

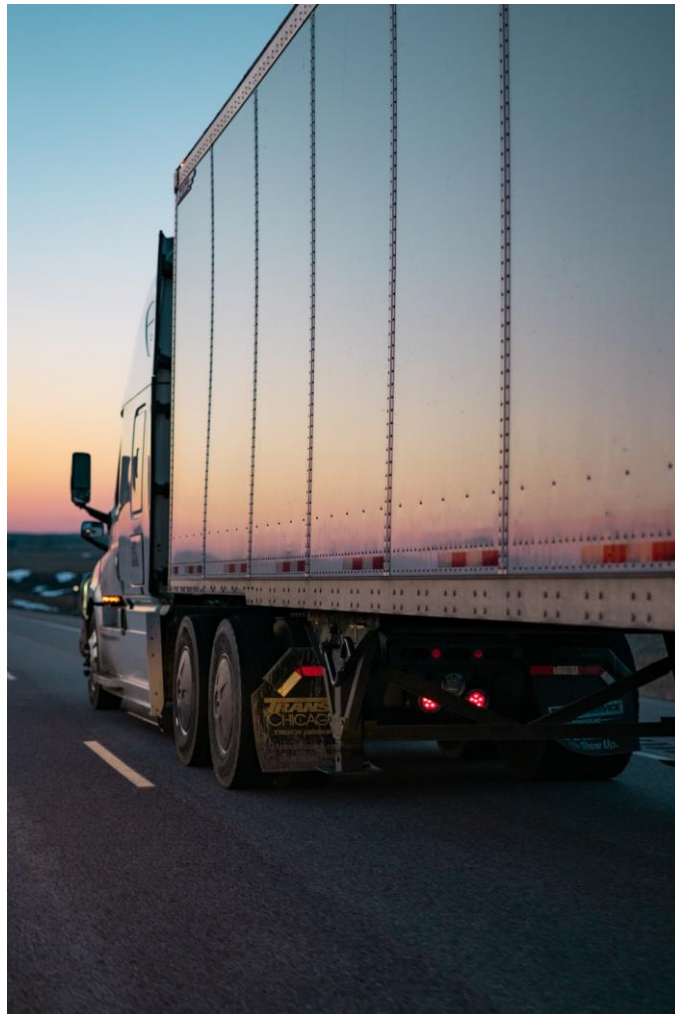
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Weigh Right Bombay

Acoustic Assessment

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1 Introduction

Waka Kotahi have appointed WSP to assess the potential noise impacts from the operation of a proposed Commercial Vehicle Safety Centre (CVSC) located in the northern part of 253 Mill Road, Bombay, Auckland.

The consenting strategy proposes a combined Notice of Requirement and resource consent process. The establishment of a Designation will be supported through an understanding of the scale and nature of effects on the environment, including noise.

A designation will be exempt from district plan matters such as noise. However, given the rural context to the site, the potential for any noise effects beyond the site is important to assess and an assessment of noise effects is still required for the Notice of Requirement (NOR).

This report addresses this matter and predicts the potential noise levels resulting from the operation of the CVSC site.

A glossary of acoustic terminology is included in Appendix A.

2 Project Background

Waka Kotahi NZ Transport Agency (Waka Kotahi) regulates heavy motor vehicle trips and monitors heavy motor vehicle loads. Heavy motor vehicles that exceed their weight limits create a higher level of crash risk, increase road maintenance costs for the National Land Transport Fund and local ratepayers, and create unfair market outcomes for freight operators.

The aim of the Commercial Vehicle Safety Programme is to reduce heavy motor vehicle overloading through the targeted selection of overloaded vehicles. The programme uses roadside technology and intelligent software to direct potentially overloaded vehicles into commercial vehicle safety centres (CVSC) (formerly known as weigh stations) throughout New Zealand.

2.1 Project description

The project will provide a CVSC site comprising of:

- A weigh bridge.
- Control building.
- Bypass lane (single lane past inspection).
- Inspection shed (including under-vehicle inspection pit) and six open inspection bays.
- Vehicle queuing capacity before the Single Dynamic Axle Weigher (DAW) (5 vehicles).
- Offload area.
- Visitor parking.

After entering the site, vehicles will be inspected and/or weighed, and will be required to manoeuvre between the various areas of the site. Staff will be housed within the Control Building which will contain office spaces and general amenities.

When required, the off-load area will operate with two trucks parked up, an overweight vehicle and another onto which cargo is transferred via forklift.

It is anticipated that operations rostering by CVSC will be based on commercial vehicle intelligence (routes, times, traffic volumes, events etc), and the site staffed when risks are highest (i.e. crash risks, vehicle volumes) typically 6 am to 9 pm.

2.2 Site location

The site is located on the northern part of 253 Mill Road, Bombay, Auckland. It is approximately 250 m east of State Highway 1 and is in a rural-rural production zone.

The surrounding area comprises a mixture of residential and commercial properties including the Bombay village neighbourhood centre and a Temple. These are indicated on the site plan in Appendix B. Of these, the dwellings will form the properties used for assessment purposes within this report. Commercial/Non-residential properties are excluded. The relative distances from the site to the surrounding dwellings is provided in Table 2.1.

Table 2.1 Distance of surrounding residential properties from the site

Property	Property Type	Distance from site
1998 Great South Road	Temple	130
1998 Great South Road	Dwelling	130
1994 Great South Road	Dwelling	175
Lot 3 DP 124783	Dwelling	190
287 Mill Road	Dwelling	240
Rural and Coastal Settlement Zone	Dwelling	350
253 Mill Road	Dwelling	100

2.3 Existing noise levels

The main source of noise in the local area will be traffic from State Highway 1. Furthermore, there is an established petrol station opposite the site. Heavy and light vehicle noise of a similar character to the proposed CVSC is likely to be present (vehicles moving at slow speeds, accelerating, breaking, and engine starting).

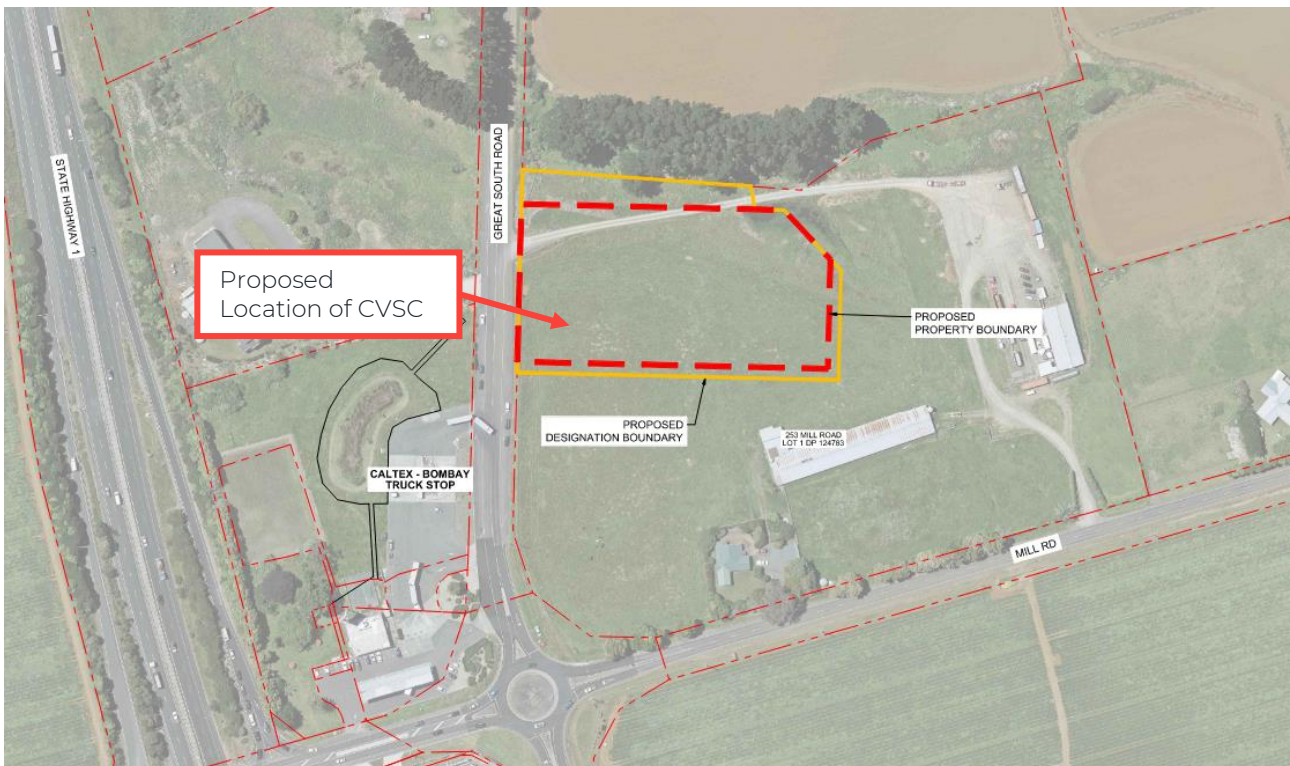


Figure 2.1 Site Location

3 Acoustic Design Standards

The consenting strategy proposes a combined Notice of Requirement (NoR) and resource consent process. The establishment of a Designation will be supported through an understanding of the scale and nature of effects on the environment, including noise.

A designation will be exempt from district plan matters such as noise, however, given the rural context to the site, confirming any noise effects beyond the site is important and may require consideration of any mitigations on-site. Furthermore, an assessment of noise effects is still required for the NoR.

Noise and vibration are district plan matters under the Auckland Unitary Plan (AUP) (Chapter E25) and the NoR application will not require consent for this. However, any noise effects beyond the proposed designation boundary have been assessed to support the s171 (RMA) assessment, subject to Part 2.

The “best practicable option” shall be adopted to ensure that the emission of noise from that land or water does not exceed a reasonable level, which implies consideration of options (Section 16 of the RMA 1991).

A key policy in E25 states in relation to noise arising from or affecting rural zones:

“(9) Avoid, remedy or mitigate the adverse effects of noise in the rural environment, having regard to the working nature of this environment.”

A reasonable level of noise for the *Rural Zone* is outlined within the AUP, Chapter E25 section E25.6.3, and is summarised in Table 3.1. For the purposes of assessment, the noise (rating) level at the notional boundary of the neighbouring sites in the rural zone will be considered against the limits in Table E25.6.3.1 of the AUP.

Table 3.1 External noise emission criteria

Zone	Time	Noise Limit
Rural Zone	Monday to Saturday 7 am – 10 pm	55 dB LAeq
	Sunday 9 am – 6 pm	
	All Other Times	45 dB LAeq 75 dB LAFmax

Where noise from the proposed CVSC is at or below the above noise limits when assessed at the notional boundary of any adjacent residential property, the effects will be compliant. Where predictions exceed these limits, the best practicable option shall be considered to mitigate the noise emissions. In addition, the following relevant AUP E25 general standards apply:

E25.6.1. General standards

- (1) Noise levels arising from activities must be measured and assessed in accordance with the New Zealand NZS 6801:2008 Measurement of environmental sound and the New Zealand Standards NZS 6802:2008 Acoustics – Environmental noise except where more specific requirements apply.
- (2) The application of an adjustment for noise containing special audible characteristics in terms of Appendix B4 Special Audible Characteristics in New Zealand Standards NZS 6802:2008 Acoustics – Environmental noise may apply to the A weighted level for any measurement, but an adjustment must not be applied to any level measured in the 63Hz and 125Hz octave bands.

Noise from vehicle movements on the existing road network are not required to be assessed and are therefore excluded.

This assessment has been undertaken in accordance with NZS 6802:2008 – Environmental Noise.

4 Activities on Site

The main source of noise will be the movement of heavy commercial vehicles around the site.

For the purposes of assessment, the following typical sound pressure level for trucks has been used, sourced from measurements undertaken by WSP of trucks operating under similar conditions to those expected to arise from the operation of the CVSC (Starting up, pulling away, Air brake release). Noise levels for electric and diesel forklift trucks have been taken from WSP's database of measurements of forklifts operating loading and unloading trucks. For the purposes of this assessment, the highest noise level of a diesel forklift has been used, should electric units be used the associated noise levels would be lower. The sound pressure levels of the assessed equipment are provided below:

- Truck idling and leaving – 72 dB L_{Aeq} at 10 m
- Truck air brake release – 80 dB L_{Amax} at 10m
- Forklift truck – 69 dB L_{Aeq} at 10 m

The inspection shed will be equipped with three exhaust fans, a booster pump and additional vehicle inspection equipment. Noise emissions from these are expected to be insignificant compared to those from heavy vehicle movements. The control room is expected to be fitted with ventilation equipment (E.g. FCU/ ceiling cassette unit). Plant information for the control room was not available at the time of writing but it is anticipated that noise emissions will be insignificant given the small size of the space. Moreover, should mitigation be required, it may be readily incorporated by way of lined ductwork or attenuators. Therefore building services equipment has not been considered within this assessment.

No significant levels of vibration are predicted to be generated on the site.

4.1 Assessment scenarios

An assessment of the following scenarios has been undertaken, reflective of the assumed typical and busiest periods:

- A) Daytime: 3 trucks on site concurrently; and,
- B) Daytime: 6 trucks on site concurrently; and,
- C) Night-time (10pm – 7am): 1-2 trucks on site concurrently.

The operator anticipates a maximum throughput of 17 vehicles per hour at peak periods, which means each vehicle can complete the weighing procedure and leave the site in 3.5 minutes.

This assessment makes the following assumptions regarding truck engine on-times.

Scenario A:

Three trucks use the facility within a 30-minute period, each with engines running for 5 minutes. While a best-case scenario is that each truck can complete the weight check in 3.5 minutes, we have conservatively assumed that all trucks would take longer due to processing delays.

Scenario B

7 Trucks on site concurrently with their engines running continuously over the entire 30-minute assessment period. This is the worst-case scenario with 5 vehicles queued before the weighbridge with engines running (fully occupying the stacking capacity), one truck driving

through the weighbridge, and one truck leaving the site, with a continuous flow of vehicles over the assessment period. Any trucks in the offloading area are assumed to have engines off in accordance with the proposed signage instructing drivers to switch off vehicles when not moving.

Scenario C

1-2 trucks on site concurrently with their engine running for 5 minutes.

4.2 Assessment methodology

In accordance with *Appendix B4 Special Audible Characteristics* in New Zealand Standards NZS 6802:2008 *Acoustics – Environmental noise*, where an activity produces a Special Audible Characteristic (SAC) a 5 dB penalty shall be applied to the A weighted level of any measurement. Given that noise from vehicle activity is an inherent part of the existing noise environment, this has not been applied to the assessment.

As outlined in NZS 6802:2008, where a sound source is not present for the entire daytime period an adjustment to the measurement can be applied. A 3 dB adjustment can be applied for a sound that occurs for less than 50 % of the daytime period. No adjustments can be used during the night-time period. Accordingly, a -3dB adjustment has been applied to all daytime noise predictions, to account for the intermittent nature of the noise from the development.

For the purposes of assessment, a 30-minute assessment period has been considered. Time weightings have been applied to the $L_{Aeq,30mins}$ noise level predictions in accordance with the engine on time per truck assumptions for the different scenarios.

For each of the assessment scenarios, noise from the total number of vehicles was summed assuming notional vehicle locations around the site. The resulting levels were assessed at the nearest residential locations using standard noise propagation formulae assuming propagation over soft ground. A screening effect was applied at 253 Mill Road due to the site level being lower than the ground beyond the southern boundary.

In addition to the $L_{Aeq,30mins}$, an assessment of the maximum noise level at each receiver (L_{AFmax}) was undertaken against the AUP criteria, based on the expected noise from air brake releases.

5 Acoustic Assessment

5.1 Results

The predicted $L_{Aeq,30mins}$ noise levels at the notional boundary of the surrounding properties during each assessment scenario are outlined in Table 5.1.

Table 5.1 Predicted $L_{Aeq,30mins}$ Noise Levels

Location	Scenario	Predicted noise level (dB $L_{Aeq,30 min}$)	Compliant with AUP noise limit?	Comments
1998 Great South Road (Temple)	A	46	Yes	-
	B	55	Yes	-
	C	45-48	No	N/A (Non-residential)

Location	Scenario	Predicted noise level (dB $L_{Aeq,30\text{ min}}$)	Compliant with AUP noise limit?	Comments
1998 Great South Road (Residence)	A	46	Yes	-
	B	55	Yes	-
	C	45-48	No	Up to a 3 dB exceedance is considered negligible. This would only occur during the worst- case scenario with 2 vehicles and an operating forklift on site
1994 Great South Road	A	43	Yes	-
	B	53	Yes	-
	C	42-45	Yes	-
Lot 3 DP 124783	A	42	Yes	-
	B	52	Yes	-
	C	42-45	Yes	-
287 Mill Road	A	40	Yes	-
	B	50	Yes	-
	C	40-43	Yes	-
Rural and Coastal Settlement Zone	A	37	Yes	-
	B	47	Yes	-
	C	36 - 39	Yes	-
253 Mill Road (adjacent property)	A	42	Yes	-
	B	51	Yes	-
	C	41 – 44	Yes	-

The predicted maximum noise levels (L_{Amax}) are provided in Table 5.2.

Table 5.2 Predicted L_{AFmax} Noise Levels

Location	Predicted noise level (dB L_{AFmax})	Compliant with AUP noise limit?	Comments
1998 Great South Road (Temple)	58	Yes	-
1998 Great South Road (Residence)	58	Yes	-

Location	Predicted noise level (dB L _A F _{max})	Compliant with AUP noise limit?	Comments
1994 Great South Road	55	Yes	-
Lot 3 DP 124783	54	Yes	-
287 Mill Road	52	Yes	-
Rural and Coastal Settlement Zone	49	Yes	-
253 Mill Road (adjacent property)	60	Yes	-

5.2 Results discussion

The site is to be designated as part of this application, and therefore under the planning framework, the AUP noise standards do not apply. However, there is a duty by the occupiers of land to ensure the activity does not generate unreasonable levels of noise, as required by Section 16 of the Resource Management Act 1991. For this assessment, the AUP noise standards, current character of noise at the site, and duration of the exceedance have been used as a basis to consider whether noise is reasonable.

Commentary regarding each of the assessment scenarios is provided below.

253 Mill Road is the parent site and accordingly any effects on persons who own or occupy the land in, on, or over which the activity will occur; or any land adjacent to that land may be disregarded for the purposes of s95D.

It is noted the CVSC produces similar a similar character of noise with other activities occurring or allowed to occur in the surrounding area; and any exceedances will be limited in duration, frequency, and by hours of operation.

Daytime (Scenario A and B)

- All noise predictions are within the AUP noise limits applicable to Rural Zones. Therefore, typical numbers of vehicle movements are considered to be acceptable and have negligible noise impacts at all surrounding properties.

Night-time (Scenario C)

- Predicted noise levels at all residential receivers are predicted to comply with the AUP noise limits, except for the residence at the northern end of 1998 Great South Road, where an exceedance of up to 3 dB is predicted during the nighttime. The magnitude of the exceedance is not significant and given that this will not occur either frequently through the night or regularly at night at all, the overall impact is considered low.

253 Mill road

253 Mill Road is the closest receiver to the site. Noise levels at this location will be mitigated by the natural berm formed due to the site surface being lower than the surrounding ground level. A plan layout is provided in Figure 5.1. A cross section which illustrates the level difference at the southern site boundary is provided in Figure 5.2.

For the purposes of assessment, line of sight from this receiver to the noise sources (vehicle engines) traversing the site was assumed to be partially obstructed, resulting in partial screening of noise from the CVSC at this location.

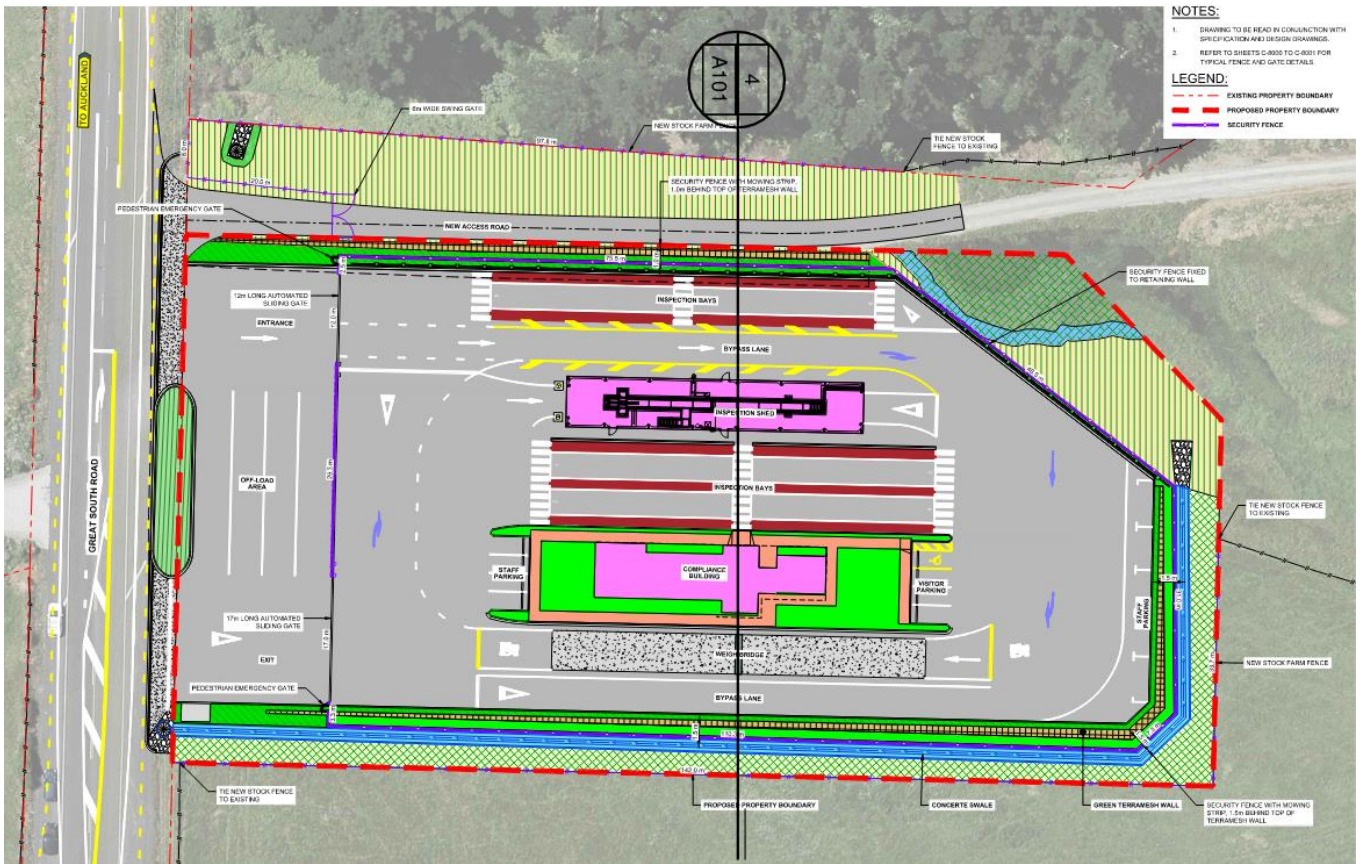
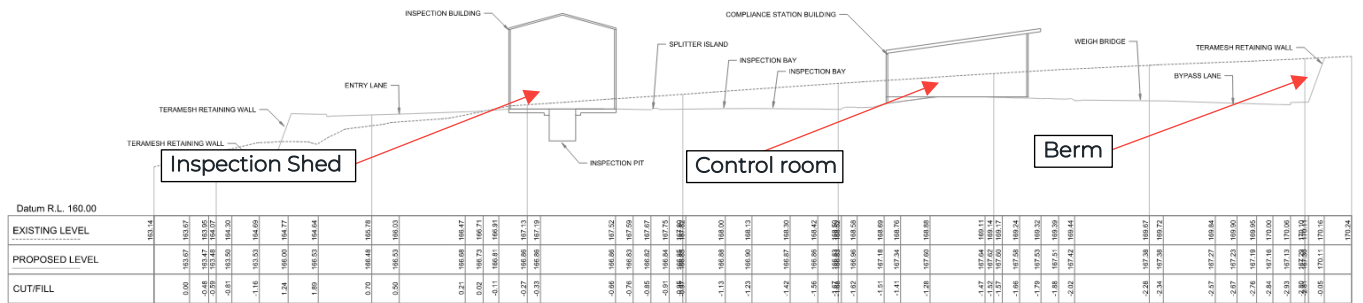


Figure 5.1: Site layout



HARDSTAND SECTION 4
 SCALE: 1:25 (A1) 1:250 (A3)

Figure 5.2: Section 4

6 Conclusions

Waka Kotahi have appointed WSP to assess the potential noise impacts from the operation of a proposed CVSC site located in the northern part of 253 Mill Road, Bombay, Auckland.

The consenting strategy for the site proposes a combined Notice of Requirement and resource consent process. The establishment of a Designation will be supported through an understanding of the scale and nature of effects on the environment, including noise.

To support this, noise levels at the properties surrounding the proposed site have been predicted and the associated impacts assessed. Whilst the NoR application will not require consent under the noise standards of E25 in the AUP, guidance has been taken to determine the predicted noise effects generated by the proposal.

An assessment was undertaken for the typical and assumed busiest daytime periods, as well as during a night-time scenario. It is however noted that the majority of the operations are expected to be daytime only.

Any building services equipment associated with the control centre has been excluded from the assessment as noise emissions from these are expected to be insignificant relative to the noise from heavy vehicle movements.

Noise levels from typical operations are predicted to meet the noise standards of the AUP at all surrounding properties. During the assumed busiest daytime conditions at full capacity, a 3 dB exceedance of the AUP noise standards for rural zones is predicted at 1998 Great South Road (residence). However, this is not expected to cause significant adverse effects, and not expected to occur frequently.

On the basis of this assessment, noise is not predicted to be a material constraint to the consenting and operation of the Bombay CVSC site.

Appendix A

Acoustic Terminology

NOTIONAL BOUNDARY

A line 20 metres from the side of any dwelling, or the legal boundary where this is closer to the dwelling.

SOUND PRESSURE LEVEL (SPL)

The basic unit of sound measurement is the sound pressure level. The sound level is the sound pressure relative to a standard reference pressure of $20 \mu\text{Pa}$ (20×10^{-6} Pascals) on a decibel scale. The pressures are converted to a logarithmic scale and expressed in decibels (dB).

SOUND POWER LEVEL (SWL)

The Sound Power of a source is the sound energy radiated per unit time by a sound source. Measured in Watts (W). As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, relative to the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

A-WEIGHTING

A frequency weighting devised to attempt to take into account the fact that human response to sound is not equally sensitive to all frequencies; it consists of an electronic filter in a sound level meter, which attempts to build in this variability into the indicated noise level reading so that it will correlate, approximately, with human response.

STATISTICAL NOISE LEVELS

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN} , where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

Of relevance are:

- L_{A10} The noise level exceeded for 10% of the measurement interval. This is commonly referred to as the average maximum noise level.
- L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.
- L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

Appendix B

Plan of the Site and Surrounding Area



wsp