

IN THE MATTER OF

the Fast-track Approvals Act 2024 ("FTAA")

AND

IN THE MATTER OF

an application for approvals by **NZ Transport Agency Waka Kotahi** to construct, operate and maintain the State Highway 1 Wellington Improvements Project

**STATE HIGHWAY 1 WELLINGTON IMPROVEMENTS PROJECT
TECHNICAL REPORT #6
NOISE AND VIBRATION REPORT**

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1. INTRODUCTION

1. My name is Siiri Wilkening. I am a Director at Marshall Day Acoustics Ltd and work in the Auckland office. I am the lead acoustic consultant for this Project.
2. I have been assisted by the following team, all of whom are employed by Marshall Day Acoustics:
 - i. Miklin Halstead, report authoring and review
 - ii. Harry Zhang, construction noise modelling and effects, and traffic noise surveys
 - iii. Tommy Joass, traffic noise modelling and ambient noise surveys
 - iv. Katie Moore and Owen Li, GIS management

Qualifications and experience

3. I hold a Master's degree in Engineering (Land Improvement and Environmental Protection) (University of Rostock, Germany). I have nearly 30 years' experience as an acoustics consultant and am a Fellow of the Acoustical Society of New Zealand. I am also a member of the Resource Management Law Association and the Institute of Directors (New Zealand).
4. My experience relevant to this Application includes:
 - i. I was the expert witness on many Roads of National Significance projects, including SH1 East West Link, SH1 Northern Corridor Improvements, SH16 Waterview Connections, SH1 MacKays to Peka Peka (Kāpiti Expressway) and SH1 Puhoi to Warkworth, all of which were designated through Boards of Inquiry. For each of these projects, my role involved all aspects of acoustics, noise and vibration effects from construction and traffic and (where relevant) underwater effects, and I presented expert evidence at the hearings
 - ii. The SH1 Southern Corridor Improvements (Manukau to Papakura and Papakura to Drury), which involves considerable challenges due to high population density close to the road. The widening of the Southern Motorway, the busiest State highway in New Zealand, will affect a large number of people, both during construction and following completion. I am the lead acoustical consultant on this project and am responsible for all works relating to noise and vibration effects, which includes ambient noise level surveys, computer noise modelling, extensive meetings and engagement with residents and Council, noise mitigation design and the formulation of noise management plans. Various stages of the Project were consented through a mixture of conventional Council hearings and the Covid Fast Track process. I appeared as expert witness at the hearings and prepared the assessments for the Fast Track process
 - iii. I was engaged as principal acoustic consultant of the Te Tupu Ngātahi Supporting Growth Alliance, with a programme providing for the planning and consenting of transport infrastructure (active modes, rapid transit and roading) for the growth areas surrounding Auckland, with projects extending from Warkworth in the north, to Drury and Pukekohe in the south, to Huapai in the west. My role was to provide oversight and peer reviews of the assessments. The role changed to include the assessment of a number of the projects (Takaanini Level Crossings, North (Strategic), North West (Strategic), Pukekohe, and Airport to Botany Rapid Transit), which involved everything from contributing to route selection to assessment and expert witness appearance at several of the combined Council hearings
 - iv. I was the peer reviewer for Basin Reserve roading scheme in 2012 and know the area of the Project well through repeated visits to the relevant sections of the roading system in Wellington
5. In addition to the above key projects, I have undertaken a large number of acoustic assessments for a variety of projects ranging from transportation and power generation to educational facilities, residential and commercial subdivisions, mining and plan changes. I have appeared as an expert

witness at many Council hearings, before numerous Environment Courts and five Boards of Inquiry. I have also taken part in Environment Court mediation.

Code of conduct

6. I confirm that I have read the code of conduct for expert witnesses contained in the Environment Court Practice Note 2023. This assessment has been prepared in compliance with that code, as if it were evidence being given in Environment Court proceedings. Unless I state otherwise, this assessment is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Project description

7. The State Highway 1 (SH1) Wellington Improvements Project (the Project) is a Road of National Significance (RoNS) which improves SH1 in Wellington City. The proposal includes the construction of improvements to SH1 within Wellington City from north of the Terrace Tunnel to Kilbirnie. I understand that the Project will provide for more efficient and reliable access on SH1 and includes duplicate tunnels at The Terrace and Mount Victoria, a new layout at the Basin Reserve as well as improvements along the remainder of the SH1 corridor from north of the Terrace Tunnel to the intersection of Cobham Drive and Evans Bay Parade. The Project aims to unblock critical bottlenecks on the state highway, maintain access for local movements and enable public transport growth.
8. The Project would include changes to roadway alignments, speeds, surfaces, and will contribute to changes in traffic volumes – all factors which affect operational noise emissions. The construction of the Project will produce noise and vibration. These matters form the focus of my report.

Scope of assessment

9. My assessment addresses the following matters:
 - i. The existing environment
 - ii. Benefits of the Project
 - iii. The methodology I have used to assess the effects of the Project
 - iv. Effects of the Project during construction
 - v. Effects of the Project during operation
 - vi. Recommended measures to avoid, remedy or mitigate adverse effects

Construction - Key Assumptions

10. I have based this assessment on the currently available construction methodology. At this stage of the Project, exact timings and durations, sequencing, precise locations of works, and finalised construction methods are not available. This assessment represents a reasonable worst-case scenario of potential construction activities and therefore an envelope of effects.
11. In our experience, construction activities within tunnels are generally far quieter at receivers compared to the support plant outside the tunnel which will control the noise environment in these areas. The use of a road header produces significantly less noise than other methods such as Tunnel Boring Machines. Our noise prediction contours therefore do not include in-tunnel works,

although the setback tables may still be useful to estimate potential risk radii due to ground borne noise.

Operational Noise – Key Assumptions

12. I have based my assessment of existing traffic noise on supplied 2018 traffic flows. I consider they reasonably represent the existing long-term noise environment.
13. I have used the existing pavement types and posted speeds to represent the future do-nothing case on the assumption that no other technical or policy changes would affect the do-nothing noise emissions along the SH1 corridor.
14. I understand that the pumps for the tunnel deluge system will only operate in emergency situations and would therefore be exempt from compliance with the Wellington City District Plan.
15. The day-to-day operations of the tunnel ventilation system will be at a significantly lower rate than would be required in a fire emergency. Therefore, while normal day to day operation should fall within the Wellington City District Plan noise limits for fixed mechanical plant, the ventilation system's emergency operational noise levels would not fall under the same restrictions.

2. EXECUTIVE SUMMARY

Existing environment

16. All Protected Premises and Facilities (PPFs) within this Project are exposed to significant levels of noise from the existing alignment of SH1, as well as from local roads and other urban and suburban activities. This has been the case for many years.
17. The ambient noise survey results (available to date) reflect this by showing noise levels in the 70 dB LAeq(24h), well within the highest noise criteria category of the road noise standard. The main noise source in the Project area is traffic noise. Other noise sources include general commercial and residential noise from people's activities, and natural sounds (particularly in the Northern Connections area of Hataitai).

Potential benefits of the Project

18. I have assessed that the potential benefits of the Project include:
 - i. Slight to noticeable reductions in noise level to some areas due to change in road alignment (e.g. around the Basin Reserve)
 - ii. If more efficient carriage of traffic on the new corridor reduces traffic flows on other corridors such as Aotea – Jervois Quay and Oriental Parade, noise reductions would occur in these areas
 - iii. The use of low noise road surface (LN5) at Ruahine Street in the Eastern Connections area, and potentially across the wider Project, results in a noticeable reduction in traffic noise level and would provide a good benefit for the wider area
 - iv. These benefits will be local – I do not consider there are any national level benefits related to noise effects as a result of this Project

Potential adverse effects without mitigation

19. I have assessed that the potential adverse effects of the Project include:
 - i. Construction noise and vibration will be significant for limited times when construction activities are close to buildings and will occur for several years across the entire Project. Even with mitigation, the noise will be at levels that will result in intrusion and adverse effects for local communities. This is not unusual for projects of this magnitude in urban and suburban environments with high population density and close proximity of sensitive receivers to the works. The Project will take an extended period to be constructed, but construction will move along the alignment, meaning that each receiver would not be affected for the entire construction period. Nevertheless, the time that construction affects each receiver will still be noticeable to significant depending on the area
 - ii. Traffic noise will increase noticeably in some local areas – around Arthur Street as well as Wellington Road, and at PPFs which would previously have been shielded by other buildings which are removed by the Project. In other areas (and for most of the PPFs), the changes will be slight, with overall traffic noise change over the entire Project and all PPFs being effectively 0 dB (i.e. no change). This is because for most PPFs the traffic noise level will remain similar, with changes ranging from -2 to +2 dB only. Most of the PPFs currently, and in the future, experience high traffic noise levels that have the potential to result in adverse health effects, irrespective of the Project not increasing these levels by a significant margin in most instances

Recommended measures to avoid, remedy or mitigate adverse effects, including conditions

20. I recommend the following measures to avoid, remedy or mitigate potential adverse effects:

i. Construction

- Design of potential construction methodology at this stage of the Project is informed by the noise contours and setbacks advised in this report
- A Construction Noise and Vibration Management Plan (CNVMP) should be prepared. The CNVMP would contain all the mitigation that will be implemented across the Project. This would include aspects such as common best practice on and off site (e.g. avoiding unnecessary noise from horns, loose tail gates etc), communication and consultation requirements, survey requirements, how complaints are dealt with and how noise barriers are to be used and placed, amongst other things
- Site or activity specific Schedules (Schedules) should be prepared throughout the construction period to manage noise or vibration effects where the relevant criteria cannot be complied with using normal best practice measures. These Schedules are prepared proactively and are flexible and responsive to any issues identified during the preparation and consultation with affected residents. Schedules provide site or activity specific mitigation and management measures after consultation with the affected receivers and take into consideration affected party feedback as far as practicable. Schedules have been used successfully on many large infrastructure projects and enable ongoing management of high noise and vibration activities
- Some specific mitigation measures that I have recommended include:
 - Avoid night-time blasting if practicable
 - Determine, through specialist assessment prior to construction, if particular heritage buildings are more vibration-sensitive due to their architectural features and apply lower vibration criteria to them
 - Provide for building condition surveys prior to and following high vibration activities to ensure that any potential damage caused by the Project construction will be rectified

ii. Operation

- The use of low noise road surface (LN5) across the Project would result in noticeable noise level improvements. This measure is subject to a practicability assessment prior to construction of the Project
- The use of low noise road surface (LN5) is recommended for the straight at Ruahine Street, where I understand it is practicable to be used. This will result in a marked noise level improvement for houses in the vicinity
- Applying NZS 6806, building modification mitigation would be investigated for those dwellings that receive very high external noise levels (i.e. above 67 dB LAeq(24h) and therefore within 'Category C' in accordance with NZS 6806) to achieve a suitable internal noise environment as well as fresh air intake and thermal comfort. Applying this approach, all sensitive receivers subject to high external noise levels (existing and in the future) would be investigated to reduce existing and future adverse noise and associated health effects
- I understand that NZTA intends to investigate building modification mitigation for those dwellings or apartments where the Project causes a noise level increase of at least 1 decibel in conjunction with noise levels in Category C; I understand NZTA is considering further limiting its building modification mitigation investigations to PPFs in residential zones

- Traffic noise barriers have been assessed for Ruahine Street and Wellington Road in the Eastern Connection area but have been found to be not practicable. Barriers would not be effective in other sections of the Project due to the height of adjacent PPFs
21. The construction and operation of the Project will each have their own effects.
- i. While construction is temporary, noise and vibration levels during that period will be high at times. Mitigation is well established for construction noise and vibration and would be implemented here as best practice measures. The Project differs from others with the tunnelling required and the potential for blasting in an inner-city area. Specific management will be required for this as discussed above
 - ii. Traffic noise will not generally change significantly for most PPFs, but existing and future noise levels are high and already have the potential to cause adverse health effects which should be mitigated if practicable
22. Subject to the above recommended measures being in place, I consider the noise and vibration effects of the proposal can be managed to a level that is reasonable.

3. EXISTING ENVIRONMENT

Introduction

23. The existing noise environment from traffic on existing roads provides a baseline for assessing noise effects. Effects can be assessed by quantifying the noise levels that people would experience due to the implementation of a project. The change in noise environment can then be interpreted in relation to subjective responses of people and possible annoyance. In addition, measured noise levels are used to verify the computer noise model.
24. Existing noise levels, where they are elevated, may also warrant higher night-time construction noise criteria. I have discussed this later in this report.
25. The existing noise environment at all PPFs is controlled by a combination of traffic on SH1, and to a lesser extent traffic on the local roading network.

Site description

Surveys

26. Short duration (15 minute) attended noise level surveys were undertaken on 20 December 2025 and 6 January 2026 between 10am and 1pm, in the vicinity of the Project. As traffic distribution over the day is known, the short duration survey results can be used to derive an indicative 24-hour traffic noise level. Short duration noise level survey results are shown in Table 1 below.

Table 1: Short duration noise level survey results

Survey location	Coordinates	Date/Start time	Measured noise level dB LAeq	Derived noise level dB LAeq(24h)	Measured background noise level dB LA90
Wellington College entrance off Paterson St	1749262.4, 5426250.1	20/12/2025 12:11	65	63	61
St Marks	1749143.5, 5426280.7	20/12/2025 13:04	65	64	62
47 Wellington Rd	1749999.6, 5425046.5	6/01/2026 10:06	64	63	56
Town Belt opposite 126 Moxham Ave	1749942.7, 5425391.0	6/01/2026 10:51	63	61	58
Home of Compassion Creche	1749003.6, 5426519.6	6/01/2026 11:44	59	57	56

27. Long duration noise level surveys were undertaken in February and March 2026, at three locations adjacent to the Project. Loggers were installed and measured noise levels continuously. The measured data was analysed and 24-hour noise levels determined.
28. All noise level survey results are shown in Table 2. A summary sheet for each long duration survey is included in Annexure A.

Table 2: Long duration noise level survey results

Location	Dates	Duration days	Measured noise level dB LAeq(24h)	Measured background noise level dB LA90
Unit 4N, 154 The Terrace	20–28 Feb 2026	8	66	62
18 Ruahine Street	20–28 Feb 2026	8	70	52
109 Vivian Street	13–24 Mar 2026	12	67	58

Modelling

29. In addition to measuring the noise levels at a number of locations along the alignment, computer noise modelling enables the prediction of existing noise levels at all PPFs within the assessment area 100m from the edge of the carriageway for urban areas in accordance with NZS 6806. In some cases, I have expanded the radius slightly to avoid sharp cutoffs in the assessment boundary.
30. In line with other specialist reports, I have divided the Project into five individual noise assessment areas. This also assists with the assessment of the large number of PPFs (1266 plus three relocated PPFs). The PPFs are therefore grouped into areas where they experience similar existing noise environments. The areas are described in Table 3 and are shown on the figures in Annexure B.

Table 3: Noise assessment areas

Area name	Number of PPFs
North of Terrace Tunnel	416
Te Aro	321
Basin Reserve	105
Mt Victoria Tunnel	106 (plus three relocated PPFs)
Eastern Connections	315

31. For each of the five areas, the noise levels received by all PPFs have been calculated. The number of PPFs in each NZS 6806 noise criteria category are summarised for the entire Project in Table 4.

Table 4 : Number of PPFs in each NZS 6806 noise criteria category

Situation	Category A	Category B	Category C
Existing (2018)	989	85	192
Do-nothing (2053)	966	63	237
Do-minimum (2053)*	962	80	227
Mitigation Option (2053)*	974	83	212

* includes the three relocated PPFs

4. BENEFITS OF THE PROJECT (POSITIVE EFFECTS)

32. My computer noise modelling has shown that there are some positive traffic noise effects throughout the Project extent – for instance in localised areas where alignments have moved further from PPFs, or where traffic volumes reduce as a result of different uses of existing roads.
33. With the potential low noise road surface (LN5) mitigation implemented in the Eastern Connections area (i.e. the straight of Ruahine Street), this area would benefit from a noise level reduction below the noise levels that are experienced at present. I recommend that the same low noise road surface also be investigated for other parts of the Project. While it is currently not clear if this is a practicable measure, by the time the Project is constructed, further information may be available that supports the use of LN5 across wider areas, resulting in a reduction in noise level across the existing high noise environments.
34. Those PPFs that potentially receive noise levels in Category C, should be investigated for building modification mitigation. I understand that NZTA's intended approach is to investigate building modification mitigation for those PPFs where the Project would result in a noise level increase of 1 dB or more, and which are located in a residential zone. While this would focus mitigation on those PPFs where the Project may have an additional adverse effect by increasing existing high traffic noise levels further, I understand NZTA may exclude those PPFs that are in the City Centre zone (which may already have been designed to mitigate external noise levels). Any PPF that receives building modification mitigation would benefit from a more appropriate and healthy indoor noise environment.
35. From a more holistic perspective, providing an efficient means of transit through Central Wellington may reduce the traffic volumes on other roads – for instance access to the Airport via Aotea/Jervois Quay and Oriental Parade. The study of such beneficial effects is beyond the scope of this assessment.

5. CONSTRUCTION NOISE AND VIBRATION

ASSESSMENT FRAMEWORK – CONSTRUCTION NOISE AND VIBRATION

Planning context

36. Much, but not all, of the proposed Project work will occur within the existing SH1 designation NZTA1 in the Wellington City District Plan. This designation has the condition related to noise that “The NZ Transport Agency shall comply with the processes and requirements of NZS 6806:2010 Acoustics – Road-traffic Noise – New and Altered Roads (or subsequent version) when altering (as defined in Section 1.5 of NZS 6806:2010) an existing road within the designation.” This condition specifically applies to the section of SH1 between the Basin Reserve and the southern end of the Terrace Tunnel.
37. While the noise and vibration limits of the Wellington City District Plan do not apply to the Project, I have used them as a guideline for appropriate noise and vibration criteria, based on New Zealand noise standards, that I have applied to the Project.
38. For the purposes of this application for a notice of requirement, I apply that same set of processes and requirements to the entire Project, irrespective of whether they are inside the existing or outside the existing designation.

Construction Noise Standards

39. I have reviewed the following guidelines and standards for the assessment of construction noise:
 - i. Wellington City 2024 District Plan (the ‘District Plan’), rule NOISE-R2 which relates to construction noise and vibration, and blasting noise within Wellington City, and references NZS 6803 (refer below)
 - ii. New Zealand Standard NZS 6803:1999 “*Acoustics – Construction Noise*” (‘NZS 6803’)
 - iii. Association of Australasian Acoustical Consultants (AAAC) “*Guidelines for Interpreting and Applying NZS 6803:1999 v1.0*” (the ‘AAAC Guidelines’)
 - iv. NZTA document “State highway construction and maintenance noise and vibration guide” (the ‘NZTA Construction Guide’), v1.1 dated August 2019
40. Both the District Plan and NZTA Construction Guide specify the use of NZS 6803. The NZTA Guide takes into account the intended application of NZS 6803 criteria and provides a solid and tested management structure to achieve the best practicable outcome for state highway projects in respect of construction noise.
41. The National Planning Standards also require the use of NZS 6803 for any future District Plans.
42. The AAAC Guidelines contain information related to the implementation of NZS 6803 limits, prediction and measurement methods, and guidance on indoor noise effects due to construction noise.
43. Overall, I recommend the use of NZS 6803 to establish noise trigger levels at which noise mitigation and management measures must be adopted.

Recommended Criteria – Airborne Noise (Excluding Blasting)

44. As most aspects of the Project construction will exceed a duration of 20 weeks, I consider that the “long-term duration” criteria under NZS 6803 Section 7.2.3 are most appropriate for this Project. In the Standard, long-term duration works are those that occur at any one location over more than 20 weeks. The guideline noise limits for these works are more stringent than shorter duration works.
45. While construction in some areas may take less than 20 weeks, I recommend applying the same criteria to the entirety of the Project. Retaining the same noise criteria for the entire Project will avoid confusion as to where each noise criterion will apply and will be more practicably managed and measured as equipment passes from one area of the works to another.
46. It is commonly accepted, and noted in the AAAC guidelines,¹ that the guideline noise limits from NZS 6803 are to act more as “trigger levels”, and exceedances indicate a requirement to adopt Best Practicable Option (BPO) noise mitigation and management measures. The recommended airborne noise trigger levels are set out in Table 5, and apply at 1 metre outside the façade of occupied buildings.

Table 5: Airborne construction noise trigger levels at occupied buildings

Day of week	Time period	Noise criteria	
		dB L _{Aeq}	dB L _{AFmax}
Occupied dwellings and other buildings containing noise sensitive activities			
Weekdays	0630 – 0730	55	75
	0730 – 1800	70	85
	1800 – 2000	65	80
	2000 – 0630	45	75
Saturdays	0630 – 0730	45	75
	0730 – 1800	70	85
	1800 – 2000	45	75
	2000 – 0630	45	75
Sundays and public holidays	0630 – 0730	45	75
	0730 – 1800	55	85
	1800 – 2000	45	75
	2000 – 0630	45	75
Other occupied buildings			
All days	0730 – 1800	70	-
	1800 – 0730	75	-

47. While the Project works as a whole are of longer duration (several years), each individual receiver building will likely be affected only for limited periods (i.e. weeks or months) of high noise levels.

¹ Association of Australasian Acoustical Consultants, AAAC Guidelines for Interpreting and Applying NZS 6803-1999 Acoustics, Construction Noise v1.0, Section 2.3 (<https://aaac.org.au/Guidelines-&-Downloads>)

48. When preparing the Construction Noise and Vibration Management Plan (CNVMP), it may be necessary to consider whether higher noise trigger levels near city centre and Terrace Tunnel areas are appropriate, particularly as night-time limits are very stringent.
49. The NZTA Construction Guide provides the following guidance:
- “Construction and maintenance at night may result in unavoidable noise levels that exceed the guideline night-time criteria in the standard.*
- Therefore, if such works are necessary and justified at night, the nighttime noise criteria set for a project may need to exceed those in the standard. The reasons for this should be clearly recorded, and the effects managed through a Construction Noise and Vibration Management Plan (CNVMP).*
- The Transport Agency should still ensure that alternative night-time noise criteria are both reasonable and practicable. Specific criteria above those in NZS 6803 may also be required for particular daytime activities, particularly where neighbouring houses are immediately adjacent to the works.*
- One situation where it may be reasonable to vary noise criteria (particularly at night) is where there are already elevated ambient noise levels.”*
50. The noise level surveys showed that existing noise levels are elevated across all hours of the day in the Te Aro and Terrace Tunnel Areas (as would be expected next to high flow state highways). Night-time noise levels remain high, with background sound levels dropping to 45 to 50 dB L_{A90} for those two areas. This means that potentially the night-time construction noise criterion could be increased to 55 to 60 dB L_{Aeq} in line with NZS 6803, which states:
- 7.2.6*
- One major factor which should be considered is whether there is a relatively high background sound level (L_{90}) due to noise from sources other than construction work at the location under investigation. In such cases limits should be based on a determination of the existing level of noise in the area (a “background plus” approach).”*
51. While this appears to be a justifiable approach, it only applies to some areas of the Project. In addition, it would not make a noticeable difference to the management of the Project as construction noise levels in close proximity to receivers (as is the case for Te Aro and the Terrace Tunnel area) would be higher than the potential 60 dB L_{Aeq} night-time noise criterion.
52. Therefore, for consistency across the Project and to take account of the practicability of applying different criteria that may not result in a change in construction outcome, we recommend retaining the construction noise criteria set out in Table 5. The management of noise effects will remain the same, using a CNVMP and Schedules as required.

Recommended Criteria – Blasting-related Airborne Noise

53. NZS 6803 states that noise from explosives (blasting) is a special case and specifies an airblast noise limit of 120 dB L_{Cpeak} measured at 1 metre outside the façade of occupied buildings. Standard NOISE-S2.2 of the District Plan provides blasting requirements and peak noise level limits and is reproduced below:
- “Peak noise levels from blasting activities must not exceed the following when measured within the notional boundary of any building set out [below]:*

1. *Occupied noise sensitive activity and visitor accommodation:*
 - a. *permissible blasting time window: 7:00am to 7:00pm; and*
 - b. *number of blasts per year: ≤ 20 ; and*
 - i. *maximum peak sound level of 120 dB L_{Zpeak} ; or*
 - c. *number of blasts per year: >20 ; and*
 - i. *maximum peak sound level of 115 dB L_{Zpeak} ; or*
 2. *Occupied commercial and industrial buildings:*
 - a. *permissible blasting time window: All hours of occupation; and*
 - b. *no limit on number of blasts per year; and*
 - i. *maximum peak sound level of 125 dB L_{Zpeak} ; or*
 3. *Unoccupied buildings*
 - a. *permissible blasting time window: All times; and*
 - b. *no limit on the number of blasts per year; and*
 - c. *all blasts comply with a maximum peak sound level of 140 dB L_{Zpeak} ”*
54. I do not expect there will be any instance of blasting where only occupied commercial/industrial and unoccupied buildings will be within audible range of blasting activities. Hence, I recommend that the sensitive activity requirements and peak noise level limits under NOISE-S2.2 section 1 are applied to all receiver buildings, namely 115 to 120 dB L_{Zpeak} depending on the number of blasts. These limits are more stringent than the NZS 6803 limit of 120 dB L_{Cpeak} .

Recommended Criteria – Ground Borne Noise

55. I note that NZS 6803 is intended to assess airborne noise received outside buildings. However, this Project will include underground activities, such as tunnelling and rock drilling. In my experience, such activities can comply with airborne noise criteria but carry a greater risk of generating noticeable levels of ground borne noise (noise passing through the ground, into building foundations, and into the building) within indoor spaces.
56. There is no simple method to predict the degree of ground borne noise transmission as it is dependent on the specific properties and make-up of the ground. To provide protection to sensitive activities that may be exposed to ground borne construction noise, I recommend applying the internal noise criteria in Table 6. These levels are based on Table 5 of the NZTA Construction Guide. These criteria are applied progressively, where Category A criteria should be complied with as far as practicable, but Category B criteria would still be reasonable with prior management.
57. The time periods shown in the table reflect the recommended blasting windows for daytime and night-time. Further discussion on why night-time blasting is potentially required, is included in paragraphs 145 and 146.

Table 6: Ground borne construction noise trigger levels within noise sensitive spaces

Space	Time period	Noise Criteria (dB $L_{Aeq(15min)}$)	
		Category A	Category B
Bedroom	2000 – 2200	30	35
Other habitable spaces	0730 – 2000	35	40

Exceedance of Criteria

58. During construction, some activities will occur close to buildings. In many instances, there is the potential for noise levels to exceed the recommended construction noise standards. For most

large-scale construction projects, exceedances of the construction noise standards for brief periods of time are common, and management will ensure that effects are reasonable.

59. NZS 6803 anticipates that at times, construction noise cannot be made to comply with the recommended criteria. Statements such as “construction noise from any site should not generally exceed the numerical noise limits”² indicate that intermittent exceedances are not unreasonable, as long as the BPO has been applied to the management and mitigation of that construction noise.
60. Whether the duration of a construction activity that exceeds the standards can be considered reasonable depends on site-specific circumstances and may vary from site to site and activity to activity. For instance, where daytime noise standards are exceeded for several days, but neighbouring residents are not at home, no one would be affected and therefore mitigation may not be required beyond communication with the residents.
61. Night-time works which only happen for a few nights in any one location may be acceptable if residents have been informed and a clear time frame has been provided. However, if night-time works are expected to be ongoing for several consecutive nights, and at a noise level that affects residents’ ability to sleep, then alternative strategies would need to be implemented, such as offering temporary relocation for those affected residents.

Construction Vibration Standards

62. For the assessment of construction vibration, I have reviewed the following Standards:
 - i. Wellington City 2024 District Plan (the ‘District Plan’), rule NOISE-R2 which relates to construction noise and vibration, and blasting noise within Wellington City
 - ii. British Standard BS 5228-2:2009 “*Code of practice for noise and vibration control on construction and open sites – Part 2: vibration*” (‘BS 5228-2’). This standard sets out reference criteria for human amenity, which act as trigger levels for consultation and communication. This standard is utilised in the NZTA Guide
 - iii. German Standard DIN 4150-3:2016 “*Vibrations in buildings – Part 3: Effects of vibration on structures*” (‘DIN 4150-3’). This standard is intended to avoid cosmetic building damage. The 1999 version of this standard is utilised in the NZTA Guide, and the 2016 version is the assessment standard under NOISE-S2 of the District Plan
63. The NZTA Construction Guide has combined the vibration criteria of BS 5228-2 and DIN 4150-3 into two sets of recommended vibration standards for construction works. In particular:
 - i. One set of standards in the NZTA Construction Guide references criteria for human amenity which act as trigger levels for consultation and communication (referred to as the “amenity standards”). This set of standards is generally taken from BS 5228-2 and is the source of the “Category A” criteria for occupied buildings as described later in this report
 - ii. The other set of standards in the NZTA Guide is generally based on the provisions of DIN 4150-3 and seeks to protect buildings from any, including cosmetic, damage (referred to as the “building standards”). This set of standards is the source of the daytime “Category B” criteria set out in Table 7 below (note that the night-time Category B criterion relates to amenity rather than building standards)
64. For blasting vibration, the NZTA Guide has also used Australian Standard AS 2187-2:2006 “Explosives – Storage and use: Use of explosives” to inform human response to blasting

² NZS 6803:1999 “*Acoustics – Construction Noise*”, Section 7.1.2

vibration. The criteria for building damage due to blasting vibration are the same as what has been applied for other activities.

Recommended Criteria – Vibration in buildings

65. Table 7 shows the recommended construction vibration criteria for buildings and structures. As noted above, these criteria are based on the NZTA Construction Guide and are underlain by a framework of management approaches to ensure that the BPO is implemented, and risk of annoyance or building damage is minimised.
66. I have also included the building protection vibration criteria to be applied to vibration sensitive buildings/structures based on DIN 4150-3. The Standard states that these limits should be used for buildings with high sensitivity to vibration and of great intrinsic value (e.g. a listed building that has particularly vibration sensitive elements such as original plaster mouldings or stained glass).
67. I understand from the constructability report that the Te Aro and Basin Reserve areas contain some vibration sensitive buildings. I have met with the Project's heritage specialist Carolyn Hill and identified those buildings that may have vibration sensitive elements that need to be protected.

Table 7: Vibration criteria at all buildings

Receiver	Location	Details	Category A	Category B
Occupied PPFs	Inside the building	2000 – 0630 hrs	0.3 mm/s PPV	1mm/s PPV
		0630 – 2000 hrs	1mm/s PPV	5mm/s PPV
		Blasting – vibration	5 mm/s PPV	10 mm/s PPV
Other occupied buildings	Inside the building	0630 – 2000 hrs	2mm/s PPV	5mm/s PPV
Vibration sensitive buildings	Building foundation	Vibration – transient	As per relevant use above	8 mm/s
		Vibration – continuous		2.5 mm/s
All other buildings	Building foundation	Vibration – transient (including blasting)	5mm/s PPV	BS 5228-2 Table B.2
		Vibration – continuous		BS 5228-2 50% of Table B.2 values

68. Table B.2 from BS 5228-2 has been reproduced as Table 8 overleaf.

Table 8: Table B.2 from BS 5228-2

Type of Building	Peak component velocity in frequency range of predominant pulse	
	4 to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s	50 mm/s
Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz and increasing to 50 mm/s at 40 Hz and above

69. In general terms, the Category A criteria aim to avoid annoyance of receivers. Because these criteria are conservative, there is a provision in the NZTA Construction Guide to relax the criteria if they cannot be practicably met, provided a vibration expert is engaged to assess and manage construction vibration to comply with the Category A criteria as far as practicable. In addition, affected people should receive communication about the proposed works and anticipated effects, to avoid concern. If Category A criteria are predicted to be exceeded, building condition surveys may be undertaken.
70. If Category A is not practicably achievable, the focus is then shifted to protecting buildings from any damage by applying the Category B criteria. If the Category B criteria (except for the night-time criterion) are complied with, then building damage will, according to DIN 4150-3, not occur. If Category B criteria are predicted to be exceeded, prior to the relevant construction activities commencing, building condition surveys must be undertaken and vibration levels must be monitored during those works. This allows an assessment of and response to any effects.
71. DIN 4150-3, which the 5mm/s Category B criterion is taken from, is a conservative standard designed to avoid all (including cosmetic) damage to buildings, e.g. superficial damage like cracking in plaster. Vibration levels would be significantly higher if structural damage was the only consideration.

Recommended Criteria – Vibration on underground services

72. Project works will be carried out in close proximity to buried pipework. Table 9 overleaf presents the relevant vibration criteria from DIN 4150-3 which are commonly applied for this purpose. The vibration criteria assume that the pipes have been manufactured and laid using current technology.

Table 9: Vibration limits for buried pipework (DIN 4150-3:2016 Table 3 and section 6.2)

Line	Pipe Material ³	Peak Particle Velocity (mm/s PPV)	
		Transient vibration	Continuous vibration
1	Steel, welded	100	50
2	Vitrified clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80	40
3	Masonry, plastic	50	25

73. I understand some works will be carried out around historic and/or poor condition underground services (e.g. Basin Reserve brick sewer main) which could be more sensitive to vibration. BS 5228-2 recommends more conservative limits to accommodate services in poor condition, such as poorly formed joints or unstable ground. I have initially adopted these to be applied to these potentially more vibration-sensitive services:
- i. 30 mm/s PPV – Transient vibration
 - ii. 15 mm/s PPV – Continuous vibration
74. Input from a structural expert to confirm whether these more stringent criteria are appropriate for the brick sewer would be useful in the preparation of the CNVMP.

ASSESSMENT METHODOLOGY – CONSTRUCTION NOISE AND VIBRATION

Introduction

75. This section describes the methodology used to assess the potential noise and vibration effects of the Project on the environment.

Assessed construction activities

76. The scope of this construction noise and vibration assessment includes:
- i. Road and pavement surface demolition and construction, including for the installation/alteration of underground services ('Road works')
 - ii. Existing building demolition
 - iii. Excavation and breaking for land clearance
 - iv. Soil injection and similar land improvement works designed to avoid ground settlement
 - v. Tunnelling works
 - In-tunnel blasting and related activities (Mt Victoria Tunnel only)
 - Tunnel boring
 - Tunnelling support (water treatment plants, pumps, ventilation fans, generators, etc.)
 - vi. Vehicle and mobile plant noise within construction yards (lay down areas)
 - vii. Piling (bored, impact, and vibro methods)

³ Assumes pipes have been manufactured and laid using current technology. If this is not the case, or services are in poor condition, special considerations must be made.

- viii. Construction of retaining elements, e.g. use of rock anchors, soil nails, secant piles
 - ix. Compaction
77. I have identified the above elements to be the primary contributors to noise and vibration received by nearby receivers. At this stage, I have not accounted for the following elements as they are less significant in respect of noise and vibration:
- i. Relocation of existing buildings, such as for heritage buildings
 - ii. Vegetation removal
 - iii. Construction vehicles using public roads
 - iv. General construction and enabling activities (e.g. scaffold and hoarding assembly)
78. I have referred to the reports below to inform parts of my assessment:
- i. Constructability Report (Hoff Consultants): To inform construction information such as high-level sequencing, areas of work, and expected equipment requirements
 - ii. Proposal Description (from the AEE): To inform locations and further details on project components such as bridges and retaining walls
 - iii. General Arrangement Drawings: To inform proposed road layouts, footpaths, bridges, and general extent of work areas

Assessment Methodology

79. My assessment is based on high-level methodologies, staging, and equipment requirements provided to us in the constructability report, in addition to assumptions based on my previous experience with similar projects in New Zealand.
80. My general approach for this assessment of construction noise and vibration has involved:
- i. Review of noise and vibration emission data for each potential construction task/process based on data previously measured by MDA for similar activities. Data from appropriate noise and vibration standards has also been considered, where relevant
 - ii. Prediction of received noise and vibration levels from construction based on indicative construction methodology, determined setback distances where the relevant noise and vibration criteria can be achieved, and computational noise modelling (to investigate screening provided by existing buildings and terrain)
 - iii. Where I predict there is a risk that Project construction cannot comply with the relevant noise or vibration criteria, I recommend management and mitigation measures. I recommend these measures be implemented through the recommended CNVMP and Schedules to the CNVMP (Schedules)
81. The constructability report states for many cases, no specific sequencing of stages is required. Thus, I have chosen to model noise and vibration of the most common and impactful works without specific references to packages or staging.
82. I present the calculated setbacks for noise and vibration to identify any buildings that may fall into a risk category of receiving levels infringing the criteria. Noise predictions have been supplemented with contours that better represent how noise may propagate around buildings and natural features. These are included in Annexure C.

Vibration sensitive buildings

83. I met with the Project's heritage specialist Carolyn Hill and discussed which buildings may be considered particularly vibration sensitive. We agreed that this may include buildings that have

original plaster mouldings or stained-glass windows. Other heritage listed buildings where cosmetic damage could be repaired without affecting the heritage character (e.g. wooden villas that would be normally repainted at frequent intervals) were not considered to be particularly vibration sensitive by us.

84. There are a number of buildings that have plaster mouldings and/or stained-glass windows, which may be assessed as vibration sensitive:
 - i. St Peter's Church (211 Willis Street, Te Aro)
 - ii. L. T. Watkins Building (176 – 182 Cuba Street, Te Aro)
 - iii. Patrick's Building (191 Cuba Street, Te Aro)
 - iv. National Bank Te Aro Building (192-194 Cuba Street, Te Aro)
 - v. Morgan's Building (197 – 199 Cuba Street, Te Aro)
 - vi. Wellington Trades' Hall Building (124 – 128 Vivian Street, Te Aro)
 - vii. Basin Reserve Museum Stand (2 Rugby Street, Basin Reserve)
85. These buildings should be specifically considered by a structural engineer and heritage specialist to confirm if they should be assessed against the vibration criteria for vibration sensitive buildings (refer Table 7).
86. While there are other buildings that are heritage listed and also appear to have decorative elements, they are likely to be less vibration sensitive. These buildings would, in my opinion, be sufficiently protected by the normal residential vibration limits based on external observations made. These buildings include:
 - i. McGavin House and Surgery (200 Willis Street, Te Aro)
 - ii. Carlton Hall (134 Vivian Street, Te Aro)
 - iii. Shop (105-107 Vivian Street, Te Aro)
 - iv. Gurney Nagle Building (33 Vivian Street, Te Aro)
87. A small number of buildings will be relocated. Even if those buildings have vibration sensitive features, they will, at that time of relocation, be appropriately secured to avoid vibration damage. Construction vibration will be significantly less than the vibration during the relocation. The buildings to be relocated are:
 - i. Home of Compassion Crèche (18 Buckle Street, Te Aro)
 - ii. Laureston House (7 Paterson Street)
 - iii. Ettrick Cottage (19 Paterson Street, Mt Victoria)
 - iv. House (140 Austin Street, Mt Victoria)

ASSESSMENT OF CONSTRUCTION EFFECTS

88. Noise level predictions for construction projects consider the sound power levels of each item of equipment, and model the noise propagation characteristics over distance, including the effects of ground and air absorption. A combined “activity sound power level” is determined from the aggregate of the items, from which I determined an effects radius.
89. These effects radii or setbacks are only indicative and conservative when applied to city centre environments as in practice, existing buildings and natural features would provide some degree of screening to receivers further afield. Hence, I have also utilised more detailed acoustic models focussed on the loudest (breaking and piling) and most common (road works) activities to better inform how construction noise may propagate from various points along the Project areas via contours. A combination of both setbacks and contours is useful for determining the potential for infringement of the noise criteria.
90. The following noise level predictions are indicative only and based on a number of assumptions. Actual noise levels and compliance distances will be addressed at the time of detailed design and construction when the CNVMP is prepared with input from the construction contractor.

Construction noise effects assessment

Equipment and activity noise levels

91. Representative predicted construction noise emissions are provided in Table 10 and Table 11 for the high-noise construction equipment/activities that may be used for this Project. The sound power levels have been sourced from measurements I have carried out in the past, or from construction noise databases such as British Standard BS 5228-1:2009 “Code of practice for noise and vibration control on construction and open sites, Part 1: Noise”.
92. Table 10 assumes no use of physical noise mitigation measures (e.g. noise barriers). It identifies the equipment that require mitigation and/or management and the indicative source-receiver distances where the noise criteria compliance risk begins without considering screening effects. This approach is deliberately conservative to represent the reasonable worst-case noise levels that may infrequently occur.
93. Table 10 can be used to identify potential infringements and inform when further scrutiny is required to ensure the best practice mitigation and management measures in the CVNMP are implemented. It can also be used to inform where an infringement could occur at an upper floor receiver if they have direct line-of-sight to the works.
94. Table 11 includes the same activities as Table 10, but assumes the 10 decibels of mitigation from an effective noise barrier. This is typical for a ground level receiver but would be less effective where receivers are elevated above the activity and where the activity itself is elevated. Where there is line-of-sight between a receiver and noise source, noise barriers provide no mitigation. For such cases, alternative noise mitigation measures may be required (e.g. breaker shrouds, selection of quieter equipment).
95. Further guidance on the selection, installation, placement, and effectiveness of noise barriers should be included in the CNVMP.

Table 10: Indicative noise setback distances⁴ without effective noise barriers

Equipment/Activity	Sound Power Level (dB L _{wA})	Setback (m) to meet noise criteria (w/out screening effects from surrounding structures)			
		70 dB L _{Aeq} Daytime	65 dB L _{Aeq} Evening	55 dB L _{Aeq} Morning	45 dB L _{Aeq} Night-time
Road works					
Paving machine	103	25	45	141	447
Grader	110	56	100	316	1000
Milling machine	110	56	100	316	1000
Road sweeper	104	28	50	158	501
Breaking equipment					
Concrete/rock breaker (20-30T)	121	200	355	1150	3550
Concrete/rock breaker (20-30T) with shroud	115	100	178	562	1800
Concrete/rock breaker (8-10T)	116	112	200	631	2000
Concrete/rock breaker (8-10T) with shroud	110	56	100	316	1000
Concrete/rock breaker (1-5T)	111	63	112	355	1150
Concrete/rock breaker (1-5T) with shroud	106	35	63	200	631
Piling equipment					
Impact piling (no mitigation)	123	251	447	1450	4500
Impact piling (casing & dolly)	114	89	158	501	1600
Vibratory sheet piling	116	112	200	631	2000
Diaphragm wall piling	110	56	100	316	1000
Bored piling (large rig)	111	63	112	355	1150
Bored piling (excavator rig)	103	25	45	141	447
Mobile plant and trucks					
Dozer (14T)	103	25	45	141	447
Excavator (5T)	102	22	40	126	398
Excavator (20T)	103	25	45	141	447
Wheeled loader	104	28	50	158	501
Transport truck	108	45	79	251	794
Dump truck	109	50	89	282	891

⁴ In accordance with the requirements of NZS 6803:1999, inclusive of 3 decibels façade reflection

Equipment/Activity	Sound Power Level (dB L _{wA})	Setback (m) to meet noise criteria (w/out screening effects from surrounding structures)			
		70 dB L _{Aeq} Daytime	65 dB L _{Aeq} Evening	55 dB L _{Aeq} Morning	45 dB L _{Aeq} Night-time
Tunnelling and support (excluding blasting)					
Roadheader*	108	45	79	251	794
Drilling blast holes*	118	141	251	794	2550
Grout batching plant	104	28	50	158	501
Ventilation fans (dependent on airflow and pressure requirements)	102	22	40	126	398
Water treatment plant	97	13	22	71	224
Spoil conveyor	70/m	-	1	3	10
Compaction					
Vibratory roller	103	25	45	141	447
Poker vibrator	106	35	63	200	631
Plate compactor	108	45	79	251	794
Soil injection ground improvement	105	32	56	178	562
Other					
Concrete cutting	115	100	178	562	1800
Tracked crusher	112	71	126	398	1300
Angle grinder	108	45	79	251	794
Hydrovac excavation	107	40	71	224	708
Mobile crane (300T)	106	35	63	200	631
Rattle gun	106	35	63	200	631
Directional drilling	105	32	56	178	562
Excavator pulveriser	104	28	50	158	501
Concrete truck and pump	103	25	45	141	447
Rock anchor/soil nail rig	103	25	45	141	447
Cordless nail gun	101	20	35	112	355
Mobile crane (<50T)	98	14	25	79	251
Pump (150mm dia)	93	8	14	45	141
Compressor	93	8	14	45	141
Generator (150kVA)	93	8	14	45	141

* These activities would be in-tunnel only, where there is higher risk for ground borne noise compliance than airborne noise. The setbacks may still be useful for identifying potential risk regions when there are no noisy activities outside tunnel portals and when these activities are closer to the portals.

Table 11: Indicative noise setback distances⁵ with effective noise barriers⁶

Equipment/Activity	Sound Power Level (dB L _{wA})	Setback (m) to meet noise trigger level (ignoring screening effects)			
		70 dB L _{Aeq}	65 dB L _{Aeq}	55 dB L _{Aeq}	45 dB L _{Aeq}
Road works					
Paving machine	103	8	14	45	141
Grader	110	18	32	100	316
Milling machine	110	18	32	100	316
Road sweeper	104	9	16	50	158
Breaking equipment					
Concrete/rock breaker (20-30T)	121	63	112	355	1150
Concrete/rock breaker (20-30T) with shroud	115	32	56	178	562
Concrete/rock breaker (8-10T)	116	35	63	200	631
Concrete/rock breaker (8-10T) with shroud	110	18	32	100	316
Concrete/rock breaker (1-5T)	111	20	35	112	355
Concrete/rock breaker (1-5T) with shroud	106	11	20	63	200
Piling equipment					
Impact piling (no mitigation)	123	79	141	447	1450
Impact piling (casing & dolly)	114	28	50	158	501
Vibratory sheet piling	116	35	63	200	631
Diaphragm wall piling	110	18	32	100	316
Bored piling (large rig)	111	20	35	112	355
Bored piling (excavator rig)	103	8	14	45	141
Mobile plant and trucks					
Dozer (14T)	103	8	14	45	141
Excavator (5T)	102	7	13	40	126
Excavator (20T)	103	8	14	45	141
Wheeled loader	104	9	16	50	158
Transport truck	108	14	25	79	251
Dump truck	109	16	28	89	282

⁵ In accordance with the requirements of NZS 6803:1999, inclusive of 3 decibels façade reflection

⁶ Only

Equipment/Activity	Sound Power Level (dB L _{WA})	Setback (m) to meet noise trigger level (ignoring screening effects)			
		70 dB L _{Aeq}	65 dB L _{Aeq}	55 dB L _{Aeq}	45 dB L _{Aeq}
Tunnelling and support (excluding blasting)					
Roadheader*	108	14	25	79	251
Drilling blast holes*	118	45	79	251	794
Grout batching plant	104	9	16	50	158
Ventilation fans (dependent on airflow and pressure requirements)	102	7	13	40	126
Water treatment plant	97	4	7	22	71
Spoil conveyor	70/m	-	-	1	3
Compaction					
Vibratory roller	103	8	14	45	141
Poker vibrator	106	11	20	63	200
Plate compactor	108	14	25	79	251
Soil injection ground improvement	105	32	56	178	562
Other					
Concrete cutting	115	32	56	178	562
Tracked crusher	112	22	40	126	398
Angle grinder	108	14	25	79	251
Hydrovac excavation	107	13	22	71	224
Mobile crane (300T)	106	11	20	63	200
Rattle gun	106	11	20	63	200
Directional drilling	105	10	18	56	178
Excavator pulveriser	104	9	16	50	158
Concrete truck and pump	103	8	14	45	141
Rock anchor/soil nail rig	103	8	14	45	141
Cordless nail gun	101	6	11	35	112
Mobile crane (<50T)	98	4	8	25	79
Pump (150mm dia)	93	3	4	14	45
Compressor	93	3	4	14	45
Generator (150kVA)	93	3	4	14	45

* These activities would be in-tunnel only, where there is higher risk for ground borne noise compliance than airborne noise. The setbacks may still be useful for identifying potential risk regions when there are no noisy activities outside tunnel portals and when these activities are closer to the portals.

96. Table 12 includes the sound power levels and compliance setbacks required for different maximum instantaneous charges (MIC) for blasting. I note that this is also an in-tunnel only

activity. The data and setback calculations are based on methods set out in US Bureau of Mines report 8485, which have been derived from surface mining blasting. I.e., the airborne setback distances are conservative but are useful for initially determining areas of potential compliance risk.

Table 12: Indicative noise setback distances for blasting without effective noise barriers

Blasting MIC (kg)	Setback (m) to meet blasting noise limits (ignoring screening effects)	
	120 dB L_{Zpeak} (≤ 20 blasts/year)	115 dB L_{Zpeak} (> 20 blasts/year)
0.3	47	76
0.5	56	90
1.0	70	114
2.0	89	143
5.0	120	195

97. Generally, multiple receiver buildings will be within the setbacks for high-noise activities during all time periods, even with effective noise barriers. This is expected and typical for major construction works in city centre environments, and exceedances of the noise criteria would only occur for limited durations as the Project works progress through each package. BPO noise mitigation and management measures must be adopted throughout the Project works to minimise the risk of potential noise effects.
98. I note that NZS 6803 acknowledges that *“Noise limits (L_{eq}) of [...] 45 dBA at night-time may mean that no construction work can take place”*, which is supported by large setback distances to comply with the night-time noise limit. As previously stated, night works must be avoided where practicable and should only be carried out where minimising impact on infrastructure is shown to be BPO (e.g. where road closures are necessary to undertake the works, and these cannot reasonably be done during daytime due to traffic disruption). Blasting must not be carried out outside of the permissible time window.
99. If night works are required, noise mitigation and management measures must be carefully considered for potentially affected receivers, taking duration, type, and scale of works into account. Further discussion around noise effects of night works is included in paragraphs 113 to 117.
100. I recommend Schedules be developed prior to any construction activities proposed to occur at night. These schedules would identify the noise and/or vibration risks from construction activities and establish the management procedures that will be used in each area. These procedures may involve the use of temporary noise barriers, choice of quieter operating equipment or rescheduling the activity to occur during the day-time period. Schedules are discussed further in paragraphs 167 to 172.
101. For in-tunnel activities, propagation of ground borne noise is difficult to predict as previously discussed. I have provided conservative noise setbacks above and vibration setbacks in paragraph 130 that provide an envelope of effects radii, but measurements will be required for validation which can be accounted for in the CNVMP.

Construction noise contours

102. I have prepared construction noise contours in Annexure C to show how noise may propagate from the following works. These are based on activities that I have assumed will be required for these works and their approximate locations:

- i. Road works (including construction of new roads and roads on bridges)
 - ii. Existing building demolition
 - iii. Construction yards (primarily trucks)
 - iv. Tunnelling support and portal construction
 - v. Ghuznee Street overbridge
 - vi. Basin Reserve retaining walls (Sussex Street trench)
103. The noise contours also indicate the specific receivers where the noise criteria may be infringed, which is not provided by the setback tables. This allows for better estimation of potential noise effects within affected buildings (paragraphs 108 and 114). The contour shown is the 70 dB L_{Aeq} noise level contour which represents compliance with the daytime noise criterion. Even when compliance with this noise criterion is achieved, there will be adverse effects while works are at or above this level (refer to Table 13 below). This is not unreasonable given that construction is a temporary activity and a necessary part of development in a society.
104. The noise contours represent the general worst-case noise levels for road works, construction yards, and Basin Reserve retaining walls. The contours for the remaining works modelled are representative of typical noise levels as information on methods and locations for these works are currently less detailed.
105. Note that the noise contours show the extent of noise propagation from multiple positions within each set of works. The received noise level at each receiver is not the cumulative noise but represents the case where a noisy activity is at the closest/most exposed position specific to the receiver and the set of works. In practice, the “centre” of noise emissions from the works would shift as the Project progresses, and high levels of construction noise exposure at any one receiver would be for limited durations per stage of works.

Construction noise effects

Daytime

106. Noise levels affect people in their place of residence or work. Construction noise is inherently higher than ongoing operational noise but is generally reasonable because of its limited duration.
107. Generally, construction noise is assessed in relation to people inside buildings. People will generally choose to not spend any extended periods in an outdoor area next to construction activities. Also, people will usually keep their windows and doors closed to reduce internal noise levels. Generally, New Zealand dwelling facades reduce noise levels by 20 to 25 decibels. I have assumed conservatively a noise level reduction of 20 decibels, though any new dwellings would achieve 25 to 30 decibels noise level reduction because of modern building construction standards.
108. How people experience noise inside or outside a building is described in Table 13 below. The descriptions have been adapted from the AAAC guidelines and my own experience.

Table 13: Potential noise effects for varying noise levels

External façade noise level dB L _{Aeq}	Potential daytime effects outdoors	Corresponding internal noise level dB L _{Aeq}	Potential Daytime Effects Indoors
Up to 65	Conversation becomes strained, particularly over longer distances.	Up to 45	Noise levels would be noticeable but unlikely to interfere with residential or office daily activities.
65 to 70	People would not want to spend any length of time outside, except when unavoidable through workplace requirements.	45 to 50	Concentration would start to be affected. TV and telephone conversations would begin to be affected.
70 to 75	Businesses that involve substantial outdoor use (for example garden centres) would experience considerable disruption.	50 to 55	Phone conversations would become difficult. Personal conversations would need slightly raised voices. Office work can generally continue, but 55 dB is considered by the experts to be a tipping point for offices. For residential activity, TV and radio sound levels would need to be raised.
75 to 80	Some people may choose hearing protection for long periods of exposure. Conversation would be very difficult, even with raised voices.	55 to 60	Continuing office work would be very difficult and become unproductive. In a residential context, people would actively seek respite.
80 to 90	Hearing protection would be required for prolonged exposure (8 hours at 85 dB) to prevent hearing loss.	60 to 70	Untenable for both office and residential environments. Unlikely to be tolerated for any extent of time.

109. Construction noise may affect receivers as close as a few metres from the works. I predict noise levels in excess of 90 dB L_{Aeq} at the façades of some buildings may occur during the noisiest activities when they are closest to those buildings (e.g. if concrete breaking is required on Vivian Street footpaths). All buildings where an exceedance of the 70 dB L_{Aeq} daytime noise criterion is predicted are shown within the red noise contour in Annexure C. Mitigation will be required.
110. While all buildings are assessed similarly in relation to daytime construction noise (i.e. the limit is the same for sensitive and commercial buildings), there are some that may be more sensitive than others. This includes schools. There are several schools within the area of influence of construction noise: Clifton Terrace Model School in Clifton Terrace, St Marks School and Preschool in Dufferin Street, Wellington East Girls' College in Austin Street, and St Patrick's College in Evans Bay Parade. When construction occurs in close proximity to these schools, communication should be held to ensure that high noise activities are undertaken, as far as practicable, outside school hours and outside exam times. Particularly disruptive construction activities may be able to be planned for school holidays to avoid adverse effects on school operations.
111. Additional to the absolute construction noise levels, the extent of mitigation and management will be dependent on the total duration of works near these dwellings – noise exposure duration of days, weeks, or months can significantly control the potential noise effects. Where the duration of high levels of noise exposure is expected to be prolonged and unavoidable, consultation with residents will be required to determine whether temporary relocation is feasible to address the

noise effects. The requirement for these consultations can be determined once the detailed methodology is confirmed and included in the CNVMP.

112. Generally, it is expected that construction noise levels will be up to 75 dB L_{Aeq} or less outside most receiver buildings. For buildings facing the works there may be some impacts on indoor living or office work environment. The impact would be mitigated by closing doors and windows. In addition, temporary construction noise barriers can be installed, where effective, to reduce noise levels by 10 decibels.

Night-time

113. The noise level received inside a noise sensitive space (e.g. bedroom) will depend on the external noise level, sound insulation performance of the façade (particularly the glazing) and room constants (such as the room dimensions and surface finishes). These factors can vary widely.
114. Table 14 provides guidance on the potential night-time effects inside sensitive spaces, depending on the external noise level and façade glazing type.

Table 14: Potential night-time noise effects in bedrooms of dwellings

External noise level (dB L_{Aeq})	Estimated internal noise level (dB L_{Aeq})			
	Sealed glazing (30 dB reduction)	Openable windows (modern building) (25 dB reduction)	Openable windows (older style building) (20 dB reduction)	Open windows (15 dB reduction)
70 – 75	40 – 45	45 – 50	50 – 55	55 – 60
65 – 70	35 – 40	40 – 45	45 – 50	50 – 55
60 – 65	30 – 35	35 – 40	40 – 45	45 – 50
55 – 60	25 – 30	30 – 35	35 – 40	40 – 45
50 – 55	20 – 25	25 – 30	30 – 35	35 – 40
45 – 50	15 – 20	20 – 25	25 – 30	30 – 35

115. The potential effects are colour coded as follows:

- Typically acceptable
- Sleep disturbance for some occupants
- Sleep disturbance for most occupants

116. Consultation and management may be required if night-time works are proposed in the vicinity of dwellings, where internal noise levels would affect sleep. Noise impacts may be less in areas where the existing ambient noise levels are elevated (e.g. dwellings adjacent to SH1). Consultation with residents, measurements of existing noise levels, and assessment of proposed activities will help to determine the appropriate noise mitigation and management measures for night works on a case-by-case basis.
117. Similar to the consideration of daytime noise effects, the acceptability of night works in respect of noise is dependent on both the level of received noise as well as its frequency and duration. A

single night of work would warrant less intensive management compared to multiple, sequential nights of work.

118. I therefore recommend that night-time works are planned holistically across the Project, ensuring that neighbouring construction sites that require night-time works are timed to not affect the same dwellings and result in increased cumulative effects.

Construction vibration effects assessment

119. The activities that pose the greatest risk of exceeding the vibration criteria (human annoyance and building damage) are compaction, impact piling, vibropiling, and blasting. I calculated vibration radii outside which compliance with the Category A and B criteria could be achieved ('vibration setbacks').
120. I understand while multiple types of piling are being considered, these have yet to be confirmed. Hence, I have assessed vibration from bored piling (lowest vibration) and crane-mounted impact piling (highest vibration) to quantify the range of piling vibration.

Equipment vibration data

121. I anticipate that vibratory rolling, piling, and blasting activities pose the greatest risk of exceeding the established vibration criteria. This assessment focuses on these activities. However, should other activities that generate higher levels of vibration be used in the vicinity of buildings, the CNVMP will reflect this at the time of detailed design.
122. I sourced vibration level data from:
- i. Previous measurements carried out by MDA
 - ii. The British Standard BS 5228-2:2009
 - iii. The Transport Research Laboratory Report referenced by that standard
123. Figure 1 presents vibration regression curves for potential activities that generate high levels of vibration, except blasting. Except for piling (where I have included impact, vibro sheet and bored piling), where an activity type is considered with equipment of various sizes, I have presented the regression curve of the highest-vibration variety (e.g. 10-12T vibratory roller instead of a 3-5T roller).
124. The regression curves are derived from the measured data with a 100% safety margin to account for potential ground condition uncertainty, making the predictions generally conservative. I expect equipment to be well maintained and operated in a considerate manner, in accordance with section 16 of the RMA, and have therefore not allowed for effects from operations that fall outside those parameters.

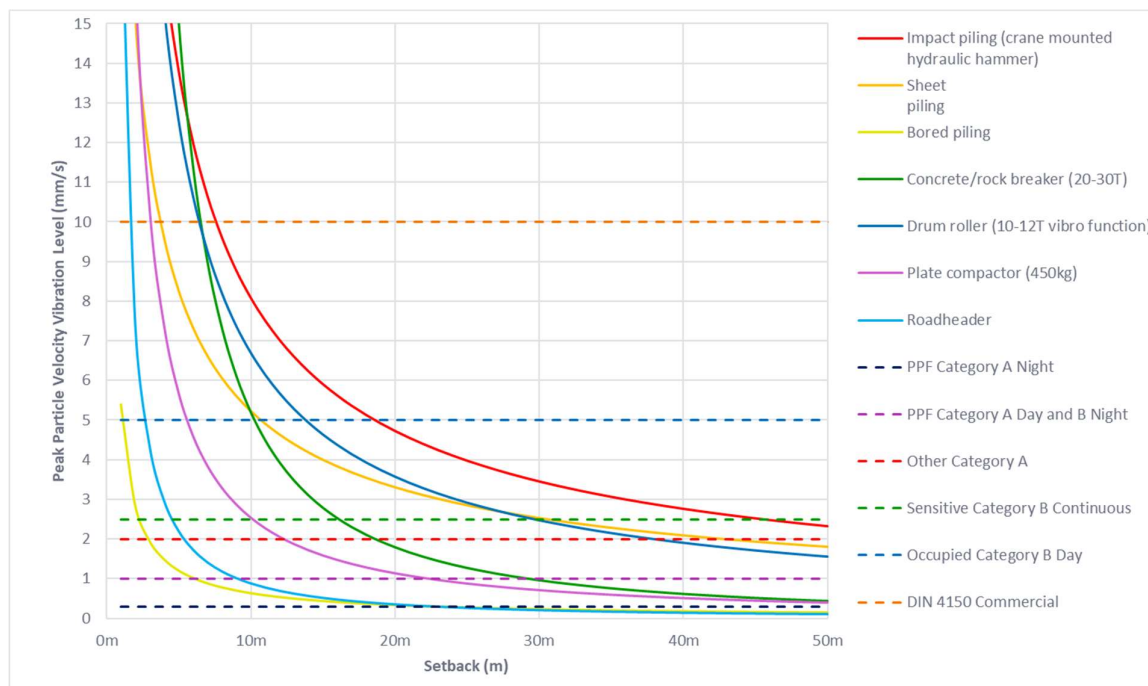


Figure 1 – Vibration regression curves (excludes blasting)

125. Figure 2 presents the vibration regression curves for various MICs for blasting. The curves have been based on the methods set out in US Bureau of Mines report 8485 and supplemented by AS 2187-2:2006. I have not applied any safety margin to these curves but have assumed the ground condition to be consistent with hard rock (basalt) as a generally conservative measure.

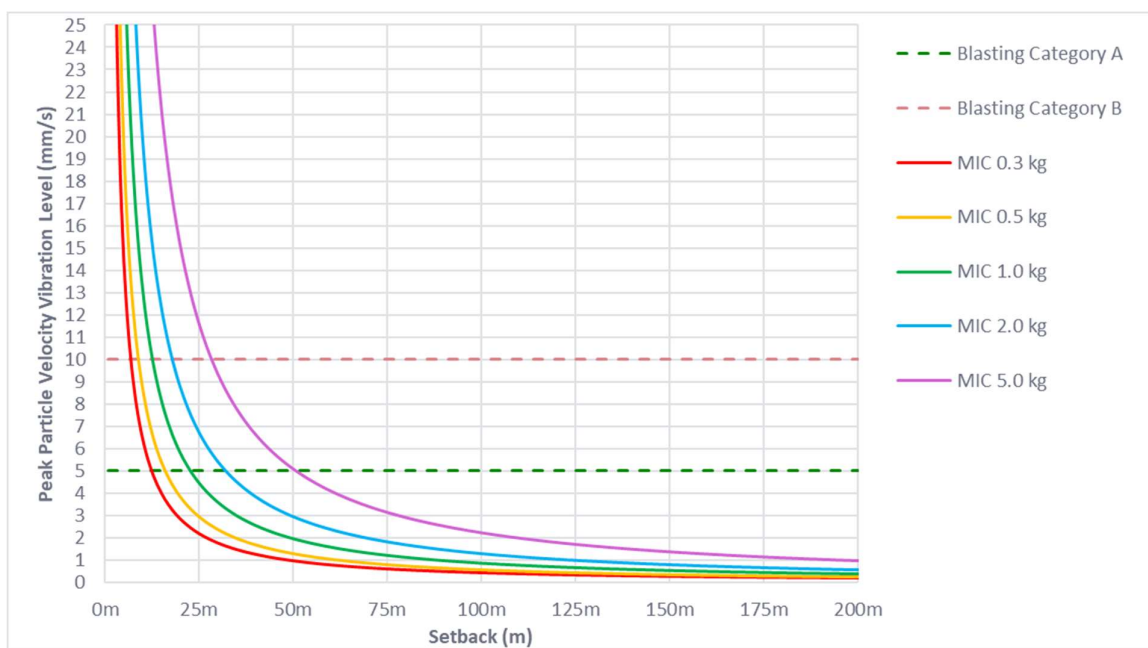


Figure 2 – Blasting vibration regression curves

126. As the vibration regression curves are indicative and for assessment purposes, they will be confirmed through surveys at the outset of construction of the Project. Such surveys will be required by the CNVMP.

Construction vibration setbacks and compliance envelopes

127. I have prepared visual representations of the construction vibration setbacks detailed above in Annexure D to show the regions within which risk of vibration effects may begin. I have identified the following sets of work as the most common and/or highest risk for infringements of the vibration criteria. I have also determined the highest vibration equipment that will be used per set of work, which is what the setback illustrations have been based on:
- i. Road works – 6-8T vibratory roller (compaction)
 - ii. Tunnel portals – 10-12T vibratory roller (compaction)
 - iii. Bridges and retaining walls – Piling (I have included bored piling (lowest vibration) and crane-mounted impact piling (highest vibration))
 - iv. In-tunnel works – Blasting (Mt Victoria tunnel only) and roadheader
128. The work locations have been approximated similarly to those determined for the noise contours.
129. The risk categories described in the bullet points and Table 15 below relate to the risk of exceeding the vibration criteria at various distances from the vibration inducing works. They are based on the indicative predictions, which will need to be updated at the time of construction as discussed above. I consider the basis of my predictions to be a reasonable worst-case for the equipment assumed. Should other equipment be used, the risk zones must be updated. This will happen through the CNVMP at the time of construction.
130. The risk categories are defined as follows for daytime works. Night-works are special cases that would require case-by-case vibration risk analysis:
- i. High Risk: Predicted to exceed both Category A and B criteria (refer Table 7)
 - ii. Medium Risk: Predicted to exceed Category A criteria, but comply with the Category B criteria
 - iii. Low Risk: Predicted to comply with Category A and B criteria

Table 15: Setback Distance in metres and associated risk zones

Equipment	Risk Zones		
	Occupied Dwellings (Residential)	Other Occupied Buildings (Commercial)	All Other Buildings
Vibratory roller (6-8T)	High: < 10 Med: 10 – 28 Low: > 28	High: < 10 Med: 10 – 13 Low: > 13	High: < 3 Med: 3 – 10 Low: > 10
Vibratory roller (10-12T)	High: < 14 Med: 14 – 38 Low: > 38	High: < 14 Med: 14 – 18 Low: > 18	High: < 4 Med: 4 – 14 Low: > 14
Bored piling	High: < 1 Med: 1 – 3 Low: > 3	High: < 1 Med: 1 – 2 Low: > 2	High: < 0 Med: 0 – 1 Low: > 1
Sheet piling (vibro)	High: < 11 Med: 11 – 43 Low: > 43	High: < 11 Med: 11 – 15 Low: > 15	High: < 2 Med: 2 – 11 Low: > 11

Equipment	Risk Zones		
	Occupied Dwellings (Residential)	Other Occupied Buildings (Commercial)	All Other Buildings
Crane-mounted impact piling	High: < 19 Med: 19 – 61 Low: > 61	High: < 19 Med: 19 – 25 Low: > 25	High: < 5 Med: 5 – 19 Low: > 19
Roadheader	High: < 3 Med: 3 – 5 Low: > 5	High: < 3 Med: 3 – 4 Low: > 4	High: < 1 Med: 1 – 3 Low: > 3

131. The “all other buildings” zone has been calculated under the assumption that all buildings are light weight structures.
132. Blasting risk levels for various MICs can be determined by referring to Annexure D.
133. The approximate number of buildings where there is a risk of exceeding Category A or B, is summarised in Table 16 below, for the highest vibration inducing activity (impact piling). Where a building is identified to receive vibration levels exceeding Category B, it would also receive vibration levels exceeding Category A.
134. The below table would require updating at the time of detailed design when the construction methodology and equipment is known. This would occur through the CNVMP.

Table 16: Indicative number of buildings in each vibration risk category for impact piling

Area	Approx. number of buildings potentially receiving vibration levels exceeding	
	Category A (1mm/s PPV)	Category B (5mm/s PPV)
Area 1 – Terrace Tunnel	0	0
Area 2 – Te Aro	115	1
Area 3 – Basin Reserve	188	21
Area 4 – Mt Victoria Tunnel	0	0
Area 5 – Eastern Connections	154	7

135. The potentially impacted buildings can be identified using the figures in Annexure D. Where the criteria of Category B are predicted to be exceeded, a building condition survey should be undertaken prior to the works causing the high vibration levels as this is the vibration level above which building damage may occur. I recommend that building condition surveys are undertaken for all buildings that are up to 50 metres from the works to ensure that vibration effects are able to be identified should a dispute about potential building damage arise. I understand that building condition surveys will also be undertaken in response to potential geotechnical issues such as ground settlement. There is likely to be an overlap between the building condition surveys required, and this will need to be coordinated by the contractor at the time of implementation.
136. Some stretches of the Project construction works are predicted to carry elevated risk of Category B criteria exceedances without mitigation, e.g. Vivian Street works. This is generally where compaction is required for road works directly adjacent to occupied buildings.
137. The vibration criteria are significantly lower at dwellings during the night. At night the potential for Category A exceedance increases to distances greater than 200m from the works, depending on

the equipment being used. On this basis, vibration intensive activities in the vicinity of occupied dwellings should be scheduled for the daytime wherever practicable.

138. Where construction activities would result in buildings within the High Risk zones, I recommend that low vibration methods of construction be investigated and implemented wherever practicable. This may include using bored piling methods, non-vibrating rollers, or pre-drilling piles. The aim of low vibration methods is to comply with the Category A vibration criteria.
139. If low vibration methodologies are not practicable, I recommend that (before construction commences) the contractor undertake the mitigation outlined in Table 17 below. The risk zones will be determined at that time also.

Table 17: Recommended mitigation of construction vibration

For buildings in the Medium Risk Zone	For buildings in the High Risk zone
Notify occupiers of the works in advance via a letter drop. The letter should outline the proposed construction activities and likely vibration effects	Engages with the building owner and occupier to discuss the proposed construction activities and likely vibration effect
Offer consultation to building occupants and ensure contact channels are readily available	Undertakes a pre-construction building condition survey
	Monitors vibration levels during the construction activities which are within the High Risk distance

140. Buildings outside the Medium Risk Zone will likely still be included in the communication in order to ensure that people are not concerned about building damage or similar.
141. The exact mitigation measures and affected buildings will be defined in the CNVMP. At that time, equipment, timing and methodology of construction will be known, and measurements can be undertaken on site to determine the regression curves for the Project locations. Mitigation will include aspects such as communication and engagement, choice of methodology and timing of works. Where houses are in either the High or Medium Risk zones, it is likely that a Schedule will need to be prepared for the works. All night works will likely require a Schedule as well.

Vibration effects

142. Vibration can be perceived at levels well below a level at which cosmetic building damage may occur. For structural damage to occur, vibration levels would need to be magnitudes higher than perceptible levels. People tend to react with concern at low vibration levels. It is therefore important to inform residents in the vicinity of the works that construction vibration may be felt – but at levels that are not damaging.
143. Table 18 shows how people may react to various vibration levels.

Table 18: Vibration effects

Vibration level (mm/s PPV)	Potential effects indoors
0.14	The threshold of perception for stationary people.
0.3	Can be perceptible during normal residential activities, particularly for more sensitive receivers. Levels above this would wake most people from their sleep. This is the Category A criterion for construction vibration generated at night-time for sensitive receivers.

1	Is generally tolerable, but complaint or adverse reaction is likely if there is no warning in office or residential environments. What people actually feel would be subject to the source but could include a steady vibration from sources such as vibratory compaction, or a small jolt such as from the movement of a large digger, either of which could rattle crockery and glassware. Sleep disturbance would be almost certain for most people. This is the Category A criterion for construction vibration generated during daytime for sensitive receivers, and the Category B criterion for sensitive receivers during night-time.
2	Vibration would clearly be felt in all situations. Can be tolerated in indoor environments such as offices, houses and retail, where it occurs intermittently during the day and where there is effective prior engagement. Effects experienced would be somewhere between levels of 1 and 5 mm/s. This is the Category A criterion for construction vibration during daytime for other occupied buildings.
5	Unlikely to be tolerable in a workplace. Highly unsettling for both the workplace and residential. If exposure was prolonged, some people could want to leave the building affected. Computer screens would shake, and light items could fall off shelves. This is the threshold below which no cosmetic damage will occur according to the DIN4150-3 standard. This is the Category B criterion for construction vibration during daytime for all occupied buildings, and the Category A criterion for unoccupied buildings.
10	Likely to be intolerable for anything other than a very brief exposure.

144. The vibration effects guidance above is fairly general and applicable to a wide variety of building occupants. I note that the actual receiver sensitivity to vibration is also dependent on the activities experiencing the vibration. Buildings that house activities such as laser eye surgery, recording studios, and laboratories will have much higher sensitivity to vibration. Any such cases will be identified as the Project design progresses, and these receivers will be prioritised for consultation during the Project works to determine the most appropriate mitigation and management measures.

Blasting effects assessment

145. In my opinion, and in-line with the District Plan requirements, I recommend that blasting activities should be limited as far as practicable during night-time. Noise and vibration generated by blasting can be unsettling, and increased receiver sensitivity during the night-time period can significantly amplify the risk of potential effects.
146. I understand that blasting may take up to 3 months and may occur only in limited areas in the centre of the Mt Victoria Tunnel. Since the existing tunnel will need to be closed during blasting, for safety reasons, any blasts will need to be timed to avoid major traffic disruption and associated adverse effects from traffic using alternative routes. Therefore, it is likely that blasting windows will need to be in more sensitive times such as later in the evening (until 10pm) or early (before morning commute).

MEASURES TO AVOID, REMEDY OR MITIGATE ACTUAL OR POTENTIAL ADVERSE ACOUSTICS EFFECTS DURING CONSTRUCTION

147. Construction activity is inherently noisy and can cause high vibration levels. Nevertheless, the RMA and NZS 6803:1999 require that noise levels are managed and mitigated so as not to exceed a reasonable level. The focus of a construction noise assessment is on managing the noise levels and resulting effects, rather than meeting a specific criterion. Similarly, construction

vibration should be managed to avoid amenity issues as far as practicable but must avoid building damage.

General Best Practice Measures

148. The following general noise mitigation measures are recommended to be implemented throughout the construction of the Project. These measures should be implemented as a matter of good practice and are considered to be the baseline mitigation for most circumstances.
- i. Public liaison and communication should be the focus of management to ensure potentially affected occupiers of neighbouring buildings are reasonably informed. A contractor environmental manager or appointed representative should be available for residents to contact. Guidance contained in acoustics.nzta.govt.nz should be referred to where relevant
 - ii. Training of personnel with regard to quiet and low vibration operating procedures should be given
 - iii. Maintenance of equipment should ensure noise and vibration levels remain as low as practicable
 - iv. Noise barriers, temporary or otherwise, should be considered where necessary and effective
 - v. Low noise and vibration plant should be selected wherever practical. Noisy plant should have noise mitigation measures (such as silencers or enclosures) fitted. Where practicable, plant that generates low levels of vibration should be used in preference to vibration intensive plant (e.g. using auger piling methods rather than vibropiling where ground conditions permit)
 - vi. Night-time operation should only occur where necessary to avoid other factors such as traffic disruption and where all practicable measures have been implemented to reduce noise emissions as per the CNVMP. Where compliance cannot be achieved, a Schedule would be implemented
 - vii. Tonal reversing alarms should be replaced with a suitable alternative such as a visual or broadband alarm if required for night-time works
 - viii. An offer of temporary resident relocation may be considered where all practicable noise mitigation measures have been implemented, and noise levels are above appropriate levels for a sustained period. Such a measure should be considered generally as a last resort
149. Complaints can arise irrespective of compliance with the noise and vibration limits. To minimise complaints, general mitigation and management measures that should be considered include, but are not limited to, the following:
- i. Avoiding unnecessary noise, such as shouting, the use of horns, loud site radios, rough handling of material and equipment, and banging or shaking excavator buckets
 - ii. Avoiding high engine revs through appropriate equipment selection and turn engines off when idle
 - iii. Maintaining site accessways to avoid potholes and corrugations
 - iv. Mitigating track squeal from tracked equipment, such as excavators (may include tensioning and watering or lubricating the tracks regularly)
 - v. Minimising construction duration near sensitive receivers
 - vi. Stationary equipment (e.g. generators) should be located away from noise sensitive receivers and site buildings and material stores used to screen them. In the case of tunnel support plant that may be operational over long periods and can generate high levels of noise, specifically designed noise enclosures may be a suitable option
 - vii. Orienting mobile machinery to maximise the distance between the engine exhaust and the nearest sensitive building façade (e.g. excavators)
 - viii. Using noise barriers where appropriate and effective

- ix. Implementing specialised mitigation measures for particularly high noise and vibration generating activities such as concrete breaking, piling and vibratory roller use
 - x. Ensuring advanced communication with affected parties is complete prior to commencing activities that are predicted to exceed the noise and vibration performance standards
 - xi. Undertaking monitoring as appropriate
150. Where an exceedance of the construction noise or vibration standards is likely due to a specific activity or in a specific area, and the general mitigation measures as discussed above are not sufficient to achieve full compliance, further mitigation and management should be investigated and implemented where practicable. Such information would be contained in a Schedule as an attachment to the CNVMP.

Building Condition Surveys

151. For construction activities resulting in buildings being located within High Risk zones (refer Table 15) I recommend that low vibration construction methods be investigated and implemented wherever practicable, with the aim of achieving Category A compliance. This may include using screw piling methods, non-vibrating rollers, or pre-drilling piles. Annexure D shows all buildings that are within the High Risk zone, represented by the vibration setback contour for Category B (i.e. 5 mm/s PPV).
152. However, if low vibration methodologies are not deemed practicable, for dwellings in the High Risk zones I recommend that the following process be implemented before construction commences:
- i. Engage with the building owner(s) and occupier(s) to discuss the proposed construction activities and likely vibration effects
 - ii. Undertake a pre-construction building condition survey. This should be required where the proposed construction methodology is predicted to reach or exceed the Category B vibration limits and should be undertaken at a trigger level lower than the Category B limits. Surveys can also be offered to building occupants within Medium Risk zones if they express concerns about building damage
 - iii. Monitor vibration levels during the construction activities which are within the High Risk distance
153. If low vibration methodologies are not deemed practicable for buildings in the Medium Risk Zone of a construction activity, I recommend that all owner(s) and occupier(s) of buildings within the Medium Risk Distance be notified of the works in advance via a letter drop which outlines the proposed construction activities and likely vibration effects, channels for effective communication are created, and consultation is offered.
154. Additional vibration monitoring and follow-up building condition surveys should be undertaken at all buildings that had pre-construction building condition surveys. They should also be undertaken in response to complaints, to ensure construction activities comply with the Category B criteria and that no building damage has occurred. If any construction-induced damage were shown to have occurred as a result of Project construction activities, this should be remedied by the contractor.
155. A number of buildings were identified as potentially vibration sensitive due to their architectural features. These are:
- i. St Peter's Church (211 Willis Street, Te Aro)
 - ii. L. T. Watkins Building (176 – 182 Cuba Street, Te Aro)

- iii. Patrick's Building (191 Cuba Street, Te Aro)
 - iv. National Bank Te Aro Building (192-194 Cuba Street, Te Aro)
 - v. Morgan's Building (197 – 199 Cuba Street, Te Aro)
 - vi. Wellington Trades' Hall Building (124 – 128 Vivian Street, Te Aro)
 - vii. Basin Reserve Museum Stand (2 Rugby Street, Basin Reserve)
156. These buildings should be specifically considered by a structural engineer and heritage specialist to confirm if they should be assessed against the vibration criteria for vibration sensitive buildings (refer Table 7).

Blast management

157. I consider that a blast window starting at 7.30am and ending at 10pm may be appropriate, provided there is good communication with affected receivers. This blast window would accommodate the times when the tunnel can be closed for blasting, which I understand to be between 8pm and 10pm. Nevertheless, this blast window extends into the more sensitive night-time.
158. Communication would need to include a clear schedule of proposed blasts including their specific blast window (i.e. the hour in which the blast will occur), appropriate sizing of the blast to be as small as practicable while still achieving the required outcome and provision of rest nights when no blasts are undertaken (e.g. no morning blasts on Sundays).
159. The aim of the communication is to avoid startle effects if people do not expect a blast to occur. Effects will still be noticeable to residents in the vicinity but may be reasonable with prior warning.
160. Should blasting be able to be undertaken during daytime (7.30am to 6pm), no additional restrictions would be required beyond compliance with the noise and vibration criteria. However, communication will remain important to avoid startle effects.

Construction Noise and Vibration Management Plan

161. I recommend that appropriate mitigation and management measures are set out in a CNVMP, which would be used to manage works on site and set out how the construction contractor interacts with the neighbouring affected parties.
162. The CNVMP should also include information set out in Section 8 and Annex E2 of NZS 6803, such as:
- i. Summary of noise and vibration standards
 - ii. Summary of assessments/predictions
 - iii. General construction practices, management and mitigation that will be used for the Project
 - iv. Noise management and mitigation measures specific to activities and/or receiving environments, particularly for high noise and/or vibration activities, and all night-time works
 - v. Monitoring and reporting requirements
 - vi. Procedures for handling complaints
 - vii. Procedures for review of the CNVMP throughout the works
163. Other content would set the vibration trigger levels when building condition surveys are required to be undertaken, management of blasts and associated community information, trigger levels for

offering temporary relocation (e.g. during night-time works) and when Schedules are required and their minimum content.

164. Where appropriate, the CNVMP should also follow the approach outlined in the relevant NZTA Guide.⁷ This approach includes a requirement for high noise and vibration risk construction projects to have an independently peer reviewed CNVMP and include a comprehensive risk-based quality assurance programme to ensure risks are appropriately managed.
165. The CNVMP should be implemented on site for each specific area of work. The CNVMP should be prepared when more detail of Project construction is available.
166. I consider any management and mitigation measures are best determined at a time when a contractor has been appointed. I consider a CNVMP that provides details on a methodology for proactively avoiding, or responding in a timely manner to, any noise issues would be a useful tool. The framework of the CNVMP would enable the construction team to take ownership of the noise issues that may arise.

Schedules

167. In addition, Schedules are a useful tool in determining how the noise and vibration effects from specific activities or in specific areas will be managed and potentially affected parties communicated with. Schedules would generally be prepared where there is a high risk of exceeding the noise and/or vibration standards on a case-by-case basis.
168. The Schedules are intended to be specific to the activity or receiver they relate to, and should therefore contain detailed information on communication, management and mitigation specific to a certain task or area.
169. The following information would normally be included in a Schedule:
 - i. The activity start and finish dates
 - ii. The nearest neighbours to the activity
 - iii. A location plan
 - iv. The activity equipment and methodology
 - v. Predicted noise/vibration levels
 - vi. Recommended BPO mitigation
 - vii. Documented communication and consultation with affected persons
 - viii. Monitoring details
 - ix. Any pre-activity building condition survey for any buildings predicted to receive vibration levels exceeding the Category A criteria and receiving noise levels towards the Category B criteria
170. Schedules would be prepared by a suitably qualified specialist or alternatively can reviewed by a suitably qualified person after being prepared by a Project Environmental Manager. They would be provided to Council for information, and any feedback will need to be taken into consideration when finalising the Schedule.

⁷ <https://www.nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Noise-and-vibration/Standards/Templates/Construction-noise-and-vibration/NZTA-Construction-noise-and-vibration-management-plan-v1.2.doc>

171. Schedules would be attached to the CNVMP, providing additional information that would sit alongside the general management and mitigation options within the CNVMP.

Management Framework

172. My recommended approach to construction noise management and mitigation involves both on and off-site measures, all of which should be implemented throughout the entire construction phase as best practice. Examples of on-site measures include training of personnel, maintenance of equipment, noise barriers and enclosures and considerate behaviour and use of equipment, and choice of low impact methodologies (e.g. using bored piling rather than vibro or impact piling). Examples of off-site measures include public liaison and communication, temporary barriers, offers of resident relocation, building condition surveys, and noise level monitoring.
173. I recommend that the requirement for the CNVMP and Schedules as a framework be contained in the designation conditions.
174. Other items that should be included in any designation conditions or the CNVMP, include:
- i. A blast window (e.g. between 6am and 10pm) and the required radius, timeframe and form of notification of affected neighbours, and
 - ii. The assessment of vibration sensitive buildings by a structural engineer prior to works, to determine the applicable vibration limits.

COMMENTS RECEIVED RELATING TO CONSTRUCTION NOISE AND VIBRATION

175. I have reviewed the comments made as part of consultation undertaken in late 2025 by people adjacent to the Project in relation to construction noise and vibration. Most comments are of a general nature, concerned with the lack of detail at this stage of the Project and how noise and vibration will be managed.
176. I have addressed these general comments in the body of my assessment. At this stage, no detailed information is available to specifically determine timing, duration, or noise or vibration levels that will be generated by the works. For that reason, my assessment focuses on an envelope approach, providing an area of effects based on a reasonable worst case construction scenario.
177. Noise and vibration will be managed through a CNVMP and Schedules. This framework is well understood and has been implemented successfully on many other large infrastructure projects. Schedules allow a proactive approach to noise and vibration management, looking ahead to works and determining management and mitigation in a focused manner that achieve the best outcome for all parties. Both CNVMP and Schedules are required by the proposed conditions.
178. One of the comments reviewed made a request for building upgrades to mitigate construction noise. This is not commonly provided for as construction is a temporary activity and will not occur continuously in one location and at high levels. Construction noise and vibration criteria are higher than the criteria for ongoing activities. This recognises that construction is temporary and a necessary part of a developed society. Therefore, even if noise levels are higher than would normally be experienced, mitigation and management would focus on protecting the wider environment (e.g. with barriers, appropriate construction methodologies and timing of works). I therefore do not consider it necessary to provide for building upgrades to mitigate construction noise.

179. Some comments seek building condition surveys prior to works to ensure that any damage to buildings (should this be caused by construction) is recorded. I consider these surveys to be an important tool to safeguard both residents and the contractor. Building condition surveys should be required by the proposed conditions or CNVMP.
180. Some comments seek that construction is limited to daytime only. While this would be preferable from a noise and vibration impact point of view, it is unlikely to be practicable. Some works will affect existing major roads that would need to be fully or partially closed for the works. This request would lead to impacts on traffic movements. Other works (e.g. blasting for the Mt Victoria tunnel) may only be undertaken if the existing SH1 is closed – this cannot be done during daytime. Limiting construction to daytime would also prolong the construction period (and associated noise and other effects). For those reasons, I disagree that construction times should be limited. It is more appropriate to manage the effects of any works outside normal daytime hours through Schedules as required by the proposed conditions.
181. Wellington City Council's (WCC) key concern about construction noise and vibration related to any proposed night-time construction works. Further detail was requested of the nature, scale, and duration of each activity requiring night works, as well as the work area where these will occur. Through discussion, I explained that the nature, scale, and duration of each activity and work area requiring night works cannot be confirmed with accuracy before a contractor has been appointed. However, the requested details will be included in the CNVMP recommended by my technical assessment. For any construction activities that are predicted to infringe the noise or vibration criteria, more detail will be provided in the Schedules as required by the conditions. My approach to provide an envelope of effects assessment with indicative noise and vibration radii within which effects will need to be managed, was supported by the WCC acoustic advisor.
182. Overall, I consider that the comments on construction noise and vibration can be appropriately managed through the proposed conditions.

SUMMARY OF CONSTRUCTION NOISE AND VIBRATION EFFECTS

183. There is a range of effects from construction noise and vibration, some of which can be mitigated to a degree. Table 19 sets out a summary of construction noise and vibration effects, potential mitigation measures and the overall effect with mitigation in place.

Table 19: Summary of construction noise and vibration effects without and with mitigation

Activity	Magnitude of effect on neighbouring buildings (without mitigation)	Potential mitigation and management	Magnitude of effect on neighbouring buildings (with mitigation)
General construction works/demolition	High	CNVMP, Schedules, BPO on and off site such as communication, timing etc	Low to Moderate
Piling	High	Use bored piling rather than vibro or impact piling	Low
In tunnel blasting (Mt Victoria only)	Moderate	Avoid night-time blasting as far as practicable, prior notification of occupiers in the vicinity	Low
High vibration activities	Moderate to High	Change of construction methodology to reduce vibration generation, building condition surveys	Low

6. OPERATIONAL NOISE

ASSESSMENT FRAMEWORK – OPERATIONAL NOISE

Standards, District Plan provisions and NZTA guidance documents

184. This section describes the standards and documents which provide guidance to operational noise assessments. Operational noise includes both traffic noise and mechanical noise (e.g. from the operation of the tunnel ventilation and pumps needed to operate the tunnel fire system).

NZS 6806 Traffic noise

185. The New Zealand Road Noise Standard NZS 6806:2010 *“Acoustics – Road-traffic noise – New and altered roads”* (‘NZS 6806’) has been adopted by the Transport Agency and is required by the existing designation conditions applying to part of the Project alignment.
186. In addition, NZTA has released its “Guide to assessing road-traffic noise (Version 2.0, February 2024)” (NZTA Traffic Noise Guide). The NZTA Traffic Noise Guide describes how NZS 6806 can be implemented. In addition, some NZTA specific processes are described, such as the use of a NZTA internal matrix of project discipline feedback when determining the best practicable option (BPO) for noise mitigation. Overall, the NZTA Traffic Noise Guide provides background on how to implement NZS 6806 and is therefore a useful complementary document to the Standard itself. It also includes some additional NZTA mandated assessment and mitigation considerations that go beyond NZS 6806, to more holistically address traffic noise effects from projects.
187. I consider the intent of NZS 6806 is to provide a pragmatic approach to the use of noise mitigation. This approach includes the requirement that a roading project needs to have a noticeable noise effect before mitigation is considered, and that any mitigation needs to achieve a noticeable reduction in noise level.
188. NZS 6806 applies to traffic noise assessments where a project falls within its thresholds, which are briefly explained below.
- i. **Assessment Positions** are described as “Protected Premises and Facilities” (PPFs). PPFs include dwellings (including those that have building consent but are not built yet), educational facilities and their playgrounds within 20m of any school building, boarding houses, retirement villages, Marae, hospitals with in-patient facilities and motels/hotels in residential zones. Businesses are not PPFs as they are not considered noise sensitive and are often noise generators in their own right

For this Project, traversing inner city areas, I have considered PPFs as follows:
 - For any sensitive building of up to 3 floor levels (i.e. ground floor and two additional floors), the building is a single PPF, under the assumption that the entire building may be one residential unit. This reflects town houses and similar low-rise buildings
 - For any sensitive building of more than 3 floor levels, each floor level is an individual PPF, allowing for individual tenancies at different floor levels to be assessed separately
 - ii. **Assessment Extent** is 100m from the edge of the new carriageway for urban areas. Urban areas are defined by Statistics NZ, and the entire Project area falls within the Urban area
 - iii. **Assessment Areas** are areas which combine PPFs that would benefit from the same mitigation (e.g. low-noise pavement). For this Project, I have identified five assessment areas, which are common to the assessment areas described in other expert assessments
 - iv. **Design Year** is a year 10 to 20 years after opening of the Project. I consider that 2053 is an appropriate design year which would allow all of the Project areas to be implemented.

- v. **Noise Criteria** Categories are set out in the Standard for 'new' and 'altered' roads. This Project involves an altered road. The Noise Criteria Categories are set out below

Table 20: Noise limits at all buildings

Category	Altered Road dB L _{Aeq} (24h)
A (primary external noise category)	≤ 64
B (secondary external noise category)	64 – 67
C (internal noise category)	40

Under the Standard, the applicable criterion at any Protected Premise and Facility (PPF) depends on the BPO test, by progressively applying the noise criteria categories to determine which can practicably be achieved. NZS 6806 is clear that preference is to be given to structural mitigation over building modification mitigation. NZS 6806 also requires achievement of the lowest external noise level with practicable structural mitigation, before considering building modification to mitigate internal noise levels.

While Categories A and B are achieved by installing structural mitigation (e.g. low noise road surface materials and/or barriers), Category C is achieved by investigating and installing building modification mitigation (e.g. mechanical ventilation, improved glazing and joinery and wall/ceiling upgrades).

We understand that NZTA has committed to investigating building modification mitigation for those PPFs that are predicted to receive noise levels in Category C and where the Project causes a noise level increase of at least 1 decibel. There are a number of PPFs that currently (and in the future) receive noise levels in Category C, where the Project will make no difference to the noise level or where the Project will result in a reduction in noise level. I do not recommend that these PPFs are assessed for building modification mitigation as the Project does not have an adverse noise effect.

- i. **Assessment Scenarios** are the various operational scenarios that I assess and compare. The Standard includes the following scenarios:
- Existing noise environment: this consists of the current road layout and traffic volume (for this Project for the year 2018 based on available data as a conservative representation of current volumes)
 - Future Do-nothing scenario: consists of the existing SH1 at the design year (2053), with (increased) Design Year traffic volume
 - Future Do-minimum scenario: consists of the modified SH1 at the design year (2053), but without any specific noise mitigation. This scenario means that the only barriers included are solid safety barriers, which are required for reasons other than noise mitigation. Local roads that are not proposed to be altered by the Project are not included in the assessment
 - Future Project with mitigation: consists of the modified SH1 road at the design year (2053), and includes mitigation that is designed specifically to reduce noise levels
- ii. Mitigation Requirements are set out in the Standard based on the BPO. Mitigation is split into structural (road surface, barriers, bunds etc) and building modification mitigation (improvement of building façades and ventilation, subsequent to the implementation of the structural mitigation). To warrant implementation, any mitigation should achieve a noticeable noise level reduction of an average of 3 decibels within each assessment area

Subjective perception of noise level changes

189. The subjective impression of changes in noise can generally be correlated with the numerical change in noise level. While every person reacts differently to noise level changes, research shows a general correlation between noise level changes and subjective responses.⁸ Table 21 shows indicative subjective responses to explain the noise level changes discussed in this report.
190. The perception of these noise level changes generally applies to immediate changes in noise level, unlike for this Project where an existing road is modified in a (mostly) minor way. However, people may subjectively have an annoyance reaction to a greater or lesser degree, depending on their perception of the Project.

Table 21: Noise level change compared with general subjective perception

Noise level change	General subjective perception ⁹
1–2 decibels	Insignificant change
3–4 decibels	Small perceptible change
5–8 decibels	Appreciable to clearly noticeable change
9–11 decibels	Halving/doubling of loudness
>11 decibels	More than halving/doubling of loudness

191. Noise is measured on a logarithmic scale, meaning that a doubling in traffic volume, e.g. from 10,000 vehicles per day (vpd) to 20,000 vpd, results in a noise level increase of 3 decibels, a just-perceptible change. A tenfold increase in traffic volume (e.g. from 10,000 to 100,000 vpd) would result in a noise level increase of 10 decibels, which would sound twice as loud.
192. For the determination of the change in noise level, I included all roads, i.e. the Project road, existing local roads and the existing SH1 in the vicinity of the Project, to provide an assessment of the effects that would actually be experienced by PPFs.

Mechanical noise

193. Mechanical noise from the day-to-day operation of the tunnel ventilation is assessed against the relevant Wellington City District Plan noise limits of NOISE-S7 Fixed Plant Noise. These are summarised in Table 22 below.

Table 22: Noise limits for mechanical plant

Receiving zone	Fixed plant noise limit	
City Centre and Local Centre zone	At all times	55 dB L _{Aeq} (15min)
	All days 10pm to 7am	75 dB L _{AFmax}
Medium and High Density Residential	All days 7am to 8pm	45 dB L _{Aeq} (15min)
	8pm to 7am	35 dB L _{Aeq} (15min)
		60 dB L _{AFmax}

194. The operation of the tunnel ventilation system during emergencies (such as fire) and the operation of the pumps associated with the tunnel sprinkler systems do not fall under the above

⁸ For instance, LTNZ Research Report No. 292: Road traffic noise: determining the influence of New Zealand Road surfaces on noise levels and community annoyance, Table 18.

⁹ Based on research by Zwicker & Scharf (1965); and Stevens (1957, 1972).

provisions. The Wellington City District Plan in NOISE-R6 Fixed Plant Noise provides that an activity is permitted where the noise is generated by fixed plant used solely for emergency purposes. I consider that both the sprinkler pumps and emergency ventilation operations would fall under these provisions and would not be required to comply with the above limits.

Traffic Noise

195. I have assessed the traffic noise effects on people based on the results of the computer noise modelling against:
 - i. The noise criteria categories of NZS 6806
 - ii. The change in traffic noise level (both beneficial and adverse)
196. The reason for the two-pronged approach is that in some circumstances, compliance with the Standard does not necessarily mean that the effects of a project would be small, and vice versa.
197. Potentially, the effects of a noise level increase can be small (e.g. a noise level increase of less than 3 decibels). At the same time, the resulting noise environment can still be high, particularly adjacent to SH1, and cause adverse effects for residential use.

Computer noise modelling

198. The propagation of road traffic noise is affected by multiple factors, amongst them:
 - i. Terrain elevations, including shielding from intervening terrain and exposure due to elevation
 - ii. Ground condition, including absorptive ground such as meadows or reflective ground such as water
 - iii. Road parameters, including road surface, traffic speed, vehicle types and gradient
199. Because of the multiple factors and their interaction, computer noise modelling is a vital tool in predicting traffic noise impacts in the vicinity of major roads and for the determination of mitigation measures. Modelling enables a comprehensive and overall picture of noise impacts to be produced, taking into consideration all of the factors potentially affecting noise propagation.
200. I used the software 'SoundPLAN', which is an internationally recognised computer noise modelling programme. In summary, SoundPLAN uses a three-dimensional digital topographical terrain map of the area as its base. In addition, I entered data into the model for existing buildings and structures (including auxiliary buildings and existing NZTA noise barriers) within the assessment area. I digitised road traffic noise sources, with road lanes located on the terrain file. The model settings are described in Table 23.

Table 23: Road traffic noise modelling parameters

Parameter	Setting/source
Software	Sound Plan 9.1
Algorithm	Calculation of Road Traffic Noise (CoRTN)
Reflection	CoRTN
Conversion	L _{A10(18h)} to L _{Aeq(24h)} -3 dB
Ground absorption	0 (areas containing PPFs are urban with less than 10% absorptive ground cover)

Parameter	Setting/source
Receiver height	2m above height of each floor
Noise contour grid	2m height, 5 m resolution
Receivers and grid position	Free-field

201. The SoundPLAN model uses the calculation algorithms of the “Calculation of Road Traffic Noise” methodology which is referenced in NZS 6806 in Section 5.3.2. The calculation algorithms take into account all of the factors set out above, including relevant atmospheric and ground conditions within appropriate parameters.
202. The adjustments for New Zealand road conditions, specifically road surface types, are also included in the model. Therefore, modelling results can be compared with the relevant criteria without further adjustment.
203. Based on the NZTA Traffic Noise Guide Table A1, I used the following road surface correction for road surface materials discussed in this report (prior to correction from $L_{A10(18h)}$ to $L_{Aeq(24h)}$):
- i. Stone mastic asphalt (SMA10) 0
 - ii. Asphaltic Concrete (AC) 0
 - iii. PA (e.g. PA10 30mm) -1
 - iv. LN5 (EPA7 50mm) -5
204. The road parameters for major segments of SH1 entered into the model are set out in Table 24 overleaf. Traffic data was provided by the client.

Table 24: Road parameters

Road	Existing 2018					Do-Nothing 2053					With Project 2053 (Do Minimum)				
Road	AADT ¹	%HCV ²	Surface	Correction ³	Speed	AADT ¹	%HCV ²	Surface	Correction ³	Speed	AADT	% HCV	Surface	Correction ³	Speed
Southbound (Toward Airport)															
Terrace Tunnel	25,900	3.9	PA10	-1	70	25,300	6.4	PA10	-1	70	35,170	4.8	SMA10/AC	0	80
Vivian St	25,500	6.4	SMA10	0	50	18,080 – 22,580	6.4	SMA10	0	50	26,800	4.5	SMA10/AC	0	50
Cambridge Terrace	27,400	4.9	SMA10	0	50	28,670	6.4	SMA10	0	50	38,100	4.8	SMA10/AC	0	60
Ruahine St / Mt Vic Tunnel	20,350	3.0	PA10	-1	70	19,500 - 24,130	5.1	PA10	-1	70	25,100	4.2	SMA10/AC	0	60
Wellington Rd	20,050	5.0	SMA10	0	50	18,530 – 20,590	5.4	SMA10	0	50	25,100	4.2	SMA10/AC	0	50
Northbound (Away from Airport)															
Wellington Rd	20,050	5.0	SMA10	0	50	21,450 – 21,640	4.6	SMA10	0	50	25,350 – 28,800	3.3	SMA10/AC	0	50
Ruahine St / Mt Vic Tunnel	20,350	3.0	PA10	-1	70	20,740 – 22,180	4.9	PA10	-1	70	27,040 – 31,610	3.6	SMA10/AC	0	60
Terrace Tunnel	30,800	3.9	PA10	-1	70	31,540	5.3	PA10	-1	70	34,200	4.8	SMA10/AC	0	80

¹ Annual average daily traffic

² Percentage heavy commercial vehicles

³ Road surface correction in accordance with page 36 of the NZTA Traffic Noise Guide. A further adjustment of by -3dB is applied during modelling to account for the conversion of L_{A10(18h)} to L_{Aeq(24h)}

205. The accuracy of the computer model needs to be verified. I used the measurement results set out in paragraphs 26 to 28 to verify that the computer model operates within satisfactory tolerances.

Table 25: Computer noise model verification

Location	Measured Level dB $L_{Aeq(24h)}$	Predicted Level dB $L_{Aeq(24h)}$	Difference decibels
Unit 4N, 154 The Terrace	66	68	+2
18 Ruahine Street	70	72	+2
109 Vivian Street	67	67	±0

206. A comparison of the measured and predicted levels for all survey positions shows that there is good agreement between measured and predicted levels, with a difference of no more than 2 decibels.
207. The prediction method used in New Zealand is CoRTN. The prediction uncertainty of this method relates to various aspects such as the variability of road surfaces and vehicle fleet, variation in road/tyre noise emissions within a road surface classification, terrain and other screening, and modelling uncertainties relating to the traffic volume and composition forecasts for future design years. The indicative 95% uncertainty limits of predicted future $L_{Aeq(24h)}$ noise levels range from ±5 to ±7 decibels.¹⁰ The method has been used for traffic noise predictions in New Zealand for decades, and the same uncertainty has applied for these predictions for the same time. However, input data has become more accurate over time, particularly the 3D digital terrain and road models.

Individual receiver noise levels

208. I have assessed noise effects at all PPFs. I have included predicted noise levels for all PPFs, for all scenarios, in the tables in Annexure F. The locations of these dwellings are shown in the drawings in Annexure E.
209. Noise criteria categories for the PPFs are shown as a graphic representation by colouring the buildings with a colour scale, showing NZS 6806 Category A buildings in green, Category B buildings in orange and Category C buildings in red. Any buildings not shown in these three colours on the figures are outside the assessment area of 100m from the road alignment, or are not PPFs, e.g. business premises.

Noise contour plans

210. Noise contour plans are a useful tool to obtain a graphical overview of a project area including currently vacant land that may be developed in the future. The contours are calculated by the computer programme by interpolating a large number of individual points. Therefore, noise contour maps should not be used to “read” noise levels for specific locations. For individual noise levels specific for each PPF, the receiver noise levels in the tables should be used (refer Annexure F).
211. Noise contour plans are contained in drawings in Annexure E. These plans show interpolated noise level bands at 5 decibel intervals from 55 dB to 70 dB $L_{Aeq(24h)}$.

Determination of preferred mitigation option

212. As discussed 20earlier in this assessment, mitigation options are somewhat limited for this Project due to the urban location which means PPFs are very close to the road edge. Potential mitigation options are low noise road surface (LN5) and, in limited areas, barriers.
213. In accordance with NZS 6806, I developed mitigation options where this was considered practicable and evaluated these with the Project team in three online workshops on 19 and 23 February and 5

¹⁰ This information is based on the paper “Uncertainty of road-traffic noise predictions in New Zealand” by Richard Jockett (NZTA), published in the Acoustical Society of New Zealand Journal in December 2023.

March 2026. A determination of the BPO mitigation option was undertaken by NZTA on 8 April 2026. The process involved the following steps:

- v. I developed mitigation options for individual assessment areas as appropriate. These assessment areas were in the Eastern Connections area, specifically Ruahine Street and Wellington Road East and West.
 - vi. These mitigation options were provided to and reviewed by relevant persons in the Project team for comment and feedback. The workshops were attended by representatives for the following disciplines: NZTA (client), urban design, heritage, social, planning, construction, stormwater.
 - vii. Feedback on the options was provided in a round table discussion, enabling fine tuning of the initial mitigation options. At that time, the team developed further mitigation options that I tested for acoustic efficiency.
 - viii. The preferred mitigation was chosen by the NZTA planning lead and is put forward as the preferred mitigation option. This mitigation option is the use of LN5 low noise road surface for the straight at Ruahine Street, but no mitigation for Wellington Road.
 - ix. The summary sheets for the BPO mitigation option choice are included in Annexure F.
214. During the detailed design and prior to construction, the detailed and final mitigation will be tested by the acoustic consultant to test if it represents the BPO at that time to ensure that the outcome is at least equivalent to that put forward with the preferred mitigation option. This step normally results in small changes that would have only minor implications on the outcome.

Mechanical Noise

215. The ventilation systems of both the existing Mt Victoria and Terrace Tunnel will be fully or partially retrofitted as part of the Project. New ventilation systems will be installed in the new tunnels. Both new and old tunnels will be fitted out with jet fans that will have silencers on both sides of the fan, resulting in a sound power level of less than 103 dB L_{WA} , and less than 75 dB L_{Aeq} at 10 metres from the fan.
216. I understand that for the normal day-to-day operation, only two jet fans each are required for any of the northbound and southbound Terrace Tunnels and the eastbound and westbound Mt Victoria tunnels. Given the low number of fans required, and the location of the fans in relation to the closest tunnel portal, noise levels outside the tunnels will be well below the relevant noise limits of the District Plan.

ASSESSMENT OF OPERATIONAL NOISE EFFECTS

Traffic noise

217. This section describes the assessment of traffic noise effects from the Project on PPFs within 100m of the indicative alignment:
- i. Against the altered road criteria of NZS 6806
 - ii. In relation to the noise level change that would be caused by the Project
218. The Do-nothing scenario (where the Project is not built) shows that noise levels at the PPFs are approximately 1 decibel higher in the design year (2053) than they are today, due to the projected increase in traffic volume over time, across the entire Project area.
219. The Do-minimum scenario (where the Project is built with no noise mitigation) allowed for a combination of SMA10 and AC road surface on the entire indicative alignment. Comparing the two future scenarios in 2053, the Do-minimum scenario has noise level changes ranging from 13 decibels lower to 10 decibels higher than the Do-nothing scenario. Across all PPFs, the average change in traffic noise level due to the Project is 0 dB. Details of these changes are described section by section below.

Traffic noise mitigation options

Low noise road surface

220. It is currently unclear if alternative surfacing such as LN5 surfaces (high performance low noise road surfaces) is practicable due to currently untested material restrictions, e.g. how these surfaces act in the context of frequent intersections. While I understand that NZTA will consider the use of LN5 surfacing, the practicability of using LN5 for most Project areas has not yet been confirmed. Should a low noise road surface such as LN5 be practicable, the overall noise effect from the operation of the Project would be generally positive and result in a noise level reduction across all areas. I have provided indicative outcomes for the possibility that LN5 surface is used across the Project.
221. However, I understand that low noise road surface (LN5) is a practicable mitigation option for the straight extent of Ruahine Street and that NZTA has committed to installing LN5 on the straight section of Ruahine Street. I have predicted noise levels using this surface and discuss the outcomes below.

Barriers

222. For most areas of the Project, I do not consider barriers a suitable mitigation measure due to the location of the road, specifically:
- i. Areas containing high rise buildings where ground floor use is non-sensitive (e.g. commercial)
 - ii. Urban environments which do not allow space to provide for barriers between the road and the building facade
223. However, in the Eastern Connections area (i.e. Hataitai) where new slip lanes are proposed between SH1 and the dwellings in Ruahine Street and Wellington Road, barriers could be a practicable and potentially effective mitigation option (when considering noise effects only). However, ultimately it was determined that use of these barriers in this location is not practicable as barriers have other, more pronounced, adverse effects such as shading, safety considerations, impedance of stormwater flow and effects on architecturally important buildings such as the Park Mews apartments. These adverse effects outweigh the (limited) positive noise effects.

Building modification mitigation

224. NZS 6806 requires that building modification mitigation is investigated for all PPFs where the external noise level is in Category C, irrespective of the existing noise levels and if a roading project would change those noise levels. The reason for this is that such high noise levels have potential health impacts that should be mitigated.
225. I understand that NZTA considers investigating building modification mitigation only for those PPFs:
- Receiving noise levels in Category C (i.e. higher than 67 dB $L_{Aeq(24h)}$)
 - Where the Project would result in a noise level increase of at least 1 decibel
 - That are in a Residential zone (Inner Residential and Outer Residential, in 2000 District Plan terms and Medium Density and High Density Residential, in 2024 District Plan terms), i.e. not in the City Centre zone of the Wellington City District Plan
226. The reasons for the potential restrictions to the building modification mitigation application are that:
- The Project has, for most PPFs, no impact on the high external noise levels, with no change to those levels or, in some instances, a decrease in noise level (though still above 67 dB $L_{Aeq(24h)}$). Therefore, the Project has no adverse effect on high noise levels for most PPFs
 - The Wellington City District Plan has, since 2000, contained a requirement for noise sensitive spaces (e.g. apartments and dwellings) to be designed to mitigate against the anticipated high noise levels in the inner city, specifically the City Centre zone ('Central Area' zone in 2000 District Plan terminology), which covers some of the Terrace Tunnel assessment area and virtually all of the Te Aro assessment area (refer Annexure B and paragraph 228). I note that while this may mean that no additional, or less, treatment is required to achieve an internal noise level of 40 dB $L_{Aeq(24h)}$ in PPFs receiving noise levels in Category C, this cannot be clearly identified at this stage of the Project. A site visit to each apartment or dwelling would be required to determine if the current building envelope is sufficient to mitigate from the predicted traffic noise levels. The provisions of the 2000 version of the District Plan are unlikely to be sufficient to achieve compliance with the internal noise criterion of 40 dB $L_{Aeq(24h)}$ as the traffic noise levels are already higher than the zone noise limits
 - The 2024 version of the District Plan contains provisions that are sufficient to mitigate internal noise levels from traffic and other city centre sources so that any new dwellings or apartments would receive an internal noise level of 40 dB $L_{Aeq(24h)}$ and would also have provisions for ventilation and cooling. This would fulfil the requirements of NZS 6806 and NZTA's requirements for any dwelling or apartment being constructed going forward
227. I have discussed both assessment options in the paragraphs below for each assessment area.

Assessment areas

228. The five assessment areas discussed separately below are shown in graphic format in Annexure A:
- Terrace Tunnel
 - Te Aro
 - The Basin Reserve
 - Mt Victoria Tunnel
 - Eastern Connections
229. Each assessment area is discussed separately in the sections below as follows:
- A brief description of the area
 - The noise mitigation options I assessed (if any), and the mitigation option recommended by the Project team
 - A table setting out the number of PPFs for the various assessment scenarios in the different NZS 6806 noise criteria categories
 - A discussion of the number of PPFs that would be investigated for building modification mitigation based on the NZS 6806 and NZTA assessment options

- v. A graph showing the noise level change due to the Project
230. I understand that the Project may be tolled, which would result in a change in traffic volumes across the area. I have assessed the indicative change in noise level should this be the case. For each area, I provide comment on the potential for traffic noise level change.

Terrace Tunnel

231. Changes to the alignment of SH1 will begin in the north at the point where Aurora Terrace crosses SH1. Southbound traffic will be shifted to the east (towards properties along The Terrace) to accommodate entry into the new Terrace Tunnel. Northbound traffic will remain in the same alignment.

NZS 6806

232. PPFs in this area are affected by traffic from the existing road. I have therefore assessed it against the 'altered' road criteria.
233. I used the computer noise model to predict existing and future traffic noise levels across the 416 PPFs along both sides of SH1 between Aurora Terrace and the north Terrace Tunnel Portal.
234. The noise levels adjacent to SH1 are predicted to increase over time by as much as 5 dB as traffic volumes increase on the existing road. The Project is predicted to reduce noise levels by up to 11 decibels for some PPFs where the new tunnel entrances are tucked behind a retaining wall which provides additional shielding for some PPFs. For other PPFs, noise levels would increase up to 5 dB where the road is more exposed. Overall, on average, noise levels would reduce by 1 dB across all PPFs in this area.
235. The net effect of the Project, using SMA10 or AC pavement for the Do-minimum scenario, is a similar number of PPFs receiving noise levels in Category C of 92 compared with 91 without the Project. The below table shows the number of PPFs in each noise criteria category.

Table 26: PPFs per noise criteria category in the Terrace Tunnel area

Noise Criteria Category	Existing scenario	Do-nothing scenario	Do-minimum scenario
A	308	296	292
B	42	29	32
C	66	91	92

236. I consider that unless a lower noise road surface could be used (e.g. LN3 or LN5), there is no suitable mitigation measure. The terrain and height of the PPFs make barriers an impracticable noise mitigation measure.
237. Should LN5 surface be practicable, the outcome would be a marked improvement over existing circumstances, no PPFs would be receiving noise levels in Category C (compared with 92) and 70 additional PPFs would receive noise levels in Category A.
238. Applying NZS 6806 (and assuming LN5 surface is not implemented), building modification mitigation would be assessed for the 92 PPFs (both buildings and apartments) that receive noise levels in Category C with the Project implemented. Applying the NZTA assessment option, there are no PPFs in this category in the Terrace Tunnel assessment area.
239. Whatever approach is taken to building modification mitigation investigation, the applicable number of PPFs should be reconfirmed during detailed design and prior to the construction of the Project, as the number of PPFs receiving noise levels in Category C may change slightly with any alignment changes.

Change in noise level

240. I predict that overall, noise levels will reduce due to the Project. Only 18 PPFs of the 416 assessed are predicted to receive a perceptible noise level increase of 3 to 5 decibels. The majority of PPFs (311 of the 416 assessed) would receive no perceptible change in noise level. The character of the noise will not change. The figure below shows the distribution of noise level changes for this area.

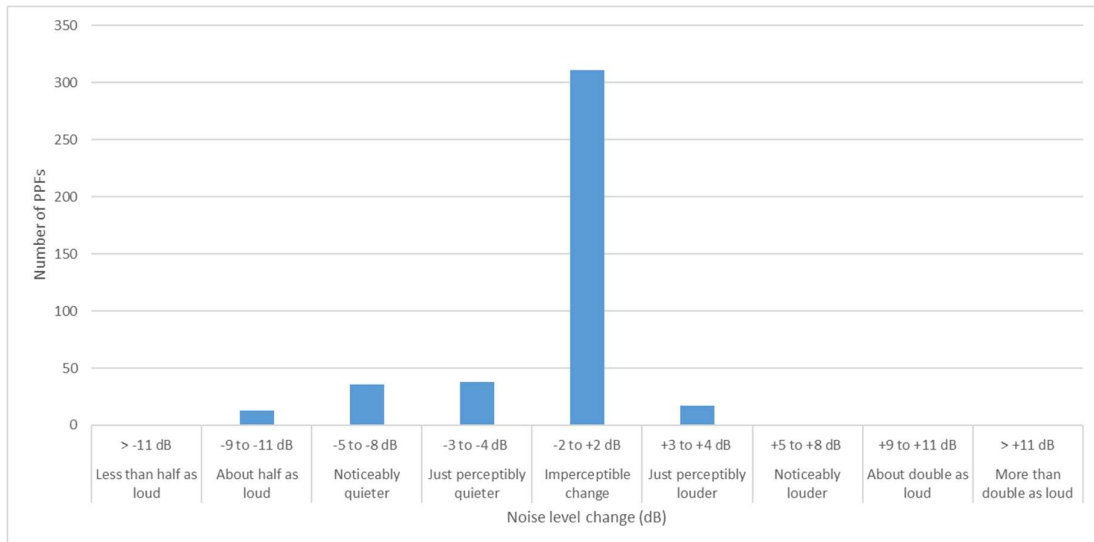


Figure 3 – Noise level changes (Do-minimum minus Do-nothing scenarios) – Terrace Tunnel area

241. Should LN5 road surface be practicable, on average a 6 dB reduction in noise level could be achieved compared with the Project not going ahead.
242. Individual predicted noise levels are shown in F and figures showing the location of the PPFs are included in Annexure E.

Tolled Scenario

243. With tolls applied to the Project, noise levels would remain largely similar in this area. Noise levels are on average 0.8 to 1 decibel lower with the tolled scenario, suggesting a traffic volume reduction of around one third compared with the untolled scenario. This would not change my overall assessment of traffic noise effects.

Te Aro

244. South of the southern Terrace Tunnel portal, southbound traffic will travel along a new road connecting the new tunnel to the existing connection to Vivian Street. Vivian Street (between Willis Street and the Basin Reserve) will be reconfigured to accommodate three lanes of traffic (replacing parking on both sides of the road) and several intersection reconfigurations. Northbound traffic will continue to use Karo Drive and Buckle Street (which do not form part of the physical works area for the Project) to connect the Arras Tunnel to the Terrace Tunnel.

NZS 6806

245. The 321 PPFs assessed in this area are affected by traffic from the existing road. I have therefore assessed the Project in this area against the 'altered' road criteria.
246. The predicted noise levels for the existing situation range up to 71 dB $L_{Aeq(24h)}$ indicating the high impact of traffic noise on houses close to busy roads. If the Project was not to go ahead, noise levels would increase slightly by up to 2 decibels in the Do-nothing scenario, indicating the increase in traffic volume over time.

247. With the Project in place, noise levels would remain relatively similar. This is expected, given that the area is very constrained and the traffic lanes will not change by being reconfigured as discussed in paragraph 244 above.
248. For the Do-nothing scenario (i.e. if the Project does not go ahead), 85 PPFs are predicted to receive noise levels in Category C. This is predicted to increase to 92 PPFs in 2053 with the Do-Minimum scenario.
249. The below table shows the number of PPFs in each noise criteria category.

Table 27: PPFs per noise criteria category in the Te Aro area

Noise Criteria Category	Existing scenario	Do-nothing scenario	Do-minimum scenario
A	223	221	219
B	32	15	10
C	66	85	92

250. The area is greatly space constrained, with only a footpath separating the buildings from the roads. Therefore, barriers are not a suitable mitigation measure here. This is also the case as many of the buildings are multi-storey, and upper floors would not be protected. The only potential mitigation option would be the use of lower noise road surface (e.g. LN3 or LN5).
251. Should LN5 surface be practicable, the outcome would be a marked improvement over existing circumstances, with a halving of PPFs receiving noise levels in Category C, and a noticeable increase in PPFs receiving noise levels in Category A (265 compared with 221 should the Project not go ahead).
252. Applying NZS 6806 (and assuming LN5 surface is not implemented), the 92 PPFs predicted to receive noise levels in Category C with the Project in place, would be investigated for building modification mitigation. With the NZTA approach applied, four PPFs (8 - 14 Buller Street) would be assessed for building modification mitigation. The number of PPFs within Category C should be reconfirmed during detailed design and prior to the construction of the Project, as this may change slightly with any alignment changes.

Change in noise level

253. I predict that overall, noise levels will remain similar for the vast majority of PPFs (266 of 321 PPFs assessed). Of the 321 PPFs, 27 PPFs are predicted to receive a perceptible to noticeable noise level increase of 3 to 5 decibels. The character of the noise will not change. The figure below shows the distribution of noise level changes for this area.

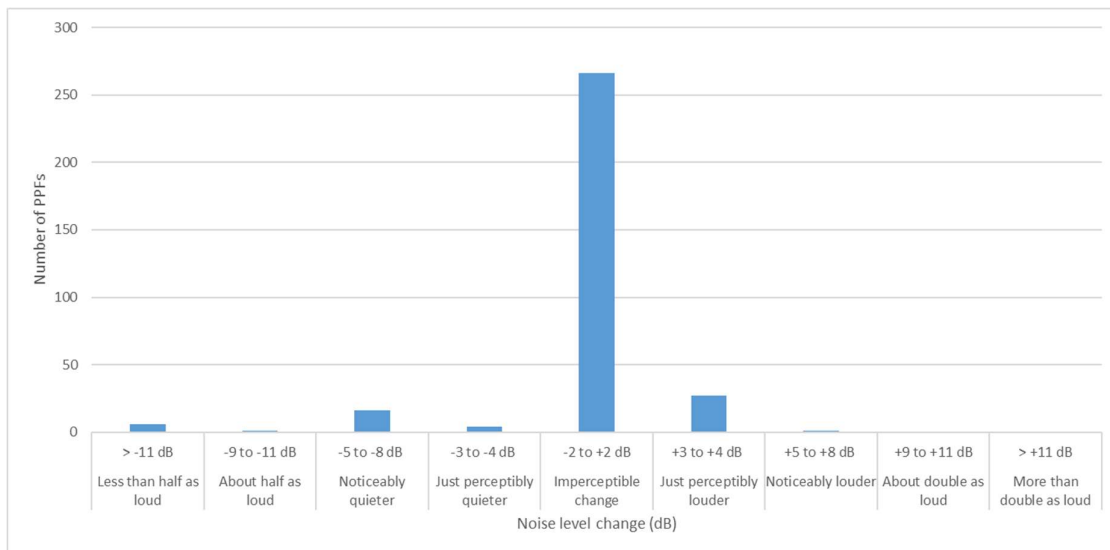


Figure 4 – Noise level changes (Do-minimum minus Do-nothing scenarios) – Te Aro area

254. Should LN5 surfacing be practicable, the average noise level reduction achieved is 5 decibels. Existing noise levels in the area are already high, and any noise level reduction would be a positive outcome for residents in the area.
255. Individual predicted noise levels are shown in Annexure F and figures showing the location of the PPFs are included in Annexure E.

Tolled Scenario

256. With tolls applied to the Project, noise levels would remain largely similar in this area. Noise levels are on average 0.5 to 1 decibel lower with the tolled scenario, suggesting a traffic volume reduction of up to one third compared with the untolled scenario. This would not change my overall assessment of traffic noise effects.

Basin Reserve

257. The area between Vivan Street and the Mount Victoria Tunnel including the Basin Reserve is subject to several realignments and construction of new road segments, as shown in detail in the Project documentation.

NZS 6806

258. The 105 PPFs in the area are already affected by traffic from the existing road. I have therefore assessed it against the 'altered' road criteria.
259. Existing noise levels vary depending on the line-of-sight from the PPFs to the existing roads, ranging from about 50 dB $L_{Aeq(24h)}$ for well shielded PPFs to mid- and high-70 dB $L_{Aeq(24h)}$ for those fronting the roads. Should the Project not go ahead (i.e. the Do-nothing scenario), noise levels will slightly increase over time by up to 2 decibels due to increases in traffic volume.
260. The Do-nothing scenario (where the Project is not implemented but traffic increases over time) results in no noticeable change compared with the existing situation. However, with the Project in place, the number of PPFs receiving noise levels in Category C would reduce noticeably, from 20 to 15.
261. The below table shows the number of PPFs in each noise criteria category.

Table 28: PPFs per noise criteria category in the Basin Reserve area

Noise Criteria Category	Existing scenario	Do-nothing scenario	Do-minimum scenario
A	83	78	80
B	2	7	10
C	20	20	15

262. The PPFs in this area are generally only separated by a footpath from the road, which makes the use of barriers not a practicable mitigation option. Using a lower noise road surface (e.g. LN3 or LN5) could result in an appreciable reduction in noise level.
263. Should LN5 surface be practicable, the outcome would be a marked improvement over existing circumstances, with only 2 PPFs receiving noise levels in Category C and 12 additional PPFs would receive noise levels in Category A.
264. Applying NZS 6806 (and assuming LN5 surface is not implemented), the 15 PPFs identified to receive noise levels in Category C would be investigated for building modification mitigation. Should only those Category C PPFs be addressed applying the NZTA approach discussed above, that would mean that no PPFs are assessed. The number of PPFs to be investigated should be reconfirmed during detailed design and prior to the construction of the Project, as it may change slightly with any alignment changes.

Change in noise level

265. With the Project in place, traffic volumes will change for some of the roads surrounding the Basin, and result in noticeable to significant noise level reductions, while other PPFs would receive increased noise levels where buildings fronting the roads will be removed to allow space for the Project. This means that shielding is lost and traffic noise levels increase.
266. The vast majority of PPFs (78 of the 105 assessed PPFs) will receive noise levels that are similar to the Do-nothing scenario, while 23 PPFs would receive noise level reductions ranging from perceptible to significant. Only four PPFs would receive perceptible to noticeable noise level increases between 3 and 8 dB.
267. The character of the noise will not change. The figure below shows the distribution of noise level changes for this area.

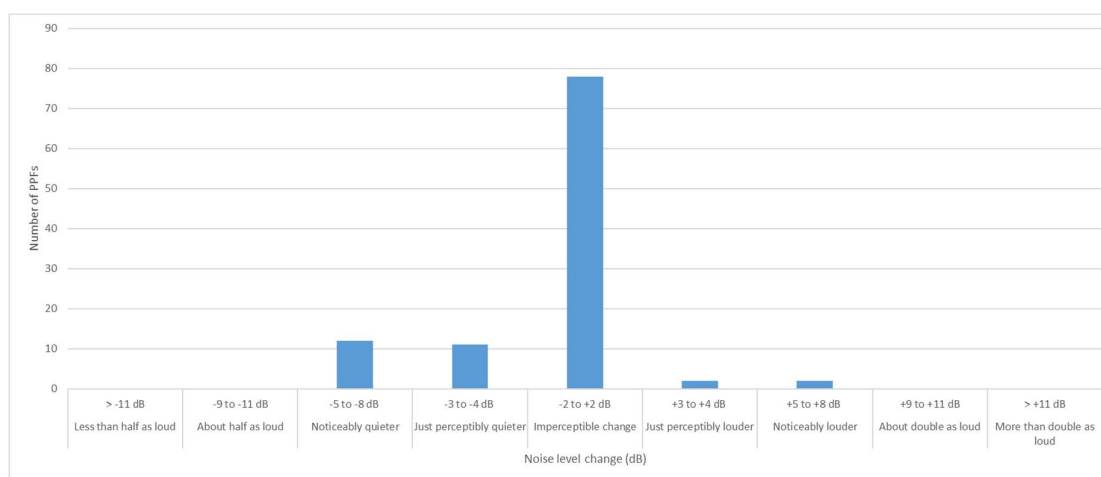


Figure 5 – Noise level changes (Do-minimum minus Do-nothing scenarios) – Basin Reserve area

268. Should LN5 road surface be practicable, on average a 6 dB reduction in noise level could be achieved compared with the Project not going ahead, a significant improvement.

269. Individual predicted noise levels are shown in Annexure F and figures showing the location of the PPFs are included in Annexure E.

Tolled Scenario

270. With tolls applied to the Project, noise levels would remain largely similar for most PPFs, with small noise level reductions of 0.5 to 2 decibels. A small number of PPFs would receive more significant noise level reductions of up to 5 decibels, which suggests that vehicles would choose other routes to avoid tolling. Nevertheless, the average noise level reduction in this area would be just above 1 decibel compared with the untolled scenario. This would not change my overall assessment of traffic noise effects.

Mount Victoria Tunnel

271. The Mount Victoria Tunnel area includes Paterson Street to the east of the Basin Reserve, extends through the Mt Victoria Tunnel which is proposed to be duplicated, and ends at the corner of Taurima Street and Ruahine Street, which will be widened and slightly realigned.
272. Three existing dwellings (7 Paterson Street (Laureston House), 19 Paterson Street (Ettrick Cottage) and 140 Austin Street) will be relocated but retained. These dwellings will be located inside the designation. However, they will be residential. I have therefore assessed them as PPFs. Since these three dwellings will be moved, I have not predicted any existing or Do-nothing scenario noise levels, but only the Do-minimum noise level for the scenario where the Project is implemented.

NZS 6806

273. The 111 PPFs (including the three relocated dwellings) in this area are already affected by traffic noise on existing roads (which are proposed to be upgraded). Therefore, I have assessed them against the 'altered' road criteria.
274. All but one PPFs are predicted to receive noise levels in Category A for all three scenarios (existing, Do-nothing and Do-minimum). Only with the Project in place, will one PPF receive noise levels in Category B (19 Paterson Street, one of the relocated dwellings). Overall, it is unlikely that mitigation would be required in this area as there are no PPFs receiving particularly high noise levels.
275. The below table shows the number of PPFs in each noise criteria category.

Table 29: PPFs per noise criteria category in the Mt Victoria Tunnel area

Noise Criteria Category	Existing scenario	Do-nothing scenario	Do-minimum scenario
A	109*	109*	111
B	0	0	1
C	0	0	0

* excluding the three relocated dwellings

276. Should LN5 road surface be a practicable mitigation measure, all PPFs would receive noise levels in Category A.

Change in noise level

277. In the Mt Victoria Tunnel area, I predict that traffic noise levels will not change significantly over time, with the Do-nothing noise levels being the same or up to 2 decibel higher than the existing noise levels.

278. With the Project in place, the vast majority of PPFs (105 of the 111 PPFs assessed) would receive similar noise levels compared with the Project not going ahead. Of the remaining PPFs, three are the relocated PPFs which will be in a different location and can therefore not be compared with the previous location noise levels. Two PPFs are predicted to receive perceptible increases of 3 to 4 decibels, and only one is predicted to receive noticeable noise level increase of 7 decibels. All of the PPFs where a noise level increase is predicted will still receive noise levels in Category A.
279. The character of the noise will not change. The figure below shows the distribution of noise level changes for this area.

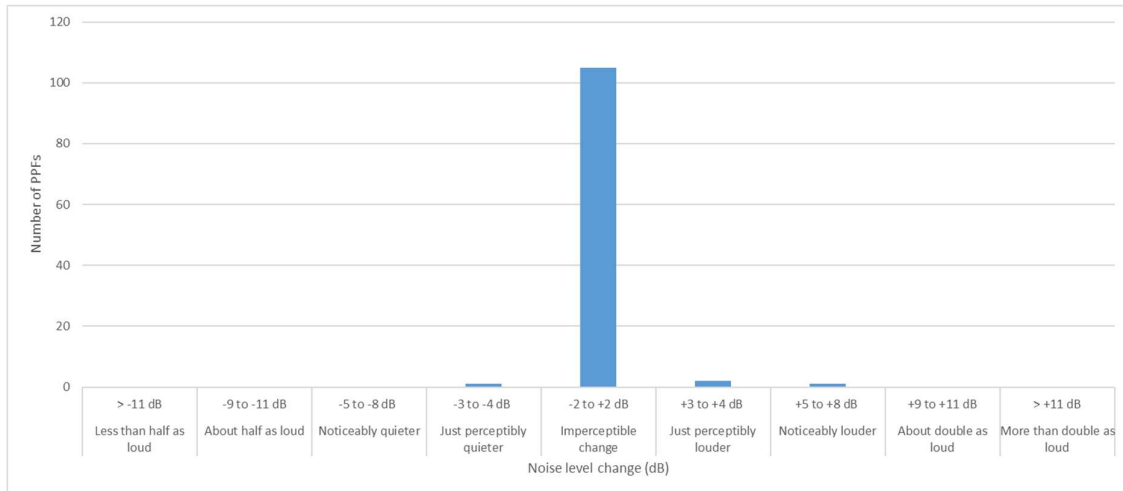


Figure 6 – Noise level changes (Do-minimum minus Do-nothing scenarios) – Mt Victoria Tunnel area

280. Should LN5 road surface be practicable, on average a 4 dB reduction in noise level could be achieved compared with the Project not going ahead.
281. Individual predicted noise levels are shown in Annexure F and figures showing the location of the PPFs are included in Annexure E.

Tolled Scenario

282. With tolls applied to the Project, noise levels would remain largely similar for most PPFs, with small noise level reductions of 0.5 to 1 decibel. This would not change my overall assessment of traffic noise effects.

Eastern Connections

283. The connection between the south end of the southern Mount Victoria Tunnel portal and Evans Bay Parade will be widened to accommodate two lanes of traffic in each direction, which will require the removal of dwellings. A slip lane and shared use path is proposed for both Ruahine Street and Wellington Road, separating the dwellings from the road and avoiding driveway access onto SH1.

NZS 6806

284. I have calculated existing and future noise levels at the 315 PPFs assessed in this area. PPFs in this area are affected by traffic from the existing road. I have therefore assessed the Project in this area against the 'altered' road criteria.
285. PPFs in the area front the roads with often only the footpath separating them from the road. Most dwellings have some form of fencing; however, I have not included this in my modelling as the quality of the fencing is not effective for noise mitigation (e.g. fences contain gaps) and there is no

- guarantee that the fences will be maintained. In addition, driveways enter the existing road, requiring gaps in the existing fencing.
286. Most PPFs (266 of the 315 PPFs) are predicted to currently receive noise levels in Category A, with 40 PPFs receiving noise levels in Category C. For the Do-nothing scenario, a slight noise level increase of up to 2 decibels is predicted. This has only a slight impact on the distribution of the noise criteria categories as shown in Table 30. With the Project in place, noise levels would reduce for a number of PPFs, while others would receive noise level increases. This manifests itself by some PPFs receiving noise levels in Category B rather than Category A, but a slight reduction in the number of PPFs receiving noise levels in Category C.
287. The Project team undertook an assessment to determine the BPO for noise mitigation along Ruahine Street and Wellington Road.
288. For Ruahine Street, options tested included a noise barrier next to SH1, or at variable locations adjacent to SH1 and the property boundaries, and the use of low noise road surface (LN3 or LN5). All options were discussed, and feedback given by various experts. The summary of the findings and matrix with the feedback is included in Annexure F. The BPO mitigation was determined to be the use of LN5 surfacing. The outcome of using LN5 road surface on the Ruahine Street straight is that the number of PPFs in the Eastern Connections area receiving noise levels in Category C is reduced from 28 to 13, and the number of PPFs receiving noise levels in Category A increase from 262 to 272. None of the PPFs benefitting from the LN5 surfacing in Ruahine Street and receiving noise levels in Category C would experience a noise level increase compared with the Project not going ahead.
289. For Wellington Road, the use of LN5 and barriers does not achieve the same level of positive effects. In addition, other adverse effects such as encroachment on the park area and the potential unsuitable characteristics of the road surface were noted. Therefore, no additional structural mitigation was considered practicable by the Project team. The summary of the findings and matrix with the feedback is included in Annexure F.
290. The below table shows the number of PPFs in each noise criteria category for the entire Eastern Connection area, including both Ruahine Street and Wellington Road and other PPFs in the area.

Table 30: PPFs per noise criteria category in the Eastern Connections area

Noise Criteria Category	Existing scenario	Do-nothing scenario	Do-minimum scenario	Mitigation Option
A	266	262	260	272
B	9	12	27	30
C	40	41	28	13

291. Applying NZS 6806, the 13 PPFs identified to receive noise levels in Category C would be investigated for building modification mitigation. Only one PPF (581 Evans Bay Parade) would receive noise levels in Category C and at least a 1 decibel noise level increase because of the Project (that building is a school building in a residential zone). This should be confirmed during detailed design and prior to the construction of the Project, as it may change slightly with any alignment changes.
292. Individual predicted noise levels are shown in Annexure F and figures showing the location of the PPFs are included in Annexure E.

Change in noise level

293. Noise levels would increase over time from the existing situation to the Do-nothing scenario by up to 3 decibels, but for most PPFs no change is predicted. With the Project in place, noise levels will remain similar for most PPFs, however, a small number would receive significant noise level

reductions (where the road moves further away and is shielded by a retaining wall), or noticeable to significant noise level increases (where houses fronting the road are removed, leaving PPFs behind exposed to traffic noise).

294. With the recommended LN5 road surface, the average noise level reduction across the PPFs in Ruahine Street is 4 decibels, a noticeable noise level reduction. Individual noise level changes range from no change (for PPFs that are already well shielded from Ruahine Street) to -5 dB for those most affected by traffic noise from Ruahine Street.
295. Largest noise level changes are predicted for houses where some buildings are removed to make way for the Project. This is particularly the case for three PPFs in Henry Street (10, 14 and 18A Henry Street), where I predict noise level increases of up to 11 decibels. At the other end of noise level changes, 117 PPFs are predicted to receive perceptible to noticeable noise level reductions due to the Project.
296. The character of the noise will not change. The figure below shows the distribution of noise level changes for this area, with the preferred mitigation in place.

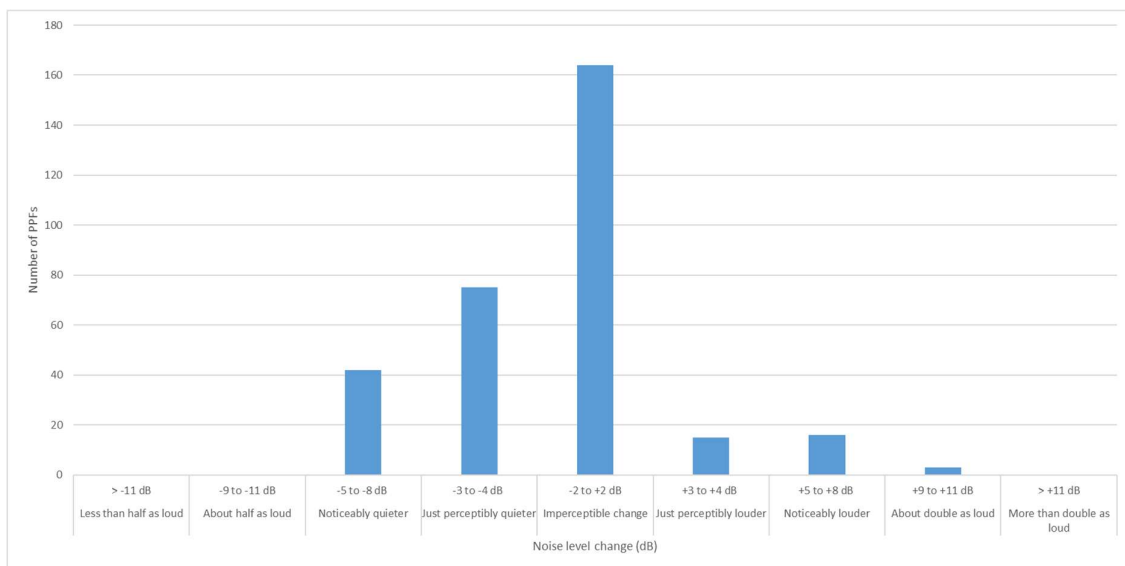


Figure 7 – Noise level changes (Mitigation Option minus Do-nothing scenarios) – Eastern Connections area

Mitigation Options

297. Irrespective of the limited change in noise level due to the Project, this area provides an opportunity for mitigation in the form of barriers between the PPFs and the Project along Ruahine Street and Wellington Road. I developed several mitigation options for these two roads, and the Project team and I held two workshops to discuss the various options and determine if we consider any as the best practicable option (BPO).
298. The BPO workshops have refined potential options.
299. There are several (non-acoustic) implications if a barrier was to be installed along Ruahine Street, such as Crime Prevention Through Environmental Design issues, visibility of architectural important buildings, shading, sight lines along the road and similar. Therefore, a barrier was not considered to represent the BPO. For the straight at Ruahine Street, noise levels can be reduced significantly using low noise road surface (LN5). This has been confirmed as the BPO by the Project team and is recommended to be implemented.
300. For Wellington Road, options are more limited due to the location of the Project in relation to the houses. I understand that low noise road surface is not a feasible option here, which means that only

barriers could be used. Given that there needs to be a gap for the Hamilton Road intersection, any barrier would have only limited efficiency, making barriers not a particularly effective option in reducing noise levels. This suggests that along Wellington Road structural mitigation is unlikely.

301. Even if structural mitigation is implemented in the Eastern Connections area, a number of PPFs (13 applying the current mitigation option) would likely still receive noise levels in Category C. Applying NZS 6806, these PPFs would be investigated for building modification mitigation. Only one PPF (581 Evans Bay Parade) would be investigated for building modification mitigation when applying the NZTA assessment method¹¹. The final number will be determined during detailed design and will depend on the mitigation measures that can be applied in this area.

Tolled Scenario

302. With tolls applied to the Project, noise levels would remain virtually the same for most PPFs, with small noise level reductions of up to 1 decibel and an average noise level reduction of 0.1 decibel. This would not change my overall assessment of traffic noise effects.

Moxham Avenue

303. The Project will result in an increase in traffic volume in Moxham Avenue, with traffic volumes without the Project in the design year ranging from about 6,900 to 9,050 vpd and traffic volumes with the Project in the design year ranging from about 9,550 to 11,300 vpd. Such traffic volume increases would result in only marginal noise level increases of 1 to 1.4 decibels. Such noise level changes would not result in adverse effects, particularly given that the character of the noise does not change.
304. It is not proposed to upgrade or resurface Moxham Avenue as part of the Project. The current road surface of Moxham Avenue is an AC surface, and I have assumed that this will be retained should any maintenance resurfacing be undertaken. AC surface is a smooth surface that assists in controlling noise levels, similar to what is currently proposed across most of the Project (where an AC or SMA10 surface would generally be used).
305. As the Project does not cause a significant change in effects on dwellings in Moxham Avenue, no additional mitigation is recommended for this area.

Mitigation summary

306. From discussion with the pavement specialist, I understand that not enough research and test data is available for low noise road surface such as LN3 or LN5 surface to be utilised along the Project for safety and engineering reasons. The exception is the straight alignment of Ruahine Street where LN5 has been confirmed as being feasible. I understand that NZTA has committed to investigating if LN5 surface could be rolled out to more sections of the Project, and that this is included in the proposed designation conditions to highlight an area of potential improvement.
307. Barriers are not suitable across the Project as they have other (non-acoustic) adverse effects on the environment or are not practicable because of the relationship of the Project roads to the receiving environment (i.e. no space or receivers are elevated).
308. There are limited options for structural mitigation (i.e. barriers and low noise road surface), which means that building modification mitigation must be assessed for this Project. NZS 6806 states that all PPFs predicted to receive noise levels in Category C should be assessed for building modification mitigation. However, noting that the Project does not generally result in a noise level increase at PPFs within Category C (and often results in a noise level reduction), I understand that NZTA is proposing to investigate building modification mitigation for PPFs in residential zones that receive

¹¹ All PPFs in the Eastern Connections area are in residential zones.

noise levels in Category C and where the Project results in a noise level increase of at least 1 decibel. Based on the current assessment, of the total 195 PPFs receiving noise levels in Category C and being located in the City Centre zone, only 86 would receive a noise level increase of at least 1 decibel. Of these, 73 PPFs would receive an imperceptible noise level increase of 1-2 decibels and 13 PPFs would receive a just perceptible increase of 3-4 decibels. However, these PPFs would not receive additional building modification mitigation due to the assumption by NZTA that they have been appropriately constructed through the requirements of the City Centre zone rules. Which PPFs would require such investigation, would need to be confirmed during detailed design, where slight changes to the alignment may result in changes to the noise levels and affected houses.

Health and amenity effects that might be experienced as a result of traffic noise levels

309. My assessment of noise effects on people is generally quantitative, relating to the noise level received in the future and the change in noise level experienced due to the Project. There are also several qualitative aspects that affect how people perceive the acoustic effects of a Project.
310. The World Health Organisation (WHO) has identified that noise levels above 50 dB L_{Aeq} may cause adverse health effects.¹² Exposures to high noise levels can result in a reduction in sleep quality, awakenings, annoyance, lack of concentration, which in turn can lead to an impact on people's health such as cardio-vascular impacts. This means that as levels increase further, more focus is applied to management, mitigation, and land use planning to reduce effects.
311. I consider that the 50 dB L_{Aeq} threshold is not a noise level that is practical to achieve in the context of the Project, given the noise levels generated by existing roads, improvements that will be made in some cases because of the Project's low noise road surface, assuming my recommendation for this is adopted by NZTA, and the current and anticipated urban development in the vicinity of the Project. However, it does provide an indication of overall effects in addition to the assessment in accordance with NZS 6806.
312. Most of the PPFs currently experience similar or higher noise levels from existing roads than they will because of the Project. Noise levels above 50 dB L_{Aeq} can occur at greater distances from the road also and are not limited to PPFs in the immediate vicinity of the road. Where effective, the Project enables the design and implementation of mitigation that will benefit these PPFs and would otherwise not have been implemented.
313. The entire Project provides for a smooth road surface as part of the Project (SMA10 or AC).
314. Irrespective of the mitigation recommended, there are 87 PPFs that I predict will receive perceptible to noticeable increases in traffic noise level. This is particularly the case where buildings are removed to make space for the Project. Due to the suburban, urban and city centre environment, where only a footpath separates houses from the road, further mitigation is generally not practicable.
315. Another aspect of people's reaction to a Project relates to habituation, i.e. "getting used to" the change and level in noise environment. This occurs over time. Any change in environment due to the introduction of a new road or moving of a road source from one location to another, may cause initial disturbance to people. However, over time, people become accustomed to the sound (both level and location), pay less attention to it and the response will diminish.

¹² The 2018 WHO guidelines recommend an external road traffic noise level of 53 dB L_{den} . This converts to approximately 50 dB $L_{Aeq}(24h)$

Other traffic noise sources

316. Traffic noise is not only generated by traffic movements on the road (controlled by the road-tyre-interaction for speeds above 40 – 50 km/h). Other aspects can also have an impact on road traffic noise but are not covered by NZS 6806 or the Calculation of Road Traffic Noise (refer paragraph 201).
317. These include:
- i. Bridge joints where traffic needs to pass over a metal piece which may cause a bump/impact of the tyre;
 - ii. Audible tactile profiles (ATP) – small raised white or coloured profiles on the road, which, if installed close to dwellings and close to the live traffic lane, can cause additional noise if traffic routinely passes over them;
 - iii. Trucks using engine brakes or generally braking as they approach an off ramp or have to slow down for a change in posted speed; and
 - iv. Vehicles accelerating into main traffic from an on ramp or where the posted traffic speed increases.
318. Each of these causes may influence traffic noise generation. Generally, the character of the traffic noise changes to include a tonal (e.g. ATP, engine braking) or impact (e.g. bridge joints) component, or noise level increase (e.g. traffic accelerating, engine braking).
319. Good design can reduce the change in noise level or character. For instance, ATP should not be installed within 100m of dwellings (i.e. not at all for this Project).¹³ Similarly, engine braking by trucks can be reduced if road design clearly indicates a drop in speed environment, enabling truck drivers to pre-empt the speed reduction.
320. Bridge joints, if not properly designed and installed, can cause unnecessary and disturbing noise that can lead to complaints. This Project contains several bridges that need to be designed to avoid such issues. For instance, I recommend that concrete TL4 or TL5 barriers are installed adjacent to the joints to reduce noise to neighbouring buildings. NZTA specifications set out maximum values for discontinuities or steps in the road surface (including at bridge joints), which can exacerbate noise generation. I recommended that the Project is designed to fulfil these specifications.¹⁴
321. Noise from particularly noisy trucks and motorbikes is also often mentioned when people complain about road traffic noise. The reason is that these noise sources stand out from the general traffic noise and are therefore more noticeable. The noise level from such vehicles (and trucks and cars) can be addressed during the Warrant of Fitness process if a vehicle seems particularly noisy and has been modified. Apart from that, excessive noise by individual vehicles is regulated by the Land Transport Rules. Road design can achieve little in relation to such elevated and intermittent noise sources as road surface does not noticeably affect that noise generation and barriers only achieve a partial reduction in noise level.
322. I recommend that each of the above aspects must be taken into consideration during the detailed design of the road to ensure that unnecessary and unreasonable noise generation is avoided. NZTA has a comprehensive set of design criteria dealing with each of the above issues, which in my opinion, will ensure that the BPO mitigation and management is included at the design stage.

¹³ <https://www.nzta.govt.nz/assets/resources/audio-tactile-profiled-roadmarkings-guidelines/docs/atp-guidelines.pdf>

¹⁴ <https://nzta.govt.nz/assets/resources/bridge-manual/docs/Bridge-manual-complete-v3.2.pdf>

Mechanical noise effects assessment

323. The noise environment surrounding the tunnel portals is already elevated by traffic in the area. Mechanical noise from the tunnel ventilation will be managed to comply with the relevant noise limits and will, for most times, be inaudible due to the high ambient noise environment.
324. The exception may be in the event of an emergency when the ventilation system may need to operate at full capacity with all fans operating. In that case, the ventilation system may be audible as traffic is stopped, and the system operates at its highest noise levels. Even then, the noise level from the system is designed such that voice notifications inside the tunnel are audible to people in vehicles. Such circumstances will be rare and last for limited periods only.
325. I therefore consider that the effects from the ventilation system operation are reasonable and will not cause adverse effects for neighbouring receivers.

MEASURES TO AVOID, REMEDY OR MITIGATE ACTUAL OR POTENTIAL ADVERSE OPERATIONAL NOISE EFFECTS

326. I have considered options to avoid, remedy or mitigated traffic noise effects.
327. If low noise road surface is a feasible option for any part of the Project, and specifically the straight alignment of Ruahine Street, I recommend that LN3 or LN5 surface is used as widely as practicable as it would provide a noticeable reduction of already high noise levels.
328. Noise barriers may be effective in Ruahine Street and Wellington Road in the Eastern Connections area, depending on inputs from other disciplines, and depending on an assessment of whether they constitute BPO.
329. Applying NZS 6806, all PPFs receiving noise levels in Category C would be investigated for building modification mitigation, to achieve an internal noise level of no more than 40 dB $L_{Aeq(24h)}$ with sufficient ventilation and cooling in place. I understand NZTA is considering an approach, whereby only those Category C PPFs would be investigated for building modification mitigation that are in residential zones and where the Project results in a noise level increase. Depending on the structural mitigation that can be installed on the Project (i.e. low noise road surface and/or barriers), the number of PPFs receiving Category C noise levels would change. Therefore, the number of PPFs that would be assessed for building modification mitigation should be determined at the time of detailed design.

COMMENTS RECEIVED RELATING TO OPERATIONAL NOISE AND VIBRATION

330. I have reviewed the comments received as part of consultation undertaken in late 2025 relating to operational noise and vibration. Most comments are of a general nature, noting concern with traffic noise levels.
331. A number of commenters were concerned with the removal of trees and how this may affect traffic noise levels. While there is a belief that trees can reduce noise, this is not the case. As a rule of thumb, if wind can pass through a medium (e.g. a tree), so can noise. Trees provide visual shielding only. Visual shielding may result in a false perception of noise level reduction, but this is not the case.
332. Some comments seek upgrades to building façades (e.g. improved glazing) to mitigate traffic noise. As discussed in my assessment, most PPFs in the vicinity of the Project already receive elevated traffic noise levels, and this will not change noticeably for most PPFs with the Project in place. I understand that NZTA intends to investigate building modification mitigation where the Project

causes a noise level increase and a PPF in a residential zone receives high noise levels (in Category C).

333. Comments were received requesting ongoing post-construction traffic noise monitoring. Noise monitoring, while helpful at times, is affected by a large number of unrelated issues (e.g. weather, other noise sources, natural sounds etc). Therefore, I do not recommend ongoing monitoring of traffic noise in a busy urban or suburban setting.
334. A comment received in relation to the Pukeahu War Memorial Park requests that the existing concrete panels near the Arras tunnel be retained. I recommend that, should the panels need to be removed during construction, they be reinstated when the Project is complete.
335. There were no comments received from WCC relating to operational noise, and agreement with my assessment was indicated.
336. Overall, I consider that the proposed conditions are suitable to deal with most of the issues raised in the comments received.

SUMMARY OF OPERATIONAL EFFECTS

337. Operational noise effects include both traffic and mechanical noise generation. Table 31 sets out a summary of operational noise effects, potential mitigation measures and the overall effect with mitigation in place.

Table 31: Summary of operational noise effects without and with mitigation

Activity	Magnitude of effect on neighbouring buildings (without mitigation)	Potential mitigation and management	Magnitude of effect on neighbouring buildings (with mitigation)
Traffic on the public roads (this is an existing effect that remains largely unchanged due to the Project)	Moderate to high	Low noise road surface (LN5) on any part of the Project where it is practicable (this measure has not been confirmed as being practicable)	Low
	Moderate to high	Low noise road surface (LN5) on the straight of Ruahine Street	Low
	High	NZS 6806 approach: Building modification mitigation for all PPFs that would receive noise levels above 67 dB L _{Aeq(24h)} following the installation of all structural mitigation	Low
		NZTA approach: Building modification mitigation for all PPFs that would receive noise levels above 67 dB L _{Aeq(24h)} following the installation of all structural mitigation, are in a residential zone and receive at least a 1dB noise level increase from the Project	Low for mitigated PPFs, Low to High for unmitigated PPFs*
In tunnel ventilation	Low	Attenuators (already proposed as discussed with the design team), design and installation to reduce noise break out	Low

* PPFs within the City Centre Zone may already include insulation and ventilation sufficient to mitigate internal noise levels to a reasonable level. However, this cannot be confirmed without visiting the PPFs and determining the façade performance and ventilation/cooling abilities of any mechanical system. Other PPFs may be older than 2000, not constructed within the requirements of the District Plan or not maintained (e.g. window seals). Therefore, traffic noise effects may range from low (for well insulated/ventilated PPFs) to high (for old, uninsulated and not ventilated PPFs).

7. CONCLUSION AND RECOMMENDATIONS

Construction noise and vibration

338. The construction of the Project will occur over an extended period of several years. However, work will only occur for part of the overall duration in each location. Given the urban environment in which the Project will be constructed, neighbouring buildings (both sensitive and commercial) will be in close proximity to the works. This means that the relevant noise and/or vibration limits will be exceeded at times as equipment operates close to buildings.
339. The bulk of the construction noise and vibration effects will result from general construction works such as demolition, excavation and compaction as well as blasting (in the Mt Victoria tunnel only). Some works will likely need to be undertaken during night-time. This would be the case where the works would require major roads to be closed, which would cause significant traffic disruption during the day.
340. Construction noise is assessed against the relevant criteria of NZS 6803, and construction vibration is assessed against criteria of DIN 4150-3 (to protect buildings from any damage) and BS 5228-2 (to protect the amenity of people as far as practicable).
341. I have predicted indicative construction noise and vibration levels from anticipated equipment to be used. Noise levels may be in excess of 90 dB L_{Aeq} at the façades of some buildings during the noisiest activities when they are closest to those buildings. In addition, during high vibration activities such as impact or sheet piling, or the use of large vibro rollers for the compaction of the road alignments, a number of buildings may receive vibration levels exceeding 5 mm/s PPV (the criterion that protects buildings from any building damage). For these buildings, firstly, an alternative construction methodology should be considered. If that is not practicable, building condition surveys must be undertaken prior to the works occurring and after the works have been completed. Should any damage have been caused by vibration from the works, this will need to be rectified.
342. My recommended approach to construction noise and vibration management and mitigation includes the use of an overarching CNVMP for all best practice management and mitigation measures, and Schedules for specific activities or locations where compliance with the relevant criteria is not practicable.
343. I recommend both on and off-site measures, all of which should be implemented throughout the entire construction phase as best practice. Examples of on-site measures include training of personnel, maintenance of equipment, noise barriers and enclosures and considerate behaviour and use of equipment, and choice of low impact methodologies (e.g. using bored piling rather than vibro or impact piling, where practicable). Examples of off-site measures include public liaison and communication, temporary barriers, offers of resident relocation, building condition surveys, and noise level monitoring.
344. I recommend that the requirement for the CNVMP and Schedules as a framework be contained in the designation conditions.

Operational noise

345. I have assessed both traffic and mechanical noise from the Project. These two noise sources are assessed against different criteria. Traffic noise is assessed against NZS 6806, and mechanical noise against the underlying Wellington City District Plan zone criteria.
346. Mechanical noise will be produced by the in-tunnel ventilation systems and, to a lesser degree, the pumps servicing the tunnel sprinkler systems. I predict that both systems can comply with the relevant criteria when they operate normally (i.e. not during emergency use, which is excluded from compliance in the District Plan).

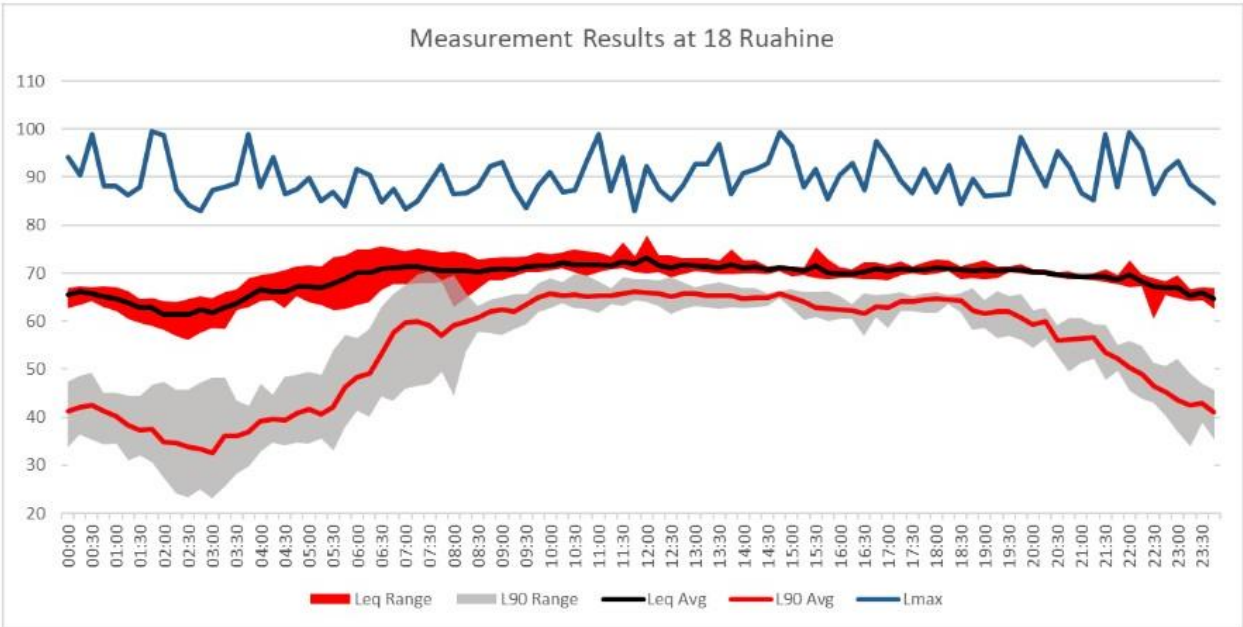
347. Traffic noise is assessed across five areas: Terrace Tunnel, Te Aro, Basin Reserve, Mt Victoria Tunnel and Eastern Connections. For the majority of assessed dwellings (PPFs), traffic noise levels will remain similar with and without the Project. For a small number of PPFs, noise levels will increase noticeably. That is the case where the road moves closer or where houses fronting the Project are removed to allow for its construction. For other PPFs, noise levels will reduce noticeably where the Project moves the road further away from houses or where the road is shielded by retaining walls or similar.
348. Traffic noise mitigation is limited for this Project due to the inner-city location. The use of low noise road surface (LN5) would normally be the most appropriate measure; however, I understand that the practicability of such surface has not yet been confirmed (this will need to be done at the detailed design stage). The only exception is the straight section of Ruahine Street in the Eastern Connections area, where LN5 surface has been confirmed and is proposed via the conditions.
349. Barriers are not a suitable mitigation measure for any area. The Project team reviewed possible barrier locations for Ruahine Street and Wellington Road in the Eastern Connections area and found many (non-acoustic) issues that may affect the effectiveness and practicability of potential barriers, therefore not making them a practicable measure.
350. Applying NZS 6806, all PPFs that receive noise levels in Category C, would be considered for building modification mitigation. However, I understand NZTA is considering investigating only Category C PPFs that are located in a residential zone and where the Project results in a noise level increase, for building modification mitigation to achieve an internal noise level of not more than 40 dB $L_{Aeq(24h)}$.
351. Overall, the Project will have limited effects on traffic noise generation across the wider area.

ANNEXURE A Noise Survey Summary Sheets

LOGGER MEASUREMENTS – 18 RUAHINE STREET

Date:	Tuesday, 10 March 2026
File name:	K:\Project\2025\20250627 - RoNS SH1 Wellington Design and Consent\03 Survey Data & Measurements\Logger Data\18 Ruahine St\Collated 18 Ruahine.xlsx
Job number:	20250627
Job name:	RoNS Wellington SH1
Initials:	TJ
Measurement Dates:	Friday, 20 February 2026 – Saturday, 28 February 2026
Notes:	Not adjusted for wind due to close proximity to the road

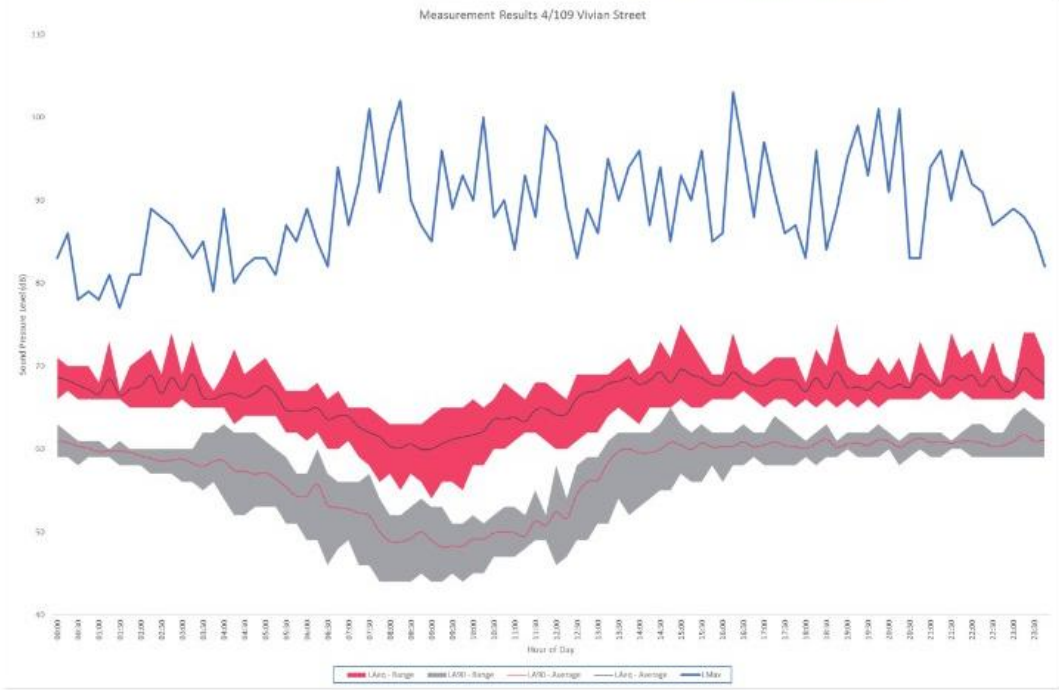
dB L _{Amax}	24 Hr	Day 0700-2200	Night 2200-0700
Range	77 – 99	78 – 99	77 – 99
dB L _{Aeq}			
Average	70	71	67
Range	59 – 78	63 – 78	59 – 72
dB L _{A90}			
Average	52	62	40
Range	23 - 67	45 – 67	23 – 64



LOGGER MEASUREMENTS – 4/109 VIVIAN STREET

Date:	Wednesday, 25 March 2026
File name:	"K:\Project\2025\20250627 - RoNS SH1 Wellington Design and Consent\03 Survey Data & Measurements\Logger Data\109 Vivian St\LS 01 20250627 109 Vivian St- Long term data analysis.xlsm"
Job number:	20250627
Job name:	RoNS Wellington SH1
Initials:	TJ
Measurement Dates:	Friday, 13 March 2026 – Tuesday, 24 March 2026
Notes:	Not adjusted for wind due to close location to the road
Removed Data:	Excessive noise from modified vehicles and motorbikes

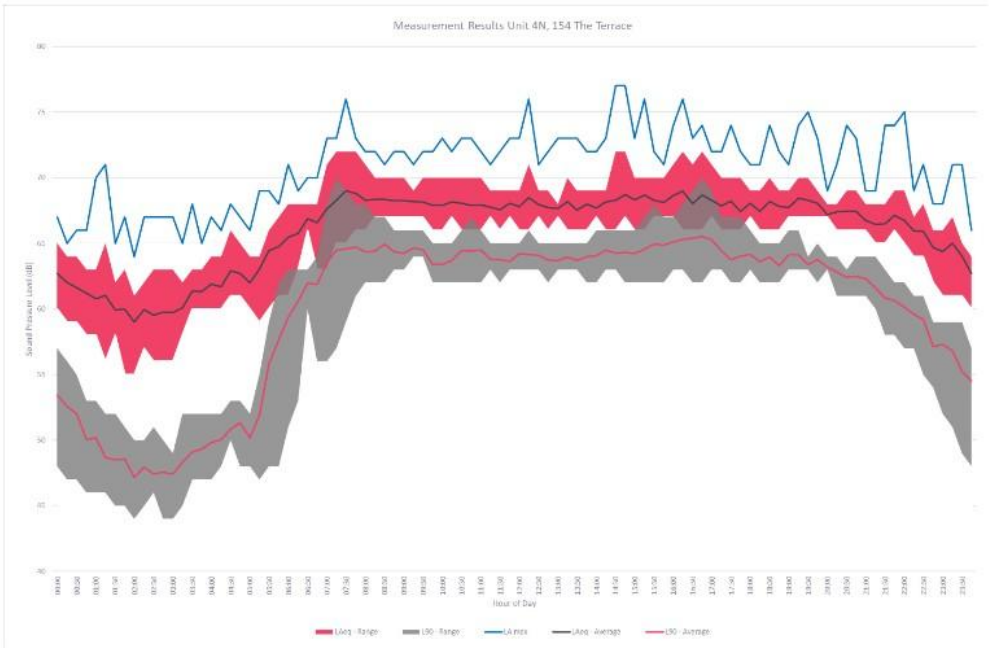
dB L _{Amax}	24 Hr	Day 0700-2200	Night 2200-0700
Range	55 – 103	70 – 103	55 – 94
dB L _{Aeq}			
Average	67	68	65
Range	47 – 79	62 – 79	47 – 75
dB L _{A90}			
Average	58	61	54
Range	43 – 68	52 – 68	43 – 64



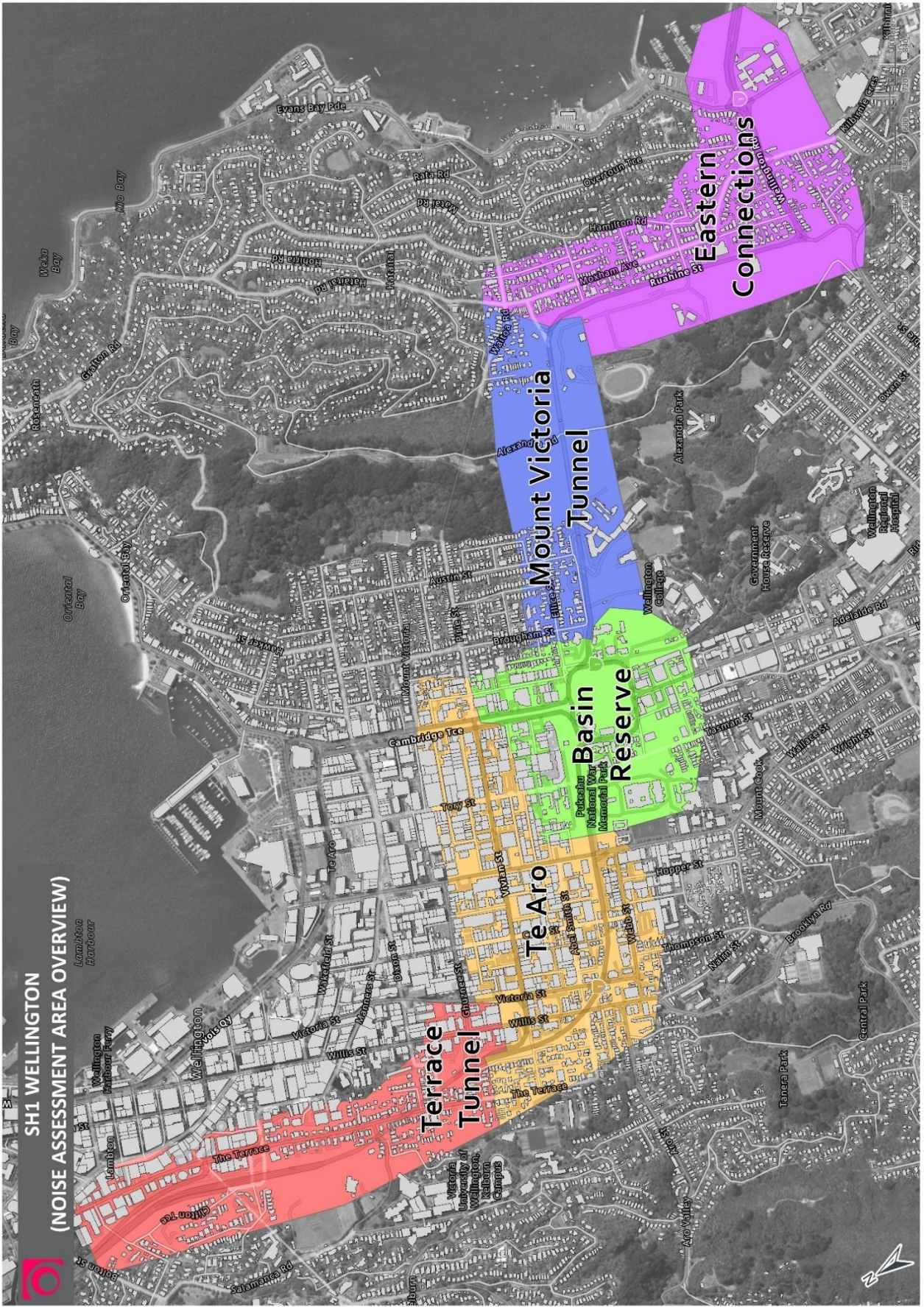
LOGGER MEASUREMENTS – UNIT 4N, 154 THE TERRACE

Date:	Tuesday, 10 March 2026
File name:	"K:\Project\2025\20250627 - RoNS SH1 Wellington Design and Consent\03 Survey Data & Measurements\Logger Data\Atrium\LS 01 20250627 Atrium - Long term data analysis.xlsm"
Job number:	20250627
Job name:	RoNS Wellington SH1
Initials:	TJ
Measurement Dates:	Friday, 20 February 2026 – Saturday, 28 February 2026
Notes:	Not adjusted for wind due to close proximity to the road

dB L _{Amax}	24 Hr	Day 0700-2200	Night 2200-0700
Range	54 – 79	64 – 79	54 – 76
dB L _{Aeq}			
Average	66	68	63
Range	52 – 76	63 – 76	52 – 74
dB L _{A90}			
Average	62	64	56
Range	43 – 70	53 – 70	43 – 66



ANNEXURE B Noise Assessment Areas



SH1 WELLINGTON
(NOISE ASSESSMENT AREA OVERVIEW)

ANNEXURE C Indicative Construction Noise Contours



**CONSTRUCTION NOISE
PREDICTION**

**CONSTRUCTION NOISE -
ROAD WORKS (TERRACE
AREA)**

**Predicted Noise Level (dB
LAeq)**

- ≥70 dB LAeq**
- Building Outlines**
- Road Works**



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
5/06/2026 4:15 pm

Drawing Details:
Scale: 1:3,000
Projection: NZGD 2000 New Zealand Transverse
Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRL0201 - 0206.res

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.
The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.



CONSTRUCTION NOISE - ROAD WORKS (TE ARO)

Predicted Noise Level (dB L_{Aeq})

- ≥70 dB L_{Aeq}**
- Building Outlines**
- Road Works**

Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
5/06/2026 4:15 pm

Drawing Details:
Scale: 1:3,500
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:

This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.



CONSTRUCTION NOISE - ROAD WORKS (BASIN)

Predicted Noise Level (dB L_{Aeq})

- ≥70 dB L_{Aeq}
- Building Outlines
- Road Works

Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
5/06/2026 4:15 pm

Drawing Details:
Scale: 1:3,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:

This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.



**CONSTRUCTION NOISE
PREDICTION**

**CONSTRUCTION NOISE -
ROAD WORKS (EASTERN)**

**Predicted Noise Level (dB
 L_{Aeq})**

≥70 dB L_{Aeq}

Building Outlines

Road Works



Client:

NZTA Waka Kotahi

Authors:

Owen Li

Date of Issue:

5/06/2026 4:15 pm

Drawing Details:

Scale: 1:3,500

Projection: NZGD 2000 New Zealand Transverse
Mercator

Map Rotation: 0°

SoundPLAN Details:

Calculation Method: ISO 9613-2:1966

Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:

This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.

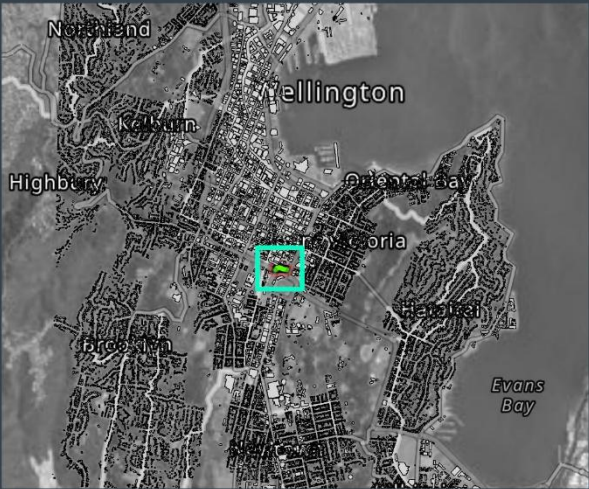


**CONSTRUCTION NOISE
PREDICTION**

**CONSTRUCTION NOISE -
BASIN RESERVE RETAINING
WALLS**

**Predicted Noise Level (dB
 L_{Aeq})**

- ≥ 70 dB L_{Aeq}
- Building Outlines
- Basin Reserve Works



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
8/06/2026 4:08 pm

Drawing Details:
Scale: 1:1,300
Projection: NZGD 2000 New Zealand Transverse
Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

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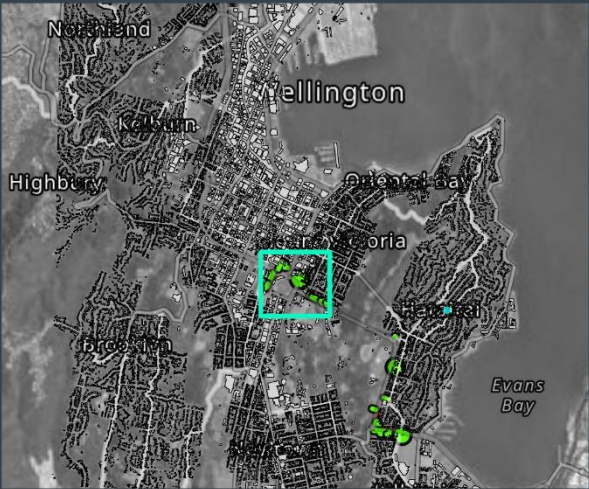


CONSTRUCTION NOISE
PREDICTION

CONSTRUCTION NOISE -
BUILDING DEMOLITION
(MOUNT VICTORIA AREA)

Predicted Noise Level (dB
 L_{Aeq})

- ≥ 70 dB L_{Aeq}
- Building Outlines
- Building Demolition Works
- Building Demolition Works



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
8/06/2026 4:25 pm

Drawing Details:
Scale: 1:2,000
Projection: NZGD 2000 New Zealand Transverse
Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.

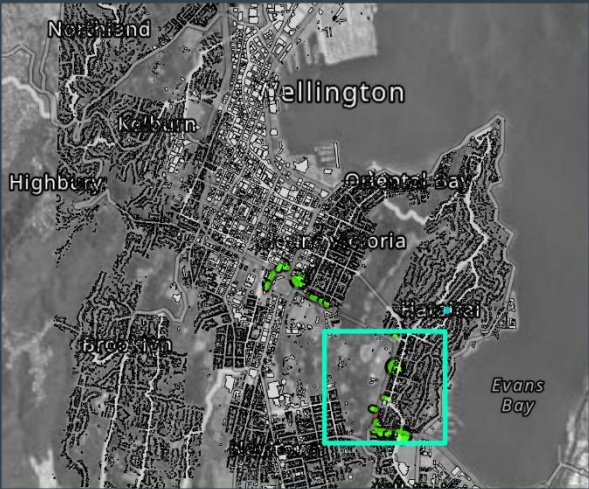


CONSTRUCTION NOISE PREDICTION

CONSTRUCTION NOISE - BUILDING DEMOLITION (HATAITAI AREA)

Predicted Noise Level (dB
 L_{Aeq})

- ≥ 70 dB L_{Aeq}
- Building Outlines
- Building Demolition Works
- Building Demolition Works



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
8/06/2026 4:25 pm

Drawing Details:
Scale: 1:3,500
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:
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The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.



CONSTRUCTION NOISE - PREDICTION

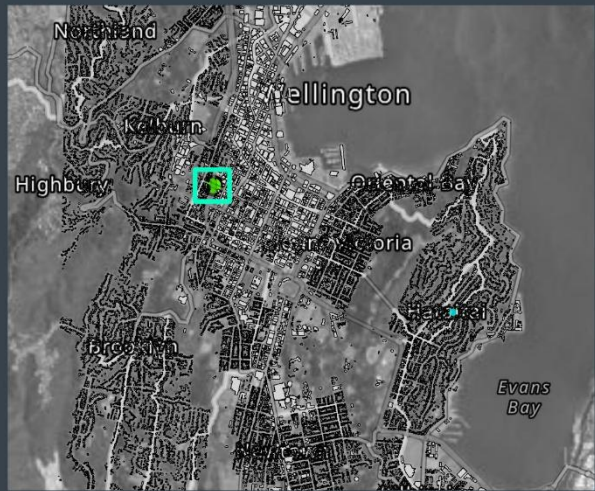
CONSTRUCTION NOISE - GHUZNEE STREET OVERBRIDGE

Predicted Noise Level (dB
 L_{Aeq})

■ ≥ 70 dB L_{Aeq}

■ Building Outlines

● Ghuznee Street Overbridge



Client:

NZTA Waka Kotahi

Authors:

Owen Li

Date of Issue:

8/06/2026 4:25 pm

Drawing Details:

Scale: 1:1,000

Projection: NZGD 2000 New Zealand Transverse
Mercator

Map Rotation: 0°

SoundPLAN Details:

Calculation Method: ISO 9613-2:1966

Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:

This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

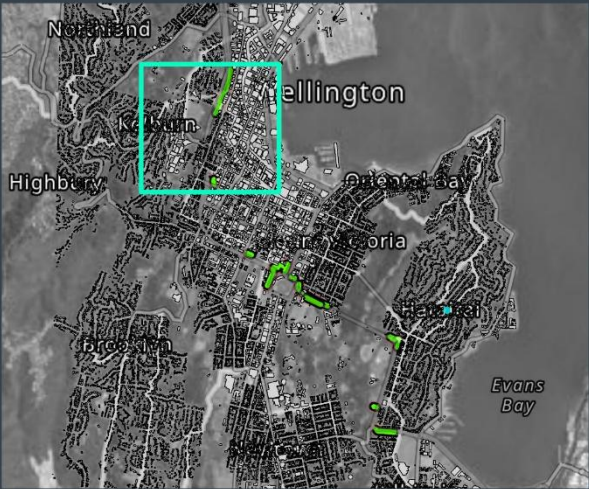
The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.



CONSTRUCTION NOISE -
YARD VEHICLES (TERRACE
AREA)

Predicted Noise Level (dB
LAeq)

- ≥70 dB LAeq
- Building Outlines
- Yard Vehicles



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
8/06/2026 4:25 pm

Drawing Details:
Scale: 1:4,000
Projection: NZGD 2000 New Zealand Transverse
Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.
The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.

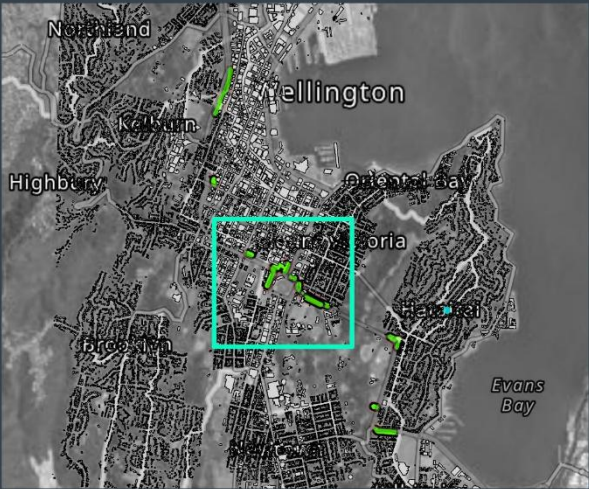


CONSTRUCTION NOISE PREDICTION

CONSTRUCTION NOISE - YARD VEHICLES (BASIN)

Predicted Noise Level (dB
 L_{Aeq})

- ≥ 70 dB L_{Aeq}
- Building Outlines
- Yard Vehicles



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
8/06/2026 4:25 pm

Drawing Details:
Scale: 1:4,000
Projection: NZGD 2000 New Zealand Transverse
Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.
The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.

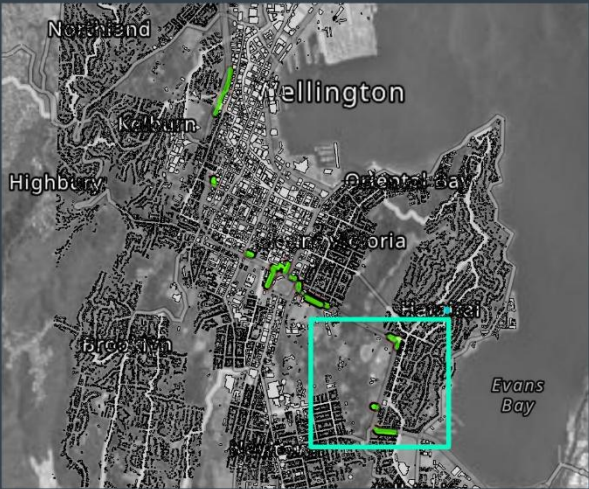


**CONSTRUCTION NOISE -
PREDICTION**

**CONSTRUCTION NOISE -
YARD VEHICLES (EASTERN)**

**Predicted Noise Level (dB
 L_{Aeq})**

- ≥ 70 dB L_{Aeq}
- Building Outlines
- Yard Vehicles



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
8/06/2026 4:25 pm

Drawing Details:
Scale: 1:4,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

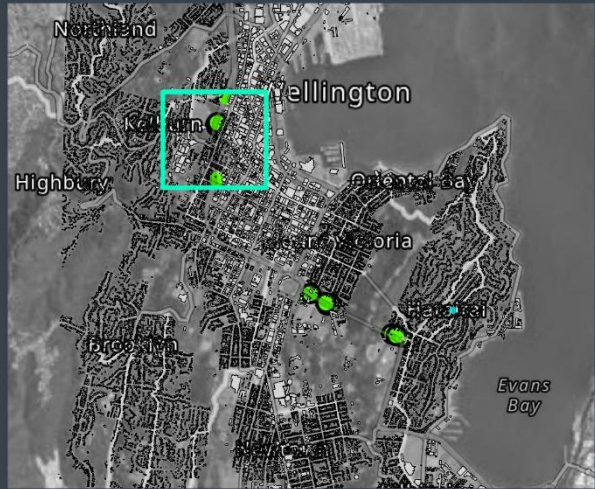
The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.



CONSTRUCTION NOISE - TUNNELING SUPPORT AND PORTAL CONSTRUCTION (TERRACE AND TE ARO AREA)

Predicted Noise Level (dB
 L_{Aeq})

- ≥ 70 dB L_{Aeq}
- Building Outlines
- Tunneling Support and Portal Construction



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
8/06/2026 4:25 pm

Drawing Details:
Scale: 1:3,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.

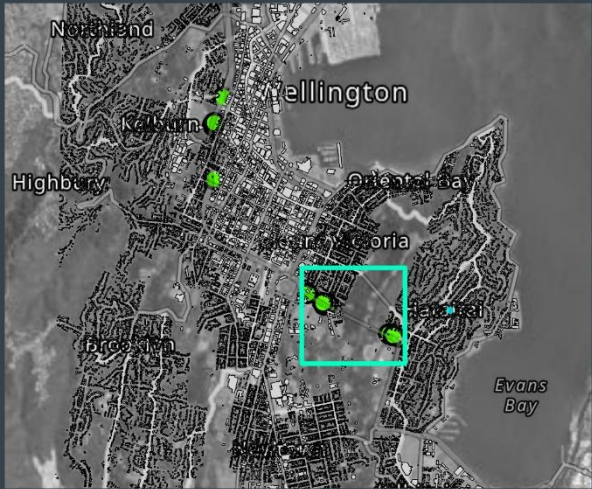


**CONSTRUCTION NOISE
PREDICTION**

**CONSTRUCTION NOISE -
TUNNELING SUPPORT AND
PORTAL CONSTRUCTION
(BASIN AND EASTERN AREA)**

**Predicted Noise Level (dB
 L_{Aeq})**

- ≥ 70 dB L_{Aeq}
- Building Outlines
- Tunneling Support and Portal Construction



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
8/06/2026 4:25 pm

Drawing Details:
Scale: 1:3,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

SoundPLAN Details:
Calculation Method: ISO 9613-2:1966
Result File Name: RRKL0201 - 0206.res

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

The noise contours were obtained by interpolations of calculated grid points (spacing typically 5-25m), with varying interpolation accuracy. Precise noise levels at specific locations, can be made available at request if not included in the projects point receiver calculations.

ANNEXURE D Indicative Vibration Setbacks

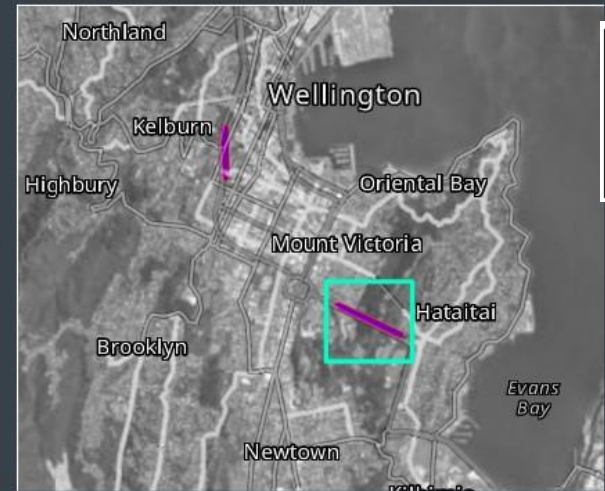
Indicative setback distances related to vibration from significant construction activities are shown in the following figures. The colours indicate the expected vibration levels according to the following scale, which relates to the vibration control criteria cited in the report.



**CONSTRUCTION VIBRATION
PREDICTION**

**CONSTRUCTION VIBRATION -
IN TUNNEL BLASTING 0.5 KG
CHARGE (MT VICTORIA)**

Vibration Level (mm/s PPV)
— <5 mm/s PPV
— <10 mm/s PPV



**Blasting
Vibration Velocity**
— < 10 mm/s PPV
— < 5 mm/s PPV

Client:
NZTA Waka Kotahi
Authors:
Owen Li
Date of Issue:
17/02/2026 4:19 pm
Drawing Details:
Scale: 1:2,500
Projection: NZGD 2000 New Zealand Transverse
Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION -
IN TUNNEL BLASTING 1 KG
CHARGE (MT VICTORIA)

Vibration Level (mm/s PPV)

- <5 mm/s PPV
- <10 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:2,500
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

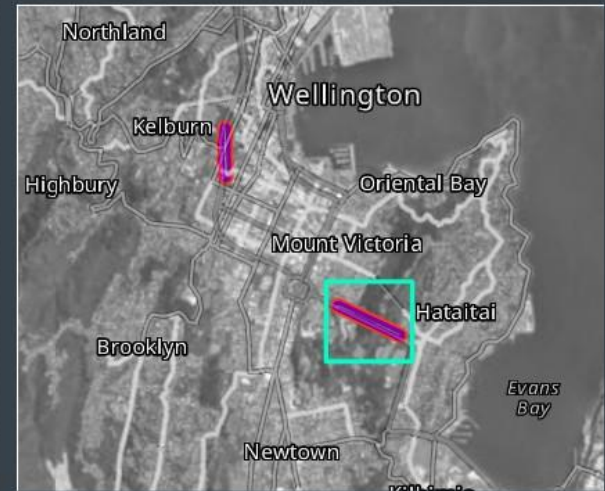
Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



**CONSTRUCTION VIBRATION
PREDICTION**

**CONSTRUCTION VIBRATION -
IN TUNNEL BLASTING 5 KG
CHARGE (MT VICTORIA)**

Vibration Level (mm/s PPV)
— <5 mm/s PPV
— <10 mm/s PPV



Client:
NZTA Waka Kotahi
Authors:
Owen Li
Date of Issue:
17/02/2026 4:19 pm
Drawing Details:
Scale: 1:2,500
Projection: NZGD 2000 New Zealand Transverse
Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION - ROADHEADER (TERRACE TUNNEL)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:1,800
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION -
ROADHEADER (MT VICTORIA
TUNNEL)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:2,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION - TUNNEL PORTAL (TERRACE TUNNEL)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm

Drawing Details:
Scale: 1:2,500
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION - TUNNEL PORTAL (MT VICTORIA TUNNEL)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:3,200
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

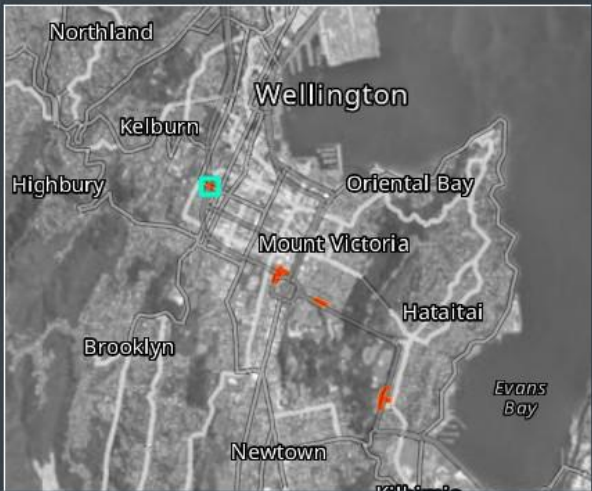
Map Notes / Comments:
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CONSTRUCTION VIBRATION - BORED PILING (TE ARO AREA)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:500
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

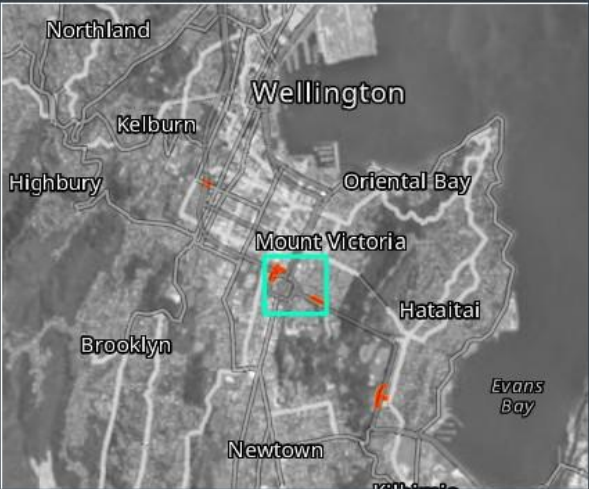


**CONSTRUCTION VIBRATION
PREDICTION**

**CONSTRUCTION VIBRATION -
BORED PILING (BASIN AREA)**

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:1,800
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

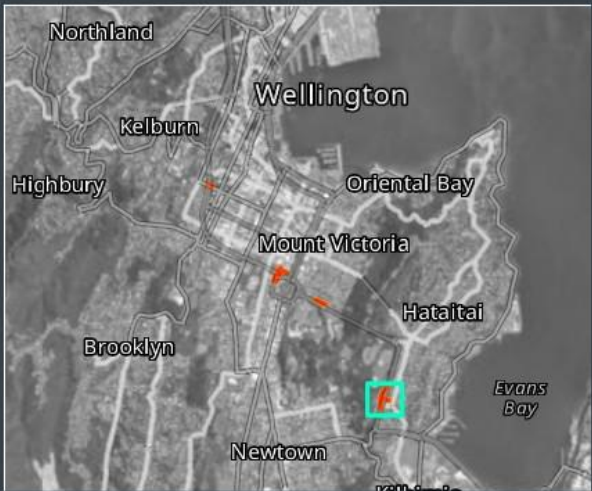
Map Notes / Comments:
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CONSTRUCTION VIBRATION - BORED PILING (EASTERN AREA)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:1,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION - IMPACT PILING (TE ARO AREA)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:1,500
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

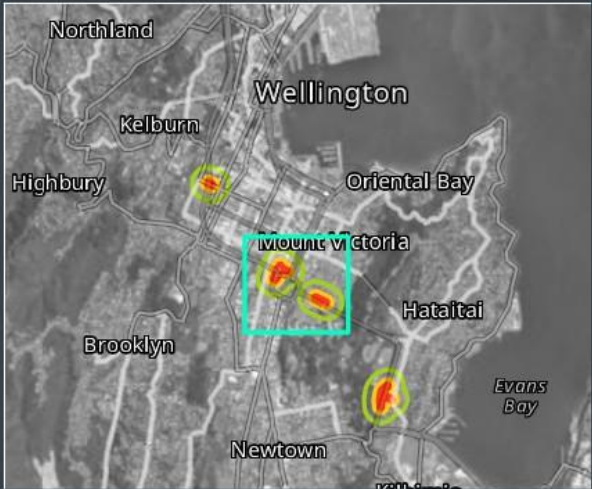
Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION - IMPACT PILING (BASIN AREA)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client:
NZTA Waka Kotahi

Authors:
Owen Li

Date of Issue:
17/02/2026 4:19 pm

Drawing Details:
Scale: 1:3,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION - IMPACT PILING (EASTERN AREA)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:2,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION - ROAD COMPACTION USING VIBRATORY ROLLING (TE ARO)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of Issue: 5/06/2026 12:29 pm
Drawing Details: Scale: 1:3,800
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.



CONSTRUCTION VIBRATION - ROAD COMPACTION USING VIBRATORY ROLLING (EASTERN)

Vibration Level (mm/s PPV)

- <1 mm/s PPV
- <2 mm/s PPV
- <5 mm/s PPV



Client: NZTA Waka Kotahi
Authors: Owen Li
Date of issue: 17/02/2026 4:19 pm
Drawing Details: Scale: 1:4,000
Projection: NZGD 2000 New Zealand Transverse Mercator
Map Rotation: 0°

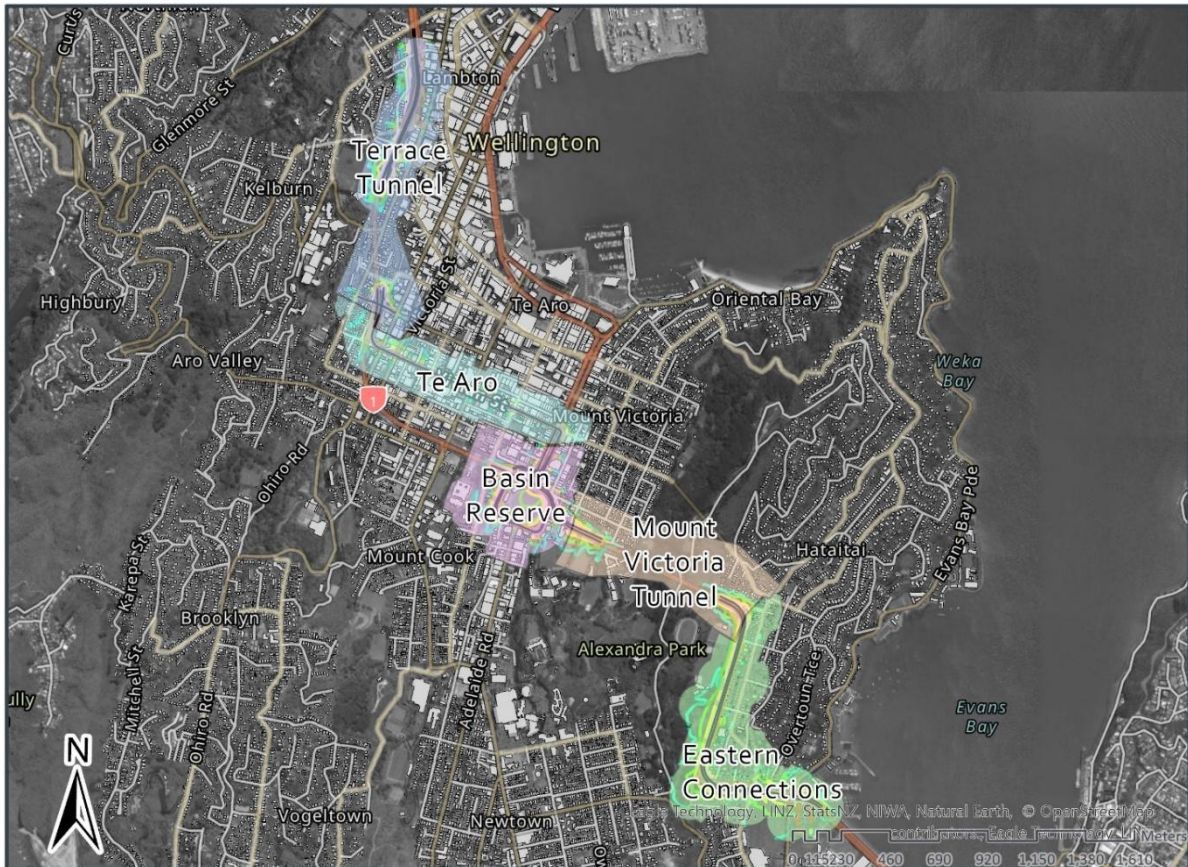
Map Notes / Comments:
This map is for graphical purposes only. While every effort has been made to ensure that the data are accurate and reliable, Marshall Day Acoustics cannot assume liability for errors or omissions in the data graphically represented.

ANNEXURE E PPF Categories and Traffic Noise Contours



STATE HIGHWAY 1 WELLINGTON IMPROVEMENTS

Overview Map

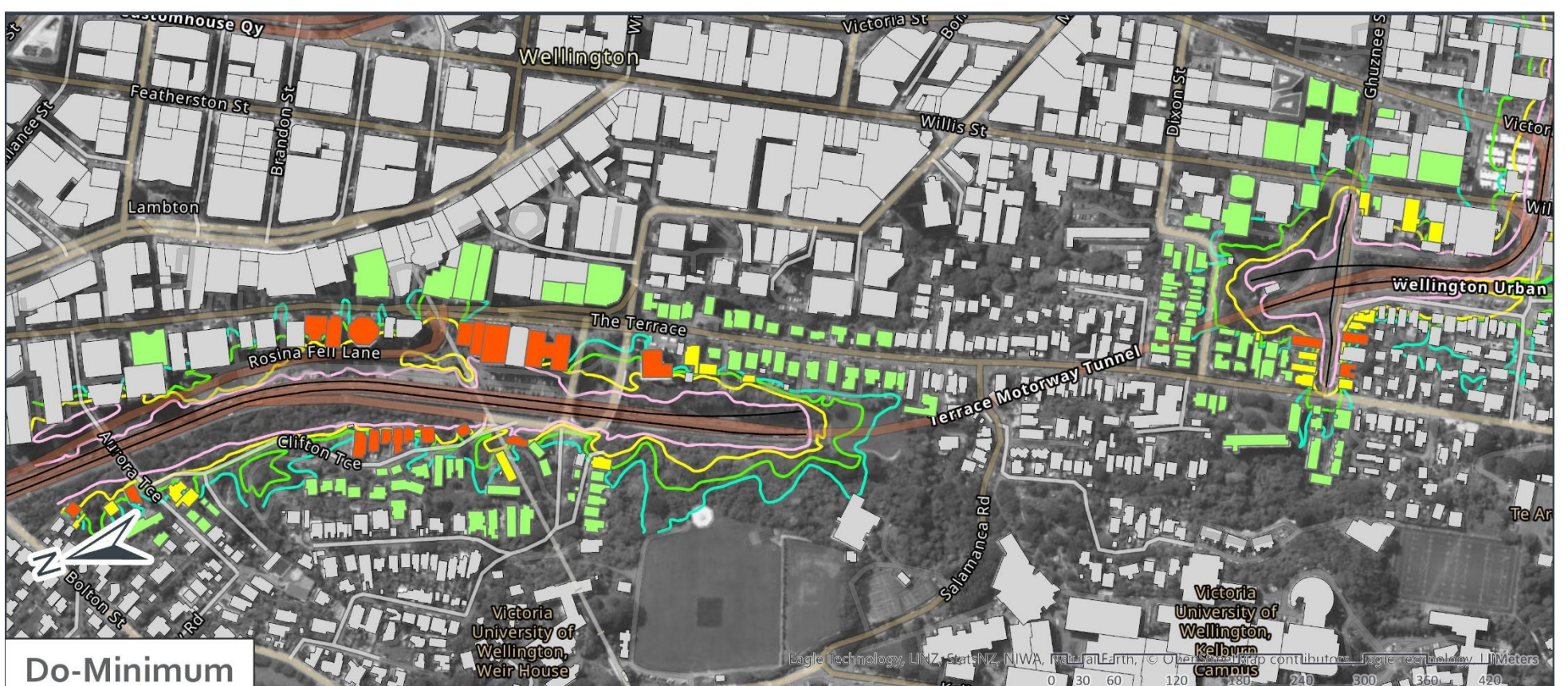
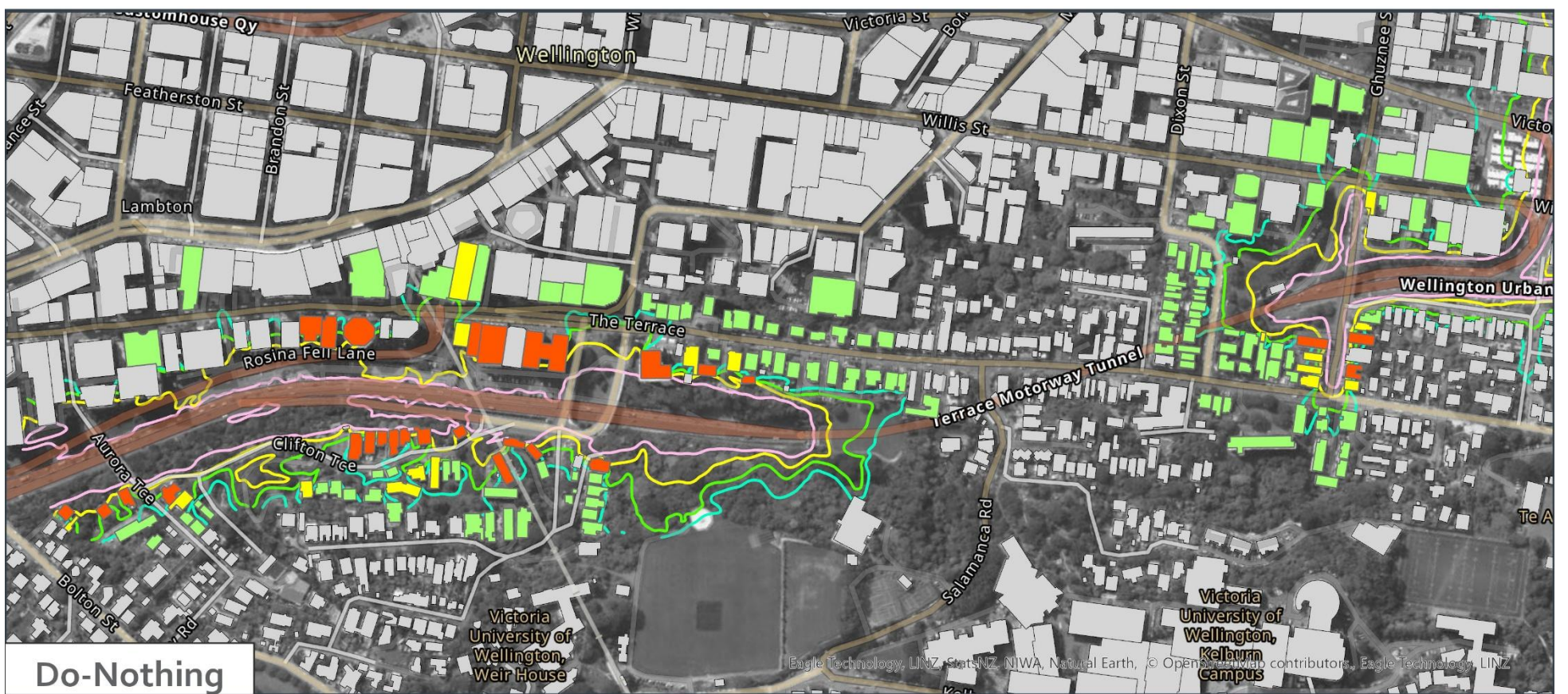
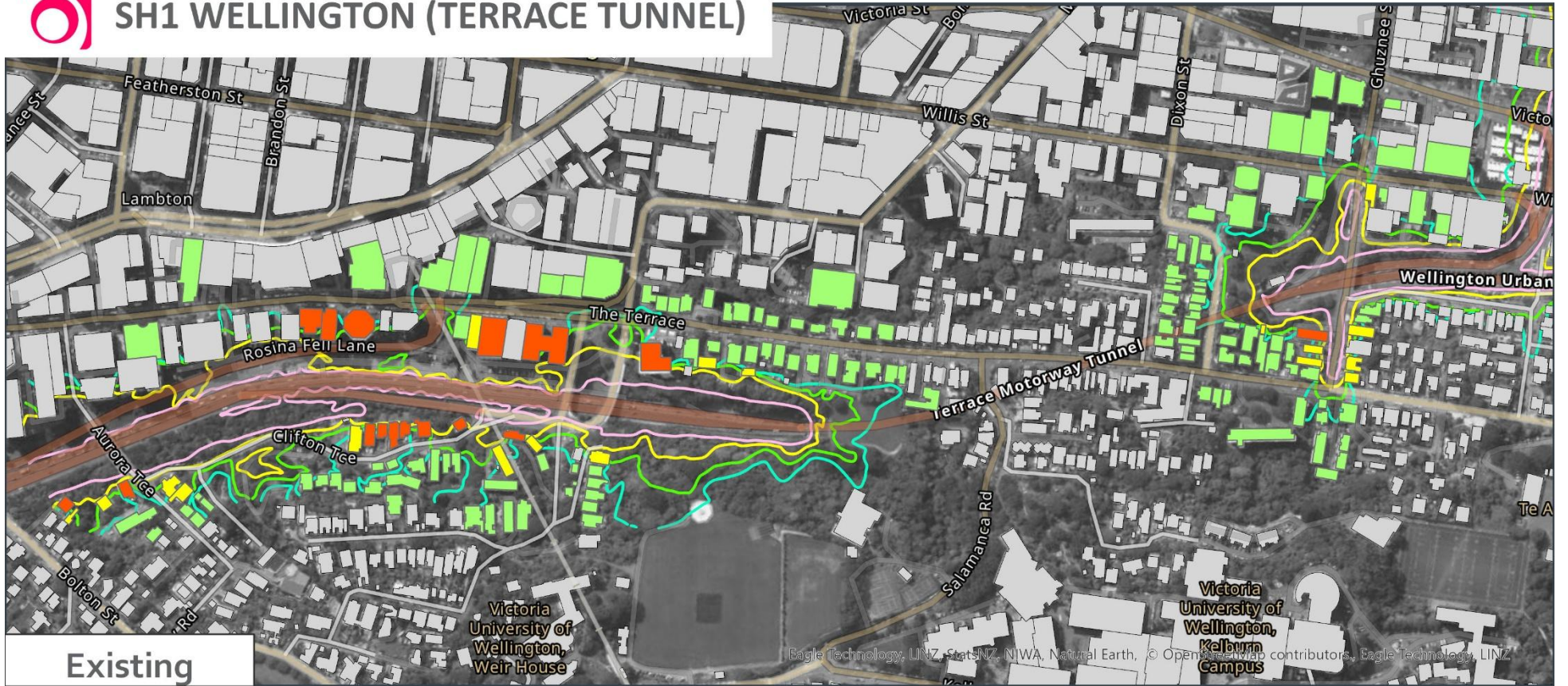


Map Legend

Dwellings (dB $L_{Aeq(24h)}$)	Contours dB $L_{Aeq(24h)}$	Assessment Area
 < 64 Category A	— 55	 Basin Reserve
 64 - 67 Category B	— 60	 Eastern Connections
 > 67 Category C	— 65	 Mount Victoria Tunnel
 Other Buildings	— 70	 Te Aro
	— Road	 Terrace Tunnel

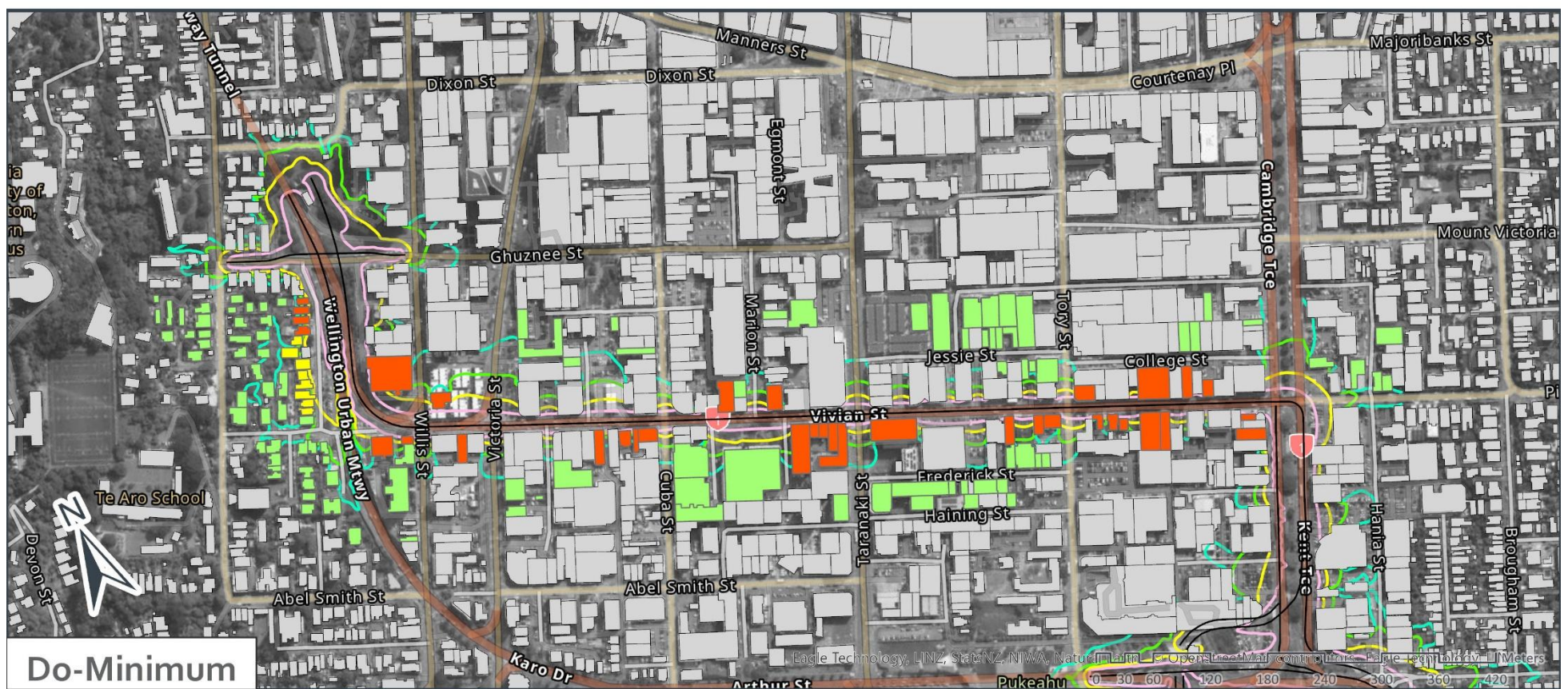
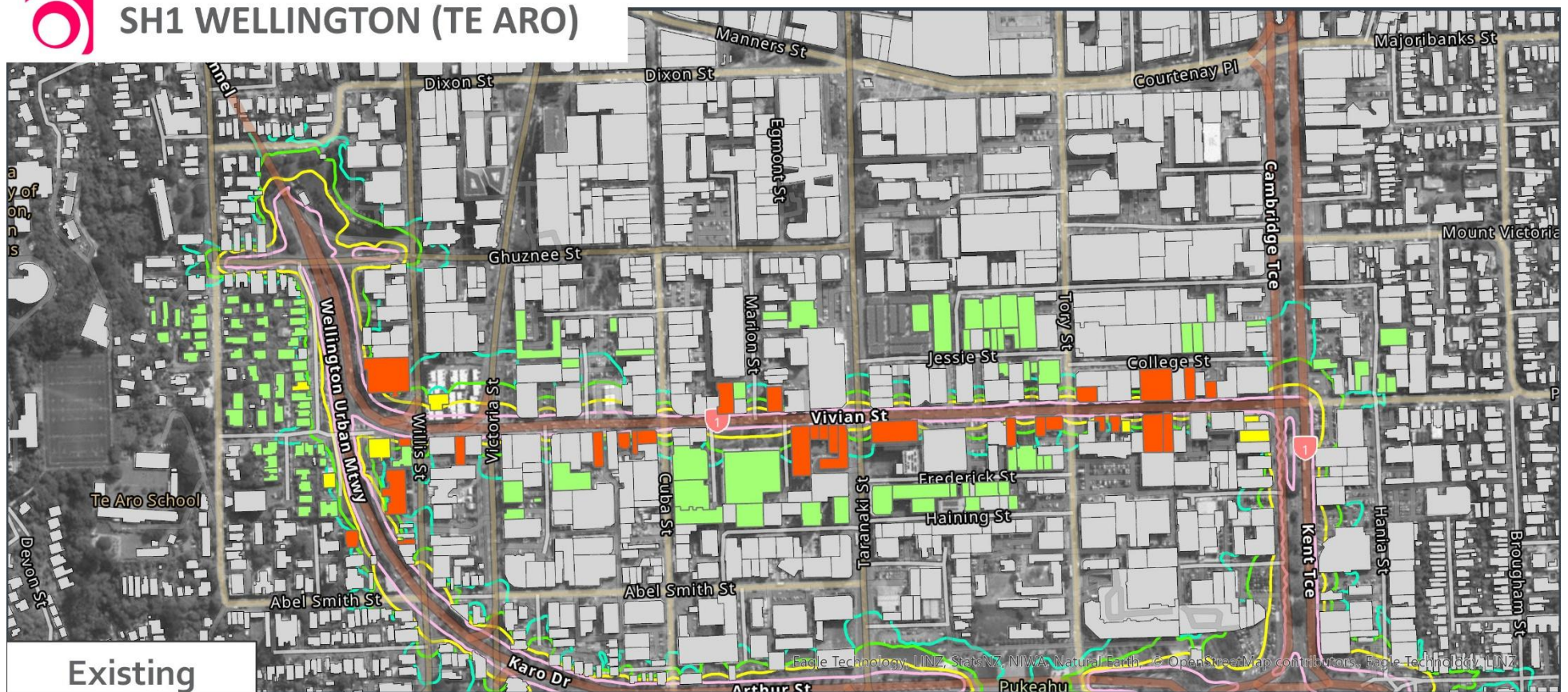


SH1 WELLINGTON (TERRACE TUNNEL)



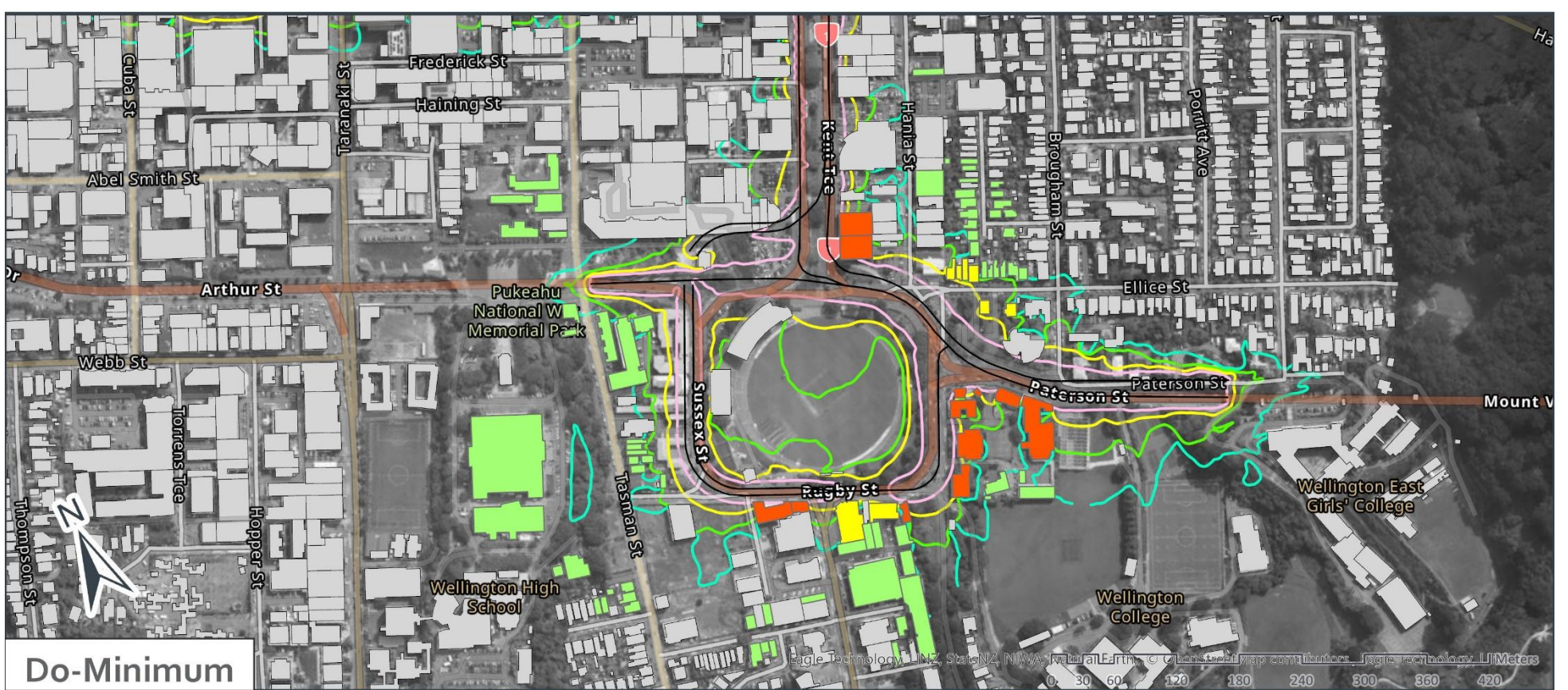
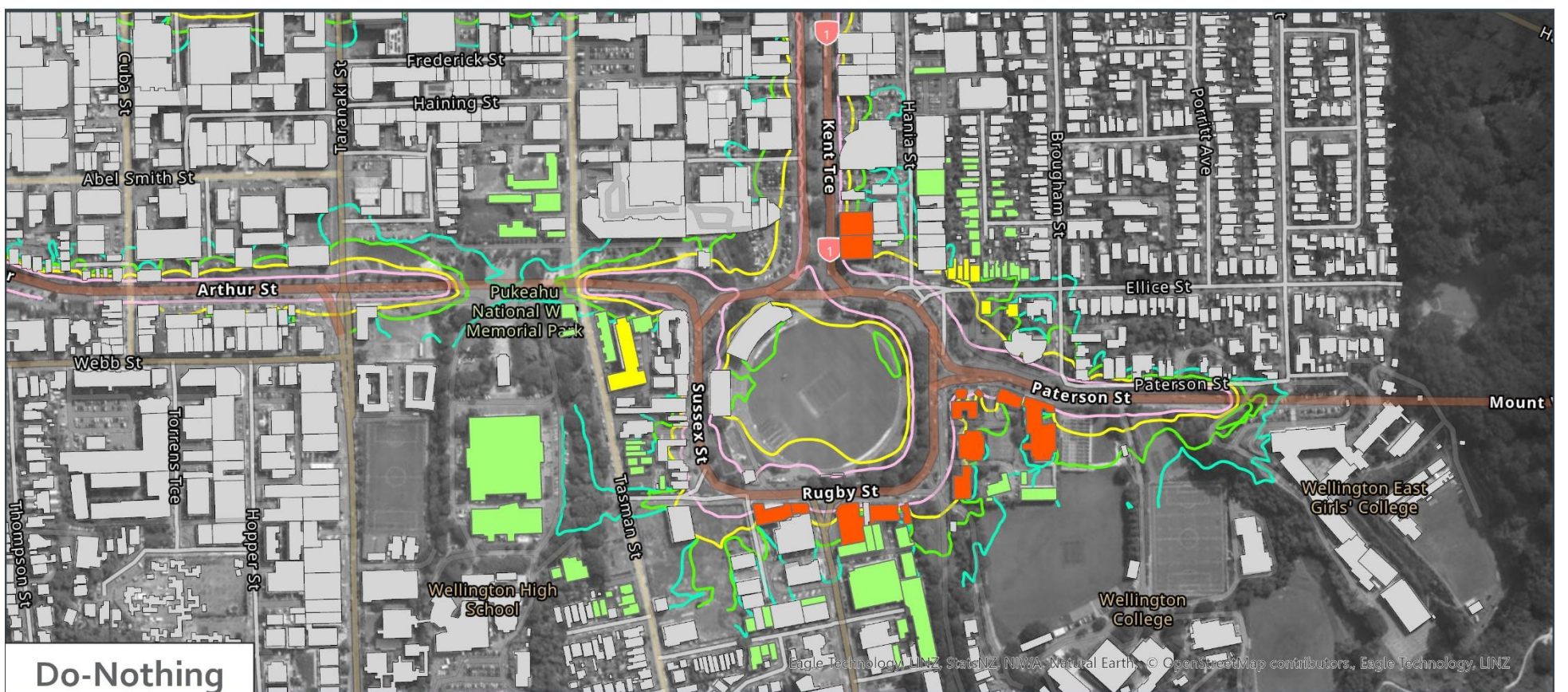
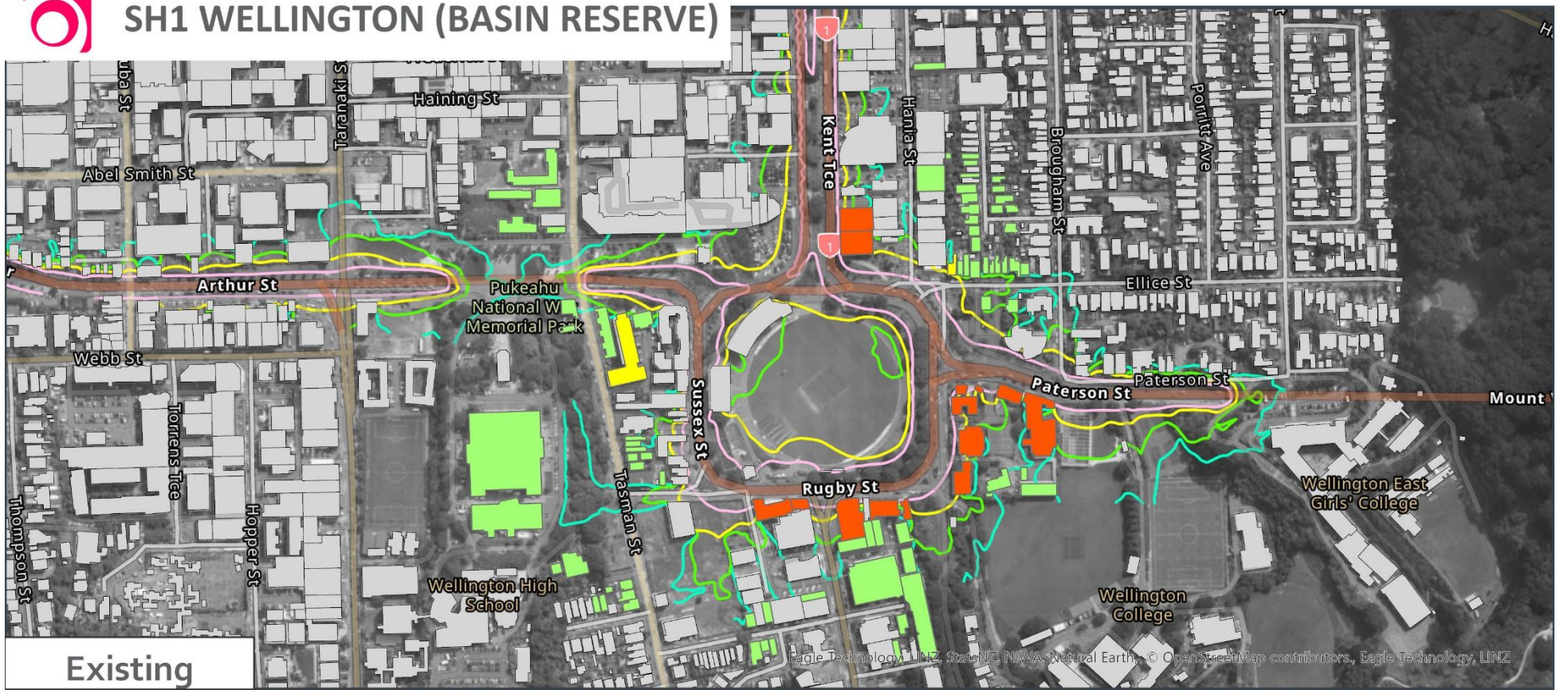


SH1 WELLINGTON (TE ARO)





SH1 WELLINGTON (BASIN RESERVE)





SH1 WELLINGTON (MT VICTORIA TUNNEL)



 SH1 WELLINGTON (EASTERN CONNECTIONS)



Project name:	Wellington RoNS									
Assessment area:	Ruahine Street									
Assessment criteria	Assessor	Reasoning behind these ratings	A1	A2	A3	A4	A5	A6	A7	A8
			2m barrier next to road, SMA/AC	2m barrier next to road, LN3	2m barrier next to road, LN5	2m barrier varying locations, SMA/AC	2m barrier varying locations, LN3	2m barrier varying locations, LN5	No barrier, LN3 surface	No barrier, LN5 surface
Compliance with NZS 6806 criteria	Siiri Wilkening	Significant reduction in Category B and C PPFs for both barrier options. MO1: 70 Cat A, 7 Cat B, 6 Cat C MO2: 76 Cat A, 7 Cat B, 0 Cat C MO3: 77 Cat A, 6 Cat B, 0 Cat C MO4: 61 Cat A, 10 Cat B, 12 Cat C MO5: 70 Cat A, 8 Cat B, 5 Cat C MO6: 71 Cat A, 8 Cat B, 4 Cat C MO7: 54 Cat A, 15 Cat B, 14 Cat C MO8: 60 Cat A, 12 Cat B, 11 Cat C	--	+	+	---	--	-	---	---
Comparison with WHO Environmental Noise Guidelines (2018)	Siiri Wilkening	All PPFs current, and in the future, will receive noise levels above 50 dB LAeq(24h). While noise levels will be reduced noticeably to significantly, they will remain	---	---	---	---	---	---	---	---
Effectiveness of noise mitigation	Siiri Wilkening	Reductions achieved: MO1: average 3.6 dB, up to 8 dB MO2: average 5.5 dB, up to 10 dB MO3: average 6.8 dB, up to 12 dB MO4: average 2.9 dB, up to 8 dB MO5: average 4.3 dB, up to 11 dB MO6: average 5.7 dB, up to 13 dB MO7: average 2.4 dB, up to 3 dB MO8: average 3.8 dB, up to 5 dB	+	+++	+++	o	+	+++	-	+
Building-modification mitigation necessary	Siiri Wilkening	While a significant reduction compared to no project (24 PPFs vs 60 - 14 PPFs), there will still be building modification required except for A2 and A3.	+	+++	+++	o	+	++	-	+
Value for money	Siiri Wilkening	BCR: MO1: 1.24 MO2: 1.78 MO3: 2.02 MO4: 0.62 MO5: 1.08 MO6: 1.35 MO7: 0.90 MO8: 1.31	o	++	+++	-	o	+	-	+
Impacts on visual amenity of surrounding residents, including shading	Stuart Houghton	A1-A3 visual amenity and shading effects to adjoining properties are minimised by the location of wall to road edge away from property boundary. There is still potential for adverse shading effects for some properties. Wall at or close to property	o	o	o	-	-	-	o	o
Road users' views of surrounding landscape	Stuart Houghton	A1-A3 wall options at the road boundary will significantly detract from road users views of surrounding landscape when aligned hard to road edge. A4-A6 reduce adverse visual effects on road users by aligning the wall to back of path against	---	---	---	-	-	-	o	o
Urban design outcome, including CPTED	Stuart Houghton	A1-A3 options aligning 2m wall to road boundary will have a very high negative effect on the user experience, safety/passive surveillance, sightlines, visual amenity and walkability given the narrow width of the footpath and total width between property boundary and wall, creating a highly confined and enclosed environment for people	---	---	---	-	-	-	o	o

Assessment criteria	Assessor	Reasoning behind these ratings	A1	A2	A3	A4	A5	A6	A7	A8
			2m barrier next to road, SMA/AC	2m barrier next to road, LN3	2m barrier next to road, LN5	2m barrier varying locations, SMA/AC	2m barrier varying locations, LN3	2m barrier varying locations, LN5	No barrier, LN3 surface	No barrier, LN5 surface
Social effects of mitigation	Michala Lander	Given current noise effects on existing properties mitigation will benefit these residents will experience a benefit from an increase in quality of life because of the reduction in Noise. Building modifications are unable to provide an adequate level of mitigation to have significant benefit. LN3 and LN5 Surface will have a much more	o	+	++	+	++	++	++	++
Engineering degree of difficulty	Corrina Gibbons-Hurinui	Noise walls will add some difficulty to the tie ins to existing levels required when compared with DF2. LN3 and LN5 surfacing will likely require a departure from the pavement SME.	-	--	--	-	--	--	--	--
Effects of mitigation on water/stormwater paths and flooding	Elliot Smith	A1 - A3: Local additions to DF2 stormwater network likely required for the northern 100m of proposed wall - additional inlets and minor pipe work. Wall does not appear to impede an existing overland flowpath. A4 - A6: Flood zone at property boundary. Proposed wall may increase flood depths within properties.	o	o	o	-	-	-	o	o
Maintenance	Corrina Gibbons-Hurinui	Noise walls will result in additional assets to maintain and in a location that would likely require either a traffic lane or the shared path to be closed to allow maintenance access.	--	--	--	--	--	--	-	-
Effects on road user safety	Duncan Tindall	Scoring vs DF2. Key influence here is the retaining wall in DF2 and vertical separation makes the addition of the noise wall on top of that a moot point for the options next to the road for much of length. Elsewhere, very marginal change to safety and whilst you could argue the noise wall could offer some protection if a vehicle were to leave the road, its a very low risk to be negligible. For teh back of path then it starts to narrow the effective width for the locations with the retaining wall between road and path, or pushes people closer to the traffic.	o	o	o	-	-	-	o	o

Assessment criteria	Assessor	Reasoning behind these ratings	A1	A2	A3	A4	A5	A6	A7	A8
			2m barrier next to road, SMA/AC	2m barrier next to road, LN3	2m barrier next to road, LN5	2m barrier varying locations, SMA/AC	2m barrier varying locations, LN3	2m barrier varying locations, LN5	No barrier, LN3 surface	No barrier, LN5 surface
Alignment with district plan objectives and policies	Mary O'Callahan	Noise sensitivity is a key risk to manage for NZTA and key consenting risk for this project; the most helpful and relevant policy is INF-P5 'Manage the adverse effects of upgrades to, or the development of new infrastructure, including effects on: 1.Natural and physical resources; 2.Amenity values; 3.Sensitive activities; 4.The identified values of Overlays; 5.The safe and efficient operation of other infrastructure; and 6.The health, well-being and safety of people and communities.' The references to amenity values and sensitive activities suggest that the noise mitigation benefits are key where adverse effects arise from infrastructure upgrades and such mitigation could potentially be weighted over visual and urban design given the location is not in an 'overlay' area; however a negative CPTED and road user safety ratings are of high importance (as part of safety for people and communities). The options with a wall next to the road (A1, A2 and A3) perform best in term of noise, but are significantly adverse on urban design, including CPTED matters. The 'varying location' wall options don't perform well from a noise perspective, other than where combined with LN5 pavement (i.e. A6). While A6 performs well for noise, it still has a level of adverse urban design and CPTED effects. There are also flooding adverse effects for A6 as a wall option. The heritage impact noted below (re Park Mews) relates to an unscheduled building in the district plan for which there is no specific policy direction requiring protection, but nonetheless is identified as a significant adverse effect with all wall options. I have sought advice from the noise specialist on the 'adverse noise effects' arising from the project given the focus of district plan policy above, vs the general benefits for Category C PPFs of the noise related criteria above. This confirmed the number of PPFs which experience an adverse effects for all options are as below MO1 – 0; MO2 – 0; MO3 – 0; MO4 – 5;	+	+	+	-	+	++	-	+++
Additional land required for mitigation	Corrina Gibbons-Hurinui	Barrier next to road: <i>Where there is no retaining wall proposed in DF2 (~25% of proposed noise barrier length), additional space within the proposed road reserve will be required. This could be achieved by shifting the DF2 Shared Path 0.5-1.5m east. This is within the current project footprint but has an impact on tie to existing levels. If a wider Shared Path is required in detailed design phase for some reason, this would require additional Town Belt landtake.</i> Barrier at property boundary: <i>Will require some temporary occupation to construct</i> Surfacing: <i>No impact on corridor width</i>	o	o	o	-	-	-	o	o

Assessment criteria	Assessor	Reasoning behind these ratings	A1	A2	A3	A4	A5	A6	A7	A8
			2m barrier next to road, SMA/AC	2m barrier next to road, LN3	2m barrier next to road, LN5	2m barrier varying locations, SMA/AC	2m barrier varying locations, LN3	2m barrier varying locations, LN5	No barrier, LN3 surface	No barrier, LN5 surface
Effects of mitigation structures on cultural values	Paul Gardner/Ben Ngaia	Mana Manaaki focuses on nurturing and caring for people, particularly those in vulnerable positions. In noise-sensitive areas, this means providing tangible support to affected residents rather than solely focusing on the technical requirements of noise barriers or mitigation devices. Noting the positive effect of mitigating noise to residents, there is a concern about the placement of the noise barriers and the potential for crime and anti-social behaviour by creating an enclosed area between the SH and property boundaries. It is recommended that alternative placements are considered that can achieve both outcomes. Mana Manaaki upholds the principle of kaitiakitanga (guardianship), ensuring that noise management plans (such as for construction or transport) also protect the health of land and water. The proposed noise barriers appear unlikely to significantly impact the mauri of awa, or degrade the quality of the whenua, however the nature of the barriers themselves may block views to important maunga (Maitairangi). It is recommended that softening landscaping is considered as partial mitigation.	-	-	0					
Effects of mitigation structures on heritage buildings and sites	Carolyn Hill	A1 - Disruption of historical connection between Park Mews and Town Belt, and disruption of views of Park Mews from public realm - defining architecture in the city. The SMA/AC road grade also fails to achieve positive noise reduction for Park Mews - i.e. lose-lose A2 - Historical connection / visual disruption per Option A1, but at least reduces adverse noise effects for Park Mews to Cat B A3 - Historical connection / visual disruption per Option A1, but at least reduces adverse noise effects for Park Mews - the LN5 surface a little better than using Option A2's LN3, although note still Cat B A4, A5 and A6 - Historical connection / visual disruption, plus barrier at boundary of Park Mews limits options for planting etc. between residents and wall. Still Category	---	--	--	---	---	---	-	-

Selected option	Basis	Workshop/review notes and reasons for selection
A8	Adjudication	Option A8 is the overall best practicable option for structural mitigation of the adverse noise effects of the project on Ruahine Street. While not as effective as A2, A3 and A6 at providing noise mitigation and value for money, A2 and A3 have roadside barriers that score negatively in terms of visual, urban design, and CPTED criteria. A8 does not score well against NZS 6806 criteria, however the only options that do (A2 and A3) also have roadside barriers. Options with variable barriers score better against the visual, urban design, and CPTED criteria, however these options still have some adverse effects in terms of maintenance, overland flow paths, road user safety and the visual connection to the Park Mews building. When evaluated against the most relevant policy of the district plan, options A6 and A8 are the only options that achieve a level of consistency with the amenity, reverse sensitivity, safety and well-being outcomes sought by the policy. The district plan criteria is therefore considered the most useful method for evaluating the tension between the noise and urban amenity outcomes of the options. On this basis A6 and A8 score the best overall, with A8 being the BPO due to it avoiding the adverse effects of the barrier options while mitigating the noise effects of the project on all but two PPFs.

Project name:	Wellington RoNS							
Assessment area:	Wellington Road West from Moxam Ave to Hamilton Road							
Assessment criteria	Assessor	Reasoning behind these ratings	B1	B2				
			<i>2m barrier next to road</i>	<i>2m barrier mid greenspace</i>				
Compliance with NZS 6806 criteria	Siiri Wilkening	Still many PPFs in Category C MO1: 5 Cat A, 3 Cat B, 5 Cat C MO2: 3 Cat A, 4 Cat B, 6 Cat C	---	---				
Comparison with WHO Environmental Noise Guidelines (2018)	Siiri Wilkening	All PPFs current, and in the future, will receive noise levels above 50 dB LAeq(24h). While noise levels will be reduced noticeably to significantly, they will remain relatively high. This is expected in an urban environment.	---	---				
Effectiveness of noise mitigation	Siiri Wilkening	Reductions achieved: MO1: average 2.2 dB , up to 4 dB MO2: average 1.5 dB, up to 2 dB	-	-				
Building-modification mitigation necessary	Siiri Wilkening	While a significant reduction compared to no project (13 PPFs vs 5/6 PPFs), there will still be building modification required.	--	--				
Value for money	Siiri Wilkening	BCR: MO1: 0.38 MO2: 0.30	---	---				
Impacts on visual amenity of surrounding residents, including shading	Stuart Houghton	For B1 and B2, both wall options are neutral, being to south of properties so no shading impact, and well separated visually across slip lane with landscape treatment to mitigate visual effects, with B2 still provide the benefit of some greening in front of wall that offers visual amenity in views from the adjoining properties and is still sufficiently separated and to the south to not present shading issues.	o	o				
Road users' views of surrounding landscape	Stuart Houghton	B1 will detract from road users views of surrounding landscape given aligned hard to edge of road, especially seen within vehicles travelling along SH1 and from the footpath on opposite southern side of Wellington Road. Option B2 avoids this outcome by aligning within centre of landscape strip that can provide visual mitigation of wall to SH1 users, and so is scored as benign with no visual effect taking into account the landscape mitigation to highway side of wall.	--	o				
Urban design outcome, including CPTED	Stuart Houghton	No difference between B1 and B2 overall, with both options having a relatively benign effect on the footpath environment in this location. While the location and scale of wall will enclose the slip lane environment and street frontage of properties from public view to some degree, taking into account the breaks at	o	o				
Social effects of mitigation	Michala Lander	The barrier located closer to the road will not significantly improve quality of life for residents of those houses. The preference is for it to be closer to the road so it does not create a feeling of encroachment on the properties as well	o	o				
Engineering degree of difficulty	Corrina Gibbons-Hurinui	Noise walls will add some engineering difficulty to the project when compared with DF2.	-	-				
Effects of mitigation on water/stormwater paths and flooding	Elliot Smith	Western wall (west of Hamilton Road intersection) appears to have similar impact to Area A - likely local additions to DF2 stormwater network. No overland flow path impeded.	o	o				
Maintenance	Corrina Gibbons-Hurinui	Both noise walls will result in additional assets to maintain. The location would likely require either a traffic lane or the service lane to be closed to allow maintenance access.	--	--				

Assessment criteria	Assessor	Reasoning behind these ratings	B1	B2				
			2m barrier next to road	2m barrier mid greenspace				
Effects on road user safety	Duncan Tindall	Constrains visibility at Hamilton Rd Intersection, more in option B1. Both rated same just -1 as signalled, but I slightly prefer B2 if we were to have either as it slightly improves the visibility for left turnign traffic to cyclists, or vehicles emerging from Hamilton in case anyone is runnign the red.	-	-				
Alignment with district plan objectives and policies	Mary O'Callahan	Noise sensitivity is a key risk to manage for NZTA and key consenting risk for this project; the most helpful and relevant policy is INF-P5 ' Manage the adverse effects of upgrades to, or the development of new infrastructure, including effects on: 1.Natural and physical resources; 2.Amenity values;3.Sensitive activities; 4.The identified values of Overlays; 5.The safe and efficient operation of other infrastructure; and 6.The health, well-being and safety of people and communities.' In this sector, none of the options are effective in mitigating noise effects, yet they have some adverse environmental effects, particularly B1 in terms of visual amenity. On this basis, the effects of incorporating either of the available mitigation options i.e. B1 or B2 in this part of the project is not well aligned with the relevant district plan policy, as they offer no particular noise benefit yet have adverse environmental effects on road safety and views /visual amenity for road users in the case of B1.	--	-				
Additional land required for mitigation	Corrina Gibbons-Hurinui	No additional land required	o	o				
Effects of mitigation structures on cultural values	Paul Gardner/Ben Ngaia	Cultural values described as per Ruahine St - Limited CPTD issues. Landscaping to soften proposed.	o	o				
Effects of mitigation structures on heritage buildings and sites	Carolyn Hill	[no identified historic heritage buildings]	o	o				

Selected option	Basis	Workshop/review notes and reasons for selection
Do-minimum	Adjudication	As neither option is effective noise mitigation and other criteria score either neutral or negative, do minimum (i.e. no structural mitigation) is the best practicable option for structural mitigation of the adverse noise effects of the project on Area B.

Project name:	Wellington RoNS						
Assessment area:	Wellington Road East from Hamilton Road to Evans Bay Parade						
Assessment criteria	Assessor	Reasoning behind these ratings	C1	C2			
			<i>2m barrier next to road</i>	<i>2m barrier mid greenspace</i>			
Compliance with NZS 6806 criteria	Siiri Wilkening	Still many PPFs in Category C MO1: 11 Cat A, 5 Cat B, 3 Cat C MO2: 8 Cat A, 5 Cat B, 6 Cat C	--	---			
Comparison with WHO Environmental Noise Guidelines (2018)	Siiri Wilkening	All PPFs current, and in the future, will receive noise levels above 50 dB LAeq(24h). While noise levels will be reduced noticeably to significantly, they will remain relatively high. This is expected in an urban environment.	---	---			
Effectiveness of noise mitigation	Siiri Wilkening	Reductions achieved: MO1: average 4.0 dB , up to 7 dB MO2: average 3.2 dB, up to 7 dB	+	o			
Building-modification mitigation necessary	Siiri Wilkening	While a significant reduction compared to no project (13 PPFs vs 3/6 PPFs), there will still be building modification required.	-	--			
Value for money	Siiri Wilkening	BCR: MO1: 0.81 MO2: 0.50	-	--			
Impacts on visual amenity of surrounding residents, including shading	Stuart Houghton	For B1 and B2, both wall options are scored as slightly negative overall given proximity to these properties. While being generally to south of properties so no shading impact, the level of separation physically and visually across slip lane is less than the western section, and with only partial ability (planting space) for landscape treatment to mitigate visual effects. B2 slightly better at western end where garden bed can still provide the benefit of some greening in front of wall that offers visual amenity in views from the adjoining properties, but not enough to make difference to score overall for this section.	-	-			
Road users' views of surrounding landscape	Stuart Houghton	To the northern side of the road where noise walls are to be located, B1 will detract from road users views of surrounding landscape given aligned hard to edge of road, especially seen within vehicles travelling along SH1 and from the footpath on opposite southern side of Wellington Road along edge of Kilbirnie Park and around the intersection with Evans Bay Parade. Option B2 partially avoids this outcome at western end but for only a short stretch, and not enough to make difference to score overall. However, to accommodate both options require additional widening into Kilbirnie Park which results in additional adverse landscape and visual effects from the further reduction of park area and increased impacts on the park edge environment, worsening the impacts of option and Project overall.	---	---			
Urban design outcome, including CPTED	Stuart Houghton	For footpath environment on northern side of road, B1 and B2 wall options both are slightly negative overall given proximity to these properties. The level of separation physically and visually across slip lane is less than the western section. CPTED issues are not of high concern to this footpath edge given the width and width of opening at each end of lane. No difference between B1 and B2 overall, with both options having a relatively benign effect on the footpath environment in this location.	-	-			
Social effects of mitigation	Michala Lander	Any further encroachment into Kilbirnie Park will result in a loss of a cricket field when there is a current shortage of fields in Wellington.	---	---			
Engineering degree of difficulty	Corrina Gibbons-Hurinui	Noise walls will add some engineering difficulty to the project when compared with DF2.	-	-			
Effects of mitigation on water/stormwater paths and flooding	Elliot Smith	Barrier in either location is within a flood zone and overland flowpath. Flood modelling would be required to confirm impact on housing to the north of Wellington Road, but expected that there will be some increase in flood depths due to impeding the flow path.	--	--			

Maintenance	Corrina Gibbons-Hurinui	Both noise walls will result in additional assets to maintain. The location would likely require either a traffic lane or the service lane to be closed to allow maintenance access.	--	--				
Effects on road user safety	Duncan Tindall	General negative as creates perception of 'motorway' but is on approach to urban intersection. Loss of visibility between cyclists travelling towards Cobham Drive and left turners into Evans Bay is a concern. More concerned at this location than Hamilton as less separation between wall and cycleway	--	--				
Alignment with district plan objectives and policies	Mary O'Callahan	Noise sensitivity is a key risk to manage for NZTA and key consenting risk for this project; the most helpful and relevant policy is INF-P5 'Manage the adverse effects of upgrades to, or the development of new infrastructure, including effects on: 1.Natural and physical resources; 2.Amenity values;3.Sensitive activities; 4.The identified values of Overlays; 5.The safe and efficient operation of other infrastructure; and 6.The health, well-being and safety of people and communities.' In this sector, only C1 is effective in mitigating noise effects (to a minor degree only), yet both C1 and C2 have adverse environmental effects, particularly in terms of visual amenity, flooding, road user safety and social effects in terms of likely additional land take from Kilbirnie Park to accommodate noise wall options. On this basis, the effects of incorporating either of the available mitigation options i.e. C1 or C2 in this part of the project is not well aligned with the relevant district plan policy, as they offer no (C2) or only minor (C1) noise benefits, yet have minor, moderate and significant levels of adverse environmental effects on visual amenity/views, flooding, road user safety and social impacts.						
Additional land required for mitigation	Corrina Gibbons-Hurinui	Additional land would be required to accommodate a noise wall without reducing the current corridor width allowances	--	--				
Effects of mitigation structures on cultural values	Paul Gardner/Ben Ngaia	Cultural Values described as per Ruahine St - Less CPTD impact.	o	o				
Effects of mitigation structures on heritage buildings and sites	Carolyn Hill	Not assessed as no heritage values	o	o				

<i>Selected option</i>	<i>Basis</i>	<i>Workshop/review notes and reasons for selection</i>
Do-minimum	Adjudication	Although C1 has a minor degree of noise mitigation effectiveness, other criteria score either neutral or significantly negative. The requirement to further encroach into Kilbirnie Park resulting in the loss of a cricket oval is also a significantly negative impact of both options. Therefore do minimum (i.e. no structural mitigation) is the best practicable option for structural mitigation of the adverse noise effects of the project on Area C.

ANNEXURE F Predicted Traffic Noise Levels at all PPFs

Each assessed PPF is shown, i.e. where an address is only shown with one floor level, then this is assessed as a single PPF, while addresses with several floor levels are assessed as multiple PPFs.

The noise levels are coloured to show the noise criteria category of NZS 6806: Category A in green, Category B in yellow and Category C in red.

F.1 Area 1 – Terrace Tunnel

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 1)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855527	44 Aurora Terrace	1.FL	67	68	67
5855519	47 Aurora Terrace	1.FL	65	66	65
5855526	48 Aurora Terrace	2.FL	61	62	60
5855523	49 Aurora Terrace	GF	58	59	55
5855525	51 Aurora Terrace	GF	58	59	55
5855524	52 Aurora Terrace	1.FL	57	58	56
5855520	1/41 Aurora Terrace	GF	67	68	67
5855483	1/46 Aurora Terrace	1.FL	70	71	69
5855482	55B Bolton Street	1.FL	69	70	69
5855528	55C Bolton Street	GF	66	67	66
5854957	100 Boulcott Street	GF	50	52	47
5854957	100 Boulcott Street	1.FL	54	57	49
5854957	100 Boulcott Street	2.FL	56	60	50
5854957	100 Boulcott Street	3.FL	57	61	51
5854957	100 Boulcott Street	4.FL	58	62	52
5854957	100 Boulcott Street	5.FL	58	62	53
5854890	2 Buller Street	GF	62	64	67
5854969	606/8 Church Street	GF	34	37	36
5854969	606/8 Church Street	1.FL	35	37	37
5854969	606/8 Church Street	2.FL	36	39	38
5854969	606/8 Church Street	3.FL	38	40	38
5855517	14 Clifton Terrace	1.FL	64	66	61
5855481	15 Clifton Terrace	GF	67	69	67
5855479	17 Clifton Terrace	GF	68	70	69
5855515	20 Clifton Terrace	1.FL	61	63	56
5855478	21 Clifton Terrace	GF	69	71	71
5855475	22 Clifton Terrace	1.FL	62	64	58
5855448	23 Clifton Terrace	1.FL	69	72	71
5855449	25 Clifton Terrace	GF	70	72	71
5855450	29 Clifton Terrace	GF	69	72	71
5855454	30 Clifton Terrace	1.FL	61	64	61
5855453	32 Clifton Terrace	GF	61	64	61
5855455	3/28 Clifton Terrace	2.FL	64	67	64
5855518	16B Clifton Terrace	1.FL	61	63	56
5855516	18A Clifton Terrace	GF	61	63	56
5855480	19B Clifton Terrace	1.FL	68	71	70
5855456	2/24B Clifton Terrace	1.FL	63	66	62
5855474	2/24B Clifton Terrace	GF	63	65	59
5855476	2/24B Clifton Terrace	1.FL	59	61	55
5855477	22A Clifton Terrace	GF	58	60	54
5855532	133 Dixon Street	GF	42	43	44
5855533	137 Dixon Street	GF	56	56	57
5855534	139 Dixon Street	1.FL	56	56	56
5855535	141 Dixon Street	1.FL	55	55	57
5855536	143 Dixon Street	1.FL	55	55	56
5855537	145 Dixon Street	1.FL	51	52	52
5855540	147 Dixon Street	GF	49	49	50
5855492	149 Dixon Street	1.FL	51	52	50
5855461	17 Everton Terrace	1.FL	58	61	54
5855462	19 Everton Terrace	1.FL	56	59	50
5855472	23 Everton Terrace	GF	49	52	47
5855471	25 Everton Terrace	GF	51	56	50
5855464	1/21 Everton Terrace	GF	54	58	53
5855451	10A Everton Terrace	1.FL	69	71	70
5855452	10A Everton Terrace	1.FL	66	68	64
5855457	10A Everton Terrace	GF	57	59	56
5855457	10A Everton Terrace	1.FL	58	61	58
5855457	10A Everton Terrace	2.FL	60	63	59
5855457	10A Everton Terrace	3.FL	60	63	60
5855458	10A Everton Terrace	1.FL	58	61	51
5855459	10A Everton Terrace	2.FL	65	68	67
5855468	10A Everton Terrace	GF	53	56	47
5855460	15A Everton Terrace	1.FL	66	69	65
5855463	17A Everton Terrace	GF	55	58	56

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 1)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855465	19A Everton Terrace	GF	56	60	57
5855466	21A Everton Terrace	GF	51	54	46
5854888	138 Ghuznee Street	1.FL	68	69	69
5854866	151 Ghuznee Street	1.FL	67	68	68
5854889	141B Ghuznee Street	1.FL	64	65	65
5854894	145B Ghuznee Street	GF	67	68	67
5854894	145B Ghuznee Street	1.FL	67	68	68
5854894	145B Ghuznee Street	2.FL	67	68	68
5854894	145B Ghuznee Street	3.FL	67	68	68
5854865	155A Ghuznee Street	GF	65	66	66
5854865	155A Ghuznee Street	1.FL	65	66	66
5854867	7/142 Ghuznee Street	GF	66	67	67
5854886	7/142 Ghuznee Street	2.FL	58	58	60
5854887	7/142 Ghuznee Street	1.FL	66	67	67
5855487	1M/204 Lambton Quay	GF	37	38	37
5855487	1M/204 Lambton Quay	1.FL	38	39	38
5855487	1M/204 Lambton Quay	2.FL	39	40	38
5855487	1M/204 Lambton Quay	3.FL	40	41	39
5855487	1M/204 Lambton Quay	4.FL	41	42	41
5855487	1M/204 Lambton Quay	5.FL	43	44	42
5855487	1M/204 Lambton Quay	6.FL	45	45	43
5855487	1M/204 Lambton Quay	7.FL	47	48	45
5855487	1M/204 Lambton Quay	8.FL	49	50	47
5854904	6 MacDonald Crescent	2.FL	60	61	62
5855529	7 MacDonald Crescent	2.FL	52	52	53
5854903	18 MacDonald Crescent	1.FL	60	61	62
5854902	20 MacDonald Crescent	GF	60	60	62
5854901	22 MacDonald Crescent	GF	60	60	62
5854877	27 MacDonald Crescent	GF	62	62	63
5855493	32 MacDonald Crescent	GF	57	57	59
5855491	34 MacDonald Crescent	GF	51	51	53
5854880	35 MacDonald Crescent	1.FL	52	52	53
5854881	35 MacDonald Crescent	1.FL	50	50	50
5855489	38 MacDonald Crescent	1.FL	47	48	47
5855490	1/36 MacDonald Cres	1.FL	50	50	51
5855538	2/26 MacDonald Cres	1.FL	60	60	61
5855539	2/28 MacDonald Cres	1.FL	60	60	61
5854900	24A MacDonald Cres	GF	60	61	62
5855531	2A MacDonald Crescent	GF	47	47	46
5855530	4B MacDonald Crescent	GF	55	56	58
5855521	13 San Sebastian Road	GF	60	60	56
5855522	13 San Sebastian Road	GF	56	56	53
5855473	17 Talavera Terrace	1.FL	58	60	55
5855469	25 Talavera Terrace	GF	55	59	53
5855470	27 Talavera Terrace	GF	55	58	54
5855467	29 Talavera Terrace	2.FL	52	54	49
5855740	88 The Terrace	GF	55	56	54
5855740	88 The Terrace	1.FL	56	57	55
5855740	88 The Terrace	2.FL	58	58	57
5855740	88 The Terrace	3.FL	59	59	59
5855740	88 The Terrace	4.FL	59	60	60
5855740	88 The Terrace	5.FL	61	61	62
5855740	88 The Terrace	6.FL	62	63	63
5855740	88 The Terrace	7.FL	63	64	64
5855485	128 The Terrace	GF	64	66	69
5855485	128 The Terrace	1.FL	65	67	70
5855485	128 The Terrace	2.FL	67	69	71
5855485	128 The Terrace	3.FL	68	70	71
5855485	128 The Terrace	4.FL	68	71	71
5855485	128 The Terrace	5.FL	69	71	71
5855485	128 The Terrace	6.FL	69	71	71
5855485	128 The Terrace	7.FL	69	71	71
5855485	128 The Terrace	8.FL	69	71	70
5855485	128 The Terrace	9.FL	69	71	70
5855485	128 The Terrace	10.FL	69	71	70
5855485	128 The Terrace	11.FL	68	70	70
5854951	133 The Terrace	GF	49	53	54

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 1)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5854951	133 The Terrace	1.FL	50	53	54
5854951	133 The Terrace	2.FL	51	54	54
5854951	133 The Terrace	3.FL	52	54	54
5854951	133 The Terrace	4.FL	53	56	55
5854952	147 The Terrace	GF	54	57	58
5854952	147 The Terrace	1.FL	55	58	59
5854952	147 The Terrace	2.FL	58	61	59
5854952	147 The Terrace	3.FL	59	62	60
5854952	147 The Terrace	4.FL	59	62	61
5854952	147 The Terrace	5.FL	60	62	62
5854952	147 The Terrace	6.FL	60	62	62
5854953	147 The Terrace	GF	56	60	61
5854953	147 The Terrace	1.FL	57	60	61
5854953	147 The Terrace	2.FL	58	61	62
5854953	147 The Terrace	3.FL	58	61	62
5854953	147 The Terrace	4.FL	59	62	62
5854953	147 The Terrace	5.FL	59	62	62
5854954	147 The Terrace	GF	56	60	61
5854954	147 The Terrace	1.FL	57	60	61
5854954	147 The Terrace	2.FL	58	61	62
5854954	147 The Terrace	3.FL	59	62	62
5854954	147 The Terrace	4.FL	60	62	62
5854954	147 The Terrace	5.FL	60	63	62
5854954	147 The Terrace	6.FL	60	63	63
5854954	147 The Terrace	7.FL	60	63	63
5854954	147 The Terrace	8.FL	60	63	63
5854954	147 The Terrace	9.FL	60	63	63
5854954	147 The Terrace	10.FL	60	63	63
5854954	147 The Terrace	11.FL	60	63	63
5854954	147 The Terrace	12.FL	61	63	63
5854954	147 The Terrace	13.FL	61	63	63
5854954	147 The Terrace	14.FL	61	64	63
5854954	147 The Terrace	15.FL	62	64	63
5854954	147 The Terrace	16.FL	62	64	63
5855564	186 The Terrace	GF	68	71	68
5855564	186 The Terrace	1.FL	68	71	69
5855564	186 The Terrace	2.FL	68	71	69
5855564	186 The Terrace	3.FL	68	71	69
5855564	186 The Terrace	4.FL	68	71	69
5855564	186 The Terrace	5.FL	68	70	69
5855564	186 The Terrace	6.FL	68	70	69
5855564	186 The Terrace	7.FL	68	70	69
5855564	186 The Terrace	8.FL	67	70	69
5855564	186 The Terrace	9.FL	67	70	69
5854966	191 The Terrace	GF	40	42	41
5854966	191 The Terrace	1.FL	43	46	43
5854966	191 The Terrace	2.FL	48	50	46
5854966	191 The Terrace	3.FL	48	53	49
5854966	191 The Terrace	4.FL	49	54	51
5854966	191 The Terrace	5.FL	50	54	52
5854966	191 The Terrace	6.FL	50	54	52
5854966	191 The Terrace	7.FL	51	55	53
5854966	191 The Terrace	8.FL	51	55	53
5854966	191 The Terrace	9.FL	52	55	54
5854966	191 The Terrace	10.FL	53	56	54
5854966	191 The Terrace	11.FL	55	57	55
5854966	191 The Terrace	12.FL	56	59	57
5854966	191 The Terrace	13.FL	57	60	58
5855556	192 The Terrace	2.FL	64	67	65
5855557	196 The Terrace	1.FL	49	51	49
5855559	206 The Terrace	1.FL	57	61	58
5855562	206 The Terrace	1.FL	66	69	67
5855560	208 The Terrace	1.FL	52	55	52
5855552	209 The Terrace	GF	41	43	42
5855561	212 The Terrace	1.FL	56	58	55
5855563	214 The Terrace	1.FL	57	60	56
5855548	216 The Terrace	1.FL	57	60	56

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 1)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855547	219 The Terrace	2.FL	41	44	42
5855542	236 The Terrace	1.FL	56	59	57
5854878	287 The Terrace	1.FL	64	64	64
5854884	287 The Terrace	2.FL	57	57	59
5854879	289 The Terrace	1.FL	66	66	65
5854883	289 The Terrace	GF	60	61	62
5854885	291 The Terrace	GF	50	50	53
5855488	296 The Terrace	1.FL	45	45	45
5854869	297 The Terrace	GF	64	65	66
5854876	298 The Terrace	GF	44	45	46
5854870	300 The Terrace	GF	45	45	47
5854875	320 The Terrace	GF	44	45	47
5854875	320 The Terrace	1.FL	46	46	49
5854875	320 The Terrace	2.FL	47	48	51
5854875	320 The Terrace	3.FL	49	49	53
5854875	320 The Terrace	4.FL	51	51	54
5854875	320 The Terrace	5.FL	52	52	55
5854875	320 The Terrace	6.FL	53	54	57
5854875	320 The Terrace	7.FL	55	55	58
5854875	320 The Terrace	8.FL	56	56	59
5855497	324 The Terrace	1.FL	51	52	53
5855498	324 The Terrace	GF	50	51	52
5855501	324 The Terrace	1.FL	51	52	52
5855502	324 The Terrace	GF	54	55	57
5854964	1/185 The Terrace	1.FL	52	57	51
5855555	1/199 The Terrace	1.FL	42	45	43
5855541	10/240 The Terrace	GF	58	60	60
5854965	187A The Terrace	GF	48	50	46
5854968	195B The Terrace	2.FL	43	46	44
5855558	196C The Terrace	2.FL	65	68	66
5854961	1A/164 The Terrace	GF	68	71	70
5854961	1A/164 The Terrace	1.FL	69	71	71
5854961	1A/164 The Terrace	2.FL	69	72	71
5854961	1A/164 The Terrace	3.FL	69	72	70
5854961	1A/164 The Terrace	4.FL	69	72	70
5854961	1A/164 The Terrace	5.FL	69	71	70
5854961	1A/164 The Terrace	6.FL	69	71	70
5854961	1A/164 The Terrace	7.FL	68	71	70
5854961	1A/164 The Terrace	8.FL	68	71	70
5855554	2/201 The Terrace	2.FL	43	45	43
5855545	2/230 The Terrace	1.FL	51	54	51
5855553	20/202 The Terrace	2.FL	63	67	64
5855550	237/217 The Terrace	2.FL	43	45	43
5854882	291A The Terrace	1.FL	63	63	63
5854868	295A The Terrace	1.FL	49	50	51
5855486	2H/120 The Terrace	GF	65	66	66
5855486	2H/120 The Terrace	1.FL	65	66	68
5855486	2H/120 The Terrace	2.FL	66	67	69
5855486	2H/120 The Terrace	3.FL	67	68	69
5855486	2H/120 The Terrace	4.FL	68	69	69
5855486	2H/120 The Terrace	5.FL	68	69	69
5855486	2H/120 The Terrace	6.FL	68	70	69
5855486	2H/120 The Terrace	7.FL	68	70	69
5855486	2H/120 The Terrace	8.FL	68	70	69
5855486	2H/120 The Terrace	9.FL	68	69	69
5855486	2H/120 The Terrace	10.FL	68	69	69
5855486	2H/120 The Terrace	11.FL	68	69	68
5855486	2H/120 The Terrace	12.FL	68	69	68
5855486	2H/120 The Terrace	13.FL	68	69	68
5855486	2H/120 The Terrace	14.FL	67	69	68
5854960	2J/154 The Terrace	GF	65	67	71
5854960	2J/154 The Terrace	1.FL	66	69	71
5854960	2J/154 The Terrace	2.FL	68	70	71
5854960	2J/154 The Terrace	3.FL	68	71	71
5854960	2J/154 The Terrace	4.FL	69	71	71
5854960	2J/154 The Terrace	5.FL	69	72	71
5854960	2J/154 The Terrace	6.FL	69	72	71

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 1)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5854960	2J/154 The Terrace	7.FL	69	71	71
5854960	2J/154 The Terrace	8.FL	69	71	71
5854960	2J/154 The Terrace	9.FL	69	71	70
5854960	2J/154 The Terrace	10.FL	68	71	70
5854956	303/169 The Terrace	GF	49	51	46
5854956	303/169 The Terrace	1.FL	52	56	47
5854956	303/169 The Terrace	2.FL	55	59	48
5854956	303/169 The Terrace	3.FL	56	60	50
5854956	303/169 The Terrace	4.FL	57	61	51
5854956	303/169 The Terrace	5.FL	57	61	52
5854956	303/169 The Terrace	6.FL	58	62	54
5854956	303/169 The Terrace	7.FL	58	62	55
5854956	303/169 The Terrace	8.FL	58	62	56
5854871	320A The Terrace	2.FL	58	59	61
5854874	322A The Terrace	GF	55	56	57
5854872	322B The Terrace	GF	60	61	62
5854872	322B The Terrace	1.FL	60	61	62
5854873	324A The Terrace	2.FL	59	60	60
5854962	4/179 The Terrace	GF	53	56	49
5854962	4/179 The Terrace	1.FL	55	60	51
5854962	4/179 The Terrace	2.FL	56	61	53
5854962	4/179 The Terrace	3.FL	57	61	54
5854963	4/183 The Terrace	1.FL	55	59	51
5855549	4/213 The Terrace	1.FL	42	44	42
5855546	4/234 The Terrace	2.FL	57	60	57
5854958	49/152 The Terrace	1.FL	64	66	69
5854959	49/152 The Terrace	GF	63	66	70
5854959	49/152 The Terrace	1.FL	64	67	70
5854959	49/152 The Terrace	2.FL	66	68	70
5854959	49/152 The Terrace	3.FL	66	69	70
5854959	49/152 The Terrace	4.FL	67	69	70
5854959	49/152 The Terrace	5.FL	67	70	69
5854959	49/152 The Terrace	6.FL	67	70	69
5855551	5/205 The Terrace	1.FL	42	44	42
5854967	6/193 The Terrace	2.FL	46	50	49
5855484	6B/126 The Terrace	GF	66	67	69
5855484	6B/126 The Terrace	1.FL	67	68	71
5855484	6B/126 The Terrace	2.FL	68	69	71
5855484	6B/126 The Terrace	3.FL	69	70	71
5855484	6B/126 The Terrace	4.FL	69	71	71
5855484	6B/126 The Terrace	5.FL	70	71	71
5855484	6B/126 The Terrace	6.FL	70	71	71
5855484	6B/126 The Terrace	7.FL	70	71	71
5855484	6B/126 The Terrace	8.FL	69	71	71
5855484	6B/126 The Terrace	9.FL	69	71	71
5855484	6B/126 The Terrace	10.FL	69	71	70
5855484	6B/126 The Terrace	11.FL	69	71	70
5855484	6B/126 The Terrace	12.FL	69	71	70
5854955	7C/163 The Terrace	GF	48	51	46
5854955	7C/163 The Terrace	1.FL	51	55	47
5854955	7C/163 The Terrace	2.FL	53	58	48
5854955	7C/163 The Terrace	3.FL	54	59	49
5854955	7C/163 The Terrace	4.FL	55	59	51
5854955	7C/163 The Terrace	5.FL	56	60	52
5854955	7C/163 The Terrace	6.FL	56	60	54
5854955	7C/163 The Terrace	7.FL	57	60	55
5854955	7C/163 The Terrace	8.FL	57	60	56
5854955	7C/163 The Terrace	9.FL	57	60	57
5854955	7C/163 The Terrace	10.FL	57	60	58
5854955	7C/163 The Terrace	11.FL	58	60	58
5855544	8/226 The Terrace	1.FL	59	62	59
5855543	A/222 The Terrace	GF	50	52	50
5855543	A/222 The Terrace	1.FL	54	56	53
5855543	A/222 The Terrace	2.FL	58	60	57
5855543	A/222 The Terrace	3.FL	60	63	60
5855001	172 Victoria Street	GF	49	50	51
5855001	172 Victoria Street	1.FL	50	51	51

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 1)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855001	172 Victoria Street	2.FL	53	54	54
5855001	172 Victoria Street	3.FL	53	54	54
5855513	112/166 Victoria Street	GF	52	53	53
5855513	112/166 Victoria Street	1.FL	53	54	54
5855513	112/166 Victoria Street	2.FL	53	54	54
5855513	112/166 Victoria Street	3.FL	53	54	55
5855513	112/166 Victoria Street	4.FL	53	54	55
5855513	112/166 Victoria Street	5.FL	54	55	55
5855513	112/166 Victoria Street	6.FL	55	56	56
5855513	112/166 Victoria Street	7.FL	55	56	57
5855513	112/166 Victoria Street	8.FL	55	56	57
5855513	112/166 Victoria Street	9.FL	55	56	57
5855514	112/166 Victoria Street	GF	36	44	44
5855514	112/166 Victoria Street	1.FL	38	45	45
5855514	112/166 Victoria Street	2.FL	39	46	45
5855514	112/166 Victoria Street	3.FL	40	46	46
5855514	112/166 Victoria Street	4.FL	42	47	46
5855514	112/166 Victoria Street	5.FL	47	47	48
5855514	112/166 Victoria Street	6.FL	50	50	52
5855514	112/166 Victoria Street	7.FL	51	52	54
5855514	112/166 Victoria Street	8.FL	52	53	54
5855514	112/166 Victoria Street	9.FL	52	53	55
5855514	112/166 Victoria Street	10.FL	53	54	55
5854910	178 Willis Street	GF	37	40	40
5854910	178 Willis Street	1.FL	38	41	41
5854910	178 Willis Street	2.FL	39	42	41
5854910	178 Willis Street	3.FL	40	42	41
5854910	178 Willis Street	4.FL	41	43	42
5854910	178 Willis Street	5.FL	43	43	42
5854910	178 Willis Street	6.FL	45	45	43
5854910	178 Willis Street	7.FL	47	47	45
5855511	195 Willis Street	GF	42	46	46
5855511	195 Willis Street	1.FL	43	47	47
5855511	195 Willis Street	2.FL	44	47	47
5855511	195 Willis Street	3.FL	45	47	47
5855511	195 Willis Street	4.FL	46	47	47
5855511	195 Willis Street	5.FL	48	48	49
5854907	200 Willis Street	GF	65	67	67
5854907	200 Willis Street	1.FL	66	67	67
5854907	200 Willis Street	2.FL	65	66	67
5854907	200 Willis Street	3.FL	65	66	66
5855443	235 Willis Street	GF	52	56	57
5855443	235 Willis Street	1.FL	54	57	58
5855443	235 Willis Street	2.FL	55	58	58
5855443	235 Willis Street	3.FL	56	58	59
5855443	235 Willis Street	4.FL	57	59	59
5855443	235 Willis Street	5.FL	58	59	59
5855443	235 Willis Street	6.FL	58	59	60
5855443	235 Willis Street	7.FL	59	60	60
5855443	235 Willis Street	8.FL	59	60	61
5854905	107/212 Willis Street	2.FL	63	63	68
5854908	1D/192 Willis Street	GF	59	61	62
5854908	1D/192 Willis Street	1.FL	60	62	63
5854908	1D/192 Willis Street	2.FL	61	62	64
5854908	1D/192 Willis Street	3.FL	61	62	64
5854908	1D/192 Willis Street	4.FL	62	63	65
5854908	1D/192 Willis Street	5.FL	62	63	65
5854908	1D/192 Willis Street	6.FL	63	63	65
5854908	1D/192 Willis Street	7.FL	63	64	65
5854908	1D/192 Willis Street	8.FL	63	64	66
5854908	1D/192 Willis Street	9.FL	64	64	66
5854908	1D/192 Willis Street	10.FL	64	64	66
5854906	202A Willis Street	2.FL	44	44	46
5855512	204/203 Willis Street	GF	51	53	54
5855512	204/203 Willis Street	1.FL	52	54	55
5855512	204/203 Willis Street	2.FL	53	54	55
5855512	204/203 Willis Street	3.FL	54	55	56

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 1)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855512	204/203 Willis Street	4.FL	54	55	56
5855743	209/180 Willis Street	GF	59	59	61
5855743	209/180 Willis Street	1.FL	60	61	62
5855743	209/180 Willis Street	2.FL	61	61	62
5855743	209/180 Willis Street	3.FL	61	62	63
5855743	209/180 Willis Street	4.FL	62	62	63
5855743	209/180 Willis Street	5.FL	62	62	63
5855743	209/180 Willis Street	6.FL	62	62	63
5855743	209/180 Willis Street	7.FL	62	62	63
5855743	209/180 Willis Street	8.FL	62	62	64
5854899	216A Willis Street	1.FL	62	62	66
5854909	219A Willis Street	GF	56	57	57
5854909	219A Willis Street	1.FL	57	58	58
5854909	219A Willis Street	2.FL	57	58	58
5854909	219A Willis Street	3.FL	57	58	58
5854909	219A Willis Street	4.FL	58	58	59
5854909	219A Willis Street	5.FL	58	59	59

F.2 Area 2 – Te Aro

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 2)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5854891	8 Buller Street	1.FL	64	64	68
5854892	10 Buller Street	1.FL	64	64	68
5854893	12 Buller Street	1.FL	64	64	68
5854896	14 Buller Street	1.FL	64	64	68
5854897	16 Buller Street	1.FL	62	62	65
5854783	28 Buller Street	GF	63	63	66
5854787	31 Buller Street	1.FL	62	63	63
5854788	31 Buller Street	1.FL	60	60	61
5854784	32 Buller Street	1.FL	63	63	65
5854785	33 Buller Street	GF	58	59	62
5854786	34 Buller Street	GF	62	62	64
5854806	35 Buller Street	GF	58	59	60
5854812	37 Buller Street	GF	56	57	58
5854809	1/39 Buller Street	1.FL	57	57	58
5854808	4/40 Buller Street	1.FL	57	58	60
5854859	4/20 Buller Street	GF	62	62	65
5854898	4/22 Buller Street	1.FL	64	64	67
5854858	1/24 Buller Street	1.FL	63	63	66
5855446	1/25 Buller Street	GF	69	69	71
5854855	1/26 Buller Street	GF	55	56	59
5854857	1/26 Buller Street	1.FL	64	65	66
5854780	4/27 Buller Street	GF	67	67	69
5854780	4/27 Buller Street	1.FL	67	67	69
5854782	30B Buller Street	1.FL	63	64	65
5854807	36B Buller Street	1.FL	56	57	59
5854854	38A Buller Street	GF	59	60	62
5854895	8A Buller Street	1.FL	53	53	56
5855434	11 Bute Street	1.FL	54	59	56
5854974	50 Cambridge Terrace	2.FL	56	58	58
5855322	2/59 Cambridge Tce	GF	64	66	67
5855322	2/59 Cambridge Tce	1.FL	66	67	68
5855322	2/59 Cambridge Tce	2.FL	66	67	68
5855322	2/59 Cambridge Tce	3.FL	66	67	68
5854972	12 College Street	1.FL	43	44	45
5854971	3/14 College Street	GF	38	39	40
5854971	3/14 College Street	1.FL	39	40	41
5854971	3/14 College Street	2.FL	40	42	43
5854971	3/14 College Street	3.FL	44	45	45
5854971	3/14 College Street	4.FL	45	46	47
5854980	204/19 College Street	GF	69	72	74
5854980	204/19 College Street	1.FL	70	71	73
5854980	204/19 College Street	2.FL	69	70	72
5854980	204/19 College Street	3.FL	68	70	71
5854980	204/19 College Street	4.FL	67	69	70

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 2)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5854980	204/19 College Street	5.FL	66	68	70
5854980	204/19 College Street	6.FL	66	67	69
5854980	204/19 College Street	7.FL	65	67	69
5854973	41/13 College Street	GF	69	71	74
5854973	41/13 College Street	1.FL	69	71	73
5854973	41/13 College Street	2.FL	68	70	72
5854973	41/13 College Street	3.FL	68	69	71
5854973	41/13 College Street	4.FL	67	68	70
5854973	41/13 College Street	5.FL	66	68	69
5854973	41/13 College Street	6.FL	66	67	69
5855321	C/9 College Street	GF	68	71	73
5855321	C/9 College Street	1.FL	69	71	73
5855321	C/9 College Street	2.FL	69	70	72
5855321	C/9 College Street	3.FL	68	69	71
5855725	192 Cuba Street	GF	71	73	72
5855725	192 Cuba Street	1.FL	71	73	72
5855725	192 Cuba Street	2.FL	71	73	71
5855725	192 Cuba Street	3.FL	70	72	70
5855053	213 Cuba Street	GF	57	61	62
5855053	213 Cuba Street	1.FL	59	62	62
5855053	213 Cuba Street	2.FL	60	62	62
5855053	213 Cuba Street	3.FL	60	62	62
5855432	3/158 Cuba Street	GF	49	53	51
5855432	3/158 Cuba Street	1.FL	51	56	54
5855432	3/158 Cuba Street	2.FL	53	57	55
5855432	3/158 Cuba Street	3.FL	54	57	55
5855432	3/158 Cuba Street	4.FL	55	58	56
5855432	3/158 Cuba Street	5.FL	56	58	57
5855432	3/158 Cuba Street	6.FL	57	59	57
5855054	385/233 Cuba Street	GF	44	49	50
5855054	385/233 Cuba Street	1.FL	46	50	50
5855054	385/233 Cuba Street	2.FL	47	50	51
5855054	385/233 Cuba Street	3.FL	47	50	51
5855054	385/233 Cuba Street	4.FL	48	51	51
5855054	385/233 Cuba Street	5.FL	49	51	51
5855054	385/233 Cuba Street	6.FL	50	52	52
5855055	385/233 Cuba Street	GF	46	51	52
5855055	385/233 Cuba Street	1.FL	48	52	52
5855055	385/233 Cuba Street	2.FL	49	52	52
5855055	385/233 Cuba Street	3.FL	49	52	53
5854977	1 Ebor Street	GF	40	42	41
5854977	1 Ebor Street	1.FL	42	43	43
5854977	1 Ebor Street	2.FL	43	45	45
5854977	1 Ebor Street	3.FL	45	46	47
5854983	5/5 Ebor Street	1.FL	39	40	40
5854981	1/9 Ebor Street	1.FL	42	43	43
5854982	16/9 Ebor Street	1.FL	40	42	41
5854991	31/9 Ebor Street	2.FL	47	49	49
5855004	2 Frederick Street	2.FL	49	50	51
5855007	10 Frederick Street	2.FL	55	58	59
5855009	11 Frederick Street	GF	41	43	44
5855009	11 Frederick Street	1.FL	43	44	46
5855009	11 Frederick Street	2.FL	45	46	47
5855009	11 Frederick Street	3.FL	48	50	50
5855009	11 Frederick Street	4.FL	50	52	53
5855010	17 Frederick Street	1.FL	50	53	54
5855014	23 Frederick Street	1.FL	47	50	51
5855016	25 Frederick Street	2.FL	43	44	43
5855005	3/4 Frederick Street	2.FL	57	59	60
5855013	202/33 Frederick Street	GF	41	44	45
5855013	202/33 Frederick Street	1.FL	43	47	47
5855013	202/33 Frederick Street	2.FL	44	47	48
5855013	202/33 Frederick Street	3.FL	46	48	49
5855013	202/33 Frederick Street	4.FL	46	49	49
5855013	202/33 Frederick Street	5.FL	48	49	50
5855433	7 Garrett Street	1.FL	50	54	52
5855008	12 Haining Street	GF	40	41	42

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 2)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855008	12 Haining Street	1.FL	41	42	43
5855008	12 Haining Street	2.FL	43	44	44
5855008	12 Haining Street	3.FL	44	45	45
5855008	12 Haining Street	4.FL	46	47	47
5855008	12 Haining Street	5.FL	48	49	49
5855012	9/38 Haining Street	GF	39	40	38
5855012	9/38 Haining Street	1.FL	42	42	39
5855012	9/38 Haining Street	2.FL	44	45	41
5855012	9/38 Haining Street	3.FL	46	47	42
5855015	G02/24 Haining Street	1.FL	46	48	48
5855170	33 Home Street	1.FL	51	52	52
5855172	5/41 Home Street	2.FL	55	58	59
5854993	11 Jessie Street	GF	44	46	46
5854990	25 Jessie Street	2.FL	48	50	51
5854988	26 Jessie Street	1.FL	45	46	47
5854987	32 Jessie Street	1.FL	56	59	60
5854984	34 Jessie Street	1.FL	53	57	58
5854989	5/27 Jessie Street	GF	42	43	43
5854989	5/27 Jessie Street	1.FL	43	45	45
5854989	5/27 Jessie Street	2.FL	45	47	47
5854989	5/27 Jessie Street	3.FL	47	49	49
5854986	3/29 Jessie Street	GF	43	44	44
5854986	3/29 Jessie Street	1.FL	44	46	46
5854986	3/29 Jessie Street	2.FL	46	47	48
5854986	3/29 Jessie Street	3.FL	47	49	49
5854986	3/29 Jessie Street	4.FL	49	51	51
5854985	31C Jessie Street	2.FL	44	45	45
5854976	702/38 Jessie Street	GF	56	60	61
5854976	702/38 Jessie Street	1.FL	58	60	62
5854976	702/38 Jessie Street	2.FL	58	60	62
5854976	702/38 Jessie Street	3.FL	58	60	62
5854976	702/38 Jessie Street	4.FL	59	60	62
5854976	702/38 Jessie Street	5.FL	59	61	62
5854976	702/38 Jessie Street	6.FL	60	61	62
5854976	702/38 Jessie Street	7.FL	60	62	63
5854992	88B/11 Jessie Street	1.FL	44	47	47
5855644	43 Kent Terrace	1.FL	60	62	63
5855048	2 Knigges Avenue	GF	59	63	63
5855048	2 Knigges Avenue	1.FL	61	64	64
5855048	2 Knigges Avenue	2.FL	61	64	64
5855048	2 Knigges Avenue	3.FL	62	64	64
5855048	2 Knigges Avenue	4.FL	62	64	64
5854970	15 Lorne Street	1.FL	39	40	40
5854994	15 Marion Street	GF	37	47	47
5854994	15 Marion Street	1.FL	39	47	48
5854994	15 Marion Street	2.FL	43	48	48
5854994	15 Marion Street	3.FL	45	48	49
5854995	21 Marion Street	GF	41	42	42
5854995	21 Marion Street	1.FL	43	45	45
5854995	21 Marion Street	2.FL	45	47	46
5854995	21 Marion Street	3.FL	46	48	48
5855431	32 Marion Street	2.FL	56	59	59
5854789	2 Oak Park Avenue	1.FL	65	65	60
5854804	1/4 Oak Park Avenue	2.FL	64	64	57
5855173	5/15 Pirie Street	1.FL	53	56	57
5855171	5/23 Pirie Street	GF	53	56	57
5855171	5/23 Pirie Street	1.FL	54	57	58
5855171	5/23 Pirie Street	2.FL	55	57	58
5855171	5/23 Pirie Street	3.FL	55	57	58
5855011	135 Taranaki Street	GF	45	52	52
5855011	135 Taranaki Street	1.FL	47	52	53
5855011	135 Taranaki Street	2.FL	49	53	53
5855011	135 Taranaki Street	3.FL	49	53	53
5855011	135 Taranaki Street	4.FL	50	53	54
5855011	135 Taranaki Street	5.FL	50	53	54
5855011	135 Taranaki Street	6.FL	51	53	54
5855011	135 Taranaki Street	7.FL	51	53	54

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 2)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855011	135 Taranaki Street	8.FL	52	53	54
5854997	152 Taranaki Street	GF	69	71	72
5854997	152 Taranaki Street	1.FL	69	71	71
5854997	152 Taranaki Street	2.FL	68	70	71
5854997	152 Taranaki Street	3.FL	67	69	70
5855050	168 Taranaki Street	GF	45	50	50
5855050	168 Taranaki Street	1.FL	47	51	50
5855050	168 Taranaki Street	2.FL	48	51	50
5855050	168 Taranaki Street	3.FL	49	52	51
5855050	168 Taranaki Street	4.FL	49	52	51
5855050	168 Taranaki Street	5.FL	50	52	51
5855050	168 Taranaki Street	6.FL	50	52	51
5855050	168 Taranaki Street	7.FL	51	53	51
5855050	168 Taranaki Street	8.FL	51	53	51
5854864	309 The Terrace	GF	50	50	53
5854860	315 The Terrace	1.FL	56	56	60
5854851	317 The Terrace	GF	48	48	51
5854849	323 The Terrace	1.FL	51	51	56
5854853	325 The Terrace	GF	56	56	60
5855503	328 The Terrace	1.FL	51	52	55
5855505	330 The Terrace	1.FL	51	52	56
5855510	331 The Terrace	1.FL	57	57	59
5855508	334 The Terrace	1.FL	48	49	51
5855509	335 The Terrace	2.FL	57	58	59
5855495	338 The Terrace	1.FL	49	50	53
5855494	2/336 The Terrace	GF	47	47	49
5854863	319C The Terrace	1.FL	55	55	60
5854850	321B The Terrace	GF	51	51	53
5854856	325A The Terrace	1.FL	59	59	63
5855496	326F The Terrace	1.FL	45	45	47
5855499	326F The Terrace	1.FL	45	45	48
5855500	326F The Terrace	GF	47	48	50
5855506	326F The Terrace	GF	46	46	48
5855504	332B The Terrace	GF	49	50	53
5855507	332B The Terrace	GF	47	47	50
5854852	7/313 The Terrace	1.FL	50	50	52
5854861	7/313 The Terrace	1.FL	55	55	59
5854862	7/313 The Terrace	1.FL	49	50	51
5855003	128C Tory Street	2.FL	51	53	55
5855439	201 Victoria Street	1.FL	53	57	57
5855442	1/219 Victoria Street	1.FL	50	52	51
5855447	212D Victoria Street	GF	71	71	73
5855731	3/195 Victoria Street	GF	42	52	53
5855731	3/195 Victoria Street	1.FL	45	54	55
5855731	3/195 Victoria Street	2.FL	53	55	55
5855731	3/195 Victoria Street	3.FL	54	56	57
5855441	5/215 Victoria Street	1.FL	52	54	54
5855323	1 Vivian Street	1.FL	67	69	70
5855352	23 Vivian Street	GF	70	72	73
5855351	27 Vivian Street	GF	69	71	73
5855353	31 Vivian Street	GF	65	67	69
5854979	33 Vivian Street	GF	70	71	73
5854975	35 Vivian Street	GF	70	71	73
5855002	41 Vivian Street	GF	69	71	73
5854978	44 Vivian Street	GF	69	71	73
5854978	44 Vivian Street	1.FL	69	71	73
5854978	44 Vivian Street	2.FL	68	70	72
5854978	44 Vivian Street	3.FL	67	69	71
5854978	44 Vivian Street	4.FL	67	68	70
5854978	44 Vivian Street	5.FL	66	68	69
5855627	45 Vivian Street	GF	69	71	73
5855000	81 Vivian Street	GF	71	73	73
5855000	81 Vivian Street	1.FL	70	72	72
5855000	81 Vivian Street	2.FL	69	71	71
5855000	81 Vivian Street	3.FL	68	70	70
5855000	81 Vivian Street	4.FL	67	69	69
5854996	101 Vivian Street	GF	69	71	72

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 2)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855436	157 Vivian Street	GF	71	74	72
5855435	161 Vivian Street	GF	69	72	70
5855006	5/51 Vivian Street	GF	70	72	73
5854999	1/109 Vivian Street	GF	70	72	72
5854999	1/109 Vivian Street	1.FL	69	71	72
5854999	1/109 Vivian Street	2.FL	68	70	71
5854999	1/109 Vivian Street	3.FL	68	70	70
5855438	167A Vivian Street	GF	71	73	72
5855052	1B/130 Vivian Street	GF	68	70	71
5855052	1B/130 Vivian Street	1.FL	68	70	71
5855052	1B/130 Vivian Street	2.FL	67	69	70
5855052	1B/130 Vivian Street	3.FL	67	69	69
5855052	1B/130 Vivian Street	4.FL	66	68	68
5855052	1B/130 Vivian Street	5.FL	65	67	68
5855052	1B/130 Vivian Street	6.FL	65	67	67
5854998	2/105 Vivian Street	GF	69	71	72
5855430	206/142 Vivian Street	GF	68	71	72
5855430	206/142 Vivian Street	1.FL	69	71	71
5855430	206/142 Vivian Street	2.FL	68	70	70
5855430	206/142 Vivian Street	3.FL	67	69	70
5855430	206/142 Vivian Street	4.FL	66	68	69
5855051	404/115 Vivian Street	GF	69	72	72
5855051	404/115 Vivian Street	1.FL	70	72	72
5855051	404/115 Vivian Street	2.FL	69	71	71
5855051	404/115 Vivian Street	3.FL	68	70	70
5855051	404/115 Vivian Street	4.FL	67	69	70
5855051	404/115 Vivian Street	5.FL	67	69	69
5855051	404/115 Vivian Street	6.FL	66	68	68
5855437	3 Walter Street	GF	48	53	51
5855437	3 Walter Street	1.FL	50	54	52
5855437	3 Walter Street	2.FL	51	54	52
5855437	3 Walter Street	3.FL	52	55	52
5855437	3 Walter Street	4.FL	53	55	53
5855437	3 Walter Street	5.FL	54	55	53
5855440	16 Walter Street	GF	46	49	47
5854802	3 Watson Street	1.FL	53	53	53
5854811	4 Watson Street	1.FL	54	55	56
5854803	5 Watson Street	1.FL	51	51	51
5854810	6 Watson Street	GF	53	54	54
5854801	7 Watson Street	1.FL	51	51	46
5854813	8 Watson Street	1.FL	53	53	54
5854805	1A Watson Street	GF	53	53	56
5855047	24 Wigan Street	GF	40	40	35
5855047	24 Wigan Street	1.FL	42	42	36
5855047	24 Wigan Street	2.FL	43	44	37
5855047	24 Wigan Street	3.FL	45	46	39
5855047	24 Wigan Street	4.FL	46	47	40
5855047	24 Wigan Street	5.FL	47	48	41
5855047	24 Wigan Street	6.FL	48	49	43
5855047	24 Wigan Street	7.FL	49	50	45
5855049	401/8 Wigan Street	GF	40	40	36
5855049	401/8 Wigan Street	1.FL	41	41	36
5855049	401/8 Wigan Street	2.FL	42	42	38
5855049	401/8 Wigan Street	3.FL	43	44	39
5855049	401/8 Wigan Street	4.FL	45	45	42
5855049	401/8 Wigan Street	5.FL	46	47	46
5855049	401/8 Wigan Street	6.FL	48	49	47
5855445	222 Willis Street	GF	69	69	72
5855445	222 Willis Street	1.FL	70	70	72
5855445	222 Willis Street	2.FL	70	69	72
5855445	222 Willis Street	3.FL	70	69	71
5855445	222 Willis Street	4.FL	69	69	71
5855445	222 Willis Street	5.FL	69	69	70
5855615	276 Willis Street	1.FL	70	70	48
5854781	5/248 Willis Street	GF	61	63	64
5854781	5/248 Willis Street	1.FL	63	63	64
5854781	5/248 Willis Street	2.FL	63	63	64

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 2)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5854781	5/248 Willis Street	3.FL	64	64	64
5854779	9/254 Willis Street	GF	68	69	50
5854779	9/254 Willis Street	1.FL	69	69	51
5854779	9/254 Willis Street	2.FL	69	69	51
5854779	9/254 Willis Street	3.FL	68	68	52
5854779	9/254 Willis Street	4.FL	68	68	57
5854779	9/254 Willis Street	5.FL	67	67	59
5855444	9B/257 Willis Street	GF	67	69	69
5854793	5 Youngs Lane	1.FL	68	68	55

F.3 Area 3 – Basin Reserve

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 3)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855350	1 Adelaide Road	GF	74	75	67
5855695	13 Adelaide Road	2.FL	60	61	57
5854947	20 Adelaide Road	1.FL	52	54	51
5855694	23 Adelaide Road	1.FL	55	55	54
5855693	5C Alfred Street	2.FL	60	61	55
5855024	3B Brown Street	1.FL	46	47	45
5854911	13 Buckle Street	2.FL	62	62	60
5854912	13 Buckle Street	GF	48	48	45
5854913	21 Buckle Street	GF	48	54	53
5854913	21 Buckle Street	1.FL	49	56	54
5854913	21 Buckle Street	2.FL	50	57	55
5854913	21 Buckle Street	3.FL	51	58	56
5855313	21 Buckle Street	1.FL	55	55	54
5854930	10 Douglas Street	2.FL	57	58	52
5854929	14 Douglas Street	1.FL	57	58	52
5854950	3/11 Douglas Street	2.FL	55	56	51
5854948	7A Douglas Street	1.FL	46	46	44
5855337	9 Dufferin Street	1.FL	73	73	70
5855339	9 Dufferin Street	1.FL	74	74	71
5855333	13 Dufferin Street	GF	73	74	73
5855335	13 Dufferin Street	1.FL	56	58	57
5855336	13 Dufferin Street	GF	53	55	55
5855341	15 Dufferin Street	1.FL	69	69	69
5855343	17 Dufferin Street	GF	68	68	68
5855340	19 Dufferin Street	GF	59	60	57
5855688	19 Dufferin Street	GF	59	59	55
5855342	2/11 Dufferin Street	GF	71	71	71
5855338	21 Ellice Street	1.FL	66	67	67
5855331	23 Ellice Street	GF	64	66	66
5855330	25 Ellice Street	1.FL	63	65	65
5855332	28 Ellice Street	GF	63	65	65
5855325	29 Ellice Street	1.FL	56	56	58
5855329	29 Ellice Street	GF	63	65	64
5855327	31 Ellice Street	1.FL	61	63	63
5855403	32 Ellice Street	1.FL	63	65	65
5855328	33 Ellice Street	1.FL	61	63	62
5855405	35 Ellice Street	1.FL	61	63	62
5855404	37 Ellice Street	1.FL	61	63	62
5855400	39 Ellice Street	GF	59	61	60
5855401	41 Ellice Street	1.FL	59	61	61
5855025	6 Girtton Terrace	GF	45	45	43
5855026	8/8 Girtton Terrace	GF	59	59	58
5855180	17A Hania Street	2.FL	52	54	54
5855324	33I Hania Street	2.FL	55	57	57
5855689	79 Kent Terrace	1.FL	69	71	71
5855344	1/80 Kent Terrace	GF	69	71	71
5855344	1/80 Kent Terrace	1.FL	69	70	71
5855344	1/80 Kent Terrace	2.FL	68	70	71
5855344	1/80 Kent Terrace	3.FL	68	69	71
5855408	1 Moir Street	GF	52	52	51
5855409	2 Moir Street	1.FL	52	53	52
5855326	3 Moir Street	GF	53	54	57

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 3)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855412	4 Moir Street	GF	48	49	48
5855406	5 Moir Street	1.FL	52	54	55
5855410	6 Moir Street	1.FL	52	53	52
5855181	8 Moir Street	1.FL	47	51	50
5855174	9 Moir Street	GF	50	51	51
5855176	15 Moir Street	GF	48	49	49
5855177	19 Moir Street	GF	47	48	48
5855178	21 Moir Street	GF	47	48	48
5855179	21 Moir Street	1.FL	46	47	49
5855175	11B Moir Street	GF	51	52	51
5855411	2A Moir Street	1.FL	52	53	51
5855407	7B Moir Street	GF	51	52	53
5854949	2A Myrtle Crescent	1.FL	52	53	48
5855334	2 Paterson Street	GF	73	74	74
5854920	2 Ranfurly Terrace	GF	47	47	47
5854919	4 Ranfurly Terrace	GF	46	47	45
5855345	19 Rugby Street	GF	71	72	70
5855623	41 Rugby Street	1.FL	75	75	71
5854937	80 Rugby Street	1.FL	58	59	64
5855346	1/21 Rugby Street	1.FL	60	61	61
5855347	1/21 Rugby Street	GF	72	72	65
5855347	1/21 Rugby Street	1.FL	73	72	66
5855347	1/21 Rugby Street	2.FL	72	72	67
5855347	1/21 Rugby Street	3.FL	72	72	66
5855348	1/21 Rugby Street	1.FL	58	59	58
5855349	1/21 Rugby Street	GF	43	43	42
5855349	1/21 Rugby Street	1.FL	45	45	44
5855349	1/21 Rugby Street	2.FL	48	48	46
5855349	1/21 Rugby Street	3.FL	58	58	53
5854946	45A Rugby Street	1.FL	76	76	71
5854939	33 Tasman Street	GF	58	59	61
5854925	35 Tasman Street	GF	57	57	60
5854926	37 Tasman Street	GF	57	57	62
5854928	41 Tasman Street	1.FL	57	58	60
5854917	44 Tasman Street	GF	50	51	51
5854918	44 Tasman Street	GF	51	52	53
5854921	62 Tasman Street	GF	46	46	46
5854924	62 Tasman Street	GF	48	49	48
5854923	64 Tasman Street	GF	49	50	48
5854922	66 Tasman Street	GF	49	50	48
5854940	7/1 Tasman Street	GF	60	61	61
5854940	7/1 Tasman Street	1.FL	62	63	63
5854940	7/1 Tasman Street	2.FL	64	64	64
5854940	7/1 Tasman Street	3.FL	65	65	64
5854941	7/1 Tasman Street	GF	60	60	60
5855621	7/1 Tasman Street	GF	63	64	64
5854927	39B Tasman Street	1.FL	51	51	50
5854938	39B Tasman Street	1.FL	61	61	63
5855017	160 Tory Street	GF	47	48	43
5855018	160 Tory Street	GF	51	51	48
5855019	160 Tory Street	GF	46	46	44
5855020	160 Tory Street	1.FL	49	49	47
5855021	176 Tory Street	1.FL	54	55	53

F.4 Area 4 – Mt Victoria Tunnel

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 4)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855027	113 Austin Street	GF	42	42	43
5855028	115 Austin Street	GF	45	46	44
5855380	123 Austin Street	2.FL	56	56	58
5855022	131 Austin Street	GF	51	52	51
5855023	131 Austin Street	GF	58	59	58
5855085	131 Austin Street	GF	53	54	54
5855086	131 Austin Street	GF	52	53	53
5855382	132 Austin Street	1.FL	45	46	45

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 4)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855373	136 Austin Street	1.FL	51	53	56
7113419	140 Austin Street	1.FL	n/a	n/a	60
5855381	5/117 Austin Street	1.FL	47	48	49
5855031	2 Austin Terrace	1.FL	47	48	48
5855032	3 Austin Terrace	GF	40	40	40
5855034	4 Austin Terrace	GF	40	41	43
5855035	5 Austin Terrace	GF	44	45	45
5855036	6 Austin Terrace	GF	47	48	48
5855420	131 Brougham Street	GF	53	55	55
5855420	131 Brougham Street	1.FL	55	57	56
5855420	131 Brougham Street	2.FL	57	58	58
5855420	131 Brougham Street	3.FL	59	60	60
5855420	131 Brougham Street	4.FL	59	61	60
5855420	131 Brougham Street	5.FL	60	61	61
5855420	131 Brougham Street	6.FL	60	61	61
5855397	134 Brougham Street	GF	52	53	52
5855396	138 Brougham Street	1.FL	57	58	57
5855398	140 Brougham Street	1.FL	55	56	56
5855394	1/143 Brougham Street	1.FL	60	62	63
5855426	1/143 Brougham Street	GF	54	55	62
5855419	3/123 Brougham Street	GF	53	55	55
5855402	40 Ellice Street	1.FL	59	60	61
5855399	43 Ellice Street	2.FL	57	59	58
5855421	46 Ellice Street	1.FL	54	56	57
5855422	48 Ellice Street	GF	51	52	54
5855423	50 Ellice Street	GF	50	51	54
5855424	52 Ellice Street	1.FL	53	54	55
5855418	53 Ellice Street	1.FL	55	56	56
5855413	55 Ellice Street	2.FL	52	52	53
5855417	56 Ellice Street	2.FL	53	54	56
5855414	57 Ellice Street	2.FL	53	54	55
5855416	58 Ellice Street	GF	50	51	52
5855361	59 Ellice Street	1.FL	53	54	54
5855415	60 Ellice Street	1.FL	50	51	53
5855359	62 Ellice Street	1.FL	49	50	52
5855363	63 Ellice Street	1.FL	52	54	53
5855360	64 Ellice Street	1.FL	50	51	52
5855364	65 Ellice Street	1.FL	51	52	51
5855357	66 Ellice Street	1.FL	51	52	53
5855358	66 Ellice Street	GF	50	51	52
5855365	67 Ellice Street	2.FL	50	51	51
5855356	68 Ellice Street	1.FL	50	51	52
5855386	69 Ellice Street	2.FL	48	49	48
5855385	71 Ellice Street	2.FL	50	51	50
5855383	73 Ellice Street	1.FL	45	46	46
5855366	74 Ellice Street	1.FL	47	47	48
5855367	76 Ellice Street	GF	48	48	50
5855378	80 Ellice Street	1.FL	49	50	49
5855377	82 Ellice Street	1.FL	48	49	50
5855039	85 Ellice Street	GF	46	47	46
5855041	87 Ellice Street	GF	44	45	44
5855040	89 Ellice Street	1.FL	47	49	47
5855029	90 Ellice Street	GF	46	48	49
5855045	91 Ellice Street	1.FL	48	50	48
5855030	92 Ellice Street	GF	45	46	46
5855033	94 Ellice Street	GF	43	43	43
5855038	96 Ellice Street	GF	43	44	43
5855037	98 Ellice Street	GF	44	45	44
5855043	100 Ellice Street	GF	43	44	43
5855042	102 Ellice Street	GF	46	46	46
5855044	104 Ellice Street	GF	46	47	47
5855379	1/86 Ellice Street	1.FL	49	49	50
5855384	1/86 Ellice Street	1.FL	46	47	47
5855395	44A Ellice Street	1.FL	55	58	59
5855362	57B Ellice Street	GF	51	52	52
5855370	70A Ellice Street	GF	47	48	49
5855369	72A Ellice Street	GF	47	48	49

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario
(Area 4)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855375	78A Ellice Street	GF	49	50	51
5855376	78A Ellice Street	1.FL	46	46	47
5855389	13 Hinau Road	GF	36	36	37
5855184	15 Hinau Road	GF	37	37	38
5855092	16 Hinau Road	GF	35	35	36
5855185	17 Hinau Road	GF	38	38	39
5855186	19 Hinau Road	GF	40	40	42
5855093	20 Hinau Road	GF	35	36	36
5855189	21 Hinau Road	GF	53	53	54
5855090	22 Hinau Road	GF	37	37	37
5855187	23 Hinau Road	GF	44	44	45
5855088	24 Hinau Road	GF	39	39	40
5855183	25 Hinau Road	GF	56	56	57
5855089	26 Hinau Road	GF	42	42	43
5855094	27 Hinau Road	GF	54	55	55
5855091	1/18 Hinau Road	GF	37	37	38
5855087	1/28 Hinau Road	GF	49	49	49
5855388	11A Hinau Road	GF	35	36	37
7113418	7 Paterson Street	1.FL	n/a	n/a	60
7113417	19 Paterson Street	1.FL	n/a	n/a	67
5855387	49 Porritt Avenue	1.FL	49	50	49
5855207	37 Waitoa Road	GF	51	53	55
5855211	38 Waitoa Road	GF	49	50	51
5855199	39 Waitoa Road	GF	56	58	60
5855208	40 Waitoa Road	GF	53	53	54
5855198	41 Waitoa Road	GF	56	57	59
5855209	42 Waitoa Road	GF	54	54	56
5855196	43 Waitoa Road	1.FL	56	57	58
5855197	43 Waitoa Road	GF	56	57	59
5855193	45 Waitoa Road	GF	53	53	55
5855194	47 Waitoa Road	1.FL	52	53	53
5855191	49 Waitoa Road	GF	55	55	57
5855192	51 Waitoa Road	1.FL	43	43	44
5855190	53 Waitoa Road	GF	53	54	57
5855195	55 Waitoa Road	GF	40	41	43
5855188	57 Waitoa Road	GF	40	40	41
5855210	44A Waitoa Road	GF	53	54	56

F.5 Area 5 – Eastern Connections

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario	Mitigation scenario
(Area 5)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855097	7 Baden Road	GF	54	56	58	55
5855096	9 Baden Road	GF	55	55	57	54
5855095	11 Baden Road	GF	53	53	55	51
5855596	13 Baden Road	GF	54	55	56	52
5855098	7A Baden Road	GF	55	56	58	55
5855113	2 Busaco Road	GF	55	56	58	57
5855101	3 Busaco Road	GF	49	49	52	52
5855102	4 Busaco Road	GF	52	53	55	54
5855103	5 Busaco Road	1.FL	53	54	56	55
5855107	7 Busaco Road	GF	48	49	53	53
5855104	9 Busaco Road	GF	49	49	52	51
5855106	11 Busaco Road	1.FL	50	51	53	52
5854660	520 Evans Bay Parade	GF	51	55	56	56
5854662	522 Evans Bay Parade	GF	52	56	57	57
5854661	524 Evans Bay Parade	1.FL	53	57	57	57
5854663	526 Evans Bay Parade	GF	54	58	59	59
5854664	528 Evans Bay Parade	GF	56	59	60	60
5854673	530 Evans Bay Parade	GF	58	61	62	62
5854674	532 Evans Bay Parade	GF	63	65	65	65
5854671	536 Evans Bay Parade	GF	66	67	66	66
5854656	581 Evans Bay Parade	GF	64	66	67	67
5854657	581 Evans Bay Parade	1.FL	47	48	50	49
5854658	581 Evans Bay Parade	1.FL	65	67	69	69
5854675	581 Evans Bay Parade	GF	51	54	55	55

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario	Mitigation scenario
(Area 5)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5854676	581 Evans Bay Parade	GF	45	46	48	48
5854677	581 Evans Bay Parade	1.FL	46	47	48	48
5854666	514A Evans Bay Parade	GF	52	54	56	56
5854659	518A Evans Bay Parade	GF	54	57	58	58
5854672	528A Evans Bay Parade	GF	49	50	52	52
5855601	1 Goa Street	GF	52	52	53	49
5855597	6 Goa Street	GF	51	53	53	48
5854702	19 Goa Street	GF	61	63	63	58
5854699	21 Goa Street	GF	73	75	72	67
5854680	22 Goa Street	GF	63	65	64	59
5854681	24 Goa Street	GF	74	75	72	67
5855604	6A Goa Street	GF	52	52	53	49
5855269	72 Hamilton Road	GF	51	51	53	48
5855602	72 Hamilton Road	GF	55	55	56	52
5855605	72 Hamilton Road	GF	51	53	55	51
5855606	72 Hamilton Road	GF	55	55	57	52
5855614	72 Hamilton Road	1.FL	54	54	56	52
5855600	82 Hamilton Road	GF	53	53	54	49
5855595	83 Hamilton Road	GF	55	55	57	53
5855599	84 Hamilton Road	GF	52	52	53	49
5855598	85 Hamilton Road	GF	53	53	55	51
5855576	86 Hamilton Road	GF	53	53	54	50
5855594	87 Hamilton Road	GF	53	54	55	51
5855593	89 Hamilton Road	GF	53	54	55	51
5855591	93 Hamilton Road	GF	54	55	56	52
5855582	94 Hamilton Road	GF	54	55	56	52
5855589	95 Hamilton Road	GF	55	55	57	54
5855590	99 Hamilton Road	GF	54	55	57	55
5855587	101 Hamilton Road	GF	54	55	58	56
5855581	102 Hamilton Road	GF	51	51	54	53
5855586	103 Hamilton Road	GF	53	54	56	55
5855583	104 Hamilton Road	GF	53	53	55	54
5855585	105 Hamilton Road	GF	53	54	57	56
5855100	107 Hamilton Road	GF	52	53	56	55
5855168	108 Hamilton Road	GF	52	52	54	53
5855122	111 Hamilton Road	GF	55	56	59	58
5855125	112 Hamilton Road	GF	51	51	52	51
5855121	113 Hamilton Road	GF	57	57	59	59
5855126	114 Hamilton Road	GF	51	51	54	54
5855120	115 Hamilton Road	GF	62	62	63	63
5855129	118 Hamilton Road	GF	52	52	53	53
5855130	120 Hamilton Road	GF	56	57	59	59
5855127	122 Hamilton Road	GF	60	61	62	62
5855123	124 Hamilton Road	GF	73	73	68	68
5855592	1/91 Hamilton Road	GF	54	55	56	52
5855588	2/97 Hamilton Road	GF	54	55	56	53
5855169	1/110 Hamilton Road	GF	51	52	54	53
5855584	106A Hamilton Road	GF	53	53	55	54
5855124	116A Hamilton Road	1.FL	56	57	58	58
5855128	116A Hamilton Road	GF	50	51	52	52
5855261	42A Hamilton Road	1.FL	51	51	53	49
5855099	91A Hamilton Road	GF	54	55	57	55
5855150	1 Henry Street	GF	54	55	58	57
5855149	2 Henry Street	GF	54	55	57	57
5855143	4 Henry Street	GF	49	50	56	56
5855139	6 Henry Street	GF	48	48	54	54
5855138	8 Henry Street	GF	49	49	53	53
5855140	10 Henry Street	GF	55	56	67	67
5854742	12 Henry Street	GF	49	49	53	53
5854738	13 Henry Street	GF	48	48	51	51
5854741	14 Henry Street	GF	55	56	66	66
5854739	16 Henry Street	GF	53	55	58	58
5854735	18 Henry Street	GF	56	58	64	64
5854736	20 Henry Street	GF	58	59	66	65

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario	Mitigation scenario
(Area 5)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5854755	22 Henry Street	GF	57	58	64	64
5854737	23 Henry Street	GF	53	54	56	56
5854754	24 Henry Street	GF	56	57	63	63
5854753	25 Henry Street	GF	55	55	58	57
5854758	26 Henry Street	GF	56	57	63	63
5854747	27 Henry Street	GF	52	52	54	53
5854751	28 Henry Street	GF	55	56	62	61
5854752	28 Henry Street	GF	55	56	62	62
5854748	29 Henry Street	GF	52	52	54	53
5854750	30 Henry Street	GF	56	57	63	63
5854745	31 Henry Street	GF	42	42	42	42
5854769	31 Henry Street	GF	46	47	48	48
5854749	32 Henry Street	GF	56	56	62	62
5854770	33 Henry Street	GF	53	53	55	54
5854768	34 Henry Street	GF	56	56	62	62
5854771	35 Henry Street	1.FL	53	53	54	53
5854773	36 Henry Street	GF	55	56	62	61
5854775	37 Henry Street	1.FL	47	47	48	48
5854772	38 Henry Street	GF	56	56	62	61
5854776	39 Henry Street	GF	52	52	54	53
5854774	40 Henry Street	GF	57	56	61	60
5854743	2/7 Henry Street	GF	51	51	54	54
5855144	2/7 Henry Street	GF	51	52	56	56
5854759	28A Henry Street	1.FL	54	55	64	64
5855151	16 Kilbirnie Crescent	GF	50	51	58	58
5855152	18 Kilbirnie Crescent	GF	56	57	60	60
5855148	28 Kilbirnie Crescent	GF	52	54	56	56
5855147	30 Kilbirnie Crescent	GF	50	53	55	55
5855146	32 Kilbirnie Crescent	GF	49	52	53	53
5855145	34 Kilbirnie Crescent	GF	50	52	54	54
5855135	38 Kilbirnie Crescent	GF	49	51	53	53
5855133	1/12 Kilbirnie Crescent	1.FL	60	61	64	64
5855134	36A Kilbirnie Crescent	GF	49	52	53	53
5855565	4 Kupe Street	GF	55	55	55	53
5855577	6 Kupe Street	GF	55	55	56	53
5855578	8 Kupe Street	GF	54	55	55	53
5855580	10 Kupe Street	1.FL	54	55	56	54
5855204	19 Moxham Avenue	GF	49	49	51	49
5855302	27 Moxham Avenue	1.FL	57	57	59	58
5855200	30 Moxham Avenue	GF	54	54	56	55
5855202	30 Moxham Avenue	GF	61	61	63	61
5855303	31 Moxham Avenue	GF	54	54	55	54
5855277	32 Moxham Avenue	GF	60	60	62	62
5855301	33 Moxham Avenue	GF	56	56	58	57
5855276	34 Moxham Avenue	GF	55	55	57	54
5855278	34 Moxham Avenue	1.FL	64	64	66	65
5855298	37 Moxham Avenue	GF	57	58	59	58
5855287	38 Moxham Avenue	GF	65	65	66	63
5855299	39 Moxham Avenue	GF	57	57	59	57
5855297	41 Moxham Avenue	1.FL	55	55	57	56
5855295	45 Moxham Avenue	1.FL	58	59	61	58
5855296	47 Moxham Avenue	1.FL	59	59	61	58
5855294	49 Moxham Avenue	1.FL	58	59	61	58
5855285	50 Moxham Avenue	GF	58	58	60	56
5855293	55 Moxham Avenue	GF	56	56	58	54
5855291	59 Moxham Avenue	1.FL	57	57	59	55
5855292	59 Moxham Avenue	1.FL	56	57	58	54
5855271	61 Moxham Avenue	GF	54	54	55	51
5855284	64 Moxham Avenue	GF	57	58	58	54
5855275	66 Moxham Avenue	GF	68	70	69	64
5855273	68 Moxham Avenue	1.FL	55	55	57	52
5855232	69 Moxham Avenue	GF	52	52	56	51
5855241	74 Moxham Avenue	GF	73	73	72	67
5855236	76 Moxham Avenue	GF	53	53	58	53
5855268	77 Moxham Avenue	1.FL	52	52	54	50
5855239	78 Moxham Avenue	GF	53	53	55	51
5855227	79 Moxham Avenue	1.FL	54	54	56	52

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario	Mitigation scenario
(Area 5)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855242	80 Moxham Avenue	GF	72	72	71	66
5855243	80 Moxham Avenue	GF	58	59	59	54
5855247	80 Moxham Avenue	GF	57	57	58	53
5855228	81 Moxham Avenue	1.FL	54	54	56	52
5855226	83 Moxham Avenue	1.FL	55	56	58	53
5855246	84 Moxham Avenue	GF	55	55	56	51
5855234	85 Moxham Avenue	1.FL	56	56	58	53
5855258	86 Moxham Avenue	GF	73	73	72	67
5855235	87 Moxham Avenue	1.FL	55	55	57	52
5855257	88 Moxham Avenue	GF	73	74	72	67
5855245	90 Moxham Avenue	GF	55	55	56	51
5855222	91 Moxham Avenue	1.FL	54	54	56	51
5855244	92 Moxham Avenue	GF	53	53	54	49
5855221	93 Moxham Avenue	GF	53	53	54	49
5855249	94 Moxham Avenue	GF	56	56	57	52
5855220	95 Moxham Avenue	GF	53	53	55	50
5855248	98 Moxham Avenue	GF	56	56	56	52
5855609	100 Moxham Avenue	GF	57	57	58	53
5855610	110 Moxham Avenue	GF	59	60	61	56
5855603	111 Moxham Avenue	GF	55	55	56	52
5855612	112 Moxham Avenue	GF	59	59	60	55
5855608	113 Moxham Avenue	GF	56	56	57	52
5855611	114 Moxham Avenue	1.FL	61	62	63	58
5855613	116 Moxham Avenue	GF	57	58	58	53
5855574	119 Moxham Avenue	GF	57	58	59	54
5855570	120 Moxham Avenue	GF	61	61	62	57
5855575	121 Moxham Avenue	GF	57	57	58	54
5855569	122 Moxham Avenue	GF	61	62	63	58
5855573	123 Moxham Avenue	GF	58	58	59	55
5855568	124 Moxham Avenue	GF	61	62	63	58
5855572	125 Moxham Avenue	GF	58	58	60	55
5854703	126 Moxham Avenue	GF	63	64	65	60
5855571	127 Moxham Avenue	GF	59	59	61	56
5855567	143 Moxham Avenue	GF	56	58	58	53
5855566	145 Moxham Avenue	GF	56	57	57	53
5854706	147 Moxham Avenue	GF	55	55	55	51
5854696	150 Moxham Avenue	GF	59	60	59	55
5854695	152 Moxham Avenue	GF	59	60	59	54
5854712	153 Moxham Avenue	GF	56	56	56	52
5854708	155 Moxham Avenue	GF	53	54	54	51
5854694	158 Moxham Avenue	GF	57	57	56	52
5854711	159 Moxham Avenue	GF	53	54	54	51
5854693	160 Moxham Avenue	1.FL	58	58	58	54
5855165	161 Moxham Avenue	GF	49	49	50	49
5854710	163 Moxham Avenue	GF	52	53	53	51
5854709	165 Moxham Avenue	GF	53	53	54	52
5854716	167 Moxham Avenue	GF	53	53	54	53
5854717	169 Moxham Avenue	1.FL	56	58	59	58
5854718	171 Moxham Avenue	1.FL	74	74	69	69
5854721	172 Moxham Avenue	GF	53	53	54	53
5854722	174 Moxham Avenue	GF	58	60	65	65
5855279	2/36 Moxham Avenue	GF	62	62	64	61
5855289	2/36 Moxham Avenue	GF	54	54	56	54
5855283	1/62 Moxham Avenue	2.FL	71	71	71	66
5855206	2/5 Moxham Avenue	1.FL	52	53	55	54
5854689	1/154 Moxham Ave	GF	66	66	64	59
5854686	1/166 Moxham Ave	GF	65	65	63	58
5854692	1/166 Moxham Ave	GF	54	53	55	51
5855607	117B Moxham Avenue	1.FL	57	58	59	54
5854707	149A Moxham Avenue	GF	55	55	55	51
5854687	156A Moxham Avenue	GF	71	71	70	65
5854688	156A Moxham Avenue	GF	62	62	62	57
5854685	160A Moxham Avenue	GF	68	68	66	62
5854725	172A Moxham Avenue	GF	57	57	61	58
5855203	21A Moxham Avenue	GF	54	54	55	53
5855205	21A Moxham Avenue	GF	50	50	52	50
5854684	4/168 Moxham Ave	GF	59	59	59	55

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario	Mitigation scenario
(Area 5)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5854691	4/168 Moxham Ave	GF	56	56	56	53
5855281	40A Moxham Avenue	1.FL	68	68	69	65
5855288	40A Moxham Avenue	1.FL	62	62	64	62
5855280	44A Moxham Avenue	1.FL	64	65	66	62
5855290	46A Moxham Avenue	GF	57	58	59	58
5855272	65A Moxham Avenue	GF	53	53	54	50
5855231	67A Moxham Avenue	GF	53	54	56	51
5855233	67D Moxham Avenue	1.FL	52	52	55	51
5855263	67D Moxham Avenue	1.FL	52	52	54	50
5855264	67D Moxham Avenue	GF	51	51	52	48
5855265	67D Moxham Avenue	1.FL	52	52	53	49
5855274	70A Moxham Avenue	GF	72	73	71	66
5855250	96B Moxham Avenue	1.FL	57	57	58	53
5854667	121 Overtoun Terrace	1.FL	54	56	57	57
5855105	122 Overtoun Terrace	GF	52	53	54	52
5855109	124 Overtoun Terrace	GF	55	55	57	56
5854648	125 Overtoun Terrace	GF	49	50	52	51
5855110	126 Overtoun Terrace	GF	56	56	58	58
5854649	127 Overtoun Terrace	1.FL	48	48	50	50
5855111	128 Overtoun Terrace	GF	57	58	59	59
5854650	129 Overtoun Terrace	GF	53	54	56	56
5855112	130 Overtoun Terrace	GF	63	63	64	64
5854652	133 Overtoun Terrace	GF	61	61	63	63
5854651	1/131 Overtoun Tce	GF	53	54	56	55
5855225	2 Raupo Street	GF	51	51	52	48
5855229	3 Raupo Street	GF	50	50	51	47
5855224	4 Raupo Street	GF	54	54	56	51
5855230	5 Raupo Street	GF	52	52	54	50
5855223	6 Raupo Street	GF	53	53	54	50
5855266	7 Raupo Street	GF	53	53	55	51
5855267	9 Raupo Street	GF	51	51	53	49
5855260	15 Raupo Street	GF	52	52	54	50
5854679	6 Ruahine Street	GF	66	67	66	61
5854678	8 Ruahine Street	GF	68	69	67	62
30537	10 Ruahine Street	GF	69	70	68	63
5855252	12 Ruahine Street	GF	69	69	67	62
5855255	14 Ruahine Street	GF	68	69	67	62
5855253	16 Ruahine Street	GF	69	71	69	64
5855254	18 Ruahine Street	GF	74	75	72	67
5855256	20 Ruahine Street	GF	70	72	70	65
5854746	2 Samoa Street	GF	45	48	49	49
5855286	18 Tapiri Street	1.FL	61	62	63	59
5855282	22 Tapiri Street	GF	65	65	66	62
5854744	10/6 Vallance Street	1.FL	46	49	51	51
5855136	10/6 Vallance Street	GF	48	49	51	50
5855137	10/6 Vallance Street	GF	47	47	49	49
5855212	28 Waitoa Road	1.FL	48	48	49	48
5854713	3 Walmer Street	1.FL	53	54	55	55
5855158	4 Walmer Street	GF	53	55	55	55
5855162	5 Walmer Street	1.FL	55	57	57	57
5855157	6 Walmer Street	GF	50	50	51	51
5855167	8 Walmer Street	GF	52	53	53	52
5855164	9 Walmer Street	1.FL	52	52	54	53
5855579	10 Walmer Street	GF	52	52	53	51
5855166	11 Walmer Street	GF	51	53	53	53
5855163	7A Walmer Street	GF	52	52	54	53
5854669	4 Wellington Road	GF	52	53	55	55
5854670	4 Wellington Road	GF	69	69	69	69
5854646	6 Wellington Road	GF	71	71	70	70
5854647	6 Wellington Road	GF	54	55	57	57
5854645	8 Wellington Road	GF	69	69	68	68
5854653	10 Wellington Road	GF	52	53	53	53
5854654	10 Wellington Road	GF	68	68	67	67
5854655	12 Wellington Road	GF	67	68	68	68
5855108	14 Wellington Road	GF	71	71	70	70
5855115	16 Wellington Road	GF	71	71	70	70
5855114	18 Wellington Road	GF	71	71	69	69

ID No.	Address	Floors	Existing scenario	Do-nothing scenario	Do-minimum scenario	Mitigation scenario
(Area 5)			dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)	dB LAeq(24h)
5855118	20 Wellington Road	1.FL	70	71	69	69
5855119	22 Wellington Road	GF	71	71	68	68
5855116	24 Wellington Road	GF	72	72	68	68
5855117	24 Wellington Road	GF	58	59	59	59
5855132	32 Wellington Road	GF	71	71	66	66
5855131	34 Wellington Road	GF	72	72	66	66
5855156	36 Wellington Road	GF	70	71	66	66
5855154	38 Wellington Road	GF	68	69	66	66
5855159	40 Wellington Road	GF	66	67	64	64
5855161	44 Wellington Road	GF	71	71	67	67
5854714	52 Wellington Road	GF	73	74	67	67
5854715	54 Wellington Road	GF	73	74	67	67
5854720	56 Wellington Road	GF	74	74	67	67
5854719	58 Wellington Road	GF	73	73	67	67
5854644	8A Wellington Road	GF	52	52	54	54
5855215	4 William Street	GF	47	48	50	48
5855214	6 William Street	GF	46	46	48	47
5855216	8 William Street	GF	46	47	48	47
5855213	10 William Street	GF	47	47	49	47
5855219	12 William Street	GF	47	47	48	46
5855217	16 William Street	GF	50	50	52	50
5855305	18 William Street	GF	52	52	53	53
5855300	22 William Street	1.FL	51	52	53	53
5855304	2/20 William Street	GF	51	52	53	52
5855218	14A William Street	GF	49	49	51	49
5855262	11 Zohrab Street	GF	49	49	50	46