EcoAcoustics

Proposed Car Wash Development
30 Maroochydore Way, Clarkson

Environmental Noise Assessment

12 November 2020

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Executive Summary

EcoAcoustics Pty Ltd conducted an assessment of a proposed car wash site located at 30 Maroochydore Way, Clarkson. This noise impact assessment report has been completed to support the proposal, as part of the development application. The purpose of this report is to assess the noise emissions from the site in accordance with the prescribed standards contained in the *Environmental Protection (Noise) Regulations 1994*.

The allowed hours of operation are 24 hours per day Monday to Sunday. To achieve these allowable hours, following needs to be incorporated into the design:

- The entry to the automatic wash bay will have an acoustically absorptive roof with the location as shown in *Figure 5.1*;
- A nib wall will be constructed extending out 4 metres from the entry point of Autobay 1 as shown in *Figure 5.1*;
- The proposed automatic car wash will be fitted with an automatic roller door on the exit, providing performance of a minimum R_w 23 (clear 3mm thick PVC);
- The vacuum bays will be fitted with an insulated roof and two sided wall providing shielding to the residences along Maroochydore Way;
- The vacuum bays are to be lined with 50mm 32kg/m^3 sound absorbing insulation.
- The plant room roof is to be lined with 50mm 32kg/m^3 sound absorbing insulation or similar.

The results of the noise predictions show that the proposed site can comply with the assigned noise levels for all time periods at nearby residential receivers with the inclusion of the attenuation measures discussed in Section 5.

1 Introduction

EcoAcoustics Pty Ltd conducted an assessment of a proposed car wash site located at 30 Maroochydore Way, Clarkson. This noise impact assessment report has been completed to support the proposal, as part of the development application. The purpose of this report is to assess the noise emissions from the site in accordance with the prescribed standards contained in the Environmental Protection (Noise) Regulations 1994.

Appendix A contains a description of some of the terminology used throughout this report.

1.1 Site Locality & Surroundings

The site and surroundings are shown in an aerial photo in *Figure 1.1.* The site is located at Maroochydore Way in Clarkson, within the City of Wanneroo. The proposed site is within close proximity to an existing MacDonalds Restaurant, service station, Bunnings Warehouse and other existing commercial premises. Noise sensitive premises located to the south across Neerabup Road and to the east across Marrochydore Way.

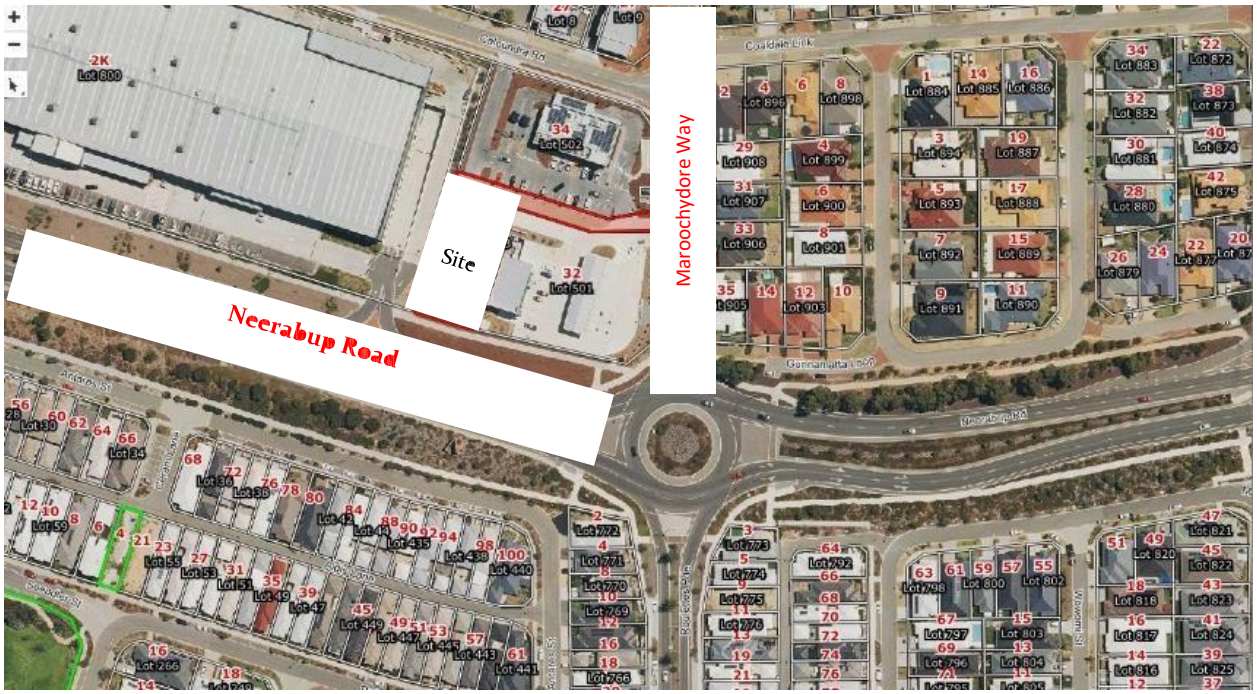


Figure 1.1: Site and Surroundings (Source: Google Earth)

1.2 Site Layout

The proposed carwash will comprise

- Three automatic wash bays and associated mechanical plant;
- Four vacuum bays; and
- Two dog wash bays.

The site layout is presented on *Figure 1.2*. *Figure 1.3* presents the site elevations.

It is understood that the hours of operation for the site will operate from 24 hours per day 7 days per week.

The potential noise impacts associated with the site include:

- The automatic wash bays;
- The mechanical plant associated with the site;
- The vacuum bays;
- Vehicles travelling around the site;
- Dog wash bay.

Table 1.1 shows the percentage breakdown of useage that has been applied to determine the appropriate noise levels during the 24 hour operations.

Table 1.1: Percentage Breakdown of Useage

Noise Source	Percentage Breakdown, %		
	07:00 to 19:00 hrs	1900 to 22:00 hrs	22:00 to 07:00 hrs
Automatic wash bays	70	30	15
Manual wash bays	70	30	15
Vacuum bays	70	30	15
Dog wash bay	70	30	15

Figure 1.2: Site Plan (source: Hodge Collard Preston)

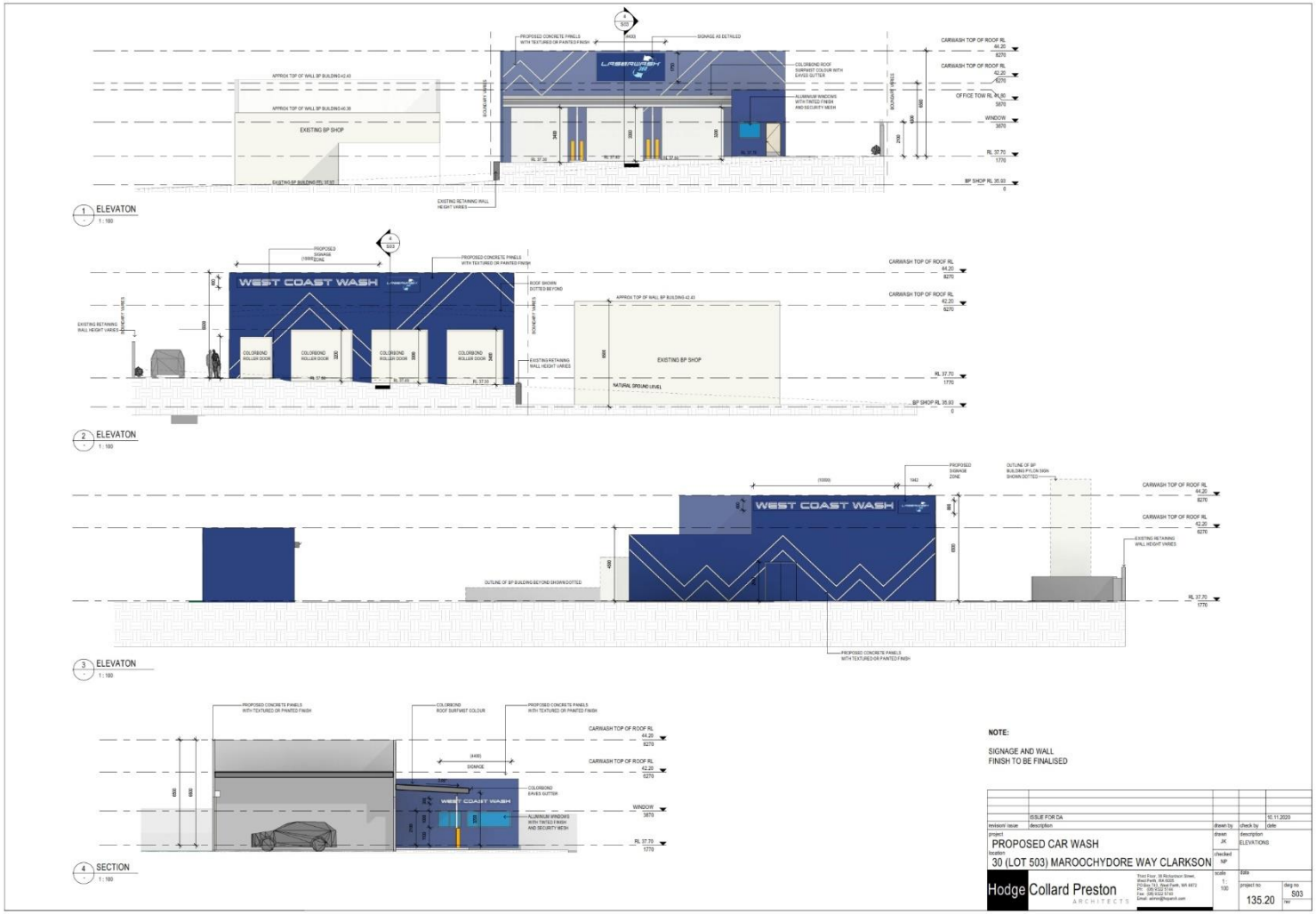


Figure 1.2: Site Elevations (source: Hodge Collard Preston)

2 Environmental Criteria

In Western Australia all Environmental noise is regulated by the *Environmental Protection Act 1986* and the *Environmental Protection (Noise) Regulations 1997*. Noise emissions from the site are required to satisfy the assigned noise levels specified in Regulations 7, 8 and 9.

The standard stipulated in Regulation 7 of the Environmental Protection (Noise) Regulations 1997 states:

7. (1) Noise emitted from any premises or public place when received at other premises –

a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and

b) Must be free of –

- *Tonality;*
- *Impulsiveness; and*
- *Modulation.*

Regulation 9 defines tonality, impulsiveness and modulation. It is regarded that noise is free of these characteristics if:

a) Tonality, impulsiveness and modulation cannot be equitably removed by means other than decreasing the overall level of noise emission; and

b) Subsequent to any adjustments as displayed in *Table 2.1* noise emissions remain compliant with the required standards when measured at the point of reception.

Table 2.1 Adjustments for Intrusive Characteristics

Tonality	Modulation	Impulsiveness
+ 5dB	+ 5dB	+ 10dB

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and are shown below in *Table 2.2*.

Table 2.2 Baseline Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
All nearby residential premises including highly sensitive areas[1]	0700 to 1900 hours Monday to Saturday **(Day)**	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays **(Sunday)**	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days **(Evening)**	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays **(Night)**	35 + influencing factor	45 + influencing factor	55 + influencing factor
Commercial	All hours	60	75	80
Industrial	All hours	65	80	90

1. Highly sensitive area means that area (if any) of a noise sensitive premises comprising –
    a. A building, or a part of a building on the premises that is used for a noise sensitive purpose; and
    b. Any other part of the premises within 15 metres of that building or that part of the building.

Based on the location of the nearby residences and the proximity to Neerabup Road and the nearby commercial premises, the influencing factor has been determined to be 7dB as a worst case. *Table 2.3* shows the assigned noise levels with the inclusion of the influencing factor.

Table 2.3: Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
All nearby residential premises including highly sensitive areas	0700 to 1900 hours Monday to Saturday (Day)	52	62	72
	0900 to 1900 hours Sunday and public holidays (Sunday)	47	57	72
	1900 to 2200 hours all days (Evening)	47	57	62
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	42	52	62

3 Noise Modelling

3.1 Methodology

Computer modelling using SoundPlan 8.2 has been used to calculate the noise levels at nearby residences. Noise modelling is used as it is not affected by background noise sources and can provide the noise level for various weather conditions.

The software incorporates the CONCAWE algorithms enabling the modelling to include the influence of wind and atmospheric stability. Input data required in the model are:

- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.1.1 Topographical Data

Topographical data was based on information provided by the client, and obtained from Google Earth.

3.1.2 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. water or bitumen) and 1 for acoustically absorbent ground (e.g. grass). In this instance value of 0.6 has been used for the surrounding area, and 0 has been used for roads, driveways and parking areas.

3.1.3 Source Sound Levels

Table 4.1 shows the sound power levels used in the modelling. The sound power levels have been determined based on file data and manufacturer's data provided by the client, along with the measurements of the existing site.

Table 4.1: Source Sound Power Levels

Description	Octave Band Centre Frequency, dB (Hz)							Overall dB(A)
	63	125	250	500	1k	2k	4k	
Automated carwash entry/exit without doors	82	83	83	85	87	86	85	**92**
Automated carwash entry/exit with doors (achieving minimum Rw 23)	70	75	72	71	65	61	53	**71**
Vacuum (unattenuated)	85	80	82	80	81	82	85	**92**
Dog Wash bay	70	71	71	73	74	74	71	**79**

4 Noise Impact Assessment

The noise level predictions for the car wash assume the following:

- Based on the sound power data provided, the noise associated with the automatic car wash has no tonal, impulsive or modulating characteristics therefore no penalty adjustment is applicable;
- The autowash bays are fitted with automatic doors on the exit of the carwash bays;
- A nib wall will be constructed extending out 4 metres from the entry point of Autobay 1 as shown in *Figure 5.1*;
- The percentage breakdown contained in *Table 1.1* has been used to determine the impact of the site during the day and night time periods;
- The vacuum bays will be fitted with an insulated roof and two sided wall providing shielding to the residences along Maroochydore Way;
- A +5dB penalty adjustment has been applied to the vacuum bay owing to the tonal characteristics; and
- The plant room and vacuum bays are to be lined with 50mm 32kg/m^3 sound absorbing insulation.

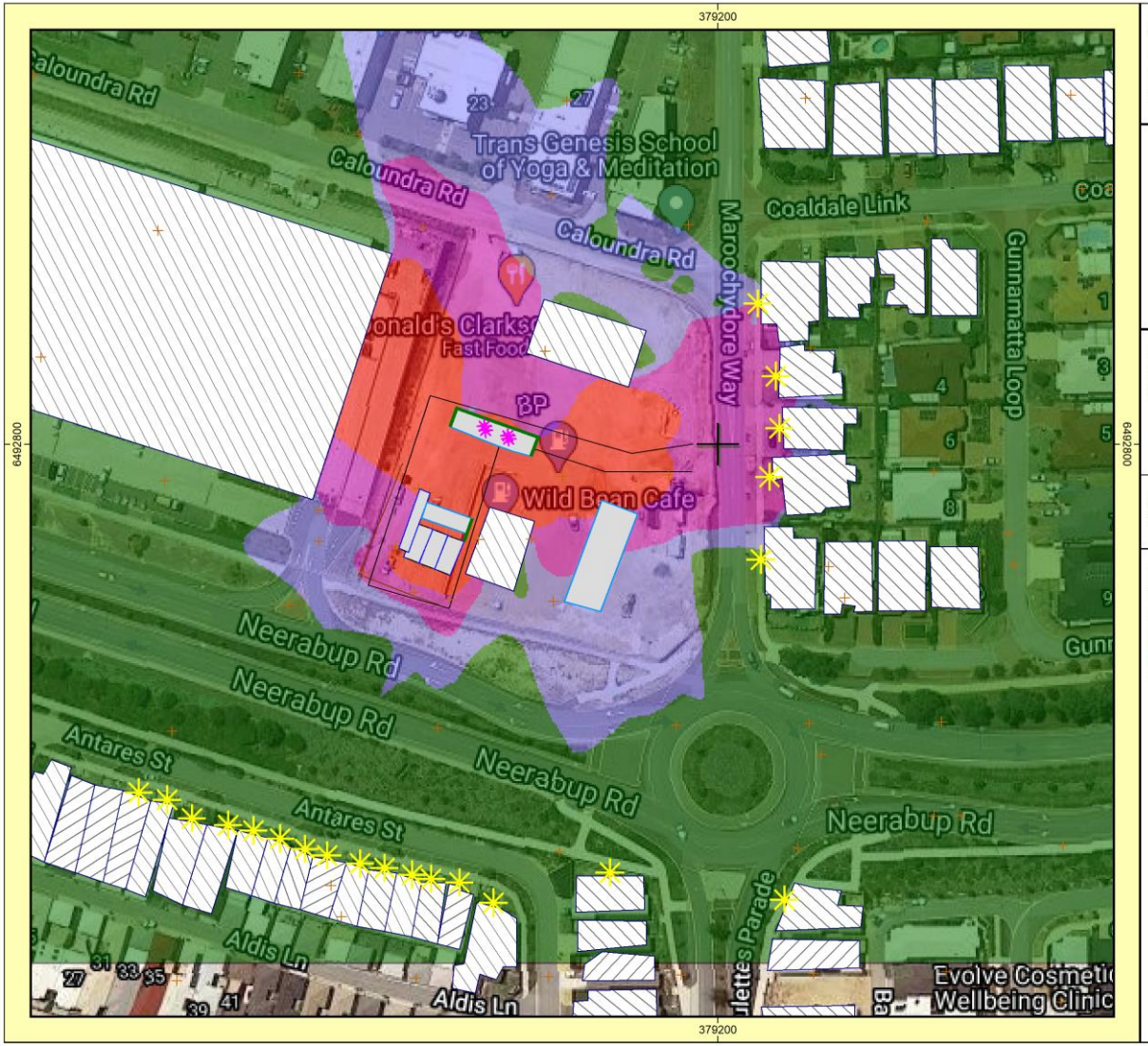
Figure 4.1 presents a noise contour plot showing the predicted daytime noise levels associated with the site. *Table 4.1* summarises the noise level predictions and compares these to the assigned noise levels for each time period.

Table 4.1: Noise Emissions From Site

Lot Location (ref Figure 1.1)	Predicted Noise Level, Day (Limit52dB(A)) dB(A) $L_{A10\ day}$	Predicted Noise Level, Evening & Sunday (Limit 47dB(A)) dB(A) $L_{A10\ evening}$	Predicted Noise Level, Night (Limit 42dB(A)) dB(A) $L_{A10\ night}$
2 Coaldale Link	41	37	34
8 Antares St	37	33	30
11 Roulettes Parade	35	32	29
29 Maroochdore Way	47	43	40
31 Maroochydore Way	47	43	40
33 Maroochydore Way	47	43	40
35 Maroochydore Way	36	33	30
74 Antares St	31	27	24

Lot Location (ref Figure 1.1)	Predicted Noise Level, Day (Limit52dB(A)) dB(A) $L_{A10\ day}$	Predicted Noise Level, Evening & Sunday (Limit 47dB(A)) dB(A) $L_{A10\ evening}$	Predicted Noise Level, Night (Limit 42dB(A)) dB(A) $L_{A10\ night}$
76 Antares St	31	27	24
78 Antares St	31	27	24
80 Antares St	32	28	25
82 Antares St	31	28	25
84 Antares St	33	30	27
86 Antares St	31	28	25
88 Antares St	28	25	22
90 Antares St	32	29	26
92 Antares St	32	28	25
94 Antares St	34	30	27
96 Antares St	33	30	27
98 Antares St	33	29	26
100 Aldis Ln	34	31	28

The results presented in *Table 4.1* show that the predicted, noise levels comply with the noise limits at all times of the day evening and night at all nearby residences based on the proposed modelling scenario discussed above and the useage percentages presented in *Table 1.1*.



Customer:
Lovegrove
Project: 30 Maroochydore Way Clarkson
Project-No. 20080881

Figure
4.1

Daytime
Entire site operating simultaneously
Calculation 1.4m above ground

Project engineer: Rebecca Ireland
Created: 30 October 2020
Processed with SoundPLAN 8.2, Update 3/04/2020

Levels Daytime L_{A10}
in dB(A)

- <= 42
- <= 47
- <= 52
- > 52

Signs and symbols

- Surface
- Wall
- Main building
- Wall
- Transparency wall are
- Sloped wall areas
- Elevation point
- Industrial building; Rc
- Point source
- Floating screen
- Roof area
- Wall
- Wall

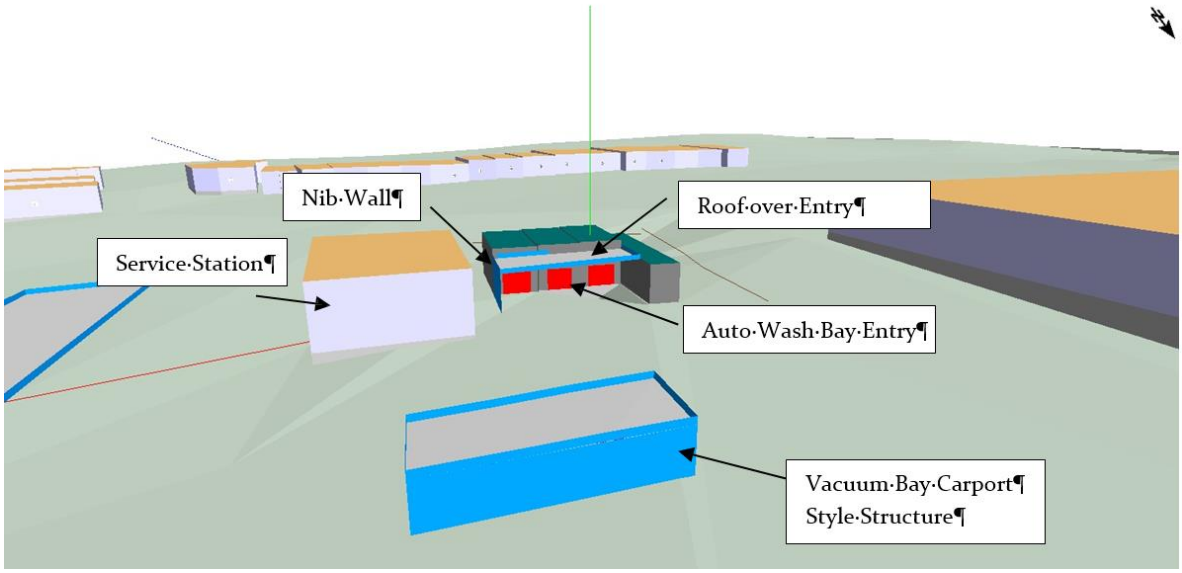
N

Length scale 1:1500
0 10 20 40 60

5 Recommendations and Discussion

To ensure compliance with the assigned noise levels throughout the 24-hour period, the following recommendations are required to be incorporated into the proposed development:

- The entry to the automatic wash bay will have an acoustically absorptive roof with the location as shown in *Figure 5.1*;
- A nib wall will be constructed extending out 4 metres from the entry point of Autobay 1 as shown in *Figure 5.1*;
- The proposed automatic car wash will be fitted with an automatic roller door on the exit, providing performance of a minimum R_w 23 (clear 3mm thick PVC);
- The vacuum bays will be fitted with an insulated roof and two sided wall providing shielding to the residences along Maroochydore Way;
- The vacuum bays and plant room are to be lined with 50mm 32kg/m³ sound absorbing insulation.



6 Conclusion

The results of the noise predictions show that the proposed site can comply with the noise criteria set out in the *Environmental Protection (Noise) Regulations 1994* for all time periods at nearby residential receivers with the inclusion of the attenuation measures discussed in Section 5.

Appendix A

Terminology

Terminology

Ambient Noise

Ambient noise refers to the level of noise from all sources, including background noise as well as the source of interest.

A-Weighting

An A-weighted noise level is a noise level that has been filtered as to represent the way in which the human ear distinguishes sound. This weighting indicates the human ear is more sensitive to higher frequencies than lower frequencies. The A-weighted sound level is described as L_A dB.

Background Noise

Background noise is the noise level from sources other than the source of interest. Background may originate from such things as traffic noise, wind induced noise, industrial noise etc.

Decibel (dB)

The decibel is the unit that characterises the sound power levels and sound pressure of a noise source. It is a logarithmic scale with regard to the threshold of hearing.

Impulsive Noise

An impulsive noise source is a short-term impact noise which may originate from such things as banging, clunking or explosive sound.

L_{A1}

An L_{A1} level is the A-weighted noise level which is overreached for one percent of a measurement period. It represents the average of the maximum noise levels measured.

L_{A10}

An L_{A10} level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "*intrusive*" noise level.

L_{A90}

An L_{A90} level is the A-weighted noise level which is overreached for 90 percent of the measurement period. It is represents the "*background*" noise level.

L_{Aeq}

L_{Aeq} refers to the comparable steady state of an A-weighted sound which, over a specified time period, contains the same acoustic energy as the time-varying level during the specified time period. It represents the "*average*" noise level.

L_{AFast}

The noise level in decibels, obtained using the A frequency weighting and the F time weighting as specified in AS1259.1-1990. L_{AFast} is used when examining the presence of modulation.

L_{Amax}

The L_{AMax} level is the maximum A-weighted noise level throughout a specified measurement.

L_{APeak}

The L_{APeak} level is the maximum reading (measured in decibels) during a measurement period, using the A frequency weighting and P time weighting AS1259.1-1990.

L_{ASlow}

A L_{ASlow} level is the noise level (measured in decibels) obtained using the A frequency weighting and S time weighting as specified in AS1259.1-1990

Maximum Design Sound Level

Maximum Design Sound Level is the level of noise beyond hearing range of most people occupying the space start, become dissatisfied with the level of noise.

Modulating Noise

A modulating source is an audible, cyclic and regular source. It is present for at least 10% of a measurement period. The quantitative definition of tonality is:

a fluctuation in the discharge of noise which;

a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;

b) is present for at least 10% of the representative

One-Third-Octave Band

One-Third-Octave-Band are frequencies that span one-third of an octave which have a centre frequency between 25 Hz and 20 000 Hz inclusive.

Reverberation Time

Reverberation time refers to an enclosure for a sound of a specified frequency or frequency band as well as the time that would be necessary for the reverberantly decaying sound pressure level in the enclosure to decrease by 60 decibels.

RMS

The root mean square level is used to represent the average level of a wave form such as vibration.

Satisfactory Design Sound Level

Satisfactory Design Sound Level refers to the level of noise that has been found to be acceptable for the environment in question, which is also to be non-intrusive.

Sound Pressure Level (L_p)

Sound Pressure Level refers to a noise source which is dependent upon surroundings, and is influenced by meteorological conditions, topography, ground absorption; distance etc. Sound Pressure Level is what the human ear actually hears. Noise modelling predicts the sound pressure level from the sound power levels whilst taking into account the effect of relevant factors (meteorological conditions, topography, ground absorption; distance etc).

Sound Power Level (L_w)

A sound power level of a noise source cannot be directly measured using a sound level meter. It is calculated based on measured sound pressure levels at recognised distances. Noise modelling includes source sound power levels as part of the input data.

Specific Noise

Specific Noise relates to the component of the ambient noise of interest. It can be specified as the noise of interest or the noise of concern.

Tonal Noise

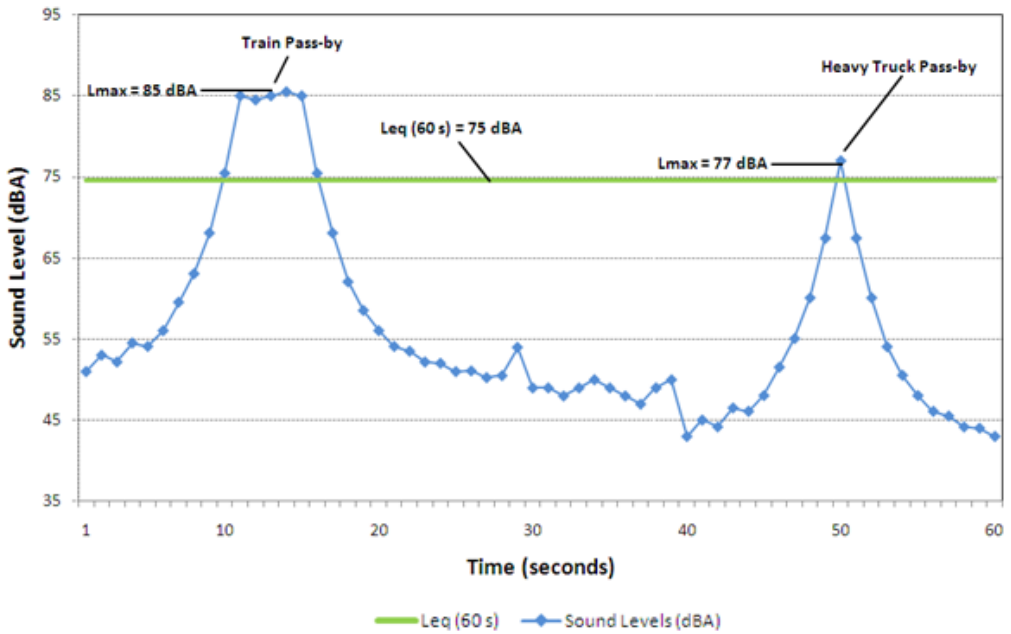
A tonal noise source can be designated as a source that has a specific noise emission over one or several frequencies, such as droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between —

a) the A-weighted sound pressure level in any one-third octave band; and

b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands, is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

Chart of Noise Level Descriptors



Typical Noise Levels