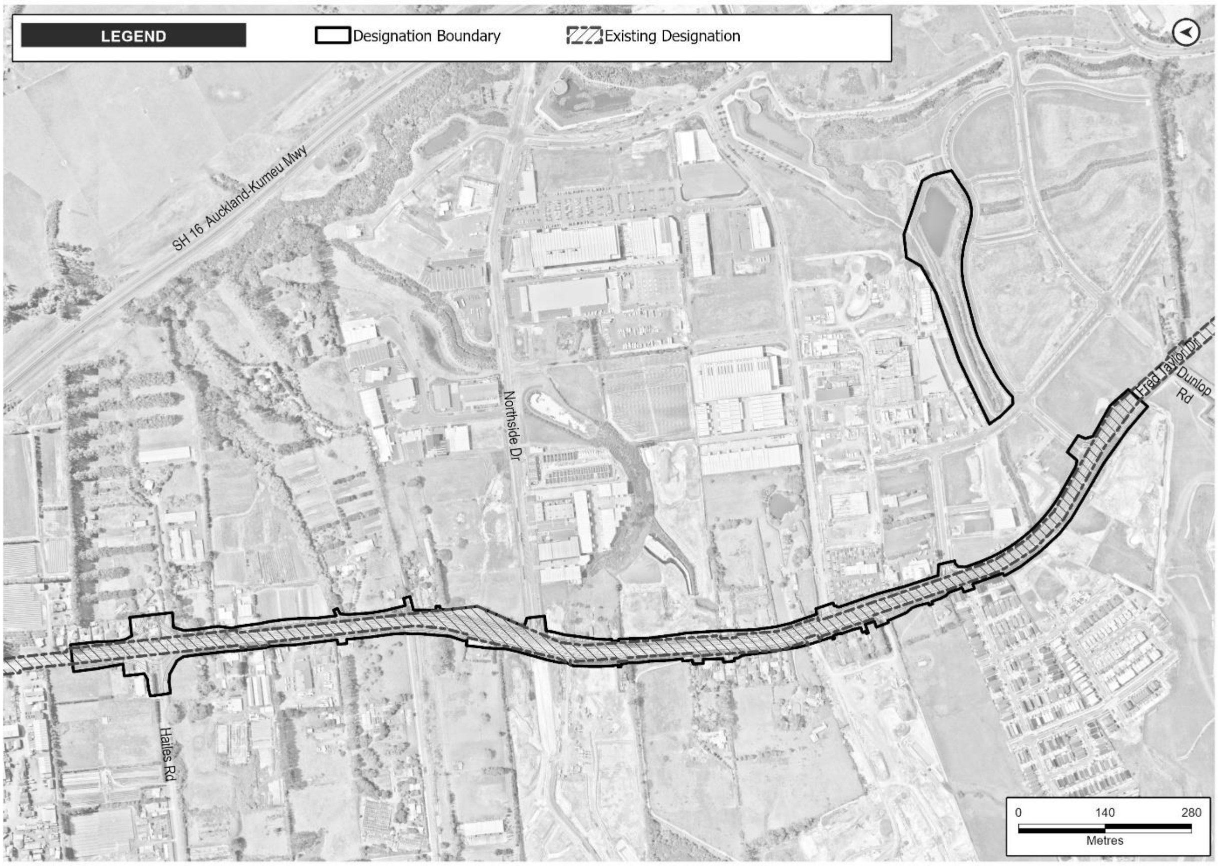
Schedule 1: General Accordance Plans and Information

Project Description

The proposed work is the construction, operation, and maintenance of an upgrade to a transport corridor in Redhills, from the Hailes Road intersection to the intersection with Dunlop Road, including active transport facilities and associated infrastructure. The proposed work is shown in the following Concept Plan and includes:

a) An upgraded transport corridor, including public transport and active transport facilities;
b) Associated works including intersections, bridges, embankments, retaining, culverts, stormwater management systems;
c) Changes to local roads, where the proposed work intersects with local roads; and
d) Construction activities, including vegetation removal, construction compounds, laydown areas, bridge works area, construction traffic management and the re-grade of driveways.

Concept Plan



Schedule 2: Identified PPFs Noise Criteria Categories

Address	New or Altered Road	Noise Criteria Category
89 Fred Taylor Drive	Altered Road	C
122 Fred Taylor Drive	Altered Road	B
1A Matakohe Road	Altered Road	B
127 Fred Taylor Drive	Altered Road	B
1B Matakohe Road	Altered Road	B
1C Matakohe Road	Altered Road	B
1D Matakohe Road	Altered Road	B
73 2 Fred Taylor Drive	Altered Road	B
166 Fred Taylor Drive	Altered Road	B
61 Fred Taylor Drive	Altered Road	B
100 Fred Taylor Drive	Altered Road	B
144 Fred Taylor Drive	Altered Road	B
129 Fred Taylor Drive	Altered Road	B
75 Fred Taylor Drive	Altered Road	B
75B Fred Taylor Drive	Altered Road	B
164 Fred Taylor Drive	Altered Road	A
96 Fred Taylor Drive	Altered Road	A
130 Fred Taylor Drive	Altered Road	A
116 Fred Taylor Drive	Altered Road	A
114 Fred Taylor Drive	Altered Road	A
83 2 Fred Taylor Drive	Altered Road	A
112 Fred Taylor Drive	Altered Road	A
83 Fred Taylor Drive	Altered Road	A
94 Fred Taylor Drive	Altered Road	A
109 Fred Taylor Drive	Altered Road	A
110 Fred Taylor Drive	Altered Road	A
10 Heri Lane	Altered Road	A
8 Heri Lane	Altered Road	A
12 Heri Lane	Altered Road	A
14 Heri Lane	Altered Road	A
102 Fred Taylor Drive	Altered Road	A
88 Fred Taylor Drive	Altered Road	A
6 Heri Lane	Altered Road	A
98 Fred Taylor Drive	Altered Road	A
2 Heri Lane	Altered Road	A
4 Heri Lane	Altered Road	A
77 Fred Taylor Drive	Altered Road	A
77 Fred Taylor Drive	Altered Road	A
3A Matakohe Road	Altered Road	A

3B Matakohe Road	Altered Road	A
118 Fred Taylor Drive	Altered Road	A
5 Matakohe Road	Altered Road	A
111 Fred Taylor Drive	Altered Road	A
121 Fred Taylor Drive	Altered Road	A
1 Dunlop Road	Altered Road	A
78 Fred Taylor Drive	Altered Road	A
122 2 Fred Taylor Drive	Altered Road	A
122 3 Fred Taylor Drive	Altered Road	A
7 Matakohe Road	Altered Road	A
106 Fred Taylor Drive	Altered Road	A
123 Fred Taylor Drive	Altered Road	A
108 Fred Taylor Drive	Altered Road	A
13 Heri Lane	Altered Road	A
105 Fred Taylor Drive	Altered Road	A
9 Matakohe Road	Altered Road	A
15 Heri Lane	Altered Road	A
11 Matakohe Road	Altered Road	A
13 Matakohe Road	Altered Road	A
15 Matakohe Road	Altered Road	A
17 Matakohe Road	Altered Road	A
11 Heri Lane	Altered Road	A
1 Heri Lane	Altered Road	A
9 Heri Lane	Altered Road	A
7 Heri Lane	Altered Road	A
63 Tahetoka Street	Altered Road	A
3 Heri Lane	Altered Road	A
5 Heri Lane	Altered Road	A
75 Tahetoka Street	Altered Road	A
71 Tahetoka Street	Altered Road	A
69 Tahetoka Street	Altered Road	A
73 Tahetoka Street	Altered Road	A
65 Tahetoka Street	Altered Road	A
67 Tahetoka Street	Altered Road	A

Legend

- NZS 6806 Assessment Area
- Protected Premises and Facilities

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Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	22/11/22

Title: Supporting Growth
NoR R2 - Building Addresses

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No:

Legend

- NZS 6806 Assessment Area
- Protected Premises and Facilities

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NoR R2 - Building Addresses

Client: Supporting Growth

Project: North West Package

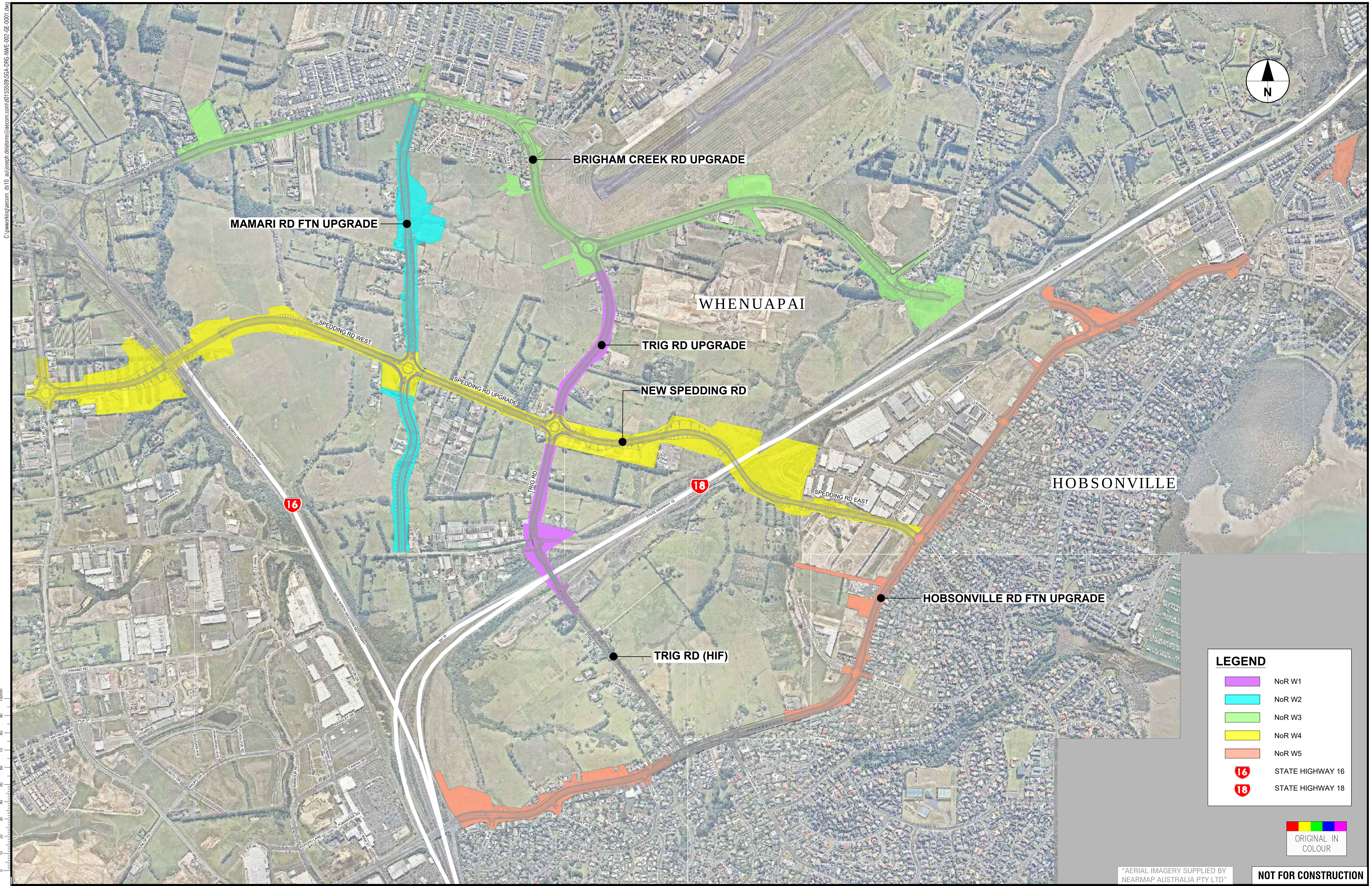
TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No:

ATTACHMENT 45

NORTH-WEST WHENUAPAI
GENERAL ARRANGEMENT PLANS
WHENUAPAI



NOT FOR CONSTRUCTION

REV	REVISIONS	DRAWN	DATE
B	ISSUED FOR NoR LODGEMENT	JDT	SEPT. 2022
A	DRAFT ISSUE FOR REVIEW	VDLT	07.05.2021

ORIGINAL SIZE A1

SURVEYED	N/A	
DRAWN	V. DELA TORRE	30.04.2021
DRAWING CHECK	J. DELA TORRE	30.04.2021
DESIGN	N/A	
DESIGN REVIEW	N/A	
APPROVED	R. MASON	07.05.2021

TE TUPU NGĀTAHI Supporting Growth

WAKA KOTAHI NZ TRANSPORT AGENCY

Project: **SUPPORTING GROWTH PROGRAMME**
NORTH WEST LOCAL NETWORK

Drawing Title: WHENUAPAI OVERALL LAYOUT PLAN

Drawing Status: **FOR LODGEMENT**
Drawing Date: 07.05.2021
A1 Scales: NTS A3 Scales: NTS
Discipline: GENERAL
Drawing No.: SGA-DRG-NWE-002-GE-0001 Revision: B

ATTACHMENT 46

NORTH-WEST WHENUAPAI
ASSESSMENT OF TRANSPORT EFFECTS

TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West Whenuapai Assessment of Transport Effects

December 2022

Version 1.0

WAKA KOTAHI NZ TRANSPORT AGENCY

New Zealand Government

Document Status

Responsibility	Name
Author	Rachel Gasson/Michelle Seymour
Reviewer	Michelle Seymour
Approver	John Daly

Revision Status

Version	Date	Reason for Issue
1.0	16/12/2022	Notice of Requirement Lodgement

Table of Contents

Appendices

No table of contents entries found.

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Abbreviations

Acronym/Term	Description
AEE	Assessment of Effects on the Environment
AC	Auckland Council
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
AUP:OP	Auckland Unitary Plan Operative in Part
CC2W	City Centre to Westgate
CTMP	Construction Traffic Management Plan
DSI	Death and Serious Injury
FTN	Frequent Transit Network
FUZ	Future Urban Zone
LOS	Level of service
NoR	Notice of Requirement (under the Resource Management Act 1991)
PT	Public transport
RASF	Auckland Transport Roads and Streets Framework
RMA	Resource Management Act 1991
SH16	State Highway 16
SH18	State Highway 18
SSTMP	Site-Specific Traffic Management Plans
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth Programme
Waka Kotahi	Waka Kotahi NZ Transport Agency

Glossary of Acronyms / Terms

Acronym/Term	Description
Auckland Council	Means the unitary authority that replaced eight councils in the Auckland Region as of 1 November 2010.
Whenuapai Assessment Package	Four Notices of Requirement and one alteration to an existing designation for the Whenuapai Arterial Transport Network for Auckland Transport.

1 Executive Summary

1.1 Overview

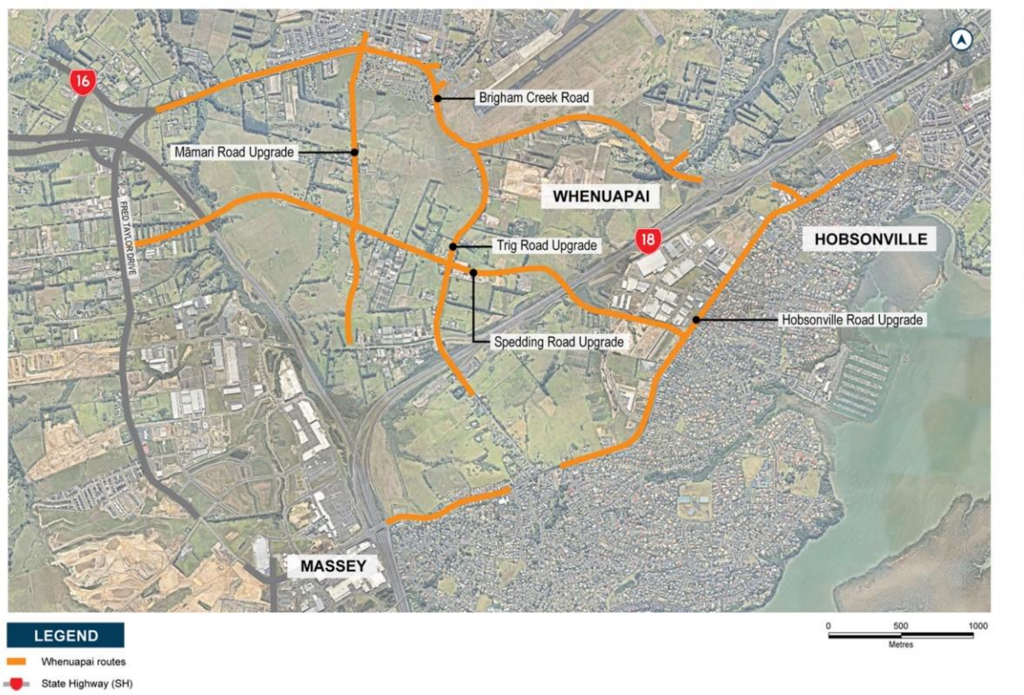
This Transport assessment has been prepared for the North West Local Arterial Network Notices of Requirement (**NoRs**) for Auckland Transport (**AT**) (the "Whenuapai Assessment Package"). The NoRs are to designate land for future local arterial transport corridors as part of Te Tupu Ngātahi Supporting Growth Programme (**Te Tupu Ngātahi**) to enable the construction, operation and maintenance of transport infrastructure in the North West. This report is for the Whenuapai area of Auckland and is referred to as the Whenuapai Assessment Package.

The Whenuapai Assessment Package comprises five separate projects which together form the North West Whenuapai Arterial Network. The network includes provision for general traffic, walking and cycling, and frequent public transport. Table 1-1 and Figure 1-1 summarise these projects.

Table 1-1: North West Whenuapai Assessment Package – Notices of Requirement and Projects

Notice	Project
NoR W1	Trig Road North
NoR W2	Māmari Road
NoR W3	Brigham Creek Road
NoR W4	Spedding Road
NoR W5	Hobsonville Road (alteration to existing designation 1437)

Figure 1-1: North West Whenuapai Assessment Package



1.2 Methodology

1.2.1 Approach to Assessment of Operational Transport Effects

Potential operational transport effects are assessed using: ·

- Transport planning assessment of expected outcomes and effects
- Transport modelling to inform demands and network performance
- Alignment with various policy documents

In respect to each individual NoR, a separate assessment has been undertaken, and the assessment criteria and methodology is summarised in Table 1-2 below.

Table 1-2: Summary of Assessment Methodology

Network Component	Information Source	Assessment Method
Safety	Crash Analysis (CAS) Database Project design drawings	Assessment to determine alignment with Vision Zero standards and design compliance with Transport Design Manual
Walking and Cycling	Walking and Cycling Network Plans Proposed Cross Sections	Assessment to determine alignment with walking and cycling strategic documents and design compliance with Transport Design Manual
Public Transport	Transport Model tools (MSM, SATURN and SIDRA) Supporting Growth Indicative Future Public Transport Network (Remix)[1]	Assessment to determine alignment with future network provisions and design compliance with the Transport Design Manual
General Traffic	Transport Model tools (MSM, SATURN and SIDRA) Project design drawings	Assessment using key model outputs including traffic volumes, levels of service for corridor midblock performance and intersection performance. Assessment of surrounding network connections
Access	Engineering Standards	Assessment identifying where there is a potential effect on access in the existing environment
Wider Network Effects	Transport Model tools (MSM, SATURN and SIDRA)	Assessment to consider how the corridor interacts with the surrounding road network
Note: A Road Safety and Audit and Safe System assessment with be done as part of the implementation business case/detailed design stage prior to implementation.		

[1] SGA Remix file provided by Auckland Transport on the draft plan of the bus network to be implemented by 2048

1.2.2 Approach to Assessment of Construction Effects

Based on the indicative construction methodology an assessment of construction effects has been completed for the package sufficient to support each Notice of Requirement. This assessment considers:

- An overview of key considerations including speed, potential impacts to pedestrians and cyclists and property access
- Identification of any works that should not occur at the same time
- Assessment of potential conflict areas with vulnerable road users that will need specific mitigation within a Construction Traffic Management Plan (CTMP).

The impact of any temporary traffic management measures implemented to undertake the projects will be re-assessed in the future, prior to construction, when a greater level of detail is available in terms of the specific construction methodology and traffic environment.

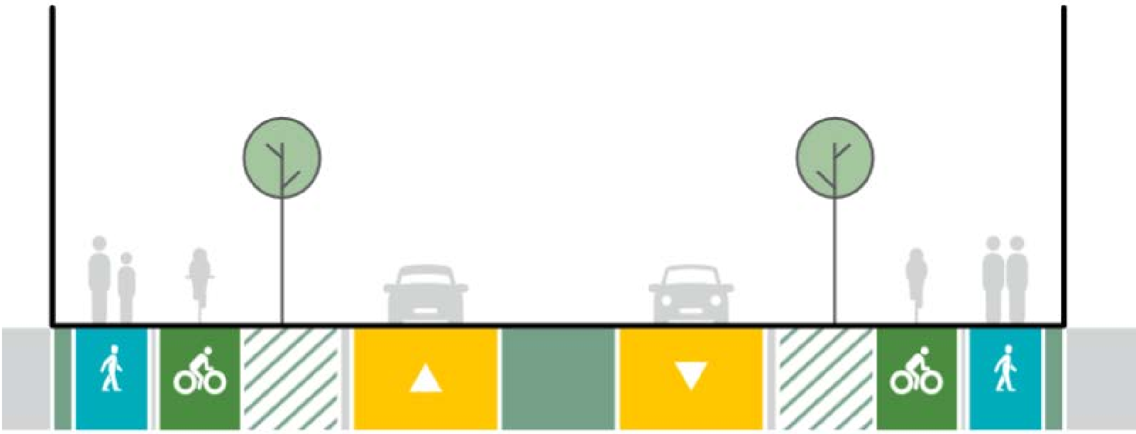
1.3 NoR W1: Trig Road North Upgrade

1.3.1 Road Environment Overview

The project proposes that the function of Trig Road will change from an existing rural two-lane road to a lower-speed (50kph) urban two-lane arterial.

The existing corridor includes two vehicle lanes, one per direction, and a footpath on the western side only. The indicative proposed design includes the same number of general traffic lanes (two), with new facilities for walking and cycling on both sides as shown in Figure 1-2.

Figure 1-2: Indicative future Trig Road corridor design



1.3.2 Overall Conclusion

Overall, the NoR W1: Trig Road Upgrade project provides positive transport effects, and there are no identified adverse effects. The project provides positive operational effects, in particular improved safety and walking and cycling effects.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to the Ministry of Education at 13 - 15 Trig Road (situated to the south of NoR W1) should be specifically considered within the CTMP prior to construction and implementation of the Project.

1.4 NoR W2: Māmari Road Upgrade

1.4.1 Road Environment Overview

The project proposes that the function of Māmari Road will change from an existing rural two-lane road to an urban four-lane arterial.

The existing corridor includes two vehicle lanes, one per direction and does don't provide for through movements. The indicative proposed design includes the same number of general traffic lanes (two), with two bus lanes, and new facilities for walking and cycling as shown in Figure 1-3. The proposed corridor connects Brigham Creek Road to Northside Drive.

Figure 1-3: Indicative future Māmari Road corridor design

1.4.2 Overall Conclusion

Overall, the NoR W2: Māmari Road Upgrade project provides positive transport effects, in particular improved safety, walking, cycling and public transport effects and there are no identified adverse operational effects.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Timitanga Community School at 9 Māmari Road should be specifically considered within the CTMP prior to construction and implementation of the Project.

1.5 NoR W3: Brigham Creek Road Upgrade

1.5.1 Road Environment Overview

The project proposes that the function of Brigham Creek Road will change from an existing rural two-lane road to an urban four-lane arterial. The existing corridor includes two vehicle lanes, one per direction, with sections of widening at key intersections. The indicative proposed design includes four traffic lanes, as well as new facilities for walking and cycling as shown in Figure 1-4 and Figure 1-5.

The form and function of Brigham Creek Road will change slightly through various segments of the corridor, with the western and eastern segments being adjacent to residential development, and the central segment adjacent to the commercial centre. As such, the designation provides flexibility for the cross section to change along the length of the Brigham Creek Road corridor, reallocating the 30m corridor to best accommodate vehicles, public transport, active modes and freight in relation to the adjacent land use.

Figure 1-4: Indicative Cross Section Brigham Creek Road – State Highway 16 to Totara Road and Tamatea Road to State Highway 18

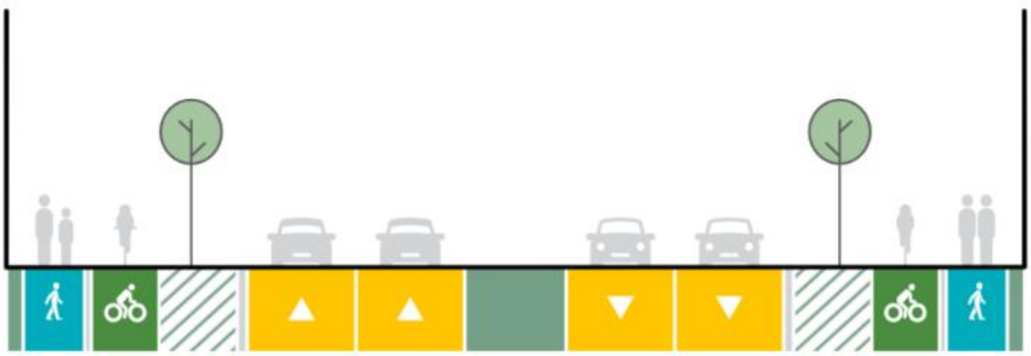


Figure 1-5: Indicative Cross Section Brigham Creek Road between Totara Road and Tamatea Road

1.5.2 Overall Conclusion

Overall, the NoR W3: Brigham Creek Road Upgrade project provides considerable positive transport effects in particular improved safety, walking and cycling, and public transport effects. Access effects on several properties have been identified, and the inclusion of these within the designation boundary is recommended.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Whenuapai School at 14 Airport Road, Whenuapai Kindergarten at 16 Airport Road, and the Whenuapai town centre should be specifically considered within the CTMP prior to implementation.

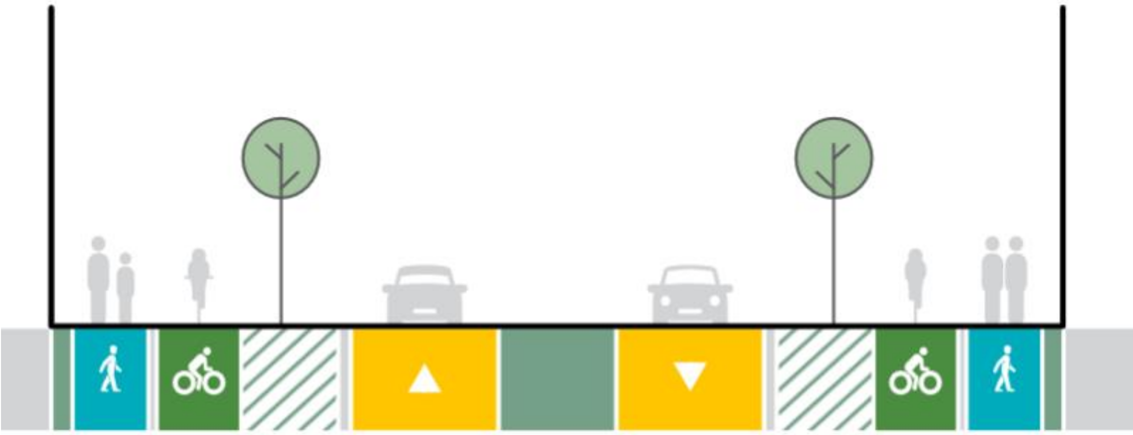
1.6 NoR W4: Spedding Road

1.6.1 Road Environment Overview

The project proposes that the function of Spedding Road will change from an existing rural two-lane road to an urban two-lane arterial.

The existing corridor includes two vehicle lanes, one per direction. The indicative proposed design includes the same number of general traffic lanes (two), with new facilities for walking and cycling as shown in Figure 1-6.

Figure 1-6: Indicative future Spedding Road corridor design



1.6.2 Overall Conclusion

Overall, the NoR W4: Spedding Road project provides considerable positive transport effects in particular improved safety, walking and cycling, and public transport effects. Access effects for one property has been identified, and access relocation is recommended for this property.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

1.7 NoR W5: Hobsonville Road FTN Upgrade

1.7.1 Road Environment Overview

The Project proposes that the function of Hobsonville Road will change from an existing two lane road to an urban two to four lane arterial with mixed components for vehicles, public transport, active modes, and freight.

The existing corridor generally provides two vehicle lanes and provides intermittent facilities for walking and cycling. The indicative proposed design includes three types of cross sections specifically:

- A generally 30m corridor that provides two vehicle lanes, two public transport lanes, and improved walking and cycling facilities.
- A generally 24m corridor that provides two vehicle lanes and new facilities for walking and cycling.
- A generally 30m corridor that provides four vehicle lanes, as well as new facilities for walking and cycling.

These cross sections are shown below.

Figure 1-7: Indicative future Hobsonville Road corridor FTN Upgrade between SH16 interchange and Luckens Road

Figure 1-8: Indicative future Hobsonville Road corridor between Luckens Road and Brigham Creek Road

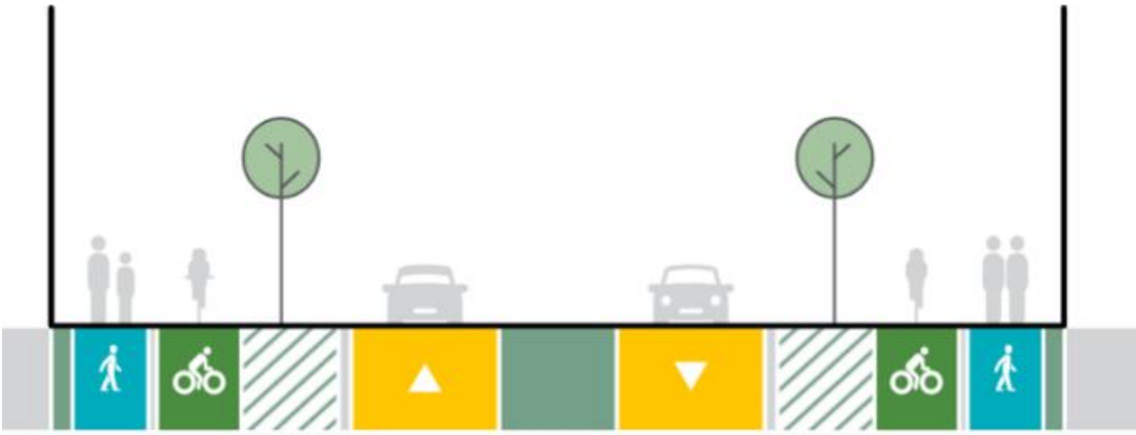
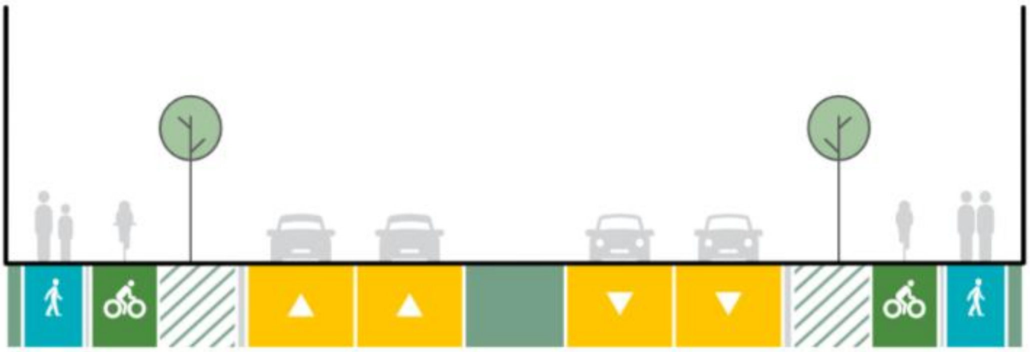


Figure 1-9: Indicative future Hobsonville Road corridor between Brigham Creek Road and Hobsonville Point Road



1.7.2 Overall Conclusion

Overall, the NoR W5: Hobsonville Road Upgrade project provides considerable positive transport effects in particular improved safety, walking and cycling and public transport effects. Access effects on several properties have been identified, and the inclusion of these within the designation boundary is recommended.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Hobsonville School and the Hobsonville town centre should be specifically considered within the CTMP prior to implementation.

2 Introduction

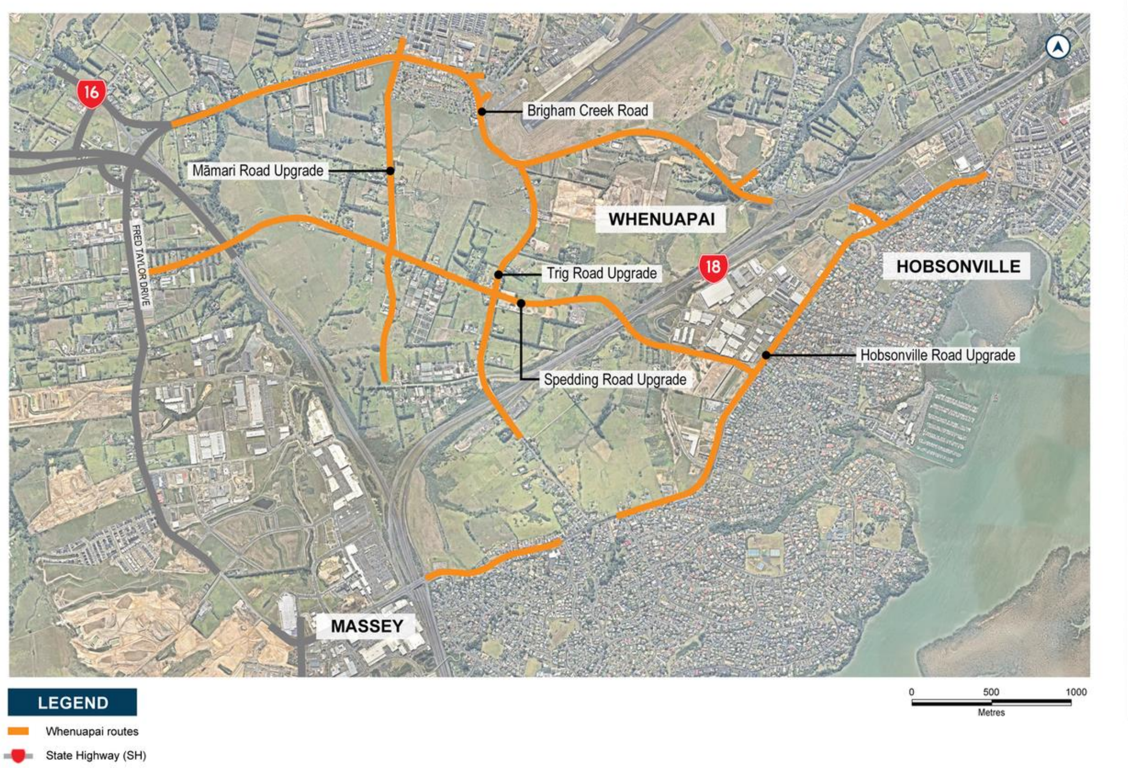
This Transport assessment has been prepared for the North West Local Arterial Network Notices of Requirement (**NoRs**) for Auckland Transport (**AT**) (the "Whenuapai Assessment Package"). The NoRs are to designate land for future local arterial transport corridors as part of Te Tupu Ngātahi Supporting Growth Programme (**Te Tupu Ngātahi**) to enable the construction, operation and maintenance of transport infrastructure in the North West Whenuapai area of Auckland.

The North West growth area is approximatively 30 kilometres north west of Auckland's central city. It makes a significant contribution to the future growth of Auckland's population by providing for approximately 42,355 new dwellings and employment activities that will contribute 13,000 new jobs across the North West. Whenuapai is one of these growth areas, located between State Highway 16 (**SH16**) and State Highway 18 (**SH18**) and at present is largely rural (but Future Urban Zoned) with an existing community consisting of new and more established residential, business and local centre land uses. This growth area is expected to be development ready by 2018-2022 with approximately 400 hectares to accommodate 6,000 dwellings. Furthermore, the Whenuapai Structure Plan was adopted by Auckland Council (**AC**) in 2016 and sets out the framework for transforming Whenuapai from a semi-rural environment to an urbanised community over the next 10 to 20 years.

The Whenuapai Assessment Package will provide route protection for the local arterials, which include walking, cycling and public transport linkages needed to support the expected growth in Whenuapai.

This report assesses the transport effects of the North West Whenuapai Assessment Package identified in Figure 2-1 and Table 2-1 below.

Figure 2-1: North West Whenuapai Assessment Package



The Whenuapai Assessment Package comprises five separate Projects which together form the North West Whenuapai Arterial Network. The network includes provision for general traffic, walking and cycling, and frequent public transport

Refer to the AEE for a more detailed Project description.

Table 2-1: North West Whenuapai Assessment Package – Notices of Requirement and Projects

Notice	Project
NoR W1	Trig Road North
NoR W2	Māmari Road
NoR W3	Brigham Creek Road
NoR W4	Spedding Road
NoR W5	Hobsonville Road (alteration to existing designation 1437)

2.1 Purpose and Scope of this Report

This assessment forms part of a suite of technical reports prepared to support the assessment of effects within the Whenuapai Assessment Package. Its purpose is to inform the AEE that accompanies the four NoRs and one alteration to an existing designation for the Whenuapai Assessment Package sought by AT.

This report considers the actual and potential effects associated with the construction, operation and maintenance of the Whenuapai Assessment Package on the existing and likely future environment as it relates to transport effects and recommends measures that may be implemented to avoid, remedy and/or mitigate these effects.

The key matters addressed in this report are as follows:

a) Identify and describe the transport context of the Whenuapai Assessment Package area;
b) Identify and describe the actual and potential transport effects of each Project corridor within the Whenuapai Assessment Package;
c) Recommend measures as appropriate to avoid, remedy or mitigate actual and potential transport effects (including any conditions/management plan required) for each Project corridor within the Whenuapai Assessment Package; and
d) Present an overall conclusion of the level of actual and potential effects for each Project corridor within the Whenuapai Assessment Package after recommended measures are implemented.

This report should be read alongside the AEE, which contains further details on the history and context of each Project. The AEE also contains a detailed description of works to be authorised for each Project, likely staging and the typical construction methodologies that will be used to implement this work. These have been reviewed by the author of this report and have been considered as part of this assessment of transport effects. As such, they are not repeated here, unless a description of an activity is necessary to understand the potential effects, then it has been included in this report for clarity.

2.2 Preparation for this Report

In preparation for this report, several resources were used to support the assessment of transport effects. A Construction Method Statement has been provided by construction specialists for each NoR (summarised in the AEE), which was used to assess the actual and potential transport effects of the construction of each Project. In terms of operational effects, the inputs used for modelling purposes are discussed in greater detail in the Assessment Methodology.

A series of Business Cases and public engagement exercises have been undertaken over the past four years as part of a wider programme of transport initiatives needed to support the growth in this north-western part of Auckland. These include:

- Transport for Future Urban Growth Programme Business Case (2016)
- North West Indicative Business Case (IBC) (2018)
- North West Detailed Business Case (DBC) (2020)

3 Assessment Methodology

Given the long-term nature of the designations being sought by the NoRs, this assessment does not assess the interim staging of individual Projects and development staged over the next three decades but instead places a greater focus on the ‘full build out’ of the future urban area in 2048+ to support future communities. Therefore, this assessment focusses on the likely future environment (full build out 2048+) and wider infrastructure upgrades.

To ascertain the long-term effects of the Projects, this assessment assesses the transport effects arising from each of the Projects that comprise the Whenuapai Package in a future context.

The methodology for the operational and construction transport effects are applicable for each NoR specified within this document. Any nuances are specified throughout the assessment.

The Assessment of Transport Effects has two elements:

- Assessment of operational effects on the transport system
- Assessment of construction effects on the transport network

The assessment is targeted at route protection, rather than imminent implementation. As such, it:

- Makes greater use of generic cross-sections and design standards ·
- Focuses more on desired outcomes and footprints
- Takes a longer-term view, with its inherent uncertainties
- Assumes more use of recommended management plans and planning processes rather than specific design details to manage potential effects

A key element of the assessment is the definition of the ‘existing/likely future environment’, against which the effects are assessed. This is a complex issue as the proposed works are planned to support urban development and will be unlikely to occur without such development. Additionally, the source of the potential effects (such as people and vehicle movement), is generally from that urban development itself, rather than from the planned infrastructure.

To isolate the effects of the planned works, the ‘Existing Environment’ includes the likely future urban development but does not include the planned Projects for which designations are sought. The effects of the Projects are then assessed using the same land use assumptions. Given the long-term perspective of the assessment, the analysis is based on the estimated ‘full build out’ for the future urban area. This is based on development yield estimates provided by Auckland Council through the Whenuapai Structure Plan[2] process.

3.1 Approach to Assessment of Operational Transport Effects

Potential operational transport effects are assessed using: ·

- Transport planning assessment of expected outcomes and effects
- Transport modelling to inform demands and network performance
- Alignment with various policy documents

[2] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/place-based-plans/Documents/whenuapai-structure-plan-september-2016.pdf

In respect to each individual NoR, a separate assessment has been undertaken that provides an assessment of:

- Each mode of transport, and
- Access for existing properties
- Wider network effects

This section will outline the methodology for these assessments.

3.1.1 Transport Modelling

Throughout the transport network analysis process, a range of different transport modelling tools have been used to undertake quantitative assessments of the transport system. These then inform decisions about planning the transport network, corridors, and intersections.

The impacts of the Projects on the future transport environment are assessed using forecasting transport models, owned by the Auckland Forecasting Centre (AFC). The models include:

- The regional multi-modal model (MSM). This model creates estimates of car, truck and public transport movements at a regional level based on land use, network and policy inputs. This model is the primary tool to estimate future PT usage. Generally, this model is run using regional assumptions as per recent ATAP planning, but with scenario-specific inputs in the growth areas.
- A local traffic model (SATURN). This uses the traffic demands from MSM on a more detailed representation of the road network.
- A strategic active model (walk/cycling) model (SAMM). This tool gives strategic-level estimates of walking and cycling demands.

The assessment of operational effects will therefore be informed by modelled estimates of travel and network performance for a future full-build-out scenario.

A SATURN (North West Area) and MSM (Regional) model with forecast year of '2048+' for the wider network was used. The '2048+' forecast includes the regional growth estimated for the year 2048 but with the addition of full build-out in the greenfield growth areas. The SATURN model uses the demand outputs from MSM, which includes inputs of the latest land use assumptions (in this instance, referred to as land use scenario i11.5). The modelling includes an overall network of infrastructure identified to support growth in the North West area. This means that the assessment assumes that all other North West Supporting Growth Programme Projects are implemented and the growth up to 2048+ will progress as planned. All transport Projects assumed in the modelling are outlined in Appendix 1.

In addition to the SATURN modelling, SIDRA[3] modelling has been undertaken to assess the operational outputs of key intersections along the project corridors. The regional model (MSM) was used to inform assessment of the public transport network components.

In regard to traffic modelling analysis used in this report, a Level of Service (LOS) metric has been used. This refers to a qualitative measure used to assess the quality of motor vehicle traffic service. LOS is used to analyse road corridors and intersections by categorising traffic flow and assigning quality levels of traffic based on a performance measure ranging from A to F and can be summarised as follows:

[3] SIDRA modelling enables an assessment of individual intersections using inputs from regional models.

- **LOS A: free flow**. Traffic flows at or above the posted speed limit and motorists have complete mobility between lanes.
- **LOS B: reasonably free flow**. LOS A speeds are maintained, manoeuvrability within the traffic stream is slightly restricted.
- **LOS C: stable flow, at or near free flow**. Ability to manoeuvre through lanes is noticeably restricted and lane changes require more driver awareness.
- **LOS D: approaching unstable flow**. Speeds slightly decrease as traffic volume slightly increase. Freedom to manoeuvre within the traffic stream is much more limited and driver comfort levels decrease.
- **LOS E: unstable flow, operating at capacity**. Flow becomes irregular and speed varies rapidly because there are virtually no usable gaps to manoeuvre in the traffic stream and speeds rarely reach the posted limit.
- **LOS F: forced or breakdown flow.** Every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required. Travel time cannot be predicted, with generally more demand than capacity

3.1.2 Transport Guidance and Documents

Within this report, the Projects have also been considered against the outcomes and objectives of applicable transport design guidance and policy directives including:

- AT's Transport Design Manual, which sets out outcomes, engineering design and construction requirements for the Projects
- AT's Vision Zero, which adopts a "Safe System" approach to focus on road safety for all road users
- AT's Roads and Streets Framework (**RASF**)[4] was also used to qualitatively assesses the typology (movement and place value) and modal priority for each corridor. A 'mandate' for each road corridor is developed and approved by the Auckland Transport RASF Committee, comprising of senior officers from AT and AC.

3.1.3 Assessment Methodology - Transport Mode

Table 3-1 summarises how each mode/element of transport has been assessed in terms of operational effects as a result of the Projects.

Table 3-1: Summary of Assessment Methodology

Network Component	Information Source	Assessment Method
Safety	Crash Analysis (CAS) Database Project design drawings	Assessment to determine alignment with Vision Zero standards and design compliance with Transport Design Manual
Walking and Cycling	Walking and Cycling Network Plans Proposed Cross Sections	Assessment to determine alignment with walking and cycling strategic documents and design compliance with Transport Design Manual

[4] https://at.govt.nz/about-us/transport-plans-strategies/roads-and-streets-framework/

Network Component	Information Source	Assessment Method
Public Transport	Transport Model tools (MSM, SATURN and SIDRA) SGA Remix File[5]	Assessment to determine alignment with future network provisions and design compliance with the Transport Design Manual
General Traffic	Transport Model tools (MSM, SATURN and SIDRA) Project design drawings	Assessment using key model outputs including traffic volumes, levels of service for corridor midblock performance and intersection performance. Assessment of surrounding network connections
Access	Engineering Standards	Assessment identifying where there is a potential effect on access in the existing environment
Wider Network Effects	Transport Model tools (MSM, SATURN and SIDRA)	Assessment to consider how the corridor interacts with the surrounding road network
Note: A Road Safety and Audit and Safe System assessment with be done as part of the implementation business case/detailed design stage prior to implementation.		

3.1.4 Assessment of Project Objectives

Each Project included in the Whenuapai Assessment Package has an identified set of Project objectives. From a transport perspective, these objectives are focused predominantly on the themes of supporting growth, safety, urban form, mode shift/choice and connectivity. The assessment of these, and how they align with the Project Objectives are included in the AEE.

3.2 Approach to Assessment of Construction Effects

3.2.1 Construction Traffic Effects

In order to assess the potential construction traffic effects, an indicative construction methodology has prepared. This can be found in the AEE.

Based on the indicative construction methodology an assessment of construction effects has been completed for the package sufficient to support each Notice of Requirement. This assessment will consider:

- An overview of key considerations including speed, potential impacts to pedestrians and cyclists and property access
- Identification of any works that should not occur at the same time
- Assessment of potential conflict areas with vulnerable road users that will need specific mitigation within a Construction Traffic Management Plan (**CTMP**) and / or Site-Specific Traffic Management Plans (**SSTMP**).

[5] SGA Remix file provided by Auckland Transport on the draft plan of the bus network to be implemented by 2048

The Project specific construction effects will be managed via a CTMP and/or SSTMP which will be developed immediately prior to implementation when the greatest certainty is available.

3.2.2 Temporary Traffic Management

The impact of any temporary traffic management measures implemented to undertake the Projects will be confirmed as part of the CTMP prior to the construction phase of each project.

It is noted that there may be some nuances between projects delivered 'online' as they are existing roads and those delivered 'offline' as new greenfield roads. There are also corridors that are both existing and new roads such as NoR W2 Māmari Road. Therefore, the CTMP should consider potential road closures, any capacity reductions on key corridors through lane closures, and any other ancillary effects such as shoulder closures.

4 Whenuapai Assessment Package Overview

An overview of the Whenuapai Assessment Package is provided in Figure 4-1 below, with a brief summary of the Whenuapai Assessment Package projects provided in Table 4-1 below.

Figure 4-1: North West Whenuapai Assessment Package – Overview of NoRs for Assessment

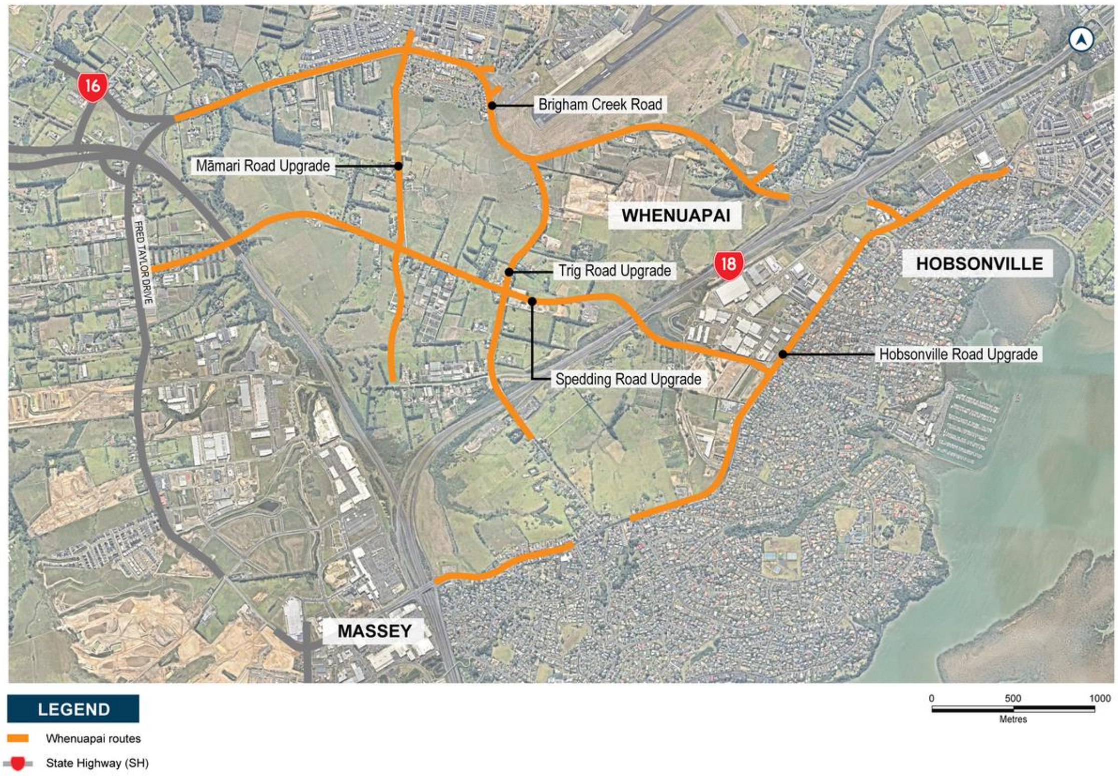


Table 4-1: Whenuapai Assessment Package Project Summary

Corridor	NOR	Description	Requiring Authority
Trig Road North	NoR W1	Upgrade of Trig Road corridor to a 24m wide two-lane urban arterial cross-section with separated active mode facilities on both sides of the corridor.	Auckland Transport
Māmari Road	NoR W2	Extension and upgrade of Māmari Road corridor to a 30m wide four-lane urban arterial cross-section providing bus priority lanes and separated active mode facilities on both sides of the corridor.	Auckland Transport
Brigham Creek Road	NoR W3	Upgrade of Brigham Creek Road corridor to a 30m wide four-lane arterial cross-section with separated active mode facilities on both sides of the corridor.	Auckland Transport
Spedding Road	NoR W4	Upgrade of the existing Spedding Road corridor and new east and west extensions to form a 24m wide two-lane arterial with separated active mode facilities on both sides of the corridor.	Auckland Transport

Corridor	NOR	Description	Requiring Authority
Hobsonville Road (alteration to existing designation 1437)	NoR W5	Alteration of the existing Hobsonville Road designation 1437 to provide for the widening of the Hobsonville Road corridor between Oriel Avenue and Memorial Park Lane. Upgrade of sections of Hobsonville Road corridor to a 30m wide four-lane cross section with separated active mode facilities on both sides of the corridor Upgrade of sections of Hobsonville Road corridor to a 24m wide two-lane cross section with separated active mode facilities on both sides of the corridor.	Auckland Transport

Please refer to the AEE for further information on these projects, including a Project description, key Project features and the planning context.

5 Whenuapai Package Construction Effects

5.1.1 Construction Traffic Effects Assessment

It is anticipated that the larger part of works required for this package of projects will likely be adjacent to or in the live carriageway, which means that temporary traffic management will be required. The scale of temporary traffic management to delineate live traffic away from the construction zones is largely dependent on the various stages and requirements of the construction activities. It is expected that short term temporary road closure for nights or weekends may be required for some specific activities, such as road surfacing, traffic switches and gas relocation. Other activities may require stop/go or contraflow traffic management, such as drainage, utility relocation, survey and investigation work.

Final temporary traffic management methods should be confirmed in the future as part of the CTMP for each project on the basis of the traffic environment. This will take into account the level of growth and activities that has occurred in Whenuapai, the availability of the alternative routes, and any additional sensitive land use activities.

The construction of the Projects will each likely require significant earthworks. Final cut and fill volumes will be confirmed following detailed design prior to construction. The construction traffic movements to accommodate the earthworks will likely result in the increase of traffic volume on construction routes used during the construction period of each of the Projects.

Given the construction timing and staging of the package has yet to be determined, there is a degree of uncertainty associated with any predicted construction methodology and associated traffic routes. This means:

- The routes that will be used by construction vehicles will depend on the location of quarries and disposal sites which are not yet certain
- The exact location and extent of compound sites/lay down areas has yet to be determined
- The timing of construction of other projects could impact on likely construction vehicle routes, for example, if Spedding Road is constructed prior or after to the upgrade of Brigham Creek Road, or Hobsonville Road

Notwithstanding this, it is considered that with available connectivity to the strategic network and available capacity in the network, construction traffic will be able to be readily accommodated.

It is noted that the access to compound sites/laydown areas and construction zone for construction vehicles, plant and materials will be via site access points identified as part of future CTMPs.

Details of the routes and time restrictions will need to be updated and refined as part of the CTMP process. It is anticipated that the routes for construction traffic will likely be limited to arterial corridors and intersections with the provision of adequate vehicle tracking. With Brigham Creek as a Level 1B freight route, it is recommended that this corridor is used where practicable.

Speed Limits

In order to maintain the safety of all road users, it is recommended to implement a safe and appropriate temporary speed limit during the construction period on the network within the extent of works, and along the construction routes if needed. This should be in accordance with the latest traffic management standards at the time of construction. These recommended measures and other measures highlighted in the CTMP are expected to reduce the potential safety risks that may be associated with construction traffic.

Pedestrians and cyclists

The existing provision for pedestrian and cyclists is variable across the network. It is likely that the demand for these modes will increase if urbanisation occurs prior to construction, but future parallel collectors could also be used as alternative routes. Therefore, effects should be assessed again when a greater level of detail is available about surrounding facilities and land use activities prior to construction. However, it is recommended that residents and stakeholders be kept informed of construction times and progress, and general observations of pedestrian and cyclist activity be used to inform appropriate traffic management measures in the CTMP.

Property access for residents and businesses

During the time of construction, there will be temporary traffic management controls such as temporary concrete or steel barriers. Existing driveways that remain during construction will be required to have temporary access provision. It is anticipated that the contractor should undertake a property specific assessment of any affected driveways and provide temporary access arrangements if required. The temporary access should ensure the ability for residents to safely access and exit the property. These requirements should be captured in the CTMP or SSTMP, if required. It is noted that significant land use change is expected along these key arterials, for example the Whenuapai town centre on Brigham Creek Road. As such, confirmation of traffic management controls will be required immediately prior to works to reflect the land use considerations at that time.

Land use activities that will need further consideration in the CTMP

The following table provides a summary of the key land use or activities that are located adjacent to the corridors and will need consideration during the development of the CTMP. This could include restricted truck movements during school pick up and drop off, or additional controls at key access locations. The below is not a final or complete list, with land use changes likely, this list will change over time.

Table 5-1: Sites for Consideration within future CTMP

Corridor	NoR	Sites for Consideration
Trig Road North	NoR W1	• Proposed Ministry of Education site at 13 -15 Trig Road
Māmari Road	NoR W2	• Timatanga Community School
Brigham Creek Road	NoR W3	• Whenuapai School • Whenuapai Kindergarten • Whenuapai town centre
Spedding Road	NoR W4	• No specific sites
Hobsonville Road (alteration to existing designation 1437)	NoR W5	• Hobsonville School • Hobsonville town centre

5.1.2 Temporary Traffic Management Effects Assessment

It is considered that temporary effects from the construction activities on network can be adequately managed through the implementation of a CTMP during the construction phase of each Project. The purpose of the CTMP is to ensure the construction of each Project is managed in such a way that enables safe and efficient movement of local traffic throughout the construction period and to minimise disruption to road users, particularly the adjacent residential properties and local activities. If required, SSTMP should be developed to manage constraints on access to affected properties.

5.1.3 Recommended Measures to Avoid, Remedy or Mitigate Construction Effects

It is considered that the potential construction traffic effects can be accommodated and managed appropriately via a CTMP. Based on the assessment of transport construction effects, it is recommended:

1) A CTMP shall be prepared prior to the Start of Construction for a Stage of Work. Any potential construction traffic effects shall be reassessed prior to construction taking into account the specific construction methodology and traffic environment at the time of construction.
2) The objective of the CTMP is to avoid, remedy or mitigate, as far as practicable, adverse construction traffic effects. To achieve this objective, the CTMP shall include:
   a) Methods to manage the effects of temporary traffic management activities on traffic;
   b) Measures to ensure the safety of all transport users;
   c) The estimated numbers, frequencies, routes and timing of traffic movements, including any specific non-working or non-movement hours to manage vehicular and pedestrian traffic near schools or to manage traffic congestion;
   d) Size access routes and access points for all construction vehicles, the size and location of parking areas for plant, construction vehicles, and the vehicles of workers and visitors;
   e) Identification of detour routes and other methods to ensure the safe management and maintenance of traffic flows, including pedestrians and cyclists, on existing roads;
   f) Methods to maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be;
   g) The management approach to loads on heavy construction vehicles, including covering loads of fine material, the use of wheel-wash facilities at site exit points and the timely removal of any material deposited or spilled on public roads;
   h) Method that will be undertaken to communicate traffic management measures to affected road users (e.g. residents/public/stakeholders/emergency services);
3) Auditing, monitoring and reporting requirements relating to traffic management activities shall be undertaken in accordance with Waka Kotahi's Code of Practice for Temporary Traffic Management.
4) Any CTMP prepared for a Stage of Work shall be submitted to Council for information ten (10) working days prior to the Start of Construction for a Stage of Work.

6 NoR W1: Trig Road North Upgrade

6.1 Project Corridor Features

6.1.1 Project Overview

Trig Road is an existing rural arterial road extending from Brigham Creek Road in the north to Hobsonville Road in the south, providing an important connection between Whenuapai and West Harbour as well as the connection to SH18 and Hobsonville Road though east facing ramps.

The Trig Road Upgrade extends from the intersection with Brigham Creek Road to south of the SH18 off-ramp. It is proposed to upgrade the Trig Road corridor from its current width of 20m to accommodate a 24m arterial cross section with separated cycle lanes and footpaths on both sides of the corridor. It includes the upgrade of intersections with Spedding Road West and tie-ins with the SH18 On Ramps.

An overview of the indicative proposed design is provided in Figure 6-1.

Figure 6-1: Overview of the Trig Road Upgrade

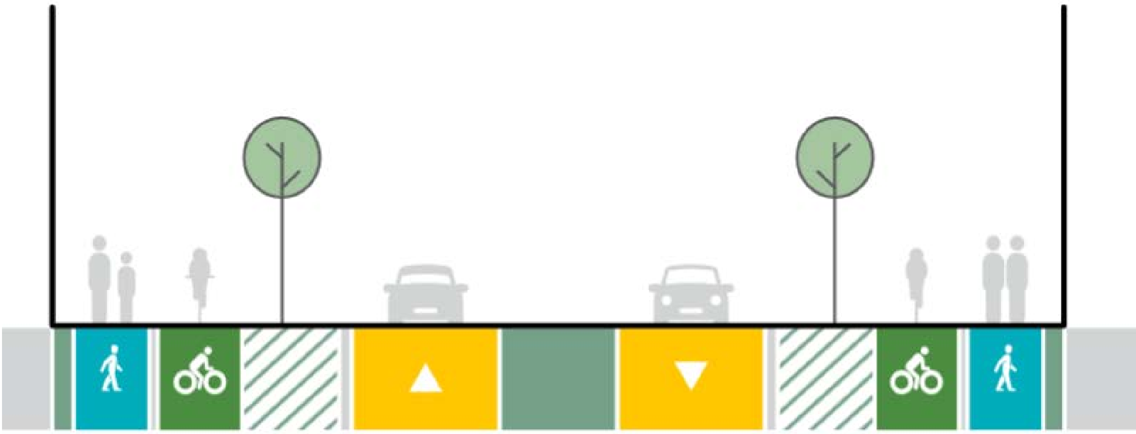
6.1.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the structure planning undertaken by Council. The wider networks were developed through the Te Tupu Ngātahi Business Case process that considered the key problems, benefits, outcomes and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Trig Road will change from a rural two-lane road to a lower-speed (50kph) urban two-lane arterial.

The existing corridor includes two vehicle lanes, one per direction, and a footpath on the western side only. The indicative proposed design includes the same number of general traffic lanes (two), with new facilities for walking and cycling as shown in Figure 6-2.

Figure 6-2: Indicative future Trig Road corridor design



The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of RASF framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

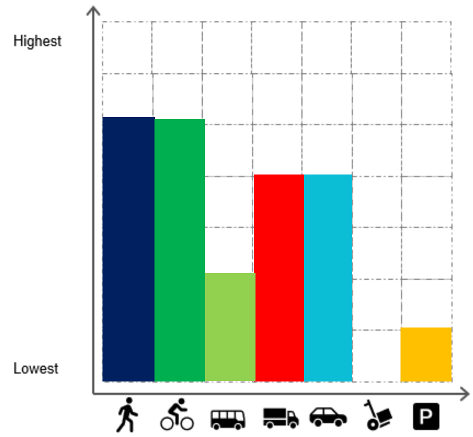
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

The corridor is assessed to have the following RASF typology:

- Place function - transitioning from P1 (rural) to P1 (local) long term
- Movement function – M2 (medium strategic significant) in the short term and longer term.

The following Figure 6-3 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic and freight. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more active modes of travel.

Figure 6-3: Future modal priority in 2048+ for Trig Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

The RASF is a tool that also acknowledges surrounding land use and integrates movement and place. As a future urban area, there remains a degree of uncertainty in regard to the future modal priority, and it is expected that the RASF assessment will be routinely reviewed to ensure that there is ongoing alignment with the transitional and final land use activities.

6.2 Existing and Likely Future Environment

6.2.1 Planning context

The Trig Road corridor runs through an existing rural environment, with the land either side of the corridor currently zoned FUZ under the AUP: OP.

The Whenuapai Structure Plan identifies the land adjacent to Trig Road as business and a potential Sports Park at the corner of Trig Road and Spedding Road.

The NZDF Air Base (Special Purpose - Airports and Airfields Zone) is located to the north of Trig Road on Brigham Creek Road. The airbase is designated (Designation 4310) for defence purposes by the Minister of Defence.

Table 6-1 below provides a summary of the Trig Road North existing and likely future environment.

Table 6-1: Trig Road Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[6]	Likely Future Environment[7]
Undeveloped greenfield areas	Future Urban Zone	High	Urban

[6] Based on AUP:OP zoning/policy direction
[7] Based on AUP:OP zoning/policy direction

Environment today	Zoning	Likelihood of Change for the environment[6]	Likely Future Environment[7]
New Zealand Defence Force Air Base	Special Purpose - Airports and Airfields Zone	Low	Urban

Please refer to the AEE for further information on the planning context.

6.2.2 Transport Environment

6.2.2.1 Existing

The existing corridor is predominantly surrounded by rural land. It is comprised of one vehicle lane in each direction, with a footpath on the western side.

Table 6-2 summarises the existing transport features of the Trig Road corridor.

Table 6-2: Trig Road: Existing Transport Features

Element	Existing Trig Road Transport Features
Corridor Characteristics	• 80kph speed limit north of Ryans Road. • Rural character with two vehicle lanes (one in each direction). • Corridor form is relatively consistent, with no kerb and channel on either side of the corridor and a footpath on the western side. A flush median is also provided where the corridor bridges SH18 and the motorway ramps connect.
Key Connections to the Wider Network	• Connects to Brigham Creek Road in the north • Connects to Hobsonville Road in the south • Connects to SH18 via east facing ramps
Traffic Volume	Recent traffic data for Trig Road was obtained from Auckland Transport[8]. The data was recorded in March 2018 and shows Trig Road (between Ryans Road and the Motorway Overbridge) carried a 5 Day Average Daily Traffic of approximately 7,300 vehicles per day (vpd), and 800 vehicles per hour (vph) during both morning and afternoon peak hours.
Road Network / General Traffic	• Trig Road / Spedding Road give-way. • Trig Road / Brigham Creek Road give-way with right turn bays. • Trig Road / SH18 On-Ramp (Northside Drive) give-way control with right turns queuing in the median. • Trig Road / SH18 Off-Ramp stop control with separated minor approach lanes
Walking and Cycling	A narrow footpath which is approximately 1.5 m wide on the western side of the corridor.
Public Transport	The 114 bus service currently operates on Trig Road and connects Hobsonville Point, Whenuapai and Westgate. This service operates at least every 60 minutes 7 days a week during core travel times (excluding mornings and evenings).

[8] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

6.2.2.2 Likely Future

The importance of Trig Road as a central north-south arterial is highlighted in the Whenuapai Structure Plan. It connects the suburbs of Whenuapai and West Harbour and provides connections to the east facing ramps for SH18, as well as Hobsonville Road, as shown in Figure 6-4.

Figure 6-4: Whenuapai Structure Plan – Trig Road

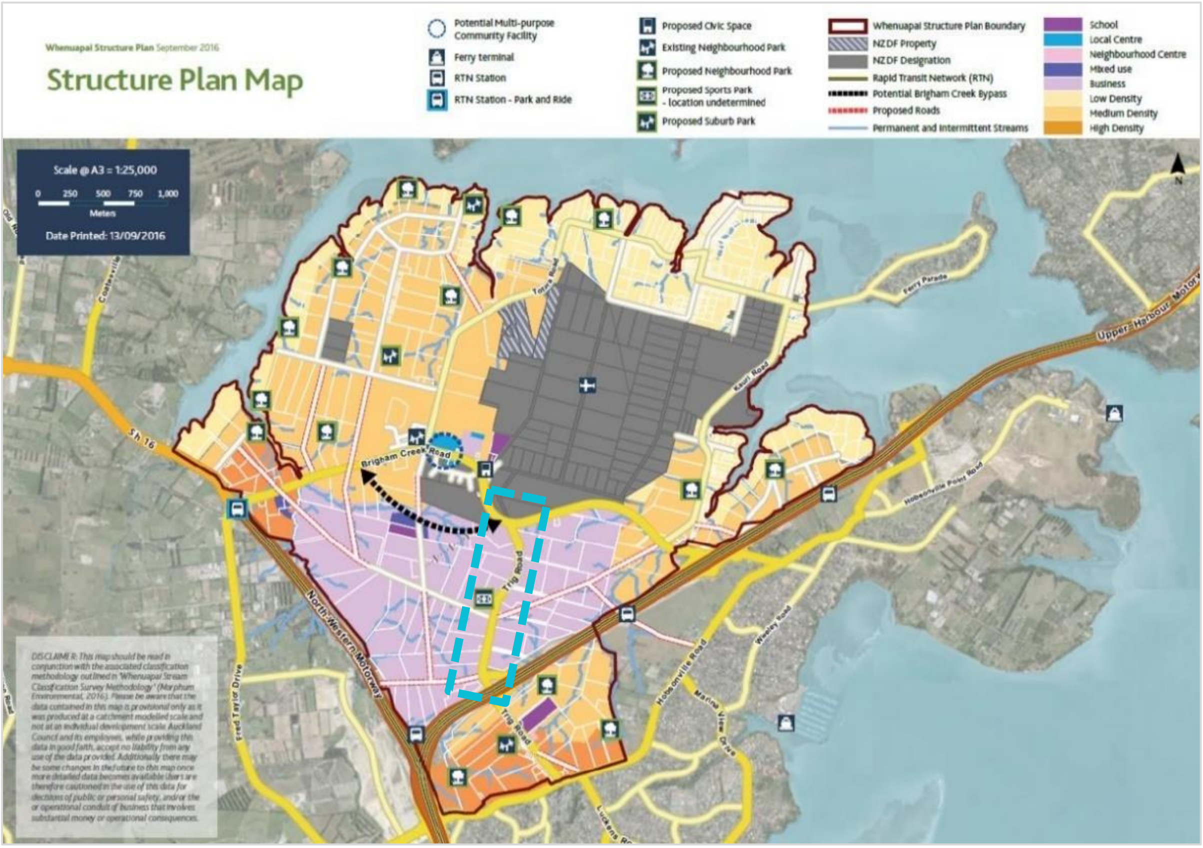


Table 6-3 summarises the likely future transport features of the Trig Road corridor.

Table 6-3: Trig Road: Likely Future Transport Features

Transport Features	Likely Future Trig Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with two vehicle lanes (one in each direction) and a central median. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities. • Generic two-lane arterial with a 24m designation.
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Trig Road in 2048 is 13,800 vehicles.
Road Network / General Traffic	• Trig Road / Spedding Road single lane roundabout. • Trig Road / Brigham Creek Road dual lane roundabout. • Trig Road / SH18/ Northside Drive On-Ramp signals. • Trig Road / SH18 Off-Ramp signals.

Transport Features	Likely Future Trig Road Transport Features
Walking and Cycling	Separated cycle lanes and footpaths on both sides.
Public Transport	Increased frequency from hourly to every 15 minutes under the indicative 2048 AT bus network.

Key features of the proposed new corridor include the following:

- Widening of Trig Road from its current general width of 20m to a 24m wide two-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections with Brigham Creek Road, and Spedding Road to accommodate proposed roundabouts, as well as localised widening around the intersections with the SH18 ramps to accommodate a signalised intersection.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- The addition of an active mode bridge to the existing bridge across SH18.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

6.3 Assessment of Operational Transport Effects

6.3.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Trig Road is expected to result in positive effects on safety when compared to the existing corridor, specifically:

- Significantly improved walking and cycling facilities along Trig Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Trig Road) at Brigham Creek Road and Spedding Road, resulting in a significantly safer environment for all road users.
- An improved speed environment by reducing speed limits to more appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (**DSIs**).

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Trig Road is developed. The traffic volume on Trig Road will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project has been designed to a 50km/h speed environment and provides segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will support a reduced number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

6.3.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Trig Road. It also includes sufficient space to provide dedicated pedestrian and cycle crossing facilities at Brigham Creek Road (NoR W3), Spedding Road (NoR W4), which connect with the expected future adjacent facilities. The specific design of these crossing facilities will be developed further at detailed design prior to implementation.

The proposed walking and cycling facilities along the corridor have been designed in accordance with relevant AT standards and policies as summarised in Table 6-4.

Table 6-4: Trig Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[9]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Trig Road are proposed to be 50km/hr, therefore the indicative proposed

[9] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf

Policy/Standard	Network Component	Assessment
		design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[10]	Footpaths: 1.8m minimum	A 1.8m footpath and a 2.0m cycle path has been allowed for within the proposed cross section. The total width of 6.8m is proposed from carriageway to road boundary. This is to provide for all TDM requirements.

Connecting to the facilities along the Trig Road North corridor is an active mode bridge, linking to the southern section of Trig Road. As the facility will be on one side of the bridge, crossing facilities will be provided at the intersection of Trig Road and SH18.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance and the Transport Design Manual.

The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Trig Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west and north-south walking and cycling connectivity.
- Lead to environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate and alongside SH18 in the longer term. (See Appendix 1 for further future network assumptions)
- Support growth adjacent to Trig Road and significantly improve safety and access to employment and social amenities.

6.3.3 Public Transport

The cross-section will provide adequate spacing to facilitate public transport and associated bus stops. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined, i.e. around centres and schools, for example.

For future public transport services, there is one proposed bus route that will use Trig Road, the 113 (Wisely Road) service between Northside Drive and Hobsonville Road. This service is forecast to operate four times an hour in both directions, and therefore operate at a 15-minute frequency.

The Project's potential operational effects on public transport are:

- Improved integration with the future public transport network and improved east-west and north-south connectivity, as well as improved access to employment and social amenities.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.

[10] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

- It will serve as a key enabler for greater use of public transport by providing a frequent connector route between urban areas and Westgate Metropolitan Centre.

6.3.4 General Traffic

As identified above, the 2048 ADT for Trig Road is 13,800 vehicles. Given that the peak hour volume is approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,380 vehicles. A two-lane corridor can efficiently accommodate 13,800 vehicles and therefore the proposed corridor design meets the forecasted needs. It is noted that the proposed traffic volumes as reported here are projections based on the implementation of the full network in Whenuapai. In terms of Trig Road, this assumes that Māmari Road, a parallel route, is also in place. Notwithstanding this, there is sufficient capacity within the corridor to accommodate a level growth prior to the implementation of Māmari Road.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 6-5.

Table 6-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Trig Road / Spedding Road (Single Lane Roundabout)	Morning Peak	A	0.659	55.9
	Evening Peak	A	0.615	45.8
Trig Road / Brigham Creek Road (Dual Lane Roundabout)	Morning Peak	A	0.311	17.6
	Evening Peak	A	0.226	9.5
Trig Road / SH18 On Ramp (Signals)	Morning Peak	C	0.878	99.5
	Evening Peak	C	0.840	98.1
Trig Road / SH18 Off Ramp (Signals)	Morning Peak	C	0.865	168.8
	Evening Peak	C	0.883	198.7

The overall LOS for all intersections is LOS C or below, with none of the intersection experiencing significant capacity constraints by 2048 (all intersections have degree of saturations below 0.9). Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

6.3.5 Access

As a future arterial corridor, the corridor is expected to be a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the east and west of Trig Road.

The collector network has been indicatively identified by the Whenuapai Structure Plan; however it is expected that this network will be subject to change as developers progress these connections through the plan change process. These will be assessed by standard planning and approval processes through Council.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways.

No change to access for any existing properties has been identified and no operational effects on egress and access to retained driveways has been identified.

As noted in Section 3.2, 13 – 15 Trig Road has an existing designation for a school. No specific design has been approved for this site, and as such access to the site will need to be further considered during the development of the CTMP should the school be present at the time of construction.

6.3.6 Freight

As an existing two-lane corridor, there is limited effects to freight movements. Proposed intersection upgrades will improve connections for turning movements and will improve reliability for the freight network.

Over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the implementation of individual corridor upgrades and further land use certainty in the future. It is noted that Trig Road is not currently identified by Auckland Transport as a freight route[11].

6.3.7 Wider Network Effects

As an existing two-lane corridor, the upgrade of Trig Road to an urban standard is considered to have no wider network effects in terms of traffic or freight. The provision of walking and cycling facilities will have a positive network effect on the walking and cycling connections, providing a strong north south corridor through the Whenuapai growth area.

6.4 Project Interdependencies

The Trig Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. These are discussed below.

[11] https://mahere.at.govt.nz/portal/apps/webappviewer/index.html?id=53d7df8746c049a1a4f7872312190001

6.4.1 Northside Drive

There is an existing designation for the Northside Drive connection from Trig Road through to SH16. This existing designation assumes a two-lane road that linked through to Westgate. There is currently no funding to implement the Northside Drive link.

The Northside Drive project has been further investigated as part of the State Highway 16 to 18 Connections project undertaken by Waka Kotahi. This project considered Northside Drive in further detail and proposed to provide additional capacity on this corridor and provide south facing ramps to State Highway 16. These proposed improvements have been included within the 2048+ modelling assessments, determining the intersection footprint.

This project currently is awaiting approval to proceed to the subsequent stage following investigations. Should implementation of the Trig Road corridor be undertaken prior to Northside Drive, further consideration should be given to interim intersection arrangements that support the final network.

6.4.2 Trig Road South

The Trig Road South project was initially identified as part of the Housing Infrastructure Fund programme of works. This identified an urbanised corridor with two traffic lanes and a two-way cycle facility on the eastern side of the corridor. NoR W1: Trig Road North Upgrade allows for a connection to these facilities, and ideally these two NoRs would be implemented concurrently. However, if this is not achievable, then consideration will need to be given during the subsequent design phase on how walking and cycling facilities in particular are integrated into the existing road corridor in a safe manner.

6.5 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

The Project provides significant positive effects and there are no operational adverse effects to mitigate.

6.6 Summary of Operational Transport Effects (NoR W1)

The operational transport effects are all positive and there are no adverse operational transport effects resulting from the Project. The assessment of transport effects for the Project is summarised in Table 6-6.

Table 6-6: Assessment of Operational Effects Summary for NoR W1 (Trig Road)

Operational Transport Effects	
Safety	In summary, the positive effects of the Project on safety are: • An improved speed environment by reducing speed limits to more appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (**DSIs**). • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.

Operational Transport Effects	
Walking and Cycling	In summary, the positive effects of the Project on walking and cycling are: • Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Trig Road. • Improve integration with the future walking and cycling network, resulting in improved north-south walking and cycling connectivity. • Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate and alongside SH18 in the longer term. • Support growth adjacent to Trig Road and significantly improve safety and access to employment and social amenities. • Improved connectivity to Trig Road South reducing existing severance as a result of SH18.
Public Transport	In summary, the positive effects of the Project on public transport are: • Good integration with the future public transport network and significantly improved north-south connectivity and improved access to employment and social amenities. • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability.
General Traffic	In summary, the positive effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth.
Access	In summary, there are no operational access effects identified for the project.
Freight	In summary, there are positive freight effects as a result of intersection upgrades improving access to the proposed commercial areas.
Wider Network Effects	In summary, there are no wider network effects identified for general traffic and freight movements. In terms of walking and cycling, there are positive network benefits through the provision of dedicated facilities on this key north-south spine.

6.7 Conclusions

Overall, the NoR W1: Trig Road Upgrade project provides positive transport effects, and there are no identified adverse effects. The project provides positive operational effects, in particular improved safety, walking and cycling effects.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to the Ministry of Education at 13 - 15 Trig Road should be specifically considered within the CTMP prior to construction and implementation of the Project.

7 NoR W2: Māmari Road Upgrade

7.1 Project Corridor Features

7.1.1 Project Overview

Māmari Road is an existing semi-rural road (noting that a section of the corridor is a paper road[12]) that extends from the intersection of Brigham Creek Road and Totara Road in the north to the intersection with Spedding Road in the south. The proposed Māmari Road Upgrade will extend the existing corridor south to connect with Northside Drive. This will provide a north-south connection between the northern parts of Whenuapai and the proposed employment/industrial zoned land in the south.

It is proposed to create a new Māmari Road corridor and widen the existing Māmari Road corridor from a 20m wide rural corridor to a 30m wide four-lane urban arterial with separated cycle lanes and footpaths on both sides of the corridor. Between Brigham Creek Road and Spedding Road, this involves the upgrade of the existing two-lane local road on the northern portion, a new corridor through a greenfield portion in the middle and the upgrade of a gravel road on the southern portion. Between Spedding Road and a future four-arm intersection with Northside Drive Extension, this involves a new greenfield corridor.

The Māmari Road Upgrade will provide an important Frequent Transit Network (**FTN**) bus link with public transport priority lanes to connect commuters from Whenuapai to the future City Centre to Westgate (**CC2W**) rapid transit station at Westgate. The intersection of Māmari Road and Brigham Creek Road is proposed to remain as a signalised intersection, and the intersection of Māmari Road and Spedding Road is proposed to be a roundabout. An overview of the indicative proposed design is provided in Figure 7-1.

[12] An unformed legal road (or 'paper road') is a legally recognised road that is undeveloped or partly formed but provides public access to a particular area or feature. Auckland Transport, 2021.

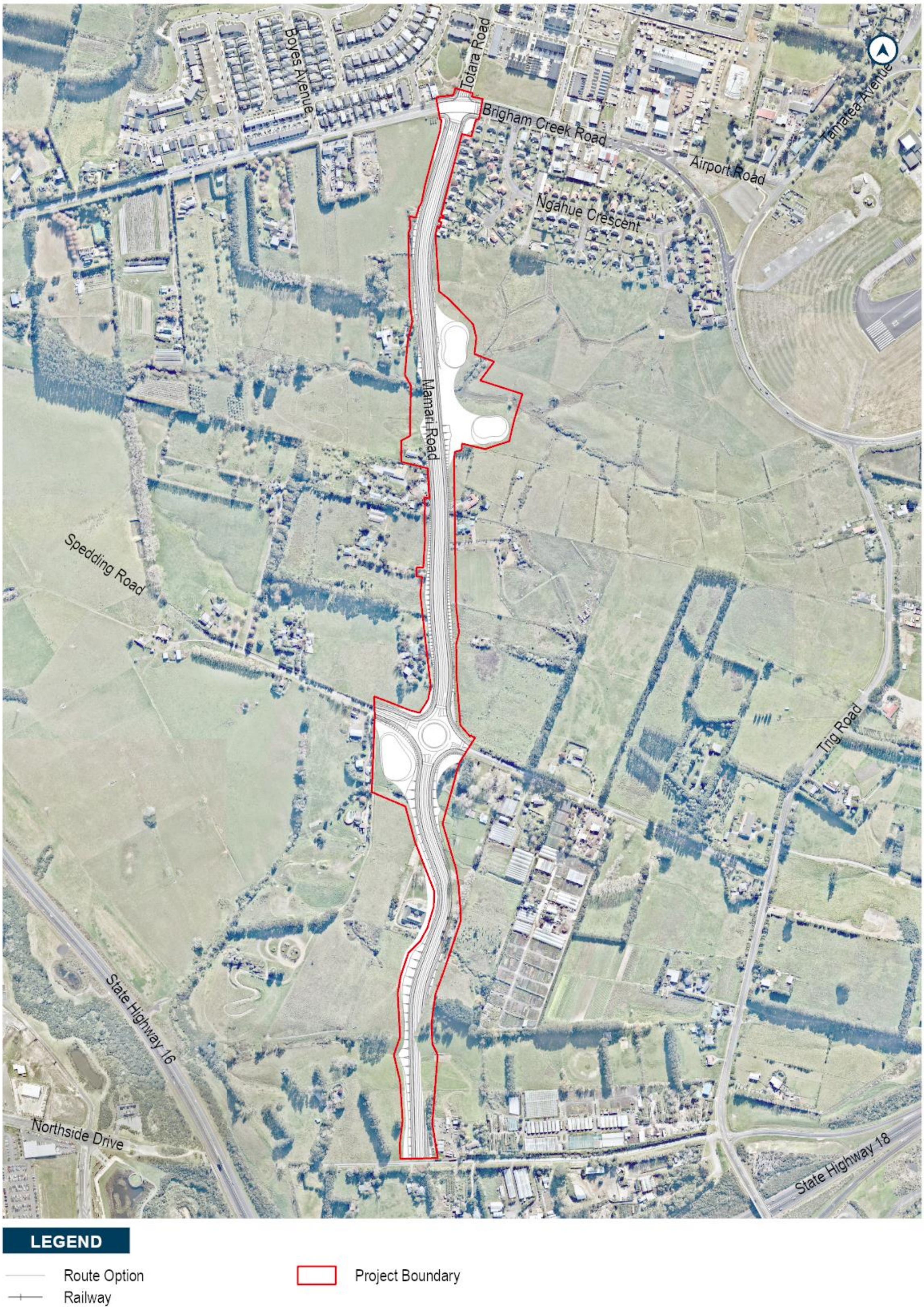


Figure 7-1: Overview of the Māmari Road Upgrade

7.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the structure planning undertaken by the Council. The wider networks were developed through the Business Case process that considered the key problems, benefits, outcomes and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Māmari Road will change from an existing rural two-lane road to a low-speed urban four-lane arterial (using AT standards) with mixed components for vehicles, PT, and active modes.

The existing corridor is narrow and includes two general vehicle lanes, one per direction. The indicative proposed design also includes two additional public transport lanes, as well as new facilities for walking and cycling as shown in Figure 7-2.

Figure 7-2: Indicative future Māmari Road corridor design

The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

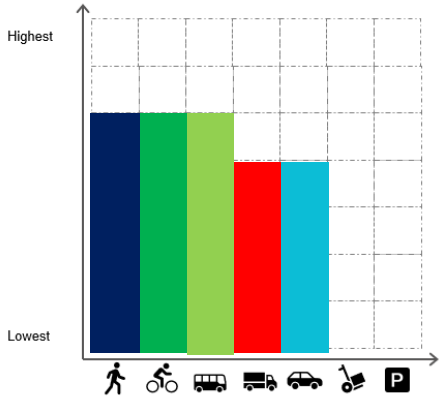
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

The corridor is assessed to have the following RASF typology:

- Place function - transitioning from P1 (rural) to P1 (mixed urban) long term
- Movement function - transitioning from M1 (low strategic movement) to M2 (medium strategic network function) long term

The following Figure 7-3 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to active modes and public transport.

Figure 7-3: Future modal priority in 2048+ for Māmari Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
	Parking and Access

7.3 Existing and Likely Future Environment

7.3.1 Planning context

The northern section of Māmari Road to Spedding Road is an existing road corridor (although a section of the road is a 'paper road'). The eastern side is predominantly zoned under the AUP:OP as FUZ, with a portion of Residential – Single House Zone. The Single House Zone forms part of the NZDF Air Base designation (Designation 4310, Minister of Defence). The western side is also predominantly FUZ. The Whenuapai Structure Plan indicates that the FUZ land will be re-zoned medium residential to the north (east side of Māmari only) and business to the south.

The southern extension to Māmari Road extends across land which is zoned FUZ and is currently undeveloped and in rural use. The Whenuapai Structure Plan indicates that the FUZ land will be re-zoned for business.

Table 7-1 below provides a summary of the Māmari Road existing and likely future environment.

Table 7-1: Māmari Road Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[13]	Likely Future Environment[14]
Residential	Residential	Low	Residential
Undeveloped greenfield areas	Future Urban	High	Urban
Timatanga Community School	Special Purpose - School Zone	Low	Urban

Please refer to the AEE for further information on the planning context.

13 Based on AUP:OP zoning/policy direction
14 Based on AUP:OP zoning/policy direction

7.3.2 Transport Environment

7.3.2.1 Existing

The existing corridor is predominantly surrounded by greenfield land.

Table 7-2 summarises the existing transport features of the Māmari Road corridor between Brigham Creek Road and Spedding Road. There are no existing features for the extension between Spedding Road and Northside Drive

Table 7-2: Māmari Road: Existing Transport Features

	Existing Māmari Road Transport Features

Corridor Characteristics	• Northern segment
	  ◦ Has a 50kph speed limit.
	  ◦ Semi-urban character with two vehicle lanes (one in each direction).
	  ◦ Corridor form is inconsistent with formal kerb and channel near the intersection with Brigham Creek Road.
	  ◦ Continuous footpath on the eastern side.
	• Southern segment
	  ◦ Has an 80kph speed limit/
	  ◦ Rural character with two unmarked unsealed vehicle lanes (one in each direction).
	  ◦ Corridor form is consistent, with no kerb and channel on either side of the corridor and no footpaths.

Key connections to the wider network	• Connects to Brigham Creek in the north, and Spedding Road in the soth. • The current road is not a through road, with parts of the corridor being a paper road.
Traffic Volume	The latest traffic data for Māmari Road was obtained from Auckland Transport[15]. The data was recorded in February 2020 and shows Māmari Road (between Spedding Road and the end) carried a 5 Day Average Daily Traffic of approximately 130 vehicles per day (vpd), and 20-40 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic	• Māmari Road / Brigham Creek Road signals. • Māmari Road / Spedding Road give-way. • Māmari Road / Northside Drive no existing intersection.
Walking and Cycling	A narrow footpath which is approximately 1.5 m wide is provided on the eastern side of the northern segment of the corridor.
Public Transport	There are no existing bus services on Māmari Road.

[15] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

7.3.2.2 Likely Future

The importance of Māmari Road as a north-south arterial is highlighted in the Whenuapai Structure Plan. It is proposed to connect the centre of Whenuapai at Brigham Creek Road and to Northside Drive in the south as shown in Figure 7-4.

Figure 7-4: Whenuapai Structure Plan – Māmari Road

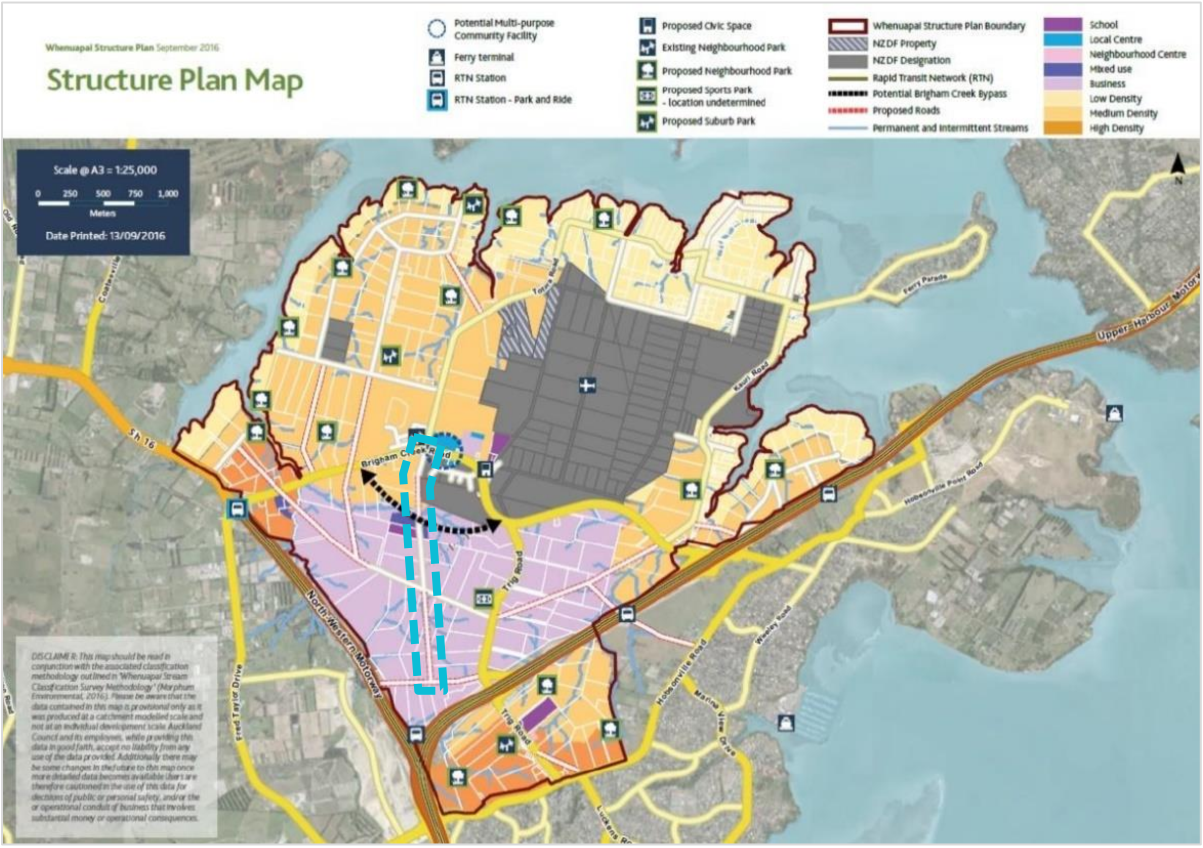


Table 7-3 summarises the likely future transport features of the Māmari Road corridor.

Table 7-3: Māmari Road: Likely Future Transport Features

	Likely Future Māmari Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with four vehicle lanes, two of which are dedicated for buses (two in each direction) and a central median. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities.
Key Network Connections	• Connect to Brigham Creek Road in the north. • Connect to Spedding Road to the south. • Connect to Northside Drive in the south
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Māmari Road in 2048 is 15,800 to 16,900 vehicles.

	Likely Future Māmari Road Transport Features
Road Network / General Traffic	• Māmari Road / Brigham Creek Road signals. • Māmari Road / Spedding Road dual lane roundabout. • Māmari Road / Northside Drive signals.
Walking and Cycling	Separated cycle lanes and footpaths on both sides.
Public Transport	The indicative 2048 AT bus network forecasts 16 buses per hour on Māmari Road, or approximately a bus every 5 minutes.

Key features of the proposed new corridor include the following:

- Widening of Māmari Road from its current general width of 20m to a 30m wide four-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections with Spedding Road to accommodate proposed roundabout, and localised widening around the intersection of Māmari Road with Northside Drive to accommodate a signalised intersection.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

7.4 Assessment of Operational Transport Effects

7.4.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Māmari Road is expected to result in positive effects on safety when compared to the existing corridor, and these consist of:

- Significantly improved, and new, walking and cycling facilities along Māmari Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved, and new, walking and cycling crossing facilities (crossing Māmari Road) at Brigham Creek Road and Spedding Road intersection, resulting in a significantly safer environment for all road users.
- An improved speed environment by reducing speed limits to more appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (**DSIs**).

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Māmari Road is developed. The traffic volumes on Māmari Road will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project has been designed to 50km/h and provides segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will likely reduce the number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

7.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Māmari Road. It also includes dedicated pedestrian and cycle crossing facilities at Brigham Creek Road (NoR W3), Spedding Road (NoR W4), and Northside Drive, which connect with expected future adjacent facilities.

The proposed walking and cycling facilities have been designed in accordance with relevant AT standards and policies as summarised in Table 7-4.

Table 7-4: Māmari Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[16]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Māmari Road are proposed to be 50km/hr, therefore the indicative proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[17]	Footpaths: 1.8m minimum	A 1.8m footpath is has been allowed for on all corridors and a 2.0m cycle path. The total width of 6.8m is provided from carriageway to road boundary. This is in accordance with the AT TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by vision zero guidance. The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Māmari Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west and north-south walking and cycling connectivity.
- Lead to environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate.
- Support growth surrounding Māmari Road and significantly improve safety and access to employment and social amenities.

7.4.3 Public Transport

The Māmari Road corridor will provide for dedicated bus lanes that connect Whenuapai town centre with Northside Drive – connecting on to Westgate centre and the future SH18 RTN.

[16] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[17] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

For future public transport services, there is one core proposed frequent bus service which will use Māmari Road. This service is forecast to operate every five minutes in the peak commute hours, and every 10 minutes outside of the peak. With this level of frequency, dedicated bus lanes will enable reliable and consistent travel times for buses.

The cross-section will provide adequate spacing to facilitate public transport and associated bus stops. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined, i.e. around centres and schools for example.

The Project's potential operational effects on public transport are:

- Reduced delays and improved reliability for future frequent public transport network on Māmari Road and the wider network.
- Improved integration with the future public transport network and improved north-south connectivity, as well as improved access to employment and social amenities.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.

7.4.4 General Traffic

As identified above, the 2048 ADT for Māmari Road is between 15,800 and 16,900 vehicles per day. Given that the peak hour volume is typically approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,600 vehicles. A two-lane corridor can efficiently accommodate 16,900 vehicles and therefore the proposed corridor design meets the forecasted needs, with the additional lane provision to accommodate greater bus priority.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 7-5.

Table 7-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Māmari Road / Brigham Creek Road (Signalised Intersection with Bus Priority measures)	Morning Peak	E	0.905	345.8
	Evening Peak	D	0.884	228.8
Māmari Road / Spedding Road (Roundabout)	Morning Peak	B	0.723	61.3
	Evening Peak	B	0.938	154.3

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Māmari Road / Northside Drive (Signals)	Morning Peak	C	0.805	111.4
	Evening Peak	C	0.807	102.6

The overall level of service for the intersection of Brigham Creek and Māmari Road performs the worst of the intersections on the corridor. It is noted that this while there are delays at the intersection, this is not considered to be unexpected for private vehicles in the peak period, and bus priority movements for the through travelling buses will be facilitated from the curb side lane. It is also noted that the regional modelling completed doesn't not allow for all future alternative routes, resulting in higher traffic volumes. This can therefore be considered a conservative assessment of the overall level of service.

Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048+ scenario.

7.4.5 Access

As a future arterial corridor, Māmari Road is expected to be a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the east and west of Māmari Road.

The collector network has been indicatively identified by the Whenuapai Structure Plan; however it is expected that these will be subject to change as developers progress these connections through the plan change process. These will be assessed by standard planning and approval processes through Council.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways. There are no specific properties that have been included within the designation for this purpose and all existing driveways are expected to be able to be reinstated.

As noted in Section 3.2, Timitanga Community School has been identified as a potential sensitive receiver. Access to the school can be maintained and has been provided for with the designation. It is noted that particular consideration to access during construction will need to be provided prior to construction as part of the recommended CTMP in Section 5.1.3.

7.4.6 Freight

The provision of a new north south corridor, connecting from Brigham Creek Road to Northside Drive will provide improved network resilience for freight movements in Whenuapai.

Over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the implementation of individual corridor upgrades and further land use certainty in the future. It is noted that Māmari Road is not currently identified by Auckland Transport as a freight route.[18]

7.4.7 Wider Network Effects

The Māmari Road project provides a strong north-south public transport corridor connecting Brigham Creek through the future Northside Drive connection. This contributes to improved public transport network effect by providing a reliable public transport corridor connecting central Whenuapai to the Westgate metropolitan centre in the longer term. In addition to this, in the longer term there remains an opportunity to connect this corridor to the future SH18 RTC (this is a non-SGA project).

In terms of walking and cycling the project provides improved network options for active modes, through the provision of dedicated facilities.

General traffic and freight will also benefit in terms of improved network resilience, with the connection to Northside providing alternative connectivity to the State Highway network, in particular to SH16 where the current connections are at Hobsonville Road and Brigham Creek Road.

Overall, the wider network effects of the project are considered positive, providing improved north south movements for all modes and supporting improved overall resilience in the network.

7.5 Project Interdependencies

The Māmari Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. These are discussed below.

7.5.1 Northside Drive

The Māmari Road corridor connects in the south to the Northside Drive corridor. This Northside Drive connection through to an overbridge with SH16 has been allowed for within the 2048+ assessments, determining the intersection footprint. There is an existing designation in place for Northside Drive (Designation 1473) which enables a two lane road corridor.

The Northside Drive project has been investigated as part of the State Highway 16 to 18 Connections project undertaken by Waka Kotahi. This project considered Northside Drive and the provision of south facing ramps to State Highway 16. These proposed improvements have been included within the full 2048+ network.

This project currently is awaiting approval to proceed to the subsequent stage following investigations.

While the majority of the Māmari Road corridor – including connections with Spedding Road - could be implemented prior to the delivery of Northside Road with no adverse effect, the full benefits particularly from a public transport perspective will not be realised until the Northside Drive connection is completed.

[18] https://mahere.at.govt.nz/portal/apps/webappviewer/index.html?id=53d7df8746c049a1a4f7872312190001

7.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

The Project provides significant positive effects. The one adverse effect identified is related to access at 18 Māmari Road, and this property is recommended for inclusion within the designation boundary.

7.7 Summary of Operational Transport Effects (NoR W2)

The assessment of transport effects for the Project is summarised in Table 7-6: Assessment of Operational Effects Summary for NoR W2 (Māmari Road).

Table 7-6: Assessment of Operational Effects Summary for NoR W2 (Māmari Road)

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • A significantly improved speed environment by providing speed limits appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs). • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Significantly reduced the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Māmari Road. • Improve integration with the future walking and cycling network, resulting in improved north-south walking and cycling connectivity. • Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate • Support growth adjacent to Māmari Road and significantly improve safety and access to employment and social amenities.
Public Transport	In summary, the effects of the Project on public transport are: • Improved reliability and travel time for frequent public transport services. • Excellent integration with the future public transport network and significantly improved north-south connectivity and improved access to employment and social amenities. • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability.
General Traffic	In summary, the effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth
Access	In summary, access on the Māmari Road corridor can generally be maintained. No other operational access effects have been identified.
Freight	In summary, the provision of a new north south corridor, connecting from Brigham Creek Road to Northside Drive will provide improved network resilience for freight

Operational Transport Effects	
	movements in Whenuapai. The corridor will also provide a direct link to the SH16 to SH18 connections provide freight efficient connectivity to the strategic network.
Wider Network Effects	In summary there are positive wider network effects for all modes. In particular there are positive effects for public transport, freight and vehicle movements through the provision of a new north south connections through the Whenuapai growth area.

7.8 Conclusions

Overall, the NoR W2: Māmari Road Upgrade project provides positive transport effects, particular improved safety, walking and cycling and public transport effects and there are no identified adverse operational effects.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Timitanga Community School at 9 Māmari Road should be specifically considered within the CTMP prior to construction and implementation of the Project.

8 NoR W3: Brigham Creek Road Upgrade

8.1 Project Corridor Features

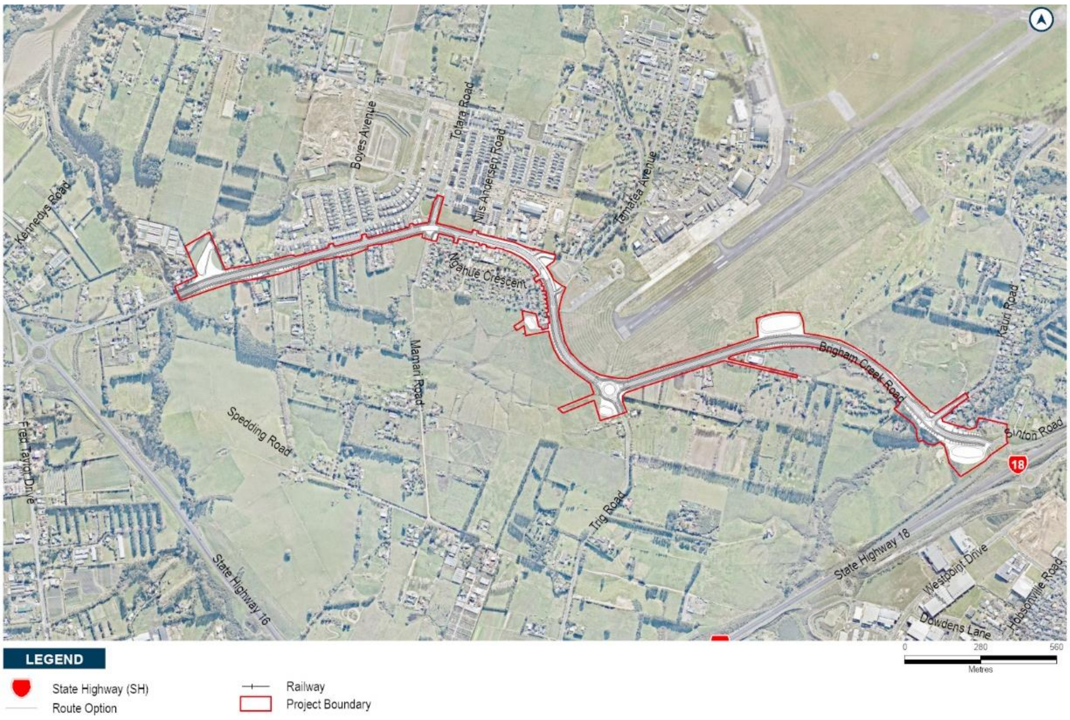
8.1.1 Project Overview

Brigham Creek Road is an existing arterial road that extends from the intersection with the SH16 in the west to the intersection with Hobsonville Road to the east. The proposed upgrade extends from the eastern side of the existing Totara Creek bridge in the west, to Kauri Road near the existing SH18 Brigham Creek Interchange in the east. This proposed upgrade runs through an existing rural environment on each end, with the middle section being a mix of town centre, industrial and residential environments. The proposed corridor upgrade will provide an east-west connection for all modes within Whenuapai and access SH16, SH18 and local destinations such as Hobsonville and Kumeū-Huapai.

It is proposed to widen the existing two-lane arterial from an approximately 20m width to a 30m wide four-lane arterial cross-section with walking and cycling facilities on both sides. This includes upgrades to the intersections with Totara Road/Māmari Road, Trig Road and Kauri Road.

An overview of the indicative proposed design is provided in Figure 8-1 below.

Figure 8-1: Overview of the Brigham Creek Upgrade



8.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the structure planning undertaken by the Council. The wider networks were developed through the Business Case process that considered the key problems, benefits, outcomes and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Brigham Creek Road will change from an existing two-lane road to a low-speed urban four-lane arterial (using AT standards). The form and function of Brigham Creek Road will change slightly through various segments of the corridor, with the western and eastern segments being adjacent to residential and the central segment adjacent to the commercial centre. As such, the designation provides flexibility for the cross section to change along the length of the Brigham Creek Road corridor, reallocating the 30m corridor to best accommodate vehicles, public transport, active modes and freight.

The indicative proposed design includes two additional vehicle traffic lanes, as well as new facilities for walking and cycling as shown in Figure 8-2, Figure 8-3, and Figure 8-4. Through the central portion of Brigham Creek Road (between Totara Road and Tamatea Avenue) the median allowance will be removed, with the space reallocated to allow for activated frontages within the town centre.

Figure 8-2: Indicative future Brigham Creek corridor between the Interchange and Totara Road

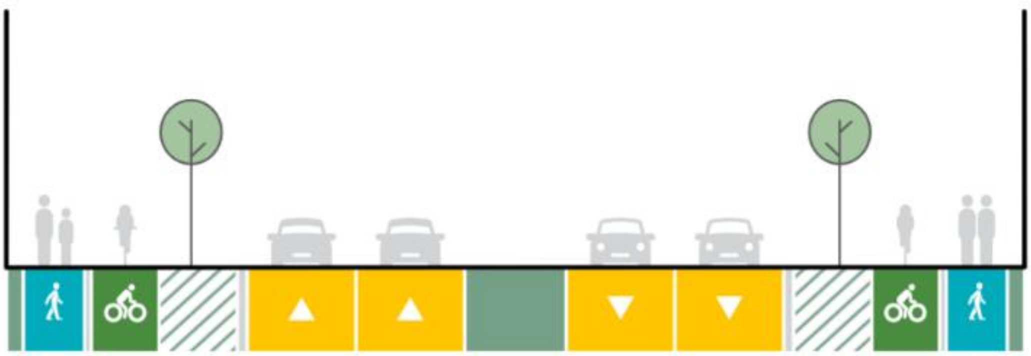
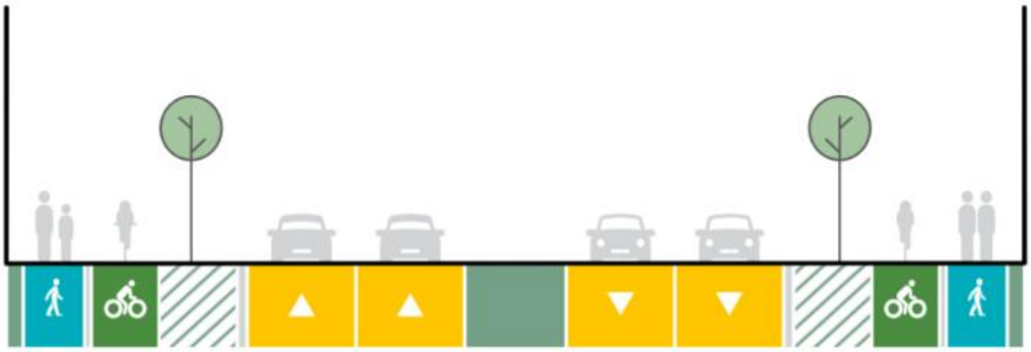


Figure 8-3: Indicative future Brigham Creek corridor between Totara Road and Tamatea Avenue

Figure 8-4: Indicative future Brigham Creek corridor between Tamatea Avenue and SH18 Interchange



The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

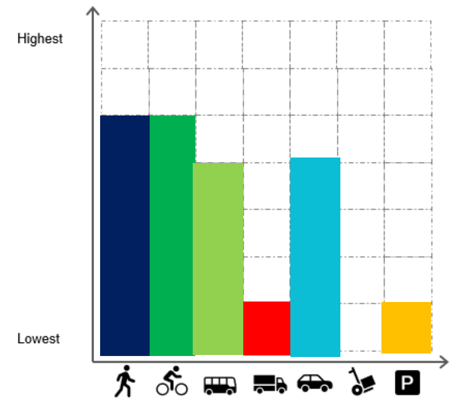
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

The corridor is assessed to have the following RASF typology:

- Place function - transitioning from P1 (rural) to P1 (local) long term
- Movement function - transitioning from M2 (medium strategic movement) to M3 (high strategic movement) long term

The following figures indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to active modes and public transport.

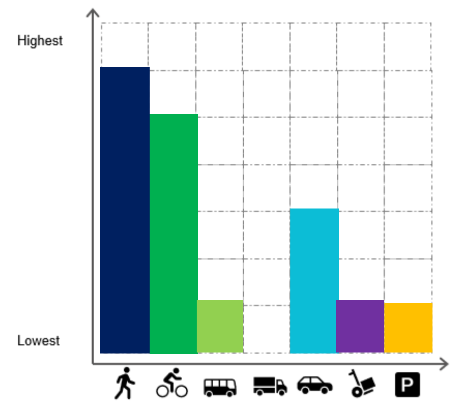
Figure 8-5: Future modal priority in 2048+ for Brigham Creek Road between the Interchange and Totara Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

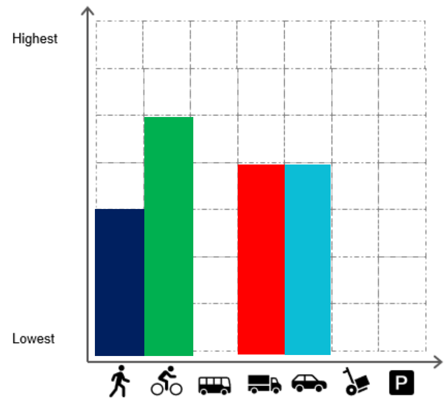
Figure 8-6: Future modal priority in 2048+ for Brigham Creek Road between Totara Road and Tamatea Avenue



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

Figure 8-7: Future modal priority in 2048+ for Brigham Creek Road between Tamatea Avenue and SH18 Interchange



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access

8.3 Existing and Likely Future Environment

8.3.1 Planning context

The land adjacent to Brigham Creek Road is zoned under the AUP:OP as FUZ, except within the existing Whenuapai Centre (which is zoned under the AUP:OP for a range of residential and business zones) and the Whenuapai NZDF airbase. The airbase is designated (Designation 4310) for defence purposes by the Minister of Defence. The designation also includes the Residential – Single House Zone within the Whenuapai Centre.

Whenuapai Structure Plan identifies medium density residential and business land uses to the south of Brigham Creek Road, with medium density residential land uses identified to the north.

Table 8-1 below provides a summary of the Brigham Creek Road existing and likely future environment

Table 8-1: Brigham Creek Road Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[19]	Likely Future Environment[20]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (Local centre)	Low	Business (Local centre)
Residential	Residential	Low	Residential
Open Space	Open Space –Informal Recreation Zone	Low	Open Space

[19] Based on AUP:OP zoning/policy direction
[20] Based on AUP:OP zoning/policy direction

Environment today	Zoning	Likelihood of Change for the environment[19]	Likely Future Environment[20]
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban
New Zealand Defence Force Air Base	Special Purpose - Airports and Airfields Zone	Low	Special Purpose – Airports and Airfields Zone

Please refer to the AEE for further information on the planning context.

8.3.2 Transport Environment

8.3.2.1 Existing

The existing corridor is predominantly surrounded by greenfields land, with the exception of the central portion of the corridor which is adjacent to the Whenuapai Airbase and a pocket of residential density.

Table 8-2 summarises the existing transport features of the Brigham Creek Road corridor.

Table 8-2: Brigham Creek Road: Existing Transport Features

	SH16 to Totara Rd	Totara Rd to Tamatea Ave	Tamatea Ave and SH18
Corridor Characteristics	• Has an 80kph speed limit • Semi-rural character with two vehicle lanes (one in each direction) • Corridor form is inconsistent with formal kerb and channel, footpath, bicycle lane, and indented parking adjacent to the recent development • Arterial classification in the Auckland Unitary Plan	• Has a 50kph speed limit • Semi-urban character with two vehicle lanes (one in each direction) • Corridor form is consistent with formal kerb and channel and footpaths • Continuous bicycle path on the northern side • On street parking provided within town centre on southern side adjacent to shops	• Has an 80kph speed limit • Semi-rural character with two vehicle lanes (one in each direction) • Corridor form is inconsistent with formal kerb and channel in some locations • Continuous shared path/footpath on the northern side, discontinuous footpath on the southern side
Key connections to the wider network	• Brigham Creek Road is a critical connection in the existing network. The corridor connects State Highway 16 to State Highway 18, providing a key strategic link currently not provided by the strategic network. • The corridor is also the main spine route through the Whenuapai area and provides access to the Whenuapai Airbase.		
Traffic Volume	The latest traffic data for was obtained from Auckland Transport[21]. The	The latest traffic data for was obtained from Auckland Transport[22]. The	The latest traffic data for was obtained from Auckland Transport[23]. The

[21] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/
[22] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/
[23] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

	SH16 to Totara Rd	Totara Rd to Tamatea Ave	Tamatea Ave and SH18
	data was recorded in September 2019 and shows Brigham Creek Road (between SH16 and Joseph McDonald Drive) carried a 5 Day Average Daily Traffic of approximately 14,400 vehicles per day (vpd), and 1,200-1,300 vehicles per hour (vph) during the morning and afternoon peak hours.	data was recorded in September 2019 and shows Brigham Creek Road (between Airport Road and the Speed Derestriction) carried a 5 Day Average Daily Traffic of approximately 15,000 vehicles per day (vpd), and 1,300-1,400 vehicles per hour (vph) during the morning and afternoon peak hours.	data was recorded in September 2019 and shows Brigham Creek Road (between SH16 and Joseph McDonald Drive) carried a 5 Day Average Daily Traffic of approximately 14,400 vehicles per day (vpd), and 1,300-1,600 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic	• Brigham Creek Road / Joseph MacDonald Drive priority controlled • Brigham Creek Road / Boyes Avenue priority controlled • Brigham Creek Road / Totara Road / Māmari Road signals	• Brigham Creek Road / Ngahue Crescent priority controlled • Brigham Creek Road / Nils Anderson Road priority controlled • Brigham Creek Road / Tamatea Road priority controlled	• Brigham Creek Road / Trig Road priority controlled • Brigham Creek Road / Kauri Road priority controlled • Brigham Creek Road / SH18 connections roundabouts
Walking and Cycling	A 1.8 m wide footpath and protected cycle lanes are provided adjacent to the recent development.	A narrow footpath which is approximately 1.5 m wide is provided on both sides, and a 1.8 m bicycle path is provided on the northern side.	A 3.0 m shared path is provided for majority of this section on the northern side. A narrow footpath which is approximately 1.5 m wide is provided in some sections on the southern side.
Public Transport	The 114 bus service currently operates on sections of Brigham Creek Road and connects Hobsonville Point, Whenuapai and Westgate. This service operates at least every 60 minutes 7 days a week during core travel times (excluding mornings and evenings).		

8.3.2.2 Likely Future

The importance of Brigham Creek Road as an east-west arterial is highlighted in the Whenuapai Structure Plan. It connects SH16 to SH18, via Whenuapai Centre, as shown in Figure 8-8. This function will continue in the longer term, however, will be less critical following the provision of SH16 to SH18 connections as detailed in Section 8.5.1.

Figure 8-8: Whenuapai Structure Plan – Brigham Creek Road

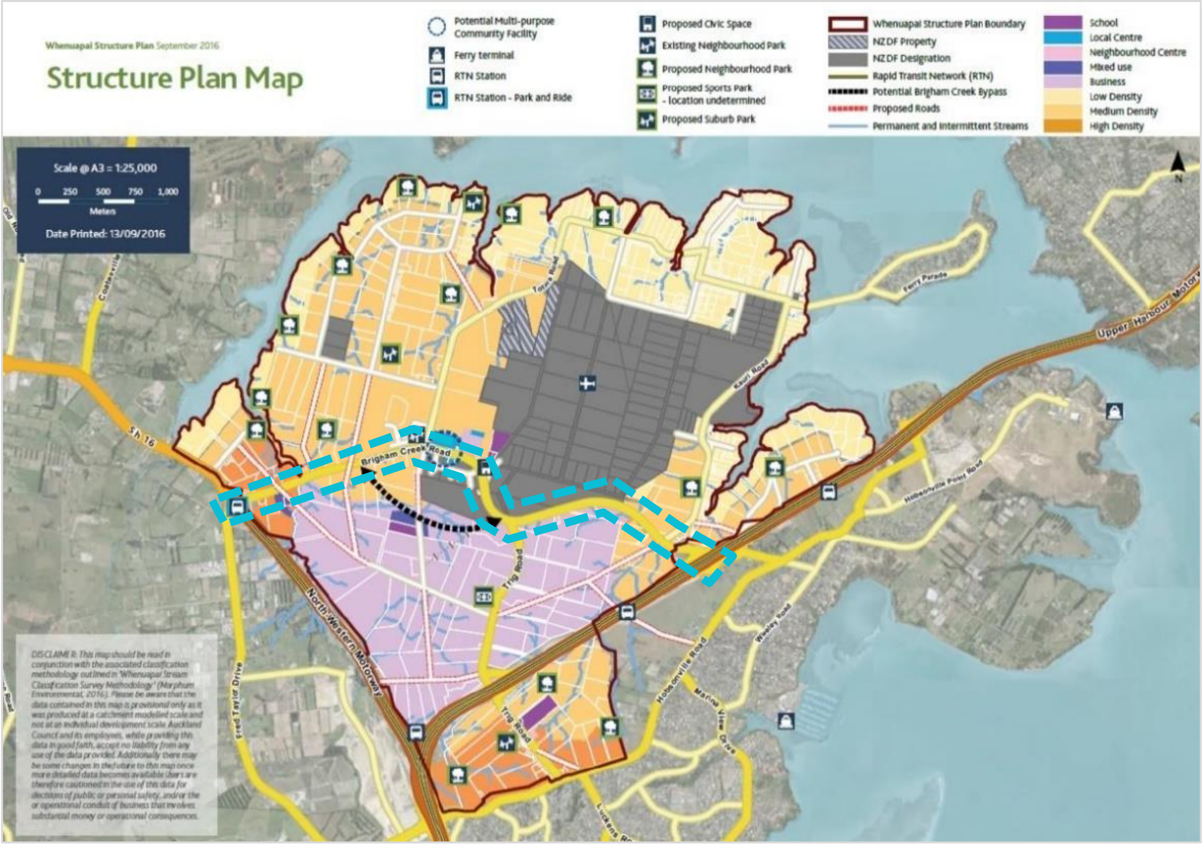


Table 8-3 summarises the likely future transport features of the Brigham Creek Road corridor.

Table 8-3: Brigham Creek Road: Likely Future Transport Features

	Likely Future Brigham Creek Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with four vehicle lanes (two in each direction) and a central median outside of the town centre. Within the town centre there is no median with this space redistributed to active travel modes. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities. • Generic four-lane arterial with a 30m designation. • Access and parking likely to be limited in the future reflective of the movement function of the corridor. • Access, parking and loading shown in the future RASF modal priority as low but present reflective of existing access that will be retained and loading and parking functions that will be assessed iteratively in conjunction with land use changes.
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Brigham Creed Road in 2048 is: • 22,900 vehicles between SH16 and Totara Road • 12,500 vehicles between Totara Road and Tamatea Avenue • 26,600 vehicles between Tamatea Avenue and SH18

	Likely Future Brigham Creek Road Transport Features
Road Network / General Traffic	• Brigham Creek Road / Ngahue Road signals • Brigham Creek Road / Trig Road dual lane roundabout • Brigham Creek Road / Kauri Road signalised intersection
Walking and Cycling	Separated 2.0m cycle lanes and 1.8m footpaths on both sides.
Public Transport	The indicative 2048 AT bus network forecasts every 7 mins in the peak and every 20mins outside of peak periods.

Key features of the proposed new corridor include the following:

- Widening of Brigham Creek Road from its current general width of 20m to a 30m wide four-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections with Trig Road to accommodate proposed roundabout, and localised widening around the intersection of Māmari Road.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

8.4 Assessment of Operational Transport Effects

8.4.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Brigham Creek Road is expected to result in positive effects on safety when compared to the existing corridor, and these consist of:

- Significantly improved walking and cycling facilities along Brigham Creek Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Brigham Creek Road) at Māmari Road and Spedding Road intersections, resulting in a significantly safer environment for all road users.
- A significantly improved speed environment by reducing speed limits to more appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs).

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Brigham Creek Road is developed. The traffic volume on Brigham Creek Road will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project propose to lower the speed limit to 50km/h and provide segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will likely reduce the number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

8.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Brigham Creek Road. It also includes dedicated pedestrian and cycle crossing facilities at Trig Road (NoR W1), and Māmari Road (NoR W2), which connect with expected future adjacent facilities.

The proposed walking and cycling facilities have been designed in accordance with relevant AT standards and policies as summarised in Table 8-4.

Table 8-4: Brigham Creek Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[24]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Brigham Creek Road are proposed to be 50km/hr, therefore the indicative proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[25]	Footpaths: 1.8m minimum	A 1.8m footpath is proposed on all corridors and a 2.0m cycle path with a 2.3m berm. The total width of 6.8m is proposed from carriageway to road boundary. This is in accordance with the AT TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by vision zero guidance. The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Brigham Creek Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west walking and cycling connectivity.
- Lead to significant environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate[26].
- Support growth surrounding Brigham Creek Road and significantly improve safety and access to employment and social amenities.

[24] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[25] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/
[26] See Appendix 1 for further information

8.4.3 Public Transport

The cross-section will provide adequate spacing to facilitate public transport and associated bus stops through the Brigham Creek centre. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined, i.e., around centres and schools for example.

For future public transport services, there is one proposed bus route which will use Brigham Creek Road, between Whenuapai and Westgate. This service will operate every 7 minutes in the peak and every 20mins outside of the peak. It is noted that the public transport network has been developed under the long-term scenario which includes several significant infrastructure elements including the SH18 RTN. It is likely there will be variations in the public transport network within Whenuapai that responds to availability of such infrastructure and supplementary road network such as Spedding Road and internal collector networks. As such the role of Brigham Creek Road in the public transport is likely to change over time, however the proposed cross section is well suited to respond to these changes.

The Project's potential operational effects on public transport are:

- Reduced delays and improved reliability for future public transport services on Brigham Creek Road and the wider network.
- Improved integration with the future public transport network and improved east-west and north-south connectivity, as well as improved access to employment and social amenities.
- The improvements will enable the road to be used by bus services as a diversion in the event of disruptions on other corridors, improving the resilience of the public transport network.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.
- It will serve as a key enabler for greater use of active transport modes by providing safe connector route between urban areas and Westgate Metropolitan Centre.

8.4.4 General Traffic

As identified above, the 2048 ADT for Brigham Creek Road is 12,500-26,600 vehicles. Given that the peak hour volume is typically approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,250-2,600 vehicles. A four-lane corridor can efficiently accommodate 26,600 vehicles and therefore the proposed corridor design meets the forecasted needs.

It is noted that there are sections that are forecast to have lower traffic volumes. This is predominantly due to the supporting role of collector networks within the future models. It is considered that a 30m cross will better provide for a continuous legible corridor that also enables intersections along the corridor.

Within the central section of Brigham Creek Road, traffic volumes are forecast to decrease to around 12,500 vehicles per day in the long term. A 30m corridor is recommended for this section to enable turning movements at the Māmari Road intersection in particular and also the future signalised intersection with Ngahue Crescent. This will also provide additional flexibility to provide for public transport priority and other facilities within the town centre when there is greater land use certainty.

The other key consideration is the role of other supporting infrastructure in the long term. The State Highway 16 to State Highway 18 connections project enables a motorway to motorway to connection between these two highways. This function is currently being undertaken by Brigham Creek Road. The forecast traffic volumes for Brigham Creek Road in 2048 assume that this strategic connection is in place, and the volumes still indicate that traffic volumes at the eastern and western end of the corridor in particular will require four traffic lanes. Should the SH16 to SH18 Connections project not be implemented alongside growth in Whenuapai, this would result in higher traffic volumes than currently forecasted and create additional transport pressure on Brigham Creek Road. This confirms that a four-lane 30m corridor is the most appropriate width for the corridor, suitable for the interim and longer-term outcomes on the corridor.

On Street Parking

The proposed 30m cross section within the existing Whenuapai town centre does not currently show on street parking. Currently there are 12 marked on street parking spaces provided within the town centre. From a transport perspective, the removal of these parking spaces is not considered to be significant. The longer-term provision of significantly improved walking, cycling and public transport connections is consistent with the policy direction from the Government Policy Statement on Transport and the Auckland Unitary Plan where there is a strong direction to encourage travel by modes other than private vehicles.

It is however noted that there may also be opportunities for the provision of parking within the 30m road corridor, should demonstrable demand be identified at the time of implementation of the corridor. This is consistent with Auckland Transport's approach to assessing these situations on a case-by-case basis[27].

Airport Road and Tamatea Road Realignment

As part of this NoR, the Airport Road and Tamatea Road connections have been realigned to meet Brigham Creek Road in a location that encourages a slower speeds. By providing tighter radius on these intersections, vehicles will enter the corridors at a slower speed. This will provide a lower speed environment on this corridor – particularly in proximity to Whenuapai Primary School.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 8-5.

Table 8-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Brigham Creek Road / Totara Road signals	Morning Peak	E	0.905	345.8
	Evening Peak	D	0.884	228.8

27 AT Parking Policy https://at.govt.nz/about-us/transport-plans-strategies/parking-strategy/parking-strategy-policies/

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Brigham Creek Road / Ngahue Crescent signals	As Ngahue Crescent is a low volume local road, traffic volumes could not be extracted from the SATURN model for subsequent SIDRA Modelling, Given the expected traffic volumes from Ngahue Crescent, the intersection is expected to perform at a suitable level in the future.			
Brigham Creek Road / Trig Road dual lane roundabout	Morning Peak	A	0.311	17.6
	Evening Peak	A	0.226	9.5
Brigham Creek Road / Kauri Road signals	Morning Peak	D	0.902	226.4
	Evening Peak	D	0.892	169.3

The overall LOS for most of intersections along Brigham Creek Road is LOS D or below, and generally all of the intersections operating within acceptable capacity performance by 2048. The one exception is the intersection of Brigham Creek Road/Totara Road. It is noted that this while there are delays at the intersection, this is not considered to be unexpected for private vehicles in the peak period, and bus priority movements for the through travelling buses will be facilitated from the kerb side lane.

Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

8.4.5 Access

As a future arterial corridor, Brigham Creek Road is expected to be a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the north and south of Brigham Creek Road.

The collector network has been indicatively identified by the Whenuapai Structure Plan; however, it is expected that these will be subject to change as developers progress these connections through the plan change process.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways.

There are no specific properties that have been included within the designation for this purpose and all existing driveways are expected to be able to be reinstated.

8.4.6 Freight

Similar to general traffic, the improved corridor capacity as a result of the Project will result in improved journey times and reliability for existing and future freight. The corridor will be able to accommodate freight movements along the mid-block and through the intersections.

Brigham Creek Road is currently classed as Level 1B. This is defined as a road of the highest strategic value to freight movement where efficient freight movements must be actively supported to maintain Levels of Service, and where competing modes and land uses require active management.[28] This corridor will continue to play a strategic freight role in the short to medium term, until the implementation of the State Highway 16 to State Highway 18 connections project is in place. Beyond this, the corridor will continue to play a role for freight, particularly given the proposed industrial activities as part of the Structure Plan. As such it is considered that the proposed 30m footprint provides a flexible corridor width to enable resilient and reliable freight movements in both the interim and the long term.

Over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the implementation of individual corridor upgrades and further land use certainty in the future.

8.4.7 Wider Network Effects

The Brigham Creek Road project will provide a four-lane corridor connecting from SH16 to SH18. The additional capacity provided in this corridor will support the significant growth expected in the Whenuapai area. The project will result in positive wider network effects, providing an alternative connection to the State Highway 16 to 18 connections in the short term, and in the longer term a resilient corridor in the case of network events or disruptions. In terms of walking and cycling, the upgrade to this corridor provides a dedicated walking and cycling spine travelling east to west through the Whenuapai growth area, enabling wider connections to link through to this corridor, providing an integrated walking and cycling network.

8.5 Project Interdependencies

The Brigham Creek Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. These are discussed below.

8.5.1 State Highway 16 to 18 Connections

As identified above there is a clear relationship between Brigham Creek Road and State Highway 16 to State Highway 18 connections. This project is a Waka Kotahi[29] project that is currently unfunded. The current Brigham Creek Road corridor provides connectivity between the two motorway corridors for vehicles travelling to/from Kumeū and further north. With forecast growth in Whenuapai and in Kumeū this connection is expected to come under increasing capacity pressure and implications on the urban form of the corridor as the adjacent land urbanises. Current forecast traffic volumes indicate that a 30m corridor is required for Brigham Creek Road even with the implementation of the SH16/18 connections.

The State Highway 16 to State Highway 18 Connections project is included within the full network in 2048 both as part of the Supporting Growth analysis and the Whenuapai Structure Plan assessments. The provision of this connection will relieve pressure on the Brigham Creek Road corridor and enable the 30m corridor to operate as a key arterial rather than a strategic connection. This longer-term

[28] Auckland Transport Strategic Freight Plan

[29] https://nzta.govt.nz/project s/sh16-18-connections

network will still require a 30m corridor to implement additional capacity at key interchange locations and/or public transport priority.

Freight

As detailed above, Brigham Creek Road is currently a Level 1B freight route and supports the strategic freight network. It is expected to continue in this role, with slightly less importance in the longer term. The corridor will continue to be important for freight movements, supporting the industrial and commercial activities indicated for Whenuapai in the Structure Plan.

SH18 Interchange Upgrade

The State Highway 16 to State Highway 18 connections project has identified that the Brigham Creek interchange with State Highway will require upgrading in the future to a grade separated interchange. The proposed designation for Brigham Creek Road has been developed in such a way that enables the corridor to connect into the existing interchange and also does not preclude the delivery of an upgraded interchange at this location.

8.5.2 Brigham Creek Interchange (SH16)

At the western extent of Brigham Creek Road the corridor will interface with the Brigham Creek interchange with SH16. This interchange is included with a separate package of designations, progressed as part of the Alternative State Highway and the extension to the rapid transit network through to Kumeū.

The indicative proposed design for Brigham Creek Road is appropriate in the case that the Brigham creek interchange is implemented before or after the Brigham Creek Road upgrade.

8.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

The Project provides significant positive effects. Adverse effects identified related to access have been identified at 55, 57, 59 and 119 Brigham Creek Road, and these properties are recommended for inclusion within the designation boundary.

8.7 Summary of Operational Transport Effects (NoR W3)

The assessment of transport effects for the Project is summarised in Table 8-6.

Table 8-6: Assessment of Operational Effects Summary for NoR W3 (Brigham Creek Road)

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • A significantly improved speed environment by providing speed limits appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs). • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.

Operational Transport Effects	
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Significantly reduced the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Brigham Creek Road. • Improve integration with the future walking and cycling network, resulting in improved east - west walking and cycling connectivity. • Support growth adjacent to Brigham Creek Road and significantly improve safety and access to employment and social amenities. In particular the proposed cross section enables an activated frontage within the Whenuapai town centre.
Public Transport	In summary, the effects of the Project on public transport are: • Improved reliability and travel time for frequent public transport services. • Good integration with the future public transport network and significantly improved east west connectivity and improved access to employment and social amenities. • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability.
General Traffic	In summary, the effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth. • On street parking within this corridor is expected to be rationalised. With the provision of alternative transport choices and expected land use changes the effect of the removal of this parking from a transport perspective is considered minimal. There may also be opportunities for the provision of parking within the 30m road corridor, should demonstrable demand be identified at the time of implementation of the corridor, consistent with Auckland Transport's approach to assessing these situations on a case-by-case basis. • Airport Road and Tamatea Road will be realigned, providing a safer, slower intersection with Brigham Creek Road
Access	• In summary, access on the Brigham Creek Road corridor can generally be maintained. No other operational access effects have been identified.
Freight	In summary, the effects on the Project on freight will be neutral. • Brigham Creek Road is currently a Level 1B freight route and supports the strategic freight network. It is expected to continue in this role, with slightly reduced importance in the longer term.
Wider Network Effects	In summary, the project will result in positive wider network effects, specifically • Providing an alternative connection to the State Highway 16 to 18 connections in the short term, and in the longer term a resilient corridor in the case of network events or disruptions. • Providing a dedicated walking and cycling spine travelling east to west through the Whenuapai growth area, enabling wider connections to link through to this corridor

8.8 Conclusions

Overall, the NoR W3: Brigham Creek Road Upgrade project provides considerable positive transport effects in particular improved safety, walking and cycling, and public transport effects..

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Whenuapai School at 14 Airport Road, Whenuapai Kindergarten at 16 Airport Road, and the Whenuapai town centre should be specifically considered within the CTMP prior to implementation.

9 NoR W4: Spedding Road

9.1 Project Corridor Features

9.1.1 Project Overview

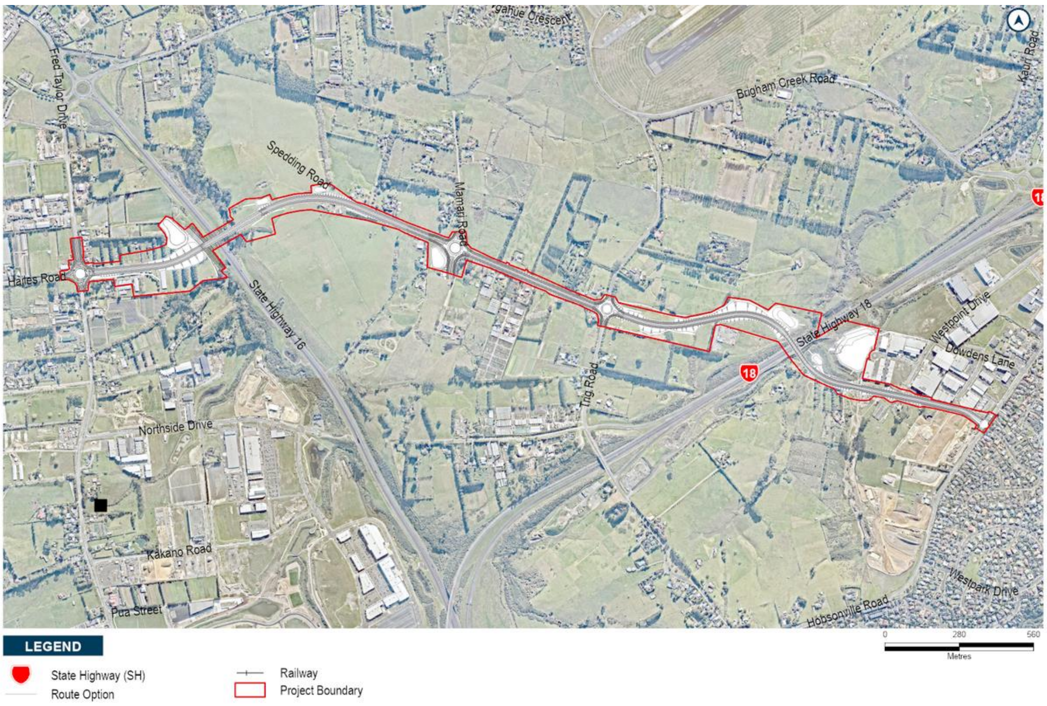
Spedding Road is currently a primary rural collector providing access to several rural lots as well as to Timitanga Community School along Māmari Road. There are two sections to the project, the New Spedding Road West section traveling over SH16 to the west, and the New Spedding Road East section, travelling over SH18 to Hobsonville Road.

The New Spedding Road West extends the existing Spedding Road from its intersection with Māmari Road to the Redhills North area over SH16 to connect with Hailes Road and Fred Taylor Drive. The New Spedding Road West will upgrade the existing 14m width corridor to a 24m wide two-lane arterial cross section with separated cycle lanes and footpaths on both sides.

This new east-west connection will support active mode and public transport connectivity between residential land use in Redhills, employment land use in Whenuapai and the proposed CC2W rapid transit station (a non-Te Tupu Ngātahi project). Furthermore, given the high degree of urbanisation expected in this FUZ area, this connection will reduce severance already created by the State Highway network and will provide a non-interchange SH16 crossing location to support local movements for all modes.

An overview of the indicative proposed design for the western extension is provided in Figure 9-1 below.

Figure 9-1: Overview of New Spedding Road West (west of Māmari Road)

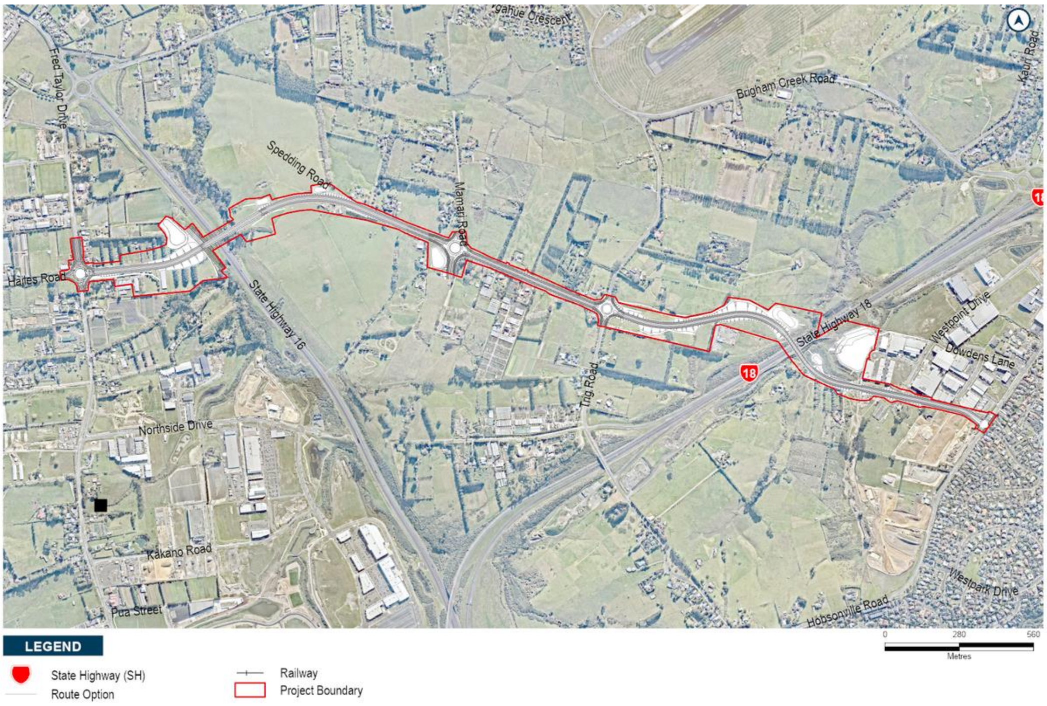


The New Spedding Road East will also consist of a 24m wide two-lane arterial cross section with separated cycle lanes and footpaths on both sides of the corridor. The intersections of Spedding

Road with Trig Road and Māmari Road are proposed to be roundabouts. Similar to the proposed extension of Spedding Road (West), the proposed extension of Spedding Road (East) will provide an east-west connection that supports active mode and public transport connectivity between the areas of Whenuapai and Hobsonville.

An overview of the proposed design for the eastern upgrade and extension is provided in Figure 9-2 below.

Figure 9-2: Overview of New Spedding Road East Upgrade (east of Mamari Road)



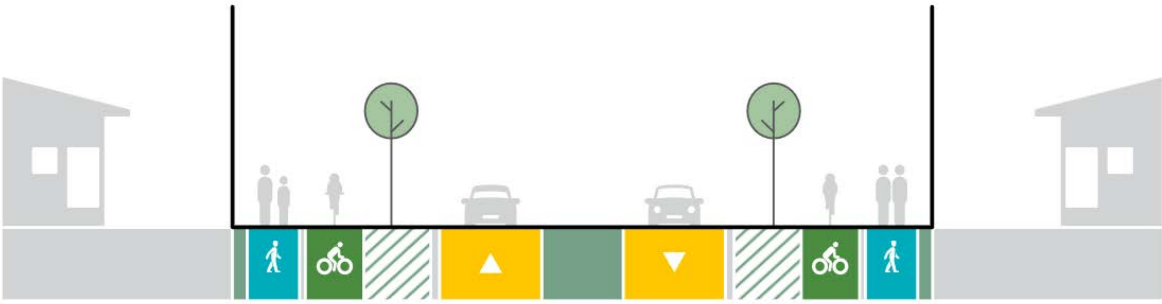
9.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the structure planning undertaken by the Council. The wider networks were developed through the Business Case process that considered the key problems, benefits, outcomes, and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Speeding Road will change from an existing rural unsealed two-lane road to a low-speed urban two-lane arterial (using AT standards) with mixed components for vehicles, public transport, and active modes.

The existing corridor is narrow and includes two vehicle lanes, one per direction, only. The indicative proposed design includes two vehicle traffic lanes, as well as new facilities for walking and cycling as shown in Figure 9-3.

Figure 9-3: Indicative future Spedding Road corridor design



The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

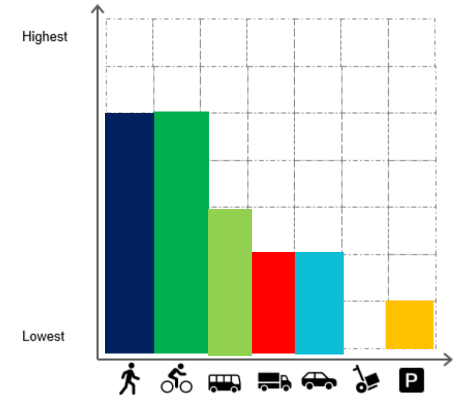
The corridor is assessed to have the following RASF typology:

- Place function - transitioning from P1 (rural) to P1 (local) long term
- Movement function - transitioning from M1 (low strategic movement) to M2 (medium strategic movement) long term

The following Figure 9-4 and * While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

Figure 9-5 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more active modes of travel.

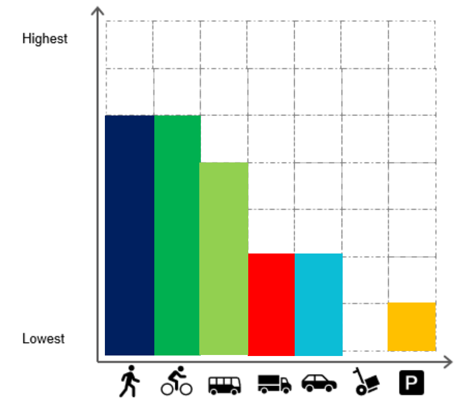
Figure 9-4: Future modal priority in 2048+ for Spedding Road (west)



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

Figure 9-5: Future modal priority in 2048+ for Spedding Road (east)



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

9.3 Existing and Likely Future Environment

9.3.1 Planning context

The land on either side of Spedding Road is zoned under the AUP: OP as FUZ, with the exception being the Business – Light Industry Zone within the Hobsonville Corridor Precinct.

The Whenuapai Structure Plan identifies the land surrounding the existing central section and proposed western end of the corridor for business.

The western section of the proposed corridor extends across SH16 and the eastern section across SH18, both SH16 and SH18 are designated by Waka Kotahi for State Highway purposes (Designation 6741).

Table 9-1 below provides a summary of the North West existing and likely future environment.

Table 9-1: Spedding Road Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[30]	Likely Future Environment[31]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
Residential	Residential	Low	Residential
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban

Please refer to the AEE for further information on the planning context.

9.3.2 Transport Environment

9.3.2.1 Existing

To the north of SH18, the existing corridor is predominantly surrounded by greenfield land and to the south of SH18, the corridor is generally adjacent to land currently being developed for light industrial purposes. Table 9-2 summarises the existing transport features of the Spedding Road corridor.

Table 9-2: Trig Road: Existing Transport Features

	Existing Speeding Road Transport Features
Corridor Characteristics	• Has an 80kph speed limit • Rural character with two unmarked unsealed vehicle lanes (one in each direction) • Corridor form is consistent, with no kerb and channel on either side of the corridor and no footpaths
Key connections to the wider network	• Connects to Trig Road • Provides access to Māmari Road
Traffic Volume	The latest traffic data for Spedding Road was obtained from Auckland Transport[32]. The data was recorded in February 2018 and shows Spedding Road (between Trig Road and Māmari Road) carried a 5 Day Average Daily Traffic of approximately 290 vehicles per day (vpd), and 30-50 vehicles per hour (vph) during the morning and afternoon peak hours.

30 Based on AUP:OP zoning/policy direction
31 Based on AUP:OP zoning/policy direction
32 Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

	Existing Speeding Road Transport Features
Road Network / General Traffic	• Spedding Road West / Māmari Road give-way • Spedding Road West / Trig Road give-way • Spedding Road West / Hobsonville Road existing consent for signals
Walking and Cycling	There is no footpath on either side.
Public Transport	There are no existing bus services on Spedding Road.

9.3.2.2 Likely Future

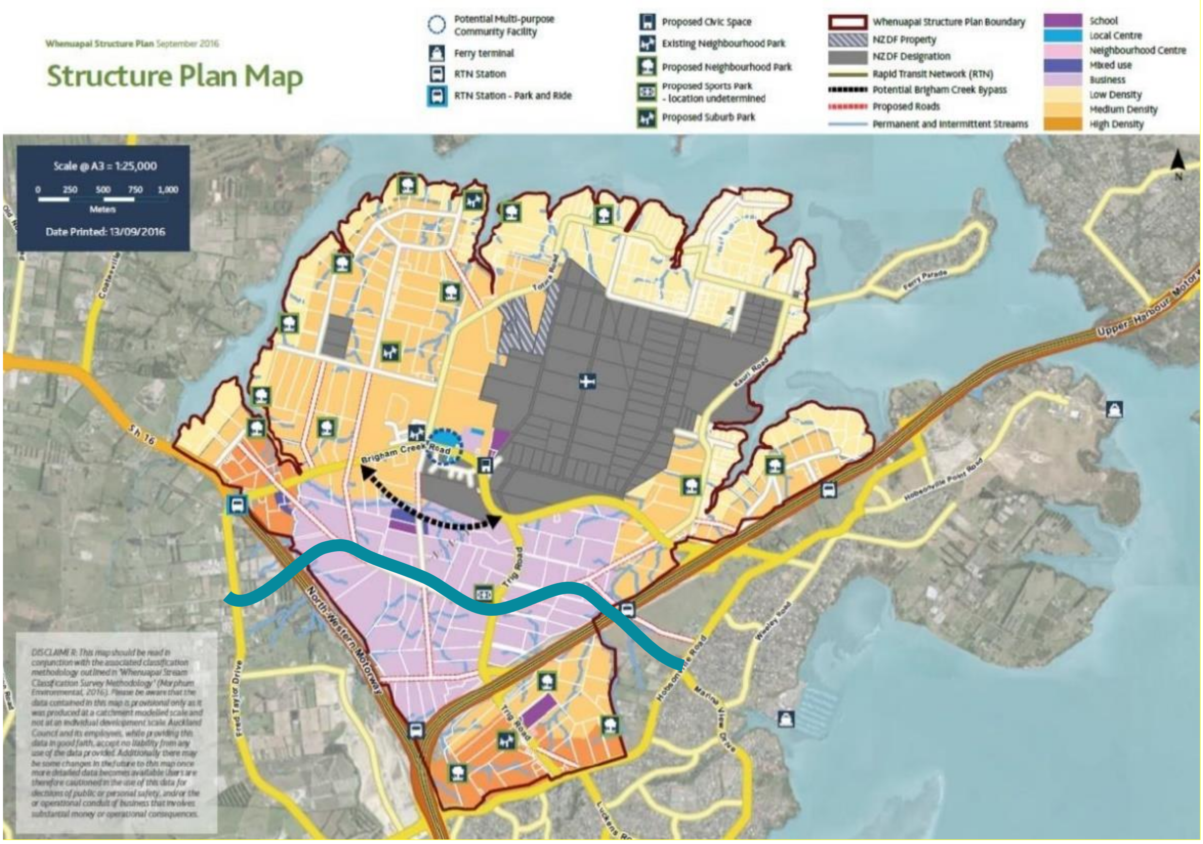
The importance of Spedding Road as an east-west arterial is highlighted in the Whenuapai Structure Plan. The Spedding Road connection is shown crossing SH18 and connecting in to Hobsonville Road in the south and Brigham Creek Road in the north.

This connection differs from the proposed Spedding Road connection within this NoR. The key difference is that the Spedding Road connection in this Project travels to the west, over SH16, connecting on to Fred Taylor Drive. The key reason for this difference is to provide increased access and connectivity for the Whenuapai growth area, in particular for walking, cycling and public transport. Further details are provided in Section 9.3.2.3.

It is also noted that the alignment for Spedding Road East, also has a different connection point, with this Project proposing to connect with Hobsonville Road and Marina View Drive via a four-way intersection.

The Structure Plan is shown Figure 9-6, with an indicative proposed Spedding Road alignment as is proposed in this NoR shown in blue.

Figure 9-6: Whenuapai Structure Plan – Spedding Road



9.3.2.3 Proposed Alignment

As noted, the Spedding Road alignment deviates from that shown in the Whenuapai Structure Plan. In particular, the alignment of Spedding Road West in the Whenuapai Structure Plan travels to the north and crosses Brigham Creek Road. The North West IBC and DBC considered the alignments for this corridor and found that the proposed alignment which crosses State Highway 16 provided the following transport benefits:

- The connection over the State Highway reduces the existing severance resulting from the State Highway 16 corridor.
- The connection as shown without interchanges to the State Highway provided a connection that would be attractive to buses, walking and cycling as would enable a peak period connection unhindered by likely motorway congestion.
- The provision of this connection provided additional network resilience in particular to State highway interchanges such as SH16 Brigham Creek.

An additional consideration was that the connection from Spedding Road to Brigham Creek was not precluded via a collector road connection, and it is considered that this collector would be more appropriate to facilitate access within the proposed growth area.

Table 9-3 summarises the likely future transport features of the Speeding Road corridor.

Table 9-3: Spedding Road: Likely Future Transport Features

	Likely Future Spedding Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with two vehicle lanes (one in each direction) and a central median. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities. • Generic two-lane arterial with a 24m cross section.
Key Connections to the wider network	• Connects to Fred Taylor Drive • Connects to Trig Road • Connects to Māmari Road • Connects to Hobsonville Road
Traffic Volume	The forecast Average Daily Traffic (**ADT**) in 2048 on Spedding Road West is 18,400 vehicles, and on Spedding Road East is 15,100 vehicles.
Road Network / General Traffic	• Spedding Road West / Fred Taylor Drive dual lane roundabout • Spedding Road West / Māmari Road dual lane roundabout • Spedding Road West / Trig Road single lane roundabout
Walking and Cycling	Separated 2.0m cycle lanes and 1.8m footpaths on both sides
Public Transport	The indicative 2048 AT bus network forecasts 9 buses per hour on Speeding Road, or approximately 1 bus every 5-10 minutes.

Key features of the proposed new corridor include the following:

- Widening of Spedding Road from its current general width of 20m to a 24m wide two-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the intersections with Fred Taylor Drive, Trig Road and Māmari Road to accommodate proposed roundabouts.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

9.4 Assessment of Operational Transport Effects

9.4.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Spedding Road is expected to result in positive effects on safety when compared to the existing corridor, and these consist of:

- Significantly improved walking and cycling facilities along Spedding Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Spedding Road) at Trig Road intersection, resulting in a significantly safer environment for all road users.
- A significantly improved speed environment by designing to lower speed limits that are more appropriate for urban environment (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs).

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Spedding Road is developed. The traffic volumes on Spedding Road will also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project has been designed to a lower speed limit of 50km/h and provides segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will likely reduce the number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

9.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Spedding Road. It also provides sufficient space to provide dedicated pedestrian and cycle crossing facilities at Trig Road (NoR W1) and Māmari Road (NoR W2) which connect with expected future adjacent facilities.

The proposed walking and cycling facilities have been designed in accordance with relevant AT standards and policies as summarised in Table 9-4.

Table 9-4: Spedding Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[33]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Spedding Road are proposed to be 50km/hr, therefore the indicative proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[34]	Footpaths: 1.8m minimum	A 1.8m footpath is proposed on all corridors and a 2.0m cycle path with a 2.3m berm. The total width of 6.8m is proposed from carriageway to road boundary. This is in accordance with the AT TDM requirements.

[33] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[34] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance. The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Spedding Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west walking and cycling connectivity. It is noted in particular that walking and cycling connectivity will be improved by the provision of a connection over the existing State Highway 16 and 18 corridors. This will improve walkable distances to employment opportunities in both Hobsonville and Westgate for future Whenuapai residents.
- Lead to environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate and the RTN stations for the longer term RTN adjacent to SH18[35].
- Support growth surrounding Spedding Road and significantly improve safety and access to employment and social amenities.

9.4.3 Public Transport

The cross-section will provide adequate space to facilitate public transport and associated bus stops. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined, i.e. around centres and schools for example.

For future public transport services, there is one proposed bus routes which will use Spedding Road. This service is forecast to operate every 12minutes in the peak periods and every 30 minutes outside of the peak.

This service will link in to the proposed Brigham Creek station for the future RTN connection to Auckland CBD via State Highway 16 and will connect to Hobsonville Town Centre in the east.

The Project's potential operational effects on public transport are:

- Excellent integration with the future public transport network and improved east-west connectivity, as well as improved access to employment and social amenities.
- The improvements will enable the road to be used by bus services as a diversion in the event of disruptions on other corridors, improving the resilience of the public transport network.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.
- It will serve as a key enabler for greater use of active transport modes by providing safe connector route between urban areas and Westgate Metropolitan Centre.

9.4.4 Access

As a future arterial corridor, Spedding Road is expected to be a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the north and south of Spedding Road.

[35] See Appendix 1 for further information on future network assumptions

The collector network has been indicatively identified by the Whenuapai Structure Plan; however, it is expected that these will be subject to change as developers progress these connections through future plan change processes.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways.

When considering access to existing properties, the intersection of Spedding Road and Fred Taylor impacts on the access to several properties within proximity to the intersection.

The access for 121 Fred Taylor Drive is relatively close to the likely roundabout and will require relocation to ensure a safe access. At 121 Fred Taylor Drive this will require relocation further south on Fred Taylor Drive. The relocation of this driveway can be accommodated within the proposed designation boundary.

9.4.5 General Traffic

As identified above, the 2048 ADT for Spedding Road is 15,100-18,400 vehicles. Given that the peak hour volume is typically approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,510-1,840 vehicles. A two-lane corridor with limited access can efficiently accommodate 18,400 vehicles and therefore the proposed corridor design meets the forecasted needs.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 9-5.

Table 9-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Spedding Road and Fred Taylor Drive – roundabout	Morning Peak	B	0.956	161.8
	Evening Peak	B	0.639	44.0
Spedding Road and Māmari Road – Roundabout	Morning Peak	B	0.723	61.3
	Evening Peak	B	0.938	154.3
Spedding Road and Trig Road – Roundabout	Morning Peak	A	0.659	55.9
	Evening Peak	A	0.615	45.8
	Morning Peak	D	0.774	75.7

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Spedding Road and Hobsonville Road – Signals	Evening Peak	D	0.607	82.0

The overall LOS for all intersections is LOS D or below, and generally all of the intersections operating within acceptable capacity performance by 2048.

Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

9.4.6 Freight

The provision of a key arterial through the proposed industrial/commercial land use activities in Whenuapai will support overall freight connections in this area. The provision of a corridor that connects through to Westgate and Hobsonville across the State Highway network will increase permeability for smaller freight trips. The Project will also result in improved journey times and reliability for existing and future freight.

Over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the realisation/ implementation of individual corridor upgrades in the future.

9.4.7 Wider Network Effects

The Spedding Road connection provides a connection for local traffic, public transport, and walking and cycling movements to access Westgate without interfacing with the State Highway 16 or State Highway 18 interchanges.

This has the additional benefit of reducing pressure on the Brigham Creek interchange, improving efficiency and operations. Without the Spedding Road connection the projected 18,400 vehicles would need to travel on Brigham Creek Road, through the Brigham Creek interchange or through the Northside Drive interchanges.

9.5 Project Interdependencies

The Spedding Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. It is noted that the Spedding Road NoR does overlap and interface with the Māmari Road NoR and the Trig Road NoR at key intersections. Additionally, there is an interface with the Hobsonville Road NoR at the eastern end. At the western end the Spedding Road NoR interfaces with Fred Taylor Drive. Te Tupu Ngātahi is proposing an upgrade to Fred Taylor Drive through a separate package of works (Redhills). Notwithstanding these interfaces, there are overlaps in the proposed designations to ensure that the intersections can be implemented irrelevant of staging or timing.

9.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

Overall, the project provides positive benefits and in terms of measures to mitigate operational effects, the relocation of driveways at 121 Fred Taylor Drive and 8 Spedding Road are recommended to facilitate safe access for these existing properties.

9.7 Summary of Operational Transport Effects (NoR W4)

The assessment of transport effects for the Project is summarised in Table 9-6.

Table 9-6: Assessment of Operational Effects Summary for NoR W4 (Spedding Road)

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • A significantly improved speed environment by designing the corridor to an appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs). • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Improve integration with the future walking and cycling network, resulting in improved east - west walking and cycling connectivity. In particular the corridor enables access across SH16 and SH18 for pedestrians and cyclists via the local road network – rather than interfacing with the motorway interchanges. This reduces the existing severance and supports greater permeability for these modes. • Support growth adjacent to Spedding Road and significantly improve safety and access to employment and social amenities.
Public Transport	In summary, the effects of the Project on public transport are: • Improved reliability and travel time for frequent public transport services • Good integration with the future public transport network and significantly improved east west connectivity and improved access to employment and social amenities • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability
General Traffic	In summary, the effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth • The provision of this corridor supports wider network outcomes, in particular by removing through traffic from key State Highway interchanges at Brigham Creek Road, Northside Drive and Trig Road. This supports these interchanges in operating more efficiently in the peak periods.
Access	In summary, the effects of the Project on access are:

Operational Transport Effects	
	• The access to 121 Fred Taylor Drive will require relocation further south on Fred Taylor Drive. • The relocation of this driveway can be accommodated within the proposed designation boundary.
Freight	In summary, the effects of the Project on freight are: • Positive overall effects for freight through Whenuapai, supporting the proposed industrial/commercial land use activities • Increased permeability for smaller freight trips via connectivity to arterial roads such as Hobsonville Road and Fred Taylor Drive • Improved journey times and reliability for existing and future freight movements with connections that are not impeded by State Highway connections.
Wider Network Effects	In summary, the wider network effects of the Project are: • The Spedding Road connection provides a connection for local traffic, public transport, and walking and cycling movements to access Westgate without interfacing with the State Highway 16 or State Highway 18 interchanges. • This has the additional benefit of reducing pressure on the Brigham Creek interchange, improving efficiency and operations. Without the Spedding Road connection the projected 18,400 vehicles would need to travel on Brigham Creek Road, through the Brigham Creek interchange or through the Northside Drive interchanges.

9.8 Conclusions

Overall, the NoR W4: Spedding Road project provides considerable positive transport effects in particular improved safety, walking and cycling, and public transport effects. Access effects for one property has been identified and relocation of the driveway is recommended.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

10 NoR W5: Hobsonville Road FTN Upgrade

10.1 Project Corridor Features

10.1.1 Project Overview

Hobsonville Road is an existing arterial corridor over 4km in length, extending from SH16 in the west to Hobsonville Point Road and Buckley Avenue / Squadron Drive in the east. The Project extends from the intersection with Oriel Avenue in the west to the intersection with Memorial Park Drive in the east and provides an important east-west connection from Westgate to Hobsonville.

The existing Hobsonville Road traverses land zoned for a range of activities under the AUP:OP (FUZ, Residential, Open Space and Business (including industrial)), therefore the recommended form and function of the corridor reflects the adjacent future land use. An overview of the indicative proposed design is provided in Figure 10-1 below.

Figure 10-1: Overview of Hobsonville Road FTN Upgrade

10.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the Whenuapai structure planning undertaken by the Council. The wider networks were developed through the Business Case process that considered the key problems, benefits, outcomes and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Hobsonville Road will change from an existing two lane road to an urban two to four lane arterial (using AT standards) with mixed components for vehicles, public transport, active modes, and freight.

The existing corridor is narrow and generally provides two vehicle lanes. The indicative proposed design includes three types of cross sections specifically:

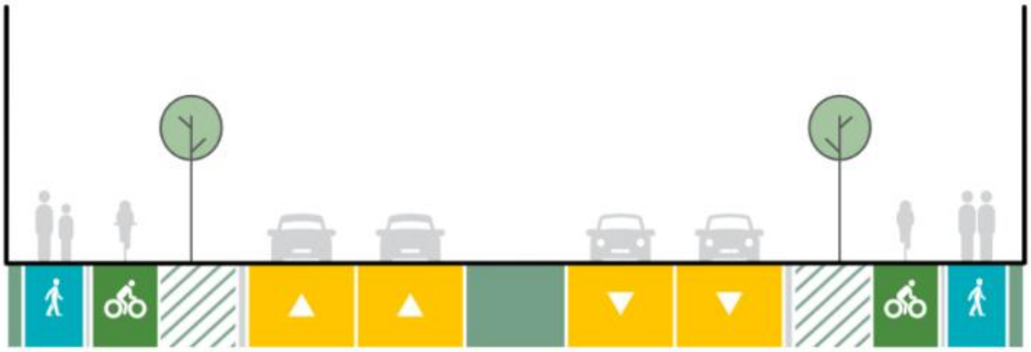
- A generally 30m corridor that provides two vehicle lanes, two public transport lanes, and improved walking and cycling facilities.
- A generally 24m corridor that provides two vehicle lanes and new facilities for walking and cycling.
- A generally 30m corridor that provides four vehicle lanes, as well as new facilities for walking and cycling.

These cross sections are shown in Figure 10-2, Figure 10-3, and Figure 10-4.

Figure 10-2: Indicative future Hobsonville Road corridor FTN Upgrade between SH16 interchange and Luckens Road

Figure 10-3: Indicative future Hobsonville Road corridor between Luckens Road and Brigham Creek Road

Figure 10-4: Indicative future Hobsonville Road corridor between Brigham Creek Road and Hobsonville Point Road



The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

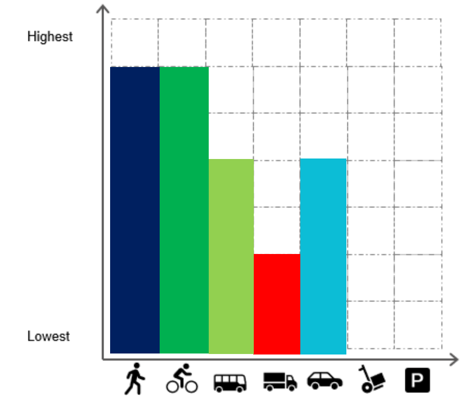
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

The corridor is assessed to have the following RASF typology:

- Place function – retain P1/P2, when the western section (Segment 1 between Fred Taylor Drive and SH16) has a P2 function, and the rest of the corridor has a P1 function
- Movement function - transitioning from M2 (medium strategic movement) to M3 (high strategic movement) long term for the majority of the corridor

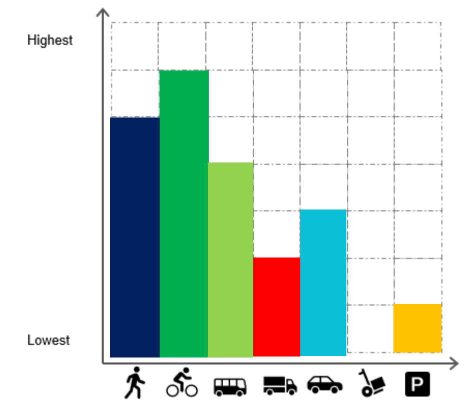
The following Figure 10-5 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more active modes of travel.

Figure 10-5: Future modal priority in 2048+ for Hobsonville Road: Fred Taylor Drive to SH16



	Legend
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access

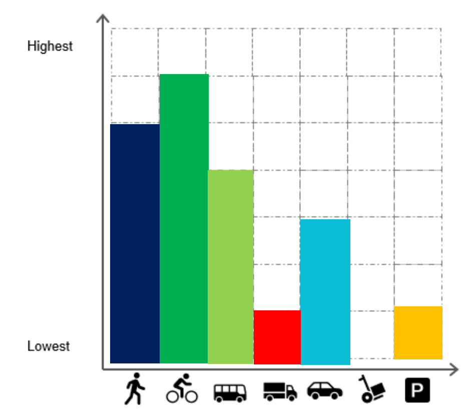
Figure 10-6: Future modal priority in 2048+ for Hobsonville Road: SH16 to Luckens Road



	Legend
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

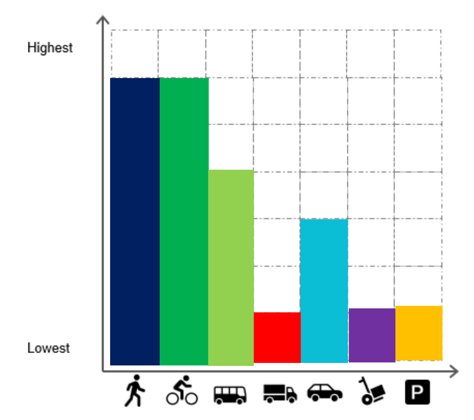
Figure 10-7: Future modal priority in 2048+ for Hobsonville Road: Luckens Road to Brigham Creek Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

Figure 10-8: Future modal priority in 2048+ for Hobsonville Road: Brigham Creek Road to Hobsonville Point Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

10.3 Existing and Likely Future Environment

10.3.1 Planning context

Hobsonville Road is an existing urban corridor with land zoned under the AUP:OP as follows:

- The southern side of Hobsonville Road is largely zoned Residential – Mixed Housing Urban Zone, with a Business – Local Centre Zone located adjacent to the intersection of Hobsonville Road, Wiseley Road and Clark Road at the eastern end of the corridor; and
- The northern side of Hobsonville Road contains a variety of land uses. Adjacent land on the western end of the corridor is currently zoned Residential – Mixed Housing Zone between SH16 and Trig Rd. Land to the east of Trig Road to Westpark Drive is currently zoned FUZ, with land then zoned Business – Light Industrial Zone to the east of Westpark Drive.

The Hobsonville Road corridor is currently designated by AT for Transport Purposes (Designation 1437). Designation 1437 has been given effect to and it is proposed to alter this designation. Table 10-1Table 10-1 below provides a summary of the North West existing and likely future environment.

Table 10-1: Hobsonville Road FTN Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[36]	Likely Future Environment[37]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (Local centre)	Low	Business (Local centre)
Residential	Residential	Low	Residential
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban

Please refer to the AEE for further information on the planning context.

10.3.2 Transport Environment

10.3.2.1 Existing

The existing corridor is predominantly surrounded by greenfield land to the north, and residential development to the south. It is generally comprised of one vehicle lane in each direction and a central median. To the south of the corridor is predominantly existing low density residential development.

Table 10-2 summarises the existing transport features of the Hobsonville Road corridor.

[36] Based on AUP:OP zoning/policy direction
[37] Based on AUP:OP zoning/policy direction

Table 10-2: Hobsonville Road: Existing Transport Features

Existing Hobsonville Road Transport Features	
Corridor Characteristics	• Has a 50kph speed limit • Semi-urban character with two vehicle lanes (one in each direction), residential on southern side of the corridor • Corridor form is inconsistent footpath, bicycle lane, and indented parking in some locations • Arterial classification in the Auckland Unitary Plan
Key connections to the wider network	• Connects to SH16 in the east • Connects to Brigham Creek Road • SH18 interchanges at Hobsonville Road, Trig Road and Brigham Creek Road
Traffic Volume	The latest traffic data for was obtained from Auckland Transport[38]. The data was recorded in September 2019 and shows the following counts for Hobsonville Road: • Between Westpark Drive and Marina View Drive carried a 5 Day Average Daily Traffic of approximately 12,100 vehicles per day (vpd), and 1,100 vehicles per hour (vph) during the morning and afternoon peak hours. • Between Sinton Road and Wiseley Road carried a 5 Day Average Daily Traffic of approximately 18,200 vehicles per day (vpd), and 1,400-1,500 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic	• Hobsonville Road / Oreil Avenue priority control • Hobsonville Road / Fitzherbert priority control • Hobsonville Road / Cyril Crescent priority control • Hobsonville Road / Trig Road priority control • Hobsonville Road / Luckens Road priority control • Hobsonville Road / Westpark Drive signalised • Hobsonville Road / Marina View Drive priority control (signals to be implemented) • Hobsonville Road / Dowdens Lane signal • Hobsonville Road / Brigham Creek Road priority control • Hobsonville Road / Williams Road priority control • Hobsonville Road / Wisely Road Wisely Road • Hobsonville Road / Memorial Park Lane signals • Hobsonville Road / Buckley Avenue signals • Hobsonville Road / Te Aho Matua Road priority control • Hobsonville Road / Nugget Avenue signals • Hobsonville Road / Sidney Wallingford Way priority control • Hobsonville Road / Eyton Kay Road priority control • Hobsonville Road / Squadron Avenue signals
Walking and Cycling	A continuous footpath is provided on the southern side of the road of the corridor, which is generally 1.5 m wide. A footpath is provided in segments on the northern side of the road for the rest of the corridor, with these footpaths generally being 1.5 m wide also. There are limited and intermittent cycling facilities along the corridor.

[38] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

Existing Hobsonville Road Transport Features	
Public Transport	The 120 bus service currently operates on Hobsonville Road and connects Constellation Station, Greenhithe, Hobsonville Rd, Westgate, Don Buck Rd, Henderson. This service operates at least every 30 minutes, 7am – 7pm, 7 days a week. Lower frequencies early morning and evenings.

10.3.2.2 Likely Future

The importance of Hobsonville Road as an east-west arterial can be seen in Figure 10-9. It provides a parallel corridor to SH18, with a connection to SH16 at the western end. At the eastern end there is a connection to SH18 via Brigham Creek Road.

Figure 10-9: Auckland Unitary Plan – Hobsonville Road

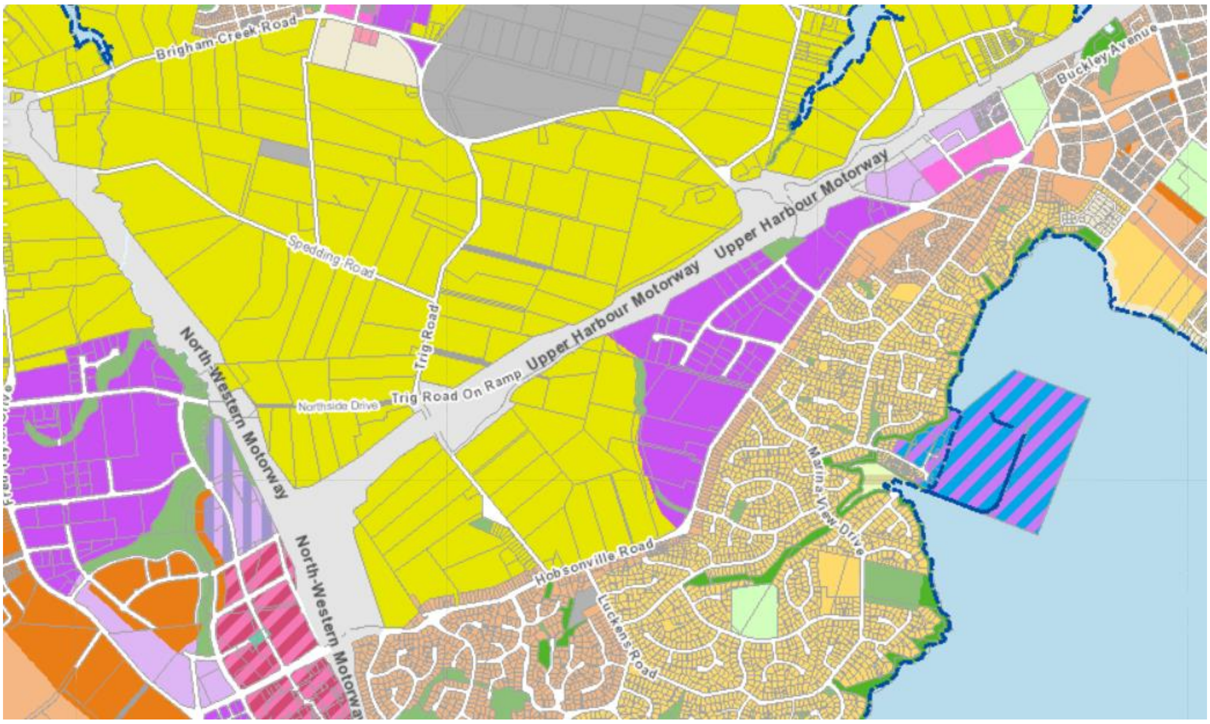


Table 10-3 summarises the likely future transport features of the Brigham Creek Road corridor.

Table 10-3: Hobsonville Road: Likely Future Transport Features

	Likely Future Hobsonville Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with two to four vehicle lanes and a central median. • Generic two to four-lane arterial with a 24-30m designation.

	Likely Future Hobsonville Road Transport Features
Wider Network Connections	• Connects to SH16 in the east • Connects to Brigham Creek Road • SH18 interchanges at Hobsonville Road, Trig Road and Brigham Creek Road
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Hobsonville Road in 2048 is: • 20,200 vehicles between SH16 and Luckens Road • 14,900 vehicles between Luckens Road and Brigham Creek Road • 23,000 vehicles between Brigham Creek Road and Hobsonville Point Road
Road Network / General Traffic	• Hobsonville Road / Trig Road signals (not included in this NoR) • Hobsonville Road / Luckens Road signals (not included in this NoR) • Hobsonville Road / Westpark Drive roundabout • Hobsonville Road / Marina View Drive signals • Hobsonville Road / Dowdens Lane signals • Hobsonville Road / Brigham Creek Road signals • Hobsonville Road / Williams Road give way • Hobsonville Road / Wisely Road give way
Walking and Cycling	Separated 2.0m cycle lanes and 1.8m footpaths on both sides
Public Transport	The indicative 2048 AT bus network forecasts every 10 to 12 mins in the peak and every 20mins outside of peak periods.

Key features of the proposed new corridor include the following:

- Widening of Hobsonville Road from its current general width of 20m. This widening is to accommodate 30m wide four-lane cross section including bus lanes, separated cycle lanes and footpaths on both sides of the corridor, and also where there are intersections in close proximity. There is also widening to allow for 24m two lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

10.4 Assessment of Operational Transport Effects

10.4.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Hobsonville Road is expected to result in positive effects on safety when compared to the existing corridor, and these consist of:

- Significantly improved walking and cycling facilities along Hobsonville Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Hobsonville Road at Brigham Creek and Spedding Road/Marina View Road intersections), resulting in a significantly safer environment for all road users.

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area to the north of Hobsonville Road is developed. The traffic volume on Hobsonville Road will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project proposes to provide segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will likely reduce the number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

10.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Hobsonville Road. It also includes sufficient space for dedicated pedestrian and cycle crossing facilities at Brigham Creek Road and Spedding Road), which connect with expected future adjacent facilities.

The proposed walking and cycling facilities have been designed in accordance with relevant AT standards and policies as summarised in Table 10-4.

Table 10-4: Hobsonville Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[39]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Hobsonville Road are proposed to be 50km/hr, therefore the indicative proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[40]	Footpaths: 1.8m minimum	A 1.8m footpath is proposed on all corridors and a 2.0m cycle path with a 2.3m berm. This is in accordance with the AT TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance. The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Hobsonville Road.

[39] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[40] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

- Improve integration with the future walking and cycling network, resulting in improved east-west walking and cycling connectivity.
- Lead to improved environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Hobsonville Road and the Westgate town centre
- Support growth surrounding Hobsonville Road and significantly improve safety and access to employment and social amenities.

10.4.3 Public Transport

The cross-section will provide adequate spacing to facilitate public transport and associated bus stops along the Hobsonville Road corridor. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined. This is particularly relevant to future land use to the north of the corridor where significant change is expected.

For future public transport services, there is one core proposed bus routes which will use Hobsonville Road, between Hobsonville and Westgate. This service will operate every 12 minutes in the peak and every 20mins outside of the peak. In addition to this there will be other supplementary services that travel over sections of Hobsonville Road. This includes:

- Whenuapai Industrial service connecting Whenuapai to Hobsonville town centre, with a 12-minute peak frequency.
- A local West Harbour service connecting West Harbour to Westgate town centre, with a 12-minute frequency.
- A Scott Point service connecting Scott Point to Hobsonville town centre, with a with a 12-minute frequency.

It is noted that the public transport network has been developed under the long-term scenario which includes several significant infrastructure elements including the SH18 RTN. It is likely that in the interim there will be variations in the public transport network within Whenuapai that responds to availability of such infrastructure and the supplementary road network such as Spedding Road and internal collector networks. As such, the role of Hobsonville Road in the public transport network is likely to change over time, however the proposed cross section is well suited to respond to these changes. In particular it is noted that Hobsonville Road will continue to provide an important east – west connection with local services even post implementation of the proposed SH18 RTN in the longer term.

In addition to the proposed bus priority lanes between the State Highway 16 interchange and Trig Road, the proposed designation provides sufficient footprint to enable bus priority at the key signalised intersections on Hobsonville Road. This will support reduced travel time for buses and provide greater reliability.

The Project's potential operational effects on public transport are:

- Reduced delays and improved reliability for future public transport services on Hobsonville Road and the wider network.
- Improved integration with the future public transport network and improved east-west connectivity, as well as improved access to employment and social amenities.

- The improvements will enable the road to be used by bus services as a diversion in the event of disruptions on other corridors, improving the resilience of the public transport network.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.
- It will serve as a key enabler for greater use of active transport modes by providing safe connector route between urban areas and Westgate Metropolitan Centre.

10.4.4 General Traffic

As identified above, the 2048 ADT for Hobsonville Road varies along the corridor. Given the length of the corridor and the land use variations this is not unexpected. A summary of expected ADT in 2048 is provided below

- 20,200 vehicles between SH16 and Luckens Road
- 14,900 vehicles between Luckens Road and Brigham Creek Road
- 23,000 vehicles between Brigham Creek Road and Hobsonville Point Road

Given that the peak hour volume is typically approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,490-2,300 vehicles. The upper range of traffic volume tends to be located in close proximity to the motorway interchanges at both State Highway 16 in the west, and towards Brigham Creek interchange with State Highway 18 in the east. A two-lane corridor with limited access can efficiently accommodate 14,900 - 20,200 vehicles. Where the volumes are forecast to be approximately 23,000 vehicles per day and there are several closely space intersections, the corridor is proposed to be four lanes. It is therefore considered that the proposed corridor design meets the forecasted needs.

It is noted that there is a section that is forecast to have lower traffic volumes. This is predominantly due to the supporting role of collector networks within the future models. In particular the additional capacity provided by the collector Spine Road in the Hobsonville, which is expected to provide access to light industrial activities north of Hobsonville Road. It is considered that proposed footprint and indicative design provides an appropriate, continuously legible corridor that also enables bus priority at key locations along the corridor.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 8-5.

Table 10-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Hobsonville Road / Don Buck Road signals	Morning Peak	D	0.858	204.1
	Evening Peak	D	0.917	201.2

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Hobsonville Road / Westpark Drive roundabout	Morning Peak	D	0.871	123.6
	Evening Peak	D	0.887	154.9
Hobsonville Road / Marina View Drive signals	Morning Peak	D	0.774	75.7
	Evening Peak	D	0.607	82.0
Hobsonville Road / Dowdens Lane signals	Morning Peak	C	0.600	74.6
	Evening Peak	C	0.718	73.5
Hobsonville Road / Brigham Creek Road signals	Morning Peak	C	0.613	127.6
	Evening Peak	D	0.494	102.7
Hobsonville Road / Memorial Park Lane signals	Morning Peak	B	0.540	60.5
	Evening Peak	B	0.436	46.3

The overall LOS for all intersections is LOS D or below, and generally all of the intersections operating within acceptable capacity performance by 2048. Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

10.4.5 Access

Hobsonville Road is an existing arterial corridor and will continue to be an arterial road in the future. As such, Hobsonville Road is a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the north of Hobsonville Road.

The collector network has been indicatively identified by the Whenuapai Structure Plan; and also in the Hobsonville Road Precinct Plan[41] Access is expected to be concentrated on the collector corridors.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways. Given the current level of urban development on this corridor and existing access, berm space has been rationalized at some points to maintain access and limit property impacts.

There are several existing properties where it has been identified that a replacement driveway will not be possible to implemented with the Project in place, primarily due to changes to road levels and

[41] I603 Hobsonville Corridor Precinct.pdf (aucklandcouncil.govt.nz)

incursion of the corridor into the front of properties. These properties have been included within the proposed designation boundary.

The properties that have been included within the NoR boundary for this reason are

- 44, 46a, 48, 50, 94 and 179a Hobsonville Road.

10.4.6 Freight

Hobsonville Road is not currently classified under the Auckland Transport Freight Plan. It is however identified as an over-dimension and overweight route. This route is generally kept clear of obstructions and also generally capable of supporting overweight/vehicles or loads. The corridor therefore currently plays a key part in the overall freight story. As such it is considered that the proposed footprint provides a flexible corridor width to enable resilient and reliable freight movements.

In the longer term, over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the realisation/ implementation of individual corridor upgrades in the future.

10.4.7 Wider Network Effects

The Hobsonville Road project provides a strong east -west public transport corridor connecting Westgate through to the Hobsonville town centre and Hobsonville Point community. In addition to this, in the longer term there remains an opportunity to connect this corridor the future SH18 RTN corridor.

In terms of walking and cycling the project provides improved network options for active modes, through the provision of dedicated facilities.

Wider network effects for general traffic and freight are considered to be neutral, with limited change from the existing network.

Overall, the wider network effects of the project are considered positive, providing improved east west public transport and active mode movements.

10.5 Project Interdependencies

The Hobsonville Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. These are discussed below.

10.5.1 Trig Road South

Trig Road South and the intersection Trig Road and Luckens Road with Hobsonville Road have been investigated by Te Tupu Ngātahi as part of a separate workstream. These intersections are proposed to be signalised in the future and will be subject to a separate NoR process, AEE and supporting assessments.

10.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

Overall, the Project provides positive benefits, particularly for walking, cycling and public transport. In terms of measures to mitigate operational effects, there are a number of properties identified in Section 10.4.5 that have been identified for inclusion within the designation boundary in response to access effects.

10.7 Summary of Operational Transport Effects (NoR W5)

The assessment of transport effects for the Project is summarised in Table 10-6.

Table 10-6: Assessment of Operational Effects Summary for NoR W5 (Hobsonville Road)

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Hobsonville Road • Improve integration with the future walking and cycling network, resulting in improved east - west walking and cycling connectivity. • Support growth adjacent to Hobsonville Road and significantly improve safety and access to employment and social amenities.
Public Transport	In summary, the effects of the Project on public transport are: • Improved reliability and travel time for frequent public transport services • Good integration with the future public transport network and significantly improved east west connectivity and improved access to employment and social amenities • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability
General Traffic	In summary, the effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth
Access	In summary, the effects of the Project on access are: • There are several existing properties where it has been identified that a replacement driveway will not be possible to implemented with the Project in place, primarily due to changes to road levels and incursion of the corridor into the front of properties. • The properties that have been included within the NoR boundary for this reason are • 44, 46a, 48, 50, 94 and 179a Hobsonville Road.

Operational Transport Effects	
Freight	In summary, there are positive effects of the project on freight. Specifically: • Positive overall effects for freight in Hobsonville, supporting the proposed industrial/commercial land use activities • The proposed footprint provides a flexible corridor width to enable resilient and reliable freight movements.
Wider Network Effects	In summary, there are neutral wider network effects identified for general traffic and freight movements. • In terms of walking and cycling, there are positive network benefits through the provision of dedicated facilities on this key east -west spine. • There are positive network benefits for the public transport movements providing a reliable public transport spine

10.8 Conclusions

Overall, the NoR W5: Hobsonville Road Upgrade project provides considerable positive transport effects in particular improved safety, walking and cycling and public transport effects. Access effects on several properties have been identified, and the inclusion of these within the designation boundary is recommended.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Hobsonville School and the Hobsonville town centre should be specifically considered within the CTMP prior to implementation.

1 Specific Transport Modelling Background Information

The Macro Strategic Model (MSM) is a region-wide model which analyses the forecast land use and informs trip generation, trip distribution and mode choice at regional level. The MSM model responds to the network assumptions, forecasted land use and regional economic policy inputs to predict regional traffic patterns and PT patronages. The outputs from the MSM model are used as:

- Demand inputs for the traffic simulation model SATURN, which analyses them at a mesoscopic level
- PT Patronage inputs for the MPT model, which analyses these at a strategic level
- Active mode inputs for the SAMM model, which analyses these at a mesoscopic level

The MSM is a four-step multi-modal model. This model was originally developed based on extensive data collected in 2006. Using observed data, and a full model validation exercise it was recently updated to reflect 2016 inputs and data. The MSM produces demands for five periods of the day, and separate assignment models exist for the morning (AM) and evening (PM) peak and weekday interpeak (IP) periods.

The model itself comprises of the following key modules:

- Trip generation: This is where the number of person-trips are estimated as a function of the land use data (population, employment, school roll etc.)
- Mode Choice: This is where the choice of recommended travel mode is determined, based on the relative costs of the various modes. The MSM modes for mode choice are car (driver and passenger combined) and passenger transport. Trips by car are converted into vehicle trips later in the model. The model also estimates the number of active mode trips, such as walking and cycling, although these are not fully modelled through to link flows.
- Trip Distribution: This is where the trips produced in each zone (generally by households), are matched to a recommended destination. This distribution is predicted as a function of the relative attractiveness for each destination zone and the travel costs to reach each destination.
- Time of Day: This is where the proportion of daily trip making occurring in each period is calculated. These proportions change in response to changes in travel costs to represent peak spreading.
- Trip Assignment: This is where the resulting travel demand, in the form of origin to destination trip tables, are loaded to the road and public transport networks. For the road assignment, an iterative process is used to firstly identify the lowest-cost route between each origin and destination followed by an estimation of the speeds and delays on each route between origin and destination, followed by an estimation of speeds and delays on each route associated with the predicted traffic flows on the route.

1.1.1 General Network Assumptions

The following general network assumption have been made in the MSM model:

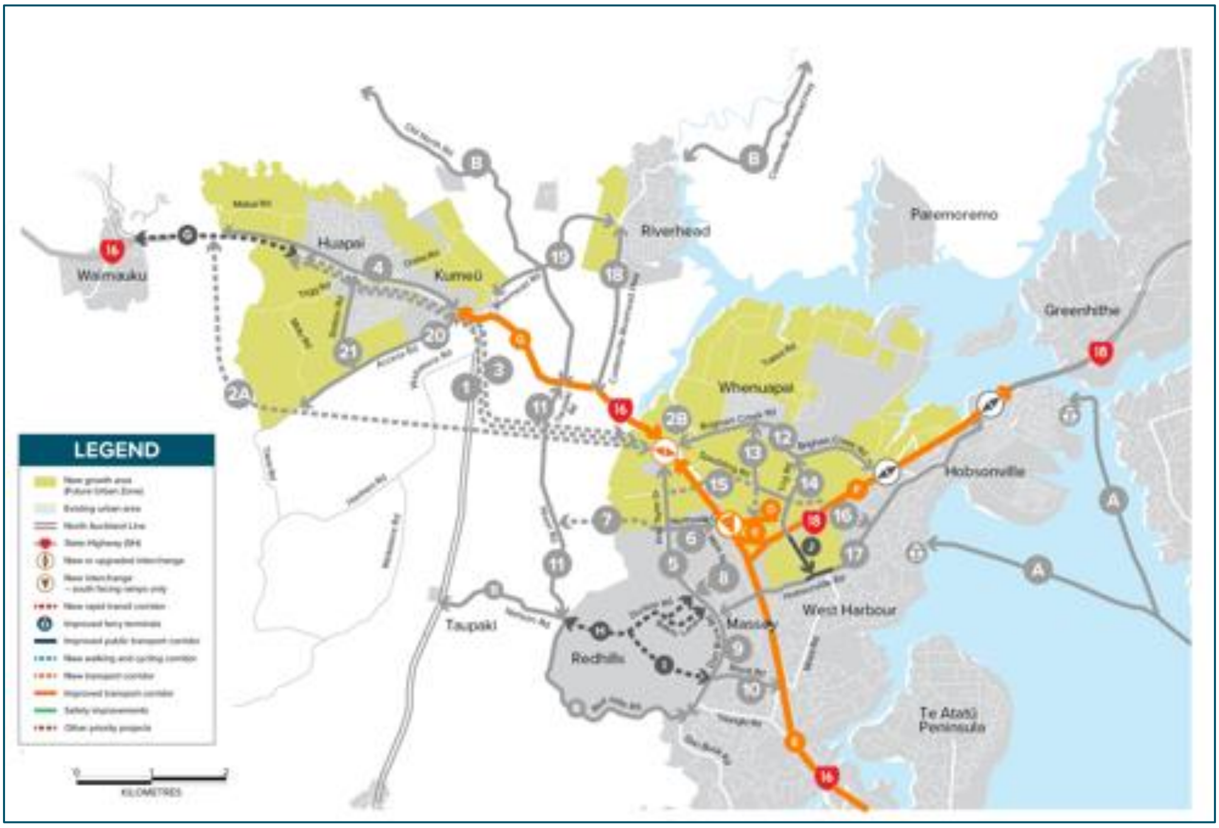
- All committed developments and respective infrastructure upgrades planned as outlined in the ATAP (Auckland Transport Alignment Project) 2.0 and RLTP (Regional Land Transport Plan) have been coded in the future MSM model

- The access points (MSM zone connectors) for each model option scenarios in the North West Detailed business case areas were reviewed and refined accordingly to reflect the future infrastructure upgrades
- The future local bus services for each model option scenarios, were updated based on inputs from the AT Metro, specifically related to routes, frequencies, bus capacities and bus speeds.

Following discussions with Waka Kotahi and Auckland Transport, the following strategic interventions have been included in the North West Do Minimum as shown in Figure A1.1.

- SH16 Brigham Creek to Waimauku project currently being delivered by Waka Kotahi.
- Full implementation of the NWRTN from the City Centre to a Brigham Creek station (City Centre to Westgate (CC2W) project). It was agreed with the owners to use the station locations identified in the North West Rapid Transit IBC.
- SH18 Rapid transit corridor between Westgate and Constellation.
- SH16 to SH18 Connections improvements.

Figure A1:1 Map showing Do Minimum projects for the North West DBC



The inclusion of these key inter-dependent strategic projects in the Do-minimum network is to account for the fact that those projects are being developed separately by Waka Kotahi/Auckland Transport, so are not included as part of the Te Tupu Ngātahi improvements package. They are however a key part of the future transport network for the North West so are part of the overall North West response. If these projects were not to occur, the likely impact is greater demands on the projects identified in this assessment. It is noted that the SH16 Brigham Creek to Waimauku project has funding and potential seed funding for the CC2W project has been included in the RLTP as part of the 10 year capital expenditure. All projects are subject to stand alone business case processes. To understand the overall North West response, it is therefore considered appropriate to include these projects in the modelling assessment.

1.1.2 MSM Outputs

There are a number of outputs from the transport modelling, including:

- Demand patterns (Origin-Destination travel) and facility usage (flows)
- Network performance
- Travel times and costs (real and perceived) for economic analysis
- Delays, queues and Level of Service (LoS) for design and assessment
- Aggregate travel statistics on travel such as Vehicle Kilometres Travelled (VKT), Passenger Kilometres Travelled (PKT) and total travel costs
- Flow and performance for environmental analysis
- Inputs to vehicle emissions models
- Inputs to noise analysis

1.2 SATURN

SATURN is a mesoscopic traffic simulation and assignment model used to undertake a variety of area wide strategic assessments through to more detailed local area assessments. It can be used as a conventional model for the analysis of traffic-management schemes over localised networks as well as for major investment improvements at a regional level. The SATURN model ensures factual representation of vehicle flow patterns and congestion on midblock sections and intersections in the form of 'arrival' flows rather than 'demand' flows. Additionally, it is used as a high-level junction simulation model that evaluates the traffic flow behaviour on junctions. It represents 'congested assignment' of multiple user classes modelled separately, including bus priority and high occupancy vehicle lanes.

1.2.1 SATURN Outputs

There are a number of outputs from the SATURN model, including:

- Vehicular flow pattern -Actual flow, Demand flow, Queued flow
- Network performance- Link and Node delays, Queue Statistics, V/C Ratios
- Mid-block capacities and speeds
- Aggregate travel statistics on travel such as Total Travel Time(hrs), Distance Travelled (kms)

1.3 SIDRA

Signalised (and unsignalised) Intersection Design and Research Aid (SIDRA) is a micro-analytical tool used for evaluating intersection performance. It has a comprehensive, lane-based network modelling approach applicable to all types on intersections-signal, priority or sign control and roundabouts. SIDRA allows the modelling of various movement classes (Light vehicle, Heavy vehicle, Buses, Bicycle, Large Trucks, Light Rail/ Trams) with distinctive vehicle features to be assigned to designated lanes, segments and signal phases.

The Te Tupu Ngātahi SIDRA model is used to analyse the form and function of proposed intersections along strategic corridors. Based on the demand flow outputs from the SATURN Model, the intersection turning flows are determined.

The performance measures of the intersection in terms of capacity, delay, Level of Service (LOS), queue length on approach lanes and optimum vehicle-pedestrian signal phasing is calculated.

It is noted that the SIDRA model is reliant on outputs from the SATURN model, with traffic distribution based on the network provided in SATURN. A finer grain network that includes all collectors and local roads is not provided in SATURN, and as such it can considered that intersection modelling in SIDRA results in a conservative assumption of performance.

ATTACHMENT 47

NORTH-WEST WHENUAPAI ASSESSMENT OF CONSTRUCTION NOISE AND VIBRATION EFFECTS

TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West Whenuapai Assessment of Construction Noise and Vibration Effects

December 2022

Version 1.0

Document Status

Responsibility	Name
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Revision Status

Version	Date	Reason for Issue
1.0	16/12/2022	Notice of Requirement Lodgement

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Appendices

No table of contents entries found.

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Abbreviations

Acronym/Term	Description
AEE	Assessment of Effects on the Environment
AC	Auckland Council
AT	Auckland Transport
AUP:OP	Auckland Unitary Plan Operative in Part
FTN	Frequent Transit Network
FUZ	Future Urban Zone
NoR	Notice of Requirement (under the Resource Management Act 1991)
RMA	Resource Management Act 1991
SH16	State Highway 16
SH18	State Highway 18
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth Programme
Waka Kotahi	Waka Kotahi NZ Transport Agency
NZDF	New Zealand Defence Force
MoD	Ministry of Defence
PPC5	Proposed Plan Change 5

Glossary of Acronyms / Terms

Acronym/Term	Description
Auckland Council	Means the unitary authority that replaced eight councils in the Auckland Region as of 1 November 2010.
Whenuapai Assessment Package	Four Notices of Requirement and one alteration to an existing designation for the Whenuapai Arterial Transport Network for Auckland Transport.

1 Executive Summary

Construction noise levels have been assessed using the method recommended in NZS 6803 in accordance with the Auckland Unitary Plan. As construction of each Project is expected to last for more than 20 weeks, the “long-duration” noise limits are applicable.

Noisy activities will typically be carried out between 7am – 6pm on weekdays. Night time and weekend works will be limited and only occur for critical activities.

Construction vibration levels have been assessed against the requirements of the AUP, which refer to the criteria in DIN 4150-3:1999 for the avoidance of cosmetic building damage (DIN criteria). The AUP also details amenity criteria, which act as a trigger for consultation if predicted to be exceeded.

Construction noise setback distances and vibration emission radii have been determined (based on assumptions of construction activities and equipment) for each of the NoR sections. The construction boundary is assumed to be the edge of the proposed alignment. Affected receivers have been identified using construction noise setback distances and vibration emission radii. The construction noise setback distances and vibration emission radii were used to determine where any potential construction noise and vibration exceedances of the relevant criteria could occur. It should also be noted that the emission radii are conservative and vibration levels measured on site tend to be much lower than those predicted at the NoR stage of a project.

Potential effects of construction noise and vibration have then been assessed and construction management and mitigation measures identified where appropriate. To avoid and/or minimise exceedances of the Project construction noise and vibration criteria, Best Practicable Option (BPO) mitigation and management measures should be utilised.

NoR W1 Trig Road (North)

Results of assessment and recommended measures

Trig Road is currently located within a predominantly rural area with few dwellings in close proximity to the road. The noise environment is dominated by road traffic noise from vehicles on Trig Road, SH18 and the surrounding network as well as aircraft noise associated with the Whenuapai Air Base.

PPC5[1] and the Whenuapai Structure Plan indicate that the land surrounding Trig Road, to the north of SH18 is likely to be Industrial or Business Zones. This zoning would likely result in an increase in ambient noise levels. Where Residential Zones are likely, to the south of SH18, ambient noise levels would likely still increase as the area urbanises.

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver at 6m. With mitigation in place, as set out in Section 5.2, noise levels of up 80 dB L_{Aeq} could occur intermittently at the closest receivers if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 80 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with

[1] Note PPC5 has now been withdrawn by Auckland Council, however land use assumptions are retained under Whenuapai Structure Plan.

lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

Vibration levels could exceed the Category B criteria of 5mm/s PPV at two receivers prior to mitigation being implemented, if high vibration generating equipment, such as the roller compactor, is used on the construction boundary at the closest position to the receivers. At these receivers there is potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration. Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

Conclusion

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment are used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

NoR W2 Māmari Road

Results of assessment and recommended measures

Māmari Road is currently located within a predominantly rural area with few dwellings in close proximity to the road. The noise environment is dominated by road traffic noise from vehicles on Māmari Road as well as aircraft noise associated with the Whenuapai Air Base. The Whenuapai Structure Plan indicates that the land surrounding Māmari Road, to the east and west is likely to be Business Zone. This zoning would likely result in an increase in ambient noise levels as the area urbanises compared to the current rural nature.

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver, Timatanga Community School, at 2m. With mitigation in place, as set out in Section 5.2, noise levels of up 90 dB L_{Aeq} could occur intermittently at the closest receivers if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

Vibration levels could exceed the Category B criteria of 5mm/s PPV at four existing dwellings and the school prior to mitigation being implemented, if high vibration generating equipment, such as the roller compactor, is used on the construction boundary at the closest position to the receivers. At these receivers there is potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration. Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

Conclusion

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment are used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

NoR W3 Brigham Creek Road

Results of assessment and recommended measures

Brigham Creek Road runs through an existing rural environment at each end, with the middle section being a mix of town centre, industrial and suburban environments. The noise environment is dominated by road traffic noise from vehicles on Brigham Creek Road as well as aircraft noise associated with the Whenuapai Air Base. PPC5 and the Whenuapai Structure Plan indicate that Brigham Creek Road is likely to be surrounded by a mix of uses in the future with a Light Industrial Zone, Business Zones and Residential Zones proposed. This zoning would likely result in an increase in ambient noise levels as the area urbanises.

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver at 2m. With mitigation in place, as set out in Section 5.2, noise levels of up 90 dB L_{Aeq} could occur intermittently at the closest receivers if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

Vibration levels could exceed the Category B criteria of 5mm/s PPV at 34 receivers prior to mitigation being implemented, if high vibration generating equipment, such as the roller compactor, is used on the construction boundary at the closest position to the receivers. At these receivers there is potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration. Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

Conclusion

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment are used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

NoR W4 Spedding Road

Results of assessment and recommended measures

Spedding Road is currently located within a predominantly rural area with few dwellings in close proximity to the road. PPC5, the Whenuapai Structure Plan and the I603 Hobsonville Corridor Precinct indicate that the land surrounding Spedding Road is likely to contain mostly industrial or business uses in the future with pockets of residential. Ambient noise levels are expected to increase as the area urbanises.

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver at 2m. With mitigation in place, as set out in Section 5.2, noise levels of up 90 dB L_{Aeq} could occur intermittently at the closest receivers if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

Vibration levels could exceed the Category B criteria at three existing dwelling and two commercial buildings prior to mitigation being implemented, if high vibration generating equipment, such as the roller compactor, is used on the construction boundary at the closest position to the receivers. At these receivers there is potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration. Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

The Whenuapai Aerodrome Heavy Anti-Aircraft Battery is scheduled as a Historic Heritage Place and is located across the properties at 4 Spedding Road and 92 Trig Road. Unmitigated vibration levels could exceed the DIN criteria for historical / sensitive structures. To control and minimise vibration levels at these structures the use of smaller or low vibration equipment will be required. A vibration management plan will be prepared in accordance with Rule E26.8.8 of the AUP.

Conclusion

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment are used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

NoR W5 Hobsonville Road

Results of assessment and recommended measures

Hobsonville Road is an existing urban corridor with development still occurring in the surrounding area. The noise environment is dominated by road traffic noise from vehicles on Hobsonville Road. Although development is still occurring in the area, ambient noise levels are unlikely to increase significantly above their current level.

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver at 2m. With mitigation in place, as set out in Section 5.2, noise levels of up 90 dB L_{Aeq} could occur intermittently at the closest receivers if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

Vibration levels could exceed the Category B criteria at 50 existing dwellings and 5 commercial buildings prior to mitigation being implemented, if high vibration generating equipment such as the roller compactor is used on the construction boundary at the closest position to the receivers. At these receivers there is potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration. Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

Conclusion

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment are used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

2 Introduction

This construction noise and vibration assessment has been prepared for the North West Local Arterial Network Notices of Requirement (**NoRs**) for Auckland Transport (**AT**) (the "Whenuapai Assessment Package"). The NoRs are to designate land for future local arterial transport corridors as part of Te Tupu Ngātahi Supporting Growth Programme (**Te Tupu Ngātahi**) to enable the construction, operation and maintenance of transport infrastructure in the North West Whenuapai area of Auckland.

The North West growth area is approximatively 30 kilometres north west of Auckland's central city. It makes a significant contribution to the future growth of Auckland's population by providing for approximately 42,355 new dwellings and employment activities that will contribute 13,000 new jobs across the North West. Whenuapai is one of these growth areas, located between State Highway 16 (**SH16**) and State Highway 18 (**SH18**) and at present is largely rural (but Future Urban Zoned) with an existing community consisting of new and more established residential, business and local centre land uses. This growth area is expected to be development ready by 2018-2022 with 401 hectares to accommodate 6,000 dwellings. Furthermore, a Whenuapai Structure Plan was adopted by the Council in 2016 and sets out the framework for transforming Whenuapai from a semi-rural environment to an urbanised community over the next 10 to 20 years.

The Whenuapai Assessment Package will provide route protection for the local arterials, which include walking, cycling and public transport (including the Frequent Transit Network (**FTN**)), needed to support the expected growth in Whenuapai.

This report assesses the construction noise and vibration effects of the North West Whenuapai Assessment Package identified in Figure 2-1 and Table 2-1 below.

The Whenuapai Assessment Package comprises five separate projects which together form the North West Whenuapai Arterial Network. The network includes provision for general traffic, walking and cycling, and frequent public transport

Table 2-1: North West Whenuapai Assessment Package – Notices of Requirement and Projects

Corridor	NOR	Description	Requiring Authority
Trig Road North	NoR W1	Upgrade of Trig Road corridor to a 24m wide two-lane urban arterial cross-section with separated active mode facilities on both sides of the corridor.	Auckland Transport
Māmari Road	NoR W2	Extension and upgrade of Māmari Road corridor to a 30m wide four-lane urban arterial cross-section providing bus priority lanes and separated active mode facilities on both sides of the corridor.	Auckland Transport
Brigham Creek Road	NoR W3	Upgrade of Brigham Creek Road corridor to a 30m wide four-lane arterial cross-section with separated active mode facilities on both sides of the corridor.	Auckland Transport
Spedding Road	NoR W4	Upgrade of the existing Spedding Road corridor and new east and west extensions to form a 24m wide two-lane arterial with separated active mode facilities on both sides of the corridor.	Auckland Transport

Corridor	NOR	Description	Requiring Authority
Hobsonville Road (alteration to existing designation 1437)	NoR W5	Alteration of the existing Hobsonville Road designation 1437 to provide for the widening of the Hobsonville Road corridor between Oriel Avenue and Memorial Park Lane. Upgrade of sections of Hobsonville Road corridor to a 30m wide four-lane cross section with separated active mode facilities on both sides of the corridor Upgrade of sections of Hobsonville Road corridor to a 24m wide two-lane cross section with separated active mode facilities on both sides of the corridor.	Auckland Transport

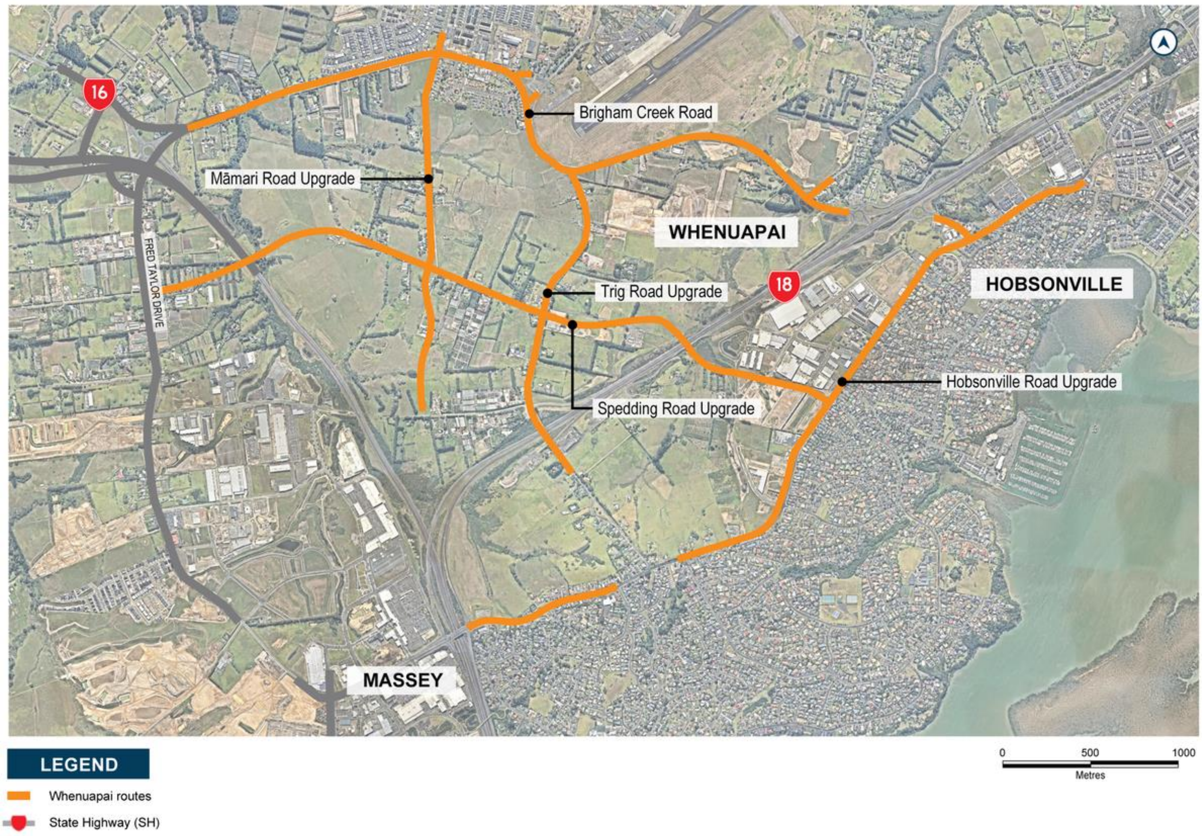

Figure 2-1: North West Local Package - Whenuapai – Overview of NoRs for Assessment

2.1 Purpose and Scope of this Report

This assessment forms part of a suite of technical reports prepared to support the assessment of effects within the Whenuapai Assessment Package. Its purpose is to inform the AEE that accompanies the four NoRs and one alteration to an existing designation for the Whenuapai Assessment Package sought by AT.

This report considers the actual and potential effects associated with the construction of the Whenuapai Assessment Package on the existing and likely future environment as it relates to the construction noise and vibration effects and recommends measures that may be implemented to avoid, remedy and/or mitigate these effects.

The key matters addressed in this report are as follows:

a) Identify and describe the noise and vibration context of the Whenuapai Assessment Package area;
b) Identify and describe the actual and potential construction noise and vibration effects of each Project corridor within the Whenuapai Assessment Package;
c) Recommend measures as appropriate to avoid, remedy or mitigate actual and potential construction noise and vibration effects (including any conditions/management plan required) for each Project corridor within the Whenuapai Assessment Package; and
d) Present an overall conclusion of the level of actual and potential construction noise and vibration effects for each Project corridor within the Whenuapai Assessment Package after recommended measures are implemented.

2.2 Report Structure

The report is structured as follows:

a) Overview of the methodology used to undertake the assessment and identification of the assessment criteria and any relevant standards or guidelines;
b) Description of each Project corridor and project features within the Whenuapai Assessment Package as it relates to construction noise and vibration;
c) Description of the existing and likely future noise environment;
d) Description of the actual and potential adverse construction noise and vibration effects of construction of each Project;
e) Recommended measures to avoid, remedy or mitigate potential adverse construction noise and vibration effects; and
f) Overall conclusion of the level of potential adverse construction noise and vibration effects of the Project after recommended measures are implemented.

This report should be read alongside the AEE, which contains further details on the history and context of the Project. The AEE also contains a detailed description of works to be authorised for the Project, likely staging and the typical construction methodologies that will be used to implement this work. These have been reviewed by the author of this report and have been considered as part of this assessment of construction noise and vibration effects. As such, they are not repeated here, unless a description of an activity is necessary to understand the potential effects, then it has been included in this report for clarity.

2.3 Preparation for this Report

The construction methodology and construction drawings for each NoR was reviewed and reference to the AUP:OP, NZS 6803 and DIN 4150 was made (these documents are discussed further below).

3 Assessment Criteria

3.1 Construction Noise

Potential construction noise effects have been assessed in accordance with the applicable AUP:OP noise rules. Rule E25.6.1(3) of the AUP:OP states that "The noise from any construction activity must be measured and assessed in accordance with the requirements of New Zealand Standard NZS6803:1999 Acoustics – Construction noise". Rules E.25.6.27(1) and E.25.6.27(2) contain noise limits for sensitive and all other receivers.

Furthermore, Rule E25.6.29 specifies that construction noise levels for work within the road for construction, maintenance and demolition activities must meet the relevant noise levels in the relevant table E25.6.27(1) or E25.6.27(2). Noise levels from E25.6.27(1) and E25.6.27(2) have been adopted for the purpose of this assessment and are reproduced in Table 3-1 and Table 3-2 respectively.

In accordance with Section 25.6.27(4) of the AUP:OP, since the works will take longer than 20 weeks a 5dB reduction has been applied in all cases to noise limits in E25.6.27(1) and E25.6.27(2) of the AUP:OP. The long duration limits are detailed in Table 3-1 and Table 3-2 below.

Table 3-1 Construction noise criteria for sensitive receivers (outside of Business – City Centre Zone and the Business – Metropolitan Centre Zone)

Day of the week	Time period	Maximum noise level >20 weeks	
		dB L_{Aeq}	dB L_{Amax}
Weekdays	6:30 – 7:30	55	70
	7:30 – 18:00	70	85
	18:00 – 20:00	65	80
	20:00 – 06:30	40	70
Saturdays	6:30 – 7:30	40	70
	7:30 – 18:00	70	85
	18:00 – 20:00	40	70
	20:00 – 06:30	40	70
Sunday and public holidays	6:30 – 7:30	40	70
	7:30 – 18:00	50	80
	18:00 – 20:00	40	70
	20:00 – 06:30	40	70

Table 3-2 Construction noise criteria for all other receivers (outside of Business – City Centre Zone and the Business – Metropolitan Centre Zone)

Time period	Maximum noise level dB L_{Aeq} >20 weeks
07:30 – 18:00	70
18:00 – 07:30	75

Exemptions to these levels are provided in Rule E25.6.29 (2) and E25.6.29 (3) where noise levels specified do not apply for planned works in the road between the hours of 10pm and 7am where:

- The number of nights where the noise generated by the works exceeds the relevant noise levels at any one receiver exceeds the relevant noise levels for 3 nights or less; and
- The works cannot practicably be carried out during the day or because the road controlling authority requires this work to be done at night; or
- Because of the nature of the works the noise produced cannot practicably be made to comply with the relevant noise levels.

Under E25.6.29 (3), noise levels specified (as replicated above in Table 3-1) do not apply for planned works in the road between the hours of 7am and 10pm where:

- The number of days where the noise generated by the works exceeds the relevant noise levels at any one receiver is 10 days or less; or
- Because of the nature of the works and the proximity of receivers the noise generated cannot be practicably made to comply with the relevant noise levels.

If situations fall under the exemption rules, then a copy of the works access permit issued by Auckland Transport will be provided to the Council five days prior to work commencing; or a construction noise and vibration management plan will be provided to the Council no less than five days prior to the works commencing in accordance with the applicable provisions of Standard E25.6.29(5).

3.2 Construction Vibration

The main objective of controlling construction vibration is to avoid vibration-related damage to buildings, structures, and services, in the vicinity of the works. Any adverse effects of construction vibration on human comfort would typically only be experienced for short durations, for most types of construction work.

It should be noted that the level of vibration perceived by humans, and the level of vibration that is likely to result in annoyance for some people, are magnitudes lower than the level of vibration capable of damaging structures. This means that vibration levels which readily comply with the building damage criteria will likely cause annoyance and adverse reaction from building occupants who mistakenly believe that their building is sustaining damage.

Potential exceedances of the amenity criteria will be considered when assessing the construction vibration effect on nearby receivers. It is recommended that the limits relating to human comfort detailed in Table 3-3 should be used as trigger for communication and consultation, and should be included in the construction management plan(s) that will be prepared as part of the Projects.

3.2.1 Auckland Unitary Plan

The AUP:OP contains rules relating to construction vibration that cover both building damage and amenity. Rule E25.6.30 states that construction activities must be controlled to ensure any resulting vibration does not exceed:

a) The limits set out in German Industry Standard DIN 4150-3 (1999): Structural vibration – Part 3 Effects of vibration on structures when measured in accordance with that Standard on any structure not on the same site; and
b) The limits set out in Table 3-3 in any axis when measured in the corner of the floor of the storey of interest for multi-storey buildings, or within 500mm of ground level at the foundation of a single storey building.

Table 3-3 AUP:OP Table E25.6.30.1 Vibration limits in buildings

Receiver	Period	Peak Particle Velocity (PPV mm/s)
Occupied activity sensitive to noise or vibration	Night-time 10pm to 7am	0.3
	Daytime 7am to 10pm	2.0
Other occupied buildings	At all times	2.0

Works generating vibration for three days or less between the hours of 7am to 6pm may exceed the limits in Table E25.6.30.1 Vibration limits in buildings above, but must comply with a limit of 5mm/s peak particle velocity in any axis when measured in the corner of the floor of the storey of interest for multi-storey buildings, or within 500mm of ground level at the foundation of a single storey building, where:

(i) all occupied buildings within 50m of the extent of the works generating vibration are advised in writing no less than three days prior to the vibration-generating works commencing; and
(ii) the written advice must include details of the location of the works, the duration of the works, a phone number for complaints and the name of the site manager.

3.2.2 DIN 4150-3:1999 – Structural vibrations: Effects of vibrations on structures

DIN 4150 contains guidelines on the vibration limits for buildings which, when complied with “will not result in damage that will have an adverse effect on the structure’s serviceability”. These limits are reproduced in Table 3-4.

Different criteria are given for “short-term” (transient) vibration sources such as blasting and impact piling, and “long-term” sources such as vibrocompaction. Note that the definition of “short-term” and “long-term” in DIN 4150-3:1999 differ from those in NZS 6803:1999 and do not strictly relate to the duration of the works, but rather how a building responds to the construction vibration. Short term vibration does not excite a structure (which would result in a significant increase in vibration), therefore vibration limits are higher than for long-term vibration.

Table 3-4 Vibration velocity guideline values for structures (DIN 4150)

Type of structure	**Short term vibration****				**Long Term Vibration**
	PPV at foundation, frequency of:			Vibration at horizontal plane of highest floor at all frequencies (mm/s)	PPV at horizontal plane of highest floor (mm/s)
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz*		
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40	10
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15	5
Structures that because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value	3	3 to 8	8 to 10	8	2.5

** At frequencies above 100 Hz, the values given in this column may be used as minimum values*
*** The Standard defines short-term vibration as “vibration which does not occur often enough to cause structural fatigue, and which does not produce resonance in the structure being evaluated”. Long-term vibration is defined as all other vibration types not covered by the short-term vibration definition.*

Clause 5.1 of DIN 4150-3 notes that a vibration level in excess of the DIN criterion does not necessarily result in building damage. The definition of ‘damage’ in DIN 4150-3 is: “any permanent effect of vibration that reduces serviceability of a structure or one of its components”.

Examples of a ‘reduction of serviceability’ include:

- The impairment of stability of the building and its components; and

- A reduction in the bearing capacity of floors.

For dwelling type buildings and structures sensitive to vibration, the serviceability is considered to have been reduced if:

- Cracks form in plastered surfaces of walls;
- Existing cracks in the building are enlarged; or
- Partitions become detached from loadbearing walls or floors.

Clause 4.5 of DIN 4150-3 states that these effects are deemed ‘minor damage’. More than minor damage would be damage above and beyond the bullet points above.

3.2.3 British Standard 5228-2

British Standard (BS) 5228-2: 2009 “Code of practice for noise and vibration control on construction and open sites” provides additional guidance on the human response to vibration, which is widely used in the assessment of effects of construction vibration. The vibration levels against perception as found in BS5228-2:2009 have been replicated in Table 3-5 below.

Table 3-5 Human perception of vibration levels

Vibration Level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might just be perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaints but can be tolerated if warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

3.2.4 Auckland Transport construction vibration criteria

The following criteria are the recommended Project construction vibration criteria for both building damage and amenity applicable for all NoRs.

The two category criteria, detailed in Table 3-6, are to facilitate a progressive management response to the increasing risks and effects during construction.

Category A sets the criteria for the amenity effects where vibrations may be perceived by occupants within a building, as adopted from the AUP:OP, and an indicator of when communication and consultations should be initiated to manage effects. Category B are based on DIN 4150 building damage criteria for daytime.

Table 3-6 Auckland Transport Construction vibration criteria

Vibration Level	Effect	Category A	Category B
Occupied activities sensitive to noise	Night-time 2000h – 0630	0.3mm/s ppv	2mm/s ppv
	Daytime 0630h – 2000h	2mm/s ppv	5mm/s ppv
Other occupied buildings	Daytime 0630h – 200h.	2mm/s ppv	5mm/s ppv
All other buildings	All other times	Tables 1 and 3 of DIN4150-3:1999	

Where compliance with the vibration standards set out in Table 3-6 is not practicable, and unless otherwise provided for in the CNVMP (refer Section 5.2.1), a schedule (refer Section 5.2.2) will be required.

4 Assessment Methodology

A consistent approach has been adopted for the whole Whenuapai Assessment Package as set out in this section. It has been assumed that no concurrent project works will occur across the multiple areas where receivers may be subjected to impacts from more than one designation. Any receivers that may be impacted by more than one Project would be considered in the CNVMP closer to the time of construction. Any buildings within the proposed designation footprint will be removed in most cases, as confirmed by the Project Team, and are not assessed. If the corridor footprint is redefined through the design process this should be considered in the CNVMP.

Construction noise setback distances and vibration emission radii have been determined (based on assumptions of construction activities and equipment) for each of the NoR sections.

The construction boundary is assumed to be the edge of the proposed alignment. Affected receivers have been identified using construction noise setback distances and vibration emission radii. The construction noise setback distances and vibration emission radii were used to determine where any potential construction noise and vibration exceedances of the relevant criteria could occur. Potential effects of construction noise and vibration have then been assessed and construction management and mitigation measures identified where appropriate. To avoid and/or minimise exceedances of the Project construction noise and vibration criteria, Best Practicable Option (BPO) mitigation and management measures should be utilised.

This report proposes a framework for construction noise and vibration management such that the most effective and practicable methods for mitigation will be planned and implemented, taking into account the extent of predicted effects. At the core of this framework is the Construction Noise and Vibration Management Plan (CNVMP) in Section 5.2.1, which will be developed prior to commencement of construction, and updated as necessary throughout the duration of construction.

4.1 Construction methodology

An indicative construction methodology has been provided by the project team to inform the assessment of each of the NoR.

The outline is based on a generic construction project and has not taken into consideration any project specific scope of works, constraints or staging requirements that may be applicable for each project. The indicative construction programme assumes a linear construction sequence.

The construction methodology for the project is as follows:

4.1.1 Site establishment

- Site access construction;
- Tree removal and vegetation clearance;
- Remove footpath, streetlights, grass verge berm;
- Property/ building modification or demolition, including fencing, driveways and gates;
- Install environmental controls e.g. silt fencing, sediment retention ponds;
- Implement traffic management to establish the construction zones;
- Service protection works; and
- Construct access tracks/ haul roads (if any).

4.1.2 Advance works

- Relocation of utilities services; and
- Major earthworks to include the following:
  - Ground improvements, undercuts, embankment foundations;
  - Cut and fill works along the alignment to formation level, including preload if required; and
  - Remove preload upon settlement completion, and subgrade preparation.

4.1.3 Main works

- Minor earthworks (cut and fill);
- Remove verge and prepare subgrade formation;
- Construct new longitudinal drainage facilities;
- Construct new pavement, widening works in available areas;
- Move traffic to newly constructed pavement areas and continue with the remaining widening works;
- Pavement reconstruction or reconfiguration of existing road furniture;
- Complete tie in works, footpaths, cycleways, lighting and landscaping;
- Construct permanent stormwater wetlands;
- Construct new culverts including rip rap and headwalls;
- Install road safety barriers (if any); and
- Bridge construction works (if any) as follows:
  - Construct abutments;
  - Piling, pier, and headstock construction;
  - Install bridge beams and decking;
  - Install settlement slabs;
  - Retaining wall construction (if any);
  - Accommodation works; and
  - Install signage and lighting.

4.1.4 Finishing works and demobilisation

- Final road surfacing and road markings;
- Commission traffic signals (if any);
- Finishing works e.g. landscaping, street furniture, fencing and outstanding accommodation works;
- Move traffic to the final road configuration; and
- Practical completion and de-establishment.

4.1.5 Plant and Equipment

Table 4-1 provides an indicative list of plant and equipment which may be required for construction across each designation.

Table 4-1 Indicative construction equipment

Construction	Construction Activity
Typical across all works	• Site facility

Construction	Construction Activity
	• Light Vehicles • Hiab truck • Trucks
Earthworks	• 20-30T Excavator • Roller Compactor • Water Cart • Tippers • Stabilizers
Drainage	• 20T Excavator • Trench Shields • Tandem Tipper • Loader • Plate compactor • Trucks • Water cart
Pavement Construction	• Grader • Water Cart • Smooth Drum Roller • Vibratory Roller • Tandem Tippers • Kerbing Machine • Concrete Truck • Plate compactor • Paver • Excavators
Bridge construction	• Concrete truck • Excavator • Tip trucks • Cranes • Delivery trucks • Pilling Rig • Concrete Pump • Elevated Work Platform

4.2 Construction Noise

Construction phases for each of the Projects are expected to occur for a minimum of 20 months. Predictions have been assessed against the noise criteria for greater than 20 weeks “long-duration” under NZS6803:1999 as presented in Table 3-1. It is expected that the majority of the works will be carried out between 7am – 6pm Monday to Saturday. There will be extended hours during summer earthworks season (e.g. 6am to 8pm, Monday to Sunday), there is also the possibility of night works for critical activities (culvert construction and road surfacing).

Various construction activities and pieces of equipment will act as noise sources on site during construction works. An indicative construction equipment list has been provided by the project team to assess the noise and vibration effects. Given construction will occur in the future, the current methodology may not be inclusive of all equipment used nearer the time of construction. Equipment tables will need to be updated to reflect selection at the development of the management plan. A minimum set back distance from receivers to comply with day-time noise criterion of 70 dB L_{Aeq} without mitigation has been calculated.

4.2.1 Equipment Noise Levels

Table 4-2 details the sound power levels from the likely significant noise sources and the various receiver setback distances required to achieve compliance with the 70 dB L_{Aeq} day-time noise criterion without mitigation. The noise data has been taken from British Standard 5228-1:2009 “Code of practice for noise and vibration control on construction and open sites”, manufacturers data or the AECOM database of noise measurements. Equipment selection at detailed design stage may include equipment with different sound power levels than those presented. The equipment list should be reassessed nearer the time at production of the CNVMP.

Table 4-2 Construction Equipment Sound levels and indicative compliance distance

Equipment	Sound power level (dB L_{wA})	Free field noise level at varying distances (dB L_{Aeq})				Minimum Setback distance to comply with day-time criteria without mitigation, metres
		5 m	10 m	20 m	50 m	
30T excavator	105	86	80	73	66	30
20T excavator	99	80	74	67	60	13
Roller compactor	101	82	76	69	62	20
Tipper Truck	107	88	82	75	68	36
Loader	105	86	80	73	66	30
Vibratory Plate Compactor	110	91	85	78	71	45
Smooth Drum Roller	103	84	78	71	64	25
Paver	103	84	78	71	64	25
Grader	99	80	74	67	60	13
Bridge Construction Only						
Concrete Truck	107	88	82	75	68	36
Cranes	99	80	74	67	60	13

Equipment	Sound power level (dB L_{wA})	Free field noise level at varying distances (dB L_{Aeq})				Minimum Setback distance to comply with day-time criteria without mitigation, metres
		5 m	10 m	20 m	50 m	
Bore Pilling	115	96	90	83	76	73

Table 4-3 details the sound power levels for key construction activities, combining the equipment sound power levels detailed in Table 4-2 where multiple items of equipment may be operating simultaneously. Table 4-3 also details the minimum setback distance at which compliance can be achieved for each activity.

Table 4-3 Activity Sound Power Levels and Compliance Distance

Construction Type	Activity Sound Power Level (dB L_{wA})	Minimum set back distance from receivers to comply with day-time limit (70 dB L_{Aeq}) without mitigation, metres
Typical across all works	110	48 m
Earthworks	111	52 m
Drainage works	113	56 m
Pavement Construction	115	76 m
Bridge Construction	117	90 m

4.3 Construction Vibration

Vibration generation and propagation is highly site specific. The generation of vibration is dependent on the local site geology, the equipment being used, the nature of the works, and even the operator.

To account for the inaccuracy in the prediction of vibration, the likely worst-case vibration has been calculated based on the equipment and hard ground geology.

Vibration from a source transmits in a spherical pattern and reduces with distance. There will be a particular distance from each source at which the vibration level equals the relevant vibration criteria. This distance is called the ‘emission radius’. The vibration criteria and emission radii for high vibration generating equipment are detailed in Table 4-4.

Table 4-4 Vibration sources and indicative emission radii

Equipment	Daytime Occupied Buildings (2 mm/s)	DIN 4150 emission radii		
		Historic and Sensitive (2.5 mm/s)	Residential (5 mm/s)	Commercial (10 mm/s)
Roller Compactor	21m	17m	8m	4m
Bore Pilling	4m	2m	1m	1m
Excavator	12m	10m	6m	2m
Tipper Truck	2m	2m	1m	0m
Vibratory Plate Compactor	3m	2m	1m	1m

We recommend that vibration measurements are undertaken at specific locations as identified through the CNVMP and schedules at the commencement of construction activities to establish vibration propagation site laws for vibration generating equipment. This approach will confirm the emission radii used in this assessment and ensure the applicable criteria are complied with. It has been found on other major construction projects, that the measured vibration levels for a particular activity are much lower than those predicted during the assessment stage.

5 Whenuapai Construction Effects

5.1 Overview of Construction Effects

Potential construction noise and vibration effects are summarised in this section.

5.1.1 Construction noise

Table 5-1 gives examples of the potential effects on receivers at different noise levels based on NZS6803 with most exposed façades providing a 20 dB reduction. Depending on the construction of the house, facades may provide up to a 25 – 30 dB reduction, particularly those that are located within the Aircraft Noise Overlay that have been designed to mitigate aircraft noise levels, therefore assumptions and effects provided below are based on a conservative approach.

Table 5-1 Potential construction noise effects on receivers

External Noise Level	Potential Daytime Effects Outdoors	Corresponding Internal Noise Level	Potential Daytime Effects Indoors
65 dB L_{Aeq}	Conversation becomes strained, particularly over longer distances	45 dB L_{Aeq}	Noise levels would be noticeable but unlikely to interfere with residential or office daily activities.
65 to 70 dB L_{Aeq}	People would not want to spend any length of time outside, except when unavoidable through workplace requirements	45 to 50 dB L_{Aeq}	Concentration would start to be affected. TV and telephone conversations would begin to be affected.
70 to 75 dB L_{Aeq}	Businesses that involve substantial outdoor use (for example garden centres) would experience considerable disruption.	50 to 55 dB L_{Aeq}	Phone conversations would become difficult. Personal conversations would need slightly raised voices. Office work can generally continue, but 55 dB is considered by the experts to be a tipping point for offices. For residential activity, TV and radio sound levels would need to be raised.
75 to 80 dB L_{Aeq}	Some people may choose protection for long periods of exposure. Conversation would be very difficult, even with raised voices.	55 to 60 dB L_{Aeq}	Continuing office work would be extremely difficult and become unproductive. In a residential context, people would actively seek respite.
80 to 90 dB L_{Aeq}	Hearing protection would be required for prolonged	60 to 70 dB L_{Aeq}	Untenable for both office and residential

External Noise Level	Potential Daytime Effects Outdoors	Corresponding Internal Noise Level	Potential Daytime Effects Indoors
	exposure (8 hours at 85 dB) to prevent hearing loss.		environments. Unlikely to be tolerated for any extent of time.

With effective management of construction activities, which includes consultation and communication with affected parties and scheduling noisy works (such as piling activities), during the daytime rather than night-time period, noise levels can be controlled for each of the Projects so that the effects on the nearest residential receivers are reduced. Barriers will not be effective at all locations, particularly where receivers are more than one storey. Where barriers are not going to be effective, the use of enclosures or local screening of equipment should be considered and implemented, where practicable. If noisy activities must take place during the night-time, and screening or other mitigation measures do not provide sufficient attenuation to meet the night-time noise criteria or are not practicable, it may be necessary to offer temporary relocation to affected residents. Temporary relocation should be considered on a case-by-case basis and as a last resort.

5.1.2 Construction Vibration

The vibration effects associated with construction of the Projects are considered in terms of human response and building damage. However, in our experience the main concern for building occupants during construction is damage to the building itself.

Humans can generally perceive vibrations at a much lower level than when building damage is likely to occur. The adverse effects of construction vibration on building occupants may be significant in some buildings adjacent to the areas of works. Adverse effects may range from annoyance to loss of amenity or inability to carry out work. Vibration effects will reduce with distance from the source, and the level of vibration transmission into a building will depend on a number of factors, such as the foundation type and building construction.

Potential effects and human perception of the vibration levels found within the AUP:OP /DIN criteria have been combined below and adopted for this assessment.

Table 5-2 Potential vibration effects on human perception summary against AUP:OP /DIN criteria

External Noise Level	Potential Daytime Effects Outdoors
0.14 mm/s	The threshold of perception for stationary people. Just perceptible in particularly sensitive environments.
0.3 mm/s	Can be just perceptible during normal residential activities, particularly for more sensitive receivers. Levels above may wake most people from their sleep. This is the AUP:OP limit for construction vibration generated at night-time for sensitive receivers.
1 mm/s	Is typically tolerable with prior notification. Complaint or adverse reaction is likely in office or residential environments, particularly if there is no prior warning. What people actually feel would be subject to the source but could include a steady vibration from sources such as vibratory compaction, or a small jolt such as from

External Noise Level	Potential Daytime Effects Outdoors
	the movement of a large digger either of which could rattle crockery and glassware. Sleep disturbance would be almost certain for most people.
2 mm/s	Vibration would clearly be felt. However, it can typically be tolerated in indoor environments such as offices, houses and retail if it occurs intermittently during the day and where there is effective prior engagement. Effects experienced would be somewhere between levels of 1 and 5 mm/s. This is the AUP:OP limit for large construction projects generating vibration.
5 mm/s	Unlikely to be tolerable in a workplace. Highly unsettling for both workplaces and dwellings. If exposure is prolonged, some people may want to leave the building Computer screens would shake and items could fall off shelves if they are not level. This is the threshold below which no cosmetic damage will occur in the DIN standard.
10 mm/s	Likely to be intolerable for anything other than a very brief exposure.

The AUP:OP sets the criteria for amenity at 0.3mm/s for night time and 2 mm/s during the day. Based on the worst-case source of a roller compactor, any receiver within a 21m radius of the construction area may experience vibration of 2 mm/s inside their property. Whilst at this level building damage is highly unlikely to occur, human perception may result in slight concerns but can generally be tolerated if activity occurs intermittently and with prior notice.

At 0.3 mm/s the emission radii could be up to 140m from construction areas, and at this level people could feel slight vibrations especially during the night-time, which may cause sleep disturbance. High vibratory activities should therefore be avoided, where practicable, during the night-time and careful management of the type of equipment used at night should be included within the CNVMP (refer Section 5.2.1).

Construction vibration effects generally have a short timeframe, typically a few days at a time. The use of high vibratory equipment, such as a roller compactor, should be managed through a CNVMP to limit potential vibration effects, and alternative equipment with lower vibratory effect should be used where practicable.

5.2 Recommended Measures to Avoid, Remedy or Mitigate Construction Effects

5.2.1 Construction Noise and Vibration Management Plan

Implementing noise management and mitigation measures via a CNVMP is the most effective way to control construction noise and vibration impacts. The objective of the CNVMP should provide a framework for the development and implementation of best practicable options to avoid, remedy or mitigate the adverse effects on receivers of noise and vibration resulting from construction. E25.6.29(5) sets out the minimum level of information that must be provided in a CNVMP. Accordingly, as a minimum, we recommend that the CNVMP should include the following content:

- Description of the works and anticipated equipment/processes;
- Hours of operation, including times and days when construction activities would occur;
- The construction noise and vibration standards for the Project;
- Identification of receivers where noise and vibration standards apply;
- Management and mitigation options, including alternative strategies adopting the BPO where full compliance with the relevant noise and/or vibration standards cannot be achieved;
- Methods and frequency for monitoring and reporting on construction noise and vibration, including:
  - Updating the predicted noise and vibration levels based on the final methodology and construction activities;
  - Confirming which buildings will be included in a pre and post building condition survey;
  - Identifying appropriate monitoring locations for receivers of construction noise and vibration;
  - Procedures to respond to complaints received on construction noise and vibration, including methods to monitor and identify noise and vibration sources;
  - Procedure for responding to monitored exceedances; and
  - Procedures for monitoring construction noise and vibration and reporting to the Auckland Council Consent Monitoring officer.
- Procedures for maintaining contact with stakeholders, notifying of proposed construction activities, the period of construction activities, and handling noise and vibration complaints;
- Contact details of the site supervisor or Project manager and the Requiring Authority's Project Liaison Person (phone, postal address, email address);
- Procedures for the regular training of the operators of construction equipment to minimise noise and vibration as well as expected construction site behaviours for all workers;
- Identification of areas where compliance with the noise and/or vibration standards will not be practicable and where a Site Specific Construction Noise and/or Vibration Management Schedule will be required;
- Procedures for how remedial works will be undertaken, should they be required as a result of the building condition surveys; and
- Procedures and timing of reviews of the CNVMP.

5.2.2 Schedules

In addition to a CNVMP, it may be necessary to produce Site Specific or Activity Specific Construction Noise and Vibration Management Schedules ("Schedules") where noise and/or vibration limits are predicted to be exceeded for a more sustained period or by a large margin. A schedule to the CNVMP provides a specific assessment of an activity and/or location and should include details such as:

- Activity location, start and finish dates;
- The nearest neighbours to the activity;
- A location plan;
- Predicted noise/vibration levels and BPO mitigation for the activity and/or location;
- Communication and consultation with the affected neighbours;
- Location, times and type of monitoring; and
- Any pre-condition survey of buildings predicted to receive vibration levels approaching the Category B vibration limits, which document their current condition and any existing damage.

5.2.3 Noise mitigation measures

A hierarchy of mitigation measures will be adopted through the CNVMP and Schedules (where produced), as follows:

- Managing times of activities to avoid night works and other sensitive times;
- Liaising with neighbours so they can work around specific activities;
- Selecting equipment and methodologies to restrict noise;
- Using screening/enclosures/barriers; and
- Offering neighbours temporary relocation.

By following this hierarchy, the BPO for mitigation will be implemented, whilst avoiding undue disruption to the community. In particular, temporary relocation of neighbours can cause significant inconvenience and should only be offered where other options have been exhausted and noise levels still require mitigation.

Some activities are likely to be set back a considerable distance from the nearest receivers and require very little or no mitigation to achieve compliance with the relevant Project noise limits. Alternative methodologies, such as careful equipment selection and use of noise barriers or localised screening (e.g. for concrete cutting) may be suitable management and mitigation measures and should be implemented where they are practicable and effective.

5.2.4 Vibration mitigation

Similarly to noise, a hierarchy of vibration mitigation measures will be adopted through the CNVMP and Schedules (where produced) as follows:

- Managing times of activities to avoid night works and other sensitive times (communicated through community liaison);
- Liaising with neighbours so they can work around specific activities;
- Operating vibration generating equipment as far from sensitive sites as possible;
- Selecting equipment and methodologies to minimise vibration;
- Offering neighbours temporary relocation; and
- In specific situations, a cut-off trench may be used as a vibration barrier if located close to the source.

In general, there are less options available to mitigate vibration propagation and insulate receiver buildings, compared to noise. Mitigation will therefore focus on scheduling of activities, effective communication with neighbours, and selection of appropriate equipment and methods, where practicable.

Appropriate vibration mitigation measures for each activity will be listed in the CNVMP and Schedules (where produced).

5.2.5 Building Condition Survey

A detailed building precondition survey should be undertaken by a suitably qualified engineer prior to the start of construction at all buildings where the daytime Category B criteria may be exceeded. The survey shall include, but not be limited to, the following:

- Determination of building classification: commercial, industrial, residential or a historic or sensitive structure;

- Determination of building specific vibration damage risk thresholds; and
- Recording (including photographs) the major features of the buildings including location, type, construction (including foundation type), age and present condition, including existing levels of any aesthetic damage or structural damage.

A post-construction condition survey of the same buildings shall be conducted when construction is completed, and any damage shown to have been caused by the Project construction rectified by the Project Team.

5.2.6 Night Works

Night works have the potential to cause the greatest disturbance to residents and should be avoided where possible. However, it is possible that night works will be required during the construction period for critical activities. Before night works are programmed, it is important to determine if there are alternative options that would avoid working at night and, if so, whether those options are technically and practicably feasible.

Where there are no practicable alternative options to night works, it may be necessary to implement enhanced noise and vibration management measures, but this will depend on the location of the worksite and the proposed activities.

When work must be carried out at night, it may be necessary to:

- Increase the frequency of communications with stakeholders;
- Carry out regular noise and vibration monitoring to confirm noise and vibration levels; or
- Offer temporary relocation to neighbours if unreasonable noise and/or vibration levels cannot be avoided.

6 NoR W1: Trig Road North Upgrade

6.1 Project Corridor Features

The Trig Road North Upgrade consists of widening the 20m road to a 24m wide two-lane cross section including cycle lanes and footpaths on both sides of the road. The project includes the upgrade of intersections with Speeding Road West and tie-ins with the SH18 On Ramps. The upgrade extends from the intersection with Brigham Creek Road to south of the SH18 off-ramp.

Key features of the proposed new corridor include the following:

- Widening of Trig Road from its current general width of 20m to a 24m wide two-lane cross section including separated cycle lanes and footpaths on both sides of the corridor;
- Localised widening around the existing intersections with Brigham Creek Road and Spedding Road to accommodate proposed roundabouts, and localised widening around the intersection of Trig Road with Northside Drive to accommodate a signalised intersection;
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts;
- The addition of an active mode bridge to the existing bridge across SH18;
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks);
- Vegetation removal along the existing road corridor; and
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

An overview of the proposed design is provided in Figure 6-1.

Figure 6-1 Overview of the Trig Road Upgrade

6.2 Existing and Likely Future Environment

6.2.1 Planning context

The Trig Road corridor runs through an existing rural environment, with the land either side of the corridor currently zoned FUZ under the AUP:OP. Proposed Plan Change 5 (PPC5) proposes to rezone the eastern side of Trig Road north of SH18 and the western side of Trig Road between Brigham Creek Road and Spedding Road as Business – Light Industry Zone. A heritage overlay is proposed at 92 Trig Road and 4 Spedding Road.

PPC5 does not extend to the west side of the corridor south of Spedding Road, however the Whenuapai Structure Plan (adopted by Auckland Council in 2016) identifies this area for business zoning. The Whenuapai Structure Plan identifies a potential Sports Park at the corner of Trig Road and Spedding Road.

The NZDF Air Base (Special Purpose - Airports and Airfields Zone) is located to the north of Trig Road on Brigham Creek Road. The airbase is designated (Designation 4310) for defence purposes by the Minister of Defence.

Table 6-1 below provides a summary of the Trig Road existing and likely future environment

Table 6-1: Trig Road Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[2]	Likely Future Environment[3]
Undeveloped greenfield areas	Future Urban Zone	High	Urban
New Zealand Defence Force Air Base	Special Purpose - Airports and Airfields Zone	Low	Urban

Please refer to the AEE for further information on the planning context.

6.2.2 Noise Environment

Trig Road is currently located within a predominantly rural area with few dwellings in close proximity to the road. The noise environment is dominated by road traffic noise from vehicles on Trig Road, SH18 and the surrounding network as well as aircraft noise associated with the Whenuapai Air Base.

PPC5 and the Whenuapai Structure Plan indicate that the land surrounding Trig Road, to the north of SH18 is likely to be Industrial or Business Zones. This zoning would likely result in an increase in ambient noise levels. Where Residential Zones are likely, to the south of SH18, ambient noise levels would likely still increase as the area urbanises.

[2] Based on AUP:OP zoning/policy direction

[3] Based on AUP:OP zoning/policy direction

6.3 Assessment of Construction Noise and Vibration Effects

6.3.1 Construction Noise Effects

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver at 6m. High noise generating activities may not occur right on the construction boundary but if they do, 16 existing properties could experience unmitigated noise levels that exceed the daytime noise criterion. Details of all properties where the criteria could be exceeded are provided in Appendix A.

With mitigation in place, as set out in Section 5.2, noise levels of up to 80 dB L_{Aeq} could still occur intermittently at the closest receivers if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility. We note that the existing receivers may not be present at the time of construction.

Future receivers constructed within 76m of the works could experience unmitigated noise levels that exceed the 70 dB L_{Aeq} noise criterion during high noise generating activities such as the pavement works.

Bridge construction is the noisiest activity that is currently proposed for the Trig Road Upgrade. It will only occur for a limited duration during bridge construction where Trig Road crosses SH18.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 80 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

Night works may be required during construction of the bridge across SH18. If there are residential receivers in close proximity to any night-time works, consultation and mitigation measures will be essential. The use of noisy equipment should be avoided, where practicable, to prevent sleep disturbance. Any night-time works are likely to be limited in duration and will be managed through the CNVMP and a Schedule.

If PPC5 is approved and the zoning detailed in the Whenuapai Structure Plan is put in place outside of the area associated with PPC5, the area of the Project north of SH18 will be bordered by the Light Industry Zone or a different Business Zone. Residential receivers are unlikely to be constructed in the Light Industry Zone and will be limited in other Business Zones. Where residential receivers are constructed in the Business Zone they will be designed to meet the internal noise criteria as set out in the AUP:OP. In designing the buildings to meet the AUP:OP internal noise criteria, construction noise received internally will also be reduced.

6.3.2 Construction Vibration Effects

All of the existing receivers along the Trig Road corridor are residential type structures. Two existing dwellings may experience vibration levels above 5mm/s PPV, exceeding the Category B criterion for residential structures, if the roller compactor is used on the construction boundary in the closest position to them. The addresses of receivers where the Category B criteria may be exceeded are listed in Appendix B. Once the compactor is 8m away from the dwellings the Category B criterion will be met. All the other equipment identified in Table 4-4 can comply with the Category B criterion at all other existing receivers. The Category B criteria would be met at future residential structures that are 8m or more from the proposed works and commercial structures that are 4m or more from the proposed works.

At buildings in close proximity to the proposed works, there is the potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration.

The vibration amenity criteria could be exceeded in existing or future buildings if they are occupied during the works and within 21 m of the roller compactor or within the emission radii identified for the other vibration generating equipment in Table 4-4. The effect on receivers would be subject to their respective proximity to the works but could include steady vibration from the roller compactor or a small jolt from a digger which could rattle crockery and glassware.

Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

High vibration generating activities should not occur during the night time in close proximity to residential receivers to avoid sleep disturbance, unless it is a critical activity and there is no alternative.

It should also be noted that the emission radii are conservative and vibration levels measured on site tend to be much lower than those predicted at the NoR stage of a project.

6.4 Conclusions

The predicted construction noise and vibration levels are based on indicative information provided by the Project Team, as set out in Section 4, and any conclusions in this assessment should be confirmed during the detailed design stage, taking account of the receivers as they exist at the time of construction.

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment are used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

7 NoR W2: Māmari Road Upgrade

7.1 Project Corridor Features

Māmari Road is an existing semi-rural road that extends from the intersection of Brigham Creek Road and Totara Road in the north to the intersection with Spedding Road in the south. The proposed Māmari Road FTN upgrade will extend the existing corridor south to connect with Northside Drive.

The key features of the proposed Māmari Road Upgrade include the following:

- The widening of the existing Māmari Road corridor (north of Spedding Road) and a new section south of Spedding Road to Northside Drive to create a 30m wide four-lane urban arterial with separated cycle lanes and footpaths on both sides of the corridor;
- Three stream crossings over the Sinton Stream, Pikau Stream and another upper branch of the Pikau Stream stream;
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts;
- Batter slopes to enable widening of the corridor, and associated cut and fill activities;
- Vegetation removal along the existing road corridor; and
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

An overview of the proposed design is provided in Figure 7-1.

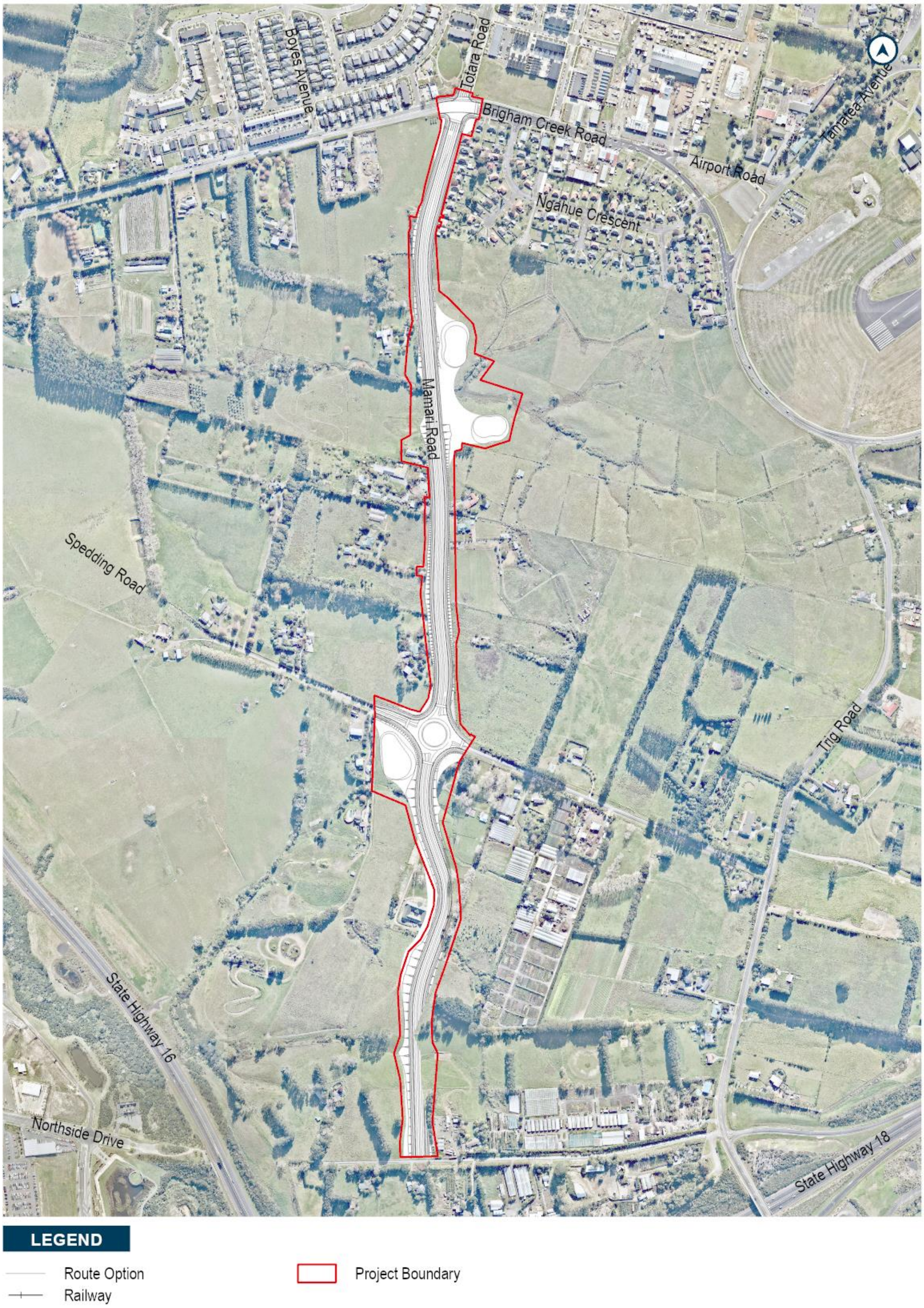

Figure 7-1 Overview of Māmari Road Upgrade

7.2 Existing and Likely Future Environment

7.2.1 Planning context

The northern section of Māmari Road to Spedding Road is an existing road corridor (although a section of the road is a 'paper road'). The eastern side is predominantly zoned under the AUP:OP as FUZ, with a portion of Residential – Single House Zone. The Single House Zone forms part of the NZDF Air Base designation (Designation 4310, Minister of Defence). The western side is also predominantly FUZ. The Whenuapai Structure Plan indicates that the FUZ land will be re-zoned medium residential to the north (east side of Māmari only) and business to the south.

The southern extension to Māmari Road extends across land which is zoned FUZ and is currently undeveloped and in rural use. The Whenuapai Structure Plan indicates that the FUZ land will be re-zoned for business.

Table 7-1 below provides a summary of the Māmari Road existing and likely future environment.

Table 7-1: Māmari Road Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[4]	Likely Future Environment[5]
Residential	Residential	Low	Residential
Undeveloped greenfield areas	Future Urban	High	Urban
Timatanga Community School	Special Purpose - School Zone	Low	Urban

7.2.2 Noise Environment

Māmari Road is currently located within a predominantly rural area with few dwellings in close proximity to the road. The noise environment is dominated by road traffic noise from vehicles on Māmari Road as well as aircraft noise associated with the Whenuapai Air Base.

The Whenuapai Structure Plan indicates that the land surrounding Māmari Road, to the east and west is likely to be Business Zone. This zoning would likely result in an increase in ambient noise levels as the area urbanises compared to the current rural nature.

7.3 Assessment of Construction Noise and Vibration Effects

7.3.1 Construction Noise Effects

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver, Timatanga Community School, at 2m. High noise generating activities may not occur right on the construction boundary but if they do, 34 existing properties could

[4] Based on AUP:OP zoning/policy direction
[5] Based on AUP:OP zoning/policy direction

experience unmitigated noise levels that exceed the daytime noise criterion. Details of all properties where the criteria could be exceeded are provided in Appendix A.

With mitigation in place, as set out in Section 5.2, noise levels of up to 90 dB L_{Aeq} could still occur intermittently at the closest receivers, if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility. We note that the existing receivers may not be present at the time of construction. Timatanga Community school is likely to remain so will be present during construction. Based on the potential noise levels detailed above it will be necessary to consult with the school and schedule noisy activities for a time that will not disrupt classes.

Future receivers constructed within 76m of the works could experience unmitigated noise levels that exceed the 70 dB L_{Aeq} noise criterion during high noise generating activities such as the pavement works.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

If a critical activity has to be carried out during the night-time in close proximity to residential receivers, consultation and mitigation measures will be essential. The use of noisy equipment should be avoided where practicable to prevent sleep disturbance. Any night-time works are likely to be limited in duration and will be managed through the CNVMP and a Schedule.

If the zoning detailed in the Whenuapai Structure Plan is put in place the majority of land surrounding Māmari Road will be Business Zoned. Residential receivers will likely be limited in the Business Zones. Where residential receivers are constructed in the Business Zone they will be designed to meet the internal noise criteria as set out in the AUP:OP. In designing the buildings to meet the AUP:OP internal noise criteria, construction noise received internally will also be reduced.

7.3.2 Construction Vibration Effects

All of the existing receivers along the Māmari Road corridor are residential type structures. Four existing dwellings and the school may experience vibration levels above 5mm/s PPV, exceeding the Category B criterion for residential structures, if the roller compactor is used on the construction boundary in the closest position to them. The addresses of receivers where the Category B criteria may be exceeded are listed in Appendix B. Once the compactor is more than 8m away from the buildings the Category B criterion will be met. All the other equipment identified in Table 4-4 can comply with the Category B criterion at all other existing receivers. The Category B criteria would be met at future residential structures that are more than 8m from the proposed works and commercial structures that are more than 4m from the proposed works.

At buildings in close proximity to the proposed works, there is the potential for cosmetic damage to buildings (such as cracking) and annoyance from the perception of vibration.

The vibration amenity criteria could be exceeded in existing or future buildings if they are occupied during the works and within 21 m of the roller compactor or within the emission radii identified for the other vibration generating equipment in Table 4-4. The effect on receivers would be subject to their respective proximity to the works but could include steady vibration from the roller compactor or a small jolt from a digger which could rattle crockery and glassware.

Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

High vibration generating activities should not occur during the night time in close proximity to residential receivers to avoid sleep disturbance, unless it is a critical activity and there is no alternative.

It should also be noted that the emission radii are conservative and vibration levels measured on site tend to be much lower than those predicted in the early stages of a project.

7.4 Conclusions

The predicted construction noise and vibration levels are based on indicative information to support this NoR and any conclusions in this assessment should be confirmed during the detailed design stage, taking account of the receivers as they exist at the time of construction.

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment is used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

8 NoR W3: Brigham Creek Road Upgrade

8.1 Project Corridor Features

Brigham Creek Road is an existing arterial road that extends from the intersection with the SH16 in the west to the intersection with Hobsonville Road to the east. The proposed upgrade extends from the eastern side of the existing Totara Creek bridge in the west, to Kauri Road near the existing SH18 Brigham Creek Interchange in the east.

Key features of the proposed upgrade include the following:

- Widening of Brigham Creek Road from its existing two-lane arterial to a 30m wide four-lane arterial cross-section with walking and cycling facilities on both sides;
- Upgrades to intersections and tie-ins with Totara Road/Mamari Road, Trig Road and Kauri Road. All intersections along Brigham Creek Road are proposed to be signalised, with exception to the intersection of Brigham Creek Road and Trig Road which is proposed as a roundabout intersection;
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts;
- Batter slopes to enable widening of the corridor, and associated cut and fill activities; and
- Vegetation removal along the existing road corridor.

An overview of the Brigham Creek Road Upgrade is provided in Figure 8-1

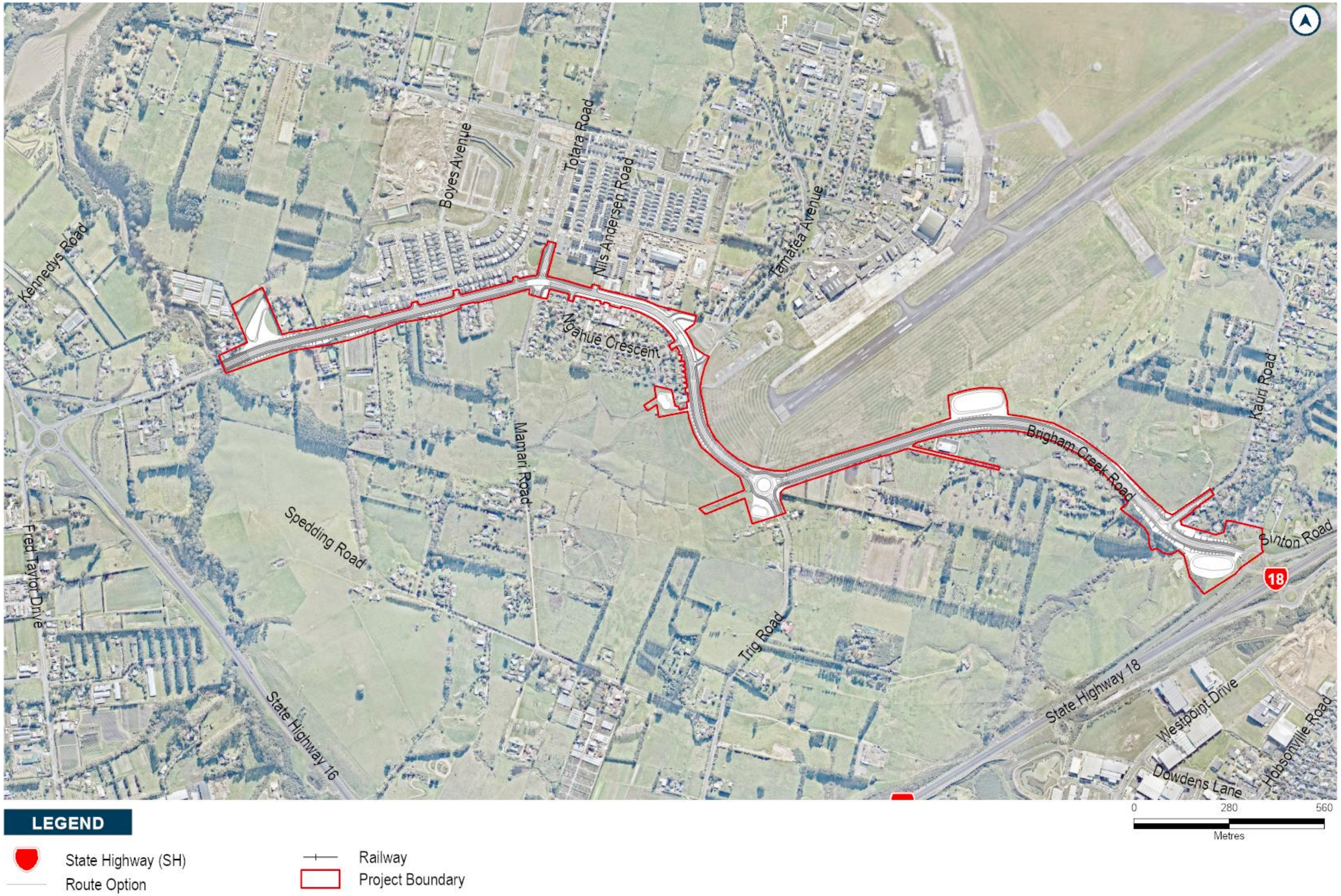

Figure 8-1 Overview of Brigham Creek Road Upgrade

8.2 Existing and Likely Future Environment

8.2.1 Planning context

The land adjacent to Brigham Creek Road is zoned under the AUP:OP as FUZ, except within the existing Whenuapai Centre (which is zoned under the AUP:OP for a range of residential and business zones) and the Whenuapai NZDF airbase. The airbase is designated (Designation 4310) for defence purposes by the Minister of Defence. The designation also includes the Residential – Single House Zone within the Whenuapai Centre.

PPC5 proposes to rezone the eastern portion of Brigham Creek Road on the south of the corridor to Business – Light Industrial zoning. The Whenuapai Structure Plan identifies medium density residential and business land uses to the south of Brigham Creek Road, with medium density residential land uses identified to the north.

Table 8-1 below provides a summary of the Brigham Creek Road existing and likely future environment.

Table 8-1: Brigham Creek Road Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[6]	Likely Future Environment[7]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (Local centre)	Low	Business (Local centre)
Residential	Residential– Mixed Housing Urban Zone	Low	Residential
Open Space	Open Space –Informal Recreation Zone	Low	Open Space
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban
New Zealand Defence Force Air Base	Special Purpose - Airports and Airfields Zone	Low	Special Purpose – Airports and Airfields Zone

8.2.2 Noise Environment

Brigham Creek Road runs through an existing rural environment at each end, with the middle section being a mix of town centre, industrial and suburban environments. The noise environment is dominated by road traffic noise from vehicles on Brigham Creek Road as well as aircraft noise associated with the Whenuapai Air Base.

[6] Based on AUP:OP zoning/policy direction
[7] Based on AUP:OP zoning/policy direction

PPC5 and the Whenuapai Structure Plan indicate that Brigham Creek Road is likely to be surrounded by a mix of uses in the future with a Light Industrial Zone, Business Zones and Residential Zones proposed. This zoning would likely result in an increase in ambient noise levels as the area urbanises.

8.3 Assessment of Construction Noise and Vibration Effects

8.3.1 Construction Noise Effects

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver at 2m. High noise generating activities may not occur right on the construction boundary but if they do, 134 existing receivers could experience unmitigated noise levels that exceed the daytime noise criterion. Details of all properties where the criteria could be exceeded are provided in Appendix A.

With mitigation in place, as set out in Section 5.2, noise levels of up to 90 dB L_{Aeq} could still occur intermittently at the closest receivers if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility. We note that the existing receivers on FUZ zoned land may not be present at the time of construction.

Future receivers constructed within 76m of the works could experience unmitigated noise levels that exceed the 70 dB L_{Aeq} noise criterion during high noise generating activities such as the pavement works.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

If a critical activity has to be carried out during the night-time in close proximity to residential receivers, consultation and mitigation measures will be essential. The use of noisy equipment should be avoided, where practicable, to prevent sleep disturbance. Any night-time works are likely to be limited in duration and will be managed through the CNVMP and a Schedule.

8.3.2 Construction Vibration Effects

The majority of the existing receivers along the Brigham Road corridor are residential type structures. 34 existing dwellings may experience vibration levels above 5mm/s PPV, exceeding the Category B criterion for residential structures, if the roller compactor is used on the construction boundary in the closest position to them. The addresses of receivers where the Category B criteria may be exceeded are listed in Appendix B. Once the compactor is 8m away from the dwellings the Category B criterion will be met. All the other equipment identified in Table 4-4 can comply with the Category B criterion at all other existing residential receivers.

There are existing commercial receivers along Brigham Creek Road between Māmari Road and Airport Road. All existing commercial receivers are located far enough from the proposed works for the Category B criterion to be met.

The Category B criterion would be met at future residential structures that are 8m or more from the proposed works and commercial structures that are 4m or more from the proposed works.

At buildings in close proximity to the proposed works, there is the potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration.

The vibration amenity criteria could be exceeded in existing or future buildings if they are occupied during the works and within 21 m of the roller compactor or within the emission radii identified for the other vibration generating equipment in Table 4-4. The effect on receivers would be subject to their respective proximity to the works but could include steady vibration from the roller compactor or a small jolt from a digger which could rattle crockery and glassware.

Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

High vibration generating activities should not occur during the night time in close proximity to residential receivers to avoid sleep disturbance, unless it is a critical activity and there is no alternative.

It should also be noted that the emission radii are conservative and vibration levels measured on site tend to be much lower than those predicted in the early stages of a project.

8.4 Conclusions

The predicted construction noise and vibration levels are based on indicative information to support this NoR and any conclusions in this assessment should be confirmed during the detailed design stage, taking account of the receivers as they exist at the time of construction.

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment is used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through a CNVMP.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

9 NoR W4: Spedding Road

9.1 Project Corridor Features

Spedding Road is currently a primary rural collector connecting two low volume access roads with no exit roads that service several rural lots as well as Timitanga Community School along Māmari Road.

The Spedding Road Upgrade extends from a new intersection with Fred Taylor Drive, over SH16 to connect to the existing Spedding Road and Trig Road, and a greenfields portion from Trig Road over SH18 to tie into Hobsonville Road. This is comprised of the following two sections:

- Spedding Road West: the upgrade of the existing Spedding Road and new extension of Spedding Road to a two-lane arterial with separated active modes; and
- Spedding Road East: A new extension of Spedding Road to a two-lane arterial with separated active modes.

9.1.1 Spedding Road (West)

Key features of the proposed upgrade include the following:

- The upgrade of the existing 14m width corridor and formation of a new corridor to a 24m wide two-lane arterial cross section with separated cycle lanes and footpaths on both sides;
- A new roundabout at the intersection of Spedding Road West and Fred Taylor Drive in the west and tie-in to the western leg of the future Spedding Road / Mamari Road roundabout in the east (part of Spedding Road East);
- A direct active mode connection to the future Regional Active Mode Corridor, which is to be located along the southern side of SH16;
- A bridge crossing the SH16 North Western motorway in the vicinity of Totara Creek.
- Stormwater dry ponds, wetlands and culverts;
- Batter slopes to enable widening of the corridor, and associated cut and fill activities; and
- Vegetation removal along the existing road corridor.

Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

9.1.2 Spedding Road (East)

Key features of the proposed upgrade include the following:

- The upgrade of the existing 14m width corridor and formation of a new corridor to a 24m wide two-lane arterial cross section with separated cycle lanes and footpaths on both sides.
- Upgrade of intersections of Spedding Road with Trig Road and Māmari Road to roundabouts.
- Tie-in to Hobsonville Road Frequent Transport Network (**FTN**) project intersection.
- A bridge crossing the SH18 motorway, and a bridge crossing the Rawiri Stream.
- Stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities.
- Vegetation removal along the existing road corridor

An overview of the proposed design is provided in Figure 9-1.

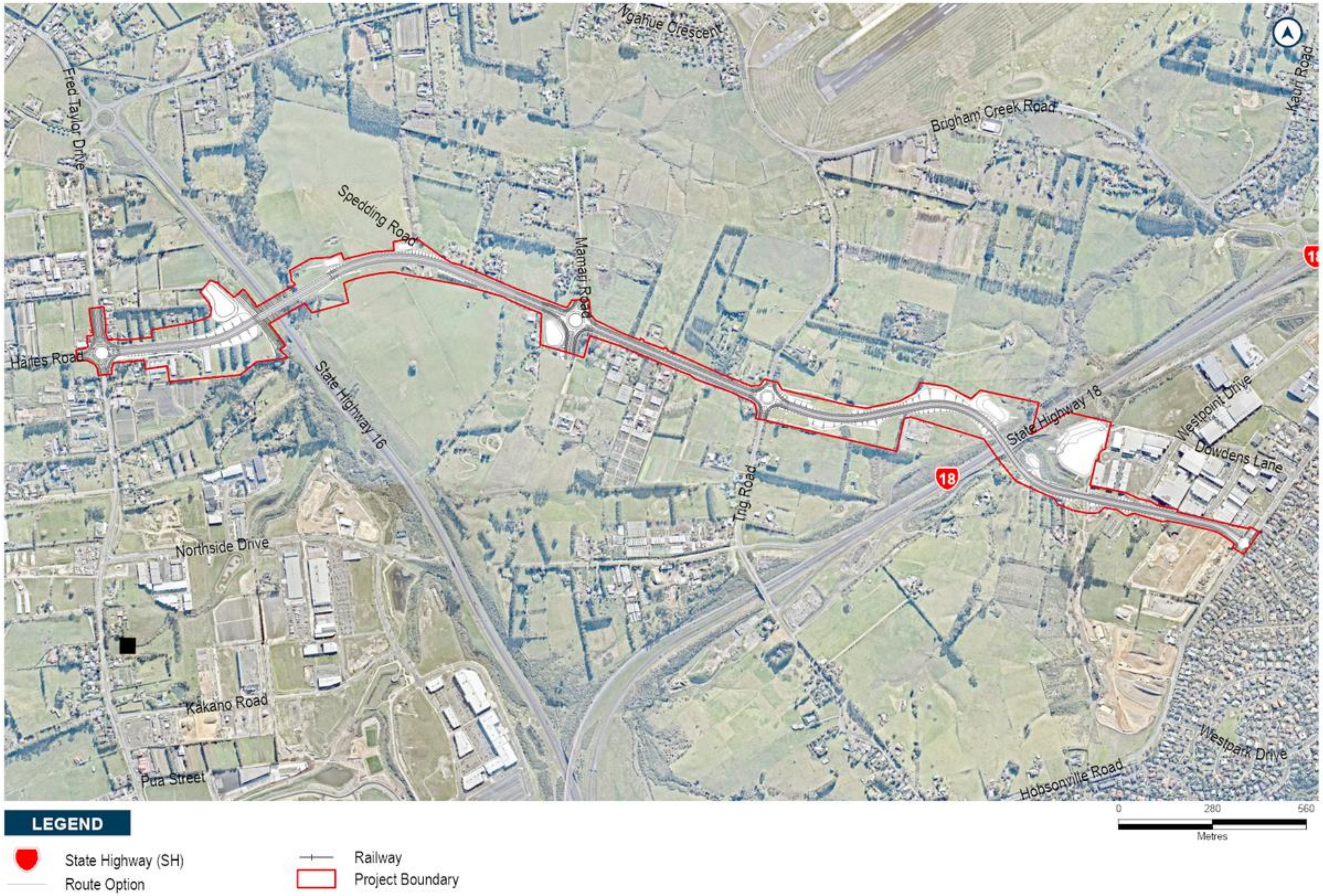

Figure 9-1 Overview of Spedding Road

9.2 Existing and Likely Future Environment

9.2.1 Planning context

- The land on either side of Spedding Road is zoned under the AUP:OP as FUZ, with the exception being the Business – Light Industry Zone within the Hobsonville Corridor Precinct.
- On the eastern end of the corridor PPC5 proposes to rezone the surrounding FUZ land to Business – Light Industry Zone in the north and Residential - Mixed Housing Urban Zone and Open Space – Informal Recreation zone in the south. The remainder of the land to the south of falls within the Hobsonville Corridor Precinct.
- PPC5 proposes a heritage overlay 4 Spedding Road and 92 Trig Road, which has legal effect under section 86B (3) (d) of the RMA. The overlay relates to four concrete gun emplacements and command post that made up the Whenuapai Aerodrome Heavy Anti-Aircraft Battery and are buried underground.
- The Whenuapai Structure Plan identifies the land surrounding the existing central section and proposed western end of the corridor for business.
- The western section of the proposed corridor extends across SH16 and the eastern section across SH18, both SH16 and SH18 are designated by Waka Kotahi for State Highway purposes (Designation 6741).

Table 9-1 below provides a summary of the Spedding Road existing and likely future environment.

Table 9-1: Spedding Road Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[8]	Likely Future Environment[9]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
Residential	Residential – Mixed Housing Urban	Low	Residential
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban

9.2.2 Noise Environment

Spedding Road is currently located within a predominantly rural area with few dwellings in close proximity to the road.

PPC5, the Whenuapai Structure Plan and the I603 Hobsonville Corridor Precinct indicate that the land surrounding Spedding Road is likely to contain mostly industrial or business uses in the future with pockets of residential. Ambient noise levels are expected to increase as the area urbanises.

[8] Based on AUP:OP zoning/policy direction
[9] Based on AUP:OP zoning/policy direction

9.3 Assessment of Construction Noise and Vibration Effects

9.3.1 Construction Noise Effects

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver at 2m. High noise generating activities may not occur right on the construction boundary but if they do, 44 existing receivers could experience unmitigated noise levels that exceed the daytime noise criterion. Details of all properties where the criteria could be exceeded are provided in Appendix A.

With mitigation in place, as set out in Section 5.2, noise levels of up to 90 dB L_{Aeq} could still occur intermittently at the closest receivers if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility. We note that the existing receivers may not be present at the time of construction.

Future receivers constructed within 76m of the works could experience unmitigated noise levels that exceed the 70 dB L_{Aeq} noise criterion during high noise generating activities such as the pavement works.

Bridge construction is the noisiest activity that is currently proposed for the Spedding Road works. It will only occur for a limited duration during bridge construction where Spedding Road crosses SH16 and SH18.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

Night works may be required during construction of the bridges across SH16 and SH18. If there are residential receivers in close proximity to any night-time works,, consultation and mitigation measures will be essential. The use of noisy equipment should be avoided, where practicable, to prevent sleep disturbance. Any night-time works are likely to be limited in duration and will be managed through the CNVMP and a Schedule.

9.3.2 Construction Vibration Effects

Existing receivers along the Spedding Road corridor are a mix of residential and commercial structures. Three existing dwellings are predicted to experience vibration levels above the Category B criterion for residential structures. Two commercial buildings could experience vibration levels exceeding the Category B criterion if the roller compactor is used on the construction boundary in the closest position to them. The addresses of receivers where the Category B criteria may be exceeded are listed in Appendix B. Once the compactor is 4m away from the commercial buildings and 8m from the dwellings the Category B criterion will be met. All the other equipment identified in Table 4-4 can comply with the Category B criterion at all existing receivers. The Category B criteria would be met at future residential structures that are 8m or more from the proposed works and commercial structures that are 4m or more from the proposed works.

At buildings in close proximity to the proposed works, there is the potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration.

The Whenuapai Aerodrome Heavy Anti-Aircraft Battery is located across the properties at 4 Spedding Road and 92 Trig Road. The Battery consists of four concrete gun emplacements and a command post that are buried underground. The Battery is scheduled as a Historic Heritage Place, therefore the DIN historic/ sensitive criterion is applicable. The construction boundary abuts the heritage overlay. Predictions indicate that unmitigated vibration levels could exceed the DIN criteria for historical / sensitive properties. To control and minimise vibration levels at these structures the use of smaller or low vibration equipment will be required. Rule E26.8.8 of the AUP requires a vibration management plan to be prepared. In addition to detailing the proposed works and mitigation measures, the vibration management plan is required to set out a methodology for monitoring the proposed works to measure compliance with DIN criterion.

The vibration amenity criteria could be exceeded in existing or future buildings if they are occupied during the works and within 21 m of the roller compactor or within the emission radii identified for the other vibration generating equipment in Table 4-4. The effect on receivers would be subject to their respective proximity to the works but could include steady vibration from the roller compactor or a small jolt from a digger which could rattle crockery and glassware.

Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

High vibration generating activities should not occur during the night time in close proximity to residential receivers to avoid sleep disturbance, unless it is a critical activity and there is no alternative.

It should also be noted that the emission radii are conservative and vibration levels measured on site tend to be much lower than those predicted in the early stages of a project.

9.4 Conclusions

The predicted construction noise and vibration levels are based on indicative information to support this NoR and any conclusions in this assessment should be confirmed during the detailed design stage, taking account of the receivers as they exist at the time of construction.

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration when high noise or vibration generating equipment is used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A vibration management plan will be produced for the Whenuapai Aerodrome Heavy Anti-Aircraft Battery that details the mitigation measures necessary to meet the DIN historic/ sensitive criterion.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

10 NoR W5: Hobsonville Road FTN Upgrade

10.1 Project Corridor Features

Hobsonville Road is an existing arterial corridor over 4km in length, extending from SH16 in the west to Hobsonville Point Road and Buckley Avenue / Squadron Drive in the east. The project extends from the intersection with Oriel Avenue in the west to the intersection Memorial Park Drive in the east and provides an important east-west connection from Westgate to Hobsonville. A section of the corridor adjacent to the intersection with Trig Road forms part of separate Te Tupu Ngātahi project and is not part of this assessment.

Key features of the proposed upgrade include the following:

- The upgrade of the section between Oriel Avenue and Luckens Road to a 30m wide four-lane arterial, and a 24m wide two-lane arterial from Luckens Road to Memorial Park Drive. Walking and cycling facilities will be provided on both sides along the entire length of the corridor;
- The upgrade of several intersections, more notably the intersection with Spedding Road East and Brigham Creek Road;
- Stormwater dry ponds, wetlands and culverts;
- Batter slopes to enable widening of the corridor, and associated cut and fill activities; and
- Vegetation removal along the existing road corridor.

An overview of the proposed design is provided in Figure 10-1.

Figure 10-1 Overview of Hobsonville Road Upgrade

10.2 Existing and Likely Future Environment

10.2.1 Planning context

Hobsonville Road is an existing urban corridor with land zoned under the AUP:OP as follows:

- The southern side of Hobsonville Road is largely zoned Residential – Mixed Housing Urban Zone, with a Business – Local Centre Zone located adjacent to the intersection of Hobsonville Road, Wiseley Road and Clark Road at the eastern end of the corridor; and
- The northern side of Hobsonville Road contains a variety of land uses. Adjacent land on the western end of the corridor is currently zoned Residential – Mixed Housing Zone between SH16 and Trig Rd (proposed for up zoning as part pf PPC5), with FUZ land behind. Land to the east of Trig Road to Westpark Drive is currently zoned FUZ, with land then zoned Business – Light Industrial Zone to the east of Westpark Drive.

PPC5 proposes to re-zone the existing FUZ area to Residential – Mixed Housing Zone and Residential – Terrace and Apartment Building Zone.

The Hobsonville Road corridor is currently designated by AT for Transport Purposes (Designation 1437). Designation 1437 has been given effect to and it is proposed to alter this designation.

Table 10-1 below provides a summary of the Hobsonville Road existing and likely future environment.

Table 10-1: Hobsonville Road FTN Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[10]	Likely Future Environment[11]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (Local centre)	Low	Business (Local centre)
Residential	Residential - Mixed Housing Urban Zone	Low	Residential
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban

10.2.2 Noise Environment

Hobsonville Road is an existing urban corridor with development still occurring in the surrounding area. The noise environment is dominated by road traffic noise from vehicles on Hobsonville Road. Although development is still occurring in the area, ambient noise levels are unlikely to increase significantly above their current level.

10 Based on AUP:OP zoning/policy direction
11 Based on AUP:OP zoning/policy direction

10.3 Assessment of Construction Noise and Vibration Effects

10.3.1 Construction Noise Effects

Receivers are located at varying distances from the construction boundary along the alignment with the closest existing receiver at 2m. High noise generating activities may not occur right on the construction boundary but if they do, 410 existing properties could experience unmitigated noise levels that exceed the daytime noise criterion. Details of all properties where the criteria could be exceeded are provided in Appendix A.

With mitigation in place, as set out in Section 5.2, noise levels of up to 90 dB L_{Aeq} could still occur intermittently at the closest receivers, if high noise generating activities occur on the construction boundary. At this level effects could include loss of concentration, annoyance, and a reduction in speech intelligibility. We note that the existing receivers may not be present at the time of construction.

Future receivers constructed within 76m of the works could experience unmitigated noise levels that exceed the 70 dB L_{Aeq} noise criterion during high noise generating activities such as the pavement works.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. It is therefore predicted that mitigated noise levels can comply with the 70 dB L_{Aeq} noise criterion for most of the construction works.

If a critical activity has to be carried out during the night-time in close proximity to residential receivers, consultation and mitigation measures will be essential. The use of noisy equipment should be avoided, where practicable, to prevent sleep disturbance. Any night-time works are likely to be limited in duration and will be managed through the CNVMP and a Schedule.

10.3.2 Construction Vibration Effects

Existing receivers along the Hobsonville Road corridor are a mix of residential and commercial buildings. 50 existing dwellings may experience vibration levels above 5mm/s PPV and 5 existing commercial buildings may experience levels above 10mm/s PPV, exceeding the Category B criterion, if the roller compactor is used on the construction boundary in the closest position to them. The addresses of receivers where the Category B criteria may be exceeded are listed in Appendix B. Once the compactor is 8m away from the dwellings and 4m from commercial buildings the Category B criterion will be met. All the other vibration generating equipment identified in Table 4-4 can comply with the Category B criterion at all existing receivers. The Category B criteria would be met at future residential structures that are 8m or more from the proposed works and commercial structures that are 4m or more from the proposed works.

At buildings in close proximity to the proposed works, there is the potential for cosmetic damage to buildings (such as cracking) and annoyance from perception of vibration.

The vibration amenity criteria could be exceeded in existing or future buildings if they are occupied during the works and within 21 m of the roller compactor or within the emission radii identified for the other vibration generating equipment in Table 4-4. The effect on receivers would be subject to their respective proximity to the works but could include steady vibration from the roller compactor or a small jolt from a digger which could rattle crockery and glassware.

Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

High vibration generating activities should not occur during the night time in close proximity to residential receivers to avoid sleep disturbance, unless it is a critical activity and there is no alternative.

It should also be noted that the emission radii are conservative and vibration levels measured on site tend to be much lower than those predicted in the early stages of a project.

10.4 Conclusions

The predicted construction noise and vibration levels are based on indicative information to support this NoR and any conclusions in this assessment should be confirmed during the detailed design stage, taking account of the receivers as they exist at the time of construction.

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to generally comply with the applicable limits as defined in the AUP. Exceedances of the criteria could occur intermittently over a short duration if high noise or vibration generating equipment is used near occupied buildings. Where an exceedance is predicted at any receiver that exists at the time of construction, the effects will be mitigated and managed through the CNVMP and Schedules.

A CNVMP is the most effective way to avoid, remedy or mitigate construction noise and vibration effects on receivers.

11 Conclusion

An assessment of the construction noise and vibration effects has been undertaken for the Projects considering a reasonable worst case scenario. The predicted noise levels and effects are based on indicative information as provided by the Project team and any assessment conclusions should be confirmed during the detailed design stage, taking account of the final equipment selections, methodology and receivers as they exist at the time of construction.

Construction noise and vibration can be mitigated and managed, utilising the measures set out in Section 5.2, to comply with the applicable limits for the majority of the works. Exceedances of the criteria could occur intermittently across all NoR’s, if high noise or vibration generating equipment is used near occupied buildings. The most impacted receivers are located within 10m of the construction boundary.

Night works will be limited to critical activities that can not be carried out at any other time.

A CNVMP will be prepared prior to construction commencing in accordance with Section 5.2.1 of this report. The CNVMP will provide a framework for the development and implementation of best practicable options to avoid, remedy or mitigate the adverse effects of construction noise and vibration on receivers that exist at the time of construction. Communication and consultation will occur with the affected receivers and a site specific schedule will be prepared if required.

Elevated noise levels should be avoided and mitigated where possible to reduce the likelihood of adverse effects such as loss of concentration, annoyance and sleep disturbance (for night works).

Whilst vibration levels at the Category A criterion of 2mm/s PPV can generally be tolerated if activity occurs intermittently and with prior notice, communication and consultation will be the key management measure to avoid annoyance and concern. Where vibration levels are predicted to exceed the Category B criteria, and where the construction methodology cannot be changed to reduce vibration levels, building conditions surveys are recommended.

Overall, construction noise and vibration can be controlled to reasonable levels with the implementation of appropriate mitigation and management measures.

Appendix A – Affected Receivers – Noise (Unmitigated)

NoR W1 Trig Road (North)

Address
82 Trig Road Whenuapai
96a Trig Road Whenuapai
90 Trig Road Whenuapai
96 Trig Road Whenuapai
43 Trig Road Whenuapai
57 Trig Road Whenuapai
84 Trig Road Whenuapai
86 Trig Road Whenuapai
1/84 Trig Road Whenuapai
73 Trig Road Whenuapai
67 Trig Road Whenuapai
94 Trig Road Whenuapai 0618
92 Trig Road Whenuapai
88 Trig Road Whenuapai
52 Trig Road Whenuapai 0618
33 Trig Road Whenuapai

NoR W2 Māmari Road

Address	Address
9 Māmari Road Whenuapai	1 Ripeka Lane Whenuapai
4 Māmari Road Whenuapai	51 Brigham Creek Road Whenuapai
6 Māmari Road Whenuapai	70 Trig Road Whenuapai
8 Māmari Road Whenuapai	5 Māmari Road Whenuapai
20 Māmari Road Whenuapai	53 Brigham Creek Road Whenuapai
24 Māmari Road Whenuapai	7 Tama Quadrant Whenuapai
22 Māmari Road Whenuapai	3 Ngahue Crescent Whenuapai
16 Māmari Road Whenuapai	7 Ngahue Crescent Whenuapai
18 Māmari Road Whenuapai	5 Ngahue Crescent Whenuapai
14 Māmari Road Whenuapai	9 Tama Quadrant Whenuapai
10 Māmari Road Whenuapai	5 Tama Quadrant Whenuapai
7 Māmari Road Whenuapai	2-10 Ripeka Lane Whenuapai
49 Brigham Creek Road Whenuapai	80 Trig Road Whenuapai

12 Māmari Road Whenuapai	72 Trig Road Whenuapai
30 Māmari Road Whenuapai	9 Ngahue Crescent Whenuapai
15 Māmari Road Whenuapai	3 Tama Quadrant Whenuapai
28 Māmari Road Whenuapai	7 Spedding Road Whenuapai

NoR W3 Brigham Creek Road

Address	Address
1-8/38 Brigham Creek Road Whenuapai 0618	50-52 Whenuapai Drive Whenuapai
40b-42c Brigham Creek Road Whenuapai	92 Whenuapai Drive Whenuapai
53 Brigham Creek Road Whenuapai	39 Brigham Creek Road Whenuapai
57 Brigham Creek Road Whenuapai	104 Whenuapai Drive Whenuapai
91 Brigham Creek Road Whenuapai	38 Whenuapai Drive Whenuapai
55 Brigham Creek Road Whenuapai	14 Airport Road Whenuapai
109 Brigham Creek Road Whenuapai	48 Whenuapai Drive Whenuapai
59 Brigham Creek Road Whenuapai	46 Whenuapai Drive Whenuapai
113 Brigham Creek Road Whenuapai	18 Brigham Creek Road Whenuapai 0618
49 Brigham Creek Road Whenuapai	112 Whenuapai Drive Whenuapai 0618
26-34 Whenuapai Drive Whenuapai 0618	8 Airport Road Whenuapai
123 Brigham Creek Road Whenuapai	5 Ngahue Crescent Whenuapai
38 Ngahue Crescent Whenuapai	4 Mamari Road Whenuapai
162 Brigham Creek Road Hobsonville	34 Ngahue Crescent Whenuapai
93 Brigham Creek Road Whenuapai	114 Whenuapai Drive Whenuapai 0618
105 Brigham Creek Road Whenuapai	2 Ruatea Street Whenuapai 0618
2 Māmari Road Whenuapai	96 Trig Road Whenuapai
1 Ripeka Lane Whenuapai 0618	4 Ngahue Crescent Whenuapai
111 Brigham Creek Road Whenuapai	46-60 Nils Andersen Road Whenuapai 0618
2-10 Ripeka Lane Whenuapai	24 Brigham Creek Road Whenuapai 0618
42d Brigham Creek Road Whenuapai	5 Kauri Road Whenuapai
51 Brigham Creek Road Whenuapai	77-85 Nils Andersen Road Whenuapai 0618
101 Brigham Creek Road Whenuapai	145 Brigham Creek Road Whenuapai
99 Brigham Creek Road Whenuapai	11-17 Maramara Road Whenuapai 0618
32c Brigham Creek Road Whenuapai 0618	1-4/46a Nils Andersen Road Whenuapai 0618
34b Brigham Creek Road Whenuapai 0618	4 Ruatea Street Whenuapai 0618
34d Brigham Creek Road	7 Ngahue Crescent Whenuapai
115 Brigham Creek Road Whenuapai	5-8/46a Nils Andersen Road Whenuapai 0618
34a Brigham Creek Road Brigham Creek	6 Ruatea Street Whenuapai 0618

Address	Address
103 Brigham Creek Road Whenuapai	6 Mamari Road Whenuapai
145a Brigham Creek Road Whenuapai	32 Ngahue Crescent Whenuapai
39a Brigham Creek Road Whenuapai	5 Boyes Avenue Whenuapai 0618
32c Brigham Creek Road	8 Ruatea Street Whenuapai 0618
32d Brigham Creek Road Whenuapai 0618	6 Ngahue Crescent Whenuapai
117 Brigham Creek Road Whenuapai	73 Trig Road Whenuapai
108 Brigham Creek Road	10 Ruatea Street Whenuapai 0618
2 Kauri Road Whenuapai	41-61 Nils Andersen Road Whenuapai 0618
121 Brigham Creek Road Whenuapai	69-71 Whenuapai Drive Whenuapai 0618
119 Brigham Creek Road Whenuapai	73-75 Whenuapai Drive Whenuapai 0618
95 Brigham Creek Road Whenuapai	1 Ruatea Street Whenuapai 0618
97 Brigham Creek Road Whenuapai	65-75 Nils Andersen Road Whenuapai 0618
125-127 Brigham Creek Road Whenuapai	2 Mcewan Street Whenuapai
1 Kauri Road Whenuapai	101 Whenuapai Drive Whenuapai 0618
36 Ngahue Crescent Whenuapai	9 Ngahue Crescent Whenuapai
3 Kauri Road Whenuapai	96a Trig Road Whenuapai
26 Brigham Creek Road Whenuapai 0618	89 Whenuapai Drive Whenuapai 0618
129 Brigham Creek Road Whenuapai	99 Whenuapai Drive Whenuapai 0618
20 Brigham Creek Road Whenuapai	85 Whenuapai Drive Whenuapai 0618
3 Boyes Avenue Whenuapai 0618	53-55 Whenuapai Drive Whenuapai
37 Ngahue Crescent Whenuapai	61-63 Whenuapai Drive Whenuapai
153 Brigham Creek Road	30 Ngahue Crescent Whenuapai
2-10 Harewood Street Whenuapai	59 Whenuapai Drive Whenuapai
3 Ngahue Crescent Whenuapai	2 Kainga Lane Whenuapai 0618
2 Ngahue Crescent Whenuapai	33-35 Whenuapai Drive Whenuapai
110 Whenuapai Drive Whenuapai 0618	65 Whenuapai Drive Whenuapai
58-88 Whenuapai Drive Whenuapai 0618	1 Joseph McDonald Drive Whenuapai 0618
102 Whenuapai Drive Whenuapai 0618	31 Whenuapai Drive Whenuapai
28 Brigham Creek Road Whenuapai 0618	93 Whenuapai Drive Whenuapai 0618
42 Whenuapai Drive Whenuapai	39 Whenuapai Drive Whenuapai
100 Whenuapai Drive Whenuapai 0618	31 Brigham Creek Road Whenuapai
106 Whenuapai Drive Whenuapai 0618	67 Whenuapai Drive Whenuapai
44 Whenuapai Drive Whenuapai	8 Mamari Road Whenuapai
98 Whenuapai Drive Whenuapai 0618	163 Brigham Creek Road Whenuapai
30 Whenuapai Drive Whenuapai	51 Whenuapai Drive Whenuapai

Address	Address
40 Whenuapai Drive Whenuapai	8 Ngahue Crescent Whenuapai
1 Maramara Road Whenuapai	2 Airport Road Whenuapai
50 Brigham Creek Road Whenuapai	73 Brigham Creek Road Whenuapai

NoR W4

Address	Address
98 Hobsonville Road Hobsonville	143b Fred Taylor Drive Whenuapai
90 Trig Road Whenuapai	119 Fred Taylor Drive Whenuapai
5a Spedding Road Whenuapai	180 Fred Taylor Drive Whenuapai
5 Spedding Road Whenuapai	2a Marina View Drive West Harbour
3 Spedding Road Whenuapai	231a Hobsonville Road Hobsonville
1/98 Hobsonville Road Hobsonville	243 Hobsonville Road Hobsonville
92 Trig Road Whenuapai	227 Hobsonville Road Hobsonville
6 Spedding Road Whenuapai	5-7 Workspace Drive Hobsonville
233 Hobsonville Road Hobsonville	8 Workspace Drive Hobsonville
1 Marina View Drive West Harbour	48-52 Westpoint Drive Hobsonville
231 Hobsonville Road Hobsonville	102 Hobsonville Road Hobsonville
2 Marina View Drive West Harbour	6 Rawiri Place Hobsonville
239 Hobsonville Road Hobsonville	4 Rawiri Place Hobsonville
229a Hobsonville Road Hobsonville	3 Workspace Drive Hobsonville
241 Hobsonville Road Hobsonville	135 Fred Taylor Drive Whenuapai
1a Marina View Drive West Harbour	15-19 Spedding Road Whenuapai
137 Fred Taylor Drive Whenuapai	14 Spedding Road Whenuapai
133 Fred Taylor Drive Whenuapai	10 Spedding Road Whenuapai
141 Fred Taylor Drive Whenuapai	1/121 Fred Taylor Drive Whenuapai
131 Fred Taylor Drive Whenuapai	117 Fred Taylor Drive Whenuapai
139 Fred Taylor Drive Whenuapai	8 Spedding Road Whenuapai
168 Fred Taylor Drive Whenuapai	143a Fred Taylor Drive Whenuapai

NoR W5 Hobsonville Road

Address	Address
321 Hobsonville Road Hobsonville	145e Hobsonville Road West Harbour
42 Hobsonville Road Hobsonville	159 Hobsonville Road West Harbour
255 Hobsonville Road Hobsonville	145a Hobsonville Road West Harbour
1/259 Hobsonville Road Hobsonville	17a Magdalen Place West Harbour

Address	Address
305 Hobsonville Road Hobsonville	33 Cyril Crescent West Harbour 0618
309 Hobsonville Road Hobsonville	6 Woodhouse Place West Harbour
2 Hendrika Court Hobsonville	5 Wiseley Road Hobsonville
295 Hobsonville Road Hobsonville	11 Magdalen Place West Harbour
19 Williams Road Hobsonville	5 Hendrika Court Hobsonville
45 Suncrest Drive West Harbour	38 Suncrest Drive West Harbour
303 Hobsonville Road Hobsonville	41/18 Williams Road Hobsonville
1-2/275 Hobsonville Road Hobsonville	17 Magdalen Place West Harbour
33/18 Williams Road Hobsonville	64 Hobsonville Road West Harbour
54 Hobsonville Road West Harbour	1-2/2 Wiseley Road Hobsonville
251 Hobsonville Road Hobsonville	12 Magdalen Place West Harbour
77 Hobsonville Road West Harbour	229 Hobsonville Road Hobsonville
1/383 Hobsonville Road Hobsonville	1/273 Hobsonville Road Hobsonville
2 Clark Road Hobsonville	1/4 Westpark Drive West Harbour
307 Hobsonville Road Hobsonville	1/323 Hobsonville Road Hobsonville
287 Hobsonville Road Hobsonville	1/25 Glucina Avenue West Harbour
289 Hobsonville Road Hobsonville	5 Bannings Way Hobsonville
1-2/279 Hobsonville Road Hobsonville	42-44 Suncrest Drive West Harbour
1-2/281 Hobsonville Road Hobsonville	2/163 Hobsonville Road West Harbour
311 Hobsonville Road Hobsonville	1/31 Glucina Avenue West Harbour
403 Hobsonville Road Hobsonville	1/133a Hobsonville Road West Harbour
291 Hobsonville Road Hobsonville	327 Bd10 Hobsonville Road Hobsonville
56 Hobsonville Road West Harbour	14 Woodhouse Place West Harbour
249 Hobsonville Road Hobsonville	20 Connemara Court West Harbour
4 Hendrika Court Hobsonville	15a Wiseley Road Hobsonville
1 Westpark Drive West Harbour	3 Seagrove Road West Harbour
1 Hendrika Court Hobsonville	10 Woodhouse Place West Harbour
283 Hobsonville Road Hobsonville	39 Suncrest Drive West Harbour
49 Hobsonville Road West Harbour	1/18 Hobsonville Road West Harbour
4 Clark Road Hobsonville	145b Hobsonville Road West Harbour
24-25/18 Williams Road Hobsonville	8 Hendrika Court Hobsonville
317 Hobsonville Road Hobsonville	13 Williams Road Hobsonville
201 Hobsonville Road Hobsonville	73 Hobsonville Road West Harbour
60 Hobsonville Road West Harbour	153d Hobsonville Road West Harbour
33 Hobsonville Road West Harbour	38/18 Williams Road Hobsonville

Address	Address
253 Hobsonville Road Hobsonville	29 Glucina Avenue West Harbour
247 Hobsonville Road Hobsonville	2/31 Glucina Avenue West Harbour
20 Hobsonville Road West Harbour	12 Woodhouse Place West Harbour
241 Hobsonville Road Hobsonville	22 Belleaire Court West Harbour
82 Hobsonville Road West Harbour	2/4 Westpark Drive West Harbour
39 Hobsonville Road West Harbour	1/18 Woodhouse Place West Harbour
319 Hobsonville Road Hobsonville	16 Woodhouse Place West Harbour
229a Hobsonville Road Hobsonville	16 Hendrika Court Hobsonville
41 Hobsonville Road West Harbour	155a Hobsonville Road West Harbour
147a Hobsonville Road West Harbour	37 Suncrest Drive West Harbour
22 Hobsonville Road West Harbour	24 Peterhouse Place West Harbour
75 Hobsonville Road West Harbour	83 Hobsonville Road West Harbour
147c Hobsonville Road West Harbour	379 Hobsonville Road Hobsonville
23/18 Williams Road Hobsonville	26 Peterhouse Place West Harbour
35 Hobsonville Road West Harbour	3-4/18 Williams Road Hobsonville
104a Hobsonville Road Hobsonville	8 Woodhouse Place West Harbour
2/2 Oreil Avenue West Harbour	153a Hobsonville Road West Harbour
17 Williams Road Hobsonville	36 Sailfish Drive West Harbour
21-22/18 Williams Road Hobsonville	17 Wiseley Road Hobsonville
19/18 Williams Road Hobsonville	3a Bannings Way Hobsonville
31 Hobsonville Road West Harbour	157b Hobsonville Road West Harbour
313 Hobsonville Road Hobsonville	20 Peterhouse Place West Harbour
243 Hobsonville Road Hobsonville	377a Hobsonville Road Hobsonville
181 Hobsonville Road Hobsonville	4 Wiseley Road Hobsonville
239 Hobsonville Road Hobsonville	327 Bd3 Hobsonville Road Hobsonville
58 Hobsonville Road West Harbour	14 Williams Road Hobsonville
199 Hobsonville Road Hobsonville	7 Hendrika Court Hobsonville
203 Hobsonville Road Hobsonville	9 Magdalen Place West Harbour
26-27/18 Williams Road Hobsonville	15 Magdalen Place West Harbour
55 Hobsonville Road West Harbour	17 Oreil Avenue West Harbour
149b Hobsonville Road West Harbour	1/28 Sailfish Drive West Harbour
26 Belleaire Court West Harbour	2/28 Sailfish Drive West Harbour
233 Hobsonville Road Hobsonville	1/8 Oreil Avenue West Harbour
29 Hobsonville Road West Harbour	15 Oreil Avenue West Harbour
205 Hobsonville Road Hobsonville	26 Connemara Court West Harbour

Address	Address
51 Hobsonville Road West Harbour	4a Marina View Drive West Harbour
231 Hobsonville Road Hobsonville	31 Cyril Crescent West Harbour 0618
1/2 Oreil Avenue West Harbour	14 Whiting Grove West Harbour
2a Fitzherbert Avenue West Harbour	7 Fitzherbert Avenue West Harbour
24 Belleaire Court West Harbour	387 Hobsonville Road Hobsonville
61 Hobsonville Road West Harbour	8 Oreil Avenue West Harbour
3 Hendrika Court Hobsonville	17b Oreil Avenue West Harbour
3 Westpark Drive West Harbour	273 Hobsonville Road Hobsonville
195 Hobsonville Road Hobsonville	1/38 Sailfish Drive West Harbour
53 Hobsonville Road West Harbour	15-16/18 Williams Road Hobsonville
395 Hobsonville Road Hobsonville	3 Marina View Drive West Harbour
34/18 Williams Road Hobsonville	11 Hendrika Court Hobsonville
6-10 Clark Road Hobsonville	10 Whiting Grove West Harbour
1 Marina View Drive West Harbour	35 Cherub Place West Harbour
277 Hobsonville Road Hobsonville	6 Optimist Place West Harbour
375 Hobsonville Road Hobsonville	10 Westpark Drive West Harbour
175 Hobsonville Road Hobsonville 0618	16-18 Clark Road Hobsonville
369a Hobsonville Road Hobsonville	30 Sailfish Drive West Harbour
373 Hobsonville Road Hobsonville	1/2 Wiseley Road Hobsonville
37 Hobsonville Road West Harbour	66 Hobsonville Road West Harbour
151d Hobsonville Road West Harbour	7 Starlight Cove Hobsonville
197 Hobsonville Road Hobsonville	27 Suncrest Drive West Harbour
381 Hobsonville Road Hobsonville	34 Sailfish Drive West Harbour
57 Hobsonville Road West Harbour	12 Whiting Grove West Harbour
151b Hobsonville Road West Harbour	7 Wiseley Road Hobsonville
299 Hobsonville Road Hobsonville	7 Optimist Place West Harbour
215 Hobsonville Road Hobsonville	5 Starlight Cove Hobsonville
267 Hobsonville Road Hobsonville	8 Optimist Place West Harbour
23 Hobsonville Road West Harbour	1/26 Peterhouse Place West Harbour
27 Hobsonville Road West Harbour 0618	14 Hendrika Court Hobsonville
8b Hobsonville Road Hobsonville	18 Woodhouse Place West Harbour
209 Hobsonville Road Hobsonville	15 Soling Place West Harbour
1/255 Hobsonville Road Hobsonville	35/18 Williams Road Hobsonville
151c Hobsonville Road West Harbour	13 Oreil Avenue West Harbour
1/257 Hobsonville Road Hobsonville	6 Louise Place West Harbour

Address	Address
2 Marina View Drive West Harbour	17 Belleaire Court West Harbour
301 Hobsonville Road Hobsonville	37 Cherub Place West Harbour
79 Hobsonville Road West Harbour	33 Cherub Place West Harbour
1/18 Williams Road Hobsonville	29 Cherub Place West Harbour
211 Hobsonville Road Hobsonville	155b Hobsonville Road West Harbour
47 Hobsonville Road West Harbour	9 Starlight Cove Hobsonville
26a Hobsonville Road West Harbour 0618	5 Seagrove Road West Harbour
43 Suncrest Drive West Harbour	5-6/18 Williams Road Hobsonville
2 Fitzherbert Avenue West Harbour	13 Magdalen Place West Harbour
44 Hobsonville Road	32 Sailfish Drive West Harbour
207 Hobsonville Road Hobsonville	10 Soling Place West Harbour
323 Hobsonville Road Hobsonville	15 Wiseley Road Hobsonville
6 Westpark Drive West Harbour	8a Hendrika Court Hobsonville
221 Hobsonville Road Hobsonville	21 Cherub Place West Harbour
151a Hobsonville Road West Harbour	19 Belleaire Court West Harbour
227 Hobsonville Road Hobsonville	153c Hobsonville Road West Harbour
59 Hobsonville Road West Harbour	31 Cherub Place West Harbour
3 Fitzherbert Avenue West Harbour	4 Whiting Grove West Harbour
4 Oreil Avenue West Harbour	1/19 Cherub Place West Harbour
217 Hobsonville Road Hobsonville	19 Magdalen Place West Harbour
383 Hobsonville Road Hobsonville	27 Cherub Place West Harbour
219 Hobsonville Road Hobsonville	7-8/18 Williams Road Hobsonville
403 Hobsonville Road Hobsonville	18 Connemara Court West Harbour
45 Hobsonville Road West Harbour	17 Soling Place West Harbour
1/46 Hobsonville Road West Harbour	325 Hobsonville Road Hobsonville
393 Hobsonville Road Hobsonville	12 Williams Road Hobsonville
16 Hobsonville Road West Harbour	8 Whiting Grove West Harbour
4a Hendrika Court Hobsonville	17 Westergrove Place West Harbour
223 Hobsonville Road Hobsonville	327 Bd9 Hobsonville Road Hobsonville
63 Hobsonville Road West Harbour	2/133a Hobsonville Road West Harbour
391 Hobsonville Road Hobsonville	6 Fitzherbert Avenue West Harbour
1/191 Hobsonville Road Hobsonville	11 Williams Road Hobsonville
213 Hobsonville Road Hobsonville	10 Wiseley Road Hobsonville
245 Hobsonville Road Hobsonville	3 Bannings Way Hobsonville
24a Hobsonville Road West Harbour	9 Williams Road Hobsonville

Address	Address
189 Hobsonville Road Hobsonville	2 Seagrove Road West Harbour
1/41 Hobsonville Road West Harbour	3/163 Hobsonville Road West Harbour
3a Wiseley Road Hobsonville	4 Woodhouse Place West Harbour
187 Hobsonville Road Hobsonville	13 Hendrika Court Hobsonville
18 Hobsonville Road West Harbour	157c Hobsonville Road West Harbour
169 Hobsonville Road West Harbour	22 Peterhouse Place West Harbour
291a Hobsonville Road Hobsonville	29 Suncrest Drive West Harbour
287a Hobsonville Road Hobsonville	15 Westergrove Place West Harbour
285 Hobsonville Road Hobsonville	35 Suncrest Drive West Harbour
327 Bd1 Hobsonville Road Hobsonville	3 Starlight Cove Hobsonville
30/18 Williams Road Hobsonville	10 Trig Road Whenuapai
3 Wiseley Road Hobsonville	379a Hobsonville Road Hobsonville
1/163 Hobsonville Road West Harbour	12 Soling Place West Harbour
3 Oreil Avenue West Harbour	85 Hobsonville Road West Harbour
225 Hobsonville Road Hobsonville	7 Magdalen Place West Harbour
185 Hobsonville Road Hobsonville	9 Wiseley Road Hobsonville
183 Hobsonville Road Hobsonville	127 Hobsonville Road West Harbour
203a Hobsonville Road Hobsonville	1/22 Peterhouse Place West Harbour
3a Hendrika Court Hobsonville	9-10/18 Williams Road Hobsonville
15 Williams Road Hobsonville	36 Suncrest Drive West Harbour
41 Suncrest Drive West Harbour	23b Wiseley Road Hobsonville
79a Hobsonville Road West Harbour	10 Oreil Avenue West Harbour
177 Hobsonville Road Hobsonville	12 Hobsonville Road West Harbour
303a Hobsonville Road Hobsonville	1/32 Glucina Avenue West Harbour
165 Hobsonville Road West Harbour	1 Bannings Way Hobsonville
133 Hobsonville Road West Harbour	13-14/18 Williams Road Hobsonville
62 Hobsonville Road West Harbour	127a Hobsonville Road West Harbour
1 Seagrove Road West Harbour	5a Bannings Way Hobsonville
17-18/18 Williams Road Hobsonville	27 Glucina Avenue West Harbour
1/39 Hobsonville Road West Harbour	11 Starlight Cove Hobsonville
14 Hobsonville Road West Harbour	15 Belleaire Court West Harbour
39/18 Williams Road Hobsonville	153b Hobsonville Road West Harbour
147f Hobsonville Road West Harbour	30 Suncrest Drive West Harbour
61a Hobsonville Road West Harbour	85a Hobsonville Road West Harbour
327 Bd2 Hobsonville Road Hobsonville	8 Louise Place West Harbour

Address	Address
43/18 Williams Road Hobsonville	25 Peterhouse Place West Harbour
22 Connemara Court West Harbour	26 Sailfish Drive West Harbour
24 Connemara Court West Harbour	5a Hanson Place West Harbour
6 Oreil Avenue West Harbour	18 Hendrika Court Hobsonville
157a Hobsonville Road West Harbour	19 Oreil Avenue West Harbour
2a Marina View Drive West Harbour	12 Wiseley Road Hobsonville
315 Hobsonville Road Hobsonville	29 Cyril Crescent West Harbour 0618
11 Oreil Avenue West Harbour	4 Louise Place West Harbour
5 Fitzherbert Avenue West Harbour	104 Hobsonville Road Hobsonville
1a Marina View Drive West Harbour	405 Hobsonville Road Hobsonville
193 Hobsonville Road Hobsonville	114 Hobsonville Road Hobsonville
8 Westpark Drive West Harbour	122 Hobsonville Road Hobsonville
28/18 Williams Road Hobsonville	397 Hobsonville Road Hobsonville
16 Williams Road Hobsonville	1c Wiseley Road Hobsonville
231a Hobsonville Road Hobsonville	82 Hobsonville Road
4 Fitzherbert Avenue West Harbour	1 Wisley Road Hobsonville
401 Hobsonville Road Hobsonville	106 Hobsonville Road Hobsonville
9 Hendrika Court Hobsonville	21 Hobsonville Road West Harbour
167 Hobsonville Road West Harbour	124 Hobsonville Road
161 Hobsonville Road West Harbour	71 Hobsonville Road West Harbour
6 Hendrika Court Hobsonville	102 Hobsonville Road Hobsonville
14 Clark Road Hobsonville	2 Dowdens Lane Hobsonville
40 Suncrest Drive West Harbour	8 Workspace Drive Hobsonville
143c Hobsonville Road West Harbour	102c Hobsonville Road Hobsonville
81 Hobsonville Road West Harbour	1-3/4 Workspace Drive Hobsonville
2/18 Williams Road Hobsonville	4 Laurenson Road Hobsonville

Appendix B – Affected Receivers – Vibration

NoR W1 Trig Road (North)

Address	Building Type
82 TRIG ROAD WHENUAPAI	Residential
96A TRIG ROAD WHENUAPAI	Residential

NoR W2 Māmari Road

Address	Building Type
9 Māmari Road Whenuapai	School
4 Māmari Road Whenuapai	Residential
6 Māmari Road Whenuapai	Residential
8 Māmari Road Whenuapai	Residential
7 Spedding Road	Residential

NoR W3 Brigham Creek Road

Address	Building Type	Address	Building Type
1-8/38 Brigham Creek Road	Residential	1 Ripeka Lane	Residential
40b-42c Brigham Creek Road	Residential	111 Brigham Creek Road	Residential
53 Brigham Creek Road	Residential	2-10 Ripeka Lane	Residential
57 Brigham Creek Road	Residential	42d Brigham Creek Road	Residential
91 Brigham Creek Road	Residential	51 Brigham Creek Road	Residential
55 Brigham Creek Road	Residential	101 Brigham Creek Road	Residential
109 Brigham Creek Road	Residential	99 Brigham Creek Road	Residential
59 Brigham Creek Road	Residential	32c Brigham Creek Road	Residential
113 Brigham Creek Road	Residential	34b Brigham Creek Road	Residential
49 Brigham Creek Road	Residential	34d Brigham Creek Road	Residential
26-34 Whenuapai Drive	Residential	115 Brigham Creek Road	Residential
123 Brigham Creek Road	Residential	34a Brigham Creek Road	Residential
38 Ngahue Crescent	Residential	103 Brigham Creek Road	Residential
162 Brigham Creek Road	Residential	145a Brigham Creek Road	Residential
93 Brigham Creek Road	Residential	39a Brigham Creek Road	Residential
105 Brigham Creek Road	Residential	32c Brigham Creek Road	Residential
2 Māmari Road	Residential	32d Brigham Creek Road	Residential

NoR W4 Spedding Road

Address	Building Type
135 Fred Taylor Drive	Residential
15-19 Spedding Road	Residential
98 Hobsonville Road	Residential
5-7 Workspace Drive	Commercial
8 Workspace Drive	Commercial

NoR W5 Hobsonville Road

Address	Building Type	Address	Building Type
321 Hobsonville Road	Residential	1 Hendrika Court	Residential
42 Hobsonville Road	Residential	283 Hobsonville Road	Residential
255 Hobsonville Road	Residential	49 Hobsonville Road	Residential
1/259 Hobsonville Road	Residential	4 Clark Road Hobsonville	Residential
305 Hobsonville Road	Residential	24-25/18 Williams Road	Residential
309 Hobsonville Road	Residential	317 Hobsonville Road	Residential
2 Hendrika Court	Residential	201 Hobsonville Road	Residential
295 Hobsonville Road	Residential	60 Hobsonville Road	Residential
19 Williams Road	Residential	33 Hobsonville Road	Residential
45 Suncrest Drive	Residential	253 Hobsonville Road	Residential
303 Hobsonville Road	Residential	247 Hobsonville Road	Residential
1-2/275 Hobsonville Road	Residential	20 Hobsonville Road	Residential
33/18 Williams Road	Residential	241 Hobsonville Road	Residential
54 Hobsonville Road	Residential	82 Hobsonville Road	Residential
251 Hobsonville Road	Residential	39 Hobsonville Road	Residential
77 Hobsonville Road	Residential	319 Hobsonville	Residential
1/383 Hobsonville Road	Residential	229a Hobsonville Road	Residential
2 Clark Road	Residential	41 Hobsonville Road	Residential
307 Hobsonville	Residential	147a Hobsonville	Residential
287 Hobsonville	Residential	22 Hobsonville Road	Residential
289 Hobsonville	Residential	104 Hobsonville	Commercial
1-2/279 Hobsonville	Residential	405 Hobsonville	Commercial
1-2/281 Hobsonville	Residential	114 Hobsonville	Commercial
311 Hobsonville Road	Residential	122 Hobsonville Road	Commercial
403 Hobsonville Road	Residential	397 Hobsonville Road	Commercial

Address	Building Type	Address	Building Type
291 Hobsonville Road	Residential		
56 Hobsonville Road	Residential		
249 Hobsonville Road	Residential		
4 Hendrika Court	Residential		
1 Westpark Drive	Residential		

ATTACHMENT 48

NORTH-WEST WHENUAPAI
ASSESSMENT OF TRAFFIC NOISE
AND VIBRATION EFFECTS
PART 1 OF 4

TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West Whenuapai Assessment of Traffic Noise and Vibration Effects

December 2022

Version 1.0

Document Status

Responsibility	Name
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Reviewer	Siiri Wilkening
Approver	John Daly

Revision Status

Version	Date	Reason for Issue
1.0	16/12/2022	Notice of Requirement Lodgement

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Appendices

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Abbreviations

Acronym/Term	Description
AADT	Annual Average Daily Traffic
AEE	Assessment of Effects on the Environment
AC	Auckland Council
AT	Auckland Transport
AUP: OP	Auckland Unitary Plan Operative in Part
BPO	Best Practicable Option
FTN	Frequent Transit Network
FUZ	Future Urban Zone
NoR	Notice of Requirement (under the Resource Management Act 1991)
PPF	Protected Premises and Facilities
RMA	Resource Management Act 1991
SH16	State Highway 16
SH18	State Highway 18
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth Programme
Waka Kotahi	Waka Kotahi NZ Transport Agency

Glossary of Acronyms / Terms

Acronym/Term	Description
Auckland Council	Means the unitary authority that replaced eight councils in the Auckland Region as of 1 November 2010.
Whenuapai Assessment Package	Four Notices of Requirement and one alteration to an existing designation for the Whenuapai Arterial Transport Network for Auckland Transport.
Altered Road	As defined in NZS 6806:2010 Section 1.5.2: Subject to 1.5.4, an altered road means an existing road that is subject to the alterations of the horizontal or vertical alignment where at any assessment position at any one or more PPF meets criteria 1.5.2 (a) or (b).
New Road	As defined in NZS 6806:2010 Section 1.6: A new road is any road which is to be constructed where no previously formed legal road existed. A new road excludes any existing road and any altered road but includes the formation of previously unformed legal road.

1 Executive Summary

Assessment undertaken

This report provides an assessment of road traffic noise effects for the Whenuapai Package covering five projects.

The report contains a review of the relevant traffic noise criteria and discussion of the appropriate criteria and assessment methodology for the Projects. Predictions of road traffic noise were carried out using the method recommended in NZS 6806 in accordance with rule E25.6.33 of the Auckland Unitary Plan – Operative in Part (AUP:OP).

The assessment of effects undertaken was two-fold: in accordance with NZS 6806 and in relation to the predicted noise level changes comparing the future traffic noise levels with and without the projects.

As required by NZS 6806, the assessment methodology included the prediction of existing and future traffic noise levels, both without (Existing and Do Nothing scenarios) and with the Projects (Do Minimum scenario).

The Existing scenario represents the current road network with current traffic volumes, i.e. the existing environment as it is experienced now. The Do Nothing scenario represents the current road network with future traffic volumes, assuming a full build out of the area. The Do Minimum scenario represents the proposed future road network, incorporating NoRs W1 to W5 and other transport projects in the area. This scenario assumes a full build out of the area, and the transport infrastructure to enable the development. This is a realistic scenario at a point in time when all NoRs are operational.

Noise effects of road traffic on existing noise sensitive locations, referred to as Protected Premises and Facilities (PPFs) within NZS 6806, have been assessed. PPFs within a 200m radius of the rural Project areas and 100m for the urban have been included. Where project areas are considered Altered Roads, these have been assessed by comparing the predicted noise levels in the design year without the Projects (Do Nothing) with the predicted noise levels in the design year with the Projects (Do Minimum). Project areas considered to be New Roads have been assessed by comparing the predicted existing noise levels with the Do Minimum predictions.

Each PPF has been assessed against Noise Criteria Categories as set out in NZS 6806, with Category A setting the most stringent external noise criteria and being the preferred category. Where this cannot practicably be achieved, then Category B is the next preferred with higher external noise criteria. Category C, an internal noise criterion, is the least preferred category and should only be applied where external noise levels cannot practicably be reduced any further. Where Category A noise levels can be achieved, no further mitigation is required.

Mitigation options have been considered for the Projects where required under NZS 6806. The BPO mitigation has been determined separately for each project and is a combination of road surface material and barriers. The BPO mitigation formed the basis of determining the relevant Noise Criteria Category for each PPF. Since the projects will be built in the more distant future, this BPO will be confirmed for all current PPFs, at the time of construction. The review, confirmation and refinement of the BPO will aim to achieve the same noise criteria categories as determined with the current BPO as presented in Appendix 2.

In addition to an assessment against the Noise Criteria Categories of NZS 6806, each Project is also assessed against the change in noise level without and with a new project, and a general subjective response is applied to the predicted change.

Residences or noise sensitive activities that are not yet built or do not have building consent, are not included in the modelling, however noise levels at the currently vacant land are provided in the noise contour maps within the Appendices and are indicative of the potential noise environment for that land.

Traffic from new or upgraded roading projects is not generally expected to create any vibration issues. The smooth and even surface typical of urban roads would likely generate no more than negligible traffic vibration impacts. Therefore, traffic vibration has not been assessed for the Projects.

Assessment assumptions

All predictions are based on traffic flow along New and Altered roads a significant time in the future (in the Design Year 2048). These traffic volumes rely on the urbanisation of the area and implementation of surrounding transport projects.

The traffic noise effects from the Projects assume that all NoRs are operational together, i.e. when the design year of NoR W1 is reached, NoRs W2 to W5 are also operational. No allowance was made for individual NoRs being implemented, or some NoRs not being implemented at all. This is due to two reasons; the transport models did not allow for these options, and the individual or combined assessment of NoRs would lead to a large number of combinations that could not all be assessed. Therefore, the decision was made to assess the furthest point in time, when all surrounding areas were developed to capacity and the associated roading network. A full list of assumptions is included in Appendix 1.

Development of the surrounding areas and urbanisation of the receiving environment over time will likely increase activity and associated ambient noise levels. Therefore, any significant change predicted in this assessment may not hold the same significance at the Design Year, due to the change in environment at the time of construction.

As such, the results are indicative of a possible future scenario, but effects cannot be definitively determined at this stage. Reassessment of the road traffic noise at PPFs covered in this report should be carried out nearer the time of construction to determine if the recommended mitigation (e.g. barriers) is still relevant at the time of construction.

Results of assessment and recommended measures

NoR W1

The Project involves the widening of Trig Road to allow for walking and cycling upgrades.

This Project does not meet the definition of an Altered Road in accordance with NZS 6806 and as set out in Section 3.1. NZS 6806 therefore does not apply, and mitigation is not required.

A comparison of the Do Nothing and Do Minimum scenarios indicates that noise levels will be lower, resulting in positive noise effects. This is due to the redistribution of traffic across the network.

NoR W2

The Project involves widening of the existing Māmari Road corridor, upgrading the paper road section to the north and building a new section of road to the south to connect with Northside Drive.

The Project consists of a combination of New and Altered Roads.

For the Altered Roads under the Do Minimum scenario, predictions show a noise level range between 51 – 71 dB $L_{Aeq(24h)}$, with two PPFs in Category B, eight in Category C and the remainder in Category A. Two mitigation options have been considered to reduce noise levels at PPFs. The options comprise of low noise road surface and localised barriers. With the recommended mitigation option of AC-14 low noise road surface applied and barriers installed at Timatanga Community School and 6 Māmari Road. Four PPFs will be in Category B with the remaining PPFs in Category A.

When comparing the Do Nothing and Mitigation scenarios, the majority of PPFs are predicted to experience an increase in noise level of 1 to 4 dB which may just be perceptible. The PPFs at 8 Māmari Road, 4 Māmari Road, 11A Spedding Road, 6 Māmari Road and 5A Spedding Road are predicted to experience noticeable increases in noise level of 12 dB, 9dB, 8 dB, 6 dB and 5 dB respectively resulting in moderate to significant adverse noise effects. We note that 6 Māmari Road, 5A and 11A Spedding Road are still predicted to fall within Category A with the recommended mitigation implemented.

For the New Roads under the Do Minimum scenario, predictions show a noise level range between 47 dB $L_{Aeq(24h)}$ to 67 dB $L_{Aeq(24h)}$, with 15 PPFs are in Category A, three PPFs in Category B and eight PPFs in Category C. Two mitigation options have been considered to reduce noise levels at PPFs. The options comprise of low noise road surface and localised barriers. With the recommended mitigation option of AC-14 low noise road surface applied and a noise barrier installed at 7 Spedding Road, eight PPFs will be in Category B with the remaining PPFs in Category A.

When comparing the Existing and Mitigation scenarios nine PPFs are predicted to experience a 3 to 7 dB increase in noise level resulting in slight to moderate adverse noise effects. 17 PPFs are predicted to experience a 9 to 18 dB increase in noise level due to the Project. 10 dB is perceived as a doubling of loudness, and the changes predicted here will result in a fundamental change in environment significantly more than doubling for some PPFs. This increase in noise level will be significant to the residents if they still reside in the area at the time of the road opening.

The majority of PPFs assessed for NoR W2 are located within the Aircraft Noise Overlay of Whenuapai Airbase. The AUP:OP requires that all new activities sensitive to aircraft noise or alterations to existing buildings accommodating activities sensitive to aircraft noise that are within the Aircraft Noise Overlay must be designed to achieve an internal noise limit of 40 dB L_{dn}. It is not clear which PPFs in the vicinity of the Māmari Road upgrade have been designed to attenuate aircraft noise, however, where this has occurred road traffic noise will also be reduced.

NoR W3

The Project involves the widening of Brigham Creek Road from its existing two-lane arterial to a 30m wide four-lane arterial cross-section with walking and cycling facilities on both sides.

For the Do Minimum scenario, 180 PPFs are in Category A, ten PPFs are in Category B and eight in Category C.

A mitigation option of installing AC-14 along the Altered Roads has been considered. This option results in all PPFs in Category A and is the recommended mitigation option for NoR W3.

When comparing the Do Nothing and Mitigation scenarios 46 PPFs are predicted to experience an insignificant change in noise level of 1 to 2 dB, 63 PPFs are predicted to experience a reduction in noise level of 3-4 dB resulting in slight positive effects. 58 PPFs are predicted to experience a 5-8 dB reduction in noise level resulting in moderate positive effects. 31 PPFs are predicted to experience a 9-12 dB reduction in noise, resulting in significant positive effects.

NoR W4

The Project involves the upgrade of the existing Spedding Road to a two-lane arterial with separated active modes and new extensions of Spedding Road to the east and west.

For the Altered Roads under the Do Minimum scenario, there are 47 PPFs in Category A and eight in Category B. There are no PPFs in Category C. A mitigation option of installing AC-14 along the whole road alignment has been considered which results in all PPFs in Category A. This is the recommended mitigation option for the Altered Roads within NoR W4.

When comparing the Do Nothing and Mitigation scenarios 37 PPFs are predicted to experience a negligible change in noise level of between 0 dB and 2 dB. Nine PPFs are predicted to experience a 3 dB to 4 dB increase in noise level, resulting in slight adverse noise effects. Three PPFs are predicted to experience a 5 dB increase in noise level, resulting in a moderate adverse noise effect. Six PPFs are predicted to experience a decrease in noise level of between 3 dB and 4 dB, resulting in slight positive effects

For New Roads the recommended mitigation is the installation of AC-14 or an equivalent low noise road surface for the whole road alignment. After implementation of the mitigation option, two PPFs will be in Category A (1/100 Hobsonville Road and 41 Trig Road) and two PPFs (1/98 Hobsonville Road and 25A Trig Road) will be in Category B. Increases in noise level are predicted when comparing existing traffic noise levels to those with the Project. The PPF at 1/98 Hobsonville Road is predicted to experience a 12 dB increase in noise level which is substantial. Smaller increases in noise level of 1 dB to 4 dB are predicted at the remaining PPFs.

1/98 Hobsonville Road and 1/100 Hobsonville Road are located within the Business - Light Industry Zone where they can be exposed to noise levels of up to 65 dB L_{Aeq} at the boundary, at all times. If neighbouring businesses operate to the full extent of their permitted noise levels, traffic noise from the road may not be noticeable.

NoR W5

The Project involves the upgrade of Hobsonville Road between Oriel Avenue and Luckens Road to a 30m wide four-lane arterial, and a 24m wide two-lane arterial from Luckens Road to Memorial Park Drive.

For the Do Minimum scenario, 470 PPFs are predicted to fall within Category A, 27 PPFs are predicted to fall into Category B and eight in Category C. Predicted noise levels range from 37 dB $L_{Aeq(24h)}$ to 72 dB $L_{Aeq(24h)}$.

Two mitigation options have been considered to reduce noise levels at PPFs. The options comprise of low noise road surface and localised barriers.

The recommended mitigation is the installation of AC-14 or an equivalent low noise road surface for the whole road alignment, with localised noise barriers at 39 Hobsonville Road and 61 Hobsonville Road. With the recommended mitigation option in place the majority of PPFs are predicted to experience either a negligible change in noise level or a decrease in noise level, resulting in positive noise effects. Upon implementation of the recommended mitigation, the majority of PPFs will be in Category A, with four PPFs in Category B.

2 Introduction

This traffic noise assessment has been prepared for the North West Local Arterial Network Notices of Requirement (**NoRs**) for Auckland Transport (**AT**) (the "Whenuapai Assessment Package"). The NoRs are to designate land for future local arterial transport corridors as part of Te Tupu Ngātahi Supporting Growth Programme (**Te Tupu Ngātahi**) to enable the construction, operation and maintenance of transport infrastructure in the North West Whenuapai area of Auckland.

The North West growth area is approximatively 30 kilometres north west of Auckland's central city. It makes a significant contribution to the future growth of Auckland's population by providing for approximately 42,355 new dwellings and employment activities that will contribute 13,000 new jobs across the North West. Whenuapai is one of these growth areas, located between State Highway 16 (**SH16**) and State Highway 18 (**SH18**) and at present is largely rural (but Future Urban Zoned) with an existing community consisting of new and more established residential, business and local centre land uses. This growth area is expected to be development ready by 2018-2022 with 401 hectares to accommodate 6,000 dwellings. Furthermore, a Whenuapai Structure Plan was adopted by the Council in 2016 and sets out the framework for transforming Whenuapai from a semi-rural environment to an urbanised community over the next 10 to 20 years.

The Whenuapai Assessment Package will provide route protection for the local arterials, which include walking, cycling and public transport (including the Frequent Transit Network (**FTN**)), needed to support the expected growth in Whenuapai.

This report assesses the traffic noise effects of the North West Whenuapai Assessment Package identified in Table 2-1 and Figure 5-1 below.

The Whenuapai Assessment Package comprises five separate projects which together form the North West Whenuapai Arterial Network. The network includes provision for general traffic, walking and cycling, and frequent public transport

Refer to the main AEE for a more detailed project description.

Table 2-1: North West Whenuapai Assessment Package – Notices of Requirement and Projects

Notice	Project
NoR W1	Trig Road North
NoR W2	Māmari Road
NoR W3	Brigham Creek Road
NoR W4	Spedding Road
NoR W5	Hobsonville Road (alteration to existing designation 1437)

2.1 Purpose and Scope of this Report

This assessment forms part of a suite of technical reports prepared to support the assessment of effects within the Whenuapai Assessment Package. Its purpose is to inform the AEE that accompanies the four NoRs and one alteration to an existing designation for the Whenuapai Assessment Package sought by AT.

This report considers the actual and potential effects associated with the operation and maintenance of the Whenuapai Assessment Package on the existing and likely future environment as it relates to traffic noise and recommends measures that may be implemented to avoid, remedy and/or mitigate these effects.

The key matters addressed in this report are as follows:

a) Identify and describe the traffic noise of the Whenuapai Assessment Package area;
b) Identify and describe the actual and potential traffic noise effects of each Project corridor within the Whenuapai Assessment Package;
c) Recommend measures as appropriate to avoid, remedy or mitigate actual and potential traffic noise and vibration effects (including any conditions/management plan required) for each Project corridor within the Whenuapai Assessment Package; and
d) Present an overall conclusion of the level of actual and potential traffic noise effects for each Project corridor within the Whenuapai Assessment Package after recommended measures are implemented.

2.2 Report Structure

This report is structured to reflect the key matters listed above in Section 2.1.

To provide a clear assessment of each project, descriptions and assessments have been separated to reflect each of the notices sought.

2.3 Preparation for this Report

A meeting was held with the Project Transport Planners, who authored the Assessment of Transport Effects, to determine the most practicable road traffic data for use within the assessment. The agreed methodology is in line with the wider Supporting Growth work.

3 Assessment Criteria

3.1 Road Traffic Noise

Rule E25.6.33 of the Auckland Unitary Plan (AUP:OP) requires that New Roads and Altered Roads which are within the scope of NZS 6806:2010[1] comply with the requirements of that standard. The assessment of all NoRs has used NZS 6806.

NZS 6806 provides criteria and an assessment method for road-traffic noise. The standard is a tool which provides performance targets and requires assessment of different options for noise mitigation (ranging from low-noise road surfaces and barriers to building modification mitigation). These options are subject to an integrated design process in which the costs and benefits are considered. The performance targets in NZS 6806 are set to achieve reasonable noise levels considering adverse health effects associated with noise on people and communities, the effects of relative changes in noise levels, and the potential benefits of New and Altered Roads. NZS 6806 is an appropriate tool to assess road traffic noise from the Projects as it provides a suitable and tested traffic noise assessment and mitigation methodology and includes relevant noise criteria.

NZS 6806 is not applicable to New and Altered Roads predicted to carry less than an Annual Average Daily Traffic ("AADT") of 2000 at the design year, or where the change in noise level due to a project (i.e. the horizontal or vertical realignment of a road) does not reach certain thresholds of effects (e.g. a change of at least 3 dB for at least one PPF).

To be defined as an Altered Road in accordance with NZS 6806 the following must apply:

- The Do Minimum noise environment would be greater than or equal to 64 dB $L_{Aeq(24h)}$ and, if no specific noise mitigation was undertaken, the alterations would increase road-traffic noise at the assessment position by 3 dB $L_{Aeq(24h)}$ or more at the design year, when compared with the Do Nothing noise environment; or

- The Do Minimum noise environment is greater than or equal to 68 dB $L_{Aeq(24h)}$ and, if no specific noise mitigation was undertaken, the alterations would increase road-traffic noise at the assessment position by 1 dB $L_{Aeq(24h)}$ or more at the design year, when compared with the do-nothing noise environment.

As set out in Sections 7 to 11, all NoRs involved changes to existing roads. Only NoR W1 does not meet the definition of an Altered Road in accordance with NZS 6806. Where the definition is not met and the road is not a new road, NZS 6806 does not apply, and mitigation is not required.

3.1.1 Protected premises and facilities

NZS 6806 requires noise effects to be assessed at noise sensitive locations within set distances of any project. These locations are known as protected premises and facilities (PPFs), and include existing houses, schools, marae and various other premises as defined in NZS 6806. Commercial and industrial premises do not fall within the definition of a PPF. Future (unbuilt) noise-sensitive premises are also not PPFs, unless they have already been granted building consent.

[1] New Zealand Standard 6806:2010 Acoustics - Road Traffic Noise

The distances from the road within which properties are considered to be PPFs is set in the standard as:

- Urban Areas – 100 metres from the edge of the nearside traffic lane.
- Rural Areas – 200 metres from the edge of the nearside traffic lane.

Most of the Project extents currently fall within a rural area as defined by Statistics New Zealand and most of the land is greenfield which is zoned as Future Urban under the AUP:OP. Therefore, it is appropriate for PPFs within 200 metres of the road Projects to be assessed in this report. The exception is for a section of NoR W5 which is in an urban area south and east of Hobsonville Road where a 100 metres radius has been assessed in accordance with NZS 6806. Outside of these areas PPFs have not been considered.

These distances ensure the assessment is made at the most relevant receivers. Potential noise effects are still controlled at receivers further away by virtue of noise criteria applying at receivers nearest to the road.

3.1.2 NZS 6806 Noise Criteria

For each of the Projects the noise criteria as summarised below are applicable.

Category	**Criterion**	**Altered Road**	**New Roads with a predicted traffic volume of 2000 to 75000 AADT at the design year**
A	Primary	64 dB $L_{Aeq(24h)}$	57 dB $L_{Aeq(24h)}$
B	Secondary	67 dB $L_{Aeq(24h)}$	64 dB $L_{Aeq(24h)}$
C	Internal	40 dB $L_{Aeq(24h)}$	40 dB $L_{Aeq(24h)}$

The Projects within the Whenuapai Assessment Package have both “Altered Roads” and “New Roads” as defined by NZS 6806:2010. These definitions have been included in the Glossary of this report.

NZ6806 Section 6.2 is therefore applicable to Projects in the Whenuapai Assessment Package where it states:

6.2.1 In certain circumstances it may be more appropriate to apply one of the sets of criteria to some assessment positions affected by a project, and another set of criteria to other assessment positions affected by the same project. Such circumstances may include, but are not limited to:

a) An intersection between a new or altered road and an existing road;
b) A ‘tie-in’, ‘transition’, or merger’ where a new or altered road reconnects with an existing road; or
c) Where any PPFs are significantly affected by noise from another existing road in the vicinity.

6.2.2 Where PPFs are affected by noise from an existing road, mitigation is only required for road-traffic noise generated on the new or altered road.

For these Projects, where a new road intersects with an existing road, all PPFs within 100m of the existing road will be assessed under the Altered Road criteria. This will only apply where the existing road is predicted to carry more that an AADT of 2000 at the design year under the Do Nothing scenario. PPFs located beyond this distance but still within 100m of the New Road alignment will be subject to the New Road criteria.

3.1.3 Design Year

The criteria apply to a design year 10 to 20 years after the completion of the Project road. In this case, the opening year has been not yet been determined. For these Projects, traffic modelling data for the year 2048 has been selected as the design year for assessment purposes for the following reasons:

- The design year traffic data incorporates and assumes all other projects (funded and otherwise) in the North West Auckland area have been constructed; these projects directly influence traffic flow through the Whenuapai Project areas.
- The 2048 design year, whilst not the most conservative scenario in terms of the traffic volume for every Project road, provides the most complete overview reflective of the development intended for the areas. If some projects do not go ahead then traffic flows within the Project alignment will likely change. Nearer the time of detailed design and construction, traffic noise will need to be reassessed.

The decision to use 2048 as the design year was made in conjunction with the Project team and further discussed in Section 5. A full list of assumptions included within the design year has been included in Appendix 1.

3.1.4 Noise Prediction Scenarios

NZS 6806 specifies scenarios to be undertaken which include the following:

- The “existing noise environment”, which is the ambient noise levels at the date of assessment.
- A “Do Nothing” scenario, which represents the traffic noise levels at the PPFs at the design year assuming no alterations are made to the existing road. (Referred to as “Likely Future without Whenuapai Projects” and “2048+ without Whenuapai” within the Transport Assessment)
- A “Do Minimum” scenario, which represents the traffic noise levels at the PPFs at the design year with the Project implemented, but without any specific noise mitigation. Road surfaces, safety barriers and other structures which are required for non-acoustic purposes may provide incidental noise mitigation and are included in this scenario. (Referred to as “Likely Future with Whenuapai Projects” and “2048+ with Whenuapai” within the Whenuapai Package Assessment of Transport Effects)
- “Mitigation” scenarios, which represent the traffic noise levels at the PPFs at the design year with various specific noise mitigation options implemented with the aim of achieving the noise criteria categories.

The Do Nothing scenario includes the growth of the surrounding area without the Project but with other projects planned to be implemented by 2048. In practice, this would be an unrealistic scenario as the future growth at full build out at the design year (2048) could not occur without the existing rural transport network being upgraded to urban standards. We also understand that the current road network could not cope with the future traffic volumes, as these volumes would lead to link and intersection delays. Therefore, while the predictions suggest a significant increase in noise level in the Do Nothing scenario compared with the Existing scenario, this would not be a feasible option.

The Do Minimum scenario represents the proposed future road network, incorporating NoRs W1 to W5 and other transport projects in the area (refer to the discussion on Assessment Assumptions below). This scenario assumes a full build out of the area, and the transport infrastructure to enable the development. This is a realistic scenario at a point in time when all NoRs are operational. Considering the wider distribution of future traffic over an increased road network enabled by the NoRs, traffic volumes appear to reduce on individual roads when compared with the (theoretical) Do Nothing scenario.

Network assumptions that are included or excluded from each scenario are summarised in Appendix 1.

3.1.5 Noise Mitigation

NZS 6806 requires that noise mitigation options are assessed, and if practicable, noise levels within Category A should be achieved. If this is not practicable then mitigation should be assessed against Category B. However, if it is still not practicable to comply with categories A or B then mitigation should be implemented to ensure the internal criterion in Category C is achieved. Depending on the external noise level, building modification mitigation to achieve Category C could include ventilation and/or noise insulation improvements ranging from upgraded glazing through to new wall and ceiling linings. Building modification mitigation of Category C should only be implemented after the lowest practicable external noise level has been achieved. This means that structural mitigation such as road surface or barriers may also be implemented.

Where a requirement to consider mitigation measures is identified, NZS 6806 states that structural mitigation should only be implemented if it achieves the following:

a) An average reduction of at least 3 dB $L_{Aeq(24h)}$ at relevant assessment positions of all PPFs which are part of a cluster; or
b) A minimum reduction of 5 dB $L_{Aeq(24h)}$ at any assessment position(s) for each PPF not in a cluster.

In circumstances where noise mitigation is warranted, NZS 6806 adopts a "Best Practicable Option" (BPO) approach. BPO considers the extent to which a mitigation option will achieve compliance with the relevant noise criteria and result in a noticeable noise reduction at assessment locations. The value-for-money of the option and the potential visual, shading and safety effects are also considered, amongst other things.

3.1.6 Road Traffic Vibration

Traffic vibration from new or upgraded roading projects is not generally expected to create issues. A key factor with new roads is the uniformity of the basecourse/pavement and the absence of near surface services. This is due to new or upgraded roads being designed to be smooth and even and avoiding vibration generated from passing traffic over uneven surfaces. Therefore, traffic vibration effects arising from operation of the Projects has not been assessed.

4 Assessment Methodology

Road traffic data provided for the Whenuapai Assessment Package relies on the development and urbanisation of the local areas, as well as other funded projects going ahead throughout the North West area, as it forms part of the wider strategic transport network. Some projects will have a direct impact on the traffic flow.

The purpose of this assessment is to determine the future potential impacts to support the future growth within the Whenuapai area. Therefore, it has been assumed all transport infrastructure developments will be constructed by the design year 2048 as indicated in Section 3.1.4. It should be noted an urban speed reduction is expected within the transport model at the time of growth and at the Do Nothing scenario (design year without Project). This differs from the NZS 6806 standard where the Do Nothing scenario should include no alterations to the roads assessed. Therefore, in accordance with the standard, speed change has been applied at the Do Minimum scenario only. As noted previously, the Do Nothing scenario is a theoretical scenario for these Projects as the existing road network would not be able to accommodate the traffic volume expected from the full future development of the area.

NZS 6806 sets reasonable criteria for road-traffic noise levels, considering health issues associated with noise and other matters. It is considered that road-traffic noise levels in compliance with NZS 6806 Category A would generally result in acceptable noise effects. Achieving the Category B criteria may also give rise to acceptable noise effects when considered with regard to the existing environment.

To determine the potential change in noise level due to the Projects, the Do Minimum (design year with Project) scenario has been compared with the Do Nothing (design year without Project) scenario.

Under NZS 6806, PPFs do not include premises which are not yet built, other than those where building consent has already been obtained but not yet lapsed. No such premises that fall under this Category were known at the time of this assessment.

Although the NZS 6806 assessment does not consider sites unless they contain, or have building consent for, a PPF, the predicted noise levels shown in the noise contour maps in Appendix 3 are considered indicative of the noise environment at adjacent sites without a PPF, including the future urbanisation areas.

4.1 Road Traffic Noise Model

A computer noise modelling software SoundPLAN (V8.2) has been used to predict road traffic noise impacts. The road traffic noise modelling employs the "*Calculation of Road Traffic Noise*" (CoRTN) algorithm, as recommended in NZS 6806. The CoRTN methodology has been adjusted for New Zealand Road Surfaces in accordance with LTNZ Report No. 326[2] and the Waka Kotahi *Guide to state highway road surface noise*[3]. The model settings are described in

Table 4-1 below.

[2] https://www.nzta.govt.nz/assets/resources/research/reports/326/docs/326.pdf

[3] https://www.nzta.govt.nz/assets/resources/road-surface-noise/docs/nzta-surfaces-noise-guide-v1.0.pdf

Table 4-1: Road traffic noise modelling parameters

Parameter	Setting/source
Software	Sound Plan 8.2
Algorithm	CoRTN
Reflection	CoRTN
Ground absorption	0.6 for urban areas; 1 for grassed areas
Receiver height	1.5 m above height of each floor
Noise contour grid	1.5 m height, 5 m resolution
Receivers and grid position	Free-field

The CoRTN algorithm gives results in $L_{A10(18h)}$. To convert these results to $L_{Aeq(24h)}$ a minus 3 dB adjustment has been made. This adjustment has been implemented in the software in conjunction with the road surface adjustment detailed below.

The limitations and uncertainties of the prediction methodology, including input data, are discussed below.

4.1.1 Traffic data

All traffic data including AADT, percentage of heavy vehicles and posted speed limit has been sourced from the Project team. The existing scenario has been based on 2015 data as provided. Traffic modelling methodology and results are described in the Whenuapai Arterial Network Transport Assessment.

The CoRTN model has been developed based on 18-hour traffic data. However, in accordance with the requirements of NZS 6806, traffic data has been entered as the 24-hour daily traffic (AADT), which results in noise levels in the order of +0.2 dB higher than would have been calculated by CoRTN based on the 18-hour AADT. The CoRTN model assumes that traffic is free-flowing, it does not apply to interrupted vehicle flows, such as at intersection, and for low volume roads under 5,000 AADT.

4.1.2 Topography

Topographic contours for the existing scenario have been provided from the Project team at a 1m resolution.

Contours for the Do Minimum scenario were obtained from the Project team for the assessment area and joined with the existing contours for the surrounding areas. Road gradients and screening have been determined from the contours.

4.1.3 Buildings

The footprints and heights for all buildings, building usage and all other structures within 200 metres of the roads have been obtained from the Project Team. The number of floors was determined assuming 2.8 m height per floor.

Noise levels were calculated at the centre of each façade, 1.5 m above each floor height with the noise levels stated being the highest of any façade.

Any buildings or structures within the designation for the Project have been removed from the model and not assessed for the Do Minimum scenario as they will be removed to provide for the Project.

4.1.4 Road alignments

Road alignments for existing roads were provided by the Project team as centrelines and widths for each carriageway section. Gradients have been calculated by SoundPLAN. Bridges were identified and entered appropriately into the noise model.

4.1.5 Road Surfaces

Surfaces of existing roads have been modelled as the current surfaces which is two-coat chipseal for the majority of roads and Asphaltic Concrete (AC-14) on Hobsonville Road and Brigham Creek Road (east of Joseph McDonald Drive). For the Do Minimum scenario, the road surfaces have been modelled assuming all surfaces to be two-coat chipseal, as advised by Auckland Transport.

The procedure used to incorporate different road surfaces in the model is as follows:

- In accordance with Transit Research Report 28[4], a minus 2 dB adjustment has been made for an asphaltic concrete road surface compared to CoRTN.
- Surface corrections relative to AC-14 have been made in accordance with LTNZ Research Report 326 and the Waka Kotahi Guide to state highway road surface noise. The combination of surface corrections for cars and heavy vehicles has been made using the equation in the Waka Kotahi Guide to state highway road surface noise.
- The combined correction, including the adjustment from $L_{A10(18h)}$ to $L_{Aeq(24h)}$, has been entered in the modelling software as a total road surface correction.

4.1.6 Existing noise barriers

There are no existing noise barriers in the Project areas covered by the Whenuapai Assessment Package.

Existing boundary fences on private properties have not been included in the noise model as their condition is unknown and they may not provide effective acoustic shielding.

This means that for some properties, the predicted traffic noise levels may be slightly higher than would actually be experienced. However, the assessment process was used to identify properties which need noise barriers to provide adequate attenuation, as part of the mitigation appraisal.

4.1.7 Bridges

All existing and new bridges have been configured to be ‘self-screening’ roads, which block the noise of the road passing under them.

4.2 Uncertainties and Limitations

The predicted road traffic noise levels presented in the following sections are based on a road traffic noise model developed in accordance with NZS 6806 and relevant guidance. The accuracy of the model is largely dependent upon the limitations of the available input data as detailed above.

4 Research Report 28. Traffic noise from uninterrupted traffic flows, Transit, 1994.

Uncertainties in the modelled noise levels can occur for a number of reasons. Uncertainties are typically related to the effects of topographical screening, appropriateness of the traffic data in terms of volumes of light and heavy vehicles, speeds (observed vs posted) and road surface type.

As stated, the terrain model has been developed by the Project GIS team based on 1m vertical terrain resolution, which provides sufficient detail to accurately account for any acoustic shielding from localised topographical features.

The traffic data has been sourced from the Project Transport team and it is accepted that the forecasting of future traffic flows may not necessarily reflect the actual flows when the Design Year is reached. The sensitivity of the noise predictions to changes in traffic data is not as significant as the effects of topographical screening. For example, if all other factors of the traffic data remain unchanged (speed and % of heavy vehicles), then a doubling or halving of the traffic data will only result in a 3 dB change which is only just perceptible by most people. A change in traffic volume data by +25 % or -25% will result in a 1 dB change in predicted noise level, which would be imperceptible.

Nevertheless, an uncertainty remains which of the Projects will be implemented, at which time and in which combination. The assessment assumes that all NoRs are implemented and operational in the design year 2048. In the interim, some NoRs may be implemented earlier than others, which would have an effect on the traffic distribution across the network, and therefore affect the noise generation.

The accuracy of the model can be quoted to a reasonable degree based upon known validations of the CoRTN model and comparisons with the measured existing noise levels. Generally, road traffic noise levels are quoted with an accuracy within 2 dB. NZS 6806 states in Section 5.3.4.2 that “The difference between measured and predicted levels should not exceed ±2 dB.”

Noise monitoring could not be undertaken at the time of the assessment due to Covid-19 related restrictions which means current traffic flows are not representative of the typical traffic flows. However, from experience we consider that the predicted noise levels are in line with similar projects and are as expected for the traffic volume, speed and road surface for these Projects.

4.3 Potential Traffic Noise Mitigation Options

For those PPFs where the NZS 6806 Category A criterion is predicted to be exceeded, the effect of the mitigation options on road-traffic noise levels at each PPF were modelled. Where NZS 6806 does not apply due to noise levels not reaching the required threshold to qualify as an Altered road, no mitigation options have been considered.

Traffic noise mitigation measures can be broadly categorised into three methods: low noise road surfaces, traffic noise barriers, and building modification. The first two methods involve structural mitigation as described in NZS6806, whilst the third involves building modification mitigation.

4.3.1 Road surfaces

The noise mitigation measure with the largest influence on the generation of road traffic noise is the road surface material.

The Do Minimum road surface for all of the Projects has been modelled as two-coat chip seal as advised by Auckland Transport. Where mitigation of noise through selection of a low-noise road surface has been investigated, AC-14 has been used.

4.3.2 Noise barriers

If low-noise road surfaces do not provide the required level of noise mitigation, traffic noise barriers may be considered alongside road surfaces. Generally, barriers will only mitigate noise if they block the line-of-sight between the noise source and receiver. They are most effective and provide the widest area of mitigation when placed immediately adjacent to traffic lanes. In order to provide the most effective noise level reduction, an acoustic barrier must be of solid material (i.e. have no gaps) and have a minimum surface weight of 15 kg/m^2 (e.g. 17mm ply sheeting, 9 mm fibre cement, concrete, earth bunds etc.).

4.3.3 Building modification

NZS 6806 requires that structural mitigation, such as noise barriers and low-noise road surfaces, should be implemented in preference to building modification mitigation. Building modification can potentially inconvenience residents and does not provide any protection to outdoor amenity. However, if low-noise road surfaces and noise barriers are not practicable or do not provide the required level of noise reduction, building modification to PPFs may be considered.

Depending on the level of reduction required, building modification measures may range from provision of mechanical ventilation only (to allow doors and windows to be closed), to the upgrade or replacement of windows, wall linings, floors and ceiling linings.

4.3.4 Maintenance of structural mitigation measures

The effectiveness of the acoustic performance of noise mitigation measures will need to be maintained over time. NZS 6806 states that “structural mitigation measures should be designed in such a way that they retain the same noise-reduction properties up to the design year”.

This means that any barrier proposed for the Projects should not develop gaps or other openings or material failure. Any damage and vandalism to the barrier will need to be replaced, and asphalt surfaces should be maintained to be smooth and even, in order to achieve the same noise reducing qualities as following initial installation.

Maintenance of structural mitigation measures to the performance standards of NZS 6806 should be undertaken for the Projects in order to achieve the noise level reductions on which the noise level predictions are based.

4.4 Overview of Traffic Noise Effects

Adverse noise effects as a result of high levels of traffic noise may include sleep disturbance, loss of concentration, annoyance, a reduction in speech intelligibility and reduced productivity. The effects are not restricted to PPFs but would also affect future residential and other noise-sensitive developments as well which are not included in the NZS 6806 definition of PPF. Where new noise sensitive developments are established in the vicinity of a road, their design should take account of the potential noise effects and care should be taken to avoid or minimise them.

The magnitude of effects will largely depend on noise levels received in noise-sensitive spaces within buildings, although there are also potential annoyance effects associated with a loss of amenity when high noise levels are received in outdoor living or recreation spaces.

The subjective perception can generally be correlated with the numerical change in noise level. A 3 dB change in noise level is just perceptible to the majority of people. A 10 dB increase in noise level is subjectively considered to be a doubling of loudness resulting in a significant impact.

Table 4-2 Noise level change compared with general subjective perception

Noise level change	General subjective perception
1 – 2 decibels	Insignificant change
3 – 4 decibels	Perceptible change
5 – 8 decibels	Noticeable change
9 – 11 decibels	Halving/doubling of loudness
> 11 decibels	More than halving/doubling of loudness

5 Whenuapai Assessment Package Overview

An overview of the Whenuapai Assessment Package is provided in Figure 5-1 below, with a brief summary of the Whenuapai Assessment Package provided in Table 5-1.

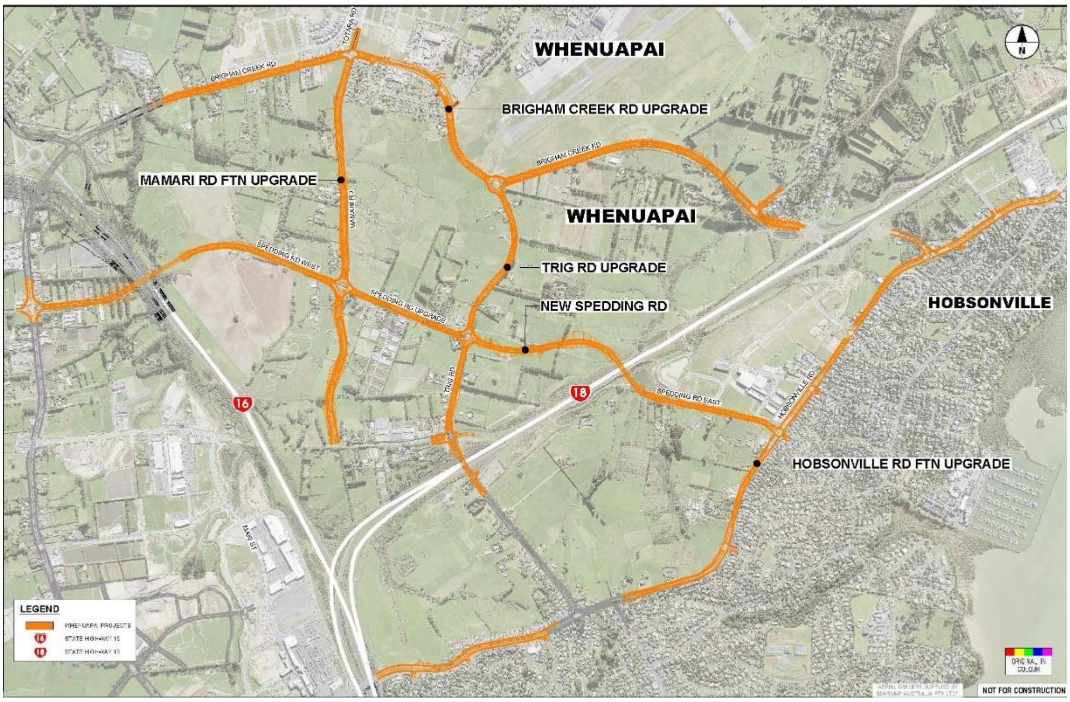


Figure 5-1: North West Whenuapai Assessment Package – Overview of NoRs for Assessment

Table 5-1: Whenuapai Assessment Package Project Summary

Corridor	NOR	Description	Requiring Authority
Trig Road North	NoR W1	Upgrade of Trig Road corridor to a 24m wide two-lane urban arterial cross-section with separated active mode facilities on both sides of the corridor.	Auckland Transport
Māmari Road	NoR W2	Extension and upgrade of Māmari Road corridor to a 30m wide four-lane urban arterial cross-section providing bus priority lanes and separated active mode facilities on both sides of the corridor.	Auckland Transport
Brigham Creek Road	NoR W3	Upgrade of Brigham Creek Road corridor to a 30m wide four-lane arterial cross-section with separated active mode facilities on both sides of the corridor.	Auckland Transport
Spedding Road	NoR W4	Upgrade of the existing Spedding Road corridor and new east and west extensions to form a 24m wide two-lane arterial with separated active mode facilities on both sides of the corridor.	Auckland Transport
Hobsonville Road (alteration to existing	NoR W5	Alteration of the existing Hobsonville Road designation 1437 to provide for the widening of the	Auckland Transport

designation 1437)		Hobsonville Road corridor between Oriel Avenue and Memorial Park Lane. Upgrade of sections of Hobsonville Road corridor to a 30m wide four-lane cross section with separated active mode facilities on both sides of the corridor Upgrade of sections of Hobsonville Road corridor to a 24m wide two-lane cross section with separated active mode facilities on both sides of the corridor.	

6 Existing Ambient Noise Environment

The criteria in NZS 6806 to assess road-traffic noise are not dependent on the existing noise levels. Measurements of existing levels are therefore not required for the assessment against that standard. Nevertheless, an appreciation of the existing environment is useful to judge the potential noise effects, regardless of compliance with any particular noise criteria. However, due to Covid-19 restrictions impacting typical traffic volumes it has not been possible to carry out noise measurements.

We expect that the rural environment in the Whenuapai region, currently zoned as Future Urban Zone, will typically have low noise levels of 45 dB $L_{Aeq(24h)}$ to 55 dB $L_{Aeq(24h).}$ In areas near the busier sections of Trig Road, Brigham Creek Road and Hobsonville Road existing noise levels could be between 55 dB $L_{Aeq(24h)}$ and 65 dB $L_{Aeq(24h).}$ A noise survey was undertaken at 22 Trig Road in 2019, for a different project as part of the Supporting Growth Alliance. An average noise level of 61 dB $L_{Aeq(24h)}$ was measured over a 10 day period.

The RNZAF Base Whenuapai also influences the noise levels in the Whenuapai area. There are a few receivers within the Project area that fall within the 65Ldn and 55Ldn noise contours.

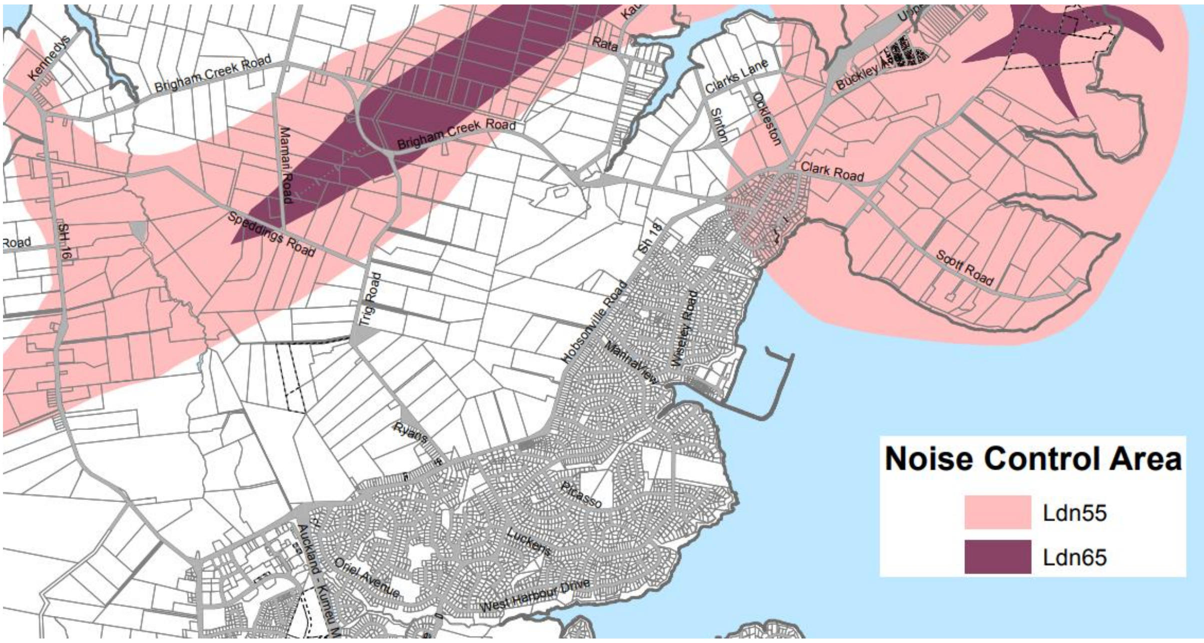


Figure 6-1: RNZAF Base Noise Contours

7 NoR W1: Trig Road North Upgrade

7.1 Project Corridor Features

The Trig Road Upgrade extends from the intersection with Brigham Creek Road to south of the SH18 off-ramp where it ties in with the work completed as part of the North West HIF Package of works. It is proposed to upgrade the Trig Road corridor from its current width of 20m to accommodate a 24m local arterial cross section with separated cycle lanes and footpaths on both sides of the corridor. It includes the upgrade of intersections with Spedding Road West and tie-ins with the SH18 on-ramps. An overview of the proposed design is provided below:

Figure 7-1: Overview of the Trig Road Upgrade

Key features of the proposed new corridor include the following:

- Widening of Trig Road from its current general width of 20m to a 24m wide two-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections with Brigham Creek Road and Spedding Road to accommodate proposed roundabouts, and localised widening around the intersection of Trig Road with Northside Drive to accommodate a signalised intersection.

The Trig Road Upgrade is predominantly a walking and cycling project that will not change traffic flows in the area. Any predicted increase in traffic volumes at the Design Year is associated with urbanisation of the area and would occur regardless of the Project.

7.2 Existing and Likely Future Environment

7.2.1 Planning context

The Trig Road corridor runs through an existing rural environment, with the land either side of the corridor currently zoned FUZ under the AUP:OP. Proposed Plan Change 5 (PPC5) proposes to rezone the eastern side of Trig Road north of SH18 and the western side of Trig Road between Brigham Creek Road and Spedding Road as Business – Light Industry Zone. A heritage overlay is proposed at 92 Trig Road and 4 Spedding Road.

PPC5 does not extend to the west side of the corridor south of Spedding Road, however the Whenuapai Structure Plan identifies this area for business zoning. The Whenuapai Structure Plan identifies a potential Sports Park at the corner of Trig Road and Spedding Road.

The NZDF Air Base (Special Purpose - Airports and Airfields Zone) is located to the north of Trig Road on Brigham Creek Road. The airbase is designated (Designation 4310) for defence purposes by the Minister of Defence.

Table 7-1 below provides a summary of the Trig Road existing and likely future environment.

Table 7-1: Trig Road Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[5]	Likely Future Environment[6]
Undeveloped greenfield areas	Future Urban Zone	High	Urban
New Zealand Defence Force Air Base	Special Purpose - Airports and Airfields Zone	Low	Urban

Please refer to the AEE for further information on the planning context.

7.2.2 Noise Environment

Trig Road is currently located within a predominantly rural area with few PPFs in close proximity to the road. The noise environment is dominated by road traffic noise from vehicles on Trig Road, SH18 and the surrounding network as well as aircraft noise associated with the Whenuapai Air Base.

PPC5 and the Whenuapai Structure Plan indicate that the land surrounding Trig Road, to the north of SH18 is likely to be Industrial or Business Zoned. This zoning would likely result in an increase in ambient noise levels. Where Residential Zones are likely, to the south of SH18, ambient noise levels would likely still increase as the area urbanises.

It is likely the construction of the Trig Road Upgrade will occur ahead of, or in parallel to, the urbanisation of these areas. Therefore, the starting assumption is that corridors will be constructed in a rural greenfield environment and operate in an urban environment with higher ambient noise levels.

[5] Based on AUP:OP zoning/policy direction
[6] Based on AUP:OP zoning/policy direction

7.3 Assessment of Road Traffic Noise Effects and Measures to Avoid, Remedy or Mitigate Actual or Potential Adverse Effects

Predicted road-traffic noise levels at all PPFs for the Existing, Do Nothing and Do Minimum scenarios are shown in Appendix 2. The cells are colour coded according to the NZS 6806 Category: Category A – green, Category B – orange, and Category C – red.

Noise contour maps showing indicative levels across a 200m radius from the alignment are provided in Appendix 3. Specific noise level values should not be taken directly from the contours as they are interpolated from a grid resulting in some localised inaccuracies.

7.3.1 Road Traffic Noise Model Results Analysis

An initial screening assessment has been carried out and the Trig Road Upgrade does not meet the definition of Altered Road in accordance with NZS 6806 and as set out in Section 3.1. The Standard therefore does not apply, and mitigation options do not need to be considered. A summary of the results of the screening assessment are presented in Table 7-2.

Table 7-2 NZS 6806 Assessment Summary – Altered Roads – NoR W1

Category	Criteria	Number of PPFs		
		Existing	Do Nothing	Do Minimum
Cat A	64 dB $L_{Aeq(24h)}$	20	11	17
Cat B	67 dB $L_{Aeq(24h)}$	0	6	3
Cat C	40 dB Internal $L_{Aeq(24h)}$	0	3	0
Total		**20**	**20**	**20**

The range of traffic noise levels predicted for each scenario are as follows:

- Existing - 46 dB $L_{Aeq(24h)}$ to 63 dB $L_{Aeq(24h)}$.
- Do Nothing - 52 dB $L_{Aeq(24h)}$ to 70 dB $L_{Aeq(24h)}$.
- Do Minimum - 49 dB $L_{Aeq(24h)}$ to 66 dB $L_{Aeq(24h)}$.

7.3.2 Assessment of Road Traffic Noise Effects

The effects associated with a change in noise level have been considered in addition to the NZS 6806 screening assessment. The Do Nothing scenario and Do Minimum scenario can be compared to determine the predicted noise level increase or decrease at PPFs. Figure 7-2 shows the predicted change in noise level at PPFs when comparing the Do Nothing and Do Minimum scenarios.

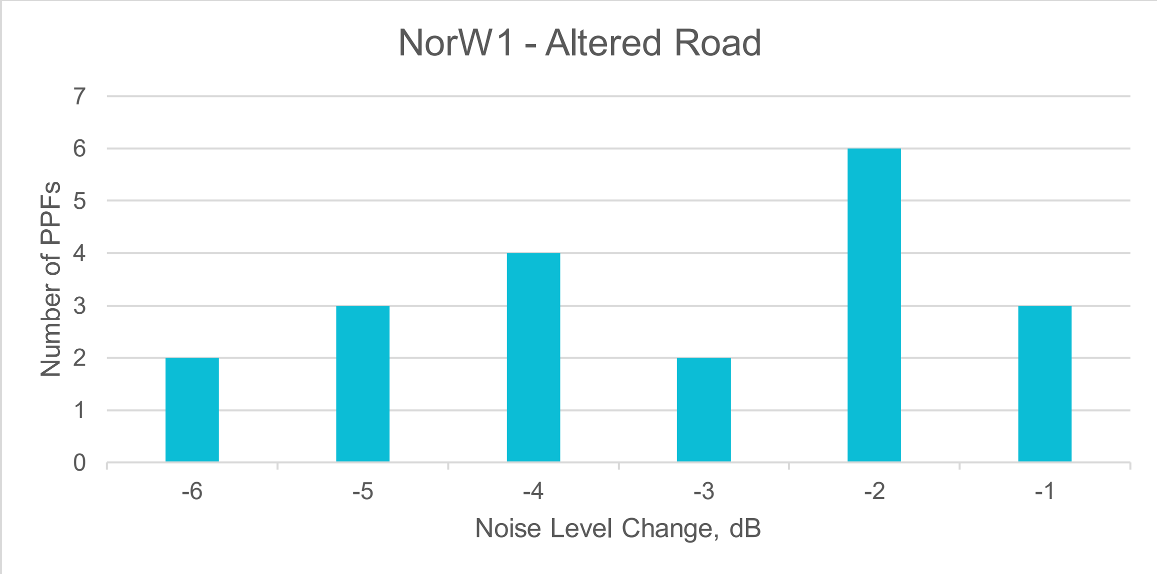


Figure 7-2: Change in Noise Level - Do Nothing Vs Do Minimum – NoR W1

Predictions indicate that noise levels will decrease at all PPFs when comparing the Do Nothing and Do Minimum scenarios. All PPFs are predicted to experience a negligible to moderate reduction in noise levels resulting in positive effects. The reduction in noise levels is due to the redistribution of traffic across the network, resulting in a reduction in traffic volumes along Trig Road.

7.4 Conclusions

Road traffic noise levels have been assessed in accordance with NZS 6806. The Trig Road Upgrade does not meet the definition of an Altered Road in accordance with NZS 6806. The Standard therefore does not apply, and mitigation options do not need to be considered.

A comparison of the predicted road traffic noise levels in the Do Nothing scenario (representative of the design year without the Project) and the Do Minimum scenario (representative of the design year with the Project) indicates that noise levels will be lower at all PPFs, resulting in positive effects. This is due to the redistribution of traffic across the network.

8 NoR W2: Māmari Road Upgrade

8.1 Project Corridor Features

It is proposed to submit a Notice of Requirement (NoR W2) to designate the land required to implement the four-lane Frequent Transit Network (**FTN**) arterial upgrade of Māmari Road.

Māmari Road is an existing semi-rural road (noting that a section of the corridor is a paper road[7]) that extends from the intersection of Brigham Creek Road and Totara Road in the north to the intersection with Spedding Road in the south. The proposed Māmari Road FTN upgrade will extend the existing corridor south to connect with Northside Drive. This will provide a north-south connection between the northern parts of Whenuapai and the proposed employment/industrial zoned land in the south (as indicated on the Whenuapai Structure Plan.

It is proposed to create a new Māmari Road corridor and widen the existing Māmari Road corridor from a 20m wide rural corridor to a 30m wide four-lane urban arterial with separated cycle lanes and footpaths on both sides of the corridor.

[7] An unformed legal road (or 'paper road') is a legally recognised road that is undeveloped or partly formed but provides public access to a particular area or feature. Auckland Transport, 2021.

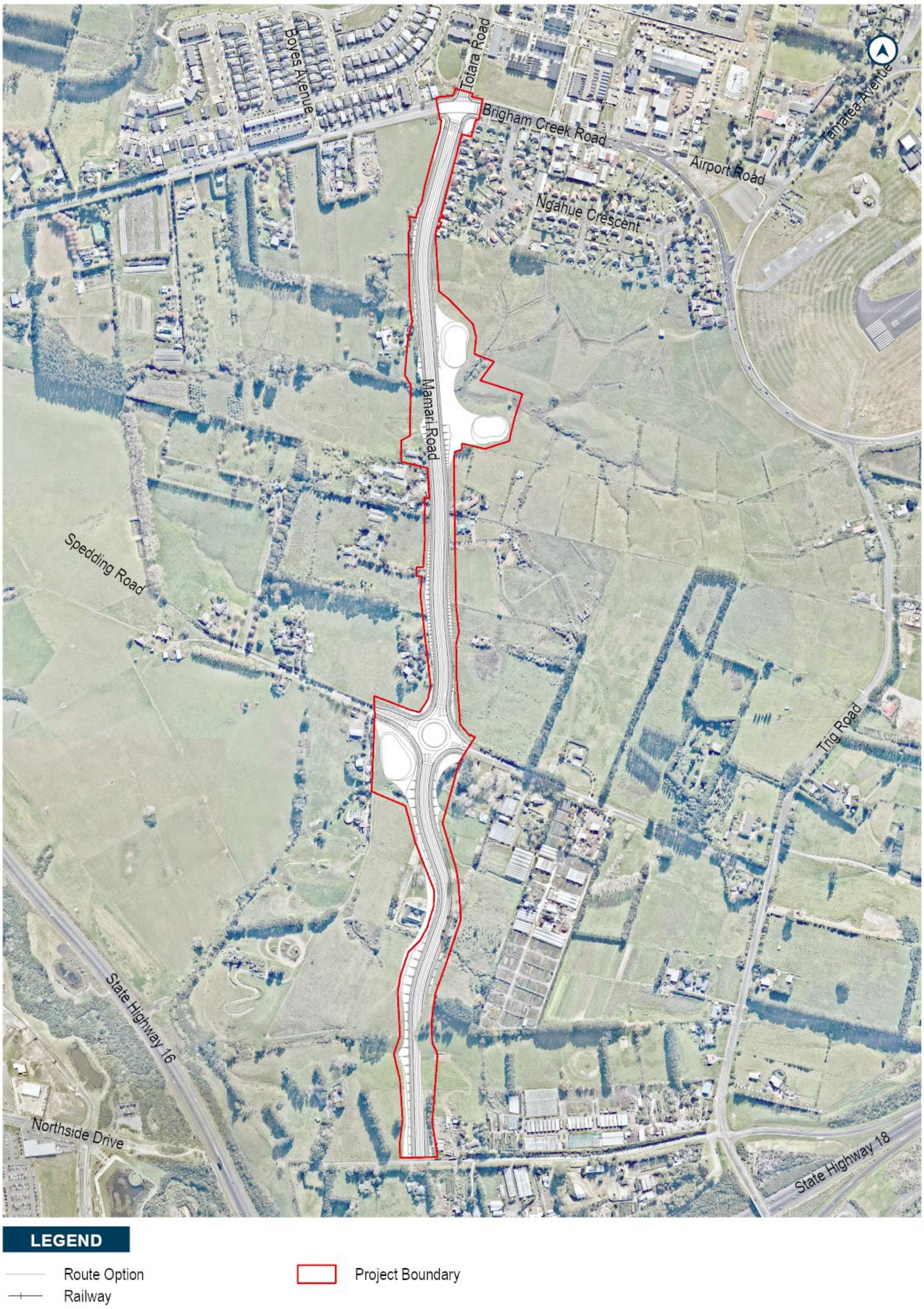


Figure 8-1: Overview of the Māmari Road Upgrade

Key features of the proposed new corridor that will ultimately affect (positive or negative) the noise environment due to altered traffic flow include the following:

- The widening of the existing Māmari Road corridor (north of Spedding Road) and a new section south of Spedding Road to Northside Drive to create a 30m wide four-lane urban arterial with separated cycle lanes and footpaths on both sides of the corridor.
- Likely posted speed of 50km/h.

8.2 Existing and Likely Future Environment

8.2.1 Planning context

The northern section of Māmari Road to Spedding Road is an existing road corridor (although a section of the road is a 'paper road'). The eastern side is predominantly zoned under the AUP:OP as FUZ, with a portion of Residential – Single House Zone. The Single House Zone forms part of the NZDF Air Base designation (Designation 4310, Minister of Defence). The western side is also predominantly FUZ. The Whenuapai Structure Plan indicates that the FUZ land will be re-zoned medium residential to the north (east side of Māmari only) and business to the south.

The southern extension to Māmari Road extends across land which is zoned FUZ and is currently undeveloped and in rural use. The Whenuapai Structure Plan indicates that the FUZ land will be re-zoned for business.

Table 8-1 below provides a summary of the Māmari Road existing and likely future environment.

Table 8-1: Māmari Road Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[8]	Likely Future Environment[9]
Residential	Residential	Low	Urban
Undeveloped greenfield areas	Future Urban	High	Urban
Timatanga Community School	Special Purpose - School Zone	Low	Urban

Please refer to the AEE for further information on the planning context.

8.2.2 Noise Environment

Māmari Road is currently located within a predominantly rural area with few PPFs in close proximity to the road. Timatanga Community School is located at 9 Māmari Road. The noise environment is dominated by road traffic noise from vehicles on Māmari Road as well as aircraft noise associated with the Whenuapai Air Base.

The Whenuapai Structure Plan indicates that the land surrounding Māmari Road, to the east and west is likely to be Business Zoned with a small area of Residential Zone to the west at the northern end. This zoning would likely result in an increase in ambient noise levels as the area urbanises.

[8] Based on AUP:OP zoning/policy direction
[9] Based on AUP:OP zoning/policy direction

It is likely the construction of the Māmari Road Upgrade will occur ahead of, or in parallel to, the urbanisation of these areas. Therefore, the starting assumption is that corridors will be constructed in a rural greenfield environment and operate in an urban environment with higher ambient noise levels.

8.3 Assessment of Road Traffic Noise Effects and Measures to Avoid, Remedy or Mitigate Actual or Potential Adverse Effects

The traffic noise assessment for NoR W2 has been separated into the typology of Altered Road and New Road. The existing section of Māmari Road runs north for roughly 500m from the Spedding Road intersection. Existing traffic volumes on Māmari Road are below 2,000 vehicles per day. There are two new sections that Māmari Road will extend along. The new northern section will continue from the northern end towards Brigham Creek Road and the new southern section will run south from the Speeding intersection. Each PPF has been assessed against the relevant noise criteria of either a New or Altered Road, depending on the classification as described in Section 3.1.2.

Traffic volumes on the northern most part of Māmari Road (leading to the Brigham Road intersection) for the Existing and Do Nothing scenarios are very low. Predicted noise levels at the PPFs adjacent to this northern section of Māmari Road (2-24 Māmari Road and those on Tama Quadrant and Ngahue Cresent) are from traffic on the southern section of Māmari Road and Brigham Creek Road.

Based on information provided by the Project team, the following residential buildings will be removed to make room for the Project alignment and have not been considered in the assessment:

- 2 Māmari Road.
- 7 Māmari Road.
- 9 Spedding Road.

One PPF, at 11A Spedding Road, is located within 200m of the New Road and 100m of the existing road. It has been assessed under the Altered Road criteria as set out in Section 3.1.2.

8.3.1 Altered Roads

8.3.1.1 Road Traffic Model Results Analysis

The Māmari Road Upgrade meets the definition of an Altered Road in accordance with NZS 6806. A summary of the results of the NZS 6806 assessment is shown in Table 8-2.

Table 8-2 NZS 6806 Assessment and Summary – Altered Roads – NoR W2

Category		Number of PPFs				
	Criteria	Existing	Do Nothing	Do Minimum	Mitigation 1	Mitigation 2
Cat A	64 dB $L_{Aeq(24h)}$	21	20	13	17	19
Cat B	67 dB $L_{Aeq(24h)}$	2	3	2	6	4
Cat C	40 dB Internal $L_{Aeq(24h)}$	0	0	8	0	0
Total		**23**	**23**	**23**	**23**	**23**

Existing scenario predictions show the noise level within the Project area is between 41 – 67 dB $L_{Aeq(24h)}$ with one PPF in Category B and the remainder in Category A.

Under the Do Nothing scenario, predictions show a traffic noise level range between 45 – 66 dB $L_{Aeq(24h)}$, still with one PPF in Category B and the remainder in Category A.

Under the Do Minimum scenario, predictions show a higher traffic noise level range between 51 – 71 dB $L_{Aeq(24h)}$, with two PPFs in Category B, eight in Category C and the remainder in Category A.

For the Do Minimum scenario, the two Category B PPFs are 30 Māmari Road and 51 Brigham Creek Road. The PPFs in Category C are 9 Māmari Road (Timatanga Community School), 8 Māmari Road, 6 Māmari Road, 4 Māmari Road, 42D, 49 and 53 Brigham Creek Road and 2-10 Ripeka Lane.

Two mitigation options have been considered to reduce noise levels at PPFs. The options comprise of low noise road surface and localised barriers.

Mitigation option 1 is applying AC-14 to the Altered Roads, resulting in all but six PPFs falling within Category A. The Category B PPFs are:

- 2-10 Ripeka Lane
- 4 Māmari Road
- 42D Brigham Creek Rd
- 6 Māmari Road
- 8 Māmari Road
- 9 Māmari Road (Timatanga Community School)

Mitigation option 2 involves applying AC-14 to the Altered Roads, as per the first mitigation option, and installing two metre high noise barriers at the five Category B PPFs. Modelling indicates that two metre high noise barriers would be effective at 6 Māmari Road reducing noise levels to within Category A.

Two metre high noise barriers would not provide the reduction required by the Standard at 2-10 Ripeka Lane and 42D Brigham Creek Rd, as these are two-storey dwellings. However, with the low noise road surface installed the predicted noise level at 2-10 Ripeka Lane and 42D Brigham Creek Rd is 66 dB $L_{Aeq(24h)}$ which is the same as under the Do Nothing scenario and 1 dB lower than the existing noise level. The two metre high noise barriers would also not provide the reduction required by the Standard at 8 Māmari Road and 4 Māmari Road due to the gaps required for driveways which significantly reduce the performance of the barrier. The predicted noise levels at 8 Māmari Road and 4 Māmari Road are 65 and 67 dB $L_{Aeq(24h)}$, respectively with the low noise road surface installed.

A two metre high noise barrier has been considered at Timatanga Community School. The noise barrier would achieve the required 5 dB reduction at the school if it installed across an existing pedestrian accessway from Māmari Road into the school. An alternative access into the school would be required or a well sealed gate, with the same construction as the barrier, could be installed. The feasibility of a noise barrier at Timatanga Community School should be investigated prior to construction, considering other factors such as access and safety.

The second mitigation option, but with barriers only installed at Timatanga Community School and 6 Māmari Road, is the recommended mitigation option for the Altered Roads within NoR W2.

8.3.1.2 Assessment of Road Traffic Noise Effects

The effects associated with a change in noise level have been considered in addition to the NZS 6806 assessment. The Do Nothing scenario and Mitigation Option 2 scenario can be compared to determine the predicted noise level increase or decrease at PPFs as a result of the Project. Figure 8-2 shows the predicted change in noise level at PPFs when comparing the Do Nothing and Mitigation Option 2 scenarios.

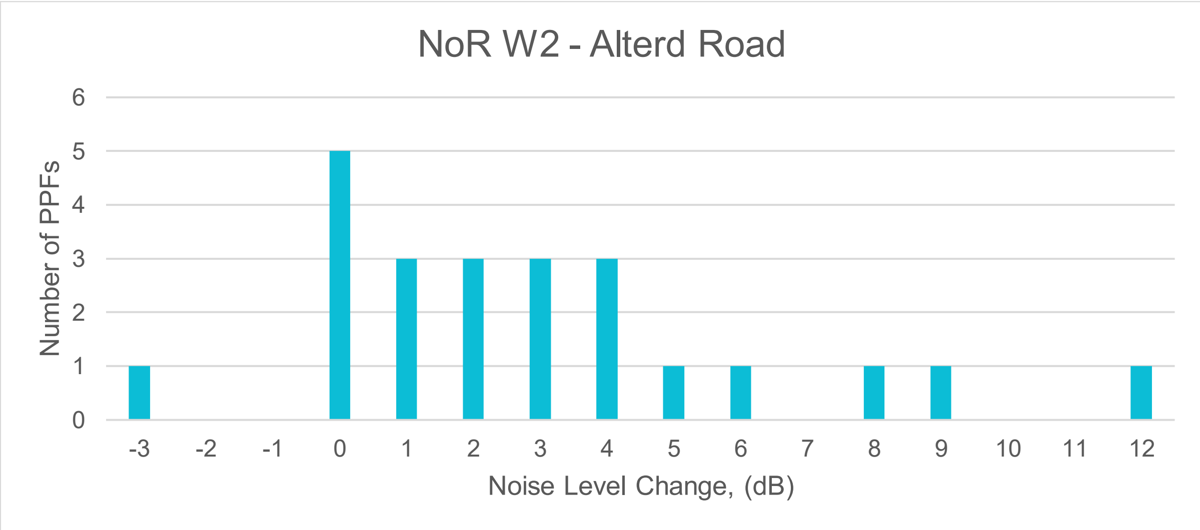


Figure 8-2: Change in Noise Level - Do Nothing Vs Mitigation Option 2 – NoR W2

Predictions indicate that noise levels will increase at 17 PPFs due to the Project when comparing the Do Nothing and Mitigation Option 2 scenarios, with noise levels remaining unchanged at four PPFs and decreasing at one PPF.

The PPFs at 8 Māmari Road, 6 Māmari Road, 4 Māmari Road and 11A Spedding Road are predicted to experience moderate to significant increases in noise level. At 8 Māmari Road, 6 Māmari Road and 4 Māmari Road the predicted 6 to 12 dB increase is due to higher traffic volumes and adjacent buildings being removed that were partially shielding the dwellings from noise from Brigham Creek Road. At 11A Spedding Road the predicted 8 dB increase in noise level is due to the cul-de-sac becoming a through-road, increasing traffic flows passing the PPF. We note that 11A Spedding Road is still predicted to fall within Category A for the Mitigated scenario.

5A Spedding Road is predicted to experience a noise increase of 5 dB, however it is still predicted to fall within Category A for the Mitigated scenario.

As stated previously, the feasibility of a two metre high noise barrier should be investigated at Timatanga Community School. If a noise barrier is constructed a decrease in noise level of 3 dB is predicted. If the noise barrier is not practicable an increase in noise level of 3 dB is predicted. A 3 dB change in noise level would be just perceptible. The school is predicted to experience either slight positive or slight adverse noise effects depending on whether the 2m high barriers are found to be practicable or not.

The majority of PPFs are predicted to experience an increase in noise level of 1 to 4 dB which may just be perceptible.

Ambient noise levels will likely increase as the area urbanises and therefore the change in noise level due to the Project may not be as noticeable at the time.

Some PPFs may not exist anymore at the time of road construction particularly given the proposed zone change in the area allowing for urban development. Therefore, the predicted effects may not be experienced by current residents.

The majority of PPFs assessed for NoR W2 are located within the Aircraft Noise Overlay of Whenuapai Airbase. The AUP:OP requires that all new activities sensitive to aircraft noise or alterations to existing buildings accommodating activities sensitive to aircraft noise that are within the Aircraft Noise Overlay must be designed to achieve an internal noise limit of 40 dB L_{dn}. It is not clear which PPFs in the vicinity of the Māmari Road upgrade have been designed to attenuate aircraft noise, however, where this has occurred road traffic noise will also be reduced.

8.3.2 New Roads

8.3.2.1 Road Traffic Noise Model Results Analysis

In accordance with NZS 6806 there is no Do Nothing scenario for the New Road, so the Existing and Do Minimum scenarios are compared.

A summary of the results of the NZS 6806 assessment are presented in Table 8-3.

Table 8-3 NZS 6806 Assessment and Summary – New Roads – NoR W2

Category	Criteria	Number of PPFs			
		Existing	Do Minimum	Mitigation 1	Mitigation 2
Cat A	57 dB $L_{Aeq(24h)}$	26	15	17	18
Cat B	64 dB $L_{Aeq(24h)}$	0	3	9	8
Cat C	40 dB Internal $L_{Aeq(24h)}$	0	8	0	0
Total		**26**	**26**	**26**	**26**

Existing scenario predictions show the noise level within the Project area is between 36 dB $L_{Aeq(24h)}$ and 50 dB $L_{Aeq(24h)}$.

For the Do Minimum scenario there is an increase in noise levels with a predicted range of 47 dB $L_{Aeq(24h)}$ to 67 dB $L_{Aeq(24h)}$. 15 PPFs are in Category A. Three PPFs at 70 Trig Road, 5 Māmari Road and 7 Spedding Road are in Category B, and the following eight PPFs are in Category C:

- 10 Māmari Road
- 12 Māmari Road
- 14 Māmari Road
- 16 Māmari Road
- 18 Māmari Road
- 20 Māmari Road
- 22 Māmari Road
- 24 Māmari Road

Two mitigation options have been considered to reduce noise levels at PPFs. The options comprise of low noise road surface and localised barriers.

Mitigation option 1 involves applying AC-14 to the New Road, resulting in nine PPFs in Category B and the remaining PPFs in Category A. The Category B PPFs are:

- 10 Māmari Road
- 12 Māmari Road
- 14 Māmari Road
- 16 Māmari Road
- 18 Māmari Road
- 20 Māmari Road
- 22 Māmari Road
- 24 Māmari Road
- 7 Spedding Road

Mitigation option 2 involves applying AC-14 to the Altered Roads, as per the first mitigation option, and installing two metre high noise barriers at the five Category B PPFs. Modelling indicates that two metre high noise barriers would be effective at 7 Spedding Road reducing noise levels to within Category A.

The two metre high noise barriers would not provide the reduction required by the Standard at the remaining Category B PPFs due to the gaps required for driveways which significantly reduce the performance of the barrier. Noise levels at the eight remaining Category B PPFs with the low noise road surface applied are between 61 dB $L_{Aeq(24h)}$ and 63 dB $L_{Aeq(24h)}$.

The second mitigation option is recommended for the New Roads within NoR W2 as it achieves the Cateory A criteria at the highest number of PPFs., i.e. low-noise surface AC-14 installed along the entire project alignment, with a localised noise barrier at 7 Spedding Road.

8.3.2.2 Assessment of Road Traffic Noise Effects

The effects associated with a change in noise level have been considered in addition to the NZS 6806 assessment. The Existing scenario and the Mitigation Option 2 scenario can be compared to determine the predicted noise level increase or decrease at PPFs because of the Project. Figure 8-3 shows the predicted change in noise level at PPFs when comparing the Existing and Mitigation Option 2 scenarios.

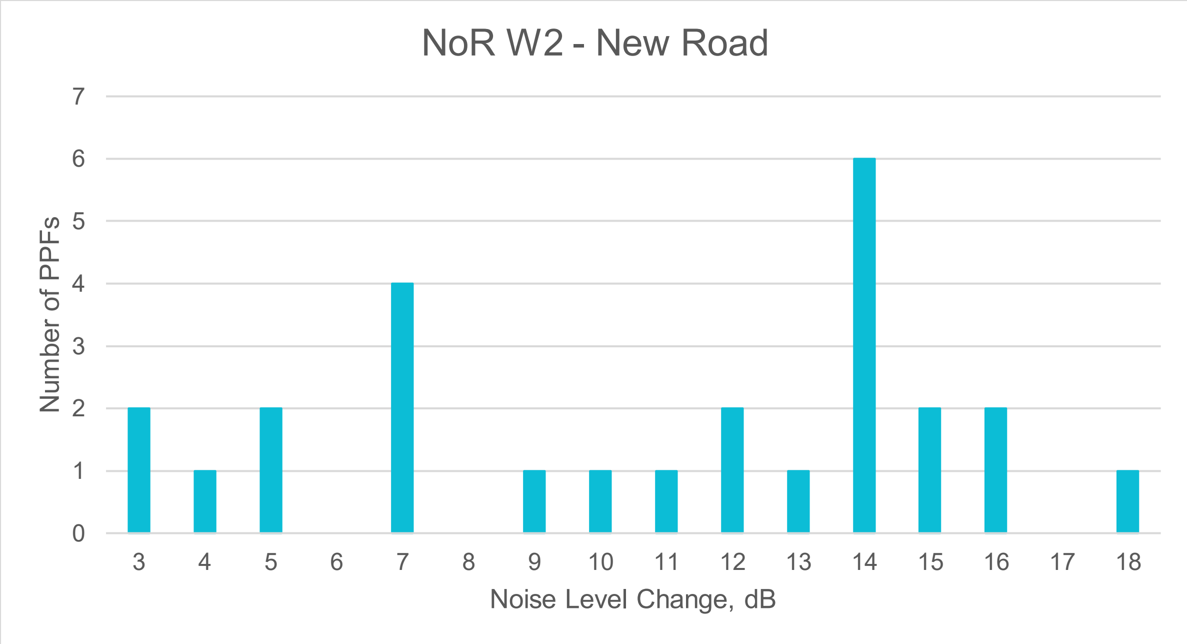


Figure 8-3: Change in Noise Level - Existing Vs Project with Mitigation – NoR W2

Predictions indicate that noise levels will increase at all PPFs assessed against the New Road criteria when comparing the Existing and Mitigation Option 2 scenarios.

Nine PPFs are predicted to experience a 3 to 7 dB increase in noise level resulting in slight to moderate adverse noise effects.

17 PPFs are predicted to experience a 9 to 18 dB increase in noise level due to the Project. 10 dB is perceived as a doubling of loudness, and the changes predicted here will result in a fundamental change in environment significantly more than doubling for some PPFs. This increase in noise level will be significant to the residents if they still reside in the area at the time of the road opening.

Ambient noise levels will likely increase as the area urbanises and therefore the change in noise level due to the Project may not be as noticeable at the time.

Some PPFs may not exist anymore at the time of road construction particularly given the proposed zone change in the area allowing for urban development. Therefore, the predicted effects may not be experienced by current residents.

The majority of PPFs assessed for NoR W2 are located within the Aircraft Noise Overlay of Whenuapai Airbase. The AUP:OP requires that all new activities sensitive to aircraft noise or alterations to existing buildings accommodating activities sensitive to aircraft noise that are within the Aircraft Noise Overlay must be designed to achieve an internal noise limit of 40 dB L_{dn}. It is not clear which PPFs in the vicinity of the Māmari Road upgrade have been designed to attenuate aircraft noise, however, where this has occurred road traffic noise will also be reduced.

8.4 Conclusions

An assessment of traffic noise has been carried out for New and Altered Roads for the Māmari Road upgrade based on NZS 6806 and the predicted change in noise levels.

For the Altered Road section, noise levels are predicted to increase at the majority of PPFs even after implementation of mitigation. Three PPFs are in Category B with the remaining in Category A after implementation of the recommended mitigation option of AC-14, or equivalent low noise road surface, and barriers installed at Timatanga Community School and 6 Māmari Road. Barriers have been considered for the three PPFs in Category B but they would not provide sufficient attenuation as the building was two storey or large gaps would be required in the barrier for driveways.

A comparison of the predicted road traffic noise levels in the Do Nothing scenario (representative of the design year without the Project) and the Mitigation scenario indicates that the majority of Altered Road PPFs are predicted to experience a slight to moderate increase in noise level of 1 to 4 dB which may just be perceptible. The PPFs at 8 Māmari Road, 4 Māmari Road and 11A Spedding Road are predicted to experience moderate to significant increases in noise level of 12 dB, 9 dB and 8 dB respectively. The PPF at 11A Spedding Road is still predicted to fall within Category A for the Mitigated scenario. 5A Spedding Road is predicted to experience a noise increase of 5 dB, however it is still predicted to fall within Category A for the Mitigated scenario.

For New Roads, 18 PPFs are in Category A and 8 are in Category B after implementation of the recommended mitigation option of AC-14 or equivalent low noise road surface and a localised noise barrier at 7 Spedding Road.

A comparison of the predicted road traffic noise levels in the Existing scenario and the Mitigated scenario indicates nine PPFs are predicted to experience a 3 to 7 dB increase in noise level resulting in slight to moderate adverse noise effects. 17 PPFs are predicted to experience a 9 to 18 dB increase in noise level due to the Project. Significant increases in noise level are predicted when comparing existing traffic noise levels to those with the Project, even after implementation of the recommended mitigation option.

Ambient noise levels will likely increase as the area urbanises and therefore any change in noise level due to the Project may not be as noticeable at the time.

The majority of PPFs assessed for NoR W2 are located within the Aircraft Noise Overlay of Whenuapai Airbase. The AUP:OP requires that all new activities sensitive to aircraft noise or alterations to existing buildings accommodating activities sensitive to aircraft noise that are within the Aircraft Noise Overlay must be designed to achieve an internal noise limit of 40 dB L_{dn}. It is not clear which PPFs in the vicinity of the Māmari Road upgrade have been designed to attenuate aircraft noise, however, where this has occurred road traffic noise will also be reduced.

9 NoR W3: Brigham Creek Road Upgrade

9.1 Project Corridor Features

It is proposed to submit a Notice of Requirement (NoR W3) to designate the land required to implement the upgrade of Brigham Creek Road to a four-lane urban arterial with separated walking and cycling lanes and footpaths on both sides

Brigham Creek Road is an existing arterial road that extends from the intersection with the SH16 in the west to the intersection with Hobsonville Road to the east. The proposed upgrade extends from the eastern side of the existing Totara Creek bridge in the west, to Kauri Road near the existing SH18 Brigham Creek Interchange in the east. This proposed upgrade runs through an existing rural environment on each end, with the middle section being a mix of town centre, industrial and residential environments. An overview of the proposed design is provided below.

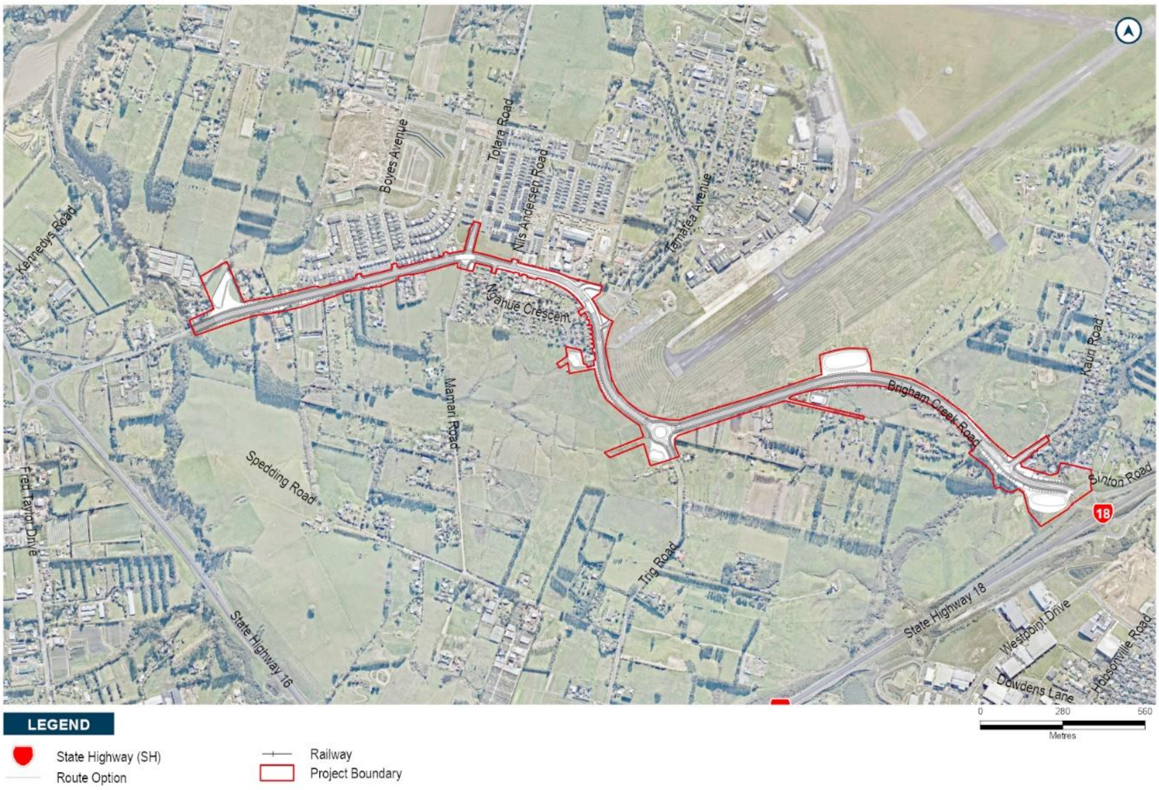


Figure 9-1: Overview of the Brigham Creek Road Upgrade

Key features of the proposed new corridor include the following:

- Widening of Brigham Creek Road from its existing two-lane arterial to a 30m wide four-lane arterial cross-section with walking and cycling facilities on both sides.
- Upgrades to intersections and tie-ins with Totara Road/Māmari Road, Trig Road and Kauri Road. All intersections along Brigham Creek Road are proposed to be signalised, with exception to the intersection of Brigham Creek Road and Trig Road which is proposed as a roundabout intersection.
- Likely posted speed of 50km/h.

9.2 Existing and Likely Future Environment

9.2.1 Planning context

The land adjacent to Brigham Creek Road is zoned under the AUP:OP as FUZ, except within the existing Whenuapai Centre (which is zoned under the AUP:OP for a range of residential and business zones) and the Whenuapai NZDF airbase. The airbase is designated (Designation 4310) for defence purposes by the Minister of Defence. The designation also includes the Residential – Single House Zone within the Whenuapai Centre.

PPC5 proposes to rezone the eastern portion of Brigham Creek Road on the south of the corridor to Business – Light Industrial zoning. The Whenuapai Structure Plan identifies medium density residential and business land uses to the south of Brigham Creek Road, with medium density residential land uses identified to the north.

Table 9-1 below provides a summary of the Brigham Creek Road existing and likely future environment.

Table 9-1: Brigham Creek Road Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[10]	Likely Future Environment[11]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (Local centre)	Low	Business (Local centre)
Residential	Residential	Low	Residential
Open Space	Open Space –Informal Recreation Zone	Low	Open Space
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban
New Zealand Defence Force Air Base	Special Purpose - Airports and Airfields Zone	Low	Special Purpose – Airports and Airfields Zone

Please refer to the AEE for further information on the planning context.

9.2.2 Noise Environment

Brigham Creek Road runs through an existing rural environment at each end, with the middle section being a mix of town centre, industrial and suburban environments. The noise environment is dominated by road traffic noise from vehicles on Brigham Creek Road as well as aircraft noise associated with the Whenuapai Air Base.

[10] Based on AUP:OP zoning/policy direction
[11] Based on AUP:OP zoning/policy direction

PPC5 and the Whenuapai Structure Plan indicate that Brigham Creek Road is likely to be surrounded by a mix of uses in the future with a Light Industrial Zone, Business Zones and Residential Zones proposed. This zoning would likely result in an increase in ambient noise levels as the area urbanises.

9.3 Assessment of Road Traffic Noise Effects and Measures to Avoid, Remedy or Mitigate Actual or Potential Adverse Effects

Predicted road-traffic noise levels at all PPFs for the Existing, Do Nothing and Do Minimum are shown in Appendix 2.

9.3.1 Road Traffic Noise Model Results Analysis

The Brigham Creek Road Upgrade meets the definition of an Altered Road in accordance with NZS 6806.

A summary of the results of the assessment are presented in Table 9-2.

Table 9-2 NZS 6806 Assessment and Summary – Altered Roads – NoR W3

Category	Criteria	Number of PPFs			
		Existing	Do Nothing	Do Minimum	Mitigation
Cat A	64 dB $L_{Aeq(24h)}$	181	177	180	198
Cat B	67 dB $L_{Aeq(24h)}$	9	7	10	0
Cat C	40 dB Internal $L_{Aeq(24h)}$	8	14	8	0
Total		**198**	**198**	**198**	**198**

The predicted ranges of traffic noise levels for each scenario are as follows:

- Existing - 38 dB $L_{Aeq(24h)}$ to 69 dB $L_{Aeq(24h)}$
- Do Nothing - 41 dB $L_{Aeq(24h)}$ to 73 dB $L_{Aeq(24h)}$.
- Do Minimum - 42 dB $L_{Aeq(24h)}$ to 71 dB $L_{Aeq(24h)}$.

For the Do Minimum scenario, 180 PPFs are in Category A, ten PPFs are in Category B and eight in Category C.

A mitigation option of installing AC-14 along the Altered Roads has been considered which would reinstate the current road surface on the existing Brigham Creek Road. This option results in all PPFs in Category A. This is the recommended mitigation option for the Altered Roads within NoR W3.

9.3.2 Assessment of Road Traffic Noise Effects

The effects associated with a change in noise level have been considered in addition to the NZS 6806 assessment. The Do Nothing scenario and Mitigation scenario can be compared to determine the predicted noise level increase or decrease at PPFs as a result of the Project. Figure 9-2 shows the predicted change in noise level at PPFs when comparing the Do Nothing and Mitigation scenarios.

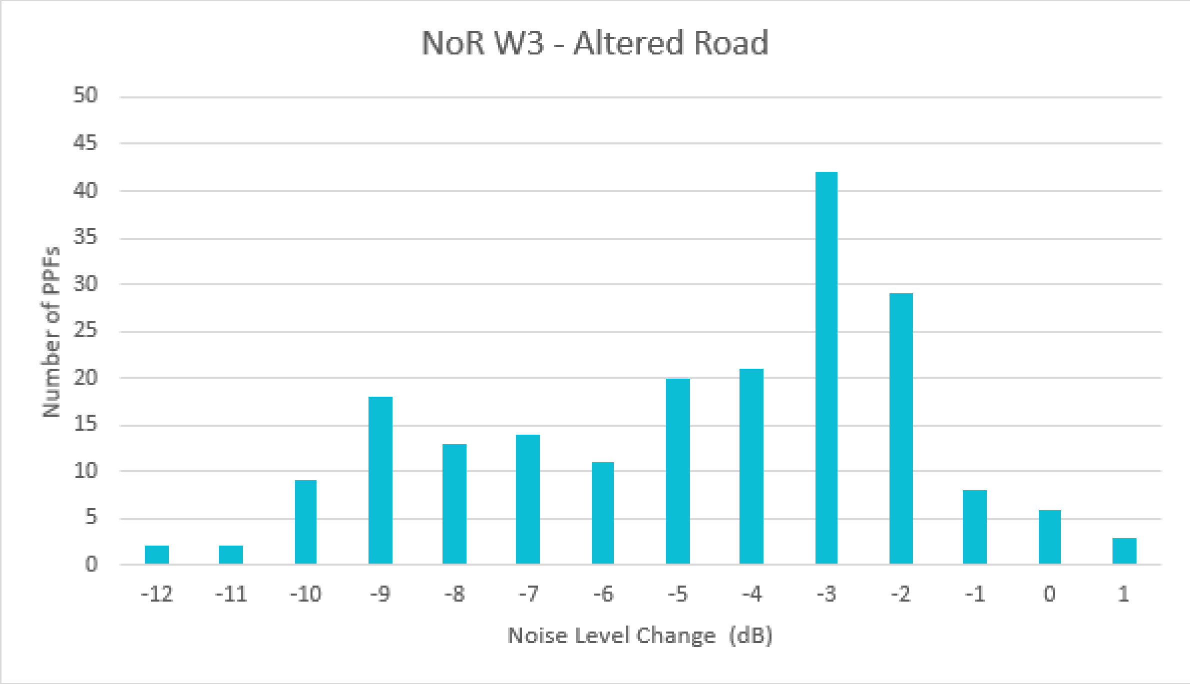


Figure 9-2: Change in Noise Level - Do Nothing Vs Mitigation scenario – NoR W3

Mitigated noise levels with the Project are predicted to be lower than the noise levels in the Design Year without the Project for all but nine PPFs resulting in positive noise effects. This is due to a reduction in traffic volumes along Brigham Creek Road upon implementation of all the Projects in the North West package and a planned decrease in speed limit. Of the nine PPFs that aren't predicted to receive a reduction in noise level, six are predicted to experience no change and the remaining three are predicted to experience a 1 dB increase which is insignificant.

46 PPFs are predicted to experience an insignificant change in noise level of 1 to 2 dB. 63 PPFs are predicted to experience a reduction in noise level of 3-4 dB resulting in slight positive effects. 58 PPFs are predicted to experience a 5-8 dB reduction in noise level resulting in moderate positive effects. 31 PPFs are predicted to experience a 9-12 dB reduction in noise, resulting in significant positive effects.

9.4 Conclusions

An assessment of traffic noise has been carried out for Altered Roads for the Brigham Creek Road Upgrade based on NZS 6806 and the predicted change in noise levels.

The recommended mitigation for the Altered Roads within NoR W3 is the installation of AC-14 or an equivalent low noise road surface. After implementation of the recommended mitigation option all PPFs are in Category A and noise levels are predicted to decrease or remain unchanged at the vast majority of PPFs resulting in positive noise effects.

10 NoR W4: Spedding Road

10.1 Project Corridor Features

It is proposed to submit a Notice of Requirement (NoR W4) to designate the land required to implement the extension of Spedding Road (West and East). This extends from a new intersection with Fred Taylor Drive, over SH16 to connect to the existing Spedding Road and Trig Road, and a greenfield portion from Trig Road over SH18 to tie into Hobsonville Road. This is comprised of the following two corridors:

- Spedding Road West: the upgrade of the existing Spedding Road and new extension of Spedding Road to a two-lane arterial with separated active modes.
- Spedding Road East: A new extension of Spedding Road to a two-lane arterial with separated active modes.

This new east-west connection will support active mode and public transport connectivity between residential land use in Redhills, employment land use in Whenuapai and the proposed CC2W rapid transit station (a non-SGA project). An overview of the proposed design is provided below.

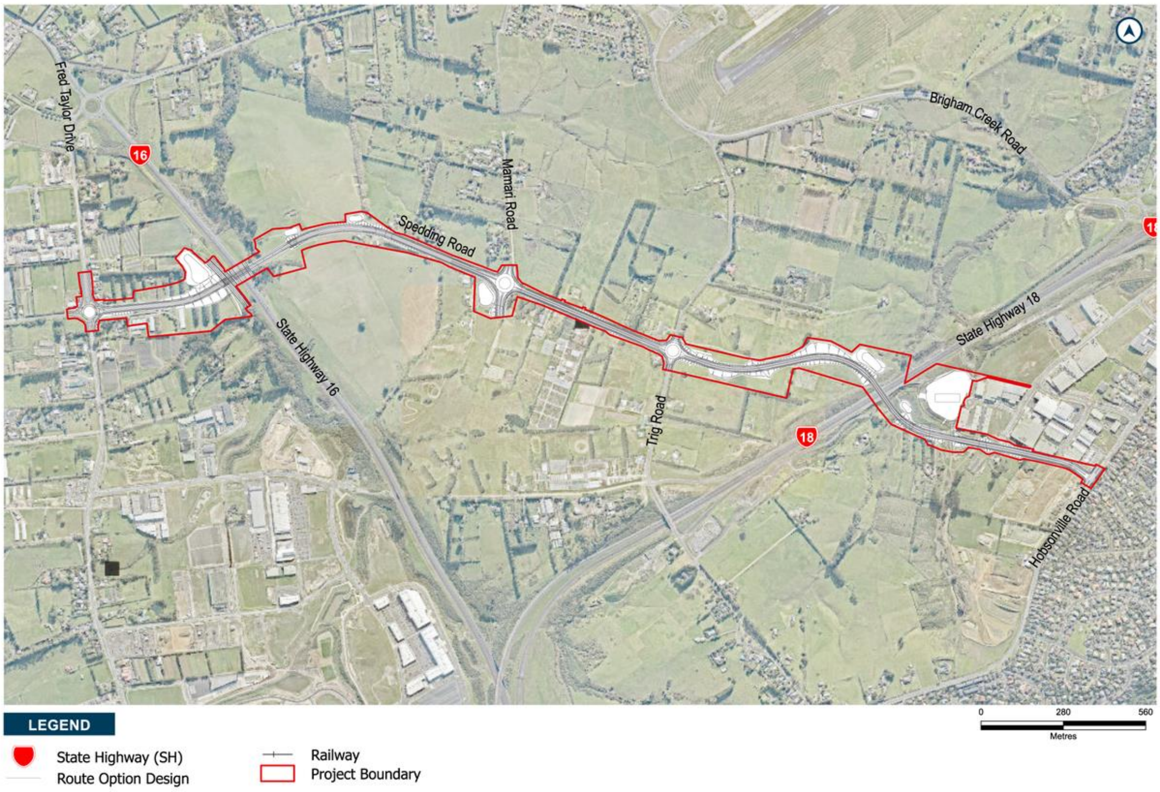


Figure 10-1: Overview of the Extension of Spedding Road

Key features of the proposed new corridor include the following:

- The upgrade of the existing 14m width corridor and formation of a new corridor to a 24m wide two-lane arterial cross section with separated cycle lanes and footpaths on both sides.

- The upgrade of the intersections of Spedding Road with Trig Road and Māmari Road to roundabouts.
- Likely posted speed of 50km/h.

10.2 Existing and Likely Future Environment

10.2.1 Planning context

The land on either side of Spedding Road is zoned under the AUP:OP as FUZ, with the exception being the Business – Light Industry Zone within the Hobsonville Corridor Precinct.

On the eastern end of the corridor PPC5 proposes to rezone the surrounding FUZ land to Business – Light Industry Zone in the north and Residential - Mixed Housing Urban Zone and Open Space – Informal Recreation zone in the south. The remainder of the land to the south of falls within the Hobsonville Corridor Precinct.

PPC5 proposes a heritage overlay 4 Spedding Road and 92 Trig Road, which has legal effect under section 86B (3) (d) of the RMA. The overlay relates to four concrete gun emplacements and command post that made up the Whenuapai Aerodrome Heavy Anti-Aircraft Battery and are buried underground.

The Whenuapai Structure Plan identifies the land surrounding the existing central section and proposed western end of the corridor for business.

The western section of the proposed corridor extends across SH16 and the eastern section across SH18, both SH16 and SH18 are designated by Waka Kotahi for State Highway purposes (Designation 6741).

Table 10-1 below provides a summary of the Spedding Road existing and likely future environment.

Table 10-1: Spedding Road Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[12]	Likely Future Environment[13]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
Residential	Residential	Low	Residential
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban

Please refer to the AEE for further information on the planning context.

10.2.2 Noise Environment

Spedding Road is currently located within a mostly rural area with few dwellings in close proximity to the road. It is located approximately 400 metres east of SH16 and 400m west of SH18.

[12] Based on AUP:OP zoning/policy direction
[13] Based on AUP:OP zoning/policy direction

PPC5, the Whenuapai Structure Plan and the I603 Hobsonville Corridor Precinct indicate that the land surrounding Spedding Road is likely to contain mostly industrial or business uses in the future with pockets of residential. Ambient noise levels are expected to increase as the area urbanises.

10.3 Assessment of Road Traffic Noise Effects and Measures to Avoid, Remedy or Mitigate Actual or Potential Adverse Effects

The traffic noise assessment for NoR W4 has been separated into the typology of Altered Road and New Road. Each PPF was assessed against the relevant noise criteria of either a New or Altered Road, depending on the classification as described in Section 3.1.1.

Based on information provided by the Project team, the following residential buildings will be removed to make room for the Project alignment and have not been considered in the assessment:

- 119 Fred Taylor Drive.
- 123 Fred Taylor Drive.
- 127 Fred Taylor Drive.
- 129 Fred Taylor Drive.
- 13 Spedding Road.
- 15 Spedding Road.
- 98A Hobsonville Road.

As identified in Section 3.1.2, where New Roads intersect the existing roads, all PPFs within 200m of the existing road have been assessed under the Altered Road criteria. These PPFs are:

- 1 Hailes Road
- 1/121 Fred Taylor Drive.
- 1/28 Sailfish Drive.
- 2/28 Sailfish Drive.
- 2/22 Sailfish Drive.
- 1 Marina View Drive.
- 1A Marina View Drive.
- 2 Marina View Drive.
- 2A Marina View Drive.
- 3 Marina View Drive.
- 4A Marina View Drive.
- 5 Marina View Drive.
- 6A Marina View Drive.
- 6B Marina View Drive.
- 7 Marina View Drive.
- 13 Soling Place.
- 15 Soling Place.
- 17 Soling Place.
- 26 Sailfish Drive.
- 30 Sailfish Drive.
- 102 Hobsonville Road.

- 131 Fred Taylor Drive.
- 133 Fred Taylor Drive.
- 135 Fred Taylor Drive.
- 137 Fred Taylor Drive.
- 139 Fred Taylor Drive.
- 141 Fred Taylor Drive.
- 143A Fred Taylor Drive.
- 143B Fred Taylor Drive.
- 166 Fred Taylor Drive.
- 166A Fred Taylor Drive.
- 168 Fred Taylor Drive.
- 223 Hobsonville Road.
- 225 Hobsonville Road.
- 227 Hobsonville Road.
- 229 Hobsonville Road.
- 231 Hobsonville Road.
- 231A Hobsonville Road.
- 233 Hobsonville Road

10.3.1 Altered Roads

10.3.1.1 Road Traffic Noise Model Results Analysis

The Spedding Road Upgrade meets the definition of an Altered Road in accordance with NZS 6806. A summary of the results of the assessment is presented Table 10-2.

Table 10-2 NZS 6806 Assessment and Summary – Altered Roads – NoR W4

Category	Criteria	Number of PPFs			
		Existing	Do Nothing	Do Minimum	Mitigation
Cat A	64 dB $L_{Aeq(24h)}$	55	54	47	55
Cat B	67 dB $L_{Aeq(24h)}$	0	1	8	0
Cat C	40 dB Internal $L_{Aeq(24h)}$	0	0	0	0
Total		**55**	**55**	**55**	**55**

The predicted traffic noise levels for each scenario are as follows:

- Existing - 35 dB $L_{Aeq(24h)}$ to 63 dB $L_{Aeq(24h)}$
- Do Nothing - 42 dB $L_{Aeq(24h)}$ to 65 dB $L_{Aeq(24h)}$.
- Do Minimum - 47 dB $L_{Aeq(24h)}$ to 66 dB $L_{Aeq(24h)}$.

For the Do Minimum scenario, there are 47 PPFs in Category A and eight in Category B. There are no PPFs in Category C.

A mitigation option of installing AC-14 along the whole road alignment has been considered. This option is predicted to result in all PPFs in Category A. This is the recommended mitigation option for the Altered Roads within NoR W4.

10.3.1.2 Assessment of Effects

The effects associated with a change in noise level have been considered as part of the NZS 6806 assessment. The Do Nothing scenario and Mitigation scenario can be compared to determine the predicted noise level increase or decrease at PPFs as a result of the Project. Figure 10-2 shows the predicted change in noise level at PPFs when comparing the Do Nothing and Project with Mitigation scenarios.

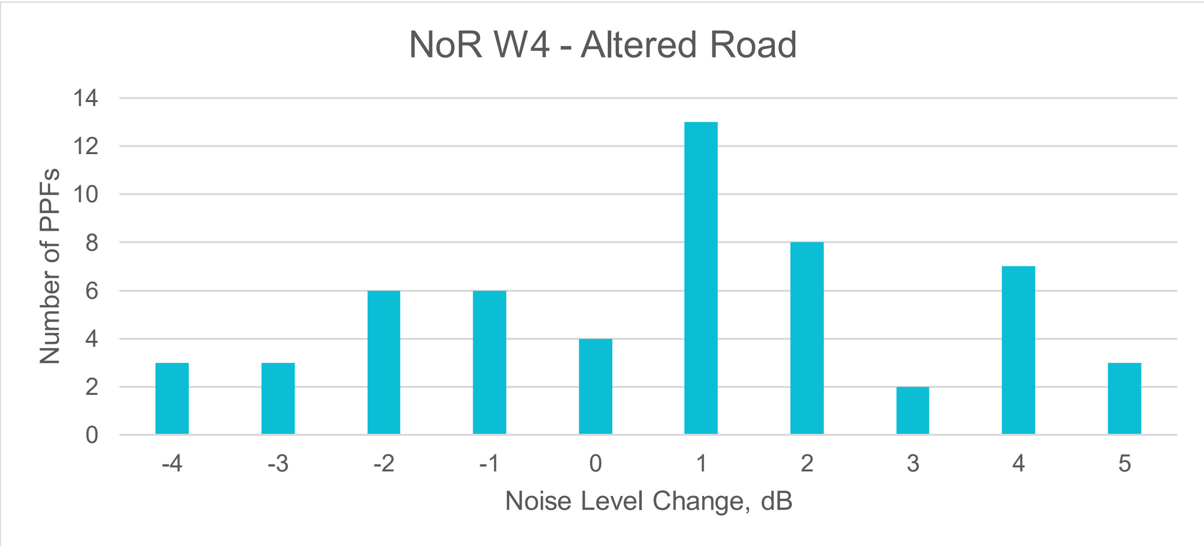


Figure 10-2: Change in Noise Level - Do Nothing Vs Project with Mitigation – NoR W4

Predictions indicate that noise levels will increase at all PPFs when comparing the Do Nothing and Mitigation scenarios.

37 PPFs are predicted to experience a negligible change in noise level of between 0 dB and 2 dB. Nine PPFs are predicted to experience a 3 dB to 4 dB increase in noise level due to the Project, resulting in slight adverse noise effects. Three PPFs are predicted to experience a 5 dB increase in noise level due to the Project, resulting in moderate adverse noise effects.

Six PPFs are predicted to experience a decrease in noise level of between 3 dB and 4 dB, resulting in slight positive effects. A number of these PPFs are along Fred Taylor Drive, where traffic flows are predicted to decrease as a result of redistribution of traffic around the road network caused by the Project. Other PPFs along Trig Road and Spedding Road are predicted to experience a reduction in noise due to the recommended mitigation of a low noise road surface.

Ambient noise levels will likely increase as the area urbanises and therefore the change in noise level due to the Project may not be as noticeable at the time.

It is noted that some PPFs may not exist anymore at the time of road construction particularly given the proposed zone change in the area allowing for urban development. Therefore, the predicted effects may not be experienced by current residents.

10.3.2 New Roads

10.3.2.1 Road Traffic Noise Model Results Analysis

In accordance with NZS 6806 there is no Do Nothing scenario for the New Road, so the Existing and Do Minimum scenarios are compared.

A summary of the results of the NZS 6806 assessment are presented in Table 10-3.

Table 10-3 NZS 6806 Assessment and Summary – New Roads – NoR W4

Category	Criteria	Number of PPFs			
		Existing	Do Minimum	Mitigation 1	Mitigation 2
Cat A	57 dB $L_{Aeq(24h)}$	3	1	2	2
Cat B	64 dB $L_{Aeq(24h)}$	1	3	2	2
Cat C	40 dB Internal $L_{Aeq(24h)}$	0	0	0	0
Total		**4**	**4**	**4**	**4**

Existing scenario predictions show the noise level within the project area is between 46 dB $L_{Aeq(24h)}$ and 60 dB $L_{Aeq(24h)}$. For the Do Minimum scenario there is an increase in noise levels with a predicted range of 55 dB $L_{Aeq(24h)}$ to 62 dB $L_{Aeq(24h)}$.

There are four PPFs in the assessment area. The results indicate that for the Do Minimum scenario, three of the PPFs will be in Category B and one will be in Category A. The Category B PPFs are located at 1/98 and 1/100 Hobsonville Road, and 25A Trig Road. The predicted traffic noise level at these PPFs with the Project are 62, 58 and 61 dB $L_{Aeq(24h)}$ respectively.

A mitigation option of installing AC-14 for the whole road alignment has been considered. This option results in the PPF at 1/100 Hobsonville Road moving to Category A. 25A Trig Road and 1/98 Hobsonville Road would remain in Category B.

A combination of two metre noise barriers placed along the road corridor to block line of sight to the remaining Category B PPFs, along with a low road noise road surface (AC-14), has also been considered. However, the noise barriers were found not to provide the required reduction in noise.

The first mitigation option is recommended for New Roads within NoR W4.

10.3.2.2 Assessment of Road Traffic Noise Effects

The effects associated with a change in noise level have been considered in addition to the NZS 6806 assessment. The Existing scenario and the Mitigation scenario can be compared to determine the predicted noise level increase or decrease at PPFs as a result of the Project. Figure 10-3 shows the predicted change in noise level at PPFs when comparing the Existing and Mitigation scenarios.

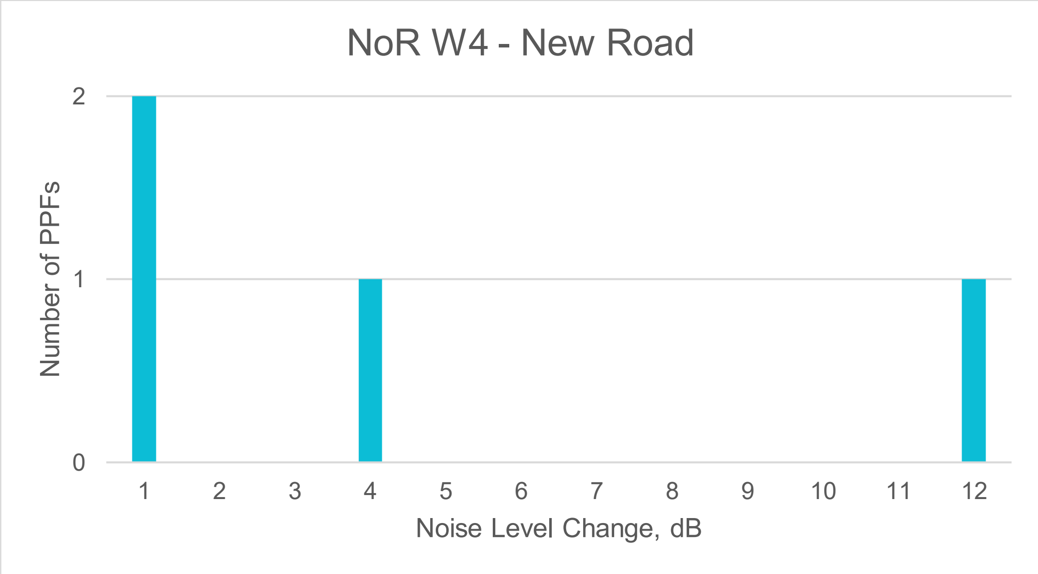


Figure 10-3: Change in Noise Level - Existing Vs Project with Mitigation – NoR W4 New Roads

The PPF at 1/98 Hobsonville Road is predicted to experience a 12 dB increase in noise level due to the Project. A 10 dB increase is perceived as a doubling of loudness. This increase in noise level could be significant to the residents if they still reside in the area at the time of the road opening.

The PPF at 1/100 Hobsonville Road is predicted to experience a 4 dB increase in noise level which is a perceptible change.

The PPFs at 1/98 and 1/100 Hobsonville Road are located within the Business - Light Industry Zone where they can be exposed to noise levels of up to 65 dB L_{Aeq} at the boundary, at all times. Traffic noise from the road may therefore not be noticeable above the noise generated by adjacent sites.

The PPFs at 25A Trig Road and 41 Trig Road are predicted to experience an increase in noise level of 1 dB, which is insignificant.

Ambient noise levels will likely increase as the area urbanises and therefore the change in noise level due to the Project may not be as noticeable at the time.

It is noted that some PPFs may not exist anymore at the time of road construction. Therefore, the predicted effects may not be experienced by current residents.

10.4 Conclusions

An assessment of traffic noise has been carried out for New and Altered Roads for the Spedding Road upgrade based on NZS 6806 and the predicted change in noise levels.

For the Altered Road section, the recommended mitigation is the installation of AC-14 or an equivalent low noise road surface for the whole road alignment. Noise levels are predicted to increase at a number of PPFs even after implementation of the recommended mitigation option, however the ambient noise levels will likely increase as the area urbanises and therefore any change in noise level due to the Project may not be as noticeable at the time.

For New Roads, the recommended BPO mitigation is the installation of AC-14 or an equivalent low noise road surface for the whole road alignment. After implementation of the mitigation option, two

PPFs will be in Category A (1/100 Hobsonville Road and 41 Trig Road) and two PPFs (1/98 Hobsonville Road and 25A Trig Road) will be in Category B. Increases in noise level are predicted when comparing existing traffic noise levels to those with the Project. The PPF at 1/98 Hobsonville Road is predicted to experience a 12 dB increase in noise level which is substantial. Smaller increases in noise level of 1 dB to 4 dB are predicted at the remaining PPFs.

It should be noted that 1/98 Hobsonville Road and 1/100 Hobsonville Road are located within the Business - Light Industry Zone where they can be exposed to noise levels of up to 65 dB L_{Aeq} at the boundary, at all times. If neighbouring businesses operate to the full extent of their permitted noise levels, traffic noise from the road may not be noticeable.

11 NoR W5: Hobsonville Road FTN Upgrade

11.1 Project Corridor Features

It is proposed to submit a Notice of Requirement (NoR W5) to alter the existing Hobsonville Road designation 1437 to allow for the proposed widening of the Hobsonville Road corridor. Hobsonville Road is an existing arterial corridor over 4km in length, extending from SH16 in the west to Hobsonville Point Road and Buckley Avenue / Squadron Drive in the east.

The project extends from the intersection with Oriel Avenue in the west to the intersection Memorial Park Drive in the east and provides an important east-west connection from Westgate to Hobsonville. An overview of the proposed design is provided below.

Figure 11-1: Overview of Hobsonville Road FTN Upgrade

Key features of the proposed new corridor that will ultimately affect (positive or negative) the noise environment due to altered traffic flow include the following:

- The upgrade of the section between Oriel Avenue and Luckens Road to a 30m wide four-lane arterial, and a 24m wide two-lane arterial from Luckens Road to Memorial Park Drive.
- The upgrade of several intersections, more notably the intersection with Spedding Road East and Brigham Creek Road.
- Likely posted speed of 50km/h.

11.2 Existing and Likely Future Environment

11.2.1 Planning context

Hobsonville Road is an existing urban corridor with land zoned under the AUP:OP as follows:

- The southern side of Hobsonville Road is largely zoned Residential – Mixed Housing Urban Zone, with a Business – Local Centre Zone located adjacent to the intersection of Hobsonville Road, Wiseley Road and Clark Road at the eastern end of the corridor; and
- The northern side of Hobsonville Road contains a variety of land uses. Adjacent land on the western end of the corridor is currently zoned Residential – Mixed Housing Zone between SH16 and Trig Rd (proposed for up zoning as part pf PPC5), with FUZ land behind. Land to the east of Trig Road to Westpark Drive is currently zoned FUZ, with land then zoned Business – Light Industrial Zone to the east of Westpark Drive.

PPC5 proposes to re-zone the existing FUZ area to Residential – Mixed Housing Zone and Residential – Terrace and Apartment Building Zone.

The Hobsonville Road corridor is currently designated by AT for Transport Purposes (Designation 1437). Designation 1437 has been given effect to and it is proposed to alter this designation.

Table 11-1 below provides a summary of the Hobsonville Road existing and likely future environment.

Table 11-1: Hobsonville Road FTN Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[14]	Likely Future Environment[15]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (Local centre)	Low	Business (Local centre)
Residential	Residential	Low	Residential
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban

Please refer to the AEE for further information on the planning context.

11.2.2 Noise Environment

Hobsonville Road is an existing urban corridor with development still occurring in the surrounding area. The noise environment is dominated by road traffic noise from vehicles on Hobsonville Road. Although development is still occurring in the area, ambient noise levels are unlikely to increase significantly above their current level.

[14] Based on AUP:OP zoning/policy direction
[15] Based on AUP:OP zoning/policy direction

11.3 Assessment of Road Traffic Noise Effects and Measures to Avoid, Remedy or Mitigate Actual or Potential Adverse Effects

Predicted road-traffic noise levels at all PPFs for the Existing, Do Nothing and Do Minimum are shown in Appendix 2.

Based on information provided by the Project team, the following residential buildings will be removed to make room for the Project alignment and have not been considered in the assessment:

- 24 Hobsonville Road
- 26 Hobsonville Road
- 28 Hobsonville Road
- 32 Hobsonville Road
- 34 Hobsonville Road
- 36 Hobsonville Road
- 38 Hobsonville Road
- 40 Hobsonville Road
- 42 Hobsonville Road
- 44 Hobsonville Road
- 48 Hobsonville Road
- 50 Hobsonville Road
- 199A Hobsonville Road
- 239 Hobsonville Road
- 245 Hobsonville Road
- 247 Hobsonville Road
- 249 Hobsonville Road
- 251 Hobsonville Road
- 255B Hobsonville Road
- 257B Hobsonville Road
- 259 Hobsonville Road

11.3.1 Road Traffic Noise Model Results Analysis

The Hobsonville Road Upgrade meets the definition of an Altered Road in accordance with NZS 6806.

A summary of the results of the assessment are presented in Table 11-2.

Table 11-2 NZS 6806 Assessment and Summary – Altered Roads – NoR W5

Category	Criteria	Number of PPFs				
		Existing	Do Nothing	Do Minimum	Mitigation 1	Mitigation 2
Cat A	64 dB $L_{Aeq(24h)}$	504	500	470	499	501
Cat B	67 dB $L_{Aeq(24h)}$	1	5	27	6	4

Cat C	40 dB Internal $L_{Aeq(24h)}$	0	0	8	0	0
Total		**505**	**505**	**505**	**505**	**505**

For the Do Minimum scenario, 470 PPFs are predicted to fall within Category A. 27 PPFs are predicted to fall into Category B, these are:

- 10 Hobsonville Road
- 147 A Hobsonville Road
- 149 B Hobsonville Road
- 151 D Hobsonville Road
- 179 Hobsonville Road
- 21-22/18 Hobsonville Road
- 27 Hobsonville Road
- 29 Hobsonville Road
- 291 Hobsonville Road
- 303 Hobsonville Road
- 305 Hobsonville Road
- 309 Hobsonville Road
- 311 Hobsonville Road
- 321 Hobsonville Road
- 373 Hobsonville Road
- 381 Hobsonville Road
- 52 Hobsonville Road
- 56 Hobsonville Road
- 60 Hobsonville Road
- 62 Hobsonville Road
- 63 Hobsonville Road
- 64 Hobsonville Road
- 66 Hobsonville Road
- 75 Hobsonville Road
- 19 Williams Road
- 23/18 Williams Road
- 24-25/18 Williams Road

Eight PPFs are predicted to fall within Category C. These are:

- 1/383 Hobsonville Road
- 31 Hobsonville Road
- 33 Hobsonville Road
- 35 Hobsonville Road
- 369 Hobsonville Road
- 39 Hobsonville Road
- 41 Hobsonville Road
- 61 Hobsonville Road

The predicted ranges of traffic noise levels for each scenario are as follows:

- Existing - 33 dB $L_{Aeq(24h)}$ to 65 dB $L_{Aeq(24h)}$
- Do Nothing - 33 dB $L_{Aeq(24h)}$ to 67 dB $L_{Aeq(24h)}$.
- Do Minimum - 37 dB $L_{Aeq(24h)}$ to 72 dB $L_{Aeq(24h)}$.

A mitigation option of installing AC-14 along the whole Altered Road alignment has been considered, which will reinstate the current asphalt surface of Hobsonville Road. This option results in all but six of the 505 PPFs in Category A. The remaining six PPFs in Category B are:

- 1/383 Hobsonville Road
- 31 Hobsonville Road
- 33 Hobsonville Road
- 35 Hobsonville Road
- 39 Hobsonville Road
- 61 Hobsonville Road

A second mitigation option of two metre high noise barriers installed at the six Category B PPFs has also been considered. It was found that the noise barriers would only achieve the required reduction in noise (5 dB noise reduction at a single PPF) at 39 Hobsonville Road and 61 Hobsonville Road. At all other locations the noise barrier performance was affected by the gaps required for driveways.

The second mitigation option is recommended for Altered Roads within NoR W5 as it achieves the Category A criteria at the highest number of PPFs possible, i.e. low-noise road surface AC-14 installed along the entire project alignment, with localised noise barriers at 39 Hobsonville Road and 61 Hobsonville Road.

11.3.2 Assessment of Road Traffic Noise Effects

The effects associated with a change in noise level have been considered in addition to the NZS 6806 assessment. The Do Nothing scenario and Mitigation Option 2 scenario can be compared to determine the predicted noise level increase or decrease at PPFs as a result of the Project.

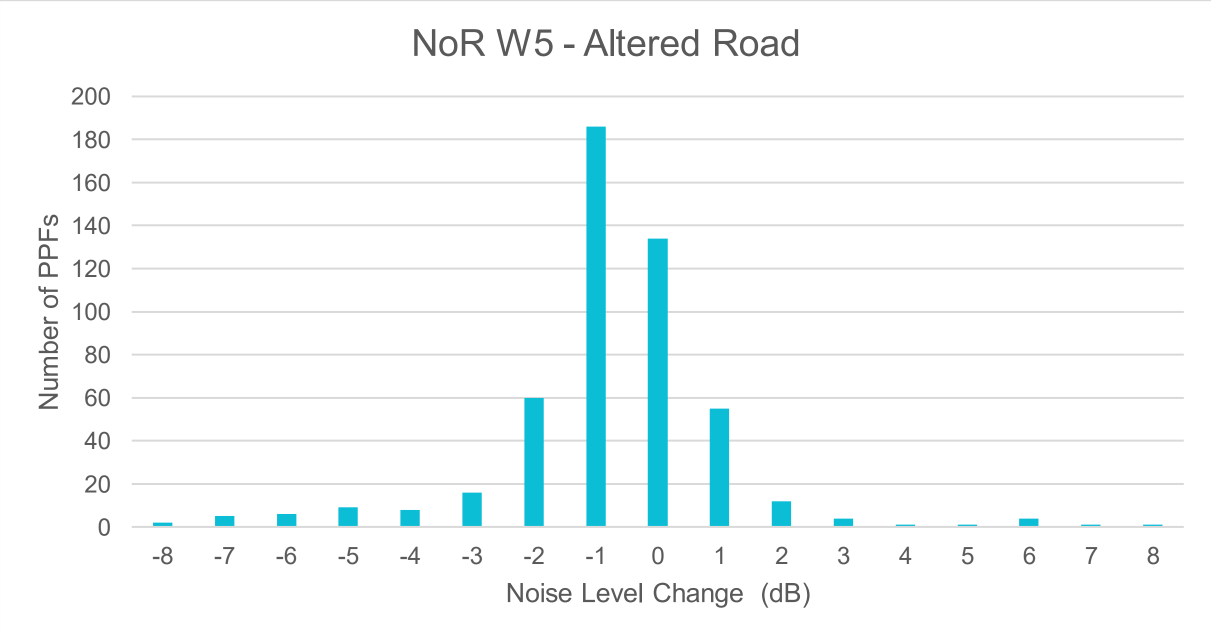


Figure 11-2 shows the predicted change in noise level at PPFs when comparing the Do Nothing and Mitigation Option 2 scenarios.

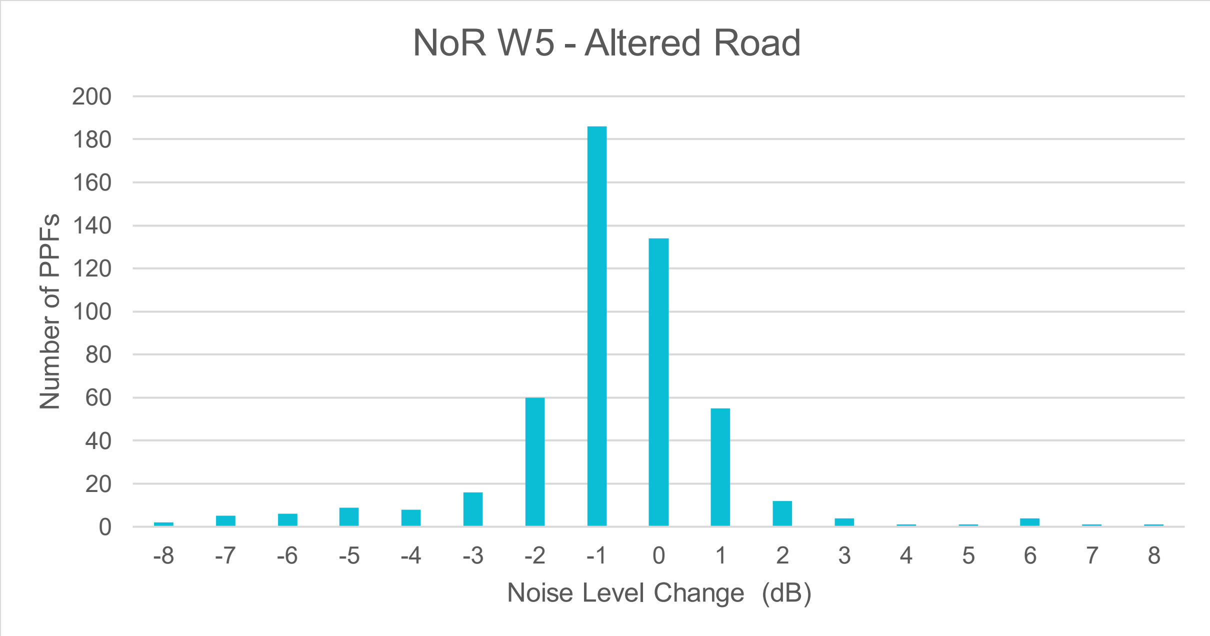


Figure 11-2: Change in Noise Level - Do Nothing Vs Mitigation Option 2 – NoR W5

447 PPFs are predicted to experience a negligible change in noise level of between 0 dB and 2 dB. Five PPFs are predicted to experience a 3 dB to 4 dB increase in noise level due to the Project, resulting in slight adverse noise effects. Seven PPFs are predicted to experience a 5 dB to 8 dB increase in noise level due to the Project, resulting in moderate adverse noise effects, although all these PPFs are in Category A with mitigation.

24 PPFs are predicted to experience a decrease in noise level of between 3 dB and 4 dB, resulting in slight positive effects. 22 PPFs are predicted to experience a 5 dB to 8 dB decrease in noise level due to the Project, resulting in moderate positive noise effects.

Ambient noise levels will likely increase as the area north of the road corridor urbanises and therefore changes in noise level, due to the Project may not be as noticeable at the time.

11.4 Conclusions

An assessment of traffic noise has been carried out for Altered Roads for the Hobsonville Road upgrade based on NZS 6806 and the predicted change in noise levels.

The recommended mitigation is the installation of AC-14 or an equivalent low noise road surface for the whole road alignment, with localised noise barriers at 39 Hobsonville Road and 61 Hobsonville Road.

With the recommended mitigation option in place the majority of PPFs are predicted to experience either a negligible change in noise level or a decrease in noise level, resulting in positive noise effects.

12 Conclusion

An assessment of traffic noise has been carried out for the Whenuapai Assessment Package for New and Altered Roads based on NZS 6806 and the predicted change in noise level. To determine the change in noise level a comparison has been made between the predicted road traffic noise levels in the Existing (for New Roads) or Do Nothing (for Altered Roads) scenario (representative of the design year without the Project, assuming traffic from full area development on the existing road network) and Do Minimum or Mitigated scenario (with the Project and all other North West Package projects implemented along with BPO mitigation where applicable).

All existing PPFs within 200m of the alignment in rural environments and 100m for urban environments of each alignment have been considered within the assessment. Buildings that are within the NoR areas have been removed from the Do Minimum scenario as they will not remain following the Project implementation.

NoR W1 does not meet the definition of an Altered Road. A comparison of the Do Nothing and Do Minimum scenarios indicates that noise levels will be lower as a result of redistribution of traffic across the network, resulting in positive effects.

For NoR W2, noise levels are predicted to increase at almost all PPFs, despite implementation of AC-14 low noise road surface mitigation for both the New and Altered sections and barriers installed at Timatanga Community School, 6 Māmari Road and 7 Spedding Road. For Altered Roads, four PPFs will be in Category B with the remaining PPFs being in Category A. For New Roads the majority of PPFs will be in Category A with eight in Category B. Ambient noise levels will likely increase as the area urbanises and therefore any change in noise level due to the Project may not be as noticeable at the time.

For NoR W3, noise levels are predicted to decrease or remain unchanged at the vast majority of PPFs after implementation of the recommended mitigation option of low-noise road surface, resulting in positive effects. With mitigation in place all PPFs are in Category A.

For NoR W4, noise levels are predicted to increase at the majority of PPFs despite implementation of AC-14 low noise road surface mitigation for both the New and Altered sections. For Altered Roads, all PPFs will be in Category A upon implementation of the recommended Mitigation option. For New Roads two PPFs will be in Category A and two in Category B. Ambient noise levels will likely increase as the area urbanises and therefore any change in noise level due to the Project may not be as noticeable at the time.

For NoR W5, the recommended mitigation is the installation of AC-14 or an equivalent low noise road surface for the whole road alignment, with localised noise barriers at 39 Hobsonville Road and 61 Hobsonville Road. With the recommended mitigation option in place the majority of PPFs are predicted to experience either a negligible change in noise level or a decrease in noise level, resulting in positive noise effects. Upon implementation of the recommended mitigation, the majority of PPFs will be in Category A, with four PPFs in Category B.

All predictions are based on traffic flow along New and Altered Roads at the design year (2048). These traffic volumes are predicated on the anticipated urbanisation of the area and implementation of surrounding infrastructure projects. Development of the surrounding areas will likely increase activity and associated noise levels. Therefore, any changes predicted for the traffic noise effects related to these Projects are not likely to represent such a significant change at the time of construction due to the change in environment.

As such, the results are indicative of a possible future scenario, but effects cannot be definitively determined at this stage. Reassessment of the road traffic noise at current PPFs will be carried out nearer the time of construction to confirm that the recommended mitigation still represents the best practicable option. The review, confirmation and refinement of the BPO shall aim to achieve the same noise criteria categories as determined with the current BPO.

Nevertheless, the predictions show that most PPFs (with the exception of 18 Category B PPFs) across all Projects will receive levels within the Category A criteria, which is the most stringent Category and represents the lowest design noise levels. Therefore, resulting noise levels will be reasonable in a residential context at the majority of PPFs assessed.

Traffic vibration from new or upgraded roading projects is not generally expected to create any vibration issues. Therefore, traffic vibration has not been assessed for the Projects.

1 Appendix 1: Assumptions

Package	Project(s)	Existing	Do Nothing	Do Minimum
Whenuapai Arterials	Trig Road upgrade (NoR W1)	x	x	√
	Māmari Road upgrade (NoR W2)	x	x	√
	Brigham Creek Road upgrade (NoR W3)	x	x	√
	Spedding Road upgrade (NoR W4)	x	x	√
	Hobsonville Road upgrade (NoR W5)	x	x	√
Redhills Arterials	Fred Taylor Drive FTN upgrade	x	√	√
	Northside Drive East extension	x	√	√
	Don Buck Road FTN upgrade	x	√	√
	Royal Road FTN upgrade	x	√	√
Riverhead Arterials	Coatesville – Riverhead Highway upgrade	x	√	√
	Riverhead Road upgrade	x	√	√
Strategic Projects	Rapid Transit Corridor (RTC)	x	√	√
	Alternative State Highway (ASH)	x	√	√
	Brigham Creek Interchange	x	√	√
	Regional Active Mode Corridor (RAMC)	x	√	√
	SH16 Main Road upgrade	x	√	√
	Access Road upgrade	x	√	√

Package	Project(s)	Existing	Do Nothing	Do Minimum
	Station Road upgrade	x	√	√
Growth	Land Use Assumptions	up to 2015	up to 2048+	up to 2048+
		Key		
			√	Included
			x	Excluded
			*	Minimal Network Change

2 Appendix 2: Predicted Traffic Noise Levels

KEY

Cat A	Cat B	Cat C

NoR W1 Altered Roads

Address	Existing	Do Nothing	Do Minimum	Mitigation
1/84 Trig Road	59	66	62	57
33 Trig Road	53	59	54	49
4 Spedding Road	49	54	51	48
43 Trig Road	61	68	63	58
46 Trig Road	51	58	56	51
52 Trig Road	54	60	58	53
57 Trig Road	61	66	65	61
64 Trig Road	56	62	57	53
66 Trig Road	46	52	49	45
67 Trig Road	59	64	63	59
73 Trig Road	57	62	60	56
82 Trig Road	63	70	66	61
84 Trig Road	61	67	63	59
86 Trig Road	58	65	61	56
88 Trig Road	49	55	50	46
90 Trig Road	58	65	64	60
92 Trig Road	57	62	61	57
94 Trig Road	59	64	59	55
96 Trig Road	61	66	64	60
96A Trig Road	63	68	65	62

NoR W2 Altered Roads

Address	Existing	Do Nothing	Do Minimum	Mitigation 1	Mitigation 2
10 Spedding Road	44	47	51	49	49
11 Māmari Road	46	50	55	51	51
11a Spedding Road	41	45	57	53	53
15 Māmari Road	49	55	62	59	59
2-10 Ripeka Lane	67	66	70	66	66
28 Māmari Road	50	55	62	58	58
38 Whenuapai Drive	52	47	52	48	48
3 Ngahue Crescent	51	52	59	55	55
30 Māmari Road	52	58	65	61	61
42D Brigham Creek Rd	67	66	70	66	66
49 Brigham Creek Road	62	64	69	64	64
5 Ngahue Crescent	49	51	58	53	53
5 Spedding Road	42	46	53	50	50

51 Brigham Creek Road	61	63	67	62	62
53 Brigham Creek Road	62	64	68	63	63
5a Spedding Road	42	46	55	51	51
6 Spedding Road	42	46	52	49	49
7 Ngahue Crescent	48	50	58	53	53
8 Māmari Road	51	53	69	65	65
8 Spedding Road	44	48	52	49	49
9 Māmari Road	52	63	70	66	60
4 Māmari Road	56	58	71	67	67
6 Māmari Road	53	57	71	67	62

NoR W2 New Roads

Address	Existing	Do Minimum	Mitigation 1	Mitigation 2
11 Spedding Road	37	55	52	52
7 Spedding Road	39	61	58	53
5 Māmari Road	45	59	56	56
66 Trig Road	37	47	44	44
68 Trig Road	36	49	46	46
70 Trig Road	37	59	55	55
72 Trig Road	37	52	49	49
78 Trig Road	37	54	50	50
80 Trig Road	38	55	52	52
10 Māmari Road	50	67	63	60
12 Māmari Road	50	67	62	60
14 Māmari Road	49	67	63	61
16 Māmari Road	48	67	63	61
18 Māmari Road	47	66	62	60
20 Māmari Road	47	67	63	60
22 Māmari Road	47	67	62	60
24 Māmari Road	47	65	61	59
1 Tama Quadrant	47	55	51	51
10 Tama Quadrant	45	56	52	52
3 Tama Quadrant	46	55	51	51
5 Tama Quadrant	46	55	51	51
7 Tama Quadrant	44	55	51	51
8 Tama Quadrant	45	55	51	51
9 Ngahue Crescent	48	56	51	51
9 Tama Quadrant	44	56	52	52
11 Ngahue Crescent	48	55	51	51

NoR W3 Altered Roads

Address	Existing	Do Nothing	Do Minimum	Mitigated
32c Brigham Creek Road	68	71	69	64
32b Brigham Creek Road	69	73	71	64
34c Brigham Creek Rd	68	71	70	64

32a Brigham Creek Rd	68	72	69	64
34a Brigham Creek Road	68	72	70	64
32d Brigham Creek Road	67	71	68	64
34d Brigham Creek Road	67	71	68	64
26-34 Whenuapai Drive	54	63	68	63
34b Brigham Creek Road	67	70	67	63
1 Ripeka Lane	67	67	65	62
49 Brigham Creek Road	62	64	65	62
40b-42c Brigham Creek Road	69	68	65	62
3 Boyes Avenue	69	68	65	62
55 Brigham Creek Road	62	64	65	61
57 Brigham Creek Road	62	64	65	61
1-8/38 Brigham Creek Road	68	69	65	61
59 Brigham Creek Road	62	63	64	61
53 Brigham Creek Road	62	64	64	61
39a Brigham Creek Road	65	69	65	61
91 Brigham Creek Road	61	63	62	60
2-10 Ripeka Lane	67	66	63	60
26 Brigham Creek Road	65	69	65	60
51 Brigham Creek Road	61	63	64	60
113 Brigham Creek Road	63	65	64	60
42d Brigham Creek Road	67	65	63	60
123 Brigham Creek Road	63	66	64	60
93 Brigham Creek Road	62	63	63	60
2-10 Harewood Street	51	58	64	60
111 Brigham Creek Road	62	64	63	59
1-9 Maramara Road	52	59	64	59
105 Brigham Creek Road	62	64	62	59
1 Kauri Road	57	62	63	59
115 Brigham Creek Road	62	64	62	59
38 Ngahue Crescent	62	64	62	59
2 Kauri Road	54	61	64	59
145a Brigham Creek Road	60	61	63	59
99 Brigham Creek Road	62	63	62	59
108 Whenuapai Drive	65	69	63	59
103 Brigham Creek Road	62	63	62	59
101 Brigham Creek Road	62	64	62	59
109 Brigham Creek Road	61	63	62	59
46-60 Nils Andersen Road	60	61	62	58
117 Brigham Creek Road	61	64	62	58
28 Brigham Creek Road	63	66	62	58
119 Brigham Creek Road	61	63	62	58
162 Brigham Creek Road	55	60	61	58
3 Kauri Road Whenuapai	53	60	63	58

95 Brigham Creek Road	60	61	61	58
97 Brigham Creek Road	60	61	61	57
77-85 Nils Andersen Road	58	60	61	57
121 Brigham Creek Road	61	63	61	57
1-4/46a Nils Andersen Road	58	60	60	57
125-127 Brigham Creek Road	60	63	61	57
129 Brigham Creek Road	60	62	60	56
5-8/46a Nils Andersen Road	58	60	60	56
18 Brigham Creek Road	61	65	61	56
8 Airport Road	56	58	60	56
163 Brigham Creek Road	56	58	60	56
41-61 Nils Andersen Road	58	59	59	56
65-75 Nils Andersen Road	57	59	59	56
4 Māmari Road	55	56	59	55
110 Whenuapai Drive	59	63	59	54
39 Brigham Creek Road	60	63	58	54
11-17 Maramara Road	50	54	58	53
1-9 Harewood St	45	52	57	53
6 Māmari Road	53	55	57	53
145 Brigham Creek Road	54	56	57	53
5 Kauri Road Whenuapai	50	55	57	53
24 Brigham Creek Road	59	63	57	53
41-43 Whenuapai Drive	52	54	56	53
39 Whenuapai Drive	51	54	56	52
45 Whenuapai Drive	53	54	56	52
58-88 Whenuapai Drive	58	61	57	52
96 Trig Road	50	52	56	52
51 Whenuapai Drive	53	54	56	52
106 Whenuapai Drive	57	61	56	52
31 Brigham Creek Road	58	61	56	52
33-35 Whenuapai Drive	50	53	56	52
73 Trig Road	50	52	56	52
112 Whenuapai Drive	56	60	56	52
8 Māmari Road	52	54	55	51
36 Ngahue Crescent	53	55	55	51
199-201 Totara Rd	44	51	56	51
37 Ngahue Crescent	53	54	54	51
159 Brigham Creek Road	52	54	55	51
114 Whenuapai Drive	56	60	55	51
14 Airport Road	51	53	54	51
53-55 Whenuapai Drive	51	53	54	50
164 Brigham Creek Road	48	52	54	50
168-178 Totara Rd	45	50	54	50
3 Ngahue Crescent	51	52	53	50

2 Ngahue Crescent	50	52	53	49
90 Whenuapai Drive	54	56	53	49
96a Trig Road	47	49	53	49
4 Ruatea Street	50	53	52	49
32 Ngahue Crescent	49	51	51	48
5 Ngahue Crescent	49	51	52	48
2 Ruatea Street	50	52	52	48
31 Whenuapai Drive	47	50	52	48
8 Ruatea Street	50	52	52	48
6 Ruatea Street	50	52	52	48
24 Ngahue Crescent	48	50	50	48
10 Ruatea Street	50	52	52	48
28 Ngahue Crescent	49	50	50	48
26 Ngahue Crescent	49	51	51	48
40 Tamiro Road	53	56	52	48
34 Ngahue Crescent	49	50	51	48
20 Ngahue Crescent	47	49	49	47
1 Joseph Mcdonald Drive	53	56	52	47
4 Ngahue Crescent	48	50	51	47
168 Brigham Creek Road	45	50	51	47
30 Ngahue Crescent	49	50	50	47
104 Whenuapai Drive	54	57	53	47
1 Ruatea Street	49	51	51	47
170 Brigham Creek Road	45	50	51	47
9 Ngahue Crescent	48	50	50	47
7 Kauri Road Whenuapai	44	49	51	47
151 Brigham Creek Road	48	50	51	47
101 Whenuapai Drive	52	55	51	47
7 Ngahue Crescent	48	50	50	47
11 Kauri Road	42	48	52	47
38 Tamiro Road	52	56	52	47
10 Ngahue Crescent	48	50	50	46
10 Māmari Road	51	51	50	46
94 Trig Road	47	50	50	46
8 Ngahue Crescent	48	49	50	46
59 Whenuapai Drive	47	48	50	46
105 Whenuapai Drive	52	55	51	46
6 Ngahue Crescent	47	49	49	46
3 Ruatea Street	48	50	49	46
9 Kauri Road	42	48	51	46
99 Whenuapai Drive	51	54	50	46
98 Whenuapai Drive	53	57	51	46
99 Whenuapai Drive	54	55	50	46
5 Ruatea Street	47	49	49	46

100 Whenuapai Drive	51	55	50	46
97 Whenuapai Drive	51	56	50	46
12 Ngahue Crescent	47	49	49	45
92 Whenuapai Drive	50	54	49	45
14 Ngahue Crescent	47	49	49	45
96 Whenuapai Dr	53	56	51	45
18 Ngahue Crescent	47	48	49	45
107 Whenuapai Drive	51	54	50	45
85 Whenuapai Drive	51	54	49	45
7 Ruatea Street	47	49	49	45
141 Brigham Creek Road	47	48	49	45
26 Tamiro Road	51	55	50	45
102 Whenuapai Drive	53	57	52	45
3 Joseph Mcdonald Drive	50	54	49	45
61-63 Whenuapai Drive	46	48	49	45
46 Pamu Road	44	47	48	44
89 Whenuapai Drive	50	54	49	44
19-59 Maramara Road	48	50	51	44
29 Hangar Lane	43	46	48	44
40 Whenuapai Drive	48	48	48	44
31 Ngahue Crescent	45	47	47	44
65 Whenuapai Drive	46	47	47	43
29 Ngahue Crescent	45	47	47	43
93 Whenuapai Drive	52	56	51	48
69-71 Whenuapai Drive	49	50	47	43
94 Whenuapai Dr	50	54	49	43
5 Boyes Avenue	49	50	46	43
2 Kainga Lane	48	51	47	43
42 Whenuapai Drive	48	48	47	43
18 Kauri Road Whenuapai	43	45	47	43
73-75 Whenuapai Drive	48	50	46	43
44 Whenuapai Drive	47	47	46	42
38 Whenuapai Drive	48	47	46	42
2 Mcewan Street	46	47	46	42
27 Hangar Lane	40	43	46	42
4 Kainga Lane	47	50	46	42
8 Joseph Mcdonald Drive	48	51	47	42
6 Kainga Lane	47	50	46	42
1 Kainga Lane	47	49	45	42
2 Boyes Avenue	47	48	45	42
27 Whenuapai Dr	43	45	45	42
7 Boyes Avenue	48	48	45	41
25 Hangar Lane	41	43	45	41
50-52 Whenuapai Drive	47	47	45	41

5 Joseph Mcdonald Drive	49	53	48	41
48 Pamu Road	45	47	49	41
15 Kauri Road	39	43	44	40
54 Pamu Road	44	45	44	40
56 Pamu Road	43	44	44	40
4 Mcewan Street	44	46	44	40
52 Pamu Road	45	47	48	40
17 Kauri Road	38	42	44	40
25 Whenuapai Dr	42	43	44	40
62 Pamu Road	43	45	43	39
60 Pamu Road	42	44	43	39
58 Pamu Road	42	43	43	39
9 Boyes Avenue	47	48	44	39
6 Mcewan Street	44	45	44	39
24 Whenuapai Drive	40	43	42	38
50 Whenuapai Drive	44	44	42	38
22 Whenuapai Drive	39	41	42	38
150-164 Totara Rd	41	47	51	47
191-197 Totara Rd	43	50	54	50

NoR W4 Altered Roads

Address	Existing	Do Nothing	Do Minimum	Mitigated
1 Hailes Road	41	43	48	44
1 Marina View Drive	57	57	63	58
1/121 Fred Taylor Drive	51	53	61	57
1/28 Sailfish Drive	41	43	51	47
10 Spedding Road	41	56	60	56
102 Hobsonville Road	50	51	57	53
168 Fred Taylor Drive	63	64	66	61
131 Fred Taylor Drive	59	62	65	60
133 Fred Taylor Drive	62	64	65	60
135 Fred Taylor Drive	63	65	66	61
137 Fred Taylor Drive	62	64	65	60
139 Fred Taylor Drive	55	57	60	55
14 Spedding Road	35	51	59	55
141 Fred Taylor Drive	57	60	66	62
143a Fred Taylor Drive	44	46	55	50
143b Fred Taylor Drive	45	47	55	51
15 Māmari Road	39	51	54	50
15 Soling Place	41	43	47	44
164 Fred Taylor Drive	52	54	57	52
166 Fred Taylor Drive	61	63	65	60
166a Fred Taylor Drive	43	45	49	44
17 Soling Place	44	46	51	48
1a Marina View Drive	51	52	60	56
2 Marina View Drive	54	54	61	56
2/28 Sailfish Drive	42	43	53	48

223 Hobsonville Road	54	55	60	55
225 Hobsonville Road	50	50	55	51
227 Hobsonville Road	55	55	61	56
229 Hobsonville Road	44	45	53	50
231 Hobsonville Road	58	58	63	59
231a Hobsonville Road	44	45	53	50
233 Hobsonville Road	58	57	63	58
2a Marina View Drive	47	48	55	50
3 Marina View Drive	44	45	51	47
4 Spedding Road	41	50	53	49
43 Trig Road	45	49	52	50
4a Marina View Drive	46	48	55	51
5 Marina View Drive	41	43	47	44
5 Spedding Road	51	62	64	60
57 Trig Road	41	49	54	50
5a Spedding Road	51	63	65	61
6 Spedding Road	47	58	61	57
8 Spedding Road	39	54	57	53
86 Trig Road	44	50	52	50
88 Trig Road	41	48	50	47
90 Trig Road	50	61	63	58
92 Trig Road	46	57	59	55
2/22 Sailfish Drive	39	42	47	43
6a Marina View Drive	43	45	51	47
6b Marina View Drive	42	44	51	47
7 Marina View Drive	41	43	47	44
13 Soling Place	44	46	50	47
26 Sailfish Drive	40	42	48	44
30 Sailfish Drive	40	42	50	46
11a Spedding Road	37	51	55	51

NoR W4 New Roads

Address	Existing	Do Minimum	Mitigation 1	Mitigation 2
1/98 Hobsonville Road	46	62	58	58
1/100 Hobsonville Road	51	58	55	55
25A Trig Road	60	61	61	61
41 Trig Road	54	55	55	55

NoR W5 Altered Roads

Address	Existing	Do Nothing	Do Minimum	Mitigation 1	Mitigation 2
33 Hobsonville Road	64	65	72	67	67
39 Hobsonville Road	65	67	71	66	60
35 Hobsonville Road	64	65	70	65	65
1/383 Hobsonville Road	63	65	71	65	65
61 Hobsonville Road	63	64	70	65	60
31 Hobsonville Road	63	64	70	65	65
41 Hobsonville Road	63	64	69	64	64

369 Hobsonville Road	62	65	69	63	63
29 Hobsonville Road	60	62	67	62	62
24-25/18 Williams Road	60	62	67	62	62
321 Hobsonville Road	61	62	67	62	62
309 Hobsonville Road	61	62	67	62	62
64 Hobsonville Road	60	61	67	61	61
10 Hobsonville Road	60	61	66	61	61
19 Williams Road	60	61	67	61	61
23/18 Williams Road	60	61	66	61	61
305 Hobsonville Road	60	62	66	61	61
21-22/18 Williams Road	60	61	65	61	61
311 Hobsonville Road	59	61	66	61	61
291 Hobsonville Road	61	61	66	60	60
52 Hobsonville Road	59	60	65	60	60
62 Hobsonville Road	59	60	65	60	60
60 Hobsonville Road	59	60	65	60	60
75 Hobsonville Road	60	61	65	60	60
56 Hobsonville Road	59	60	65	60	60
53 Hobsonville Road	58	59	64	60	60
179 Hobsonville Road	61	61	65	60	60
149b Hobsonville Road	61	61	65	60	60
63 Hobsonville Road	60	61	65	60	60
147a Hobsonville Road	61	61	65	60	60
59 Hobsonville Road	58	59	64	60	60
27 Hobsonville Road	58	60	65	60	60
66 Hobsonville Road	58	60	65	59	59
303 Hobsonville Road	59	61	65	59	59
151d Hobsonville Road	61	61	65	59	59
½ Oreil Avenue	59	60	64	59	59
51 Hobsonville Road	57	59	63	59	59
307 Hobsonville Road	59	60	64	59	59
373 Hobsonville Road	57	58	65	59	59
151c Hobsonville Road	60	60	64	59	59
147c Hobsonville Road	60	60	64	59	59
151b Hobsonville Road	60	60	64	59	59
17 Williams Road	57	58	64	58	58
395 Hobsonville Road	57	59	64	58	58
289 Hobsonville Road	60	60	64	58	58
55 Hobsonville Road	57	58	62	58	58
381 Hobsonville Road	56	58	65	58	58
317 Hobsonville Road	57	59	63	58	58
195 Hobsonville Road	60	60	63	58	58
79 Hobsonville Road	57	59	63	58	58
26a Hobsonville Road	49	50	63	58	58

49 Hobsonville Road	57	58	62	58	58
287 Hobsonville Road	60	60	63	58	58
54 Hobsonville Road	57	58	63	58	58
369a Hobsonville Road	56	57	64	58	58
19/18 Williams Road	57	59	63	58	58
20 Hobsonville Road	57	58	63	58	58
199 Hobsonville Road	60	60	63	58	58
375 Hobsonville Road	56	57	64	58	58
1-2/279 Hobsonville Road	60	60	63	58	58
45 Suncrest Drive	57	58	63	57	57
8a Hobsonville Road	52	53	62	57	57
33/18 Williams Road	56	58	63	57	57
1-2/281 Hobsonville Road	60	60	63	57	57
319 Hobsonville Road	56	58	62	57	57
151a Hobsonville Road	59	59	62	57	57
22 Hobsonville Road	55	55	62	57	57
209 Hobsonville Road	58	58	62	57	57
181 Hobsonville Road	59	59	62	57	57
1/46 Hobsonville Road	50	51	62	57	57
1/275 Hobsonville Road	59	59	63	57	57
26-27/18 Williams Road	54	57	62	57	57
57 Hobsonville Road	55	56	61	57	57
229a Hobsonville Road	59	59	62	57	57
313 Hobsonville Road	56	57	62	57	57
81 Hobsonville Road	54	56	62	57	57
2a Park Drive	58	59	62	57	57
16 Hobsonville Road	56	57	62	57	57
58 Hobsonville Road	55	57	62	57	57
2a Fitzherbert Avenue	56	57	61	57	57
47 Hobsonville Road	56	58	61	56	56
391 Hobsonville Road	54	56	62	56	56
83 Hobsonville Road	54	55	61	56	56
241 Hobsonville Road	54	55	61	56	56
243 Hobsonville Road	54	54	61	56	56
251 Hobsonville Road	55	56	61	56	56
253 Hobsonville Road	54	54	61	56	56
104a Hobsonville Road	56	56	61	56	56
231 Hobsonville Road	58	58	61	56	56
2 Marina View Drive	54	54	60	56	56
283 Hobsonville Road	57	57	61	56	56
221 Hobsonville Road	57	56	61	56	56
215 Hobsonville Road	57	57	61	56	56
239 Hobsonville Road	54	55	61	56	56
299 Hobsonville Road	54	56	61	55	55

327 Bd1 Hobsonville Road	54	56	61	55	55
383 Hobsonville Road	53	55	61	55	55
323 Hobsonville Road	54	55	60	55	55
1/163 Hobsonville Road	57	57	60	55	55
197 Hobsonville Road	57	57	60	55	55
301 Hobsonville Road	54	55	60	55	55
85 Hobsonville Road	53	55	60	55	55
295 Hobsonville Road	55	55	60	55	55
213 Hobsonville Road	56	56	60	55	55
201 Hobsonville Road	58	57	60	55	55
211 Hobsonville Road	56	56	60	55	55
219 Hobsonville Road	56	55	60	55	55
233 Hobsonville Road	58	57	60	55	55
1/41 Hobsonville Road	53	55	60	55	55
14 Hobsonville Road	54	55	59	54	54
18 Hobsonville Road	53	54	59	54	54
2 Hendrika Court	58	57	60	54	54
45 Hobsonville Road	55	56	59	54	54
77 Hobsonville Road	54	56	59	54	54
217 Hobsonville Road	56	55	59	54	54
133 Hobsonville Road	50	50	59	54	54
247 Hobsonville Road	52	53	59	54	54
227 Hobsonville Road	56	55	59	54	54
189 Hobsonville Road	55	55	59	54	54
37 Hobsonville Road	53	54	59	54	54
1 Marina View Drive	57	57	59	54	54
1/191 Hobsonville Road	55	55	59	54	54
23 Hobsonville Road	58	60	59	54	54
2/87 Hobsonville Road	52	54	59	54	54
3 Fitzherbert Avenue	53	54	59	54	54
223 Hobsonville Road	54	54	59	54	54
157a Hobsonville Road	55	55	59	54	54
277 Hobsonville Road	54	53	59	53	53
1-2/2 Wiseley Road	52	54	59	53	53
26 Belleaire Court	54	54	58	53	53
34/18 Williams Road	51	53	59	53	53
1 Hendrika Court	54	54	59	53	53
165 Hobsonville Road	54	54	58	53	53
187 Hobsonville Road	54	54	58	53	53
207 Hobsonville Road	54	54	58	53	53
82 Hobsonville Road	53	53	58	53	53
72 Hobsonville Road	52	54	58	53	53
203, 203a Hobsonville Road	56	56	58	53	53
175 Hobsonville Road	54	54	58	53	53

205 Hobsonville Road	56	56	58	53	53
61a Hobsonville Road	52	53	57	53	53
267 Hobsonville Road	54	53	58	52	52
3 Oreil Avenue	53	55	57	52	52
1 Park Drive	54	54	57	52	52
1/39 Hobsonville Road	52	53	58	52	52
5 Bannings Way	51	53	58	52	52
327 Bd2 Hobsonville Road	50	52	57	52	52
2/2 Oreil Avenue	54	55	57	52	52
2 Fitzherbert Avenue	52	53	57	52	52
249 Hobsonville Rd	54	54	60	55	55
28/18 Williams Road	49	51	57	52	52
177 Hobsonville Road	53	53	57	51	51
1/87 Hobsonville Road	51	52	57	51	51
72c Hobsonville Road	50	52	56	51	51
70 Hobsonville Road	50	52	56	51	51
4 Wiseley Road	50	52	57	51	51
89 Hobsonville Road	50	52	56	51	51
1-2/259 Hobsonville Road	53	53	56	51	51
161 Hobsonville Road	52	53	56	51	51
167 Hobsonville Road	52	52	56	51	51
159 Hobsonville Road	52	53	56	51	51
127 Hobsonville Road	44	44	56	51	51
193 Hobsonville Road	52	52	56	51	51
169 Hobsonville Road	52	52	56	51	51
401 Hobsonville Road	49	51	56	51	51
185 Hobsonville Road	52	52	56	50	50
30/18 Williams Road	48	50	55	50	50
3a Bannings Way	49	51	56	50	50
1/18 Woodhouse Place	50	51	55	50	50
24 Belleaire Court	49	49	55	50	50
1/255 Hobsonville Road	48	49	56	50	50
3 Wiseley Road	48	50	56	50	50
14 Woodhouse Place	48	50	54	50	50
24a Hobsonville Road	42	44	54	50	50
1/18 Williams Road	47	49	55	49	49
73 Hobsonville Road	49	50	54	49	49
11 Magdalen Place	49	50	54	49	49
291a Hobsonville Road	49	50	54	49	49
16 Woodhouse Place	48	50	54	49	49
17-18/18 Williams Road	47	49	54	49	49
1-2/257 Hobsonville Road	47.7	48.1	54	49	49
327 Bd10 Hobsonville Road	47	49	54	49	49
10 Wiseley Road	47	49	54	49	49

225 Hobsonville Road	49	49	54	49	49
15 Williams Road	46	48	54	48	48
2park Drive	50	50	54	48	48
15 Wiseley Road	47	49	54	48	48
1/323 Hobsonville Road	47	48	53	48	48
15a Wiseley Road	46	48	54	48	48
5-6/18 Williams Road	45	47	53	48	48
5 Fitzherbert Avenue	48	49	53	48	48
16 Williams Road	45	47	53	48	48
303a Hobsonville Road	46	48	53	48	48
327 Bd3 Hobsonville Road	45	47	53	48	48
13 Williams Road	45	47	53	48	48
80 Hobsonville Road	45	46	53	48	48
15 Starlight Cove	45	47	53	48	48
18 Woodhouse Place	47	48	52	48	48
5 Wiseley Road	45	48	53	47	47
85a Hobsonville Road	45	47	53	47	47
6 Woodhouse Place	47	49	52	47	47
12 Woodhouse Place	46	48	52	47	47
387 Hobsonville Road	45	47	53	47	47
79a Hobsonville Road	46	47	52	47	47
20 Woodhouse Place	47	48	52	47	47
4 Oreil Avenue	50	51	52	47	47
3-4/18 Williams Road	44	46	52	47	47
21 Woodhouse Place	47	48	52	47	47
377a Hobsonville Road	45	46	53	47	47
9 Williams Road	45	46	53	47	47
12 Wiseley Road	45	47	52	47	47
155a Hobsonville Road	48	48	52	47	47
7 Fitzherbert Avenue	46	48	52	47	47
287a Hobsonville Road	47	47	52	47	47
40 Suncrest Drive	47	47	52	47	47
41/18 Williams Road	44	46	52	47	47
12 Hobsonville Road	47	49	51	47	47
23b Wiseley Road	44	46	52	46	46
183 Hobsonville Road	48	48	52	46	46
4 Fitzherbert Avenue	46	48	51	46	46
17 Oreil Avenue	48	49	51	46	46
17 Wiseley Road	44	46	52	46	46
10 Woodhouse Place	45	47	51	46	46
1/2 Wiseley Road	45	47	52	46	46
379 Hobsonville Road	44	46	52	46	46
1a Marina View Drive	50	51	51	46	46
43 Suncrest Drive	46	46	51	46	46

2/18 Williams Road	44	45	51	46	46
15 Magdalen Place	45	47	51	46	46
1 Bannings Way	45	47	52	46	46
9 Wiseley Road	44	46	52	46	46
68 Hobsonville Road	44	46	52	46	46
7-8/18 Williams Road	43	45	51	46	46
11 Starlight Cove	43	45	51	46	46
11 Williams Road	43	45	51	46	46
37 Suncrest Drive	44	46	51	46	46
7 Wiseley Road	44	46	51	46	46
8 Woodhouse Place	45	47	51	46	46
43/18 Williams Road	43	45	50	46	46
11 Wiseley Road	44	46	51	46	46
17 Magdalen Place	45	46	51	46	46
39/18 Williams Road	42	44	50	46	46
14 Williams Road	43	45	51	46	46
2 Trig Road	44	46	51	46	46
5a-c Woodhouse Place	45	46	50	46	46
3 Bannings Way	44	46	51	45	45
23a Wiseley Road	43	46	51	45	45
26 Peterhouse Place	45	46	50	45	45
147f Hobsonville Road	47	47	51	45	45
17a Magdalen Place	45	46	50	45	45
12 Williams Road	43	45	51	45	45
6 Park Drive	46	47	50	45	45
6 Fitzherbert Avenue	45	46	50	45	45
17b Oreil Avenue	47	48	50	45	45
24 Peterhouse Place	44	46	50	45	45
3 Woodhouse Place	44	46	50	45	45
315 Hobsonville Road	43	45	50	45	45
41 Suncrest Drive	44	45	50	45	45
72a Hobsonville Road	43	45	50	45	45
119 Hobsonville Road	43	43	50	45	45
125 Hobsonville Road	39	39	49	45	45
42-44 Suncrest Drive	44	45	50	45	45
17 Starlight Cove	42	44	50	45	45
327 Bd5 Hobsonville Road	42	43	50	45	45
4 Woodhouse Place	44	46	50	45	45
7 Starlight Cove	42	44	50	44	44
3a Wiseley Road	42	45	50	44	44
33 Cyril Crescent 0618	44	45	49	44	44
13 Magdalen Place	44	45	49	44	44
31 Cyril Crescent	44	45	49	44	44
12 Magdalen Place	43	45	49	44	44

1/18 Hobsonville Road	45	47	49	44	44
2a Marina View Drive	46	46	49	44	44
325 Hobsonville Road	42	44	49	44	44
285 Hobsonville Road	44	44	50	44	44
153a Hobsonville Road	45	45	49	44	44
9-10/18 Williams Road	41	43	49	44	44
1/25 Glucina Avenue	44	44	49	44	44
24 Connemara Court	42	44	49	44	44
6 Wiseley Road Hobsonville	43	45	50	44	44
15-16/18 Williams Road	42	44	49	44	44
19 Starlight Cove	41	43	49	44	44
21 Starlight Cove	41	43	49	44	44
39 Suncrest Drive	42	44	49	44	44
13 Wiseley Road Hobsonville	42	44	49	44	44
379a Hobsonville Road	42	43	49	44	44
36 Suncrest Drive	44	44	49	44	44
5 Starlight Cove	41	43	49	44	44
9 Fitzherbert Avenue	43	45	49	44	44
19 Oreil Avenue	45	46	49	44	44
7 Williams Road	41	43	49	44	44
145a – 145b Hobsonville Road	45	45	49	44	44
102 Hobsonville Road	50	51	49	44	44
11-12/18 Williams Road	41	42	49	44	44
1/31 Glucina Avenue	44	44	49	44	44
4 Hendrika Court	46	46	49	44	44
157b Hobsonville Road	45	45	49	44	44
20 Peterhouse Place	43	45	49	44	44
1/26 Peterhouse Place	43	45	49	44	44
10 Trig Road	42	44	49	44	44
35/18 Williams Road	41	43	49	43	43
6 Hendrika Court	44	44	49	43	43
29 Cyril Crescent	43	45	49	43	43
38/18 Williams Road	41	43	48	43	43
1/273 Hobsonville Road	44	44	49	43	43
327 Bd4 Hobsonville Road	41	43	48	43	43
7 Hanson Place	43	44	48	43	43
6 Louise Place	42	44	48	43	43
19 Magdalen Place	43	44	48	43	43
9 Magdalen Place	43	44	48	43	43
5a Hanson Place	43	44	48	43	43
5a Bannings Way	41	44	49	43	43
8 Hendrika Court	44	44	48	43	43
271 Hobsonville Road	44	44	48	43	43
23 Starlight Cove	40	42	48	43	43

13-14/18 Williams Road	46	48	48	43	43
127a Hobsonville Road	37	37	48	43	43
9 Starlight Cove	40	42	48	43	43
3 Starlight Cove	40	42	48	43	43
131 Hobsonville Road	41	41	48	43	43
4a Marina View Drive	46	46	48	43	43
22 Connemara Court	41	43	48	43	43
1/133a Hobsonville Road	40	40	48	43	43
17a Wiseley Road	41	43	48	43	43
20 Connemara Court	41	43	48	43	43
19 Bridgehead Cove	39	41	48	43	43
157c Hobsonville Road	44	44	48	43	43
129c Hobsonville Road	39	39	48	43	43
7 Optimist Place	44	44	48	43	43
3/1a Williams Road	40	42	48	42	42
2/1a Williams Road	40	42	48	42	42
129b Hobsonville Road	40	40	47	42	42
8 Louise Place	41	43	48	42	42
27 Suncrest Drive	42	43	48	42	42
229 Hobsonville Road	44	44	47	42	42
327 Bd9 Hobsonville Road	40	42	47	42	42
3 Park Drive	43	44	47	42	42
70a Hobsonville Road	41	42	47	42	42
21a Wiseley Road	40	42	48	42	42
2/31 Glucina Avenue	42	42	47	42	42
29 Glucina Avenue	42	42	47	42	42
3 Hendrika Court	44	44	47	42	42
10 Hendrika Court	44	44	47	42	42
26 Connemara Court	40	42	47	42	42
2/163 Hobsonville Road	43	43	47	42	42
25 Peterhouse Place	41	43	47	42	42
4a Hendrika Court	44	44	47	42	42
33 Cherub Place	44	44	47	42	42
20 Belleaire Court	41	41	47	42	42
1/19 Cherub Place	43	43	47	42	42
231a Hobsonville Road	43	43	47	42	42
10 Whiting Grove	43	43	47	42	42
131a Hobsonville Road	40	40	46	42	42
7a Bannings Way	40	42	47	41	41
5 Williams Road	39	41	47	41	41
145e Hobsonville Road	42	42	47	41	41
22 Belleaire Court	42	42	47	41	41
22 Peterhouse Place	41	42	46	41	41
38 Suncrest Drive	41	42	47	41	41

327 Bd8 Hobsonville Road	39	41	46	41	41
17 Soling Place	43	43	46	41	41
1/8 Oreil Avenue	45	46	46	41	41
23 Peterhouse Place	41	42	46	41	41
8 Park Drive	42	42	46	41	41
1/325 Hobsonville Road	39	41	46	41	41
123b Hobsonville Road	39	39	46	41	41
19 Belleaire Court	41	41	46	41	41
4/1a Williams Road	39	41	47	41	41
4 Louise Place	40	42	46	41	41
143c Hobsonville Road	42	42	46	41	41
8 Magdalen Place	41	42	46	41	41
6 Oreil Avenue	42	43	46	41	41
32 Suncrest Drive	40	41	46	41	41
3 Optimist Place	42	42	46	41	41
327 Bd6 Hobsonville Road	39	41	46	41	41
18 Connemara Court	39	40	46	41	41
28 Connemara Court	39	40	46	41	41
37 Cherub Place	42	42	46	41	41
12 Whiting Grove	42	42	46	41	41
10 Mona Vale	40	41	46	41	41
29 Suncrest Drive	40	41	46	41	41
7 Magdalen Place	40	41	46	41	41
6 Magdalen Place 0618	40	42	45	40	40
8 Oreil Avenue	41	42	45	40	40
8 Trig Road Whenuapai	39	40	45	40	40
16 Belleaire Court	40	40	45	40	40
10 Magdalen Place	40	42	45	40	40
18 Belleaire Court	40	41	45	40	40
13 Soling Place	42	42	45	40	40
1/22 Peterhouse Place	40	41	45	40	40
16 Peterhouse Place	40	41	45	40	40
8 Optimist Place	41	41	45	40	40
1 Seagrove Road	41	42	45	40	40
18 Peterhouse Place	40	42	45	40	40
2/133a Hobsonville Road	39	39	45	40	40
5 Optimist Place	41	41	45	40	40
8a Louise Place	39	41	45	40	40
129 Hobsonville Road	38	38	45	40	40
16 Whiting Grove	41	41	45	40	40
6 Trig Road Whenuapai	38	40	45	40	40
1/16 Peterhouse Place	40	41	45	40	40
5 Hanson Place	39	41	45	40	40
30 Suncrest Drive	39	40	45	40	40

14 Whiting Grove	41	41	45	40	40
1/4 Park Drive	41	41	45	40	40
35 Cherub Place	42	42	45	40	40
27 Glucina Avenue	40	40	45	40	40
2/4 Park Drive	41	41	45	40	40
3a Louise Place	39	40	45	40	40
1a Bannings Way	38	40	45	40	40
153d Hobsonville Road	41	41	45	40	40
6 Optimist Place	41	41	45	40	40
123 Hobsonville Road	37	37	44	40	40
1/32 Glucina Avenue	40	40	45	39	39
10 Oreil Avenue	43	44	44	39	39
23 Glucina Avenue	39	40	45	39	39
10 Soling Place	41	41	45	39	39
8a Hendrika Court	41	41	45	39	39
12 Soling Place	41	41	44	39	39
14 Hendrika Court	41	41	44	39	39
10 Louise Place	38	40	44	39	39
273 Hobsonville Road	40	40	45	39	39
34 Suncrest Drive	39	39	44	39	39
6b Marina View Drive	41	42	44	39	39
121b Hobsonville Road	37	38	44	39	39
5 Louise Place	38	40	44	39	39
35 Suncrest Drive	38	39	44	39	39
3 Marina View Drive	43	43	44	39	39
3/163 Hobsonville Road	40	40	44	39	39
30 Connemara Court	37	39	44	39	39
155c Hobsonville Road	40	41	44	39	39
157d Hobsonville Road	40	40	44	39	39
39 Cherub Place	40	40	44	39	39
10 Park Drive	40	40	44	39	39
16 Hendrika Court	42	43	44	39	39
155b Hobsonville Road	41	41	44	39	39
5 Seagrove Road	40	40	44	39	39
16-18 Clark Road	39	41	44	38	38
9 Hendrika Court	42	43	44	38	38
20a Belleaire Court	38	39	43	38	38
14 Belleaire Court	38	39	43	38	38
8 Whiting Grove	39	40	43	38	38
33 Suncrest Drive	37	38	43	38	38
12 Hendrika Court	40	40	43	38	38
16 Connemara Court	37	38	43	38	38
31 Cherub Place	40	40	43	38	38
72b Hobsonville Road	37	39	43	38	38

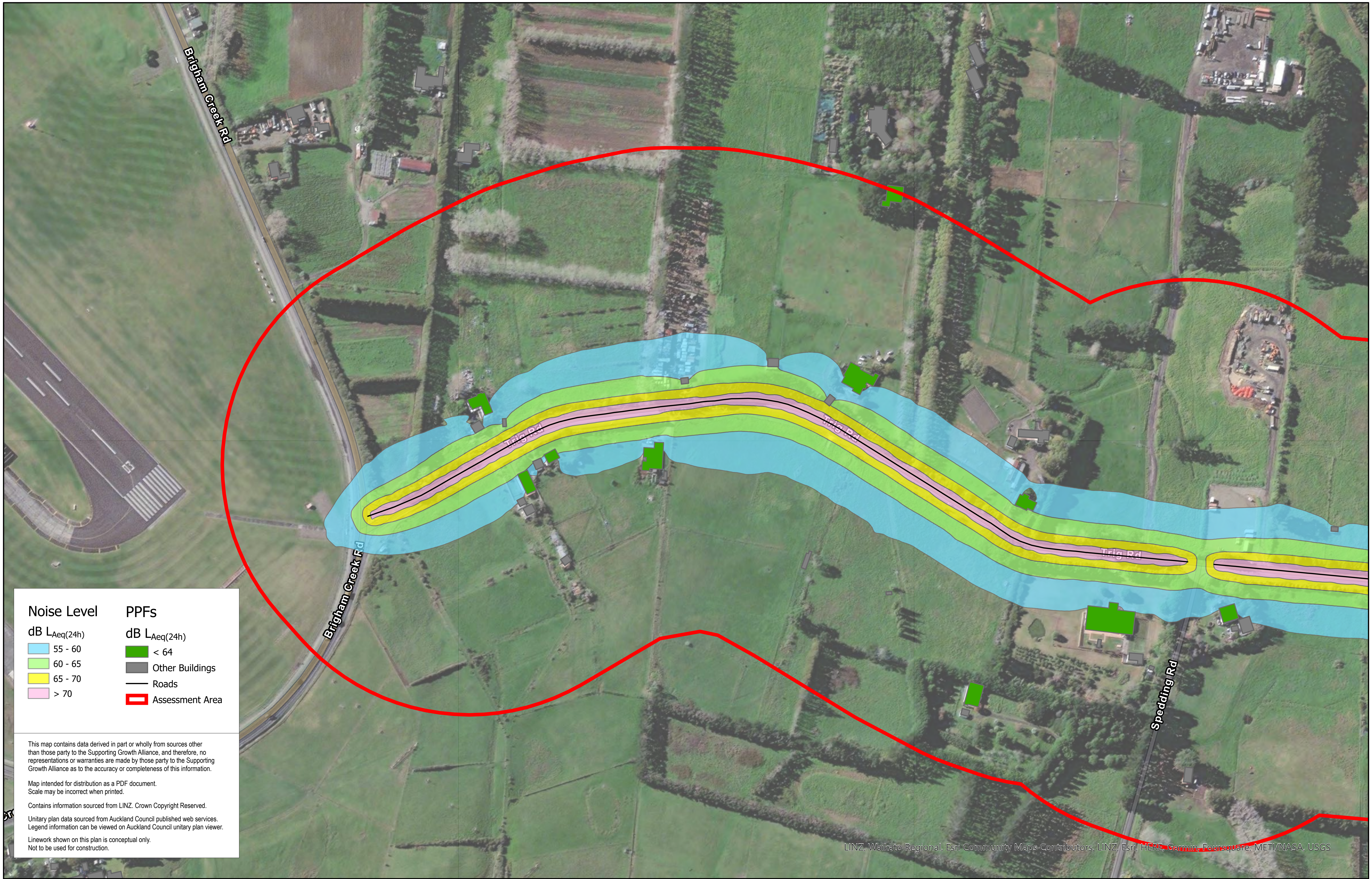
21 Cherub Place	39	39	43	38	38
123a Hobsonville Road	34	35	43	38	38
11 Hendrika Court	41	41	43	38	38
56 Cherub Place	39	39	43	38	38
17Ergrove Place	39	39	43	38	38
3 Seagrove Road	39	39	43	38	38
121a Hobsonville Road	37	37	43	38	38
27 Cherub Place	39	39	43	38	38
2-4 Workspace Drive	42	42	43	38	38
14 Connemara Court	36	38	43	38	38
29 Cherub Place	39	39	43	37	37
30 Glucina Avenue	37	38	43	37	37
2/19 Cherub Place	39	38	42	37	37
4 Whiting Grove	38	39	42	37	37
157e Hobsonville Road	38	38	42	37	37
15 Ergrove Place	39	39	42	37	37
18 Hendrika Court	41	41	42	37	37
15 Soling Place	39	39	42	37	37
7 Marina View Drive	39	40	42	37	37
6a Marina View Drive	41	42	42	37	37
1/13 Belleaire Court	37	37	42	37	37
13 Hendrika Court	41	42	42	36	36
12 Belleaire Court	37	37	41	36	36
5 Marina View Drive	40	40	42	36	36
2 Optimist Place	38	38	42	36	36
17 Cherub Place	37	37	41	36	36
14 Ergrove Place	37	37	41	36	36
153c Hobsonville Road	38	37	41	36	36
7 Hendrika Court	41	41	41	36	36
8 Soling Place	37	37	41	36	36
121 Hobsonville Road	35	35	41	36	36
4 Luckens Road	43	43	41	36	36
28 Glucina Avenue	36	37	41	36	36
20 Hendrika Court	39	40	41	36	36
7 Seagrove Road	37	37	41	36	36
17 Belleaire Court	36	36	41	36	36
153b Hobsonville Road	36	36	41	35	35
25 Cherub Place	37	37	41	35	35
18 Whiting Grove	37	37	41	35	35
11 Soling Place	37	38	40	35	35
2/25 Sailfish Drive	41	41	40	35	35
2/28 Sailfish Drive	41	41	40	35	35
6 Soling Place	36	36	40	35	35
15 Belleaire Court	35	36	40	35	35

23 Cherub Place	36	36	40	35	35
16 Ergrove Place	36	36	40	35	35
13 Ergrove Place	36	36	40	35	35
3a Hendrika Court	41	42	40	34	34
5 Hendrika Court	40	40	39	34	34
1/28 Sailfish Drive	39.6	40.2	39	33	33
1-2/38 Sailfish Drive	39.2	39.6	39	33	33
155d Hobsonville Road	34.1	34.2	38	33	33
36 Sailfish Drive	40.1	40.4	38	33	33
9 Belleaire Court	33.4	33.6	38	33	33
2/22 Sailfish Drive	37.4	37.7	38	33	33
26 Sailfish Drive	38.0	38.4	38	32	32
11 Belleaire Court	33	33	37	32	32
30 Sailfish Drive	39	39	37	32	32

ATTACHMENT 49

NORTH-WEST WHENUAPAI
ASSESSMENT OF TRAFFIC NOISE
AND VIBRATION EFFECTS
PART 2 OF 4

3 Appendix 3: Noise Contour Maps



Map Scale @ A3:

0 30 60 120 Meters

N

Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	23/11/22

Title:

Supporting Growth

NoR W1 - Existing Road Traffic Noise

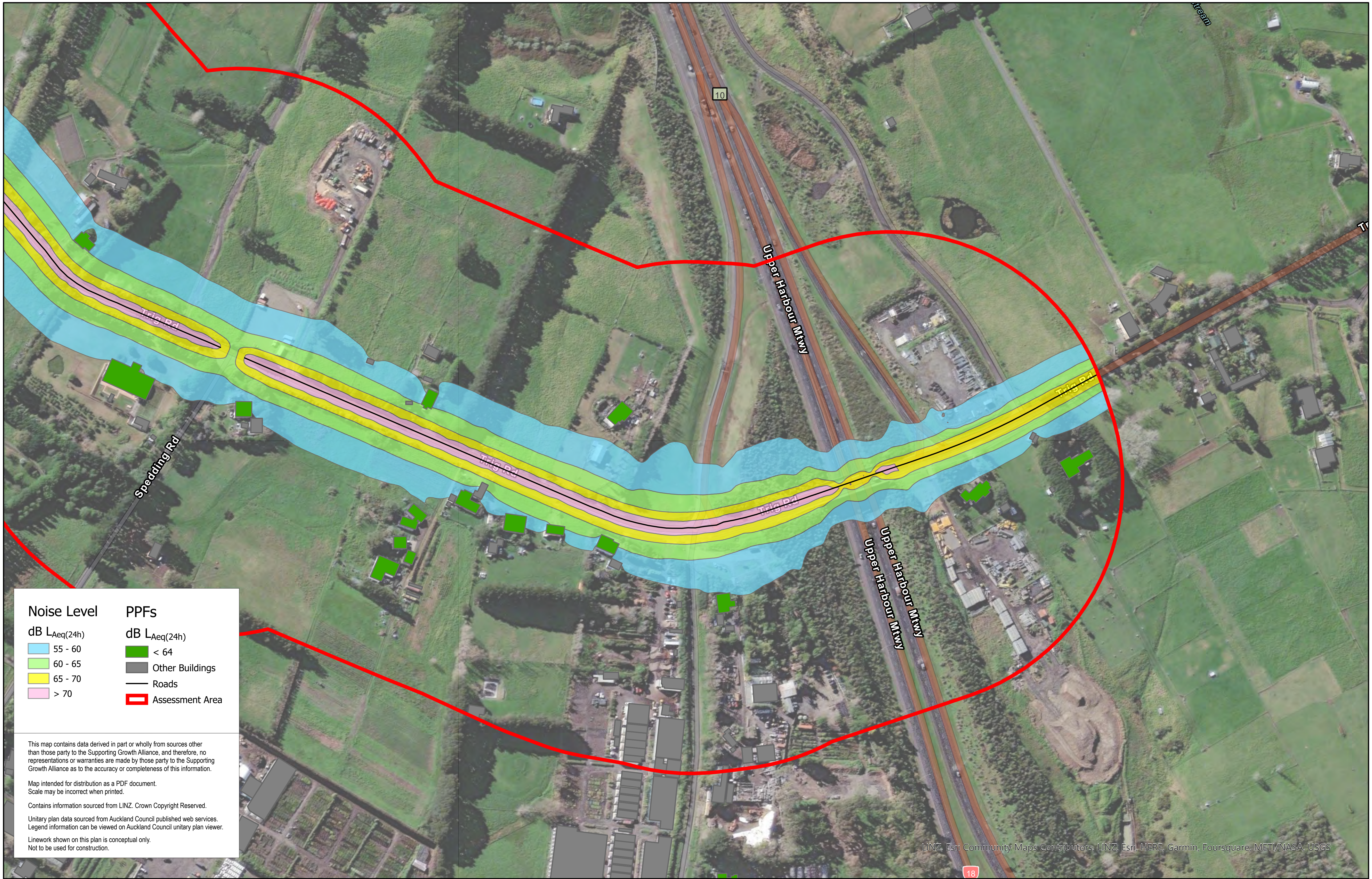
Client: **Supporting Growth**

Project: **North West Package**

TE TUPU NGĀTAHI Supporting Growth

Discipline: **GIS**

Drawing No: **SGA-NOR-W1-000**



Map Scale @ A3:

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N

Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	23/11/22

Title:

Supporting Growth

NoR W1 - Existing Road Traffic Noise

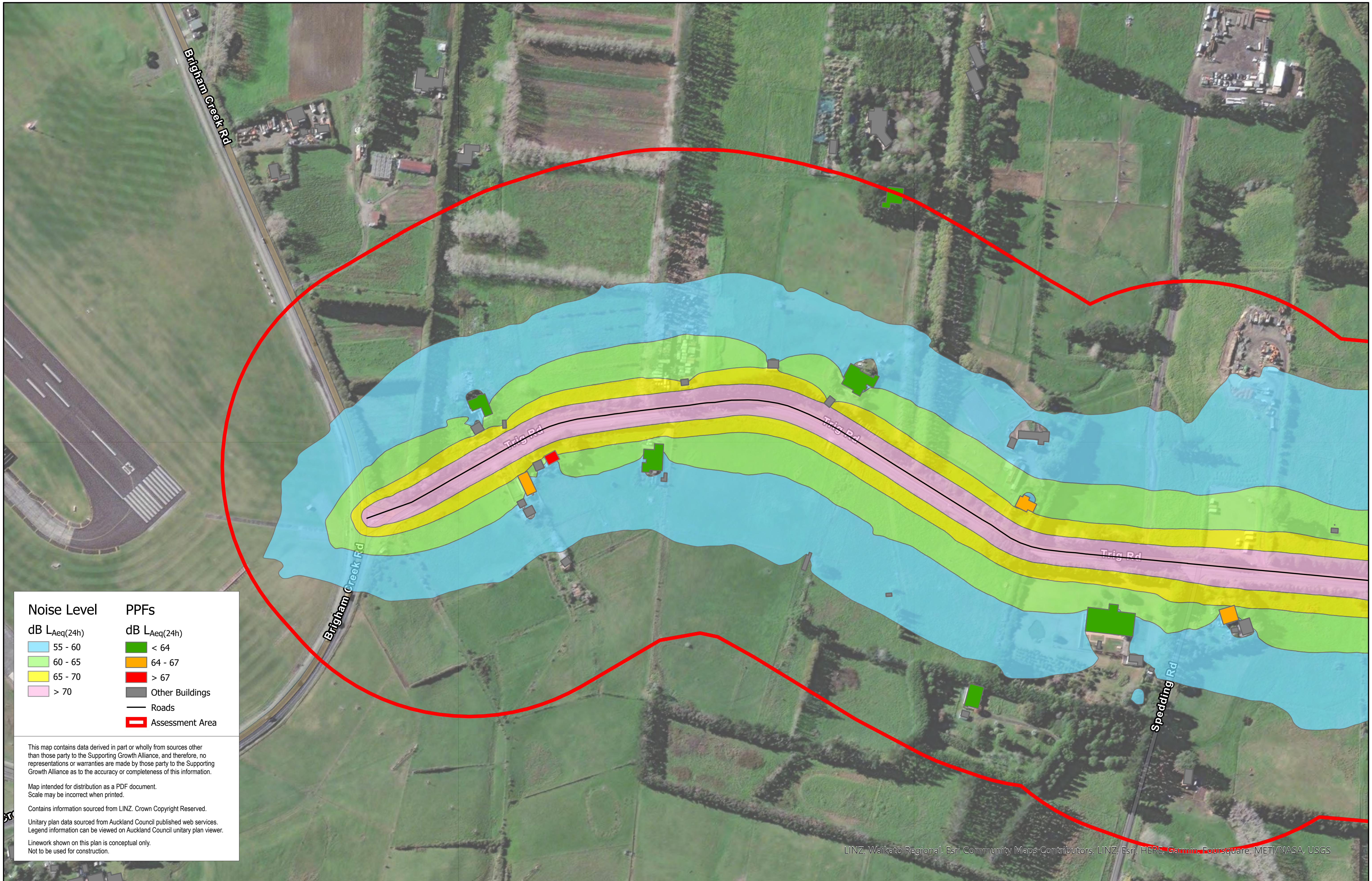
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



Noise Level

dB $L_{Aeq(24h)}$

- 55 - 60
- 60 - 65
- 65 - 70
- > 70

PPFs

dB $L_{Aeq(24h)}$

- < 64
- 64 - 67
- > 67
- Other Buildings
- Roads
- Assessment Area

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Linework shown on this plan is conceptual only.
Not to be used for construction.

Map Scale @ A3:

0 30 60 120 Meters

N

Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	23/11/22

Title: **Supporting Growth**

NoR W1 - Do Nothing Road Traffic Noise

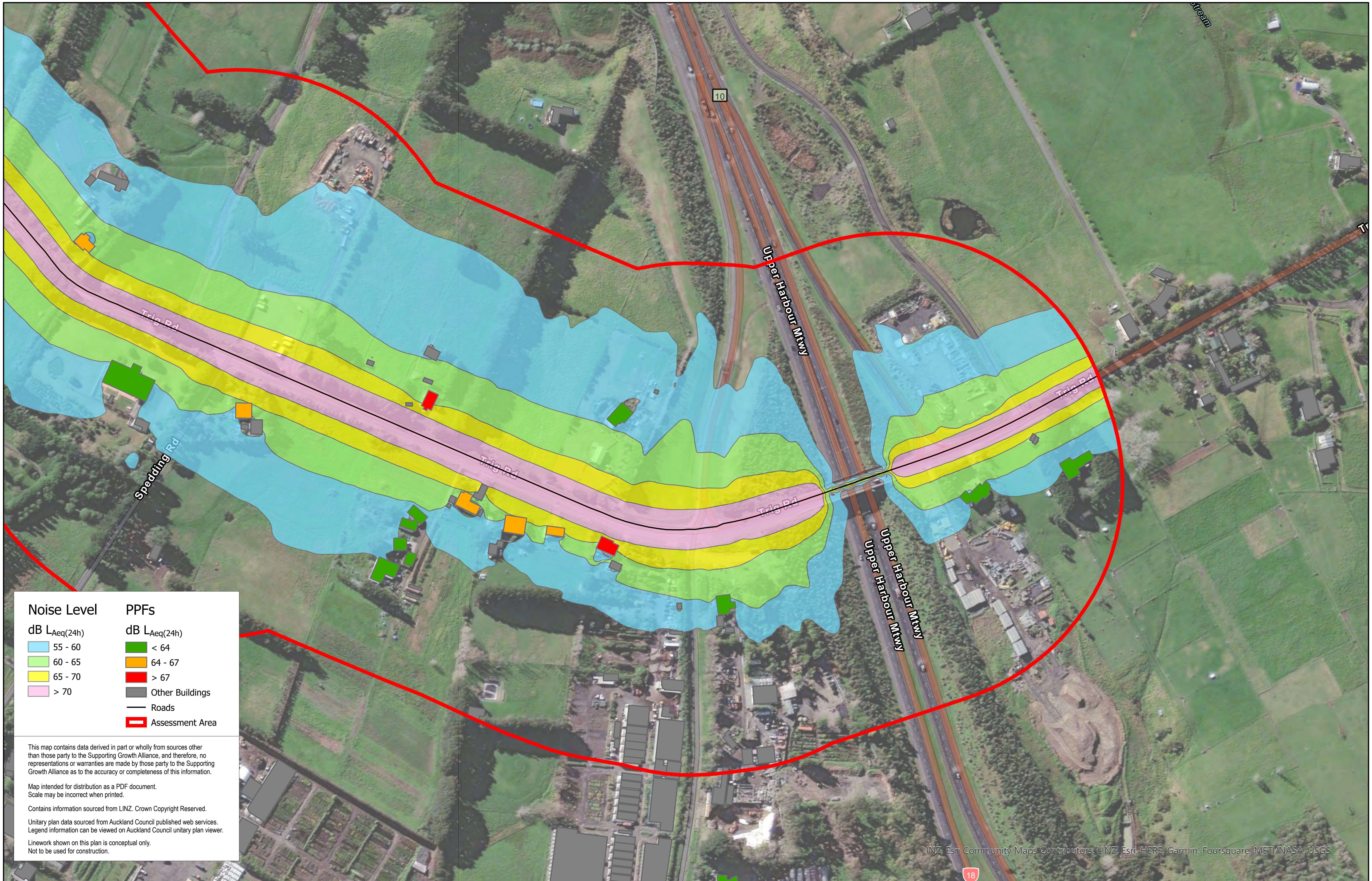
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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N

Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	23/11/22

Title:

Supporting Growth

NoR W1 - Do Nothing Road Traffic Noise

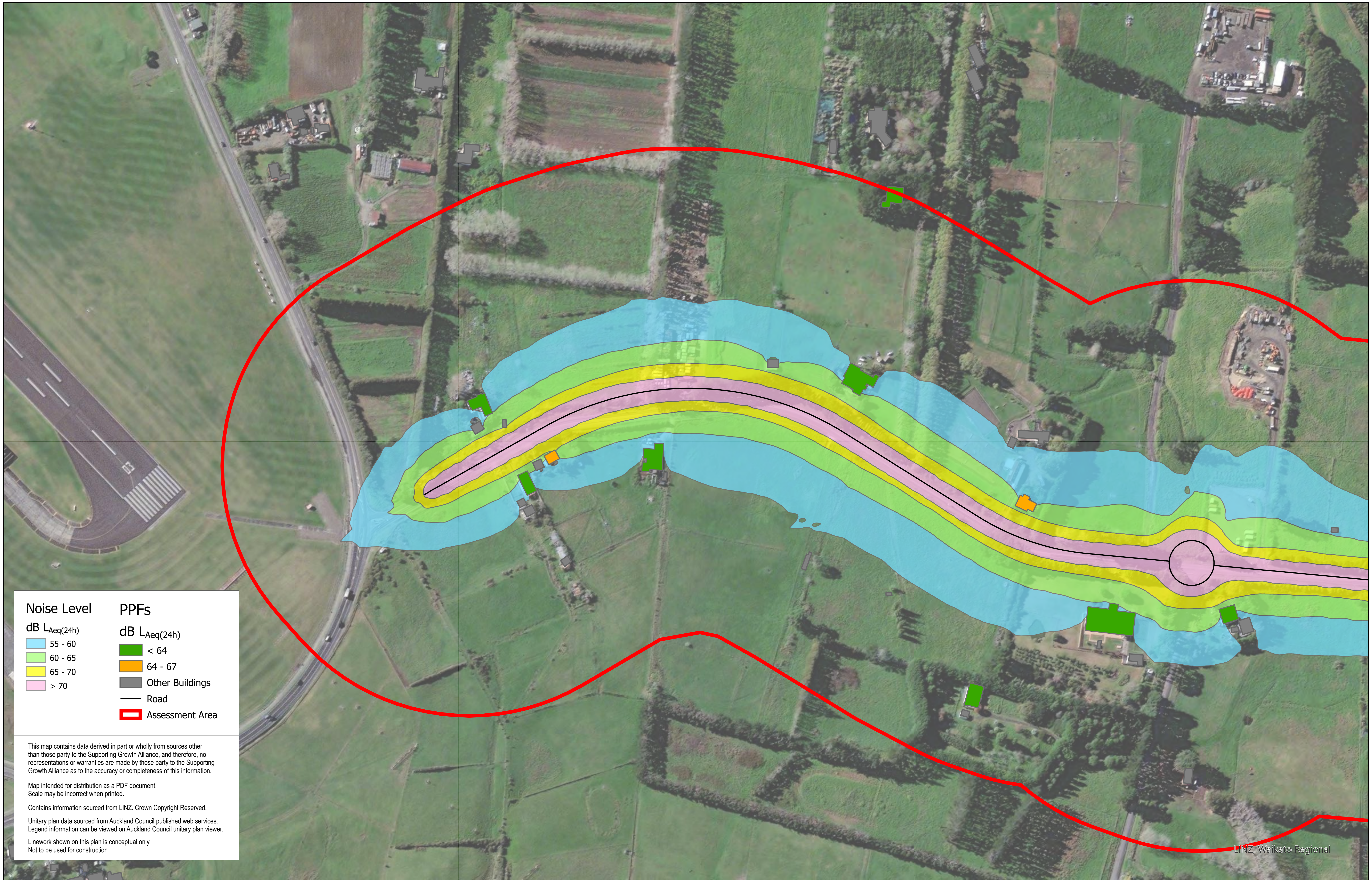
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



Map Scale @ A3:

0 30 60 120 Meters

N

Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	23/11/22

Title:

Supporting Growth

NoR W1 - Do Minimum Road Traffic Noise

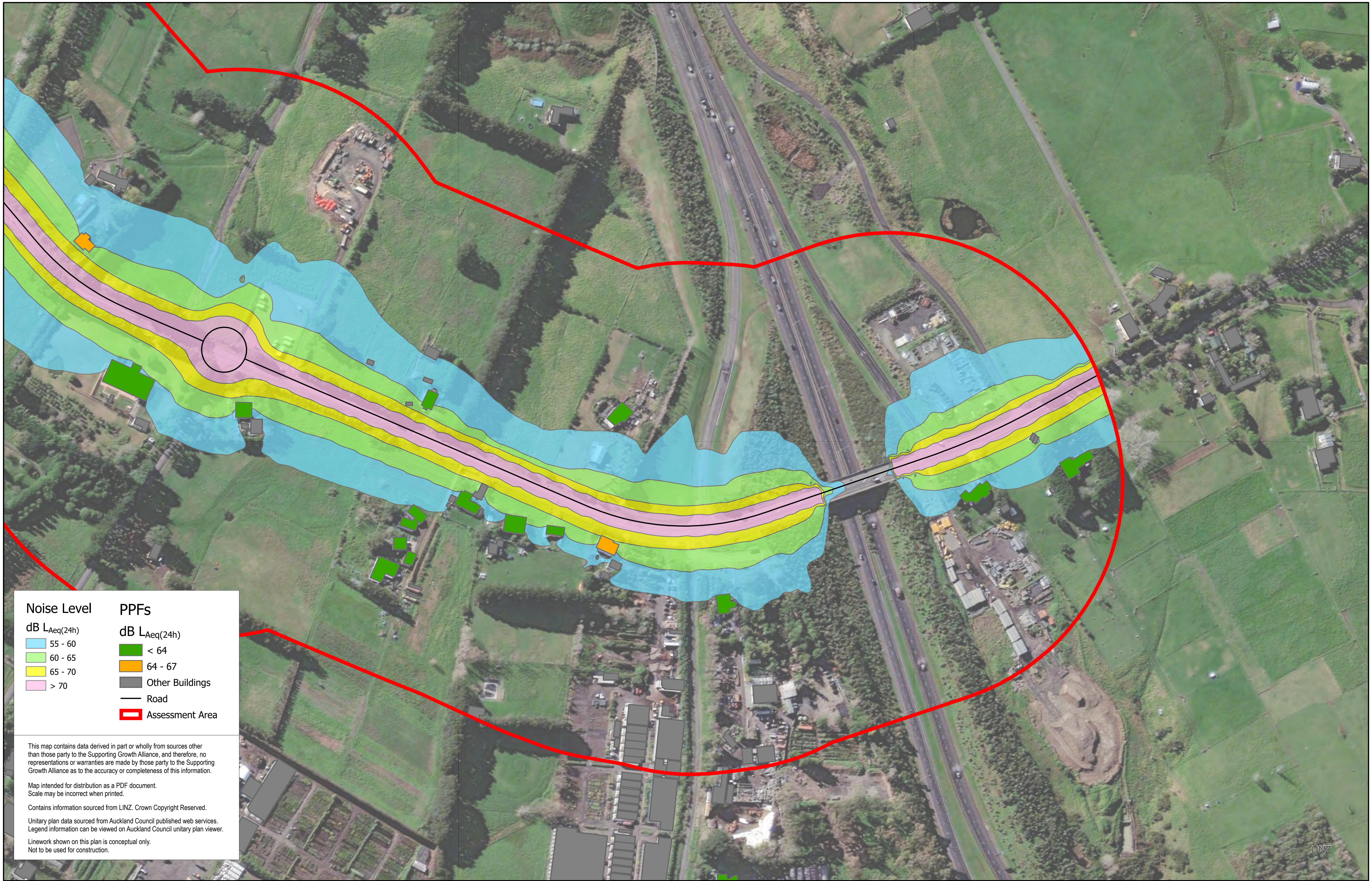
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



Map Scale @ A3:

0 30 60 120 Meters

N

Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	23/11/22

Title:

Supporting Growth

NoR W1 - Do Minimum Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

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0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title: Supporting Growth
NoR W2 - Existing Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title:

Supporting Growth

NoR W2 - Existing Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

PPFs New

dB $L_{Aeq(24h)}$

< 57

Noise Level

dB $L_{Aeq(24h)}$

55 - 60

60 - 65

65 - 70

> 70

PPFs Altered

dB $L_{Aeq(24h)}$

< 64

Other Buildings

Assessment Area

Road

Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title:

Supporting Growth

NoR W2 - Existing Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title: Supporting Growth
NoR W2 - Do Nothing Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

PPFs New

dB $L_{Aeq(24h)}$

< 57

Noise Level

dB $L_{Aeq(24h)}$

55 - 60

60 - 65

65 - 70

> 70

PPFs Altered

dB $L_{Aeq(24h)}$

< 64

Other Buildings

Assessment Area

Road

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Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title:

Supporting Growth

NoR W2 - Do Nothing Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title:

Supporting Growth

NoR W2 - Do Nothing Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

ATTACHMENT 50

NORTH-WEST WHENUAPAI
ASSESSMENT OF TRAFFIC NOISE
AND VIBRATION EFFECTS
PART 3 OF 4

Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title: Supporting Growth

NoR W2 - Do Minimum Road Traffic Noise

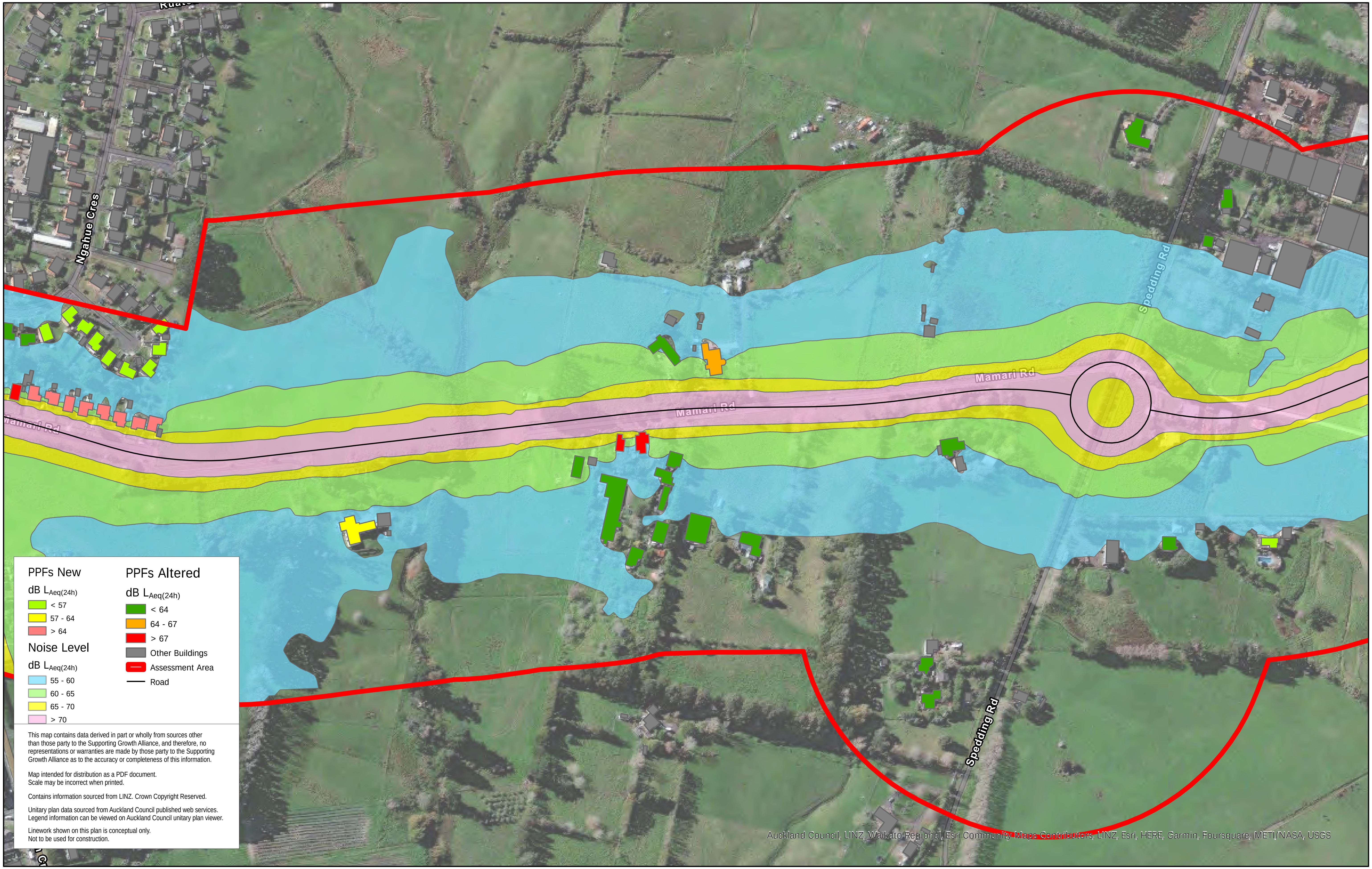
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



Map Scale @ A3:

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Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title:

Supporting Growth

NoR W2 - Do Minimum Road Traffic Noise

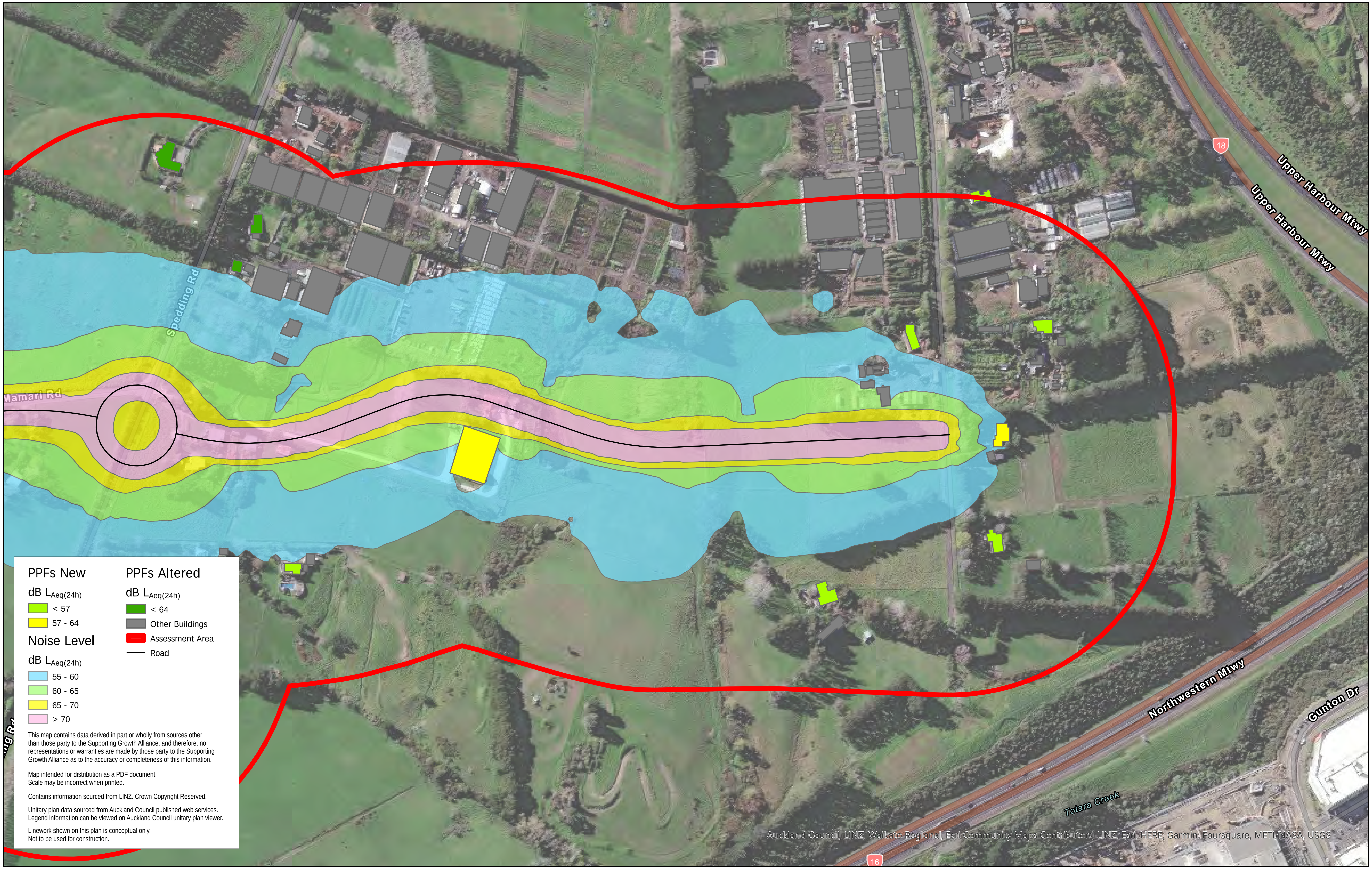
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title:

Supporting Growth

NoR W2 - Do Minimum Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

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Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title:

Supporting Growth

NoR W2 - Mitigated Road Traffic Noise

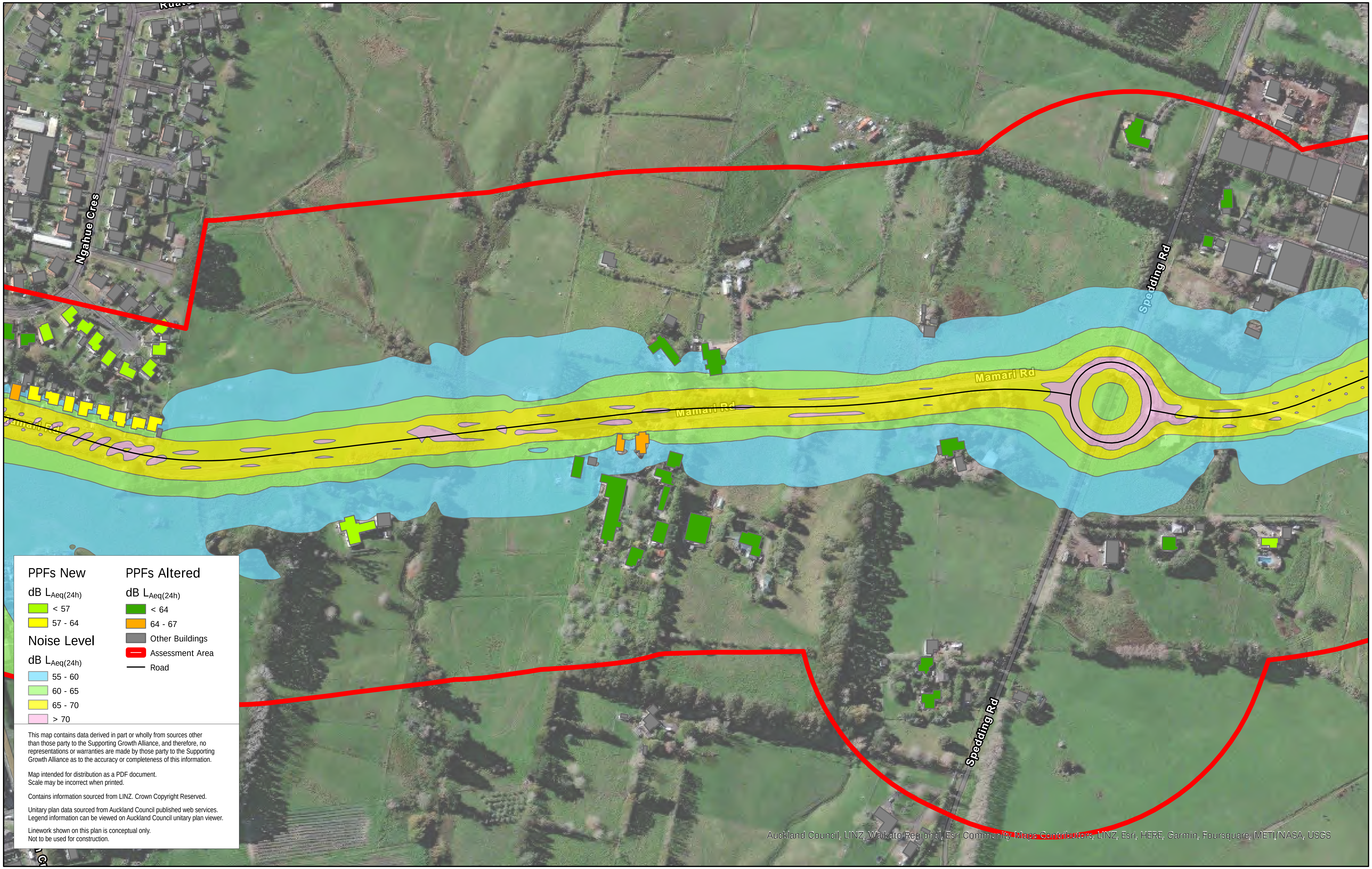
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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Map Scale @ A3:

0 30 60 120 Meters

Revision	Author	Verified	Approved	Date
1	Author	DRAFT	DRAFT	dd/mm/yyyy

Title: Supporting Growth
NoR W2 - Mitigated Road Traffic Noise

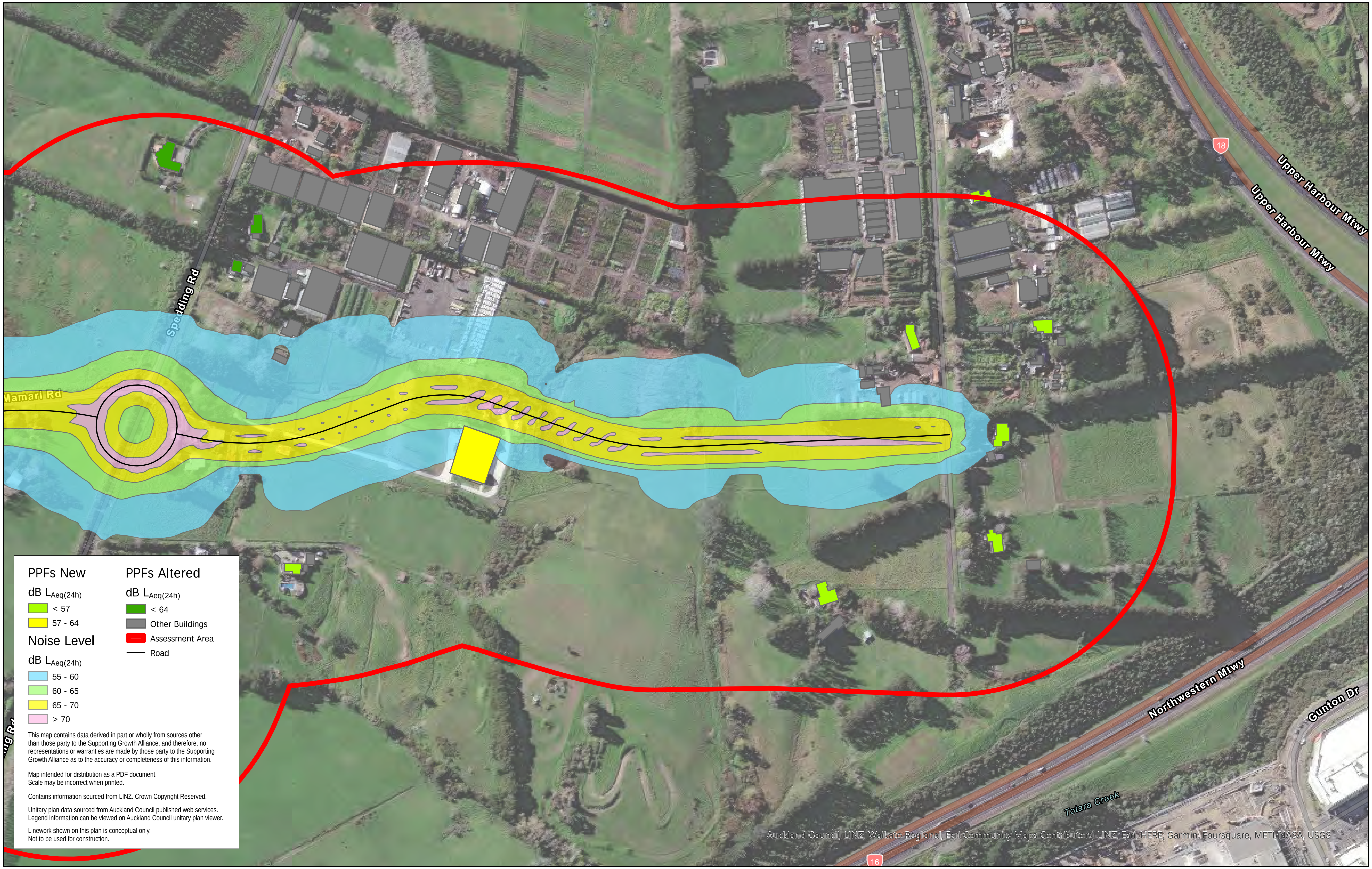
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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Project: North West Package

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Supporting Growth

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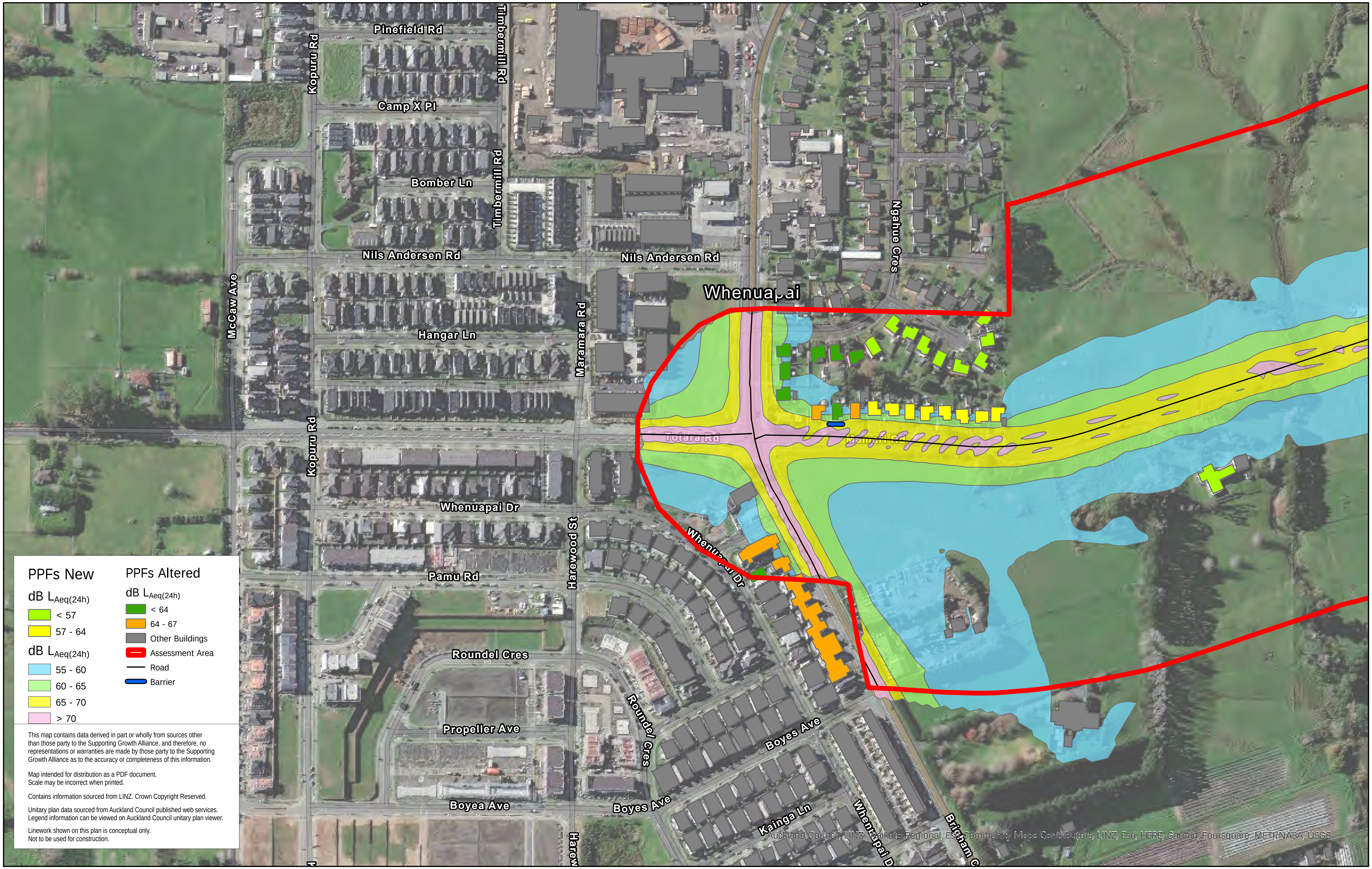

PPFs New

dB $L_{Aeq(24h)}$
- < 57
- 57 - 64

dB $L_{Aeq(24h)}$
- 55 - 60
- 60 - 65
- 65 - 70
- > 70

PPFs Altered

dB $L_{Aeq(24h)}$
- < 64
- 64 - 67
- Other Buildings
- Assessment Area
- Road
- Barrier

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Revision	Author	Verified	Approved	Date
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Title:

Supporting Growth

NoR W2 - Mitigated Road Traffic Noise 2

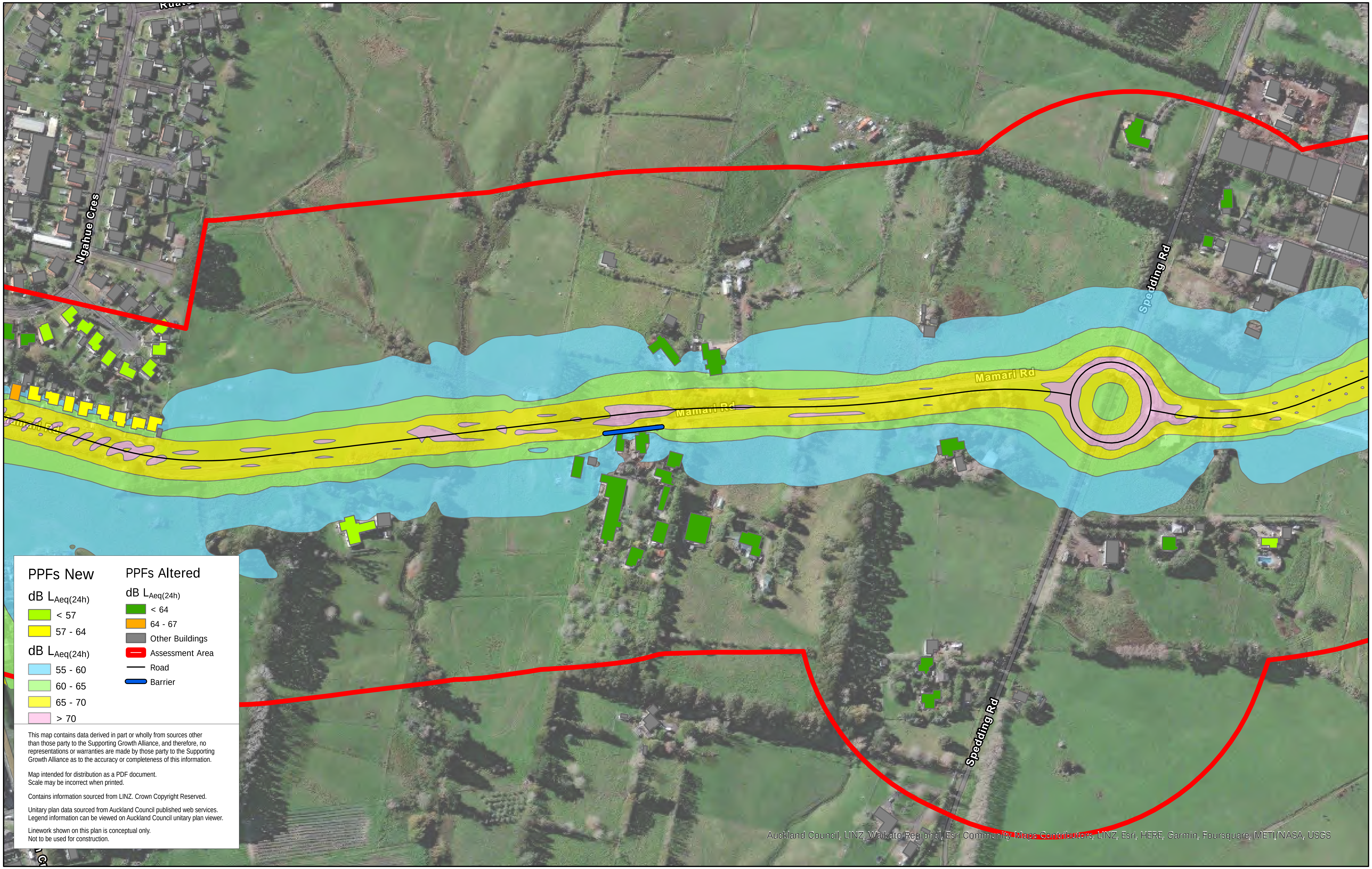
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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Title: Supporting Growth
NoR W2 - Mitigated Road Traffic Noise 2

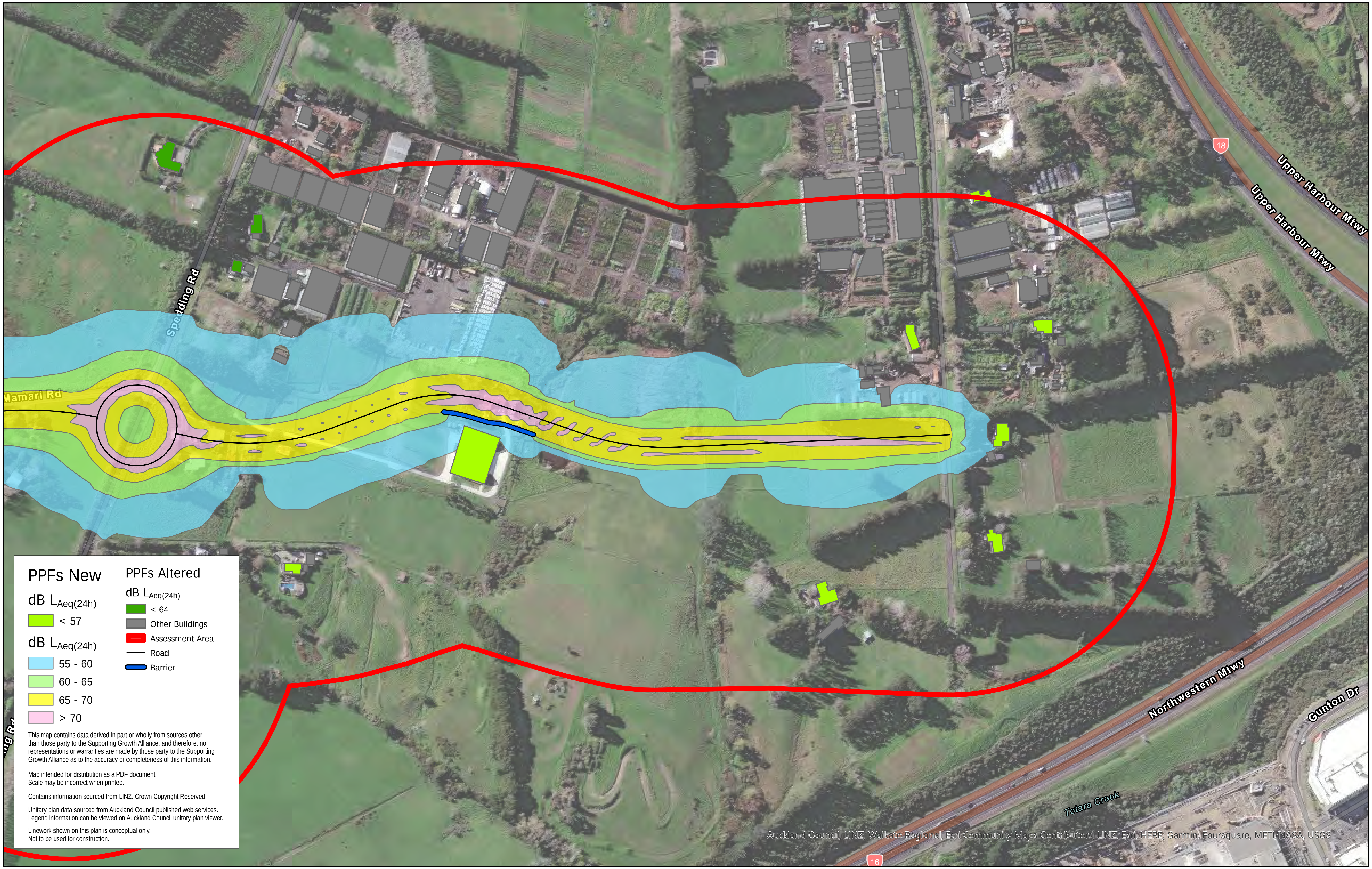
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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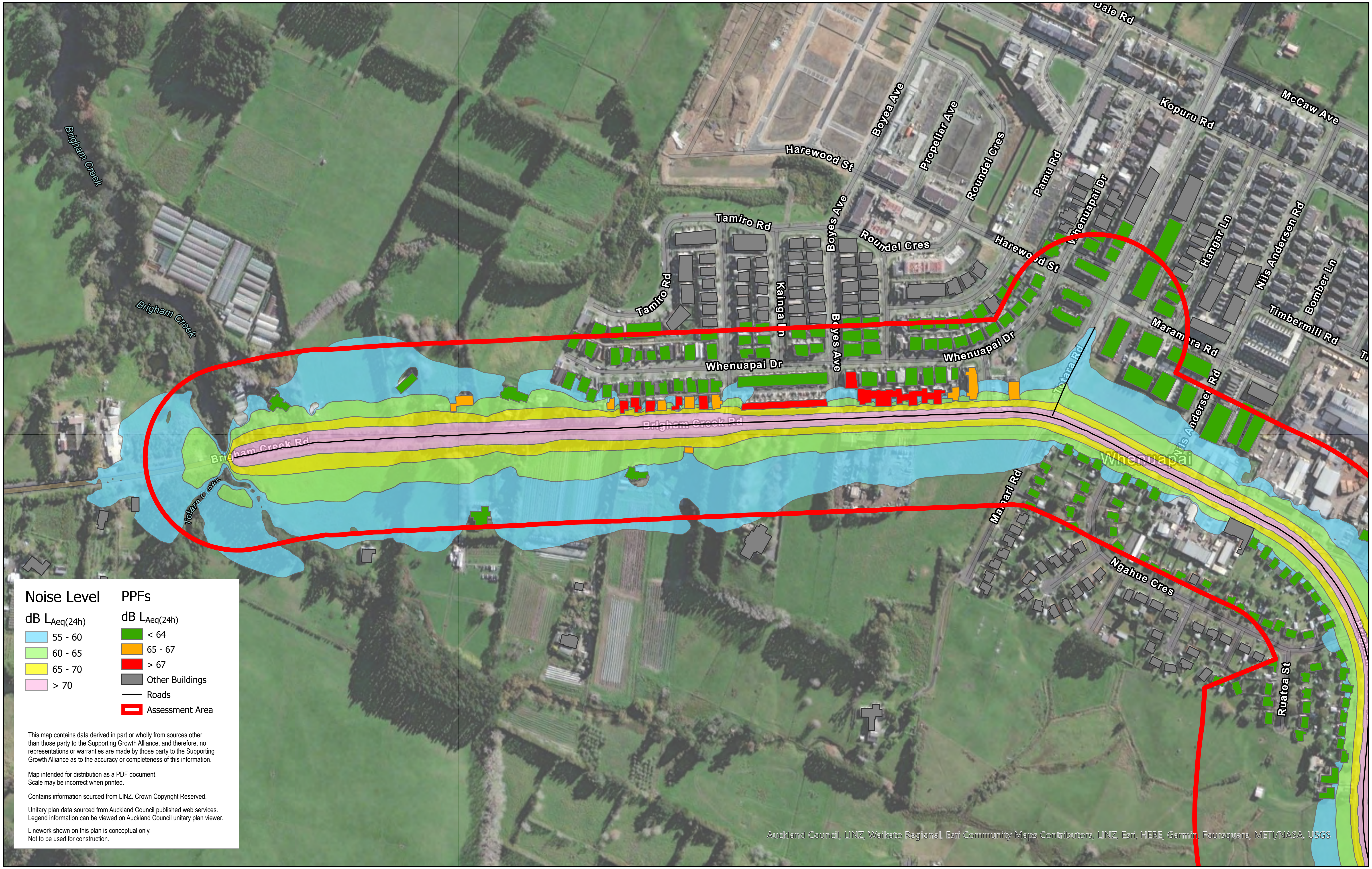
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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Revision	Author	Verified	Approved	Date
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Title:

Supporting Growth

NoR W3 - Existing Road Traffic Noise

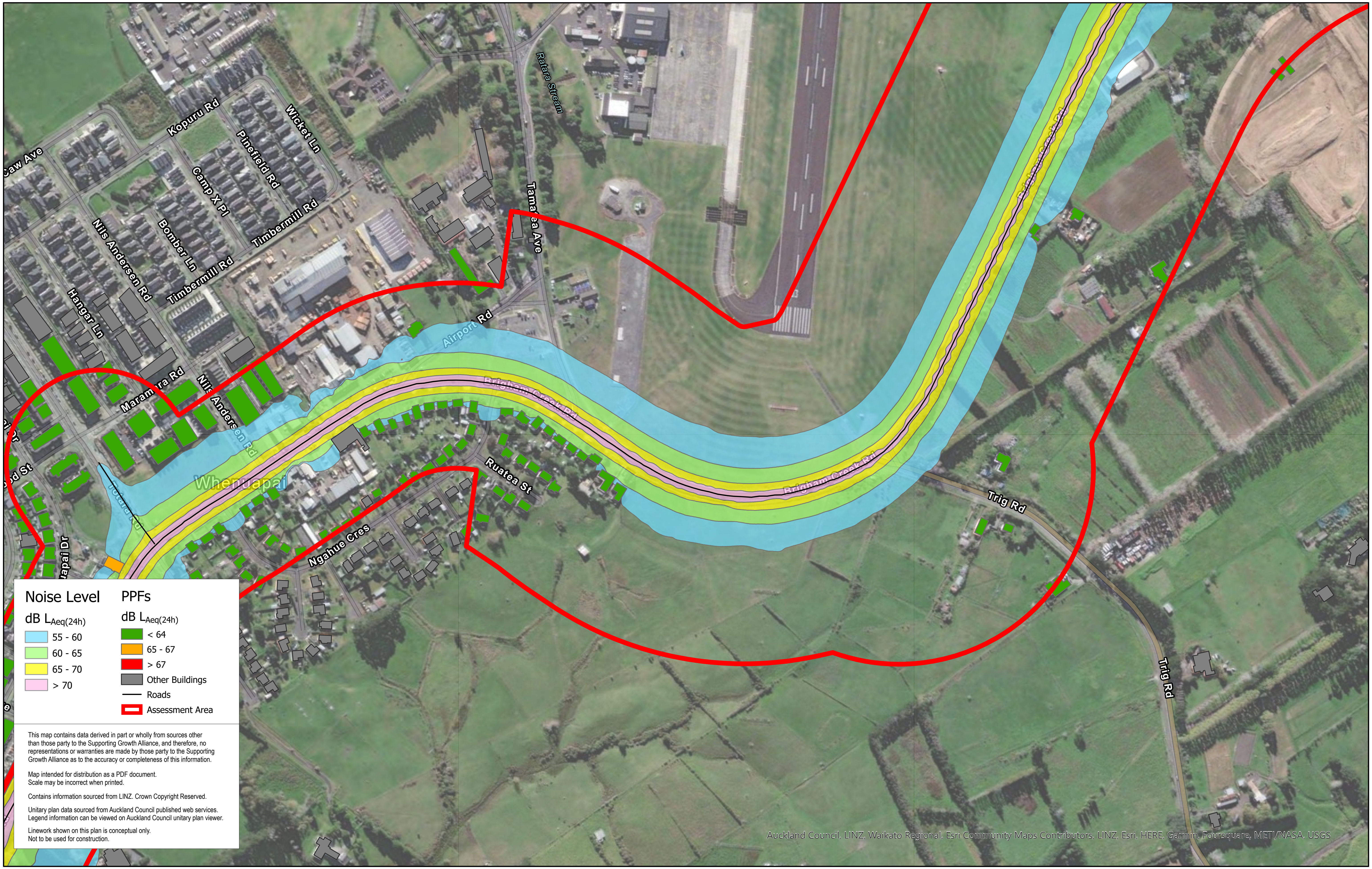
Client: **Supporting Growth**

Project: **North West Package**

TE TUPU NGĀTAHI
Supporting Growth

Discipline: **GIS**

Drawing No: **SGA-NOR-W1-000**



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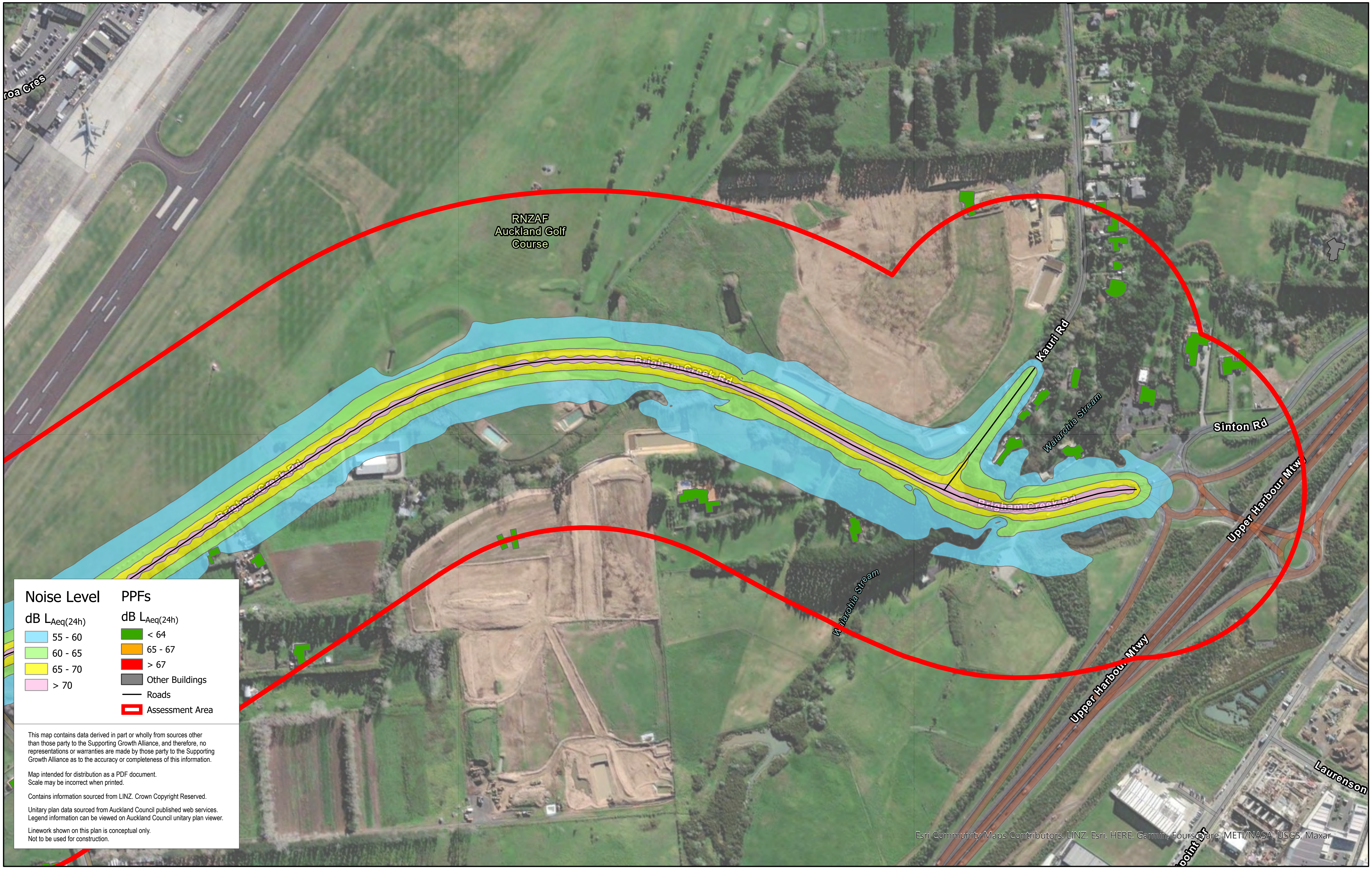

Noise Level

dB $L_{Aeq(24h)}$

- 55 - 60
- 60 - 65
- 65 - 70
- > 70

PPFs

dB $L_{Aeq(24h)}$

- < 64
- 65 - 67
- > 67
- Other Buildings
- Roads
- Assessment Area

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Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

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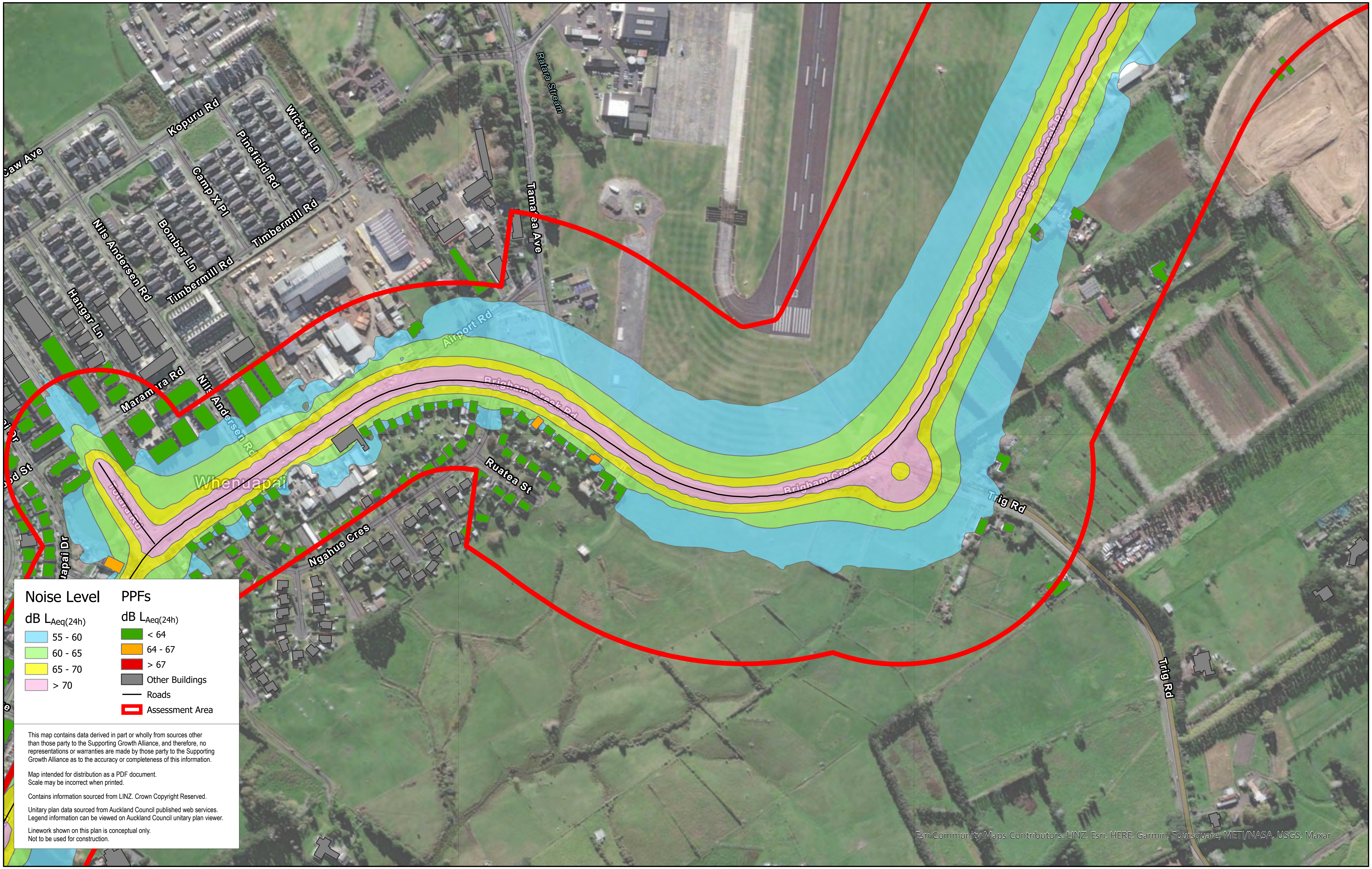

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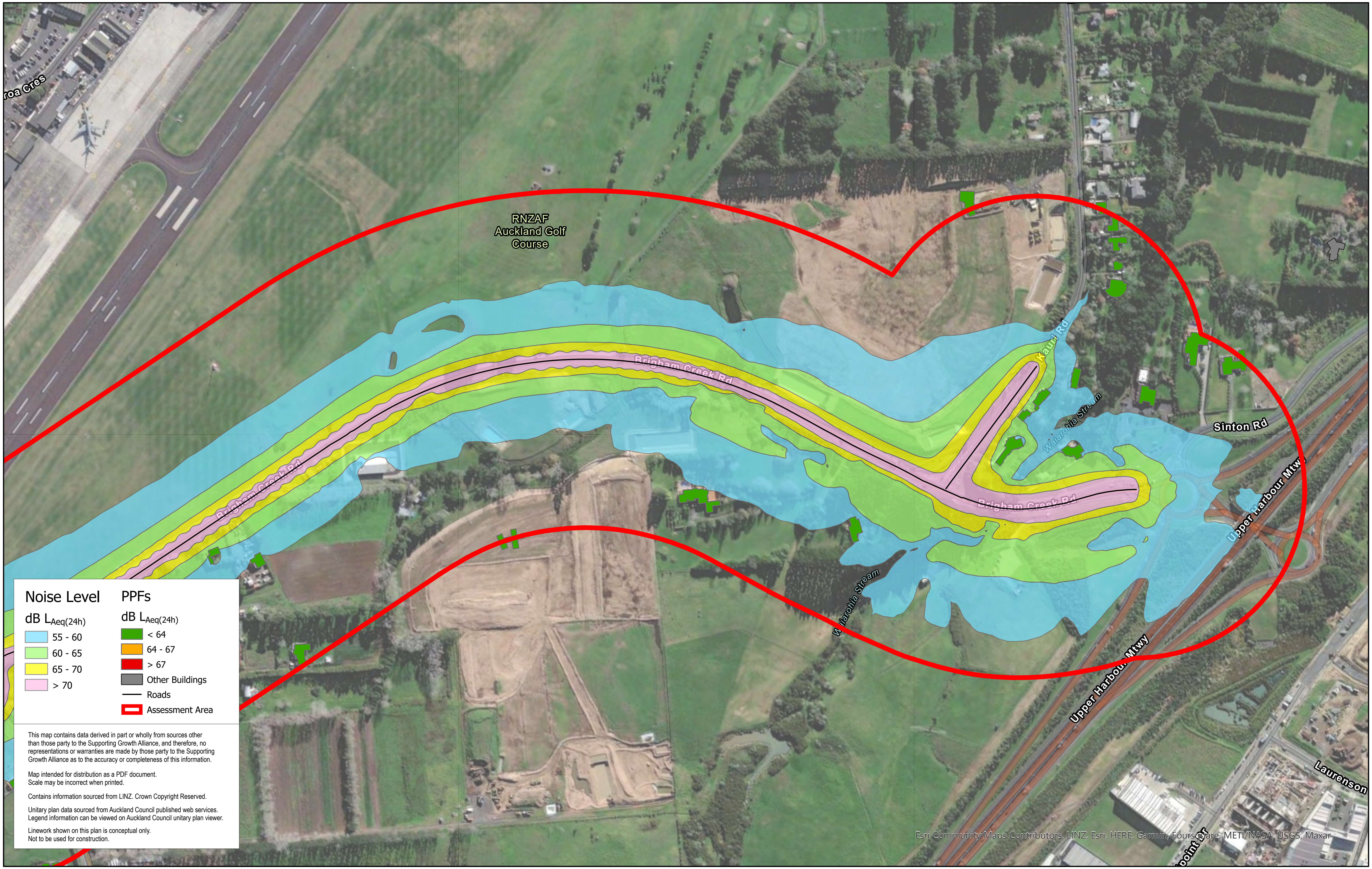

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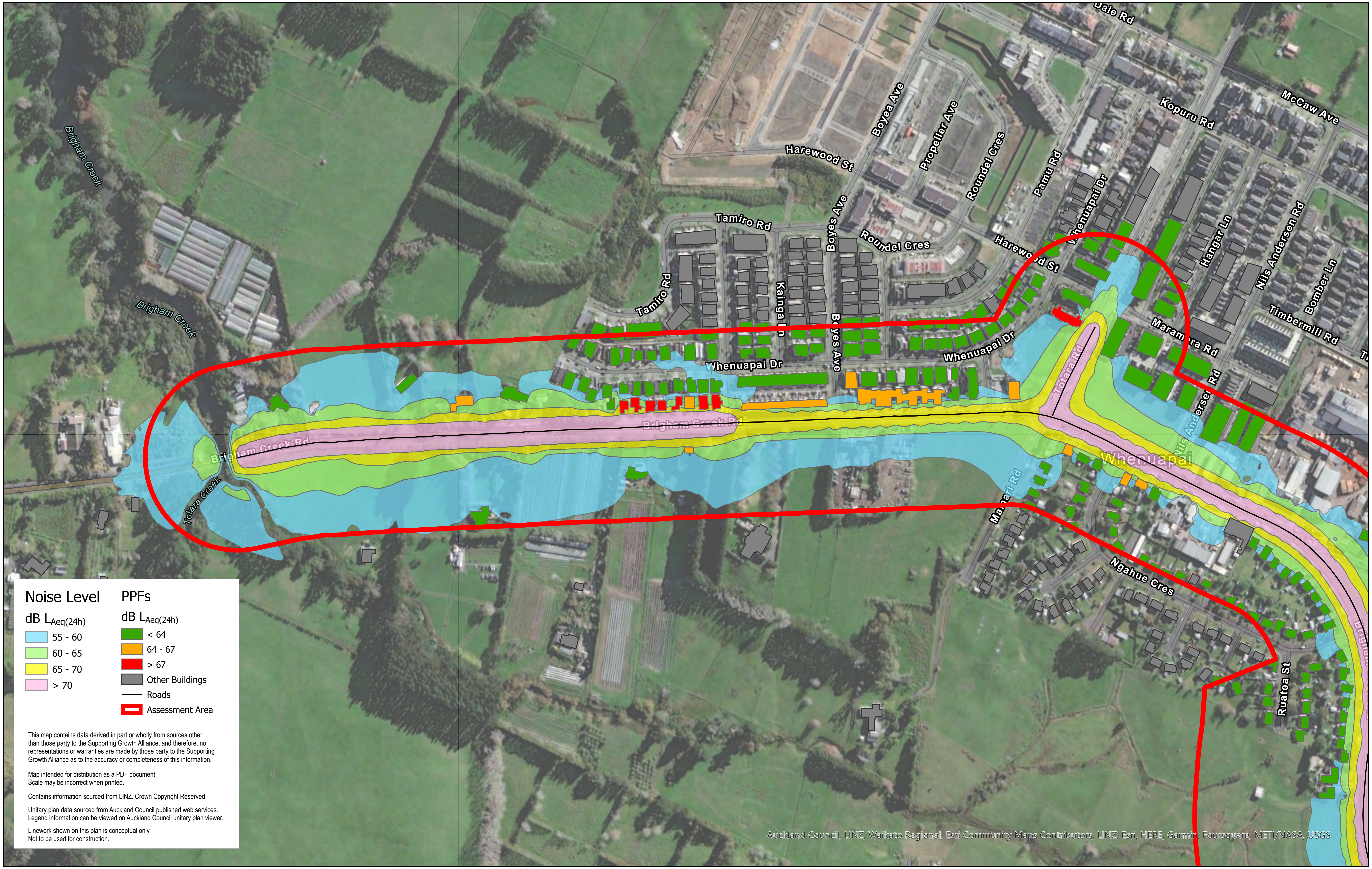

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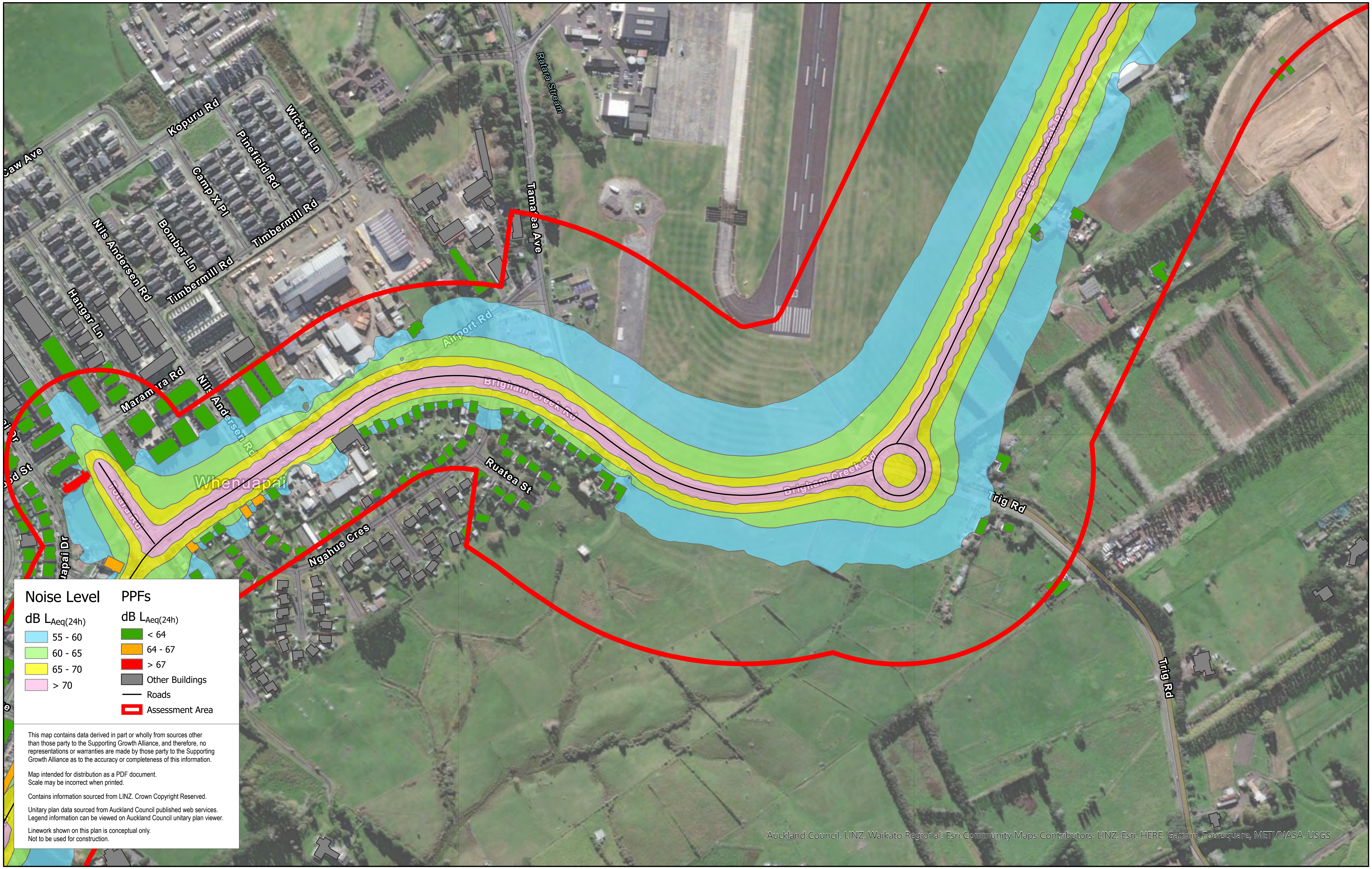

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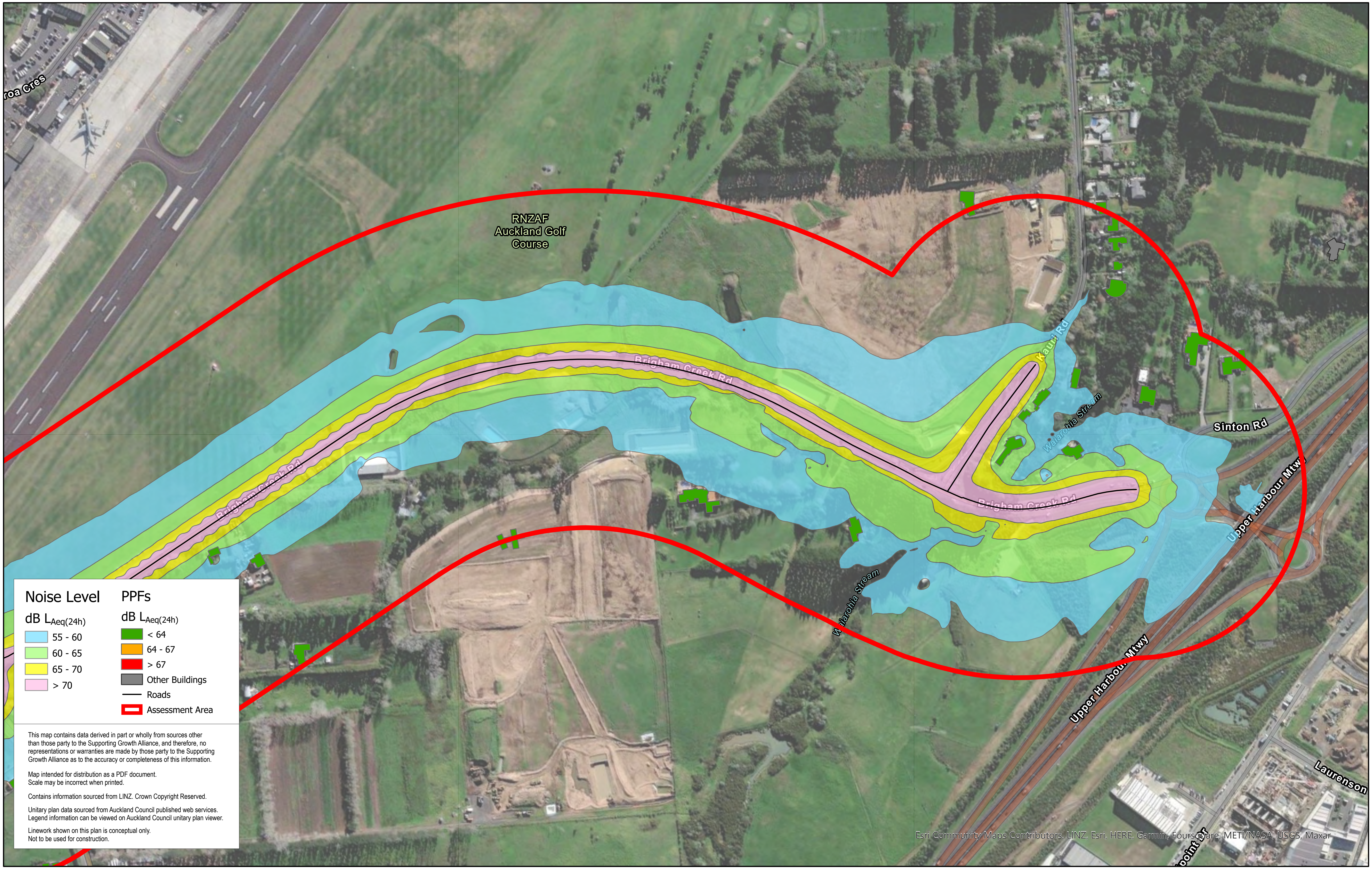

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Supporting Growth

NoR W3 - Do Minimum Road Traffic Noise

Client: **Supporting Growth**

Project: **North West Package**

TE TUPU NGĀTAHI
Supporting Growth

Discipline: **GIS**

Drawing No: **SGA-NOR-W1-000**

Map Scale @ A3:
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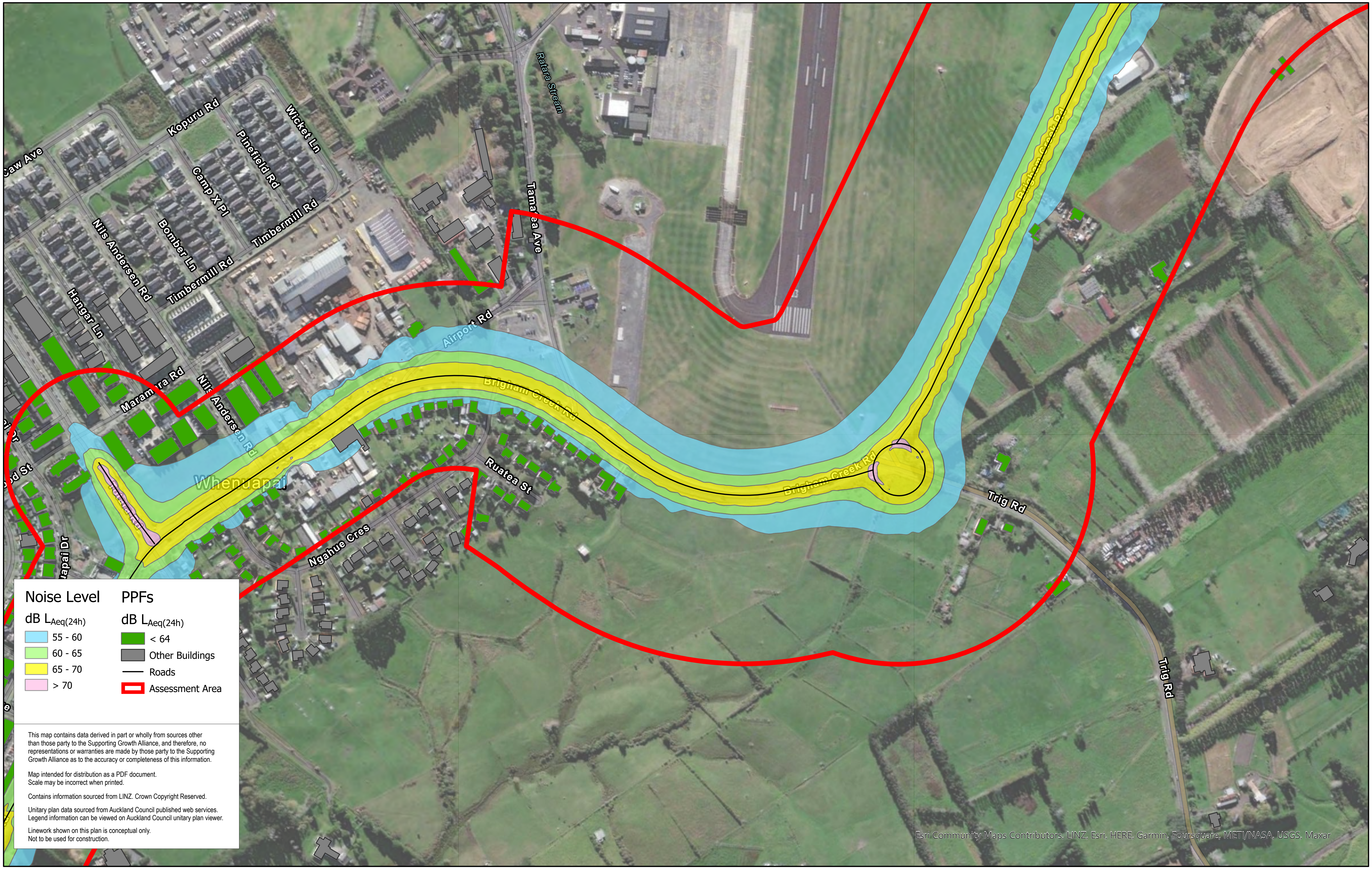
Title:
Supporting Growth
NoR W3 - Mitigated Road Traffic Noise

Client: Supporting Growth
Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS
Drawing No: SGA-NOR-W1-000



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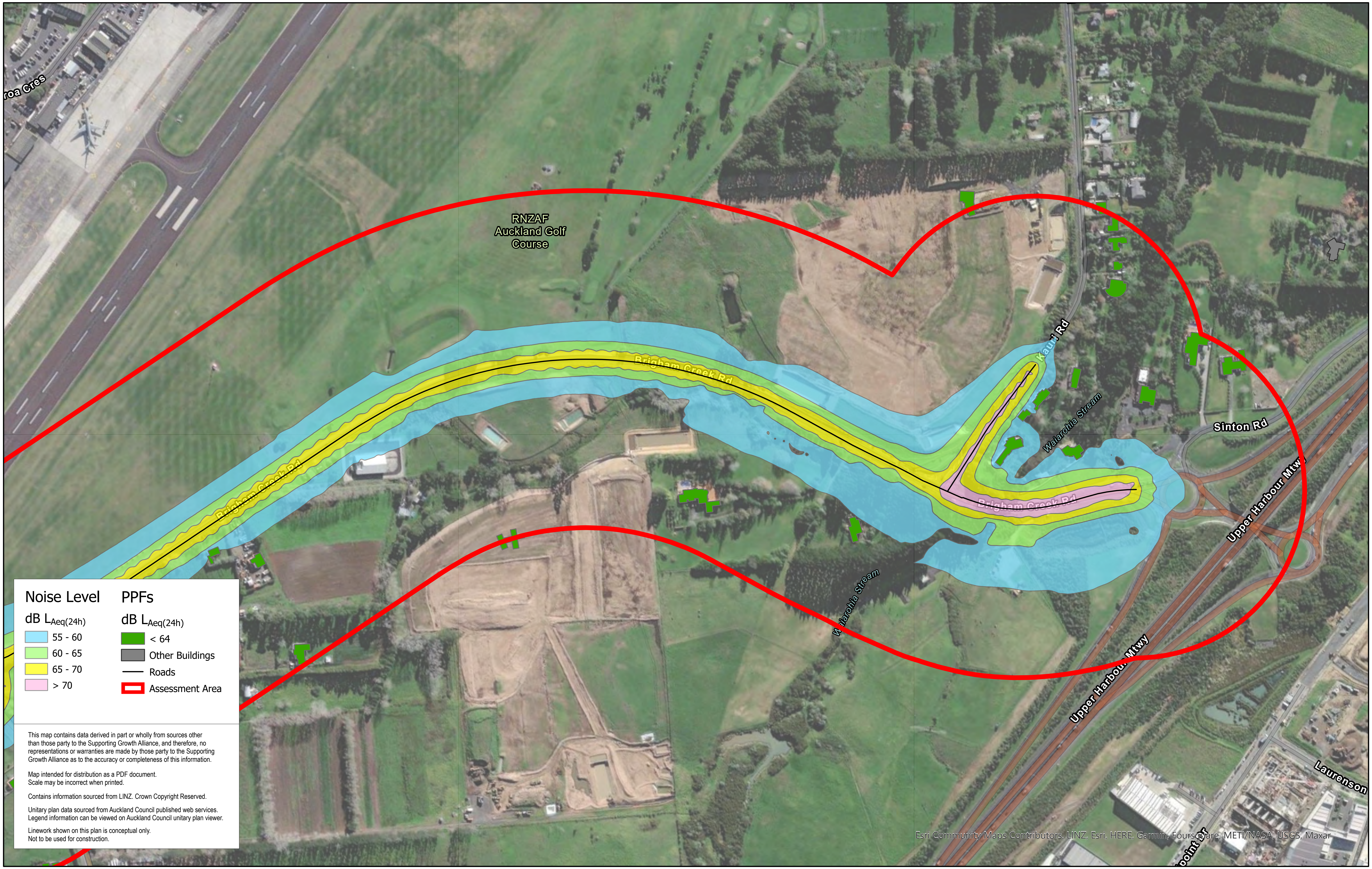

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Supporting Growth

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Drawing No: SGA-NOR-W1-000

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Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	23/11/22

Title:

Supporting Growth

NoR W4 - Existing Road Traffic Noise

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

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NoR W4 - Existing Road Traffic Noise

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Project: North West Package

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Supporting Growth

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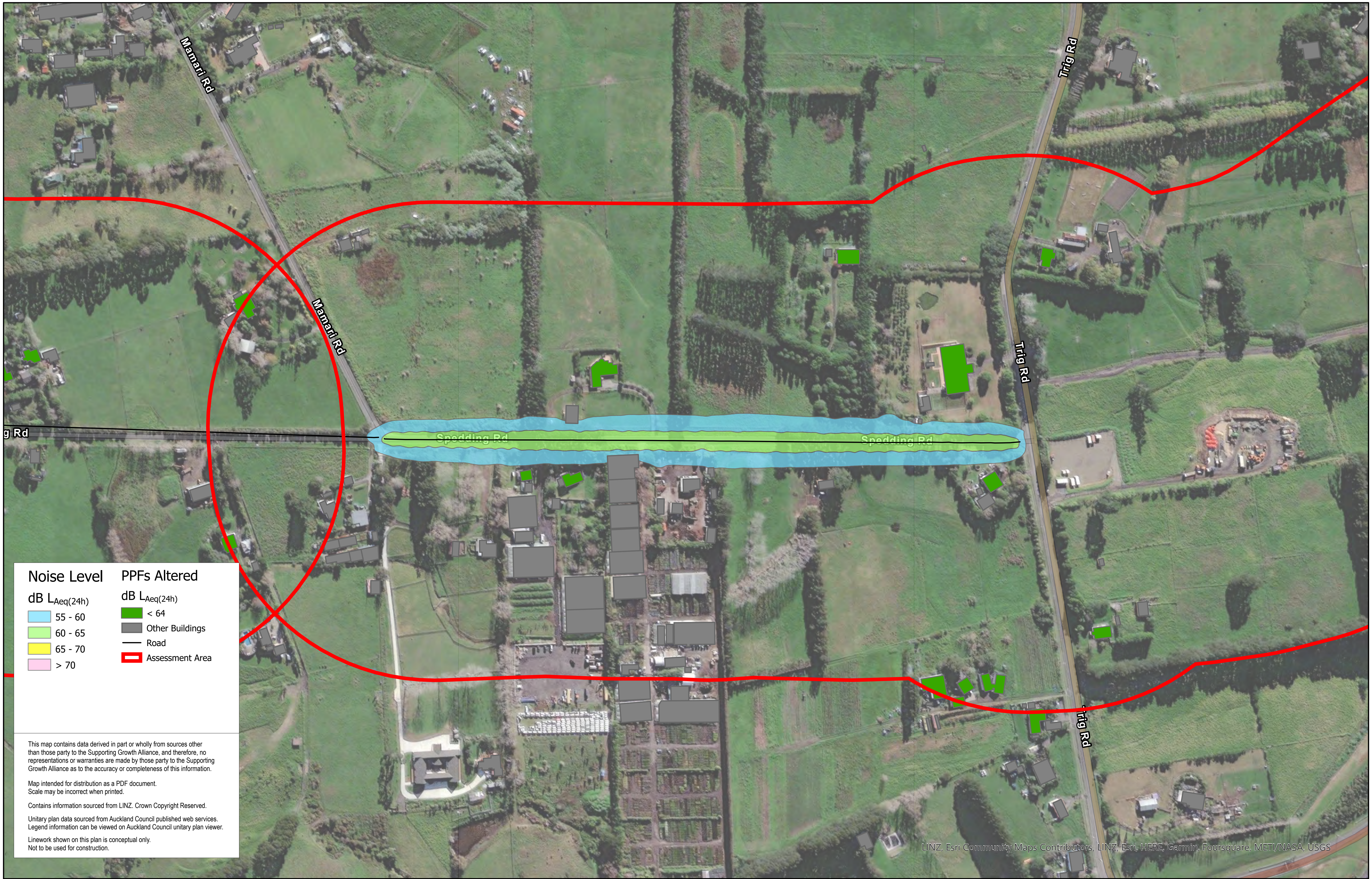

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NoR W4 - Do Nothing Road Traffic Noise

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TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Noise Level

dB $L_{Aeq(24h)}$

- 55 - 60
- 60 - 65
- 65 - 70
- > 70

PPFs Altered

dB $L_{Aeq(24h)}$

- < 64
- Other Buildings
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Supporting Growth

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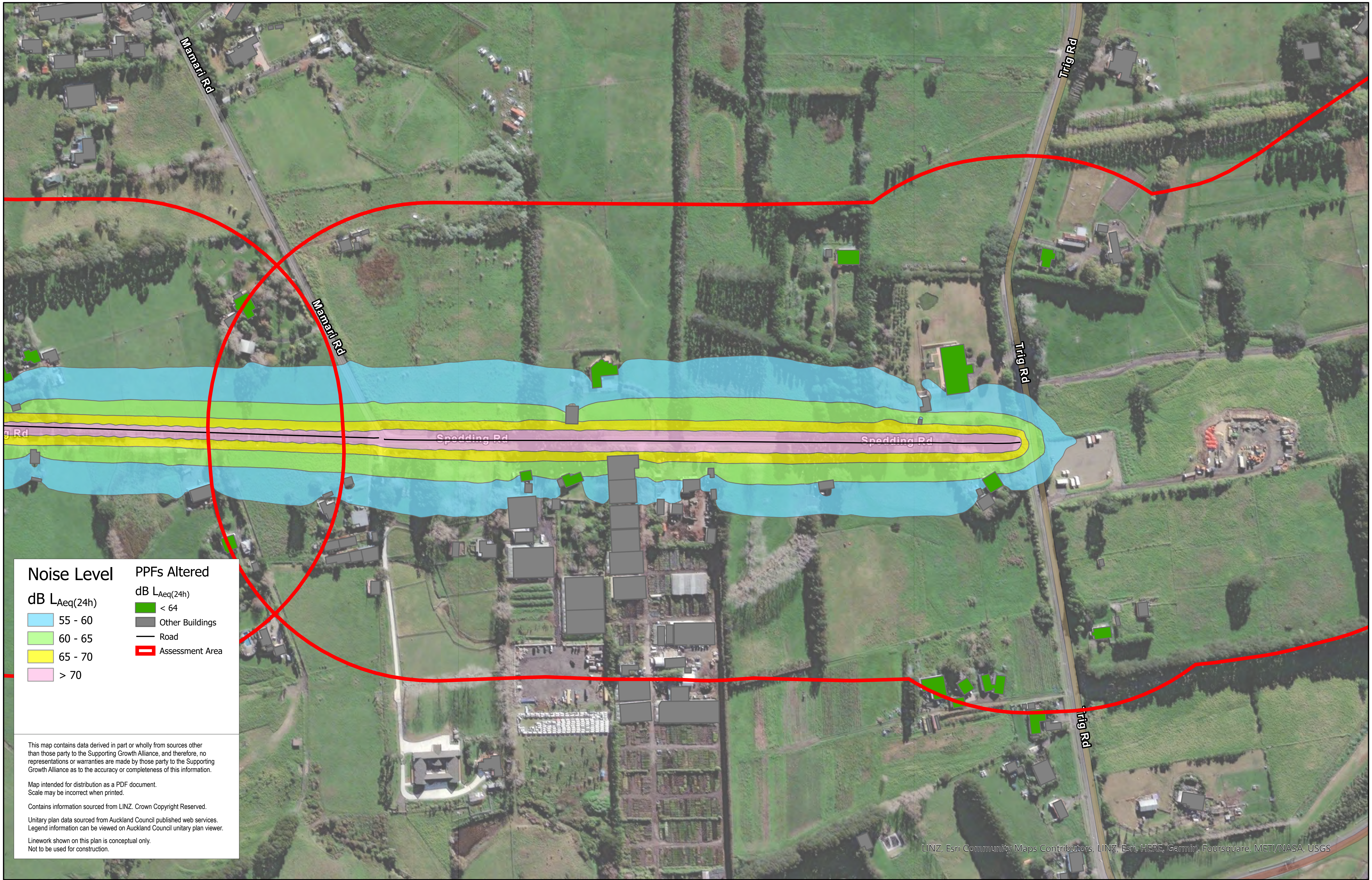

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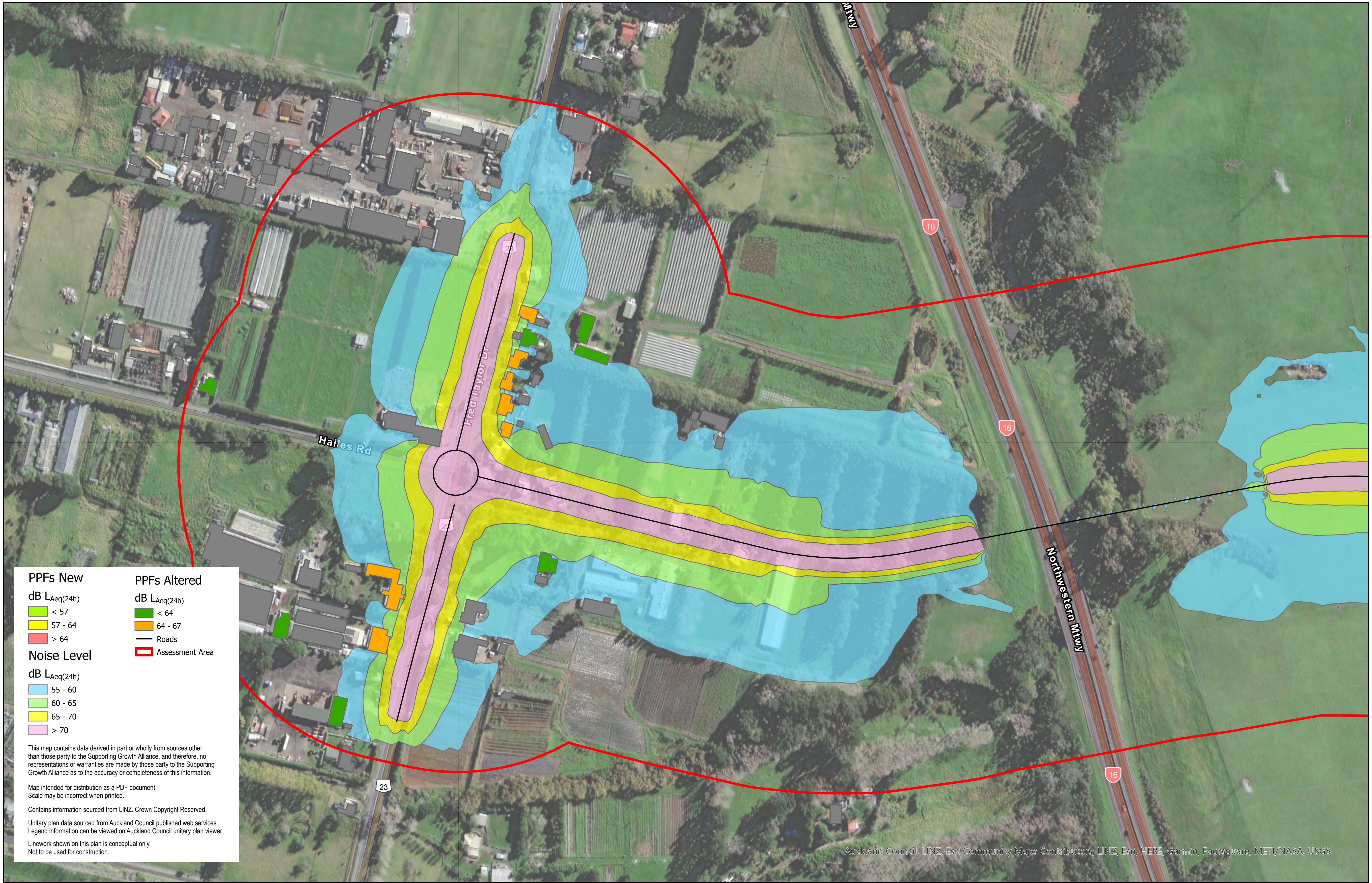

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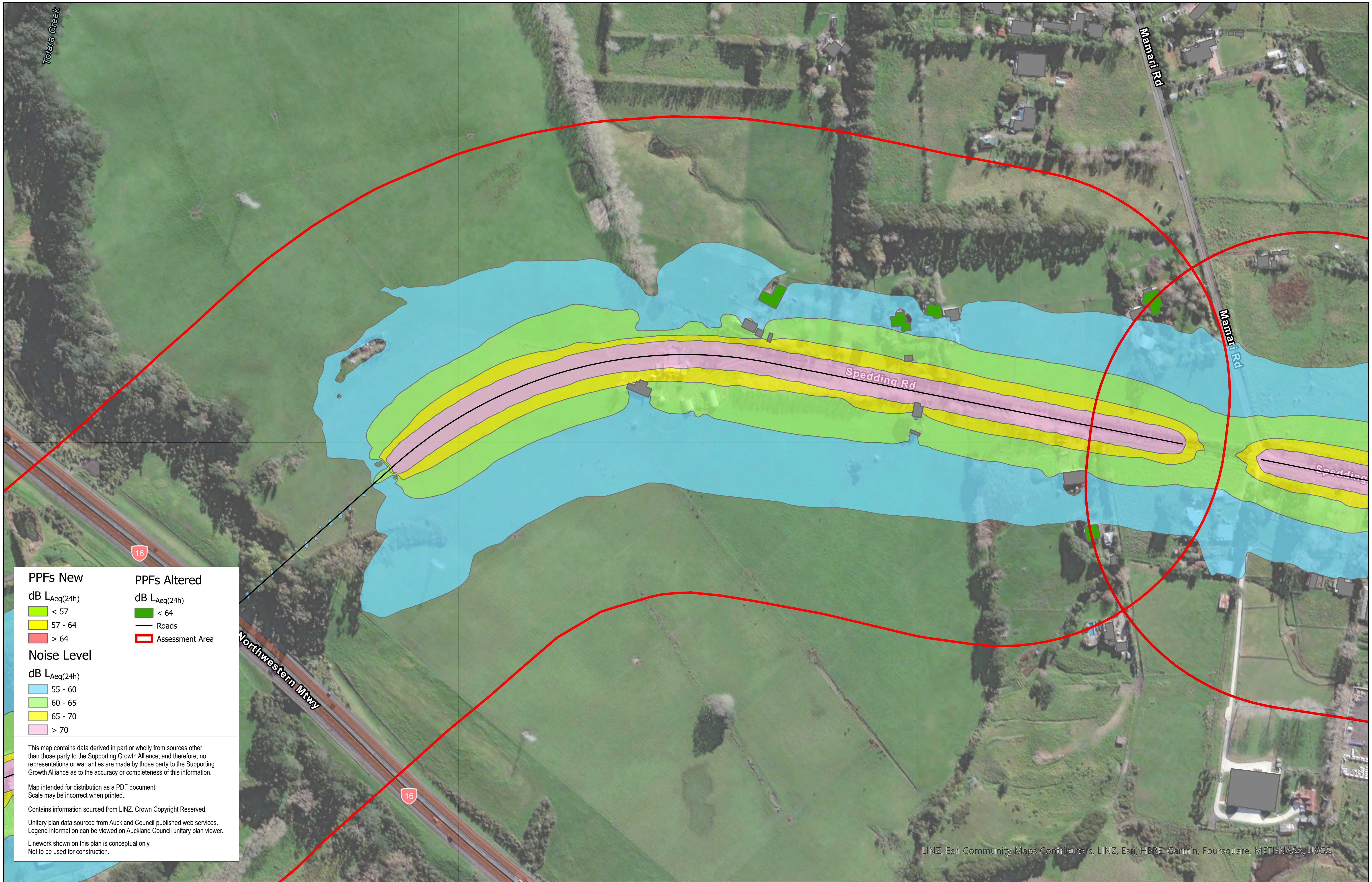

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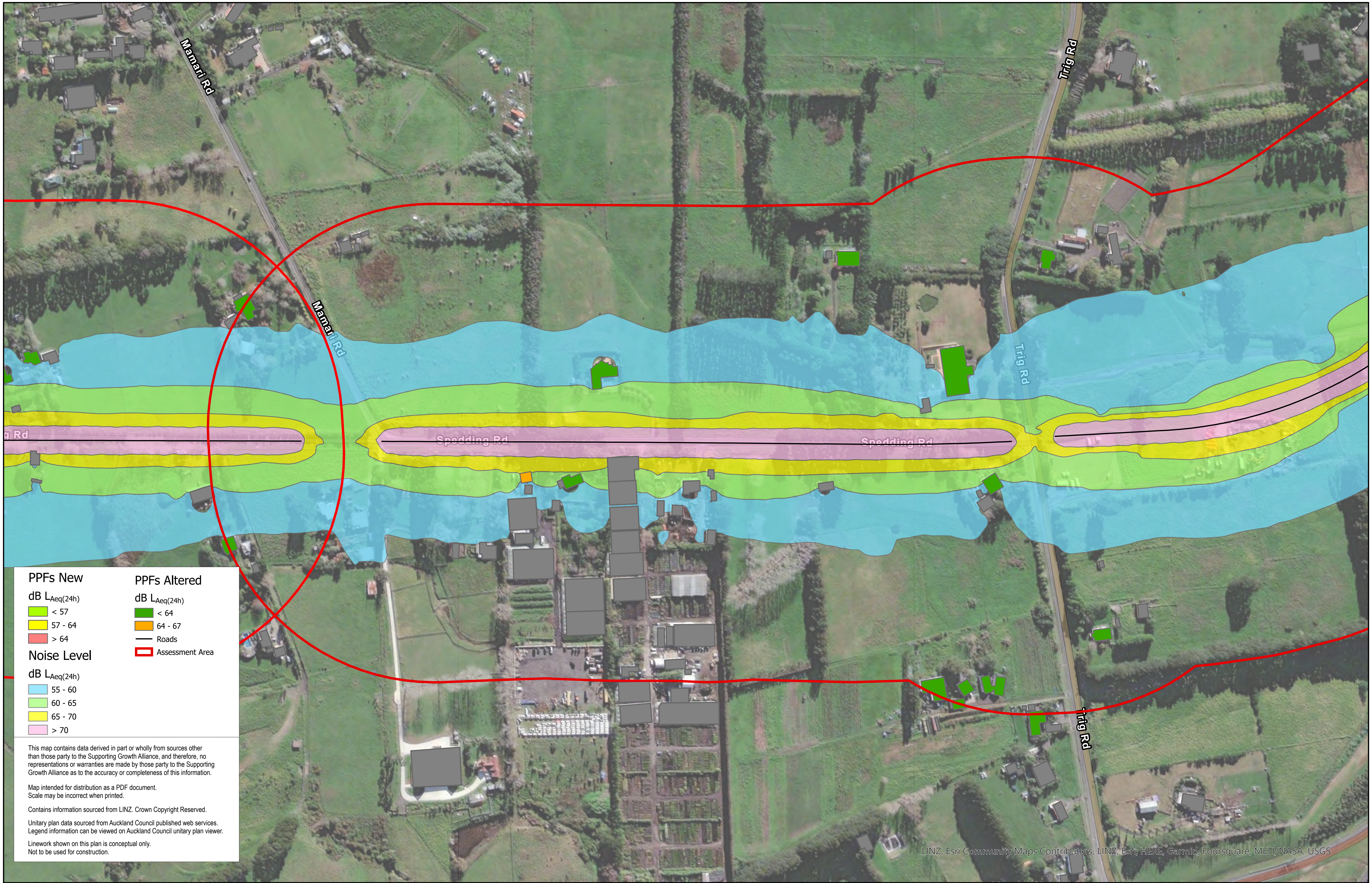

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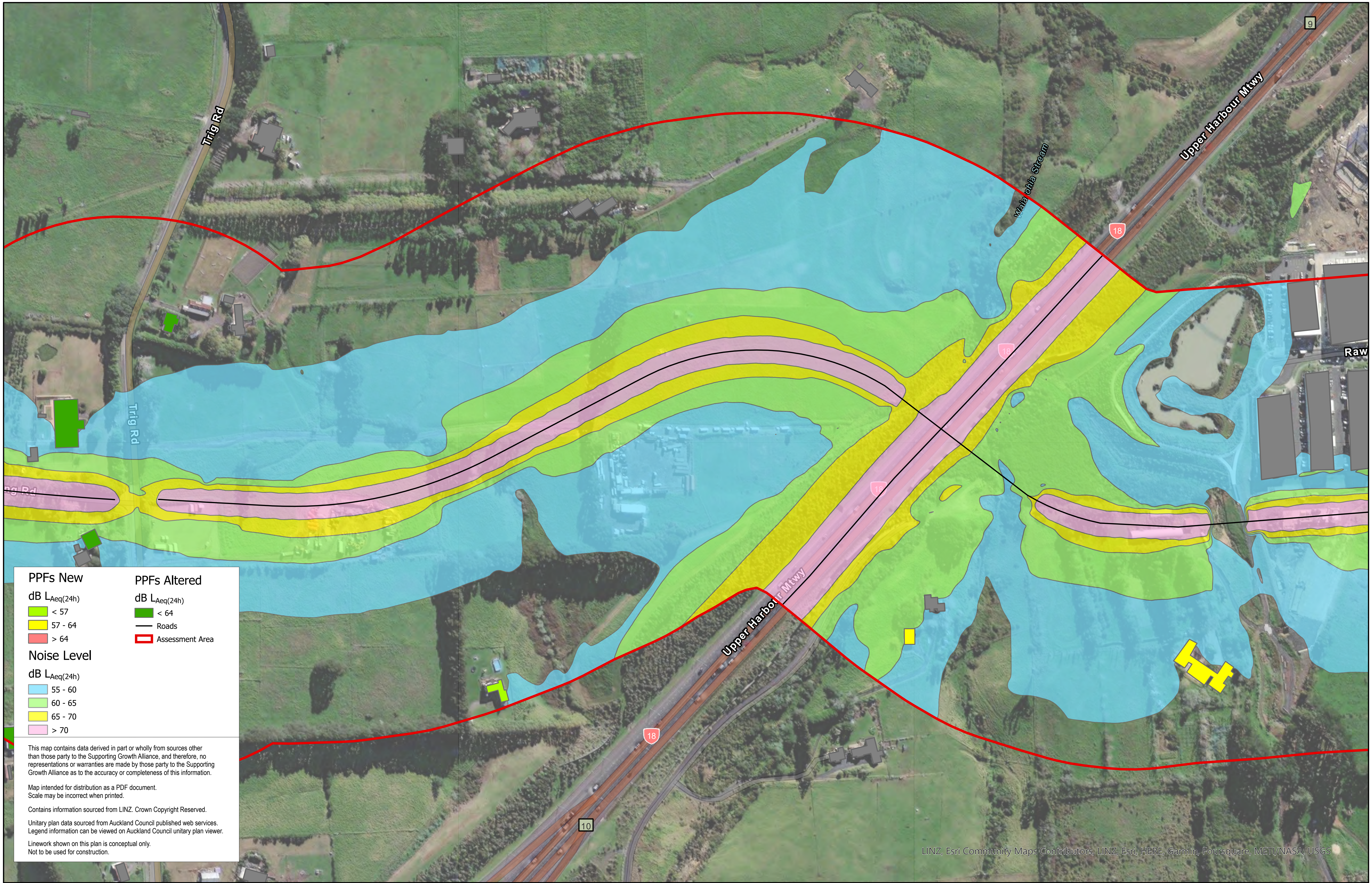

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1	DA	SJ	CD	23/11/22

Title:

Supporting Growth

NoR W4 - Do Minimum Road Traffic Noise

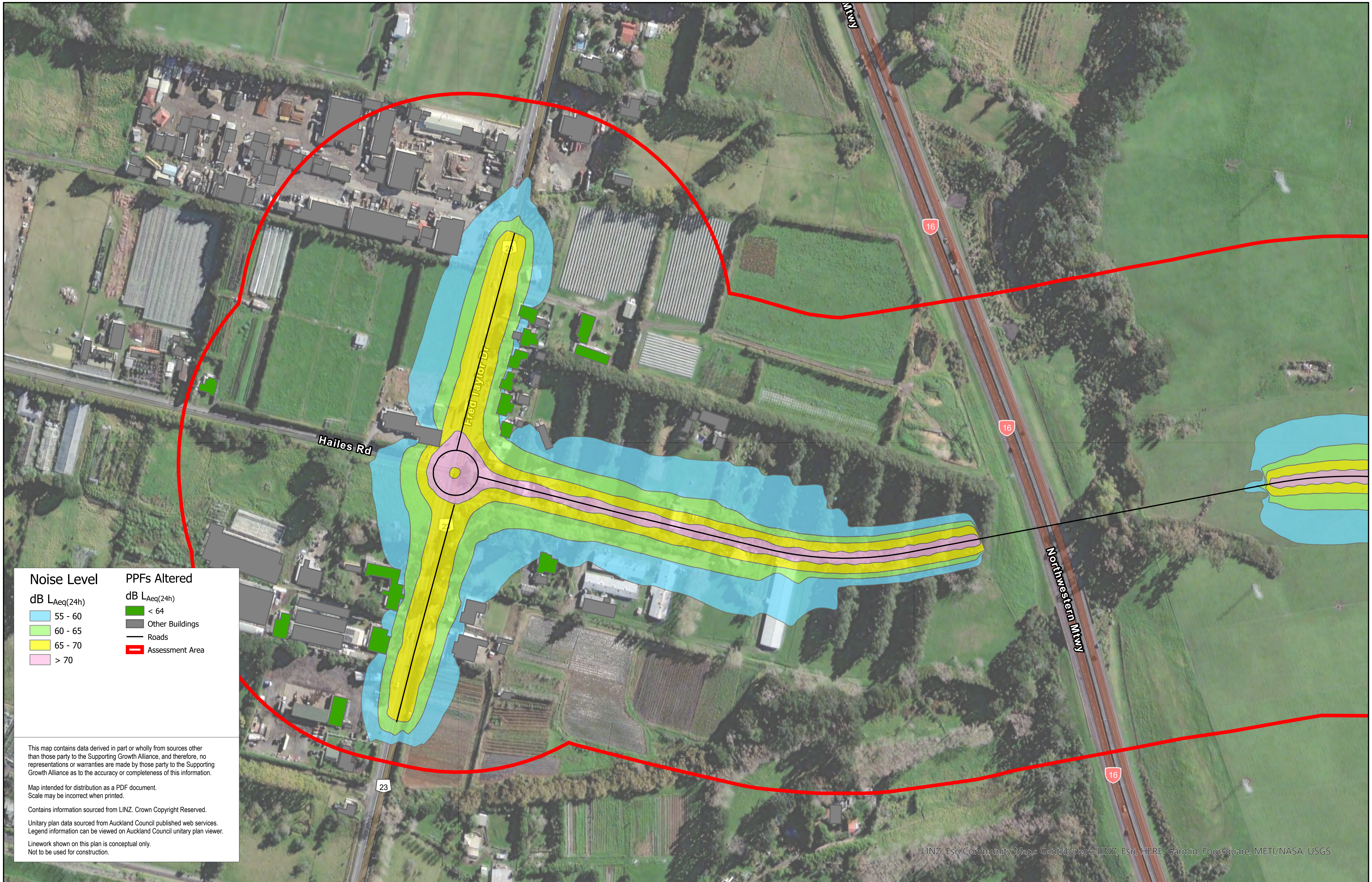
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI
Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



Map Scale @ A3:

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N

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Title:

Supporting Growth

NoR W4 - Mitigated Road Traffic Noise

Client: **Supporting Growth**

Project: **North West Package**

TE TUPU NGĀTAHI
Supporting Growth

Discipline: **GIS**

Drawing No: **SGA-NOR-W1-000**

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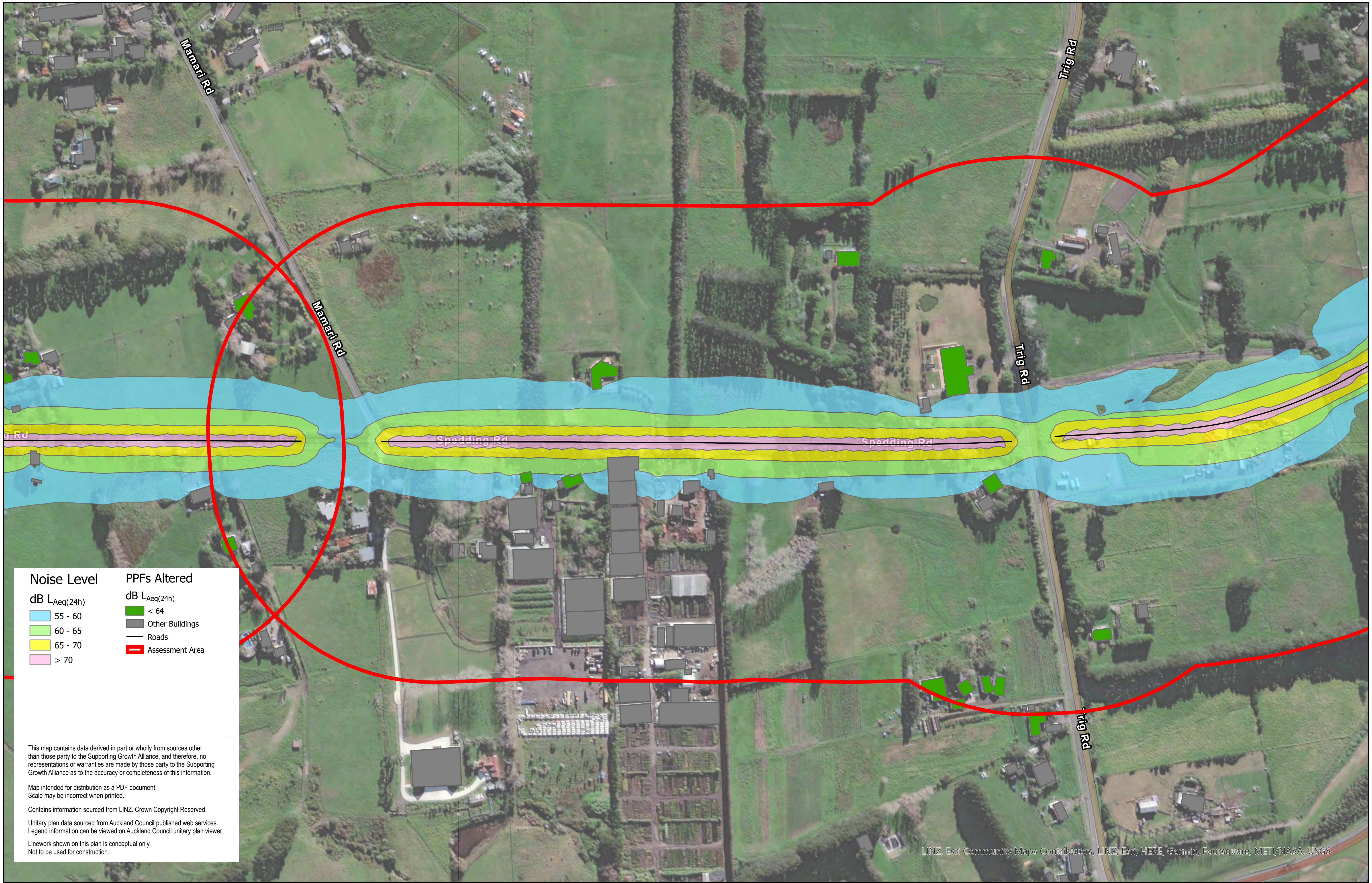
Discipline: **GIS**

Drawing No: **SGA-NOR-W1-000**



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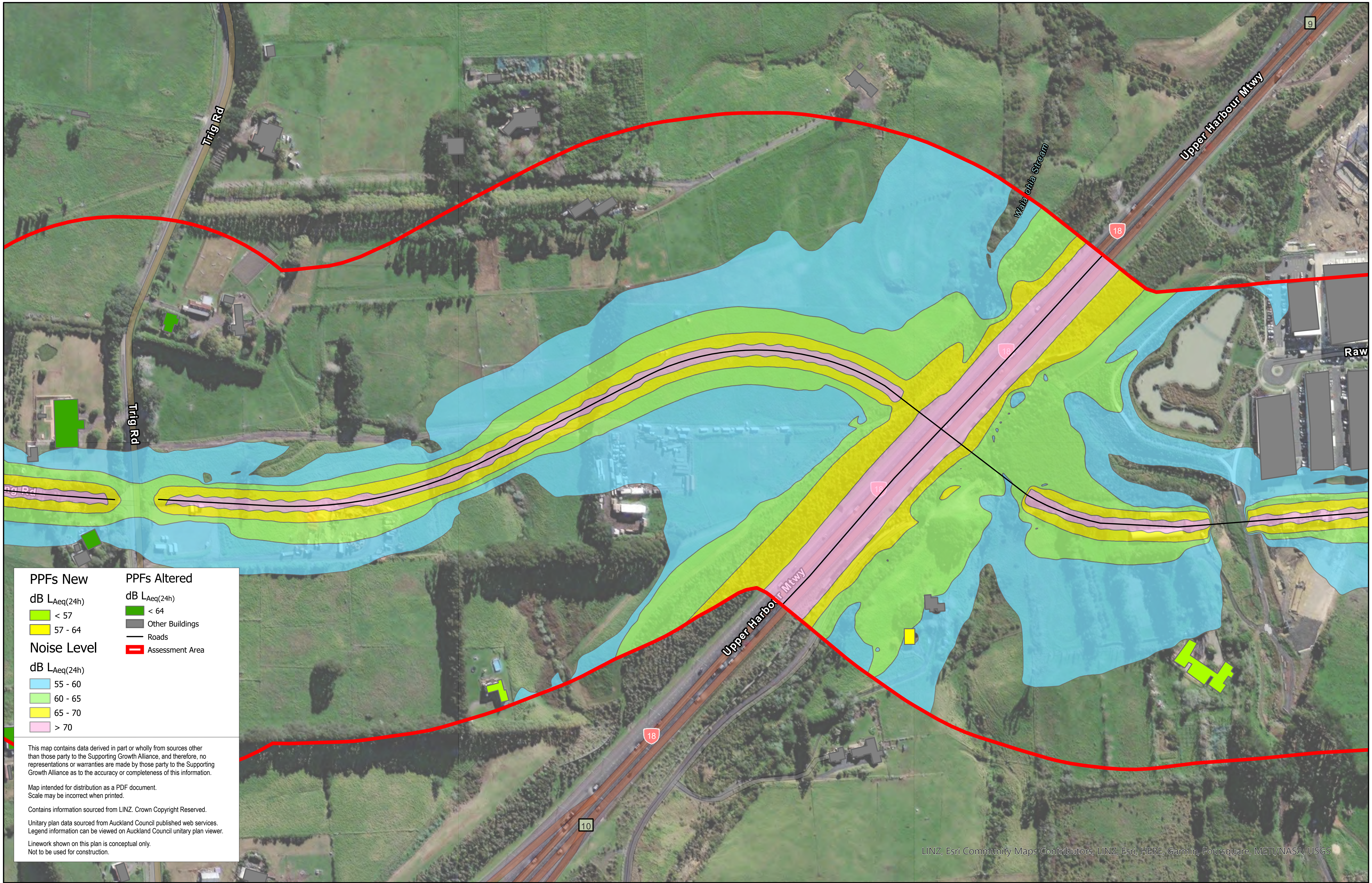

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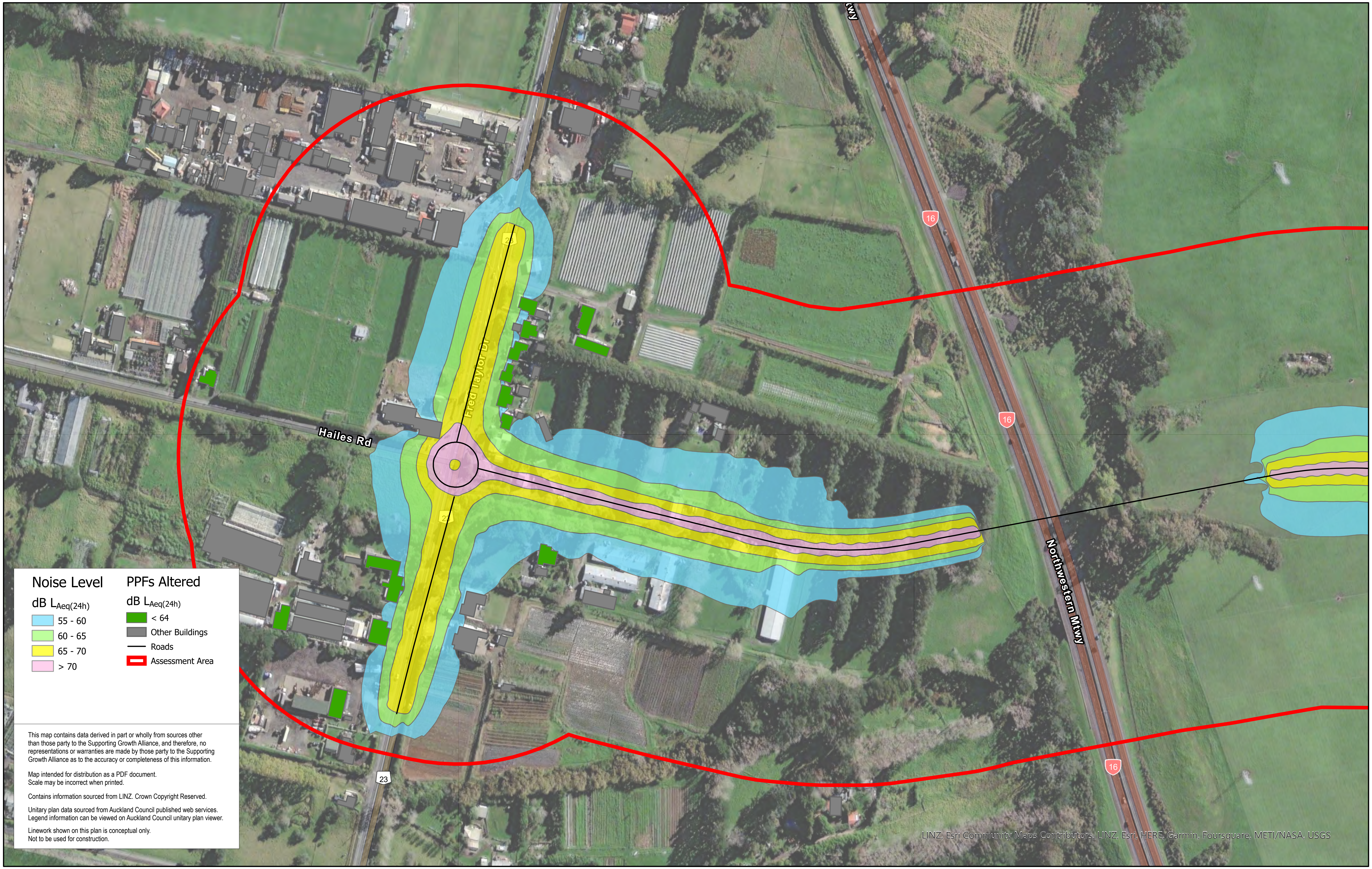
ATTACHMENT 51

NORTH-WEST WHENUAPAI
ASSESSMENT OF TRAFFIC NOISE
AND VIBRATION EFFECTS
PART 4 OF 4



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Drawing No: SGA-NOR-W1-000

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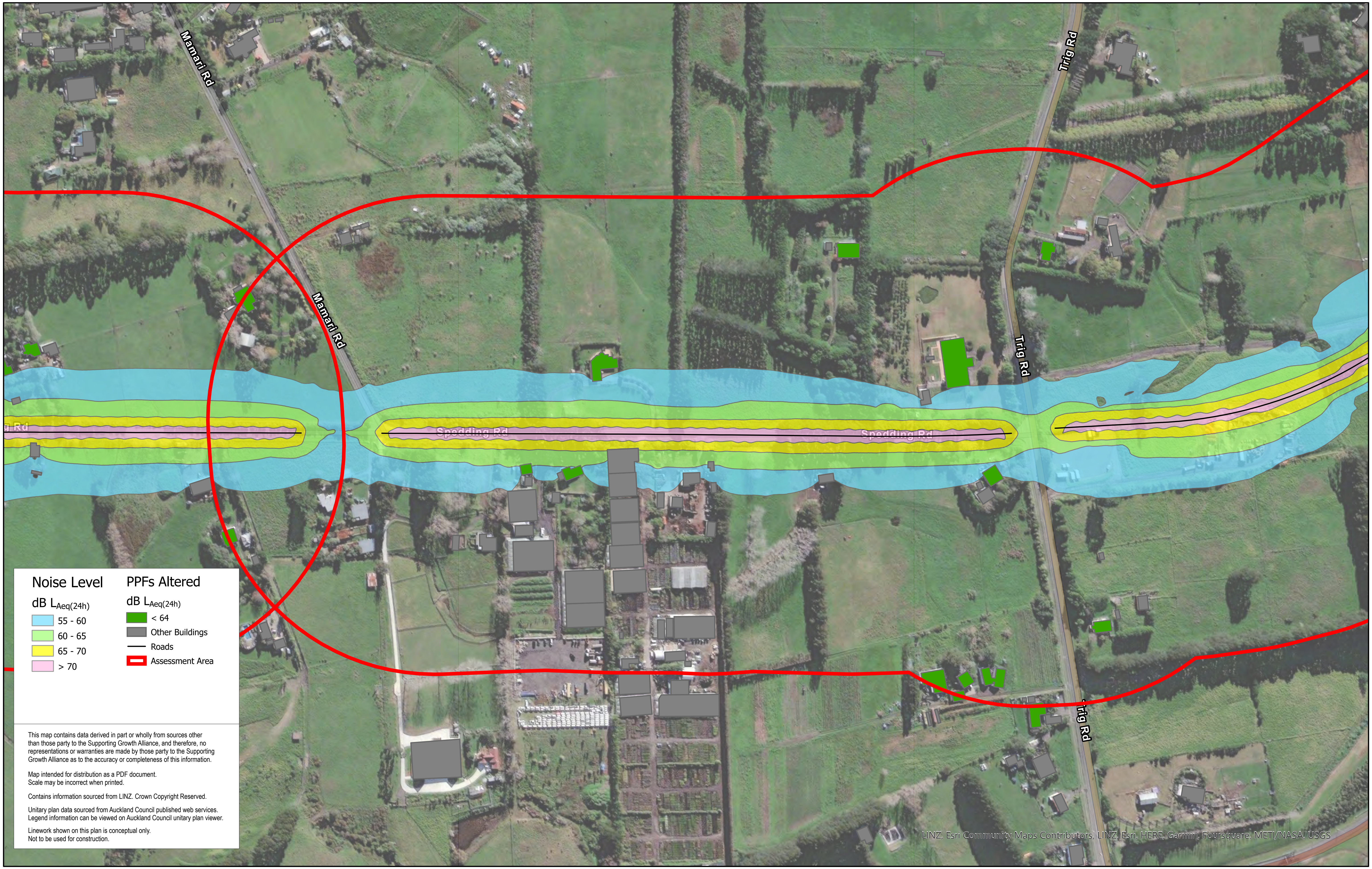

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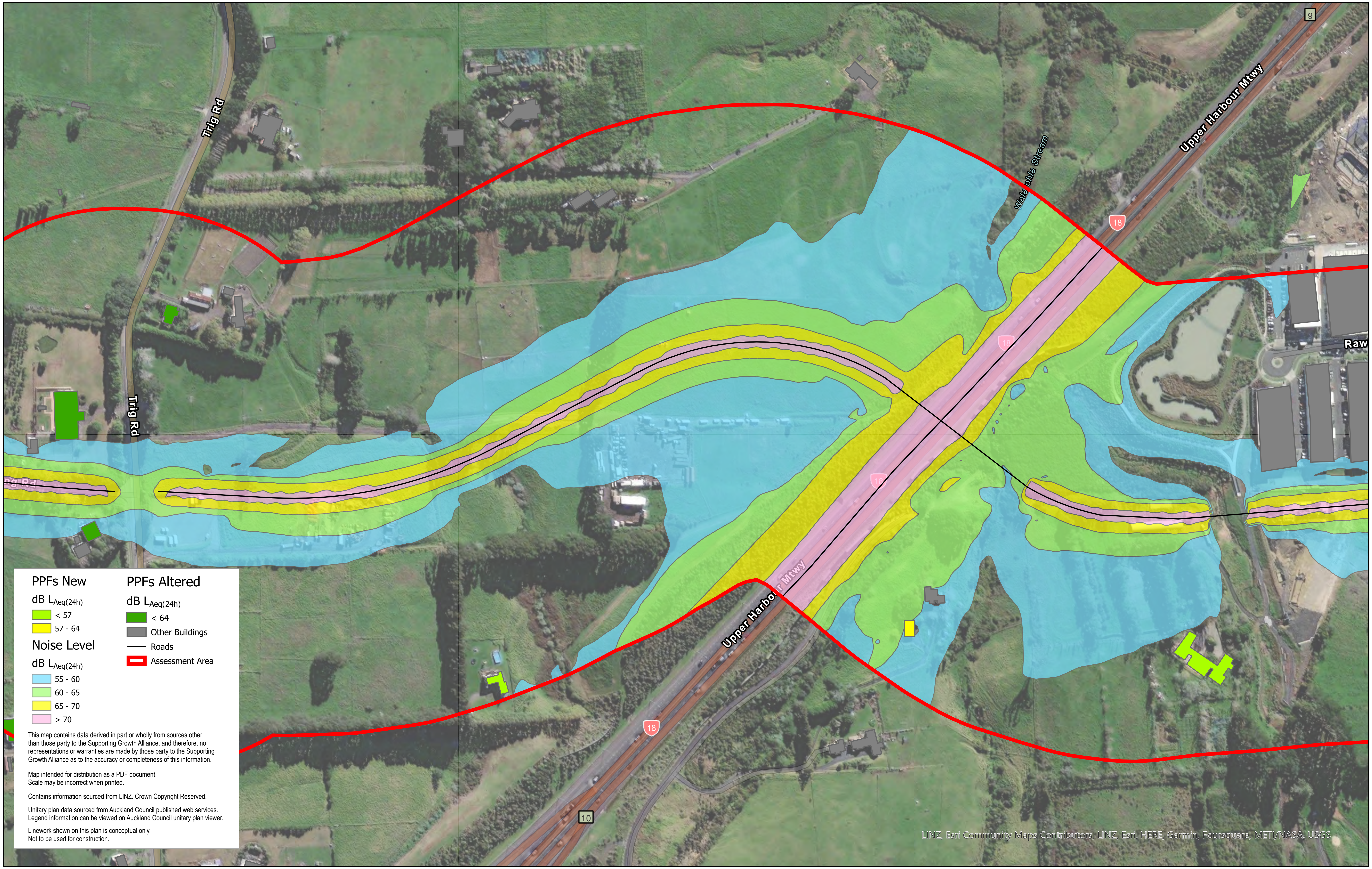

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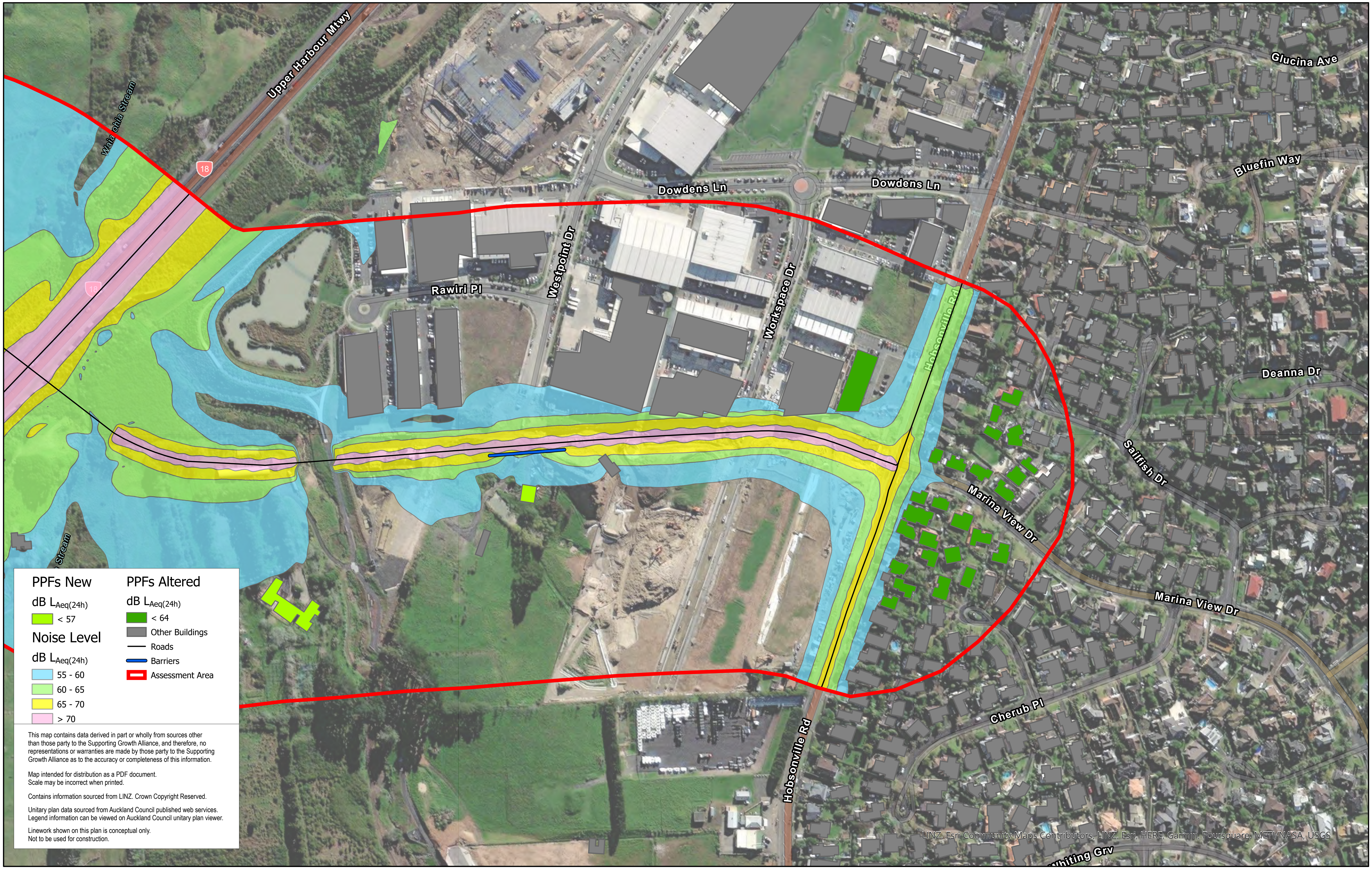

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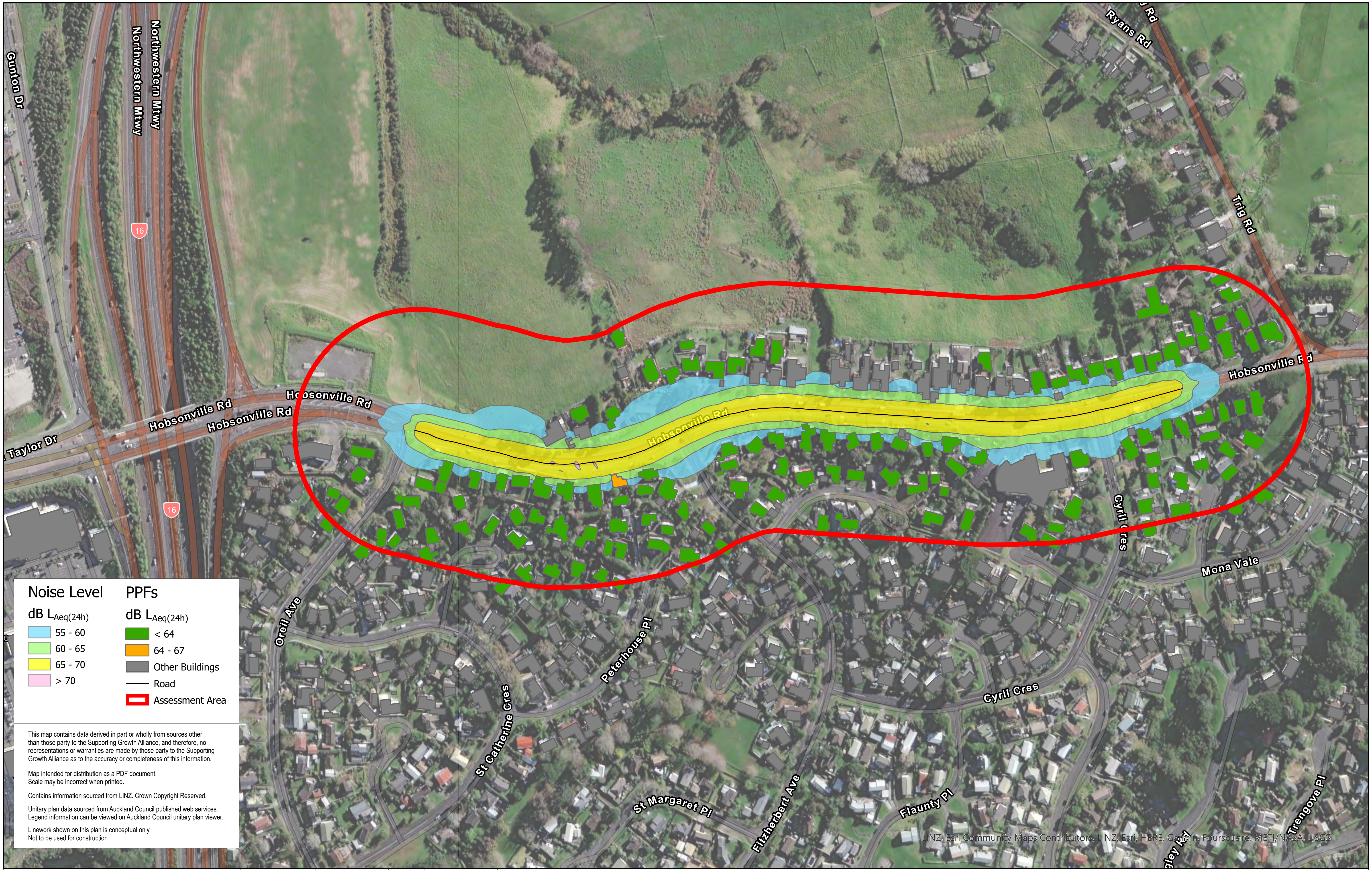

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NoR W5 - Existing Road Traffic Noise

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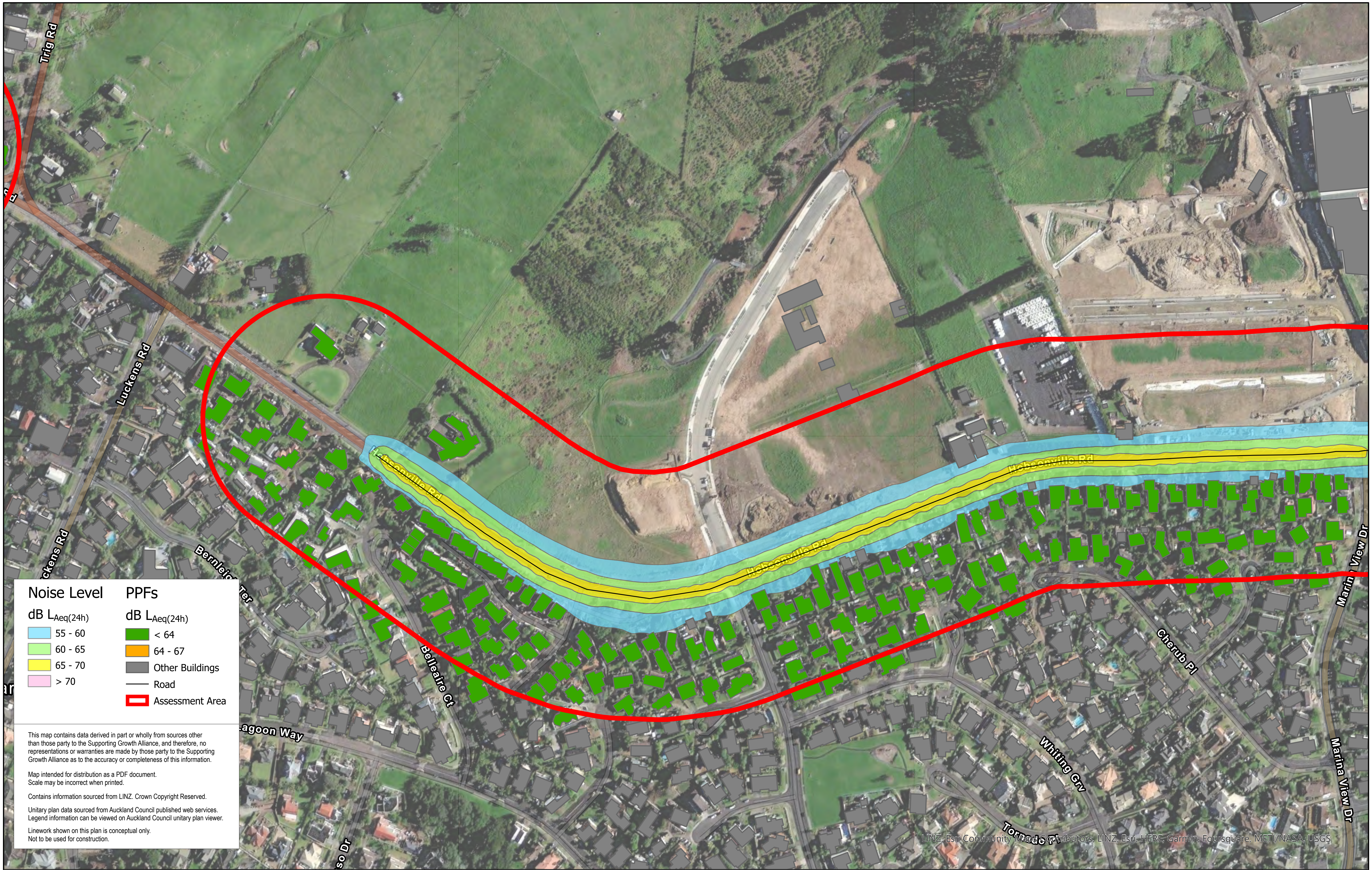
Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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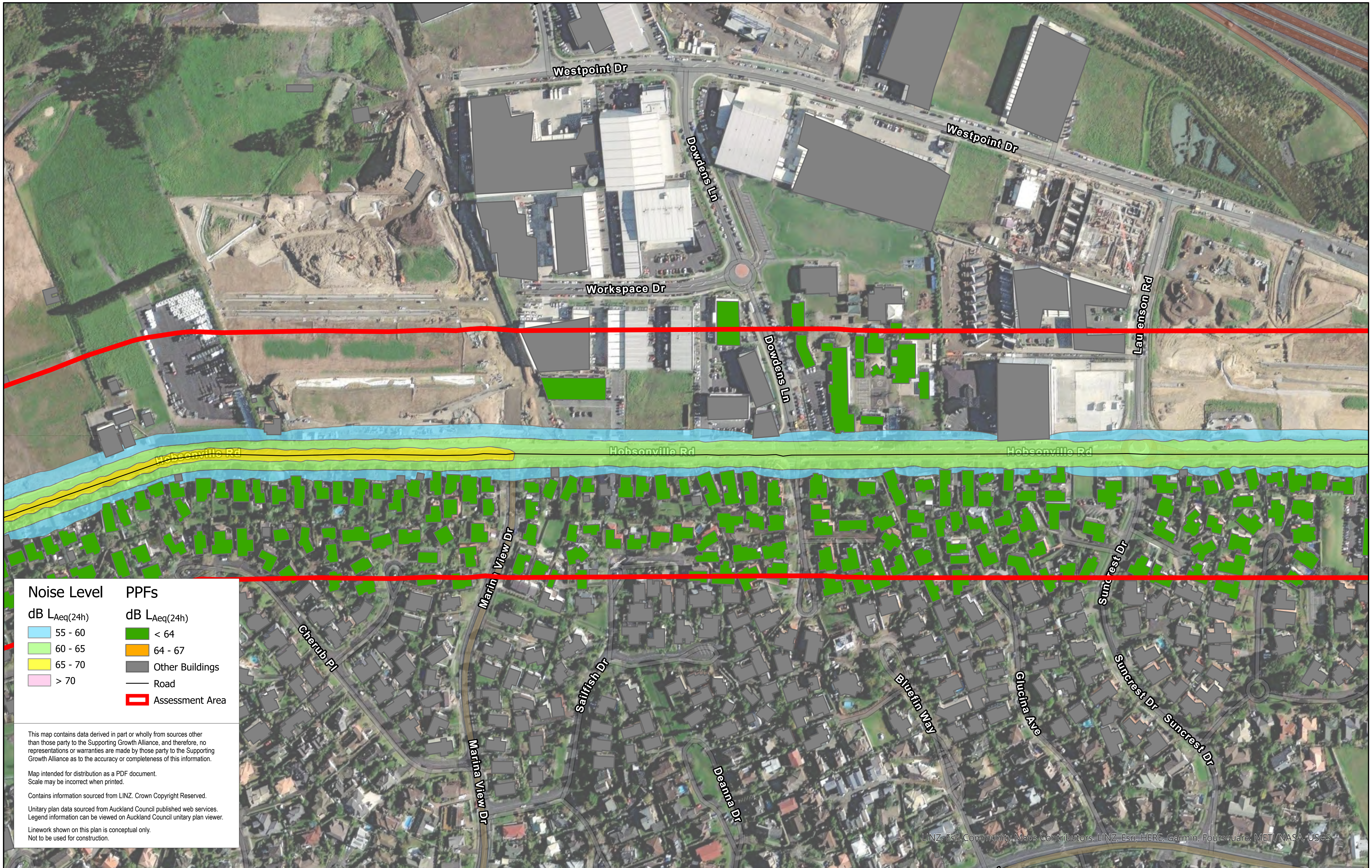
Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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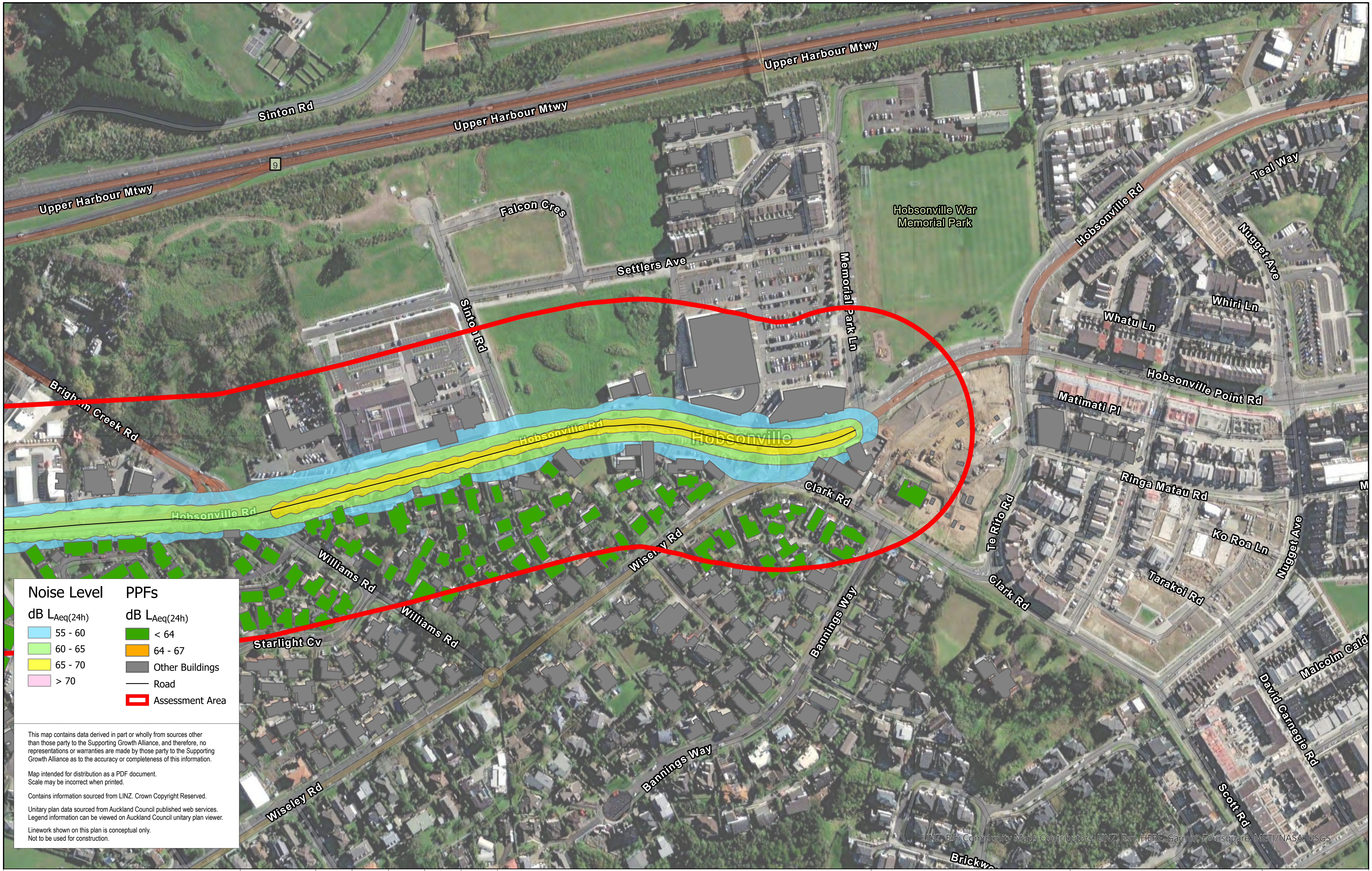

Noise Level

dB $L_{Aeq(24h)}$

- 55 - 60
- 60 - 65
- 65 - 70
- > 70

PPFs

dB $L_{Aeq(24h)}$

- < 64
- 64 - 67
- Other Buildings
- Road
- Assessment Area

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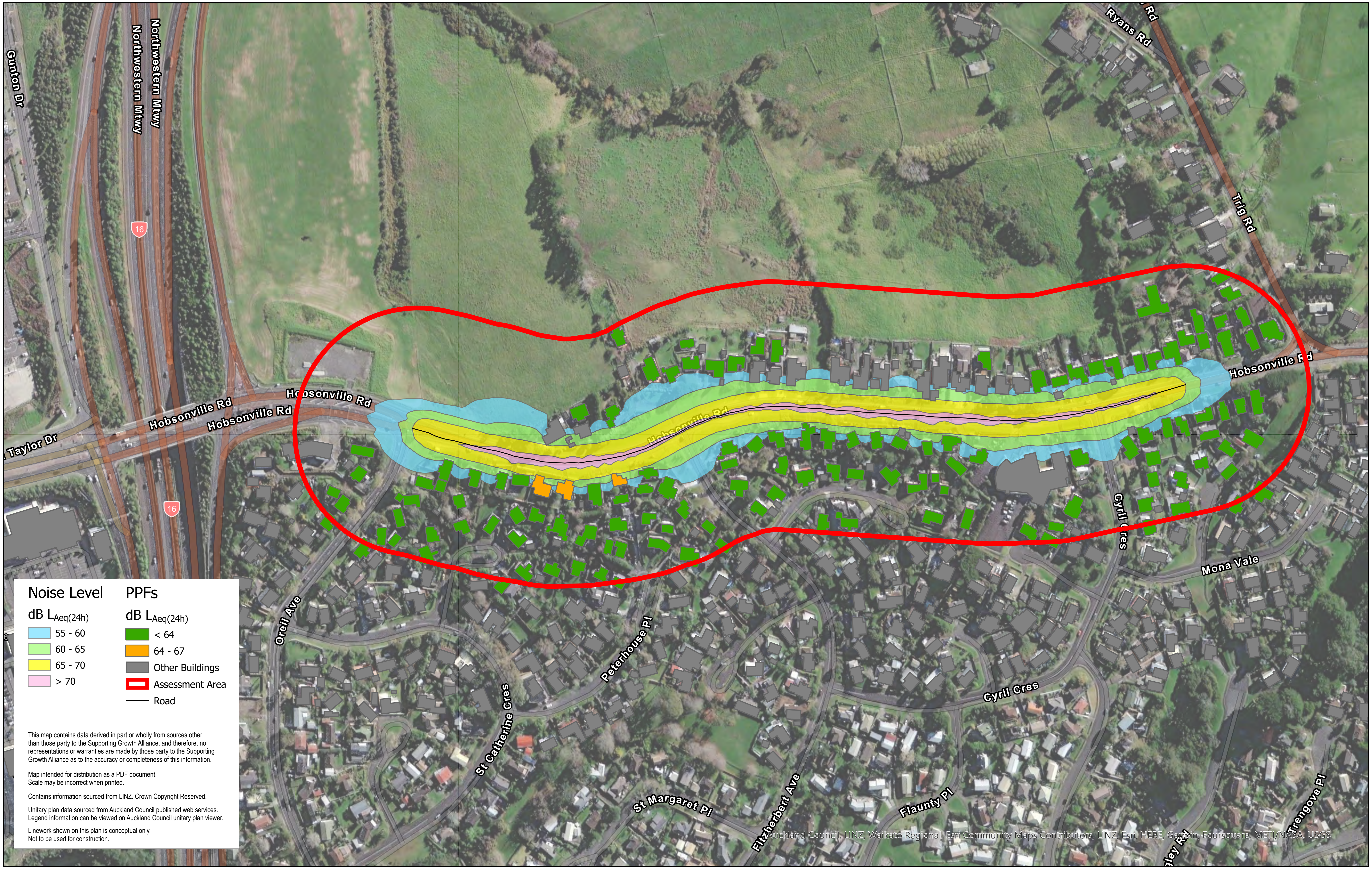

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Revision	Author	Verified	Approved	Date
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Title:

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NoR W5 - Do Nothing Road Traffic Noise

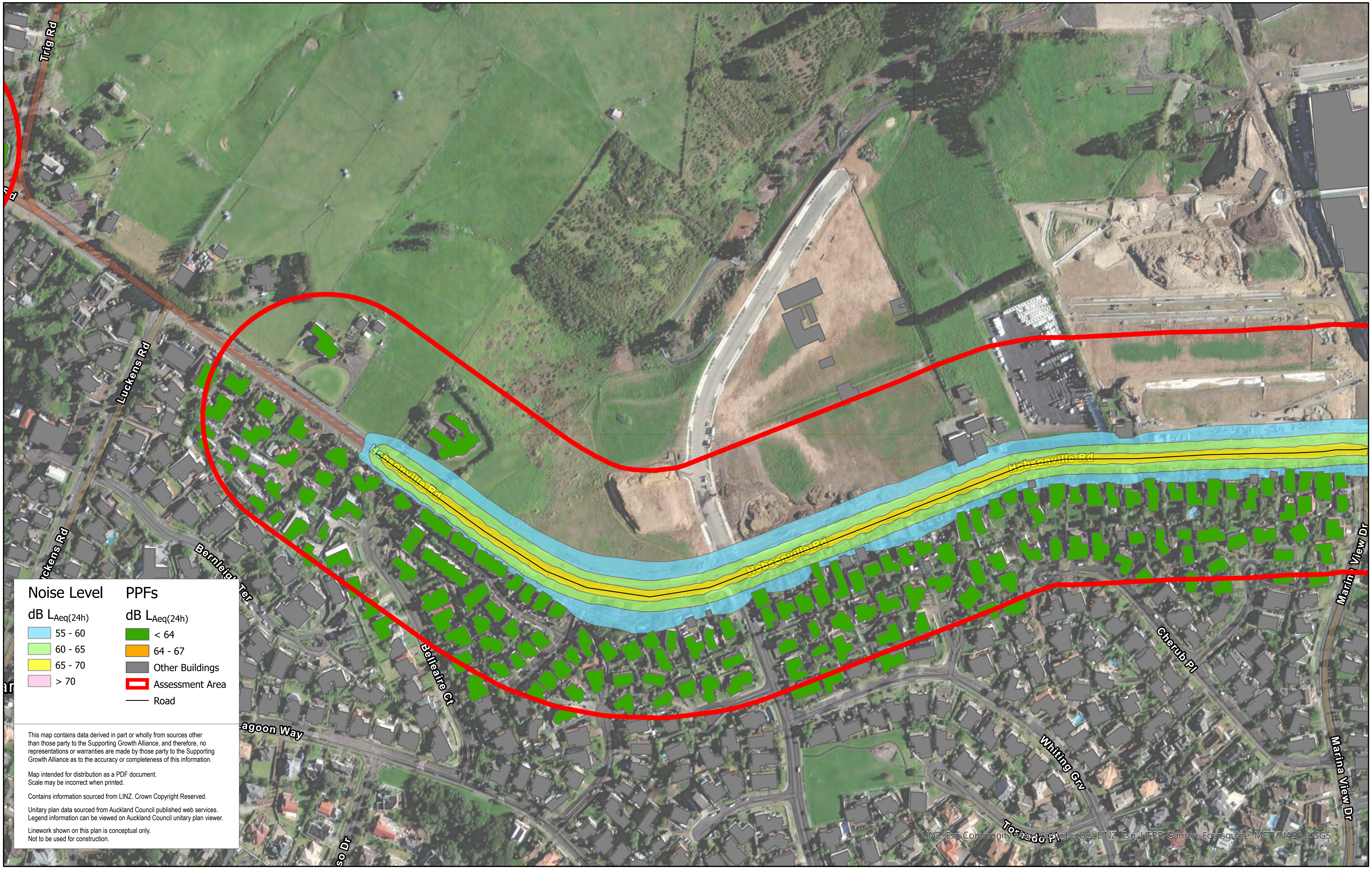
Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000



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Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

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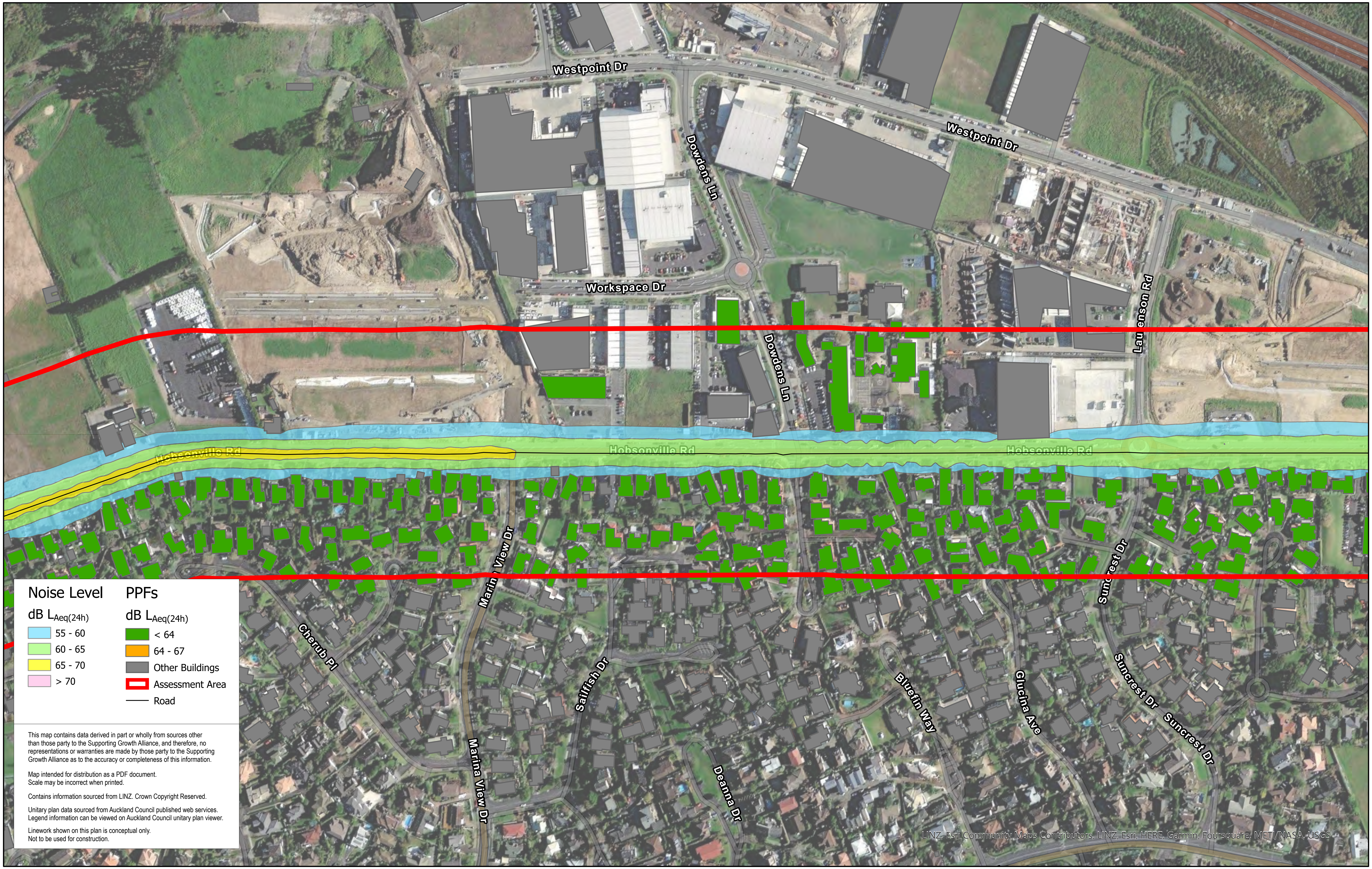

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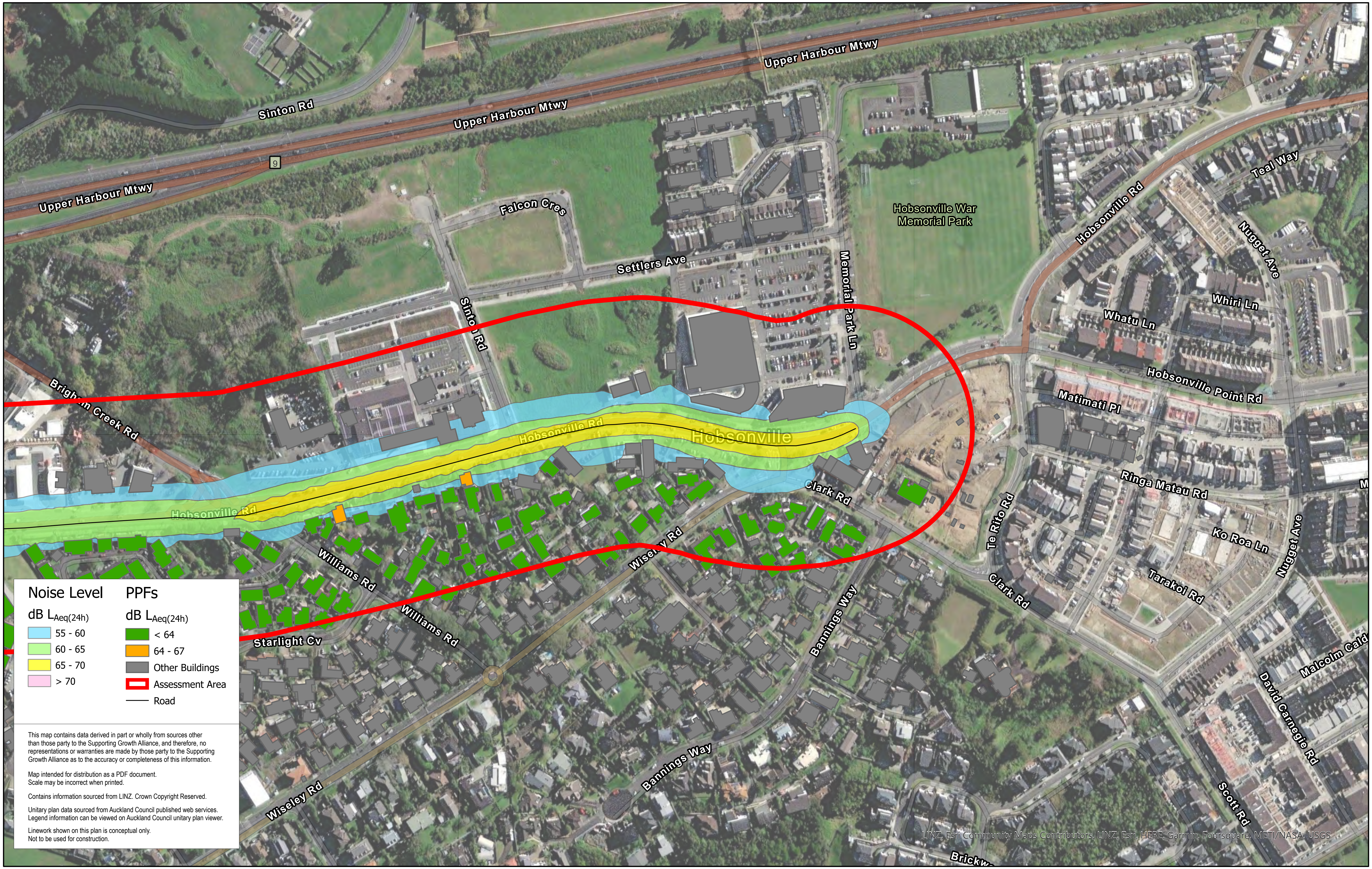

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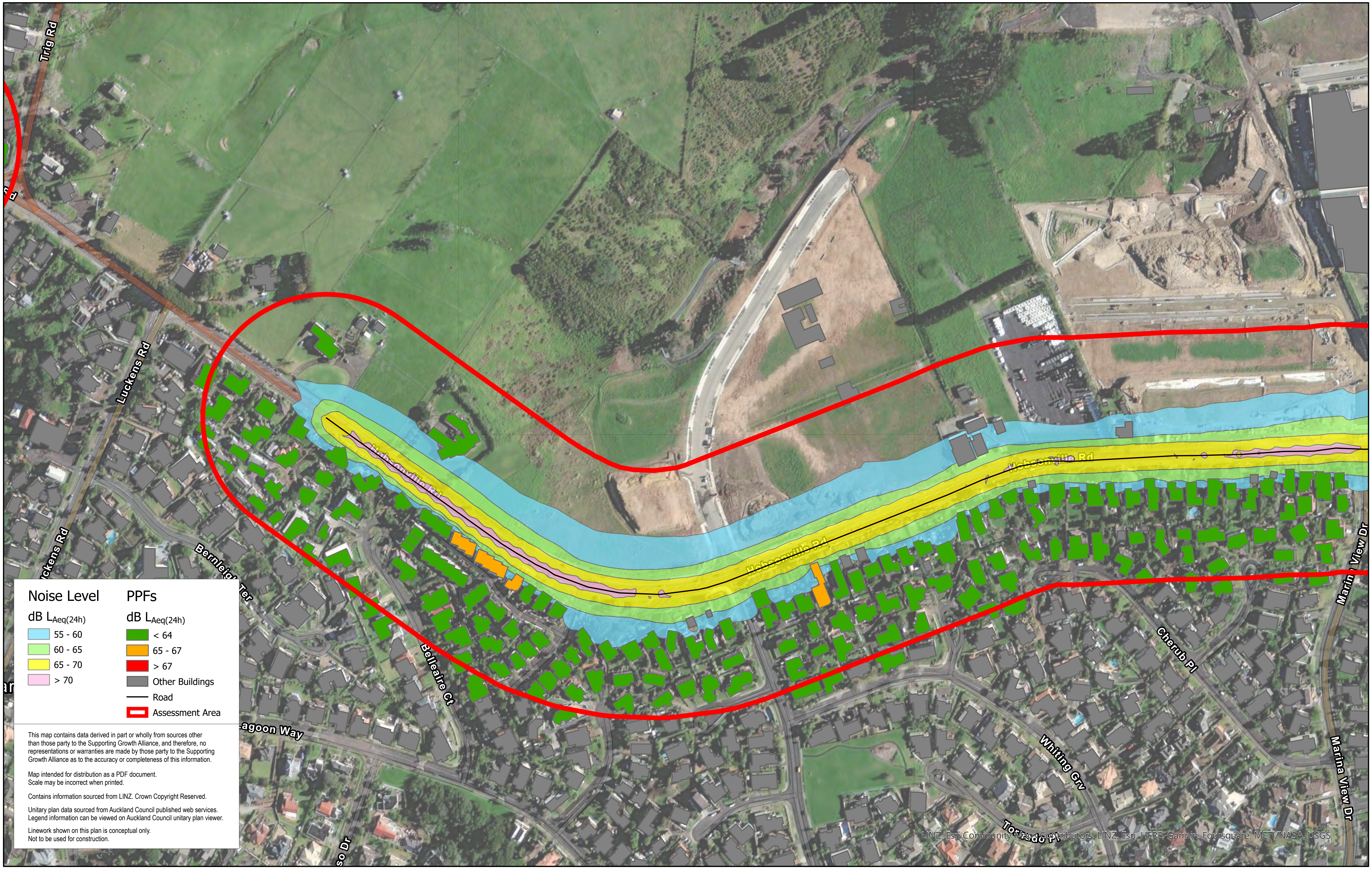

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Noise Level

dB $L_{Aeq(24h)}$

- 55 - 60
- 60 - 65
- 65 - 70
- > 70

PPFs

dB $L_{Aeq(24h)}$

- < 64
- 65 - 67
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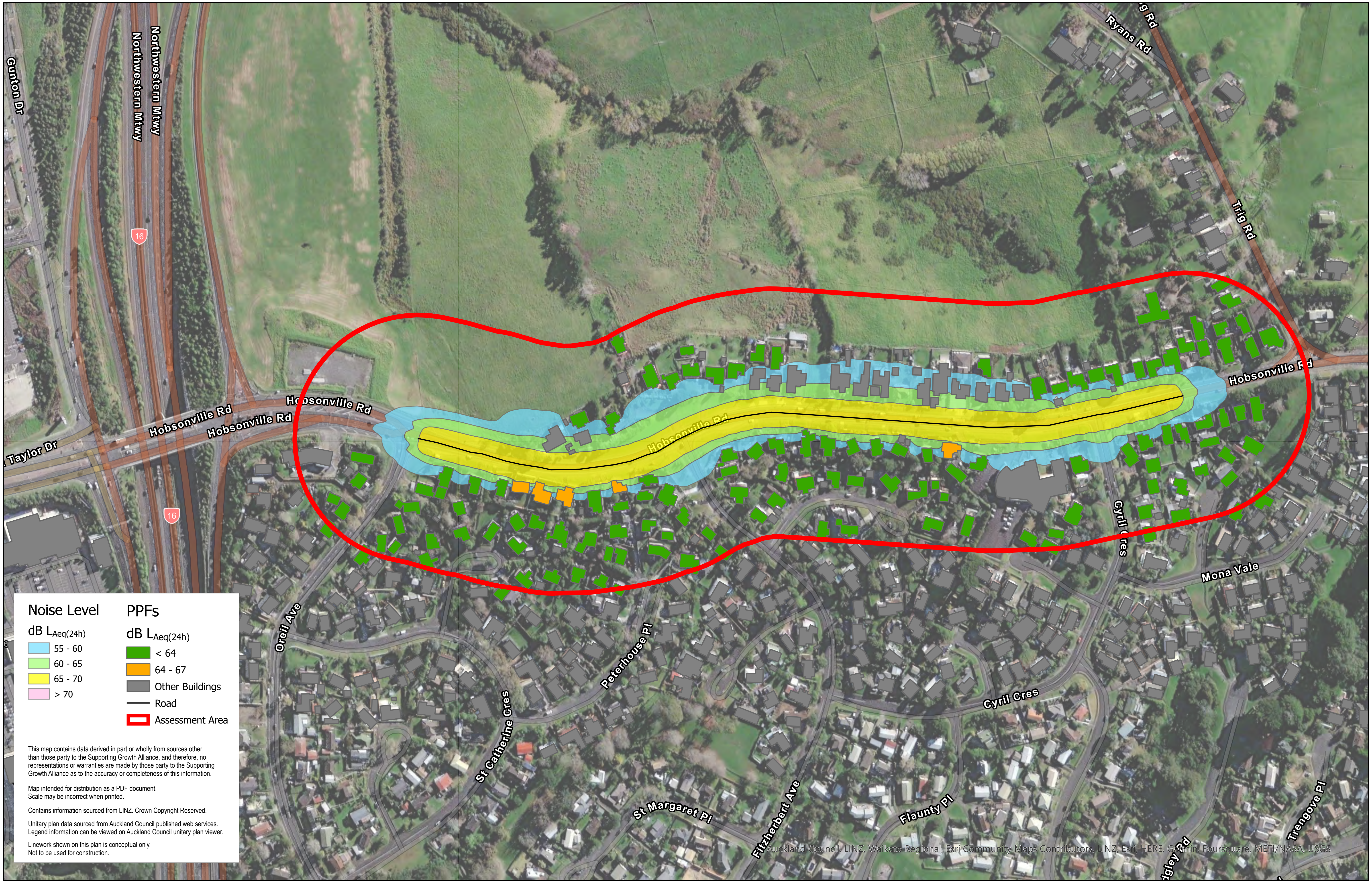

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- 55 - 60
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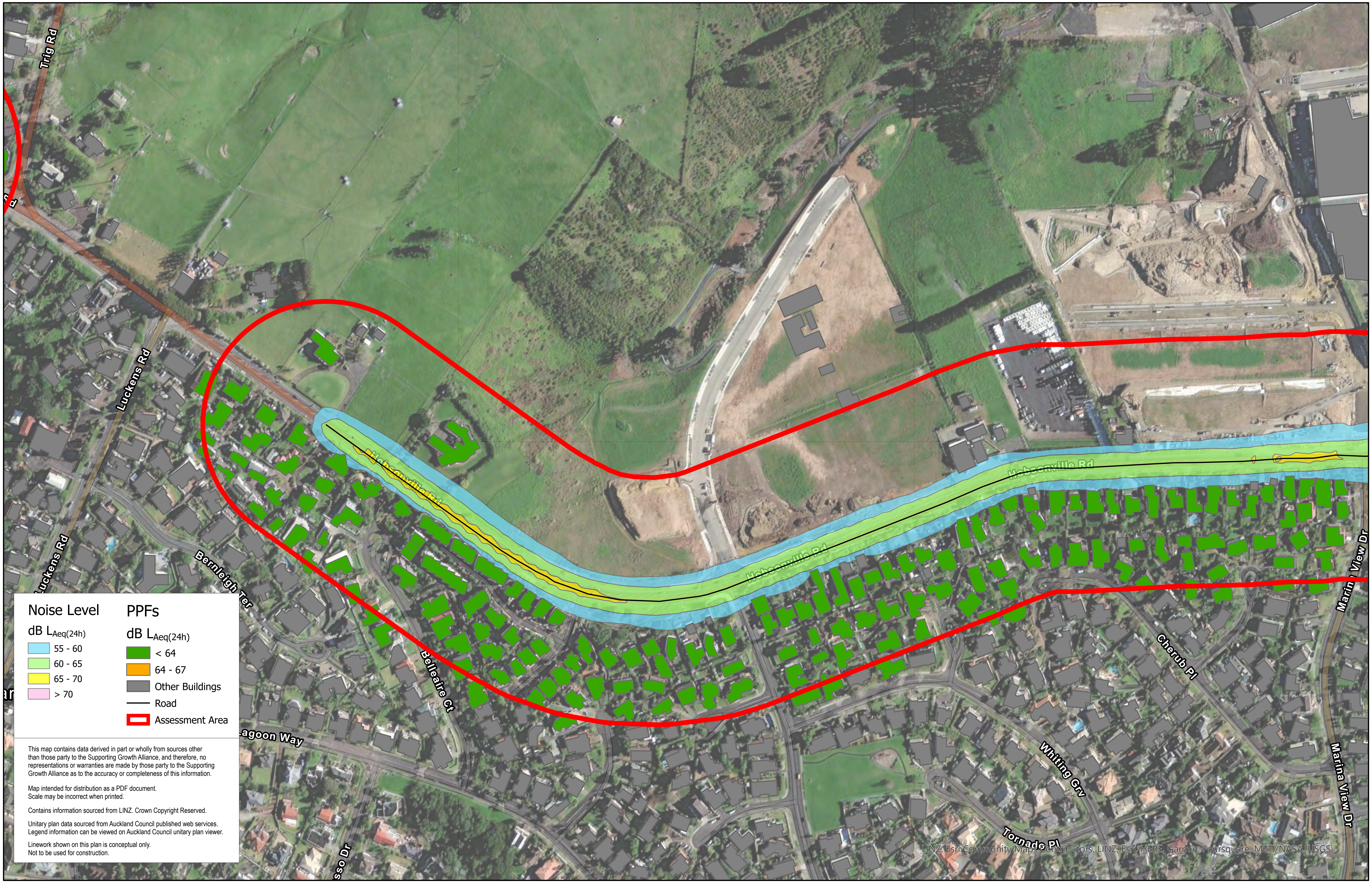

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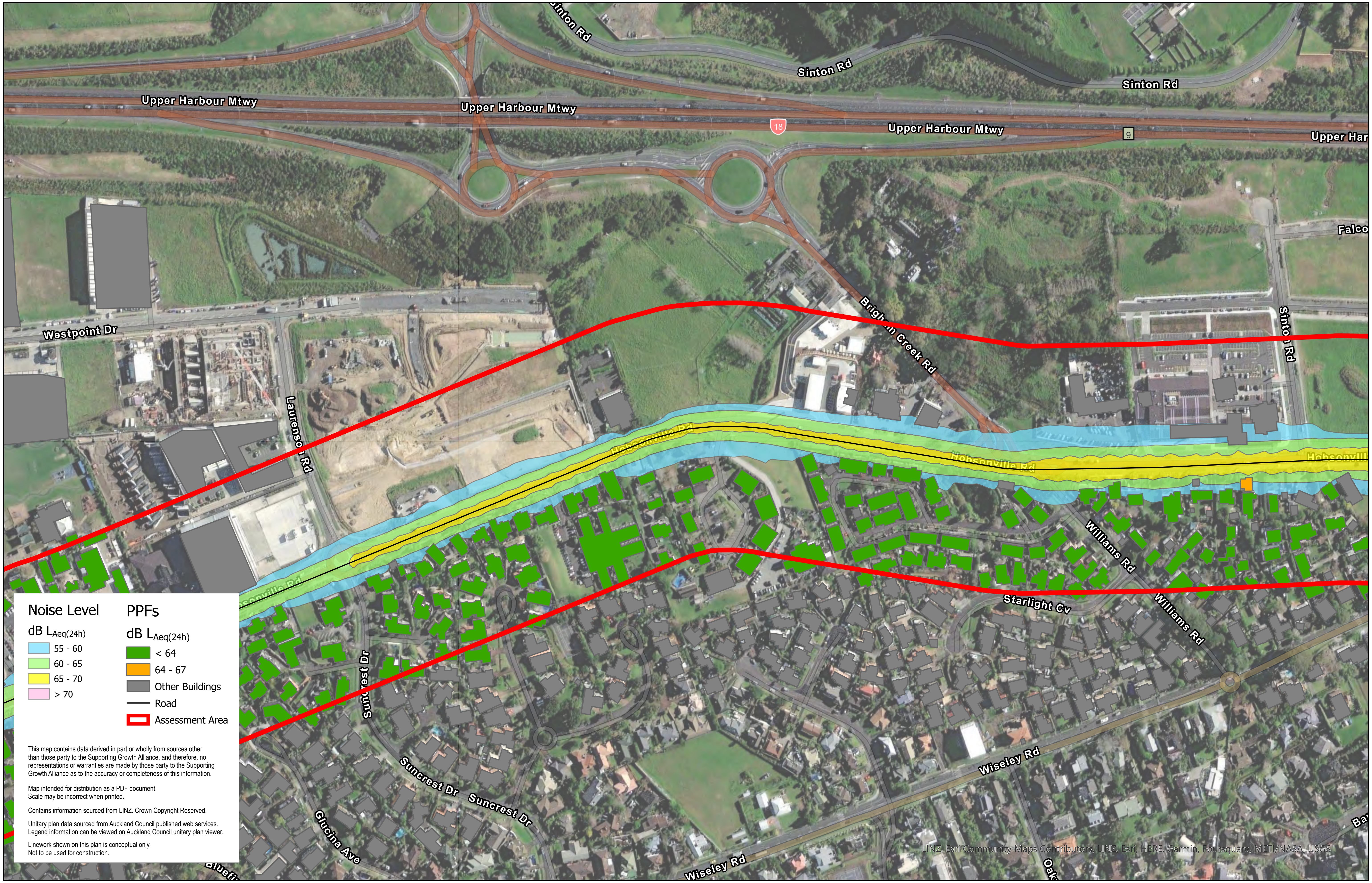

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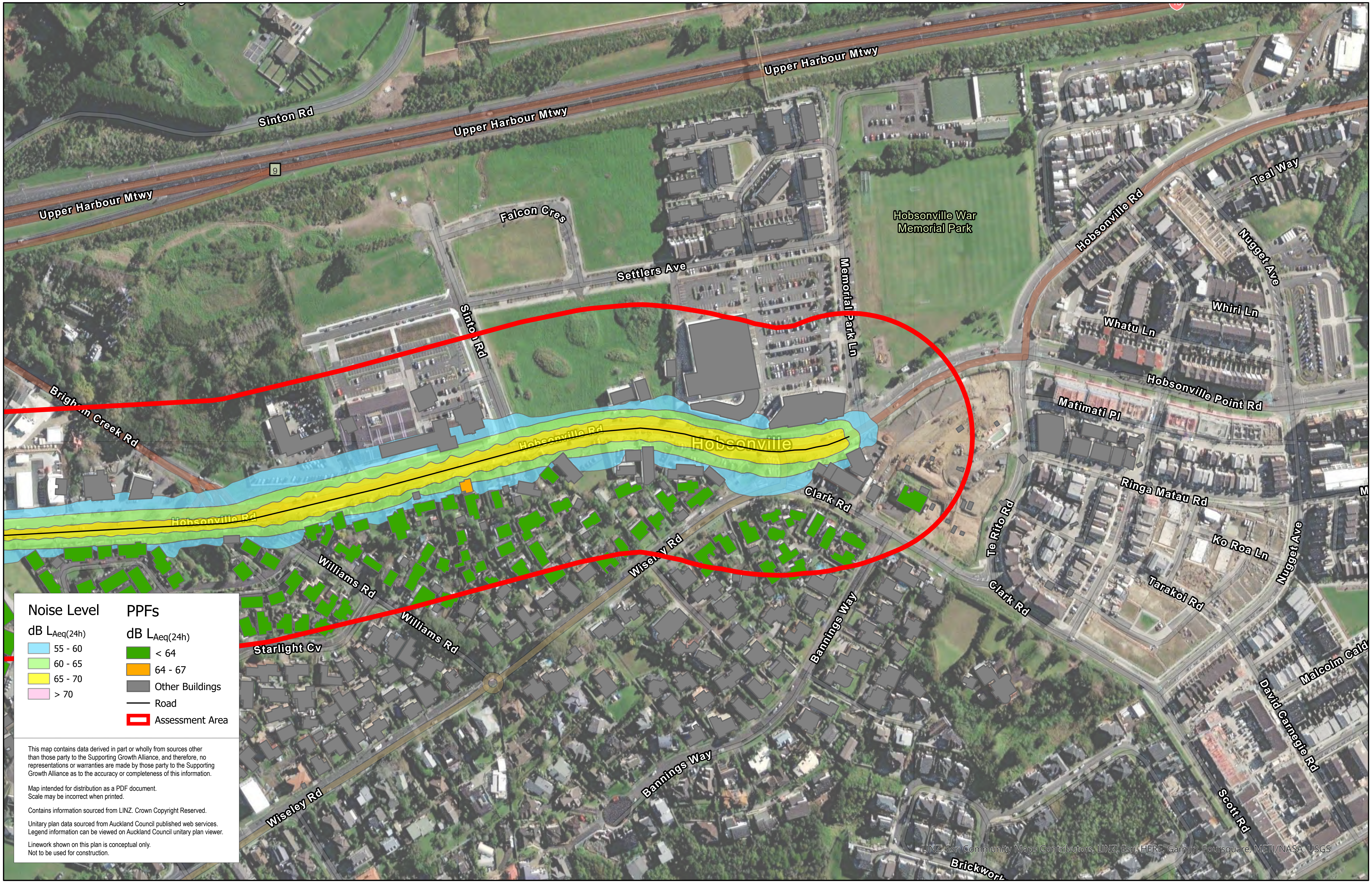

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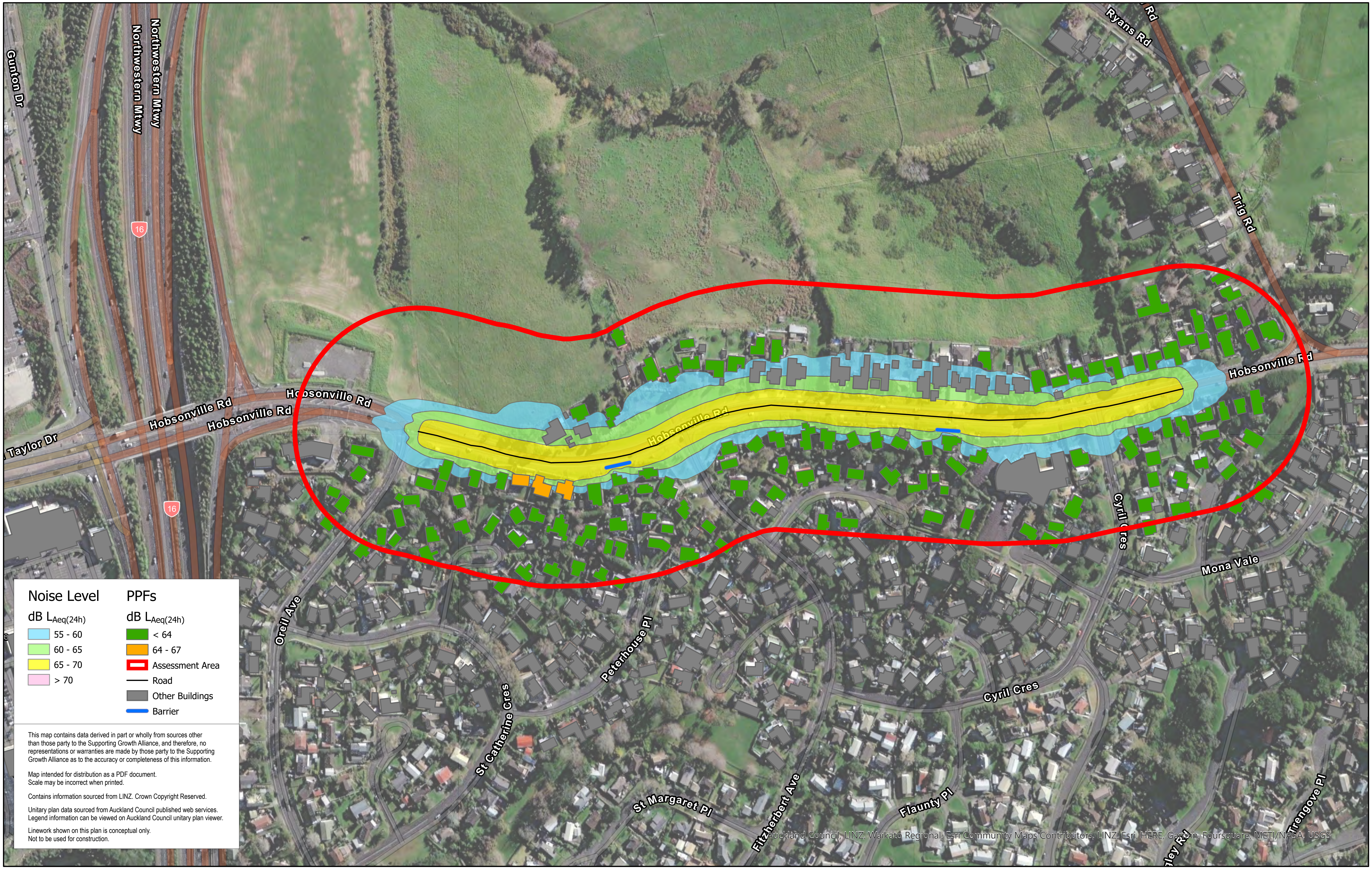

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TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

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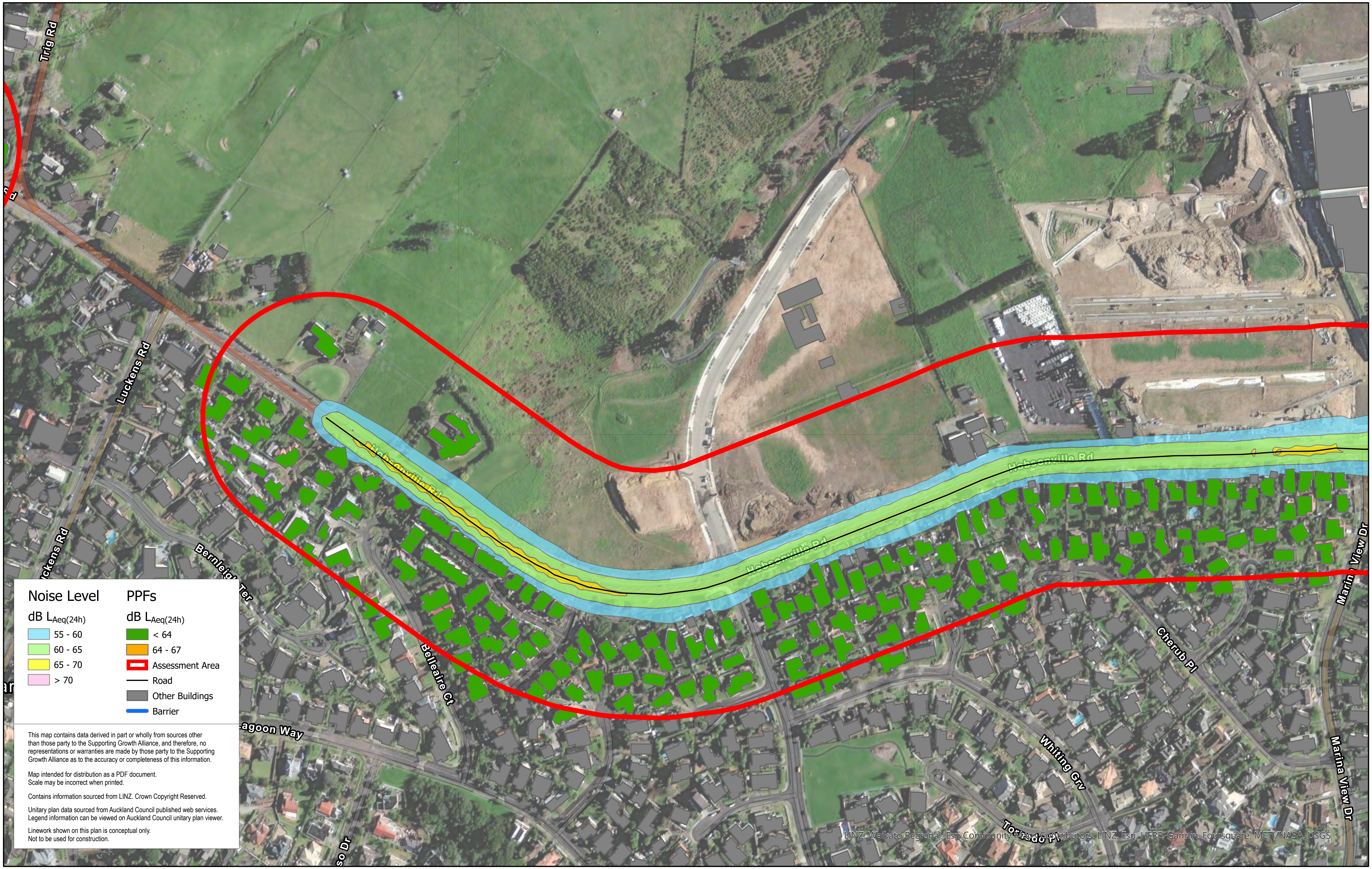

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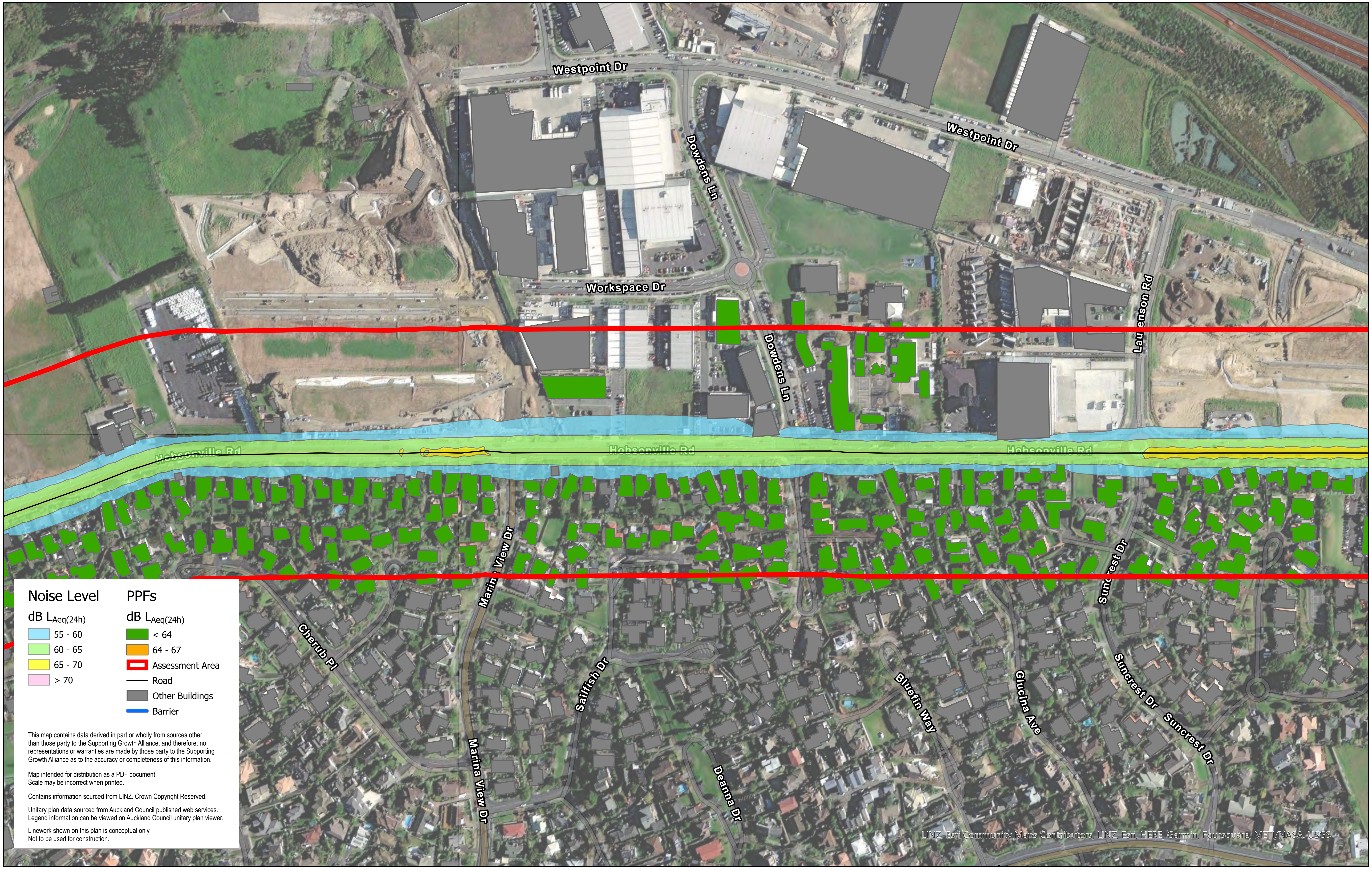

Map Scale @ A3:

0 30 60 120 Meters

N

Revision	Author	Verified	Approved	Date
1	DA	SJ	CD	23/11/22

Title:

Supporting Growth

NoR W5 - Mitigated Road Traffic Noise 2

Client: Supporting Growth

Project: North West Package

TE TUPU NGĀTAHI Supporting Growth

Discipline: GIS

Drawing No: SGA-NOR-W1-000

Noise Level

dB $L_{Aeq(24h)}$

- 55 - 60
- 60 - 65
- 65 - 70
- > 70

PPFs

dB $L_{Aeq(24h)}$

- < 64
- 64 - 67
- Assessment Area
- Road
- Other Buildings
- Barrier

Map Scale @ A3:

0 30 60 120 Meters

N

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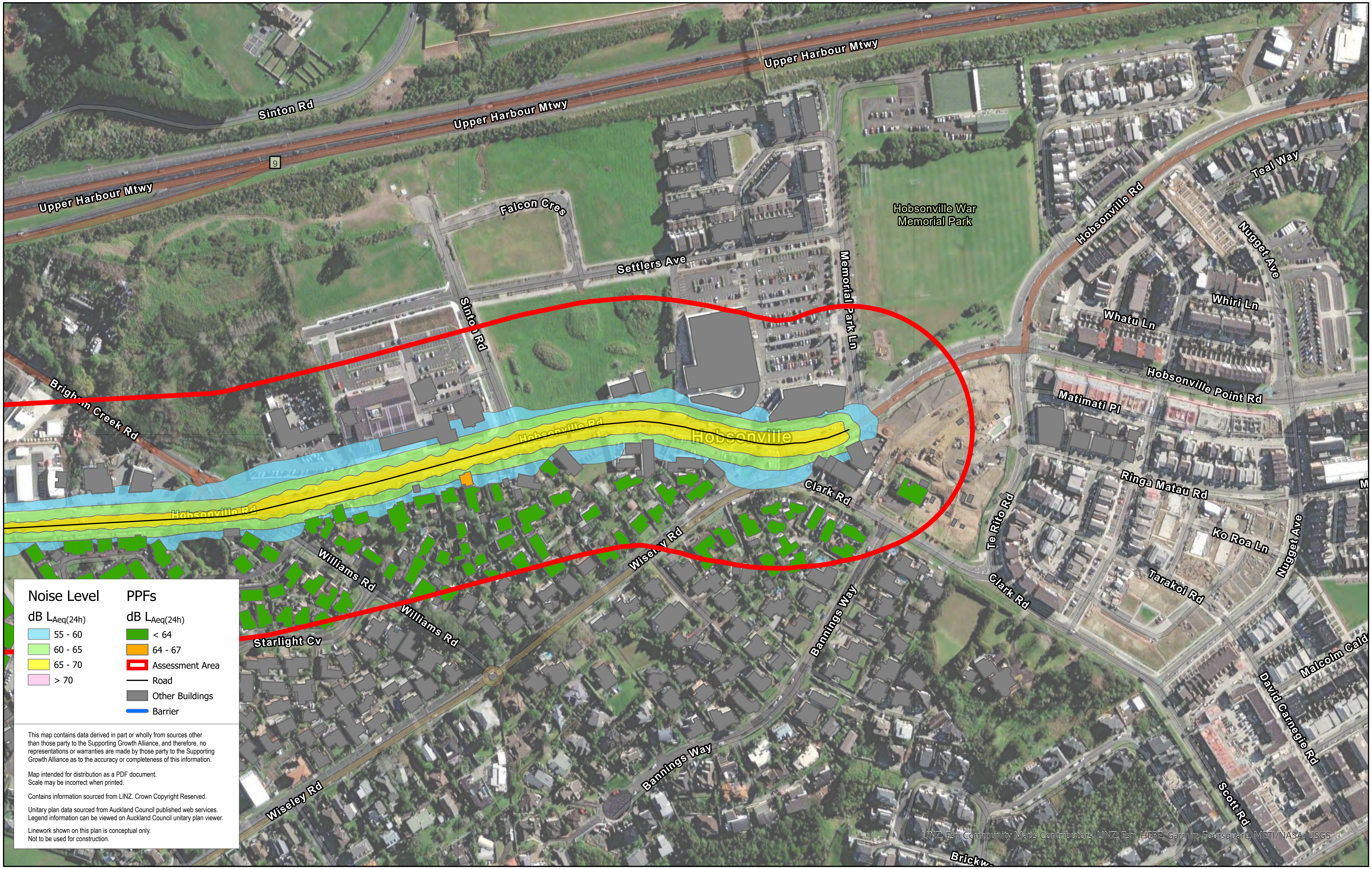

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