



NOISE EFFECTS

MILL INDUSTRIAL PARK
HILL ROAD, HAMILTON

PREPARED FOR
The Consortium

DATE
11 February 2026

Acoustic assessment prepared by Styles Group for The Consortium.

REVISION HISTORY

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1	23/10/25		Final Draft	Jon Styles, MASNZ	Gemma Styles Consultant Styles Group
2	19/11/25		Final	Director and Principal Styles Group	
3	11/02/26	Updated masterplan	Final		

Statement of experience

I am and have been the Director and Principal of Styles Group Acoustics and Vibration Consultants for 20 years. I am a Council Member of the Acoustical Society of New Zealand, and I am on the Board of Directors of the Australasian Association of Acoustical Consultants.

I have over 24 years' experience advising on the management of construction and operational noise and vibration effects. I have worked on a significant number of plan changes and resource consent applications for large-scale residential and mixed use developments across New Zealand. I have extensive experience advising on the management of noise effects from land transport infrastructure, and development of controls to improve the compatibility of residential development around such infrastructure.

I am a regular and experienced expert witness for Council, Environment Court, District Court, High Court and Board of Inquiry hearings. I confirm that, in my capacity as author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

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Executive summary

Styles Group has assessed the construction noise and vibration and operational noise effects from the proposed Greenhill Industrial Park at Greenhill Road (the **Site**).

The proposal is to enable the subdivision and development of the Site for industrial lots, to enable commercial activity as an extension of the Greenhill Expressway Service Centre and to enable ongoing rural-residential activity at the periphery of the Site.

The majority of the Site and all adjacent sites are in the General Rural Zone (**GRUZ**) of the Waikato District Plan – Operative in Part (**WDPOP**). The Greenhill Expressway Service Centre in the south-western corner of the Site is in the Commercial Zone.

This advice has been prepared accompany a referral application under the Fast-track Approvals Act 2024 and confirms the proposal can be designed and constructed to comply with the relevant permitted activity standards of the WDPOP. This assessment also finds that the proposal can achieve the level of acoustic amenity anticipated and provided for by the Hamilton City Operative District Plan (**HCDP**) for receivers on the western side of the Waikato Expressway (**WEX**).

I have identified various options for the management of noise effects that can be explored and refined as part of the substantive application. My key findings and recommendations are summarised below.

Management of noise effects received beyond the Site

The proposal will enable the construction and operation of a comprehensive industrial development. This assessment finds that industrial development on the Site can be located, designed and operated to achieve compliance with the permitted activity noise standards in NOISE-R8 for noise received at notional boundaries at all adjacent sites in the GRUZ.

I have set out an option for the substantive application to include non-compliance with NOISE-R8 of the WDPOP as a reason for consent, and for the application to seek resource consent to enable noise levels from industrial lots to exceed the numerical daytime, evening and nighttime noise limits in NOISE-R8 by 5 dB at the closest receivers that share a common boundary with the site or are adjacent to the site (i.e. separated by a road). This approach would effectively adopt the same numerical noise limits (i.e. 55dB L_{Aeq} daytime and 45 L_{Aeq} nighttime) that are used in other WDPOP plan rules to manage interface noise effects between industrial and residential or rural zones. These noise limits are designed to deliver an adequate level of acoustic amenity to non-acoustically treated dwellings near industrial activity. I understand that this option and any reasons for consent at any adjacent sites will be explored as part of consultation with adjacent receivers.

Management of noise effects received within the Site

I have provided recommendations to manage noise levels generated and received between future industrial and commercial lots within the Site. These recommendations include noise limits and activity-based land use controls that are designed to ensure ongoing land use compatibility between future industrial, commercial and rural-residential activities.

The recommendations above to manage land use compatibility are presented as the basis for proposed conditions that could be attached to the substantive application. The proposed mechanisms for achieving land use compatibility will be further explored and refined as part of the substantive application and proposed condition set (if required).

Construction noise and vibration

My preliminary assessment finds that the noise effects from the majority of the construction phase can be managed to achieve compliance with the permitted construction noise standards in the WDPOP due to the ample separation distances to adjacent receivers.

A construction noise assessment will be provided as part of the substantive application, in accordance with the recommended numerical limits and assessment procedures set out in NZS 6803:1999 *Acoustics – Construction Noise*. The construction noise assessment will confirm whether construction work can be managed to comply with the permitted noise standards in Rule NOISE-R4 and Rule AINF-R2 of the WDPOP.

In the event that the assessment identifies that some aspects of the construction phase will require resource consent for short-term exceedances of the permitted noise standards, the assessment will provide details of how a CNVMP will be used to ensure the best practicable option is adopted so that construction noise effects are minimised as far as practicable.

Road traffic noise

The western boundary of the Site is affected by the State Highway noise control boundary. The WDPOP includes acoustic treatment requirements for any noise sensitive activity inside the noise control boundary. The proposal is to develop the land inside the noise control boundary for industrial and commercial activities that are not defined as noise sensitive activities.

1.0 Introduction

Styles Group has assessed the construction and operational noise effects from the Greenhill Industrial Park. This advice has been prepared accompany a referral application under the Fast-track Approvals Act 2024.

This assessment sets out the key considerations for management of noise effects from the proposal and provides an assessment of the potential construction and operational noise effects in accordance with the relevant permitted noise standards prescribed by the Waikato District Plan Operative in Part (**WDPOP**).

This report should be read in conjunction with the documentation submitted with the Referral application and site plans. A glossary of acoustical terms used within this document is attached as Appendix A.

2.0 The proposal

The Greenhill Industrial Park proposal is for a comprehensive new industrial park, with direct access to the Waikato Expressway (**WEX**) via Greenhill Road and Pardoia Boulevard.

The project is to create vacant lots that can accommodate a range of industrial and compatible commercial activities and associated buildings. The proposal also includes all required infrastructure, including transport, three waters, and associated site and civil works.

The Greenhill Park Masterplan is shown in Figure 1 and Figure 2 displays the densities of the proposed land use activities.



Legend

- | | |
|--|---|
| Site Boundary | Proposed Wastewater Pumpstation |
| Proposed Industrial Lots (with indicative buildings and on-lot landscaping) | Existing Radio Aerial for Retention |
| Proposed Rural Residential Lots | Existing Overhead Power Pole and Lines for Retention |
| Proposed Greenhill Expressway Service Area (Extended) | Designation J17 (Requiring Authority - NZTA) |
| Proposed Road Swales | Expressway Noise Control Areas |
| Proposed Landscape Buffer between Rural Residential and Industrial Lots (10-15m) | Existing Rural Residential Properties (outside of the Site) |
| Proposed Landscape Buffer along Waikato Expressway (10-15m) | Existing Childcare |
| Proposed Stormwater Ponds & Riparian Areas | Potential Access Options to Greenhill Expressway Service Area |
| Potential Existing Mature Trees for Retention (pending further investigation) | Existing Residential Dwelling to Retain |
| Existing Modified Watercourse for Realignment & Renaturalisation | |

Figure 1 Greenhill Masterplan



Figure 2 Lots sizes and yield distribution

3.0 The Site and receivers of noise

The Site is in the General Rural Zone (**GRUZ**) of the WDPOP. The adjacent land to the north, west and south of the Site is within the jurisdiction of the WDPOP and is also in the GRUZ.

The receivers surrounding the Site include the noise sensitive activities (dwelling and childcare centre) on the sites adjacent to the northern, eastern and southern boundaries of the Site. These receivers are in the GRUZ of the Waikato District. The closest notional boundaries (dwellings and childcare centre) are identified with a red circle in Figure 3.

The Site is separated from the closest notional boundaries within the territorial boundary of Hamilton City Council by the WEX and separation distances exceeding 200m. The land on the western side of the WEX is zoned Rural, with land to the south of Pukeroa Road zoned Residential. I consider that noise generated from the Site will comply with the permitted noise levels prescribed by the Hamilton City District Plan (**HCDP**) due to separation distance.



Figure 3 The Site (outlined red) and closest receivers (identified with a red circle)

4.0 The key considerations for the management of noise effects from the Site

The key considerations for the management of noise effects from the Site are:

- To ensure that **construction noise and vibration** effects will be reasonable for the receivers adjacent to the Site.
- To ensure that **operational noise** from future industrial and commercial activities will be compatible with the level of noise amenity that is anticipated and provided for in the GRUZ.

The key considerations for the management of noise effects generated and received within the Site is to ensure that the proposal includes appropriate measures to control **operational noise** levels generated and received between industrial, commercial and rural-residential lots.

The permitted noise standards of the WDPOP are reproduced in full in Appendix A.

The rules and standards in the HCDP do not apply to the proposal, however I have also included the permitted standards in Appendix B for completeness. I have not identified any constraints in terms of the proposal being designed, constructed and operated in a way that is compatible with the level of acoustic amenity anticipated and provided for by the HCDP.

5.0 Assessment of construction noise and vibration effects

5.1.1 Permitted construction noise standards

NOISE-R4 of the WDPOP require that construction noise levels are managed in accordance with the recommended numerical limits set out in NZS 6803:1999 '*Acoustics – Construction Noise*' (**NZS6803:1999**). Rule AINF-R2¹ of the WDPOP controls noise associated with the construction of infrastructure² and also requires compliance with NZS6803:1999.

NZS6803:1999 provides guideline noise limits that are based on the duration of construction works at any one location, and the occupation of the receiving site.

NZS6803:1999 recommends a noise limit³ of 70 dB L_{Aeq} and 85 dB L_{AFmax} applies to construction work undertaken between 7:30am and 6:00pm, Monday to Saturday. The construction noise limits apply when measured and assessed 1m from the façade of any occupied dwelling in a rural zone.

5.1.2 Key recommendations for construction noise

At this point in time, a contractor has not yet been appointed which means that I have not been able to review a proposed construction methodology, including the specific construction equipment and

¹ I understand this rule is subject to currently subject to an appeal [000086].

² Including structures for transport on, under or over land by cycle ways, rail, roads, walkways, or any other means;

³ The construction noise limit applying to construction projects greater than 20 weeks in duration.

durations of construction work in various parts of the Site. The findings below are based on a preliminary review of the masterplan and my experience on a large number of similar projects.

The masterplan indicates that the majority of enabling works that are likely to be undertaken near to the Site boundaries will comprise bulk earthwork at the beginning, followed by recontouring, compaction and paving of access roads and installation of services. I expect that the works will require very typical plant and machinery such as bulldozers, compactors, excavators, paving machines, concrete pours and trucks.

The construction noise levels from vertical construction phase will generally be quieter than the noise from civil works, especially where proposed buildings are separated from external boundaries.

The highest construction noise levels are likely to be generated from works requiring the operation of heavy plant and plant required for compaction and paving of access roads and installation of services within approximately 50m of occupied dwellings near the periphery of the Site. My analysis of the masterplan and receivers finds that:

- The closest receiver is separated from the proposed main access road by more than 150m.
- All other receivers are separated from future areas of road construction by distances exceeding 150m.

The noise levels generated from the majority of construction activities are expected to comply with the recommended noise limits in NZS6803:1999 at all occupied dwellings based on the expected type of construction activities and ample separation distances.

5.1.3 Construction noise assessment to be provided as part of the substantive application

A construction noise assessment will be provided as part of the substantive application, prepared in accordance with the recommended numerical limits and assessment procedures set out in NZS 6803:1999. The construction noise assessment will confirm whether construction work can be managed to comply with the permitted noise standards in Rule NOISE-R4 and Rule AINF-R2 of the WDPOP.

The assessment will provide details of how a Construction Noise and Vibration Management Plan (**CNVMP**) will be used to ensure the best practicable option is adopted so that construction noise effects are minimised as far as practicable in the event that the assessment identifies that some aspects of the construction phase will require resource consent for short-term exceedances of the permitted noise standards.

Based on my experience with similar projects, I expect that construction noise levels can be managed to be reasonable for all receivers through a CNVMP that is designed to mitigate the effects of any minor exceedances of the construction noise limits as far as practicable.

5.2 Construction vibration

The WDPOP does not include any rules or standards to control vibration generated from construction work.

I have not identified the need for any conditions to manage vibration generated from construction work due to the separation distances between construction work and buildings on adjacent sites.

My preliminary assessment is that vibration generated by construction work will be able to readily comply with the limits in German Standard DIN 4150-3:1999 *Structural vibration – Effects of vibration on structures* (the **DIN limits**) without the need for any specific mitigation measures.

5.2.1 Construction vibration assessment to be provided as part of substantive application

My preliminary assessment finds that vibration levels from construction work activity is likely to readily comply with the DIN limits at all nearby receivers. However, I have not undertaken a detailed review of the proposed construction methodology as this has not yet been confirmed.

I recommend that the substantive application includes an assessment that confirms that construction vibration levels can be managed to comply with the limits in German Standard DIN 4150-3:1999 *Structural vibration – Effects of vibration on structures*.

6.0 Operational noise received *beyond* the Site

Industrial activities typically involve loading trucks, forklift movements in outdoor yard areas, mechanical plant and manufacturing processes. These activities that have the potential to generate noise on a 24-hour basis, 7 days per week.

In this case, the proposal is to enable industrial activity near to sites containing noise sensitive activities. The noise generated from industrial activities will therefore need to be managed to comply with noise levels that will deliver an adequate level of amenity for noise sensitive activities. I consider there are two options to manage industrial noise levels generated from the Site and received at nearby notional boundaries. These options are discussed below.

	Noise limits	Description
Option 1	Comply with NOISE-R8 - this rule requires that noise levels generated from an activity within the Site must comply with the following noise limits when measured and assessed at any notional boundary of any site in the GRUZ: • 50 dB L_{Aeq} between 7am and 7pm • 45 dB L_{Aeq} between 7am and 10pm • 40 dB L_{Aeq} and 65 dB L_{Amax} between 10pm and 7am.	These are the <u>permitted</u> noise levels prescribed by the WDPOP for noise generated and received between sites in the GRUZ

	Noise limits	Description
	Seek resource consent to exceed the noise limits in NOISE-R8 by 5dB at the closest notional boundaries within and adjacent to the Site, i.e.:	These noise limits are consistent with District Plan noise limits (including the WDPOP ⁴) that are typically applied to manage noise effects at the zoning interface between business / industrial zones and zones containing noise sensitive receivers (e.g. rural / residential)
Option 2	• 55 dB L_{Aeq} between 7am and 7pm • 50 dB L_{Aeq} between 7am and 10pm • 45 dB L_{Aeq} and 70 dB L_{Amax} between 10pm and 7am.	

6.1 Option 1: To manage industrial noise in accordance with the underlying zone noise limits in NOISE-R8

Option 1 involves managing noise levels across the interface between the proposed industrial lots and the existing GRUZ receivers surrounding the Site in accordance with the permitted noise levels for the GRUZ in NOISE-R8.

NOISE-R8 requires that noise levels generated from an activity within the Site must comply with the following noise limits when measured and assessed at any notional boundary of any site in the GRUZ:

- 50 dB L_{Aeq} between 7am and 7pm
- 45 dB L_{Aeq} between 7am and 10pm
- 40 dB L_{Aeq} and 65 dB L_{Amax} between 10pm and 7am.

The permitted noise levels in NOISE-R8 are designed to deliver noise sensitive land use with a good level of acoustic amenity.

The requirement to operate in compliance with NOISE-R8 at any notional boundary on an adjacent site will present a constraint to those industrial activities that establish near to the periphery of the Site.

The types of operational constraints that will apply to future industrial activities may involve limitations on the timing and location of high noise generating activities that are unable to be effectively screened. An example of an industrial activity that may be constrained by the requirement to comply with the noise limits in NOISE-R8 might include an open industrial yard with forklifts and heavy vehicles near to the periphery of the Site. The constraints can often be minimised and in some cases avoided with good site design and by using built form to screen noise generating activities from GRUZ dwellings.

⁴ For example, NOISE-R19 for the Horotiu Industrial Park Precinct requires that "Noise from an activity in the Horotiu Industrial Park that does not exceed (i) 55dBA L_{Aeq} 7am to 10pm; or (ii) 45dBA L_{Aeq} and 70dBA L_{Amax} 10pm to 7am the following day at any notional boundary.

6.2 Option 2: To exceed the underlying noise limits in NOISE-R8 by 5dB at adjoining/ adjacent sites containing a notional boundary

Option 2 involves seeking consent to exceed the limits in NOISE-R8 by 5dB (during all prescribed timeframes) at any notional boundary within or adjacent to the Site.

The Option 2 noise limits are:

- 55 dB L_{Aeq} between 7am and 7pm
- 50 dB L_{Aeq} between 7am and 10pm
- 45 dB L_{Aeq} and 70 dB L_{Amax} between 10pm and 7am.

Option 2 would effectively adopt the same numerical noise limits that are adopted in other WDPOP plan rules⁵ (and other District Plans) that control noise from industrial precincts and received at adjacent notional boundaries. In other words, this option would deliver the same outcome that would be achieved by rezoning the land to Industrial. The Option 2 noise limits will reduce the constraint on the industrial activities at the interface but will reduce the amenity for the nearest receivers in the GRUZ. This approach will still constrain the industrial activities near to the periphery of the Site, but to a lesser extent than Option 1.

The noise levels in Option 2 are 5dB higher than the permitted noise levels for the GRUZ and will therefore reduce the degree of noise constraint on the industrial activities but will also provide a reduced level of acoustic amenity for adjacent sites containing noise sensitive activity when compared to the noise limits in Option 1.

Noise levels of 55dB L_{Aeq} during the daytime and 45 dB L_{Aeq} at night are recognised as being the upper desirable level of noise at a noise sensitive activity and are the highest noise limits for non-acoustically treated buildings containing noise sensitive receivers. Levels higher than these can compromise amenity and will often require acoustic insulation to ensure adequate sleep protection. The noise levels in Option 2 would deliver a reduced level of outdoor amenity when compared to Option 1, but the amenity would still be typically acceptable for noise sensitive receivers.

We understand that the Project Team are in consultation with the owners of adjacent sites, and this process may result in the proposal including non-compliance with NOISE-R8 as a reason for consent at adjacent sites.

Figure 4 identifies the adjacent sites (marked with yellow X) where we recommend that a noise limit of 55 dB L_{Aeq} (7am to 7pm), 50 dB L_{Aeq} (7pm to 10pm) and 45 dB L_{Aeq} and 70 dB L_{AFmax} (10pm to 7am) applies at any an existing or future notional boundary.

⁵ For example, NOISE-R19 for the Horotiu Industrial Park Precinct requires that “Noise from an activity in the Horotiu Industrial Park that does not exceed (i) 55dBA L_{Aeq} 7am to 10pm; or (ii) 45dBA L_{Aeq} and 70dBA L_{Amax} 10pm to 7am the following day.

If Option 2 is pursued, the substantive application will identify any lots where resource consent is sought to enable a higher noise limit, along with any written approvals for noise and/or an assessment of noise effects. The assessment of noise effects will consider the actual and potential noise effects of the proposed noise limit on the relevant receivers, taking into account:

- The level of acoustic amenity prescribed for the GRUZ
- Whether the proposed noise limits will exceed the existing background noise levels
- Whether the noise levels will be compatible with the existing noise environment and be reasonable for noise sensitive activities.

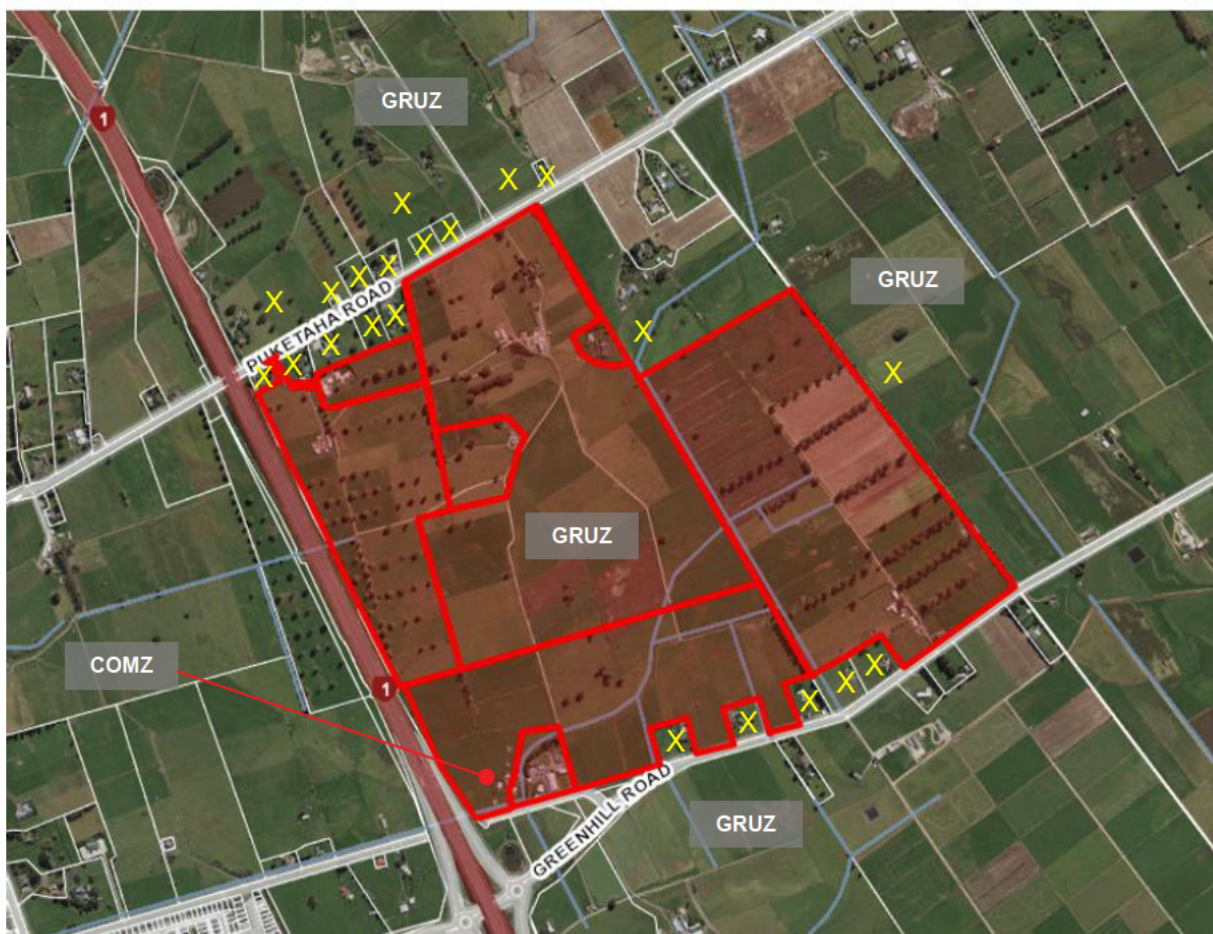


Figure 4 Plan showing sites (marked X) where noise limits in Option 2 could apply. These are indicative and will be explored as part of ongoing consultation and investigations for substantive application.

Option 2 noise limits are 55 dB L_{Aeq} (7am to 7pm) and 50 dB L_{Aeq} (7pm to 10pm) and 45 dB L_{Aeq} and 70 dB L_{AFmax} (10pm to 7am)

6.2.1 Constraint arising from Option 1 or Option 2

Operating in compliance with the noise levels set out in Option 1 and Option 2 will constrain the noise emissions for the industrial activities near to the periphery of the Site, compared to a situation where

the industrial activities only had industrial neighbours. This is an inherent and typical constraint that exists at industrial: residential interfaces in the WDPOP and across New Zealand. I expect that the typical due diligence process will ensure that any future industrial activities are aware of the need to comply with the relevant noise limits before establishing on the Site.

6.3 Commercial noise received beyond the Site

The Greenhill Expressway Service Area is in the Commercial Zone of the WDPOP. The proposal is to extend the Service Area by an additional 1.76ha. The extension is in the GRUZ.

NOISE-R15 requires that noise levels generated and received from a Commercial zone must comply with the permitted noise levels for the receiving zone. This will require the activities in the Commercial Zone to meet the noise limits in NOISE R8 when measured and assessed at any notional boundary.

In accordance with the same approach for the management of industrial noise, I consider there are two options to manage noise levels from the Greenhill Expressway Service Area (in the Commercial Zone) and extended Service Area (in the GRUZ):

Option 1: To comply with the permitted noise levels for the underlying zones

NOISE-R15 and NOISE-R8 will require commercial activities in the Commercial Zone and GRUZ to operate in compliance with the permitted GRUZ limits in NOISE-R8 at any adjacent notional boundary. NOISE-R8 requires that noise levels received at the notional boundary of any site in the GRUZ must not exceed:

- 50 dB L_{Aeq} between 7am and 7pm
- 45 dB L_{Aeq} between 7am and 10pm
- 40 dB L_{Aeq} and 65 dB L_{Amax} between 10pm and 7am.

Or

Option 2: To exceed the permitted noise levels for the underlying zones by 5dB:

This approach would include non-compliance with NOISE-R15 and NOISE R8 as a reason for consent to enable commercial activities in the Commercial Zone and GRUZ to exceed the numerical daytime and nighttime noise limits in NOISE-R8 by 5 dB at proximate notional boundaries. This approach would adopt the following noise limits for noise received at proximate notional boundaries in the GRUZ:

- 55 dB L_{Aeq} between 7am and 7pm
- 50 dB L_{Aeq} between 7am and 10pm
- 45 dB L_{Aeq} and 70 dB L_{Amax} between 10pm and 7am.

Figure 3 identifies the adjacent sites where I recommend that a noise limit of 55 dB L_{Aeq} (7am to 10pm) and 45 dB L_{Aeq} and 70 dB L_{AFmax} (10pm to 7am) applies at any an existing or future notional boundary. I consider that this option is likely to be acceptable. If Option 2 is pursued, the substantive application

will confirm the relevant sites where resource consent is sought to authorise any uplift in noise limits, along with any written approvals for noise and/ or an assessment of noise effects that addresses the relevant considerations set out in Section 6.2.

6.4 Vehicle noise generated from the Site

I understand that the internal access roads will be vested as a public road. The WDPOP zone noise limits do not apply⁶ to road traffic noise generated from roads that are vested or dedicated as road.

7.0 Operational noise generated and received between lots *within* the Site

The proposal will enable the Site to be divided into a number of industrial and commercial lots, as well as lots that will contain rural-residential activity. As identified earlier in this advice, the underlying GRUZ noise limits in NOISE-R8 are designed to control noise between sites containing rural land uses and have not been designed to control noise levels between industrial and commercial activities.

I have provided recommendations that are designed to manage ongoing land use compatibility between industrial, commercial and rural-residential lots. The controls I have recommended are based on the same general principles that would apply if the proposal was a plan change. These include noise limits and activity-based land use controls

7.1 Noise limits between industrial and commercial lots **within** the Site

Section 6.0 describes how noise limits will be used to control the level of industrial and commercial noise that will be received at all assessment locations (notional boundaries) **beyond** the boundaries of the Site.

The underlying GRUZ noise limits will not prescribe any noise limit between industrial lots within the Site that do not contain a notional boundary. In our experience, the absence of any noise limit between industrial lots can give rise to conflict between business activities. We recommend that the substantive application considers the use of noise limits that are designed to be enabling for industrial land use, while providing future occupiers with certainty on the noise levels that are permitted to be generated by nearby activities.

I recommend that the substantive application considers providing for the following noise levels to be generated and received between lots in the GRUZ (i.e. any lots that do not contain a notional boundary) within the site:

- i. 65dB $L_{Aeq(15min)}$, 7am to 10pm every day; and
- ii. 55dB $L_{Aeq(15min)}$ and 85dB L_{Amax} from 10pm to 7am the following day.

⁶ AINF Rule 10 of the WDPOP states that any zoning rules cease to have effect from the time land is vested or dedicated as road.

The recommended daytime noise limits are generally consistent with permitted noise levels in another industrial zone in the Waikato District⁷, except I that have recommended a lower night time noise limit to manage cumulative night time noise levels generated from activities across the Site. The daytime and night time noise levels I have recommended are consistent with the permitted noise levels in the Commercial Zone (NOISE-R15), with modifications to the prescribed timeframes for daytime and nighttime so that the periods generally align with the GRUZ (where the nighttime period commences at 10pm).

Noise levels between commercial lots in the Greenhill Expressway Service Area (in the Commercial Zone) will be managed by NOISE-R15.

7.2 Noise limits between industrial / commercial lots and rural-residential lots **within** the Site

The proposal includes several rural-residential lots at the periphery of the Site. These lots are likely to share a common boundary with future industrial lots.

I recommend that the substantive application includes non-compliance with NOISE-R8 and NOISE-R15 as a reason for consent and includes measures that will achieve noise limits that are 5dB higher than the underlying noise standards for noise generated from commercial and industrial lots and received at notional boundaries that are within the Site. The recommended noise limits applying at any notional boundary within the Site are:

- i. 55 dB L_{Aeq} between 7am and 7pm
- ii. 50 dB L_{Aeq} between 7am and 10pm
- iii. 45 dB L_{Aeq} and 70 dB L_{Amax} between 10pm and 7am.

These noise limits are consistent with the “Option 2” noise limits discussed in Section 6.1.2 for notional boundaries that are directly adjacent to the Site. The proposed noise levels are designed to provide an adequate level of acoustic amenity to non-acoustically treated dwellings near to an industrial interface. The noise limits will reduce the degree of noise constraint on industrial activities when compared to the underlying noise limits for the GRUZ. These noise limits would only apply for as long as the site receiving the noise is occupied by a notional boundary.

7.3 Use of activity-based land use controls

The noise limits recommended in Section 7.1 are designed to be enabling for industrial and commercial activities where the lots do not contain a notional boundary of a noise sensitive activity. The recommended noise limits would be incompatible for non-acoustically treated noise sensitive activities that may establish on lots allocated for industrial or commercial activity.

Noise sensitive activities defined by the WDPOP are:

⁷ Such as the General Industrial Zone in Pokeno (NOISE-R18) which enables 65dB L_{Aeq} at all times

- i. Residential activity
- ii. Visitor accommodation
- iii. Schools and tertiary education premises
- iv. Health Centre.

I understand that some of these activities may be permitted by the underlying GRUZ standards and could potentially establish within the commercial or industrial areas of the Site. In my experience, the potential establishment of noise sensitive activities within the areas of the Site allocated for industrial activity may constrain the operation of adjacent industrial activities and give rise to a potential reverse sensitivity conflict.

For example, if a noise sensitive activity establishes within an area of the Site allocated for industrial / commercial activity, all surrounding industrial/ commercial lots will be required to meet noise limits that are designed to protect noise sensitive activities. This will present a significant constraint to the industrial /commercial activities that may be otherwise well separated from dwellings in the peripheral areas part of Site and adjacent to the Site.

I therefore recommend that the substantive application includes controls to restrict the establishment of noise sensitive activities on land allocated for industrial and commercial land use, unless the specific type of noise sensitive activity can be adequately protected from the permitted noise environment using acoustic treatment.

In my experience, health centres and visitor accommodation can be successfully acoustically treated to deliver an adequate level of acoustic amenity indoors, however residential and educational facilities typically contain outdoor areas that cannot be acoustically treated. The exception to educational facilities could include trade workshops that provide vocational training. Any required use of acoustic treatment to ensure noise sensitive activities are compatible with the proposed noise environment inside the industrial and commercial areas of the Site will be explored and refined as part of the substantive application.

The recommendations above to manage land use compatibility are presented as the basis for measures that could be proposed in the substantive application. These will be further explored and refined as part of the substantive application and proposed condition set.

8.0 Road-traffic noise effects from the WEX

Figure 5 displays the extent of the western part of the Site that is within the State Highway Corridor Noise Control Boundary (**NCB**).

All land affected by the NCB is proposed to be used for commercial or industrial land use. These land uses will not trigger the acoustic treatment requirements in NOISE-R44 that require new buildings containing noise sensitive activities inside the NCB to be designed and constructed to mitigate road-traffic noise. NOISE-R44 and Section 8.1(4) of APP1 require bedrooms and habitable rooms to be designed and constructed so that road traffic noise does not exceed 40 dB $L_{Aeq(24hours)}$ indoors.



Figure 5 Area of the Site within the State Highway Corridor Noise Control Boundary

In the event that any noise sensitive activities are proposed in the future, compliance with NOISE-R44 will be straightforward to achieve as part of any future building consent process and can be demonstrated through the compliance pathway specified in the rule and permitted activity standard in Section 8.1(4) of APP1 of the WDPOP.

9.0 Summary

Styles Group has assessed the potential construction noise and vibration effects from the Greenhill Industrial Park.

My analysis of the masterplan finds that the proposal is capable of achieving compatibility with the level of acoustic amenity anticipated and provided for in the GRUZ of the Waikato District and options are available through the substantive application to appropriately manage noise effects.

I have not identified that any specific conditions are required to ensure a reasonable level of noise in the Hamilton District. I expect that noise levels from the Site will comply with the permitted noise levels prescribed by the Hamilton City District Plan due to separation distance.

I have provided recommendations for the appropriate management of construction and operational noise. These recommendations are straightforward and can be readily addressed within the substantive application.

The key recommendations are

Recommendation 1: Construction noise and vibration

I recommend that the substantive application includes an assessment of construction noise levels in accordance with the recommended numerical limits and assessment procedures set out in NZS 6803:1999. The assessment will confirm whether construction noise levels can be managed to comply with the permitted standards, or alternatively, whether a restricted discretionary activity resource consent will be required under NOISE-R4 to authorise temporary and intermittent exceedances of the permitted construction noise standards.

My preliminary assessment of the masterplan and likely works finds that vibration generated by construction work on the Site is likely to readily comply with the limits in German Standard DIN 4150-3:1999 *Structural vibration – Effects of vibration on structures* for avoiding building damage without requiring any specific mitigation.

The assessment for the substantive application will detail how a CNVMP will be used to ensure that construction noise effects are minimised to ensure compliance with the permitted standards for as much of the project as is practicable. I am confident that the construction noise and vibration effects can be managed to be reasonable for all receivers.

Recommendation 2: Management of operational (industrial and commercial) noise effects received beyond the Site

My analysis of the masterplan finds that future activities on the proposed industrial lots can be located, designed and managed to achieve compliance with a reasonable level of noise at all notional boundaries at the periphery of the Site. I consider that there are two options available for managing this interface. The options are:

- 1) To comply with the permitted noise standards for the GRUZ. This would apply the noise limits from NOISE-R8 which are 5dB lower (at all times of day) than noise limits typically applied to control noise levels between an industrial and residential interface. These noise limits would deliver a good level of amenity to existing notional boundaries but would create a considerable operational constraint on the industrial activities at the periphery of the Site, near to existing houses.
- 2) Seek resource consent for noise limits 5dB higher than the underlying GRUZ noise standards at the notional boundaries that are directly adjacent to the Site. This would ease the constraint on the industrial /commercial activities while providing an adequate level of acoustic amenity for non-acoustically treated noise sensitive activities. The noise limits would deliver a reduced

level of outdoor amenity when compared to Option 1, but the amenity would still be typically acceptable for noise sensitive receivers. This option would essentially deliver a similar outcome as a scenario whereby the proposed industrial sites were rezoned “Industrial” and interface noise limits were applied to manage noise effects on proximate noise sensitive activities.

I have recommended that the consultation and investigations for the substantive application considers Option 2 to apply a slightly higher interface noise limit (55dB L_{Aeq} daytime/ 45dB L_{Aeq} nighttime) at lots that adjoin or are directly adjacent to the Site.

Overall, I consider that future industrial activities can be located, designed and managed to achieve compatibility with the level of acoustic amenity required for non-acoustically treated residential activity regardless of which option is adopted.

Recommendation 3: Management of operational (industrial and commercial) noise effects within the Site

I have set out recommendations to ensure the permitted noise environment within the Site is sufficiently enabling for industrial and commercial activities, whilst ensuring ongoing compatibility between industrial, commercial and rural-residential activities. I have recommended that consent is sought to apply the higher noise limits of 55 dB L_{Aeq} (7am to 7pm), 50 dB L_{Aeq} (7pm to 10pm) and 45 dB L_{Aeq} and 70 dB L_{AFmax} (10pm to 7am) for noise generated from industrial / commercial lots and received at rural-residential lots within the Site. I have recommended the consent provides for higher noise levels for noise generated and received between industrial and commercial lots, on the basis that the consent will also include controls to restrict the establishment of noise sensitive activities⁸ on land allocated for industrial and commercial land use.

The proposed mechanisms for achieving land use compatibility will be further explored and refined as part of the substantive application and proposed condition set (if required).

⁸ unless the specific type of noise sensitive activity can be adequately protected from the elevated noise environment using acoustic treatment.

Appendix A WDPOP Noise standards

These provisions apply to noise generated from the Site and received in the Waikato District.

Definition of Noise Sensitive Activities

Means buildings or parts of buildings used for, or intended to be used for the following purposes:

1. Residential activity;
2. Visitor accommodation;
3. Schools and tertiary education premises;
4. Health centre

Definition of Noise Sensitive Activity

Means any or all of the following:

- (a) buildings used for residential activities, including boarding establishments, retirement villages, parakiting housing development, visitor accommodation, and other buildings used for residential accommodation but excluding camping grounds;
- (b) marae and marae complex;
- (c) hospitals;
- (d) teaching areas and sleeping rooms in an education facility; (e) places of assembly.
- (e) places of assembly

Construction Noise

NOISE- R4	Noise- Construction	
All zones	(1) Activity status: PER Where: (a) Noise from any construction, maintenance, or demolition activity that is measured, assessed and managed in accordance with the requirements of NZS6803:1999 'Acoustics - Construction Noise'	(2) Activity status where compliance not achieved: RDIS (a) Effects on amenity values; (b) Hours and days of construction; (c) Noise levels; (d) Timing and duration; and (e) Methods of construction.

Construction Noise – All Infrastructure (Appeal 000086)

AINF-R2	Construction noise	
All zones	(1) Activity status: PER Where: (a) Construction, maintenance, repair, replacement, upgrading or removal of infrastructure or the installation of new infrastructure	(2) Activity status where compliance not achieved: RDIS Council's discretion is restricted to the following matters: (a) Effects on amenity values; (b) Hours of construction;

	must comply with NZS 6803:1999 Acoustics - Construction noise.	(c) Noise levels; (d) Timing and duration; and (e) Methods of construction
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Noise generated and received in the General Rural Zone

NOISE- R8	Noise- general	
GRUZ- General Rural Zone	(1) Activity status: PER Where: (a) Noise measured at the notional boundary on any other site in the GRUZ - General Rural Zone must not exceed: (i) 50dB LAeq, 7am to 7pm every day; (ii) 45dB LAeq, 7pm to 10pm every day; (iii) 40dB LAeq and 65dB LAmax, 10pm to 7am the following day. (b) Noise measured within any site in any zone, other than the GRUZ - General rural zone, must meet the permitted noise levels for that zone. (c) Noise levels must be measured in accordance with the requirements of New Zealand Standard NZS 6801:2008 "Acoustics - Measurement of Environmental Sound". (d) Noise levels must be assessed in accordance with the requirements of New Zealand Standard NZS 6802:2008 "Acoustic - Environmental noise".	(2) Activity status where compliance not achieved: DIS

Noise generated from the Commercial Zone and received in the GRUZ

NOISE-R15		
Noise - general		
COMZ - Commercial zone	(1) Activity status: PER Where: (a) Noise measured within any:	(2) Activity status where compliance not achieved: DIS

	(i) In the COMZ - Commercial zone must not exceed: (1) 65dB $L_{Aeq(15min)}$, 7am to 11pm every day; and (2) 55dB $L_{Aeq(15min)}$, 11pm to 7am the following day; and (3) 85dB L_{Amax}, 11pm to 7am the following day; or (ii) In the GRZ - General residential zone, MRZ1 - Medium density residential zone 1, MRZ2- Medium density residential zone 2, LLRZ - Large lot residential zone and SETZ - Settlement Zone must not exceed: (1) 55dB $L_{Aeq(15min)}$, 7am to 7pm; and (2) 50dB $L_{Aeq(15min)}$, 7pm to 10pm; and (3) 40dB $L_{Aeq(15min)}$, 10pm to 7am the following day; and (4) 65dB L_{Amax}, 10pm to 7am the following day. (iii) Noise measured within any site in any zone other than the LCZ - Local centre zone, GRZ - General residential zone, MRZ1 - Medium density residential zone 1, MRZ2- Medium density residential zone 2, LLRZ - Large lot residential zone or SETZ - Settlement Zone must meet the permitted noise levels for that zone. (b) Noise levels must be measured in accordance with the requirements of NZS 6801:2008 Acoustics - Measurement of Environmental Sound. (c) Noise levels must be assessed in accordance with the requirements of NZS 6802:2008 Acoustics - Environmental.	
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State Highway Noise Control Boundary

NOISE- R44	Construction of a new building containing a sensitive land use within a State Highway or Rail Corridor Noise Control Boundary
1. Activity status: PER Activity-specific standards: (a) New buildings are designed, constructed and maintained to ensure that any part of the building located within the State Highway or Rail Corridor Noise Control Boundary and containing an activity listed in Table 28 APP1:	Activity status where compliance not achieved: RDIS Council's discretion is restricted to the following matters: 1. Adverse effects on health and amenity of people indoors within the Noise Control Boundary overlays

i. complies with the maximum future indoor design noise levels in Table 28 in APP1 and meets the ventilation requirements in Section 8.1(4) of APP1; or ii. is located so the nearest exterior façade of that part of the building is at least 50m from the formed carriageway of the state highway and 50m from the formed railway track and there is a solid building, fence, wall or landform that blocks the line of sight from all parts of all windows and doors to that activity to: 1) All parts of the formed carriageway of the state highway. 2) All points 3.8m directly above the formed railway track; or iii. is located so it can be demonstrated by way of prediction or measurement by a suitably qualified and experienced acoustic consultant that noise at all exterior facades of that part of the building will be no more than 15 dB above the relevant maximum indoor design noise levels in Table 28 in APP1: or iv. accords with the construction schedule in Table 29 of APP1 and meets the ventilation requirements in Section 8.1 (4) of APP1.	2. Alternative options for building design or location that would achieve compliance with the standards in APP1 3. Adverse effects on the continuing operation of the state highway network, or railway corridor as a result of non-compliance with the standards in APP1 4. Any natural or built features of the site or surrounding area that will mitigate noise effects 5. The outcome of any consultation undertaken with NZTA or KiwiRail
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APP1- Acoustic insulation requirements for the State Highway and Rail Corridor Noise Control Boundary

8. State Highway and Rail Corridor Noise Control Boundary

The State Highway and Rail Corridor Noise Control Boundary overlays shown on the planning maps identify areas that have the potential to experience high noise levels from road and rail traffic. New buildings and alterations to habitable rooms in buildings used for sensitive land uses are required to demonstrate that adverse noise effects have been appropriately managed by demonstrating compliance with the standards specified in section 8.1.

8.1 Standards for permitted activities within the State Highway and Rail Corridor Noise Control Boundary overlays

- (1) Prior to the construction or alteration of, or change of use within, any building to which this standard applies, a design report shall be submitted to the Council demonstrating compliance with the maximum indoor design noise levels specified in Table 28, applying the assumptions in sections 8.1(2) and 8.1(3) below. Alternatively, the design report may be substituted with confirmation that the construction or alteration of, or change of use within, the building will meet the construction schedule requirements in Table 29.

Table 28 – Maximum indoor design noise levels for state highway and rail corridor noise

Type of Noise Control Boundary	Activity	Rail Corridor maximum indoor design noise level	State Highway maximum indoor design noise level
State Highway and Rail Corridor	Bedrooms	35 dB L _{Aeq} (1hour)	40 dB L _{Aeq} (24hour)
	Lecture rooms / theatres, music studios, assembly halls	35 dB L _{Aeq} (1hour)	35 dB L _{Aeq} (24hour)
	Conference rooms, drama studios, libraries and designated sleeping rooms for children aged 6 years or younger in schools, early childhood centres or tertiary institutions	40 dB L _{Aeq} (1hour)	40 dB L _{Aeq} (24hour)
	Sensitive activities in hospitals including overnight medical care, wards, clinics, consulting rooms, theatres, nurses' stations	40 dB L _{Aeq} (1hour)	40 dB L _{Aeq} (24hour)
	Places of assembly including churches, places of worship and marae	35 dB L _{Aeq} (1hour)	35 dB L _{Aeq} (24hour)
	Other habitable rooms	40 dB L _{Aeq} (1hour)	40 dB L _{Aeq} (24hour)

(2) For State Highways, the design road noise is to be based on measured or predicted external noise levels plus 3 dB*.

Table 29 - Construction Schedule

Elements	Minimum construction schedule for controlling noise in State Highway and Railway Noise Effects Areas in addition to the requirements of the New Zealand Building Code	
Exterior walls	Wall cavity infill of fibrous insulation, batts or similar (minimum density of 9kg/m3)	
	Cladding and internal wall lining complying with either Options A, B or C below:	
	Option A - Light cladding: timber weatherboard or sheet materials with surface mass between 8kg/m2 and 30 kg/m2 of wall cladding	Internal lining of minimum 17 kg/m2 plasterboard, such as two layers of 10 mm thick high-density plasterboard, on resilient/isolating mountings
	Option B - Medium cladding: surface mass between 30 kg/m2 and 80 kg/m2 of wall cladding	Internal lining of minimum 17 kg/m2 plasterboard, such as two layers of 10 mm thick high-density plasterboard
	Option C - Heavy cladding: surface mass between 80 kg/m2 and 220 kg/m2 of wall cladding	No requirements additional to New Zealand Building Code
Roof/ceiling	Ceiling cavity infill of fibrous insulation, batts or similar (minimum density of 7 kg/m3)	
	Ceiling penetrations, such as for recessed lighting or ventilation, shall not allow additional noise break-in	

	Roof type and internal ceiling lining complying with either Options A, B or C below:	
	Option A - Skillion roof with light cladding: surface mass up to 20 kg/m ² of roof cladding	Internal lining of minimum 25 kg/m ² plasterboard, such as two layers of 13 mm thick high-density plasterboard
	Option B - Pitched roof with light cladding: surface mass up to 20 kg/m ² of roof cladding.	Internal lining of minimum 17 kg/m ² plasterboard, such as two layers of 10 mm thick high-density plasterboard
	Option C - Roof with heavy cladding: surface mass between 20 kg/m ² and 60 kg/m ² of roof cladding	No requirements additional to New Zealand Building Code
Glazed areas	Aluminium frames with full compression seals on opening panes	
	Glazed areas shall be less than 35% of each room's gross floor area	
	Either: double-glazing with: - a laminated pane of glass at least 6 mm thick; - a cavity between the two panes of glass at least 12 mm deep; and - a second pane of glass at least 4 mm thick Or - any other glazing with a minimum performance of Rw 33 dB	
Exterior doors	Exterior door: - within the state highway noise effects area with a line-of-sight to any part of the state highway road surface; or - within the railway corridor noise effects area with a line-of-sight to any point 3.8m directly above the formed railway track.	Solid core exterior door, minimum surface mass 24 kg/m ² , with edge and threshold compression seals; or other doorset with minimum performance of Rw 30 dB

(4) If opening windows must be closed to achieve the design noise levels in Table 28 or if a building is constructed in accordance with the construction schedule in Table 29, the building must be designed, constructed and maintained with a mechanical ventilation system that:

- (a) For habitable rooms located within the State Highway or Rail Corridor Noise effects area containing a residential activity, achieves the following requirements:
- Provides mechanical ventilation that can operate continuously to satisfy clause G4 of the New Zealand Building Code and that provides at least 1 air change per hour, but no less than 7.5L/s per occupant;
 - Provides cooling and heating that is controllable by the occupant and can maintain the inside temperature between 18°C and 25°C when assessed using a 2.5% design weather condition for the applicable location. An acceptable design weather set would include IRHACE Yearbook 2009 NIWA weather data; and

- iii. A HVAC system installed in compliance with (4)(a)(i) and (ii) above, must not generate more than 35 dB $L_{Aeq(30s)}$ when measured 1 metre away from any grille or diffuser. The noise level must be measured after the system has cooled the rooms to the temperatures in (4)(a)(ii), or after a period of 30 minutes from the commencement of cooling (whichever is the lesser).
 - a) Alternatively, in lieu of section (4)(a) above, a design verified by a suitably qualified and experienced HVAC expert stating the design proposed will provide ventilation and internal space temperature controls to meet or exceed the outcomes described in parts (4)(a).
- (5) A commissioning report must be submitted to the Council prior to occupation of the building demonstrating compliance with all of the mechanical ventilation system performance requirements in 8.1(4).

*The State Highway Noise Effects Area is based on national road-traffic noise modelling by AECOM. The inputs for key parameters are as follows:

- **Date of input datasets:** 2021 (generally reflecting 2020/21 conditions)
- **Traffic volumes (AADT):** CoreLogic National Road Centreline dataset; 24h traffic data entered in CRTN as 18h traffic
- **Heavy vehicles (%HV):** CoreLogic National Road Centreline dataset
- **Speed:** CoreLogic National Road Centreline dataset; Posted speed limit
- **Road surface:** Surface types as recorded in NZTA RAMM database; Surface corrections in accordance with NZTA Guide to state highway road surface noise, including a -2 dB correction from CRTN to a reference AC-10 surface.
- **Bridge locations:** CoreLogic National Road Centreline dataset; Height interpolated from start and end points
- **Terrain:** LIDAR where available; NZ School of Surveying 15m nationwide DEM in other areas; Data combined in GIS to produce 1 m×1 m DEM for noise model
- **Building footprints:** LINZ NZ Building Outlines dataset
- **Building heights:** Where available, calculated from DSM median height minus DEM median height, otherwise: 6 m residential / 8 m commercial
- **Noise barriers:** None modelled

Appendix B HCDP Noise standards

Definition of Noise-Sensitive Activities

Noise-sensitive activities: Means residential activities (including residential accommodation in buildings which predominantly have other uses such as commercial or industrial premises), marae, spaces within buildings used for overnight patient medical care, and teaching areas and sleeping rooms in buildings used as educational facilities. For the purpose of this definition educational facilities includes tertiary institutions and schools, and premises licensed under the Education (Early Childhood Services) Regulations, and playgrounds which are part of such facilities and located within 20m of buildings used for teaching purposes.

Construction noise and vibration

25.8.3.2

Construction Noise

All construction noise shall comply with the relevant noise levels stated in NZS6803: 1999, section 7.2 'Recommended numerical limits for construction noise' and shall be measured and assessed in accordance with NZS 6803:1999 'Acoustics – Construction Noise'.

25.8.3.3

Construction Vibration

Construction vibration received by any building on any other site shall comply with the provisions of and be measured and assessed in accordance with German Standard DIN 4150-3:1999 Structural vibration – Effects of vibration on structures.

Noise performance standards for noise received in Residential Zones

25.8.3.7

Noise Performance Standards for Activities in all Zones Except Major Facilities, Knowledge, Open Space, Ruakura Logistics and Ruakura Industrial Park Zones

Activities in all Zones except Major Facilities, Knowledge, Open Space, Ruakura Logistics and Ruakura Industrial Park Zones, shall not exceed the following noise levels at any point within the boundary of any other site in the:

i. Residential Zones.

Time of day	Noise level measured in L _{Aeq} (15min)	Noise level measured in L _{AFmax}
0600- 0700 hours	45 dB	75 dB
0700- 2000 hours	50 dB	-
2000- 2300 hours	45 dB	-
2300- 0600 hours	40 dB	75 dB

Rules – Specific Standards

25.8.3.1

Measurement and Assessment of Noise

Noise levels shall be measured in accordance with NZS 6801:2008 "Acoustics – Measurement of Environmental Sound" and assessed in accordance with NZS 6802:2008 'Acoustics – Environmental Noise'. These apply unless otherwise stated.