



Project: **TUPENGA | SH29/SH29 TAURIKO WEST**

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Attention: **s9(2)(a)**

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1.0 EXECUTIVE SUMMARY

I have assessed traffic noise against the criteria of NZS 6806:2010, in relation to the predicted change in noise level and relevant UK guidance. The Project will introduce a new noise source in addition to the existing major roads, into what is currently a largely semi-rural and suburban area with some commercial uses.

The Project will run roughly parallel to, and include some work on, the existing SH29 and SH29A. The existing SH29 and SH29A generally control the ambient sound levels in the vicinity of the Project. Therefore, the change in noise level will be less than would otherwise be expected for a new road.

The Project does not result in sufficient effects to warrant an assessment under NZS 6806. Noise level changes will generally be slight, and in many instances, noise levels will reduce due to the Project moving traffic further away from PPFs.

Nevertheless, I used NZS 6806 as the baseline to assess the effects of the Project. Due to the influence of the existing roads on the sound environment, I have assessed most of the protected premises and facilities (PPFs) against the “Altered road” criteria of NZS 6806, with only two clusters (four PPFs) against the “New road” criteria.

Traffic noise levels will be managed through the use of low noise road surface. This surface material is prescribed by NZTA’s Design Guidelines for Roads of National Significance. No further mitigation, e.g. in the form of barriers, is required for any of the existing sensitive receivers.

Tauriko School will be relocated as part of the Project, and I understand that NZTA and the Ministry of Education are negotiating the terms of that move. I have assessed the new school site. Since no detailed information is available at this stage, my assessment is based on a preliminary potential layout. I consider that, for the potential layout, the school site can be mitigated with the use of a barrier so that school buildings can be naturally ventilated, or alternatively, mechanical ventilation may be installed in the buildings to enable windows to remain closed. Either option would achieve suitable internal noise levels in classrooms that conform with the Ministry of Education’s relevant guidelines. However, specific mitigation will need to be reviewed once the school layout is known.

The Tauriko West urban development area has not yet obtained building consents for its new subdivision. Therefore, any noise mitigation should be incorporated by the future developers into the design, taking account of traffic noise from the Project.

Overall, I consider the Project has negligible noise effects and can be operated to generate reasonable noise levels at all PPFs.

2.0 INTRODUCTION

The Project is described in detail in the Substantive Application Report. I have not repeated this information here.

2.1 Purpose and scope

The purpose of this report is to assess the potential traffic noise effects from the Project on the receiving environment once the Project becomes operational. Traffic vibration is also briefly discussed.

This assessment covers the following:

- The existing environment
- The traffic noise assessment methodology
- Assessment of traffic noise effects and
- Proposed mitigation measures

The Glossary of Terminology (for technical terms) is included in Appendix A.

2.2 Qualifications and Experience

My name is Siiri Wilkening. I am an acoustics consultant, and a Director of Marshall Day Acoustics Ltd (MDA). MDA is a specialist acoustics consultancy of about 100 professional acoustics consultants, founded in 1981, with offices in New Zealand, Australia, Hong Kong/China, and France. I have worked at MDA for 27 years.

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).

My experience relevant to this Application includes:

- I was the expert witness on many Roads of National Significance, 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.
- 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 these projects 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.
- 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.

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.

2.3 Code of Conduct

Although this Project is not being considered before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses as contained in section 9 of the Environment Court Practice Note 2023. I agree to comply with that Code. I am satisfied that the matters which I address in this Operational Noise and Vibration Assessment are within my area of expertise, except where I

state that I am relying on information provided by another person or expert. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

3.0 EXISTING NOISE ENVIRONMENT

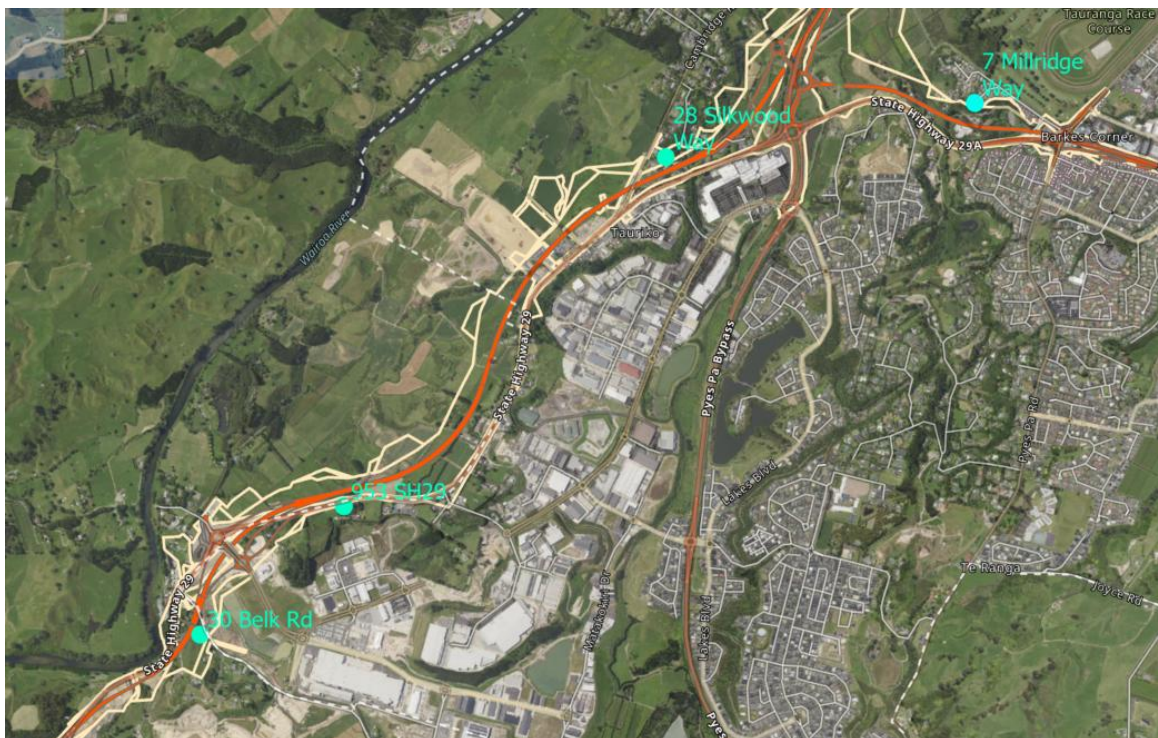
The existing noise environment provides a baseline for assessing noise effects. In addition, measured sound levels for locations in the vicinity of existing major roads are used to verify the computer noise model. The existing sound environment at most of the dwellings is controlled by traffic on the existing SH29 and SH29A or major local roads such as Cambridge Road.

3.1 Ambient noise surveys

My colleagues at MDA undertook long duration unattended surveys of the existing ambient noise environment across the Project under my supervision. Noise levels were measured at four positions¹ for multiple days during November and December 2025 (see Figure 1). The positions were chosen to reflect most of the proposed alignment, be outside the designation and experience road traffic noise from existing roads.

A detailed summary of each survey is attached in Appendix B. The surveys generally followed the requirements of the NZTA noise monitoring requirements.² Measurements were undertaken over several days to obtain data across different traffic flow scenarios, weather conditions and weekday/weekend.

Figure 1: Ambient sound survey locations



I then used the noise survey results to determine the 24-hour sound levels at each location. All noise survey results are set out in Table 1.

¹ Two locations (30 Belk Road and 28 Silkwood Way) are now within the designation boundary.

² <https://www.nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Noise-and-vibration/Assessment/NZTA-Noise-monitoring-requirements-V1.0.pdf>

Table 1: Noise level survey results (from west to east)

Location	Coordinates	Survey period	Duration (days)	Measured sound level dB LAeq(24h)	Background sound level dB LA90
7 Millridge Way	37°44'00.8"S 176°07'04.4"E	28/11/2025 8/12/2025	10	53	50
28 Silkwood Way	37°44'11.3"S 176°06'03.4"E	28/11/2025 9/12/2025	11	50	47
953 SH29	37°45'10.2"S 176°04'58.8"E	9/12/2025 16/12/2025	7	50	42
30 Belk Road	37°45'31.8"S 176°04'31.7"E	9/12/2025 16/12/2025	7	47	41

3.2 Existing noise modelling

I used a computer noise model to calculate the existing noise levels at all dwellings within 100 metres of the indicative alignment for the Project in urban areas, and within 200 metres in rural areas as defined by Statistics NZ.³ The computer model of the existing situation includes the existing State Highways and all major local roads. More details about the computer noise modelling are included in Section 4.1.1.

I measured sound levels to verify the results from the computer noise model for the existing situation. The results are set out in Table 2 below.

Table 2: Computer noise model verification

Location	Measured Level dB LAeq(24h)	Predicted Level dB LAeq(24h)	Difference decibels
30 Belk Road	47	50	+3
953 State Highway 29	50	53	+3
28 Silkwood Way	50	56	+6
7 Millridge Way	53	60	+7

Based on above, the measured and predicted noise levels show good agreement at 30 Belk Road and 953 State Highway 29.

The two locations where the prediction diverges significantly from the measured levels, are discussed below.

At 28 Silkwood Way, the predicted noise level is 6 dB higher than the measured level. This difference may be attributable to temporary traffic conditions at the time of measurement. Roadworks were underway on Cambridge Road and nearby State Highway 29 (for the Tauriko West enabling works), including associated road closures. In addition, observed vehicle speeds were generally lower than the posted speed limits (60 km/h on Cambridge Road and as low as 70 km/h on State Highway 29). During peak periods, significant congestion was observed near the intersection, with vehicles

³ Statistics NZ defines the urban area and rural areas: <https://datafinder.stats.govt.nz/layer/120965-urban-rural-2025/>

travelling at reduced speeds. These factors are likely to have affected measured noise levels relative to the modelled scenario, which assumes free-flow traffic conditions at posted speeds.

At 7 Millridge Way, the predicted noise level is 7 dB higher than the measured level. Similar to the above location, significant congestion was observed on State Highway 29A during peak periods, with reduced vehicle speeds. Lower traffic speeds typically result in reduced noise emissions. In addition, the chipseal surface on SH 29A appeared to be worn, which may also have contributed to lower measured noise levels compared with the assumed surface condition in the model.

The paper ‘Uncertainty of road-traffic noise prediction in New Zealand’⁴ states that indicative uncertainties between ± 5 dB and ± 8 dB can be observed for the range of conditions typically described by NZ road-traffic noise assessments, with sensitivity to factors such as screening, road surface type, and distance from the road edge line to the survey location. This means that the results are within the bounds of uncertainty for the distances of the survey positions to the existing road edge.

Overall, I consider the model performs to a generally satisfactory accuracy and is suitable to be used to predict existing and future noise levels for the PPFs in the vicinity of the Project.

4.0 ASSESSMENT METHODOLOGIES

4.1 Traffic noise

I have assessed the operational noise effects of the Project on people based on:

- The noise criteria categories of NZS 6806:2010 Acoustics – New and altered roads – Road-traffic noise (NZS 6806);
- The potential noise level changes due to the Project; and
- The UK Planning Guidance.

NZS 6806 sets noise criteria categories for new and altered roads which provide for primary and secondary preferred outdoor noise levels (Categories A and B), and a backstop internal noise level (Category C). Most of the Project is assessed against the altered road criteria as the existing ambient noise environment is already controlled by traffic noise on the existing SH29 and SH29A. Only a small number of PPFs are assessed against the new road criteria where they are remote and less affected from existing road noise.

The change in noise level is an important measure to determine what effect a project will have on the environment. Where the noise level with the Project does not change significantly, that shows that a project has little adverse effect on neighbouring houses. This test is also required to determine if NZS 6806 applies.

The UK Planning Guidance does not set “criteria”. It enables an assessment of the noise effects of a project on people’s daily lives. For instance, where the existing noise levels are high, and remain high or change only marginally, people are already used to the noise levels and would not change their day-to-day activities. Where existing noise levels are very low, and would increase by a noticeable margin, while noise levels may still be “comparatively” low, people are used to a certain amenity and may change how they go about their daily lives (e.g. closing windows at night).

Each assessment methodology addresses a different aspect of traffic noise, and therefore utilising all three can provide a more holistic picture than just applying NZS 6806 by itself.

Additional detail about each of these assessment methodologies is included in Appendix C.

⁴ New Zealand Acoustics Journal: Volume # 36 Issue # 2, ISSN 0113-8359. https://acoustics.org.nz/wp-content/uploads/ASNZ_2023_V362_Opt.pdf

4.1.1 Computer noise modelling

The propagation of road traffic noise is affected by multiple factors, including:

- Terrain elevations, including shielding from intervening terrain and exposure due to elevation;
- Ground condition, including absorptive (e.g. grass or vegetation) or reflective ground (e.g. water);
- Atmospheric conditions, including wind or temperature inversions; and
- Road parameters, including road surface, traffic speed, vehicle types and gradient.

Because of these factors and their interaction, computer noise modelling is a vital tool in predicting traffic noise impacts in the vicinity of major roads. It provides a comprehensive and overall picture of noise impacts, by taking into consideration all the factors potentially affecting noise propagation.

For this assessment, I have used the software 'SoundPLAN' V9.1, which is an internationally recognised computer noise modelling programme. In summary, SoundPLAN uses a three-dimensional digital topographical terrain map of the Project area as its base. It also includes data for existing buildings and structures (including auxiliary buildings). I digitised road traffic noise sources into the model, with road lanes located on the terrain file. The model settings are described Table 3 below.

Table 3: Road traffic noise modelling parameters

Parameter	Setting/source
Software	SoundPLAN V9.1
Algorithm	Calculation of Road Traffic Noise
Reflection	Calculation of Road Traffic Noise
Conversion	$L_{A10(18h)}$ to $L_{Aeq(24h)}$ -3 dB
Ground absorption	0.6 for urban areas; 1 for rural areas
Receiver height	1.5 m above height of each floor
Noise contour grid	1.5 m height, 5 m resolution
Receivers and grid position	Free-field

The SoundPLAN model uses the calculation algorithms of the "Calculation of Road Traffic Noise"⁵ methodology, which is referenced in NZS 6806 in Section 5.3.2. The algorithms account for the factors set out above, including relevant atmospheric and ground conditions within appropriate parameters. Adjustments for New Zealand road conditions, specifically road surface types, are also included in the model. As a result, the modelling results can be compared with the relevant criteria without further adjustment.

Based on the NZTA Guide to assessing road-traffic noise, February 2024, Table A1, I used the following road surface correction for the modelled road surface materials of the different scenarios (prior to adjustment from $L_{A10(18h)}$ to $L_{Aeq(24h)}$):

- Chip seal (Grade 2/3) +6
- Stone mastic asphalt (SMA14) +2

⁵ Department of Transport Welsh Office ISBN 0 11 550847 3), including Annex 4 Additional Advice to CRTN Procedures (August 2008)

- Stone mastic asphalt (SMA10) 0
- LN3 (EPA7 40mm) -3
- LN5 (EPA7 50mm) -5

Based on the Standardised Designs – NZTA Standardised design solutions for use on State Highway Roads of National Significance (Version 3.0, June 2025)⁶, the do-minimum scenario (where the Project is built with no noise mitigation) allowed for the following surfaces:

- LN3 (EPA7 40 mm) on the main alignment for SH29 and SH29A, except where sensitive receivers are indicated to be affected by high traffic noise levels;
- LN5 (EPA7 50mm) on the main alignment for SH29 and SH29A in the vicinity of groups of sensitive receivers that are predicted to receive noise levels in Category B or C;
- SMA14 on all ramps, interchanges and local roads except as set out below; and
- SMA10 at Barkes Corner (ramps), Cameron Road, Pyes Pa Road, and the existing SH29A retained as local road
- Chip seal on some local roads where this is the current road surface.

In addition, the Project team has provided a Speed Limit Overview Plan. The proposed speed limits for the main alignment range from 80 to 110 km/h. Speed limits for other roads (including local roads and ramps) have been modelled at 50 to 110 km/h. I have included these speed limits in our model for the do-minimum scenario.

For the existing and do-nothing scenarios (refer Appendix C1), I have used the posted speed limits.

The road parameters entered into the model are set out in Table 4. Traffic data was provided by the client.

⁶ <https://nzta.govt.nz/assets/resources/standardised-designs/nzta-standardised-designs-solutions.pdf>

Table 4: Road parameters

Road Corridor	Existing 2025		Future 2048 (no Project) Do-nothing		Future 2048 (with Project) Do-minimum	
	AADT (vpd)	HCV (%)	AADT (vpd)	HCV (%)	AADT (vpd)	HCV (%)
State Highway 29 Offline						
Redwood Ln to Takitimu Dr	N/A	N/A	N/A	N/A	14,500	20.1
Takitimu Dr to Barks Corner	N/A	N/A	N/A	N/A	23,900	10.4
State Highway 29						
Omanawa Rd to Redwood Ln	17,311	15.6	21,400	16.7	21,600	16.7
Redwood Ln to Gargan Rd	17,311	15.6	32,500	13	12,800	10
Gargan Rd to Access Rd next to Tauriko School	17,311	15.6	31,900	12.4	14,500	13.1
Access Rd next to Tauriko School to Cambridge Rd	17,311	15.6	45,700	8.1	23,900	8.3
Cambridge Rd to Takitimu Dr	25,071	7.5	49,300	6.9	23,100	7
Takitimu Dr	7,187	14.2	29,000	11.8	43,600	13.5
State Highway 29A						
Takitimu Dr to Barks Corner	29,622	7.5	41,800	10.5	41,000	7.5
East of Barks Corner	21,383	7.5	30,900	11.1	23,100	10.5
State Highway 36						
Takitimu Dr	5,984	11	4,900	11.8	43,200	9.7
Local Roads						
Redwood Ln	240	6.5	8,100	4.3	9,000	4.3
Kaweroa Dr	1,500	26.5	13,600	17.3	10,300	17.5
Cambridge Rd	12,800	10.5	17,500	5.7	14,900	5.7
Cameron Rd	17,100 – 18,600	7	18,700 – 20,000	6	17,500 – 21,000	6
Pyres Pa Rd	16,000	5	17,100	3.3	16,700	3.3

4.1.2 Noise level predictions

I have predicted noise levels for all PPFs, for all relevant scenarios, in the tables in Appendix D. The cells are coloured green (for NZS 6806 Category A), yellow (for Category B), and red (for Category C). The classification of these PPFs, i.e. if they are assessed against the new or altered road criteria, are shown in the drawings in Appendix D, and the individual noise levels are shown in the tables in Appendix E.

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 with SoundPLAN by interpolating a large number of individual receiver points. Therefore, noise contour

maps should not be used to “read” noise levels for specific locations. In the noise level contour plans, I have also shown NZS 6806 noise criteria categories for the PPFs as a graphic representation on the figures by colouring the buildings with the same colour scale as for the tables in Appendix E. Any buildings not shown in these three colours on the figures are not PPFs, e.g. garages, sheds, or business premises.

Noise contour plans are contained in drawings in Appendix F. These plans show interpolated noise level bands at 5 decibel intervals from 45 dB to 75 dB $L_{Aeq(24h)}$.

4.2 Traffic vibration

Traffic vibration is usually only generated when heavy vehicles drive over bumps or dips in the road. I have determined the road traffic vibration risk by reviewing data of heavy vehicles travelling on existing roads with a range of surface conditions. For a newly sealed pavement, the risk contour is less than 2 metres from the road edge. There will be no receivers outside the Proposed Designation this close to the traffic lane edge. Therefore, I do not consider that traffic vibration needs to be assessed for the Project.

5.0 ASSESSMENT OF TRAFFIC NOISE EFFECTS

This section describes the assessment of traffic noise effects from the Project on PPFs within 100m of the indicative alignment in urban areas and 200m of the rural areas. The assessment considers:

- The new and altered road criteria of NZS 6806;
- The noise level change that would be caused by the Project; and
- The UK Planning Guidance in relation to people’s responses to the noise level and noise level change.

Below, I discuss the traffic noise assessment for all PPFs, as well as effects relating to specific areas such as the new school site, a new residential subdivision and an existing outdoor area.

5.1 NZS 6806

5.1.1 Applicability test

I tested if the Project falls under the provisions of NZS 6806. That is only the case where noise levels received are above Category A and:

- For PPFs assessed against the new road criteria, where the noise at any one PPF is predicted to increase by 3 dB $L_{Aeq(24h)}$ or more when compared with the existing noise environment.
- For PPFs assessed against the altered road criteria, either of the following applies:
 - o The do-minimum noise environment would be greater than or equal to 64 dB $L_{Aeq(24h)}$ and the alterations would increase road traffic noise by 3 dB or more when compared with the do-nothing noise level at any PPF, or
 - o The do-minimum noise environment would be greater than or equal to 68 dB $L_{Aeq(24h)}$ and the Project would increase the noise level by 1 dB or more when compared with the do-nothing noise level at any PPF.

The do-nothing scenario (where the Project is not built) shows that noise levels at the PPFs are approximately two to three decibels higher in the design year (2048) than at present, due to the projected increase in traffic volumes over time. This indicates that if the Project does not go ahead, noise levels will continue to increase.

The do-minimum scenario (where the Project is built but no specific noise mitigation implemented) shows that noise levels will not change noticeably for the majority of PPFs and will in most instances

remain similar or reduce. For those PPFs where the traffic noise level is predicted to increase by 3 dB or more, noise levels will be within Category A.

This means that the Project does not fall within the provisions of NZS 6806 in accordance with Sections 1.2.3. and 1.5.2 of NZS 6806 as it does not have sufficient effects on the environment to warrant investigation of further mitigation.

5.1.2 Summary of results

In order to undertake the NZS 6806 screening assessment, I divided the Project into clusters, which represent individual assessment areas that are affected by similar sections of road. The location of all clusters is shown in Appendix D. Individual predicted noise levels for all clusters are shown in Appendix E and figures showing the location of the PPFs are included in Appendix F.

I have summarised the number of PPFs in each category for all clusters in Table 5 below.

Table 5: Number of PPFs in each category

Noise Criteria Category	Existing scenario	Do-nothing scenario	Do-minimum scenario
A	120	108	161
B	23	23	8
C	28	38	1

There are only two PPFs (7 and 9 Rosewood Lane) where I predict a change in noise criteria category from A to B. In both cases, the noise level change is only 1 decibel or less, and the predicted noise level is at the lowest end of Category B, i.e. 65 dB $L_{Aeq(24h)}$. For all other PPFs, the noise criteria category remains the same or becomes a more stringent category (e.g. moving from Category B to Category A).

There is only one PPF (40 Elderton Ave) where I predict a noise level in Category C. For this PPF, the noise level would remain unchanged with the Project in place despite the increase in traffic volume. Therefore, no mitigation is recommended.

The individual noise levels predicted for these clusters are shown in Appendix E and Appendix F.

5.2 Change in noise level

Overall, noise level changes range from -21 dB to +8 dB across all PPFs. The average noise level change is -5 dB. Those PPFs where a noticeable noise level increase is predicted, would still receive noise levels in Category A.

I have summarised the number of PPFs assessed against the altered and new road categories, by noise level change, in Figure 2 and Figure 3 respectively.

Figure 2: Numbers of Altered Road PPFs by noise level change

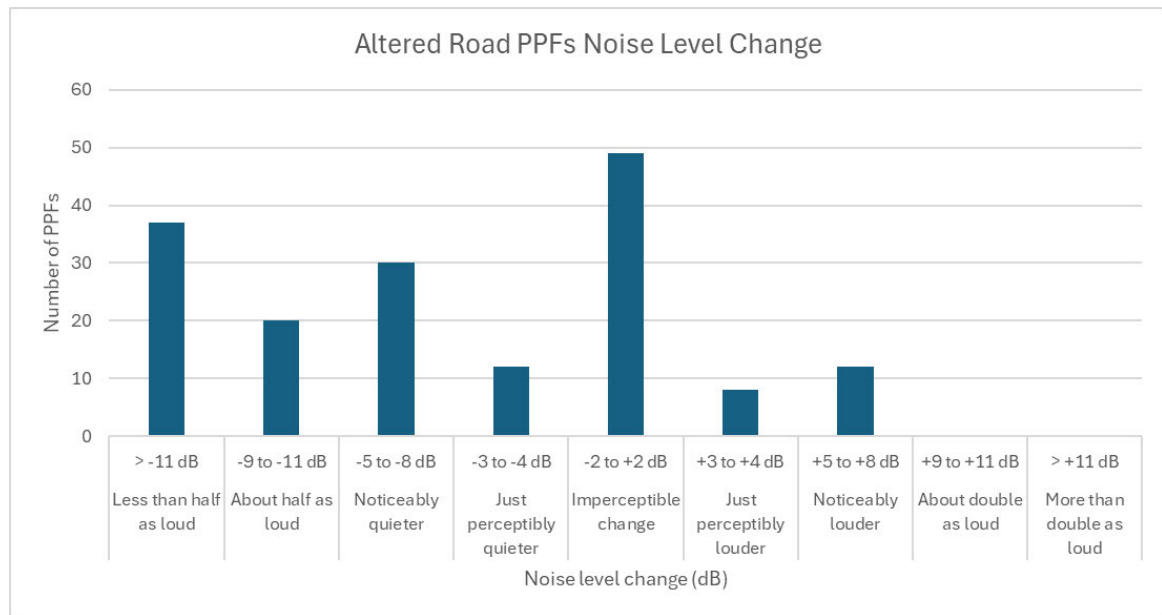
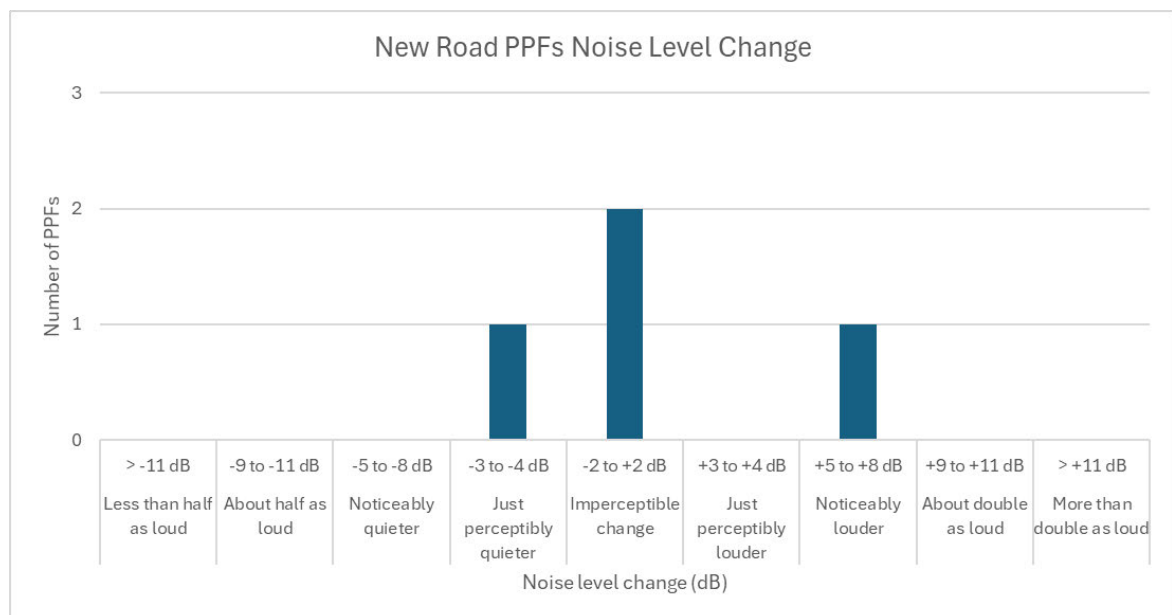


Figure 3: Numbers of New Road PPFs by noise level change



Where noise levels are predicted to increase noticeably (12 PPFs⁷ assessed against the altered road criteria and one PPF (9813L SH29) assessed against the new road criteria), the predicted noise levels will remain in Category A in all cases.

5.3 UK Planning Guidance

While many PPFs receive currently, and in the future, noise levels above 55 dB $L_{Aeq(24h)}$, the Project results overall in a reduction in noise level. Noise level increases are mostly occurring within Category A levels, and reductions occur for many PPFs with noise levels in Categories B and C.

Most of those already receive noise levels of that magnitude or higher, and I consider that people are habituated to these noise levels and unlikely to be adversely affected by their continuation. It is

⁷ 3 Dumfries Place, 8, 11, 12, 17, 21, 25, 33 and 42 Havensbrook Way, 8 Kirtle Close, 7 Marshall Avenue and one PPF at Orange Grove Village.

unlikely that people will change their behaviours because of the Project. While noise levels may be “present and intrusive” at present, this will not change for most PPFs. For some PPFs, noise levels will reduce sufficiently to move into the “present and not intrusive” category.

Overall, I consider that the Project would not result in new adverse noise exposure effects for the PPFs.

5.4 Noise exposure effects

Our 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.

The World Health Organisation (WHO) has identified that noise levels above 50 dB L_{Aeq} ⁸ may cause adverse health effects. Exposure to high noise levels can result in a reduction in sleep quality, awakenings, annoyance, lack of concentration, which in turn may affect people’s health. This means that as levels increase further, more focus is applied to management, mitigation, and land use planning to reduce effects.

I consider achieving the 50 dB L_{Aeq} guideline value 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 locations because of the Project’s low noise road surface and the current and anticipated urban development in the vicinity of the Project. However, the threshold does provide a useful indication of overall effects in addition to the assessment in accordance with NZS 6806.

Many PPFs currently experience noise levels from existing roads that are similar to or higher than those predicted as a result of the Project. Noise levels above 50 dB L_{Aeq} can occur at considerable distances from the road and are therefore not limited to PPFs in the immediate vicinity of the alignment. The proposed low noise road surface will benefit those dwellings further away, as well as the wider area.

Another aspect of people’s reaction to a Project relates to habituation, i.e. “getting used to” the ambient noise level. This occurs over time. Any change in the environment, such as 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 typically diminishes.

5.5 Tauriko School new location

Tauriko School will need to be relocated to enable the construction of the Project. I understand that NZTA and the Ministry of Education are negotiating the terms of the relocation, including potential noise mitigation.

The new location for the school is at 764 SH29. The site boundary is approximately 60 metres from the new SH29 Offline corridor (at its closest point). A draft layout for the new school site shows that the school buildings are more than 140 metres from the new SH29 Offline corridor.

The Ministry of Education’s Designing Quality Learning Spaces (DQLS) guidelines for acoustics require an internal noise level of 40 dB L_{Aeq} in learning and breakout spaces to be achieved. That is the internal design level to which the school will likely be designed.

I have predicted external traffic noise levels across the school site in 0.

⁸ The 2018 WHO guidelines recommend an external road traffic noise level of 53 dB L_{den} . This converts to approximately 50 dB $L_{Aeq}(24h)$

With implementation of the Project without mitigation (do-minimum scenario), most of the school buildings are predicated to experience noise levels between 55 and 57 dB $L_{Aeq(24h)}$, which would equate to approximately 42 to 45 dB $L_{Aeq(daytime)}$ inside with windows ajar for ventilation.

With these noise levels, internal noise level requirements can be achieved by closing windows and using mechanical ventilation instead of natural ventilation or only opening windows on the building side facing away from the road. If this ventilation strategy is adopted, no additional acoustic treatment is required.

Alternatively, if a 2 m high barrier is installed along and inside the site boundaries, as shown in Figure 4, this would reduce external noise levels to below 53 dB $L_{Aeq(24h)}$. Such a barrier would also provide mitigation for outdoor play areas. The most effective barrier location is along the site boundaries rather than the designation boundaries due to topography.

Figure 4: Indicative barrier location for school



The existing SH29 contributes to the noise levels received at the school site. Therefore, upgrading the road surface on the Project to LN5 is not sufficient to reduce the noise levels to below 55 dB $L_{Aeq(24h)}$.

I consider that the school site can be designed to ensure that school buildings can use natural ventilation, i.e. open windows. This can be achieved by placing barriers in appropriate locations. The final mitigation form and location will need to be refined and updated once the site layout of the school buildings is known.

5.6 Tauriko West urban growth area – Classic Development subdivision

An existing resource consent is in place for a proposed residential development at 800 and 820 SH29. The subdivision is intended to include a 200-unit retirement village and a total of 1,200 residential lots. The closest lots within the development are approximately 55 metres from the proposed designation.

I calculate that noise levels could potentially be up to 60 dB $L_{Aeq(24h)}$ at the most exposed façades of the closest potential dwellings, without additional mitigation (i.e. only with the low noise road surface LN3 included in the Project design). Predicted noise levels both for the do-nothing and do-minimum situations across the development are shown in Appendix H. I have provided this information for any future developer to incorporate appropriate mitigation into the subdivision and building design, to achieve suitable internal and external noise levels.

The Tauranga City Plan rule 4E.2.5 requires new noise sensitive activities establishing within reverse sensitivity plan areas to be insulated to meet 40 dB $L_{Aeq(24h)}$ inside with ventilation.

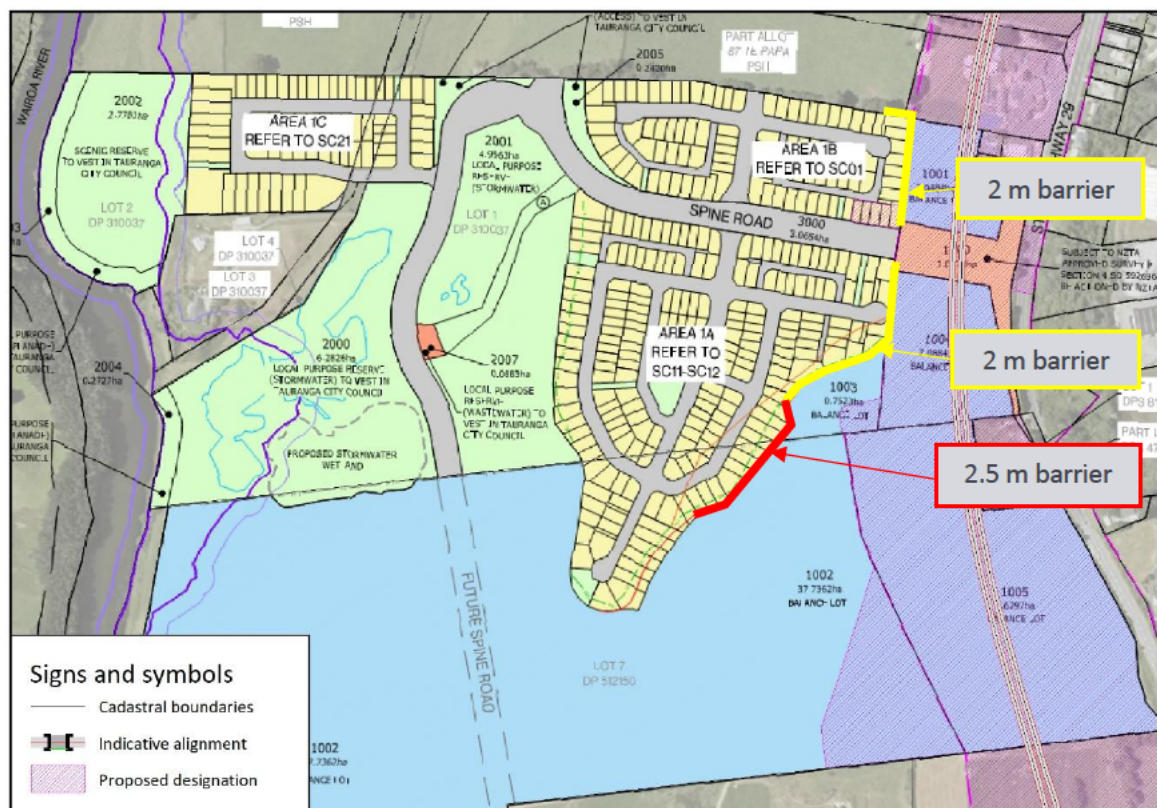
Noise levels would drop off with distance from the Project. This means that different areas within the subdivision would be subject to different traffic noise levels, and therefore would need different levels of mitigation to achieve suitable internal noise levels as follows:

- For dwellings where predicted façade incident noise levels are up to 55 dB $L_{Aeq(24h)}$, no mitigation is required.
- For dwellings with predicted levels between 55 and 60 dB $L_{Aeq(24h)}$, mechanical ventilation should be installed so that windows can remain shut and ensure that internal noise levels are appropriate (i.e. 40 dB $L_{Aeq(24h)}$ or lower).
- Alternatively, a 2 m and 2.5 m high acoustic barrier along the subdivision boundaries could be installed, as shown in Figure 5 overleaf. This barrier would achieve mitigation for the ground floor level. If the subdivision is intended to contain double storey dwellings, the barrier would not be effective for the upper floor, and treatment as per the above bullet points would be appropriate.

The most effective mitigation measure would be to ensure that houses are designed to contain non-sensitive spaces facing the road (e.g. bathrooms or hallways) and have minimum windows toward the Project. This would minimise the requirement for additional building upgrades during construction.

In any event, mitigation should be incorporated into the design of the subdivision at the time of subdivision planning, taking guidance from the noise level contours provided in Appendix H.

Figure 5: Potential barrier locations for the Tauriko West urban growth area



I predict current existing noise levels of 59 to 66 dB $L_{Aeq(24h)}$ and noise levels of 62 to 69 dB $L_{Aeq(24h)}$ for the do-nothing scenario without the Project. The western part of the outdoor area is higher and more exposed to the traffic noise and therefore receives noise levels at the upper end of the predicted levels.

With the Project implemented (do-minimum scenario), I predict that noise levels will remain similar to existing noise levels (59 – 66 dB $L_{Aeq(24h)}$), i.e. a reduction in noise level compared with the do-nothing scenario.

5.8 Other traffic noise sources

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.

These include:

- Bridge joints where traffic needs to pass over a metal piece which may cause a bump/impact of the tyre
- Audible tactile profiles (ATP) which, if installed close to dwellings and close to the live traffic lane, can cause additional noise if traffic routinely passes over them
- Trucks using engine brakes or generally braking as they approach an off ramp and
- Vehicles accelerating into main traffic from an onramp

Each of these 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 from ramps, engine braking).

Good design can reduce the change in noise level or character. For instance, ATP should not be installed within 100m of dwellings, and potential adverse noise effects should be evaluated before installation.⁹ Similarly, engine braking by traffic, and especially trucks, can be reduced if road design clearly indicates a drop in speed environment (e.g. where the Project with its 110 km/h speed limit approaches the existing SH29 with its 100 km/h speed limit), enabling truck drivers to pre-empt the speed reduction.

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 the road surface does not noticeably affect that noise generation and barriers only achieve a partial reduction in noise level.

Each of the above aspects would be taken into consideration during the detailed design of the road by applying the relevant NZTA guidelines, to ensure that unnecessary and unreasonable noise generation is avoided. NZTA has a comprehensive set of design criteria dealing with the above issues, which in my opinion, will ensure that the best practice measures will be included at the design stage.

⁹ <https://www.nzta.govt.nz/assets/resources/audio-tactile-profiled-roadmarkings-guidelines/docs/atp-guidelines.pdf>

5.9 Summary of traffic noise mitigation

As discussed, the Project does not have adverse traffic noise effects on the environment with the road surface (LN3 and LN5) implemented in accordance with the NZTA RoNS Guidelines. Therefore, no mitigation is proposed beyond the use of low noise road surface.

The proposed new school site will likely require mitigation to achieve the internal design noise levels for classrooms. Mitigation could be in the form of a noise barrier along the site boundary or mechanical ventilation for classrooms. The specific mitigation required will need to be confirmed once the school layout has been determined.

I have provided noise level contours across the Tauriko West urban growth area (i.e. the Classics Development subdivision site) to provide an indication for any future developer of the site to design any potential houses to achieve appropriate internal noise levels. Appropriate outcomes could be achieved either by choosing an appropriate subdivision and dwelling layout, providing a noise barrier or providing mechanical ventilation for habitable rooms.

Other noise sources such as ATP, bridge joints and similar aspects will be designed to reduce noise generation as far as practicable and in line with accepted and commonly used NZTA design standards.

6.0 RECOMMENDATIONS

I recommend that:

- Traffic noise from the Project to be measured and assessed in accordance with NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads;
- Traffic noise be mitigated using LN5 road surface at Barkes Corner, and using LN3 for the remainder of the main alignment in accordance with NZTA's RoNS Guidelines, as well as SMA or similar material for any high friction areas such as ramps, intersections or roundabouts;
- Traffic noise mitigation for the new Tauriko School site is refined once the layout of the buildings on site is provided by the Ministry of Education, and may include traffic noise barriers at the relevant site boundaries and/or mechanical ventilation for buildings where an appropriate internal noise level can only be achieved with windows closed;
- The Tauriko West urban growth area (Classic Development site) could be provided with the noise level contours to enable good planning and the implementation of traffic noise mitigation by the developer to comply with the provisions of the Tauranga City Plan; and
- Other traffic noise sources such as bridge joints and ATP be taken into consideration when designing the road, as well as design options that may reduce braking noise, in accordance with NZTA standard design guidelines.

APPENDIX A GLOSSARY OF TERMINOLOGY

Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Hertz (Hz)	Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).
Noise	A sound that is unwanted by, or distracting to, the receiver.
Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
dB	Decibel The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \text{ mPa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
dBA	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
$L_{Aeq}(t)$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.
$L_{A10}(t)$	The A-weighted noise level equalled or exceeded for 10% of the measurement period. This is commonly referred to as the average maximum noise level.
(t)	The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
NZS 6806:2010	New Zealand Standard NZS 6806:2010 "Acoustics - Road-traffic noise - New and altered roads"
Vibration	When an object vibrates, it moves rapidly up and down or from side to side. The magnitude of the sensation when feeling a vibrating object is related to the vibration velocity. Vibration can occur in any direction. When vibration velocities are described, it can be either the total vibration velocity, which includes all directions, or it can be separated into the vertical direction (up and down vibration), the horizontal transverse direction (side to side) and the horizontal longitudinal direction (front to back).
LN3	Epoxy-modified porous asphalt with a maximum chip size of 7mm. This surface will be laid at a minimum 40mm deep. Also called EPA7 40mm.
LN5	Epoxy-modified porous asphalt with a maximum chip size of 7mm. This surface will be laid at a minimum 50mm deep. Also called EPA7 50mm.

APPENDIX B NOISE SURVEY SUMMARY SHEETS

Logger Measurements

Date: Wednesday, 11 February 2026

File name: I:\JOBS\2025\20250591\03 Survey Data & Measurements\[Ls 03 20250591 CMP {SiteHive} - 7 Millridge Way long-term data analysis.xlsx]Logger Summary Sheet

Job number: 20250591

Job name: Tauriko West Route Protection

Initials: CMP / JW / DM

Measurement Dates: Friday, 28 November 2025 to Monday, 08 December 2025

Weather removed: 10:30 hrs of rain/wind outside met window removed

Notes: 7 Millridge Way

OVERVIEW SUMMARY SHEET

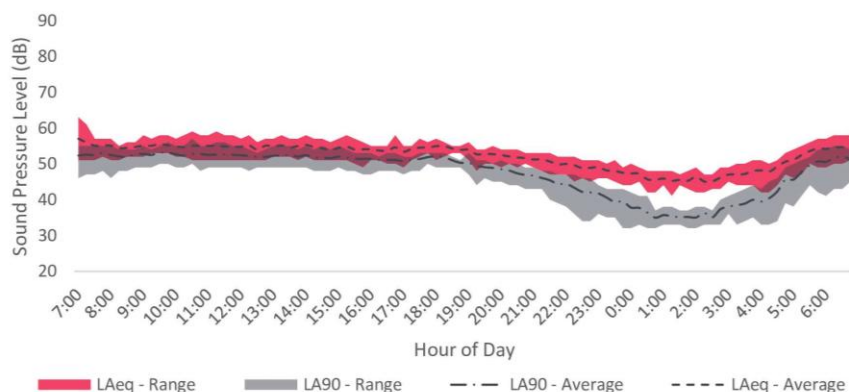
dB L _{Amax}	24 Hr	Day 0700-2200	Night 2200-0700
	Average	Average	Average
	67	68	64
	Range	Range	Range
	64 - 68	64 - 70	60 - 67

dB L _{Aeq}	24 Hr	Day 0700-2200	Night 2200-0700
	Average	Average	Average
	53	54	50
	Range	Range	Range
	52 - 55	52 - 56	47 - 52

dB L _{A90}	24 Hr	Day 0700-2200	Night 2200-0700
	Average	Average	Average
	50	52	45
	Range	Range	Range
	48 - 52	49 - 54	40 - 48



Ambient Sound Level - Diurnal Summary (LAeq vs LA90) 28 November 2025 to 08 December 2025 at 7 Millridge Way



Logger Measurements

Date: Wednesday, 11 February 2026

File name: I:\JOBS\2025\20250591\03 Survey Data & Measurements\[Ls 01 20250591 CMP {SiteHive} - 28 Silkwood way long-term data analysis.xlsx]Logger Summary Sheet

Job number: 20250591

Job name: Tauriko West Route Protection

Initials: CMP / JW / DM

Measurement Dates: Friday, 28 November 2025 to Tuesday, 09 December 2025

Weather removed: 10:30 hrs of rain/wind outside met window removed

Notes: 28 Silkwood Way

OVERVIEW SUMMARY SHEET

dB L_{Amax}

	24 Hr	Day 0700-2200	Night 2200-0700
Average	67	68	65
Range	63 - 70	64 - 72	60 - 71

dB L_{Aeq}

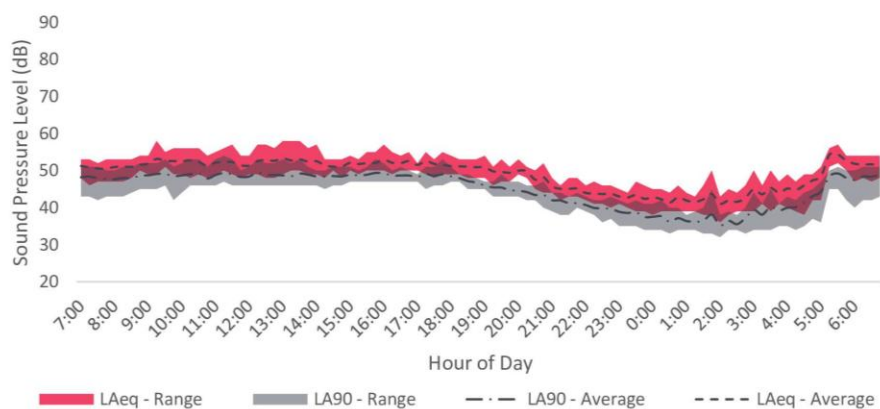
	24 Hr	Day 0700-2200	Night 2200-0700
Average	50	52	48
Range	49 - 52	50 - 54	45 - 49

dB L_{A90}

	24 Hr	Day 0700-2200	Night 2200-0700
Average	47	48	43
Range	45 - 49	46 - 50	39 - 45



Ambient Sound Level - Diurnal Summary (LAeq vs LA90) 28 November 2025 to 09 December 2025 at 28 Silkwood Way



Logger Measurements

Date: Wednesday, 11 February 2026

File name: I:\JOBS\2025\20250591\03 Survey Data & Measurements\[Ls 04 20250591 CMP {SiteHive} - 953 SH29 long-term data analysis.xlsx]Logger Summary Sheet

Job number: 20250591

Job name: Tauriko West Route Protection

Initials: CMP / JW / DM

Measurement Dates: Tuesday, 09 December 2025 to Tuesday, 16 December 2025

Weather removed: 4:55 hrs of rain/wind outside met window removed

Notes: 953 SH29

OVERVIEW SUMMARY SHEET

dB L_{Amax}

	24 Hr	Day 0700-2200	Night 2200-0700
Average	69	71	64
Range	67 - 72	68 - 74	60 - 65

dB L_{Aeq}

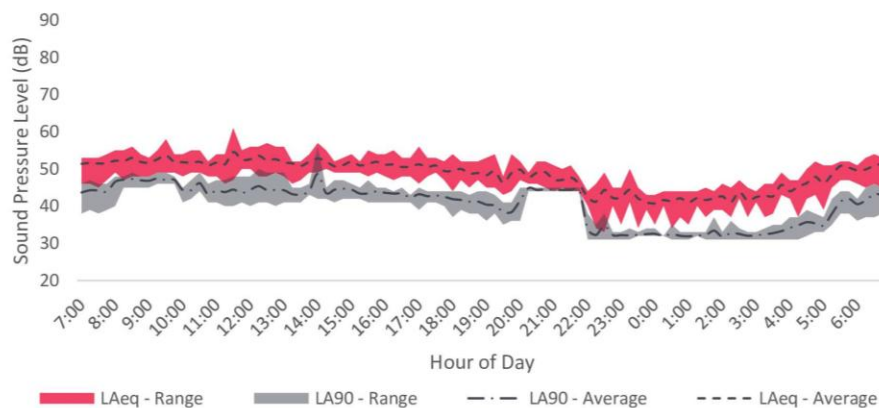
	24 Hr	Day 0700-2200	Night 2200-0700
Average	50	51	46
Range	48 - 51	50 - 52	43 - 47

dB L_{A90}

	24 Hr	Day 0700-2200	Night 2200-0700
Average	42	44	37
Range	41 - 44	43 - 45	34 - 38



Ambient Sound Level - Diurnal Summary (LAeq vs LA90) 09
December 2025 to 16 December 2025 at 953 SH29



Logger Measurements

Date: Wednesday, 11 February 2026
 File name: I:\JOBS\2025\20250591\03 Survey Data & Measurements\[Ls 02 20250591 CMP {SiteHive} - 30 Belk Road long-term data analysis.xlsx]Logger Summary Sheet
 Job number: 20250591
 Job name: Tauriko West Route Protection
 Initials: CMP / JW / DM
 Measurement Dates: Tuesday, 09 December 2025 to Tuesday, 16 December 2025
 Weather removed: 4:55 hrs of rain/wind outside met window removed
 Notes: 30 Belk Road

OVERVIEW SUMMARY SHEET

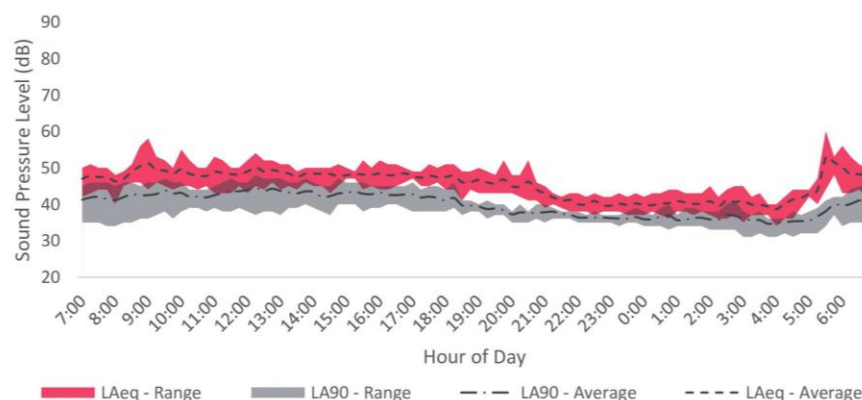
dB L _{Amax}			
	24 Hr	Day 0700-2200	Night 2200-0700
Average	68	69	62
Range	64 - 70	66 - 72	58 - 65

dB L _{Aeq}			
	24 Hr	Day 0700-2200	Night 2200-0700
Average	47	48	44
Range	45 - 48	46 - 49	41 - 47

dB L _{A90}			
	24 Hr	Day 0700-2200	Night 2200-0700
Average	41	42	37
Range	38 - 43	39 - 45	34 - 39



Ambient Sound Level - Diurnal Summary (LAeq vs LA90) 09
 December 2025 to 16 December 2025 at 30 Belk Road



APPENDIX C ASSESSMENT FRAMEWORK

C1 NZS 6806

NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads is the New Zealand road traffic noise standard. It provides a robust framework of determining, and process to develop, mitigation which responds to effects caused by the Project.

We briefly explain relevant terms of NZS 6806 below:

- **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.
Note that:
 - Areas earmarked for future residential development are not PPFs as the location and specific type of the receiving buildings are not known. However, to provide information for the future developers, we have provided noise level predictions over vacant land.
 - Businesses are not PPFs as they are not considered noise sensitive and are often noise generators in their own right.
- **Assessment Area** is the area 200m from the edge of the Project for rural areas and 100m from the edge for urban areas. Most of this Project falls into urban areas.
- **Clusters** are areas which combine PPFs that would benefit from the same mitigation (e.g. road surfaces).
- **Design Year** is a year 10 to 20 years after opening of the Project. While it is currently unclear when the Project would open, we chose 2048 as the design year, to be most conservative.
- **Noise Criteria Categories** are set out in NZS 6806 for ‘new’ and ‘altered’ roads. This Project contains both new and altered road sections, depending on the location of the receivers in relation to existing major roads. The Noise Criteria Categories are set out in Table 6 below.

Table 6: Traffic noise criteria categories in accordance with NZS 6806

Category	Altered Road dB L _{Aeq} (24h)	New Road dB L _{Aeq} (24h)
A (primary external noise category)	≤ 64	≤ 57
B (secondary external noise category)	64 – 67	57 – 64
C (internal noise category)	40 (provided the external noise level is > 67)	40 (provided the external noise level is > 64)

The aim is to achieve the lowest practicably achievable noise criteria category at each PPF for future assessment scenarios. The outcome depends on the Best Practicable Option (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 (e.g. noise barriers) over building modification mitigation (e.g. glazing). NZS 6806 also requires achievement of the lowest external noise level with practicable structural mitigation, before considering building modification to mitigate internal noise levels.

- **Assessment Scenarios** are the various operational scenarios that we assess and compare. NZS 6806 includes the following scenarios:

- Existing noise environment: consists of the current road layout and traffic volume. This scenario enables the verification of the computer noise model with measured noise levels.
- Future do-nothing scenario: consists of the existing roads as above, but with traffic volume at the Design Year (2048).
- Future do-minimum scenario: consists of the proposed Project and any existing roads that are being altered by the Project, at the Design Year (2048), 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. Where a low noise road surface is proposed as the “base” road surface (as is the case for the Project in accordance with the RoNS Guidelines¹⁰), this road surface is also included in the do-minimum scenario.
- Future Project with mitigation: consists of the above do-minimum scenario and includes mitigation that is designed specifically to reduce noise levels, e.g. noise barriers or lower noise road surface.

C2 Subjective perception of perception of noise level change

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.

Table 7 shows indicative subjective responses to explain how a sudden noise level change may be perceived. From experience, we have found that the subjective perception of a noise level change can be translated into an effect, which is generally based on people’s annoyance reaction to noise level changes, which may depend on their perception of the Project.

The perception of these noise level changes generally applies to immediate changes in noise level, e.g. if a noise source is switched on and off. With a new road, while a new noise source is introduced, that will not be quite the same as a sudden change in level.

Table 7: Noise level change compared with general subjective perception

Noise level change	General subjective perception
1–2 decibels	Insignificant/imperceptible change
3–4 decibels	Just perceptible change
5–8 decibels	Appreciable to clearly noticeable change
9–11 decibels	Halving/doubling of loudness

Noise is measured on a logarithmic scale, meaning that a doubling in traffic volume (e.g. from 5,000 vehicles per day (vpd) to 10,000 vpd) results in a noise level increase of 3 decibels, a just-perceptible change. To achieve a noise level change of 10 dB, a ten-fold increase or decrease of traffic volume would be required.

C3 UK Planning Guidance

People react to noise depending on a large number of factors. These include their perception of a project, expectations as to what they feel they should hear in their environment, if they contribute to the noise (e.g. by driving on the road), and if the character or level of the noise causes them

¹⁰ <https://nzta.govt.nz/assets/resources/standardised-designs/nzta-standardised-designs-solutions.pdf>

annoyance or a change in habits. The UK Planning Guidance¹¹ provides a table on how this effect could be described.

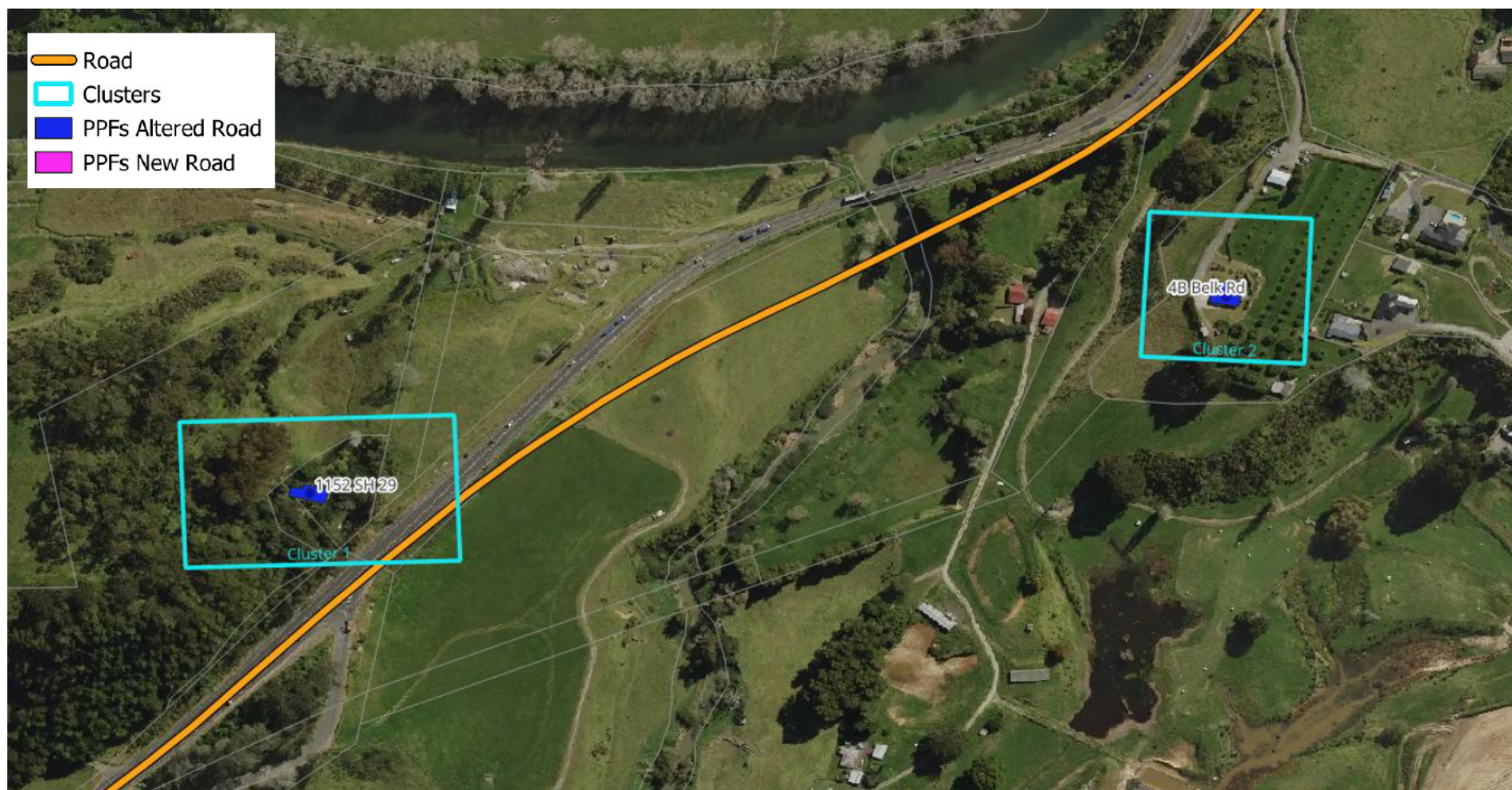
Table 8: Noise exposure hierarchy

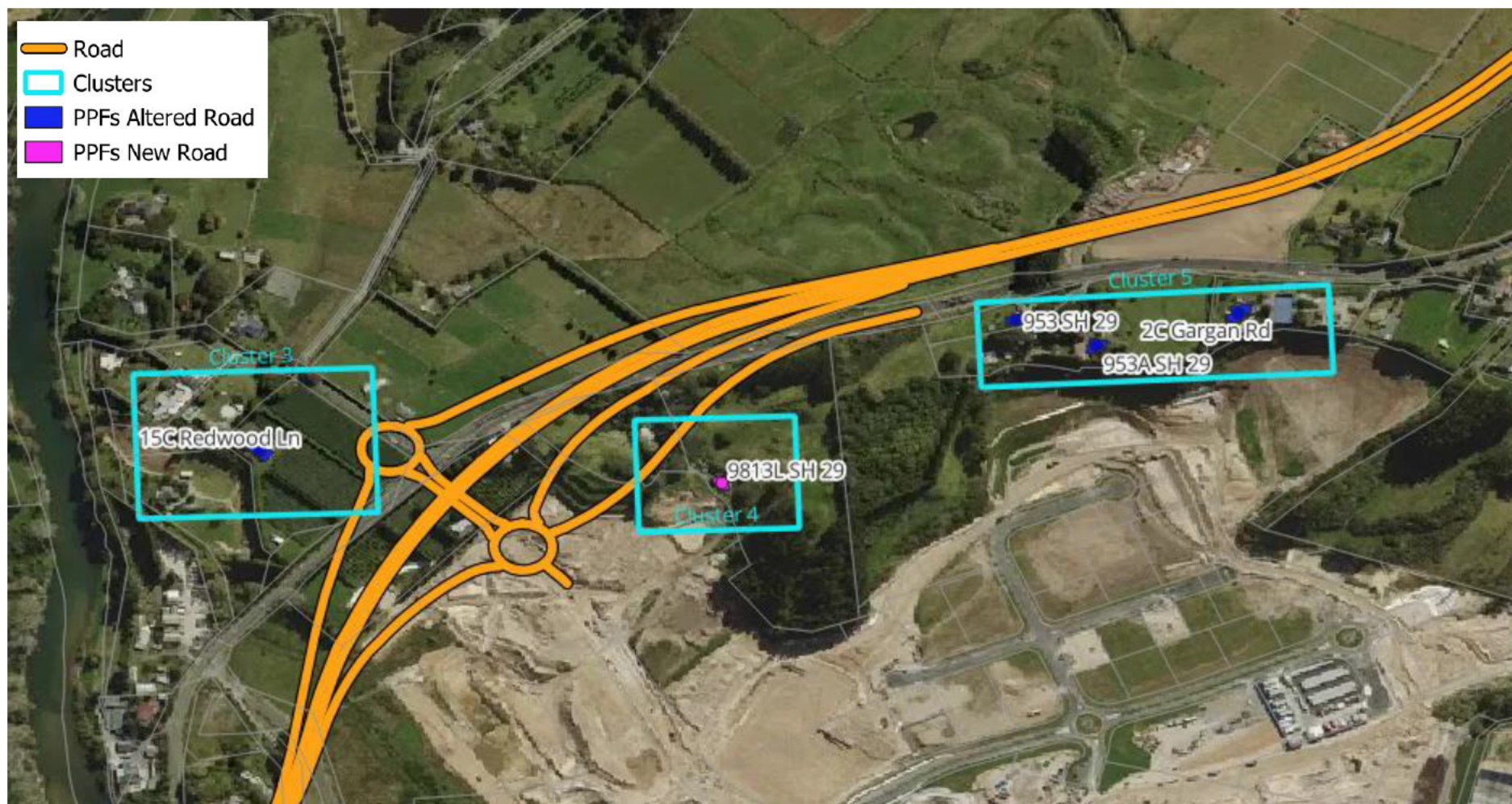
Response to Project noise	Examples of outcome	Effect level
Not present	No effect	No observed effect
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No observed adverse effect
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed adverse effect
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable adverse effect

The above guidance is independent of a noise level, but also takes into account character, duration, and frequency of noise.

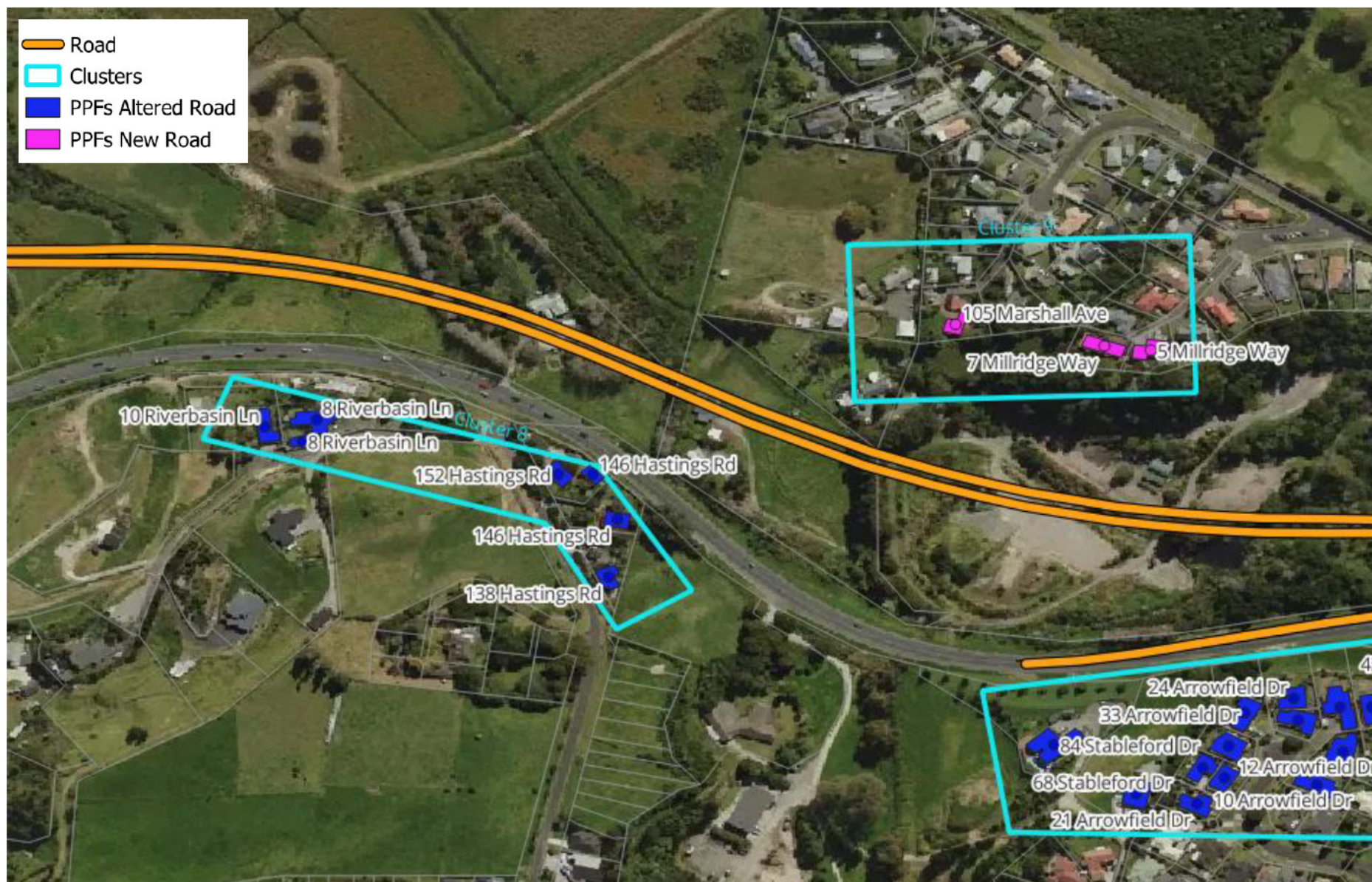
¹¹ UK Planning Guidance, Paragraph: 005, ID: 30-005-20190722, dated 22 July 2019.
<https://www.gov.uk/guidance/noise--2>

APPENDIX D NEW AND ALTERED ROAD PPFs AND ASSESSMENT CLUSTERS

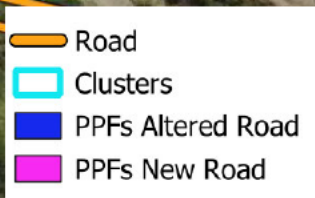
















APPENDIX E PREDICTED TRAFFIC NOISE LEVELS

Cluster 1	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
State Highway 29 1152	Altered	65	66	63
Cluster 2	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Belk Road 4B	Altered	57	58	59
Cluster 3	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Redwood Lane 15A	Altered	57	59	58
Cluster 4	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
State Highway 29 9813L	New	49	53	57
Cluster 5	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Gargan Road 2C	Altered	59	61	52
State Highway 29 953	Altered	61	63	53
State Highway 29 953A	Altered	61	63	48
Cluster 6	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Rosewood Lane 5	Altered	58	60	59
Rosewood Lane 7	Altered	62	64	65
Rosewood Lane 9	Altered	61	64	65
Rosewood Lane 12	Altered	55	57	57
Cluster 7	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Wallace Place 15B	Altered	59	60	55
Wallace Place 21	Altered	57	60	58
Westridge Drive 54	Altered	62	65	59
Westridge Drive 56	Altered	59	62	56
Westridge Drive 66	Altered	63	66	60

Cluster 8	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Hastings Road 138	Altered	66	68	60
Hastings Road 146	Altered	69	71	60
Hastings Road 152	Altered	78	80	61
Riverbasin Lane 8	Altered	70	72	61
Riverbasin Lane 10	Altered	73	75	61

Cluster 9	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Marshall Ave 105	New	59	61	55
Millridge Way 5	New	63	65	62
Millridge Way 7	New	63	65	61

Cluster 10	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Marshall Avenue 1	Altered	59	62	64
Marshall Avenue 5	Altered	62	64	63
Marshall Avenue 7	Altered	49	51	56
Marshall Avenue 11	Altered	60	62	62
Marshall Avenue 13B	Altered	59	61	55
Marshall Ave 9A & 9B	Altered	63	65	59

Cluster 11	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Cameron Road 1474	Altered	65	65	52
Cameron Road 1476	Altered	66	66	56
Cameron Road 1478	Altered	65	65	58
Cameron Road 1480	Altered	60	60	56
Greenpark School	Altered	61	61	51

Cluster 12	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Arrowfield Drive 10	Altered	54	56	51
Arrowfield Drive 12	Altered	48	50	48
Arrowfield Drive 16	Altered	61	63	62
Arrowfield Drive 21	Altered	61	63	56
Arrowfield Drive 22	Altered	56	58	53

Cluster 12	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Arrowfield Drive 24	Altered	60	62	61
Arrowfield Drive 25	Altered	62	64	58
Arrowfield Drive 27	Altered	49	50	53
Arrowfield Drive 29	Altered	63	65	60
Arrowfield Drive 33	Altered	61	63	59
Elderton Avenue 21	Altered	50	52	53
Elderton Avenue 23	Altered	48	50	51
Elderton Avenue 27	Altered	59	61	61
Elderton Avenue 31	Altered	64	66	64
Elderton Avenue 32	Altered	48	50	52
Elderton Avenue 34	Altered	48	49	49
Elderton Avenue 35	Altered	60	62	61
Elderton Avenue 36	Altered	54	56	56
Elderton Avenue 38	Altered	63	65	64
Elderton Avenue 40	Altered	68	70	68
Elderton Avenue 42	Altered	62	64	62
Orange Grove Village - North	Altered	55	57	63
Orange Grove Village - East	Altered	60	60	54
Pyes Pa Road 12	Altered	49	50	51
Pyes Pa Road 14	Altered	65	65	61
Pyes Pa Road 16	Altered	63	63	48
Pyes Pa Road 18	Altered	65	65	59
Pyes Pa Road 20	Altered	64	64	53
Pyes Pa Road 20A	Altered	50	51	59
Pyes Pa Road 6B	Altered	61	62	61
Stableford Drive 68	Altered	61	63	57
Stableford Drive 84	Altered	62	64	57
State Highway 29A 511	Altered	65	67	67

Cluster 13	Type	Existing dB LAeq(24h)	Do Nothing dB LAeq(24h)	Do Minimum dB LAeq(24h)
Annandale Drive 24	Altered	53	55	53
Annandale Drive 25	Altered	52	54	47
Annandale Drive 26	Altered	59	61	51
Annandale Drive 27	Altered	59	61	56
Cheyne Road 93	Altered	63	65	50
Cheyne Road 97	Altered	64	66	54
Cheyne Road 101	Altered	64	67	55
Cheyne Road 103	Altered	66	68	55
Cheyne Road 107	Altered	66	68	55
Cheyne Road 111	Altered	66	68	54
Cheyne Road 115	Altered	68	70	54
Cheyne Road 119	Altered	68	70	54
Cheyne Road 123	Altered	71	74	54
Cheyne Road 127	Altered	70	73	53
Cheyne Road 131	Altered	70	72	53
Cheyne Road 133	Altered	70	72	53
Dumfries Place 2	Altered	72	74	66
Dumfries Place 3	Altered	52	54	60
Dumfries Place 4	Altered	70	72	64
Dumfries Place 5	Altered	57	59	52
Dumfries Place 6	Altered	67	69	64
Dumfries Place 7	Altered	57	59	59
Dumfries Place 8	Altered	61	64	63
Dumfries Place 11	Altered	53	55	59
Fairfax Crescent 51	Altered	56	58	48
Fairfax Crescent 52	Altered	60	62	55
Fairfax Crescent 54	Altered	63	65	54
Fairfax Crescent 55	Altered	58	61	53
Fairfax Crescent 56	Altered	66	68	52
Fairfax Crescent 59	Altered	59	61	52
Fairfax Crescent 60	Altered	73	75	55
Fairfax Crescent 63	Altered	58	60	51
Fairfax Crescent 64	Altered	73	75	55
Fairfax Crescent 65	Altered	59	61	49
Fairfax Crescent 66	Altered	74	76	56
Fairfax Crescent 68	Altered	73	76	57

Cluster 13	Type	Existing dB L _{Aeq} (24h)	Do Nothing dB L _{Aeq} (24h)	Do Minimum dB L _{Aeq} (24h)
Fairfax Crescent 70	Altered	73	75	58
Fairfax Crescent 71	Altered	58	61	50
Fairfax Crescent 72	Altered	72	74	60
Fairfax Crescent 74	Altered	74	76	62
Fairfax Crescent 76	Altered	73	75	63
Fairfax Crescent 78	Altered	71	73	62
Fairfax Crescent 80	Altered	66	68	56
Fairfax Crescent 82	Altered	63	65	60
Fairfax Crescent 84	Altered	68	70	62
Fearnley Grove 24	Altered	51	53	50
Fearnley Grove 26	Altered	50	52	49
Fearnley Grove 27	Altered	53	53	49
Fearnley Grove 28	Altered	47	49	50
Fearnley Grove 29	Altered	55	55	55
Fearnley Grove 30	Altered	50	51	54
Fearnley Grove 31	Altered	48	49	47
Galloway Crescent 20	Altered	51	53	53
Galloway Crescent 22	Altered	51	53	54
Galloway Crescent 24	Altered	57	59	54
Galloway Crescent 31	Altered	50	52	48
Galloway Crescent 33	Altered	56	58	52
Galloway Crescent 35	Altered	73	75	67
Galloway Crescent 37	Altered	73	75	67
Galloway Crescent 39	Altered	73	75	66
Galloway Crescent 41	Altered	73	75	66
Galloway Crescent 43	Altered	71	73	64
Havenbrook Way 2	Altered	66	66	56
Havenbrook Way 3	Altered	64	64	63
Havenbrook Way 4	Altered	54	55	59
Havenbrook Way 6	Altered	51	52	51
Havenbrook Way 7	Altered	56	58	61
Havenbrook Way 8	Altered	52	53	59
Havenbrook Way 10	Altered	51	52	51
Havenbrook Way 11	Altered	54	56	62
Havenbrook Way 12	Altered	50	52	60
Havenbrook Way 14	Altered	49	50	48

Cluster 13	Type	Existing	Do Nothing	Do Minimum
		dB L _{Aeq} (24h)	dB L _{Aeq} (24h)	dB L _{Aeq} (24h)
Havenbrook Way 17	Altered	53	55	62
Havenbrook Way 18	Altered	47	48	51
Havenbrook Way 21	Altered	54	56	62
Havenbrook Way 22	Altered	48	50	53
Havenbrook Way 24	Altered	46	48	48
Havenbrook Way 25	Altered	53	55	62
Havenbrook Way 26	Altered	49	51	53
Havenbrook Way 29	Altered	54	56	60
Havenbrook Way 32	Altered	49	51	53
Havenbrook Way 33	Altered	51	53	59
Havenbrook Way 37	Altered	49	51	49
Havenbrook Way 39	Altered	48	50	49
Havenbrook Way 42	Altered	49	51	59
Kinmount Drive 20	Altered	55	57	50
Kinmount Drive 21	Altered	54	56	48
Kinmount Drive 22	Altered	58	61	49
Kinmount Drive 23	Altered	59	61	50
Kirtle Close 4	Altered	50	52	49
Kirtle Close 6	Altered	50	52	52
Kirtle Close 8	Altered	51	53	59
Pyes Pa Road 5	Altered	62	64	64
Pyes Pa Road 7	Altered	58	60	48
Pyes Pa Road 11	Altered	66	66	58
Pyes Pa Road 15	Altered	49	50	52
Pyes Pa Road 17	Altered	66	66	54
Pyes Pa Road 19	Altered	64	64	54
Pyes Pa Road 21	Altered	66	66	49
Pyes Pa Road 23	Altered	66	66	62
Pyes Pa Road 25	Altered	65	65	50
Pyes Pa Road 11A	Altered	66	65	64
Pyes Pa Road 15A	Altered	51	52	48
Pyes Pa Road 5A	Altered	56	59	58
Pyes Pa Road 7A	Altered	62	64	52

APPENDIX F TRAFFIC NOISE LEVELS – FIGURES



TAURIKO WEST – TUPENGA

Overview Map

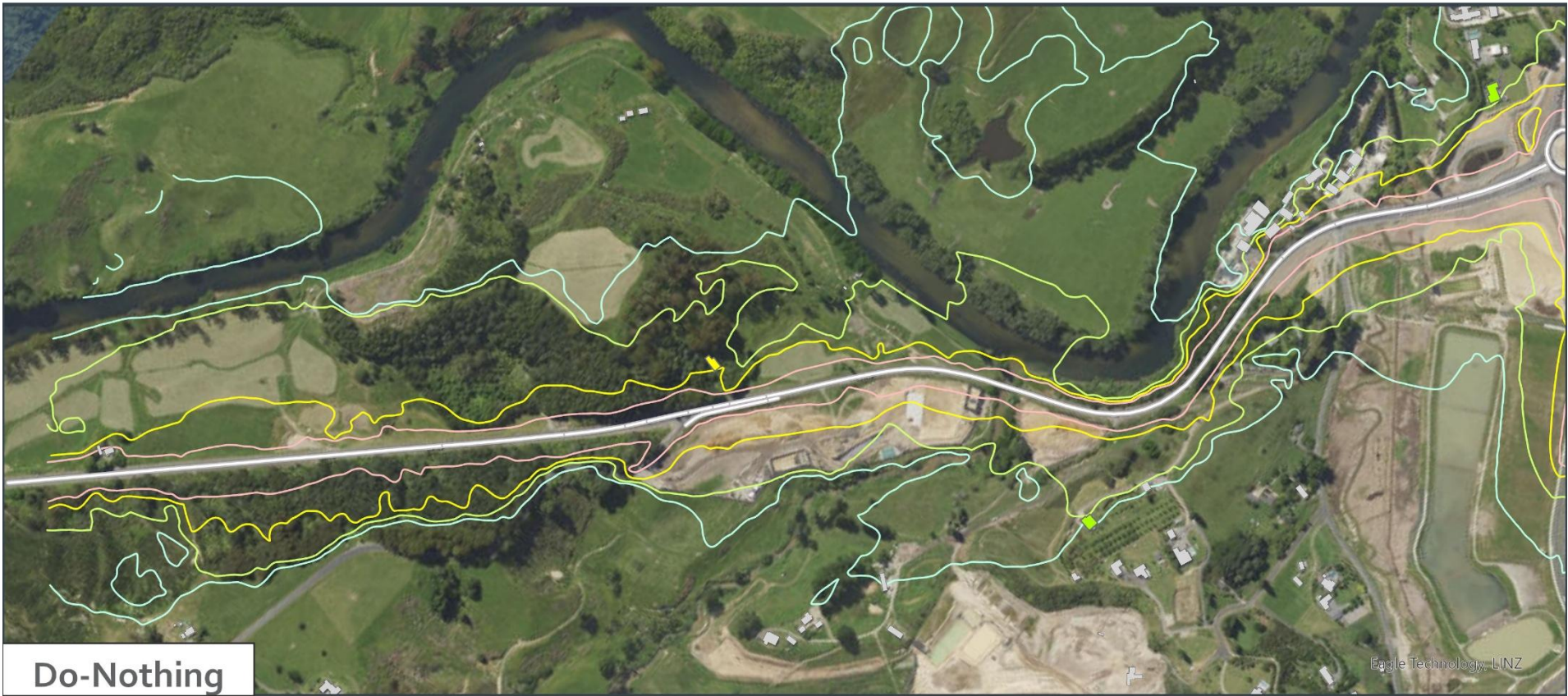


Map Legend

New Road (dB $L_{Aeq(24h)}$)		Proposed Road	Contours dB $L_{Aeq(24)}$	
■ < 57	Category A	— Noise protection walls	— 55	
■ 57 - 64	Category B	■ Other buildings	— 60	
■ > 64	Category C	 Section Area	— 65	
Altered Road (dB $L_{Aeq(24h)}$)			— 70	
■ < 64	Category A			
■ 64 - 67	Category B			
■ > 67	Category C			

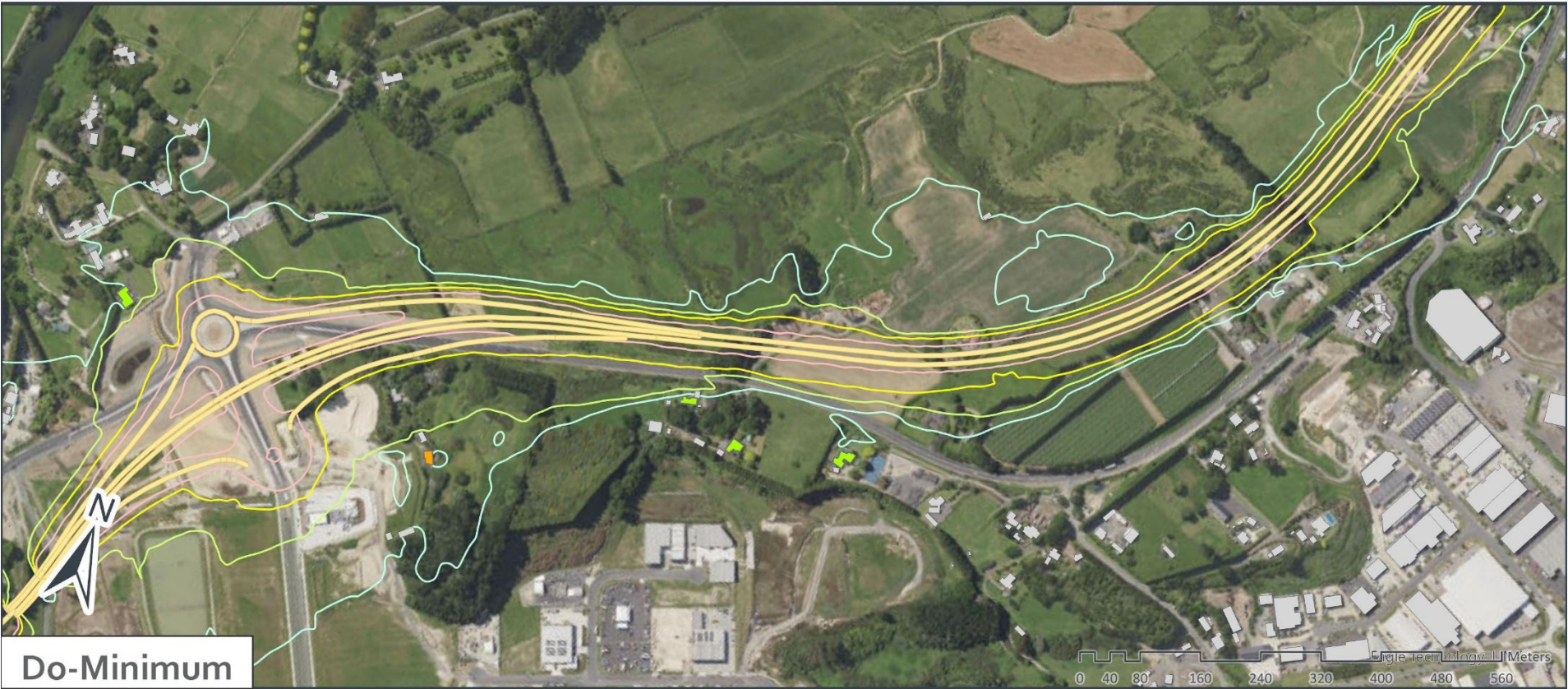
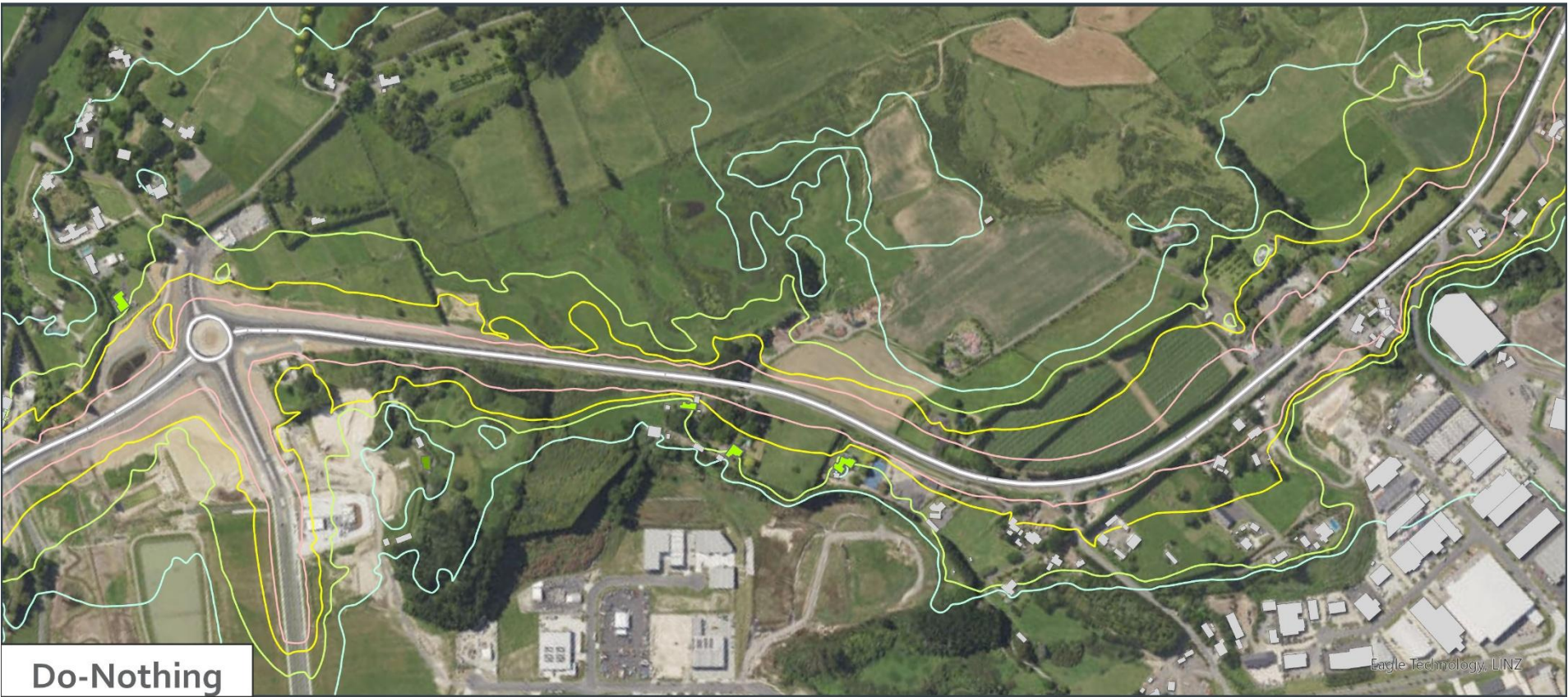
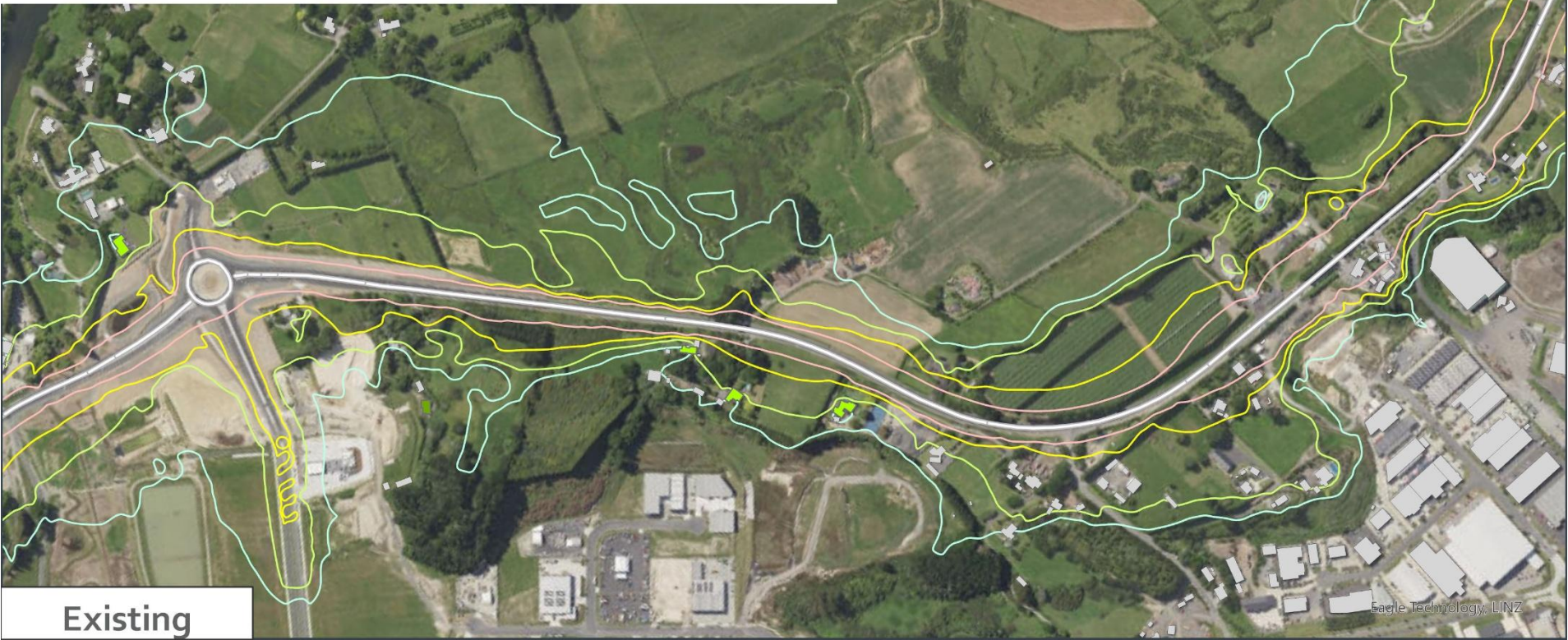


TAURIKO WEST – TUPENGA (SECTION 1)





TAURIKO WEST – TUPENGA (SECTION 2)



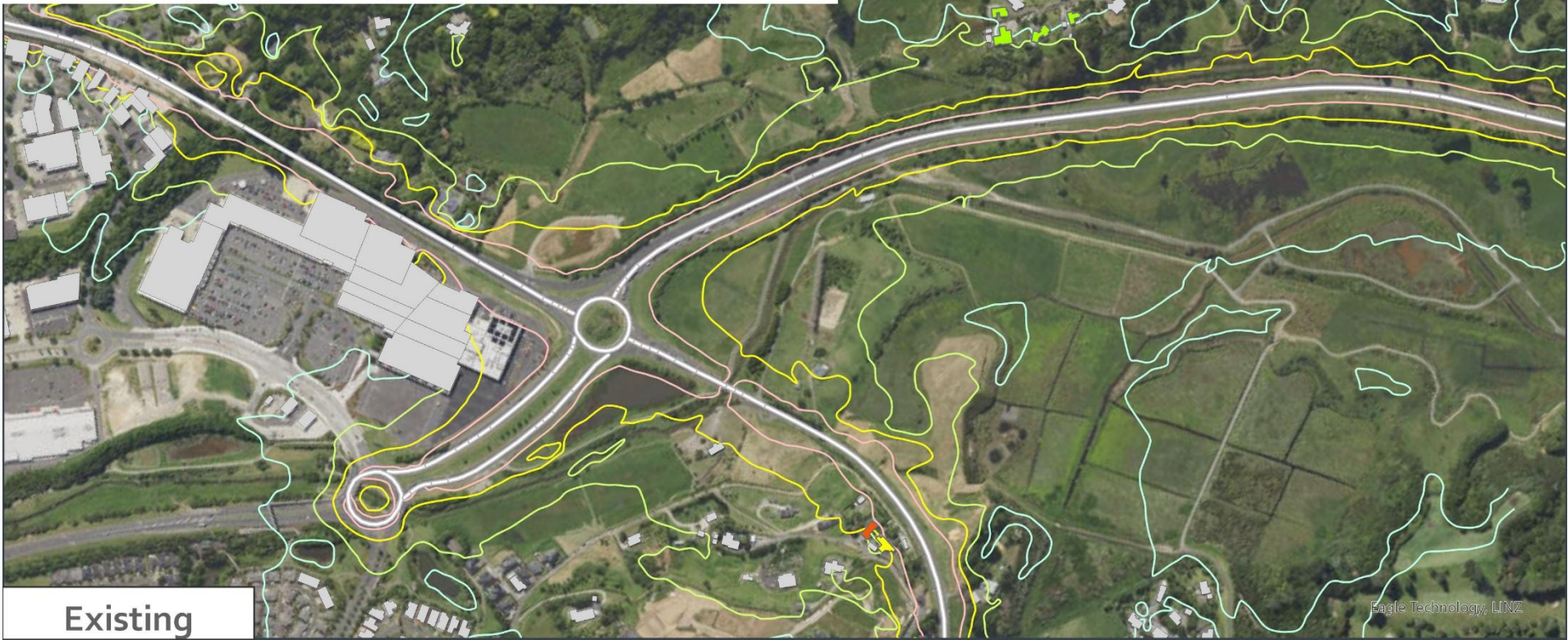


TAURIKO WEST – TUPENGA (SECTION 3)





TAURIKO WEST – TUPENGA (SECTION 4)





APPENDIX G NOISE LEVELS AT NEW SCHOOL SITE

Do-nothing noise levels

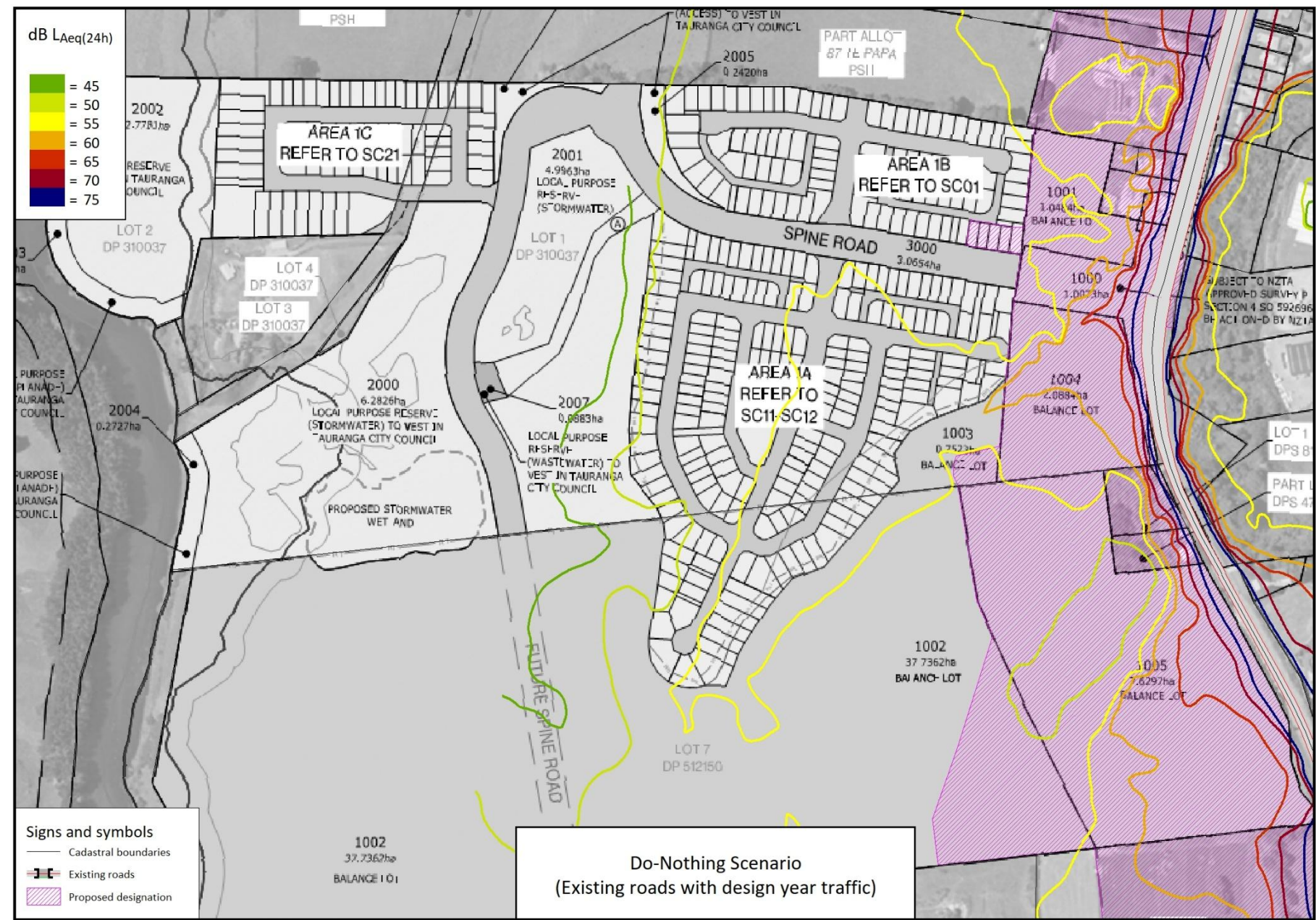


Do-minimum noise levels



APPENDIX H NOISE LEVELS ACROSS CLASSIC DEVELOPMENTS SUBDIVISION

Do-nothing noise levels



Do-minimum noise levels

