TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West Whenuapai Assessment of Traffic Noise and Vibration Effects

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Version 1.0

WAKA KOTAHI
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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.

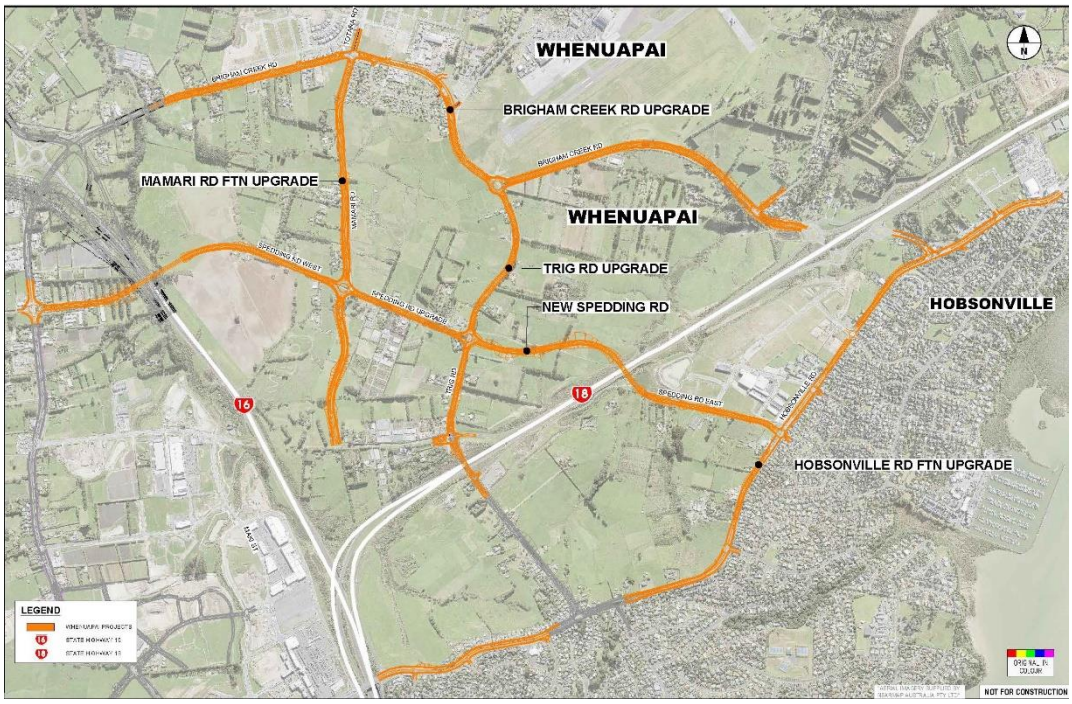

Figure 5-1: North West Whenuapai Assessment Package – Overview of NoRs for Assessment

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.

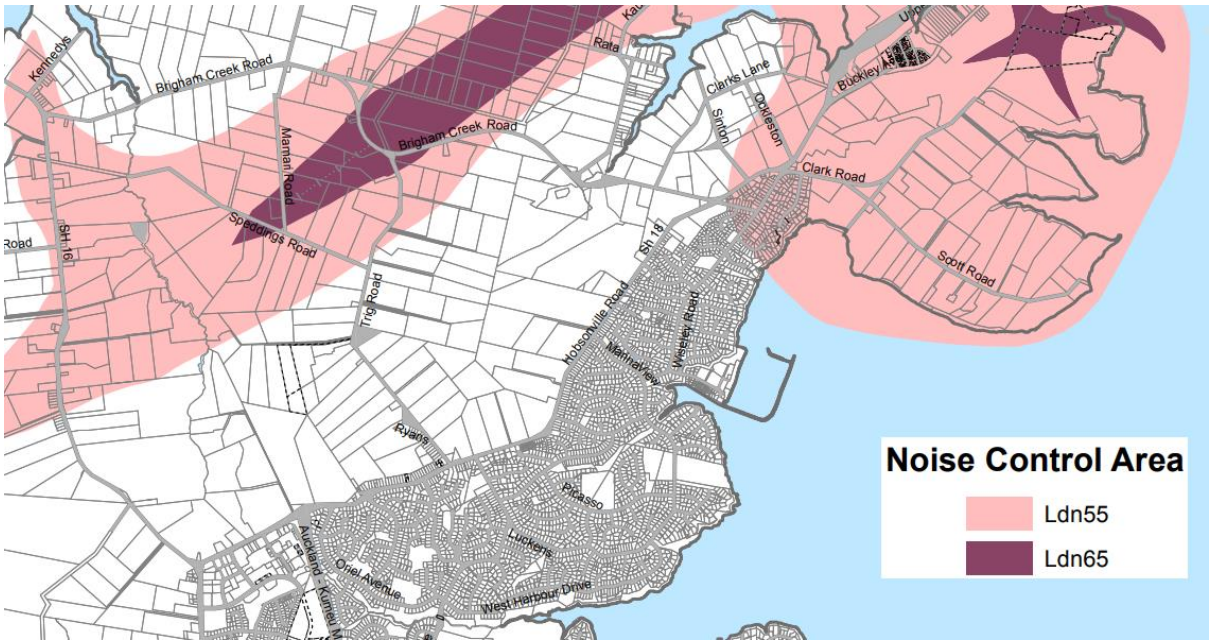

Figure 6-1: RNZAF Base Noise Contours

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.

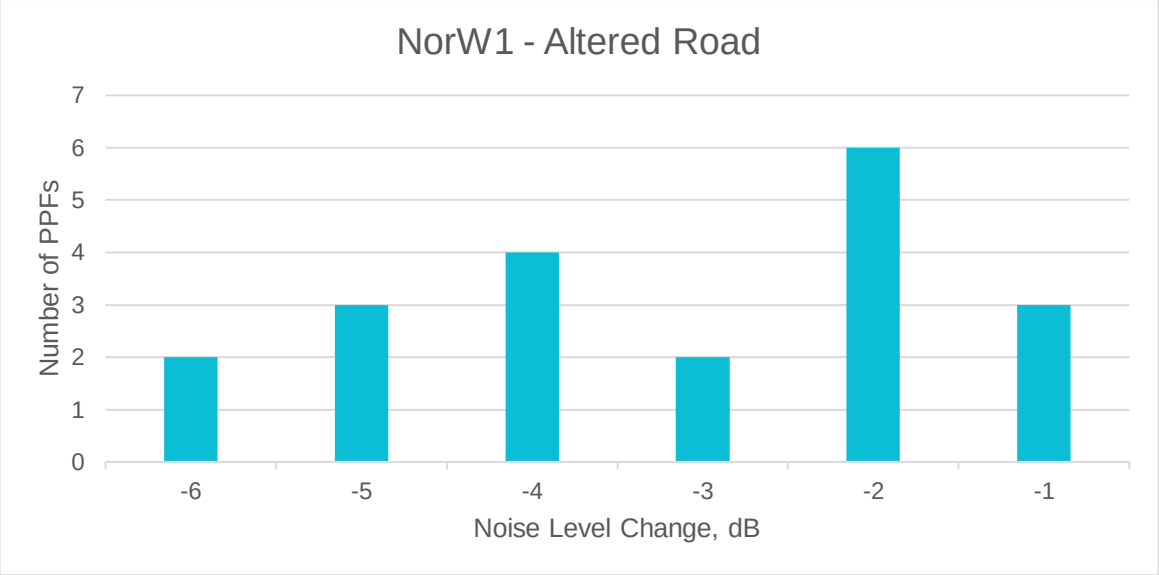

Figure 7-2: Change in Noise Level - Do Nothing Vs Do Minimum – NoR W1

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.

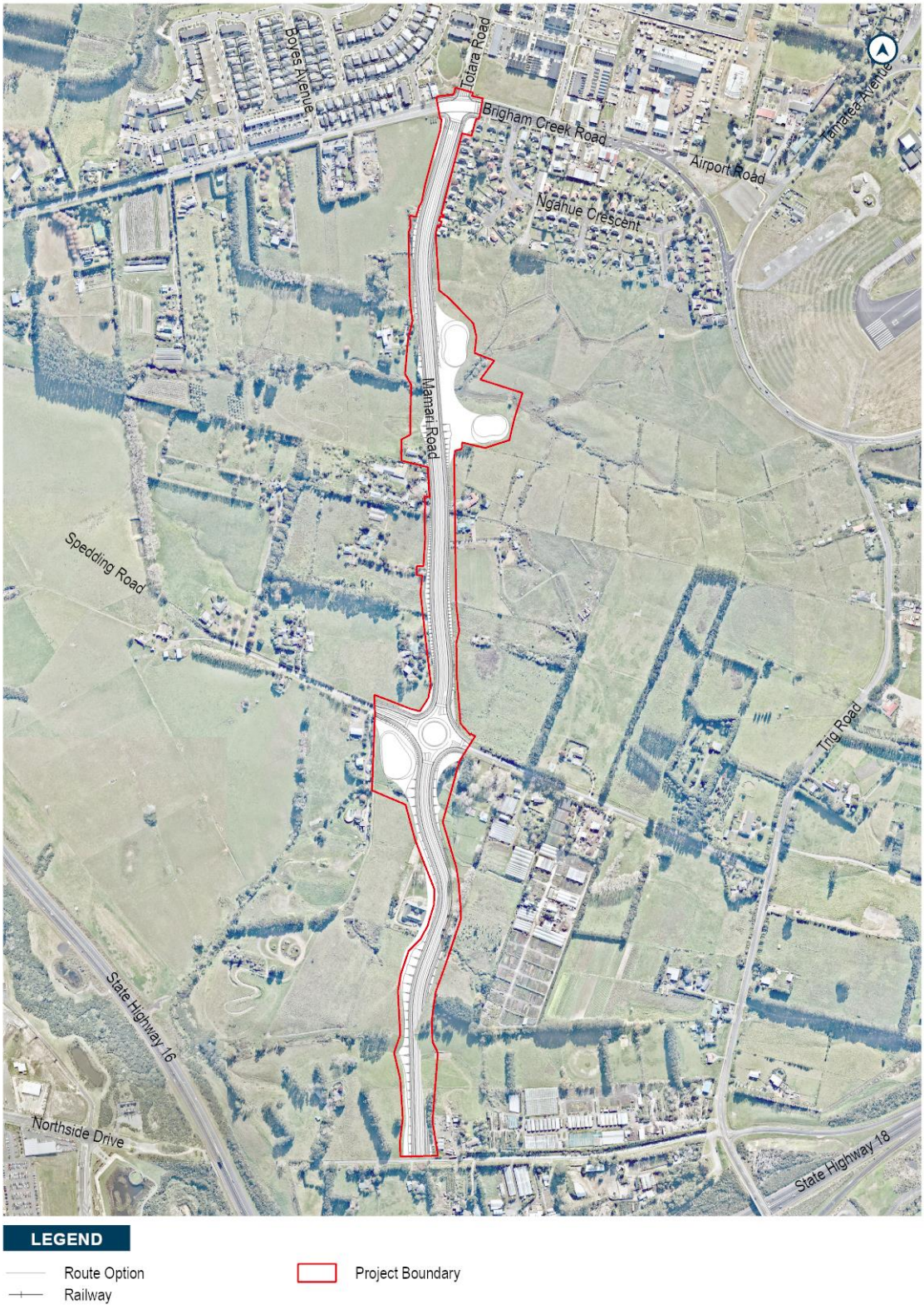

Figure 8-1: Overview of the Māmari Road Upgrade

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.

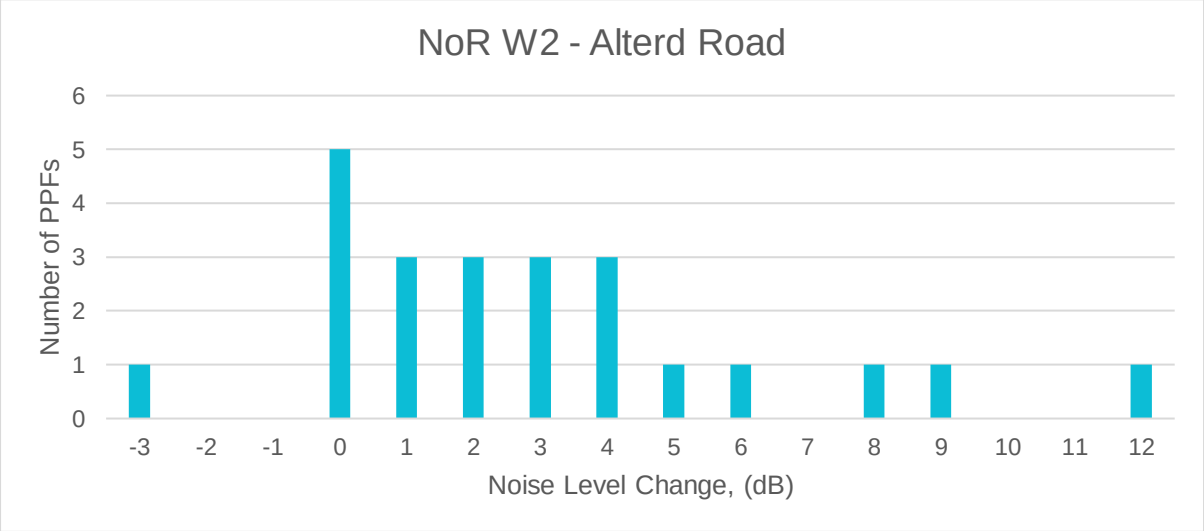

Figure 8-2: Change in Noise Level - Do Nothing Vs Mitigation Option 2 – NoR W2

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.

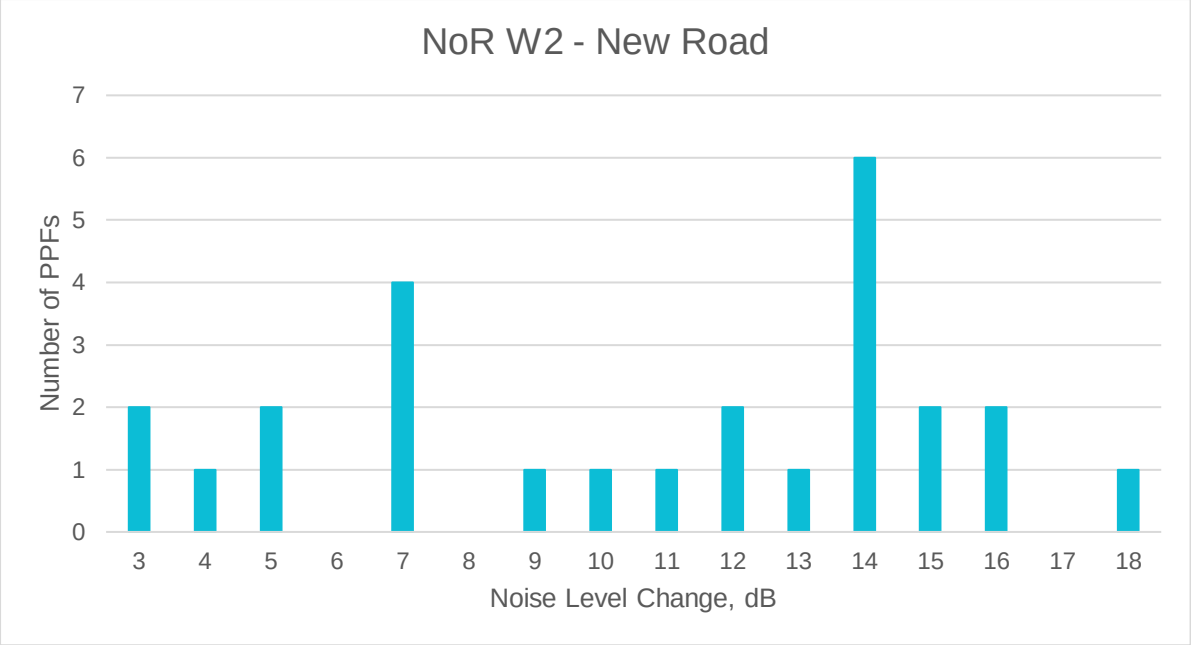

Figure 8-3: Change in Noise Level - Existing Vs Project with Mitigation – NoR W2

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.

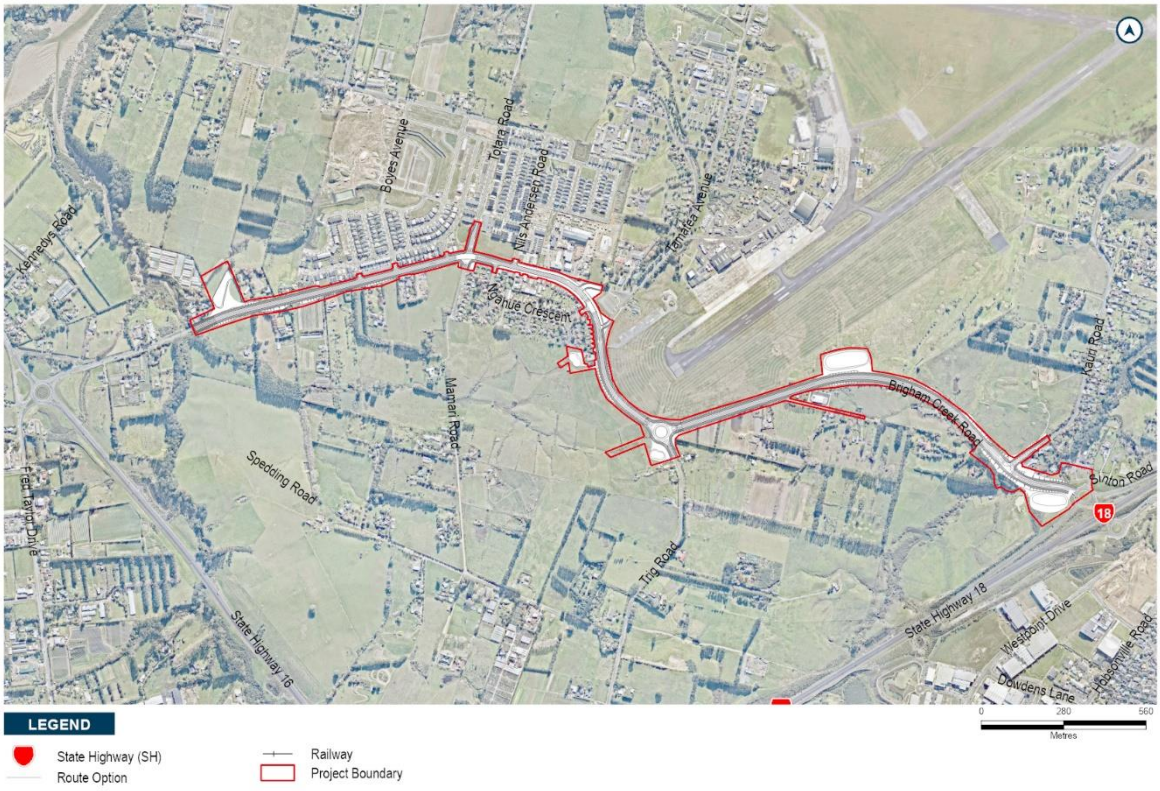

Figure 9-1: Overview of the Brigham Creek Road Upgrade

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.

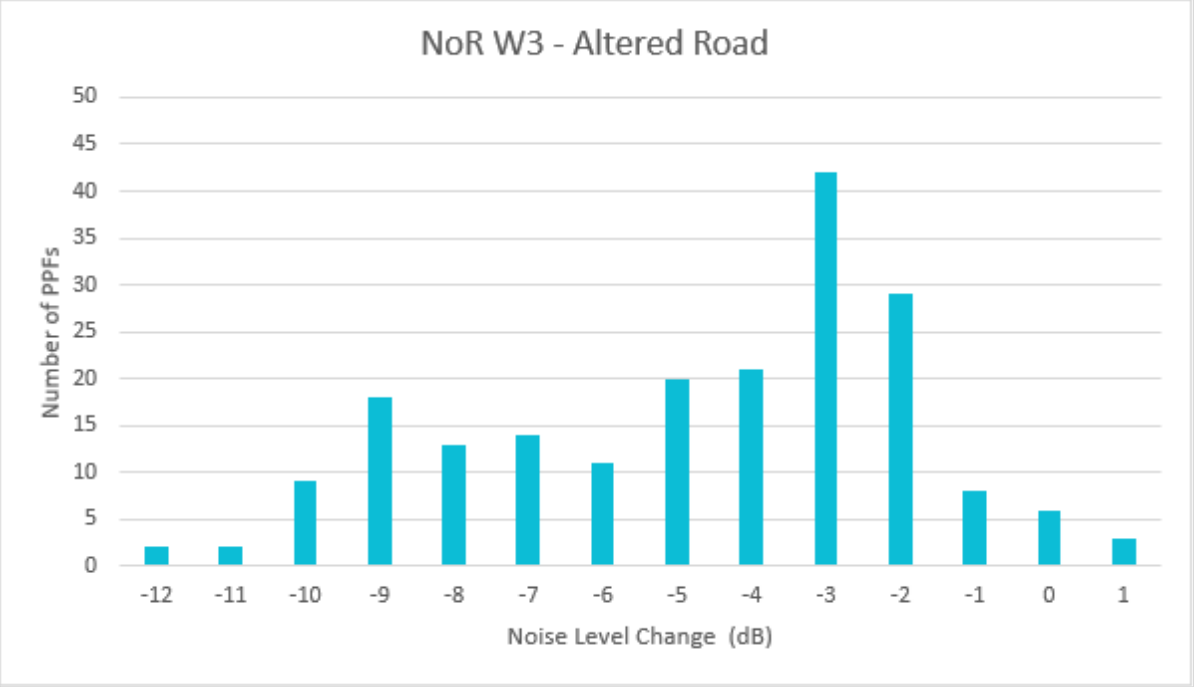

Figure 9-2: Change in Noise Level - Do Nothing Vs Mitigation scenario – NoR W3

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.

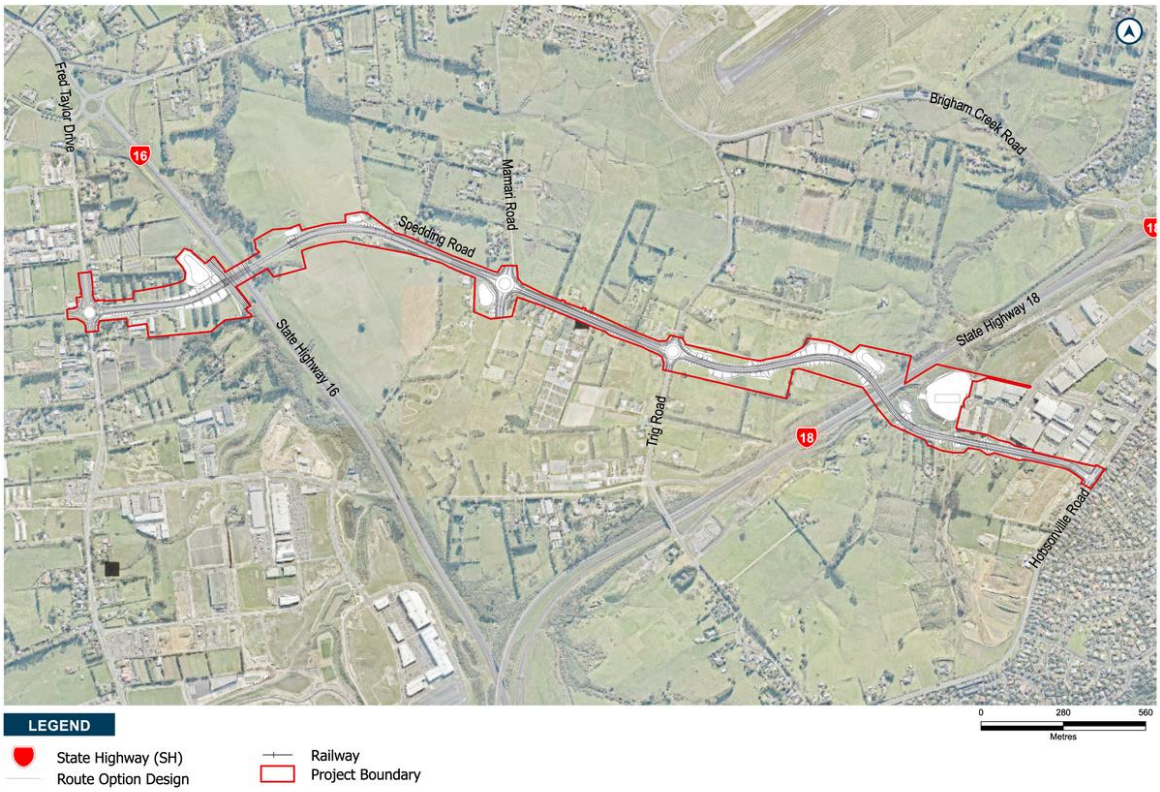

Figure 10-1: Overview of the Extension of Spedding Road

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.

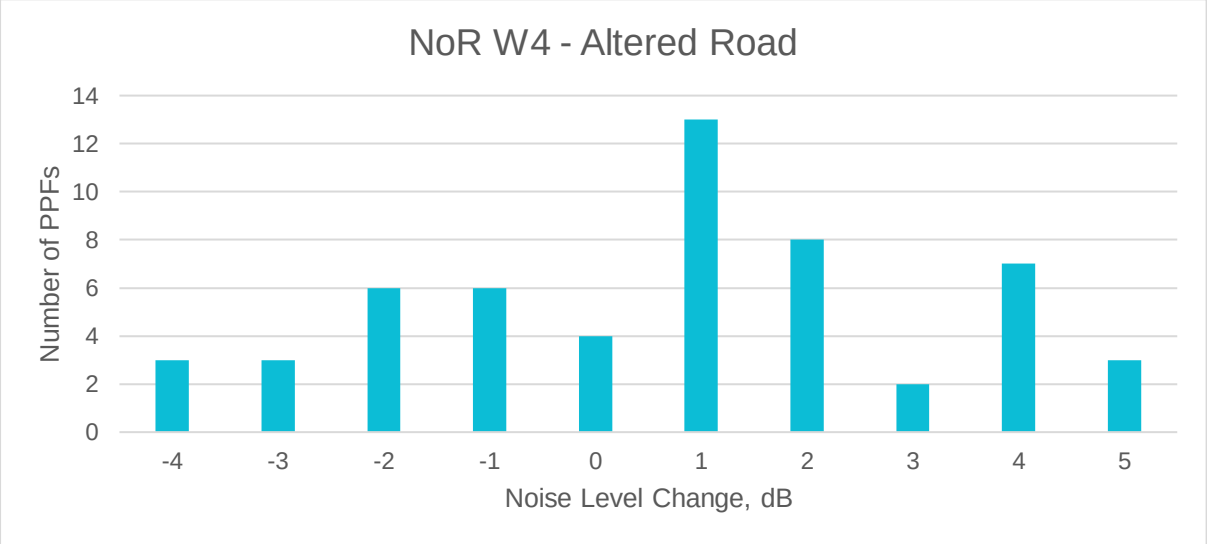

Figure 10-2: Change in Noise Level - Do Nothing Vs Project with Mitigation – NoR W4

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.

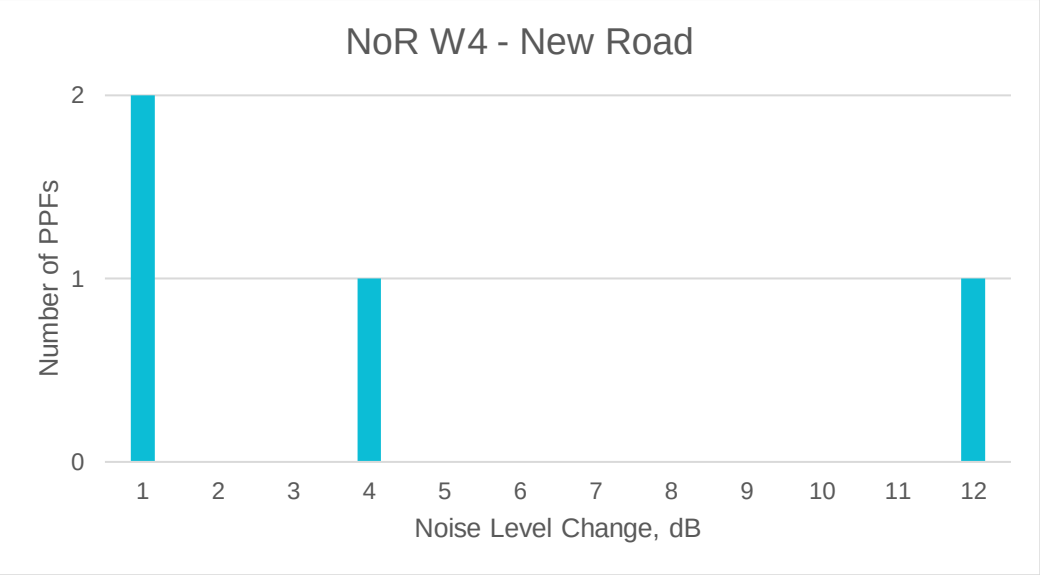

Figure 10-3: Change in Noise Level - Existing Vs Project with Mitigation – NoR W4 New Roads

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.

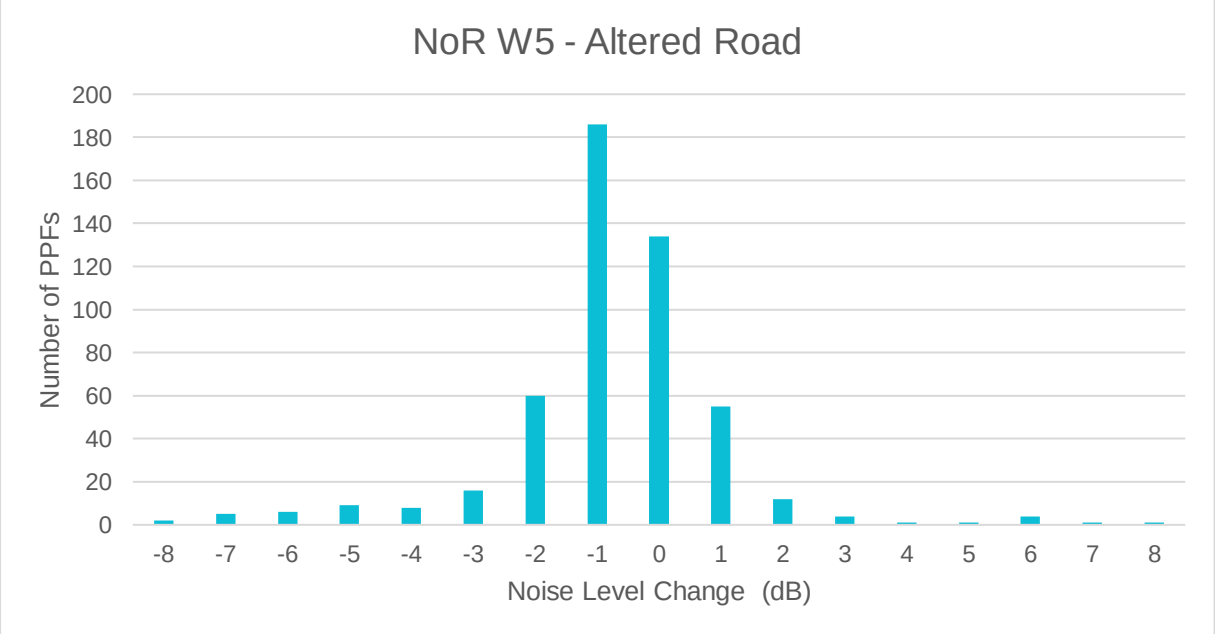

Figure 11-2 shows the predicted change in noise level at PPFs when comparing the Do Nothing and Mitigation Option 2 scenarios.

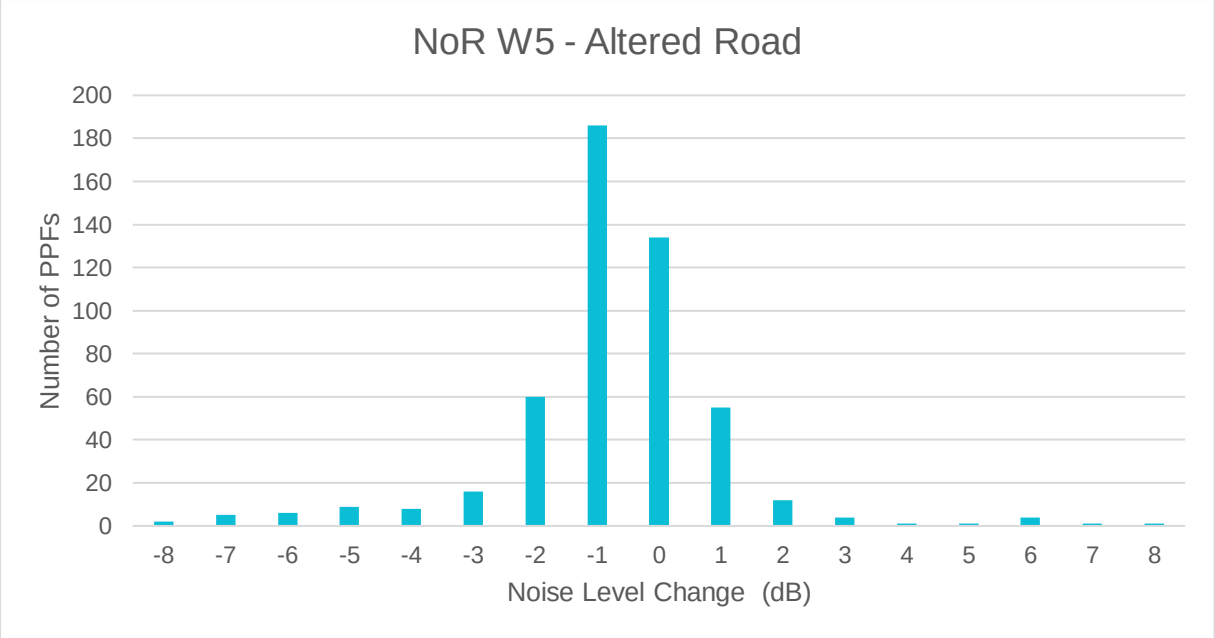

Figure 11-2: Change in Noise Level - Do Nothing Vs Mitigation Option 2 – NoR W5

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