PROPOSED CAR WASH

1001 JOONDALUP DRIVE
BANKSIA GROVE

ENVIRONMENTAL ACOUSTIC ASSESSMENT

MARCH 2023

OUR REFERENCE: 30681-3-23056

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FOR

GERMANO DESIGNS

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REVISION HISTORY

Revision	Description	Date	Author	Checked
1	Updated equipment sound power levels and analysis	22/02/2023	AS	PLD
2	Updated Appendix A with correct plans. Edited model to reflect no blowers used in auto service bays. Edited Table 4.1 to reflect correct auto bay sound power levels.	02/03/2023	AS	PLD

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1. INTRODUCTION

Herring Storer Acoustics were commissioned by Germano Designs to undertake an acoustic assessment of noise emissions associated with the proposed car wash development to be located at 1001 Joondalup Drive, Banksia Grove.

This report assesses noise emissions from the premises with regards to compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*. It is understood that the car wash development consists of two automatic car wash bays, four self-service car wash bays and four vacuuming bays. Therefore, noise sources considered as part of this assessment include:

- Car wash and vacuum units.

We note that from recent information received from the DWER, the bitumised area would be considered as a road, thus noise relating to the "propulsion and braking" of motor vehicles is exempt from the *Environmental Protection (Noise) Regulations 1997*. We note that these noise sources are rarely critical in the determination of compliance.

For reference, the plan for the proposed development is attached in Appendix A.

2. SUMMARY

The closest neighbouring residences to this development are located to the west of the development. There are also commercial facilities to the north and east. As the facility would be open for 24 hours, seven days a week, noise received at the neighbouring noise (highly) sensitive premises from these noise sources needs to comply with the appropriate assigned noise levels for all periods.

Analysis of the noise from the carwash shows that compliance with the assigned L_{A10} noise levels would be achieved, with the inclusion of the following noise mitigation:

- Vacuum units to be acoustically hooded.
- Auto car wash bays permitted to operate with roller doors up on the condition that no blowers are utilised.

From the analysis undertaken, noise emissions from the proposed development has been assessed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times, provided the noise mitigation to the carwash, as outlined above is incorporated into the development.

3. CRITERIA

The allowable noise level for noise sensitive premises in the vicinity of the proposed Facility site is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 and 8 stipulate maximum allowable external noise levels or assigned noise levels that can be received at a premise from another premises. For residential premises, this noise level is determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. The base noise levels for residential premises and the assigned noise levels for industrial premises are listed in Table 3.1.

TABLE 3.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF
Commercial Premises	All times	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax(Slow)}$ is more than 15 dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3 dB L_{AFast} or is more than 3 dB L_{AFast} in any one-third octave band;

(b) is present for more at least 10% of the representative assessment period; and

(c) is regular, cyclic and audible;

"tonality" means 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_{ASlow} levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 3.2 below.

TABLE 3.2 - ADJUSTMENTS TO MEASURED LEVELS

Where **tonality** is present	Where **modulation** is present	Where **impulsiveness** is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

For this development, the closest residential premises of concern are located, as shown on Figure 3.1 below.

FIGURE 3.1 – AREA AROUND PROPOSED DEVELOPMENT

The influencing factor at the nearest residential locations to the proposed carwash have been determined as summarised in Table 3.3.

TABLE 3.3 – INFLUENCING FACTORS

Influencing Factor Parameter	**Influencing Factor (dB)**
	All Residences
Major Road within inner circle	+6
Major Road within outer circle	+2
Secondary Road within inner circle	0
Commercial Premises within inner circle	+0.8
Commercial Premises within outer circle	+1.2
TOTAL IF	+8

Note: The total transport factor due to roads can be a maximum of 6dB. The influencing factor is always rounded to the nearest whole number, so therefore there is an addition of **8dB** for all residences except C1, C2 and C3 which are commercial.

Based on the above, the assigned noise levels are as listed in Table 3.4.

TABLE 3.4 - ASSIGNED OUTDOOR NOISE LEVEL FOR RESIDENCES IN RESIDENTIAL LOT 1

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises: Highly sensitive area	0700 - 1900 hours Monday to Saturday	53	63	73
	0900 - 1900 hours Sunday and Public Holidays	48	58	63
	1900 - 2200 hours all days	48	58	63
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	43	53	63
Commercial Premises	All times	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

4. MODELLING

Modelling of the noise propagation from the proposed development was carried out using an environmental noise modelling computer program, "SoundPlan". Calculations were carried out using the EPA weather conditions as stated in the Environmental Protection Authority's *"Draft Guidance for Assessment of Environmental Factors No.8 - Environmental Noise"*.

Noise emissions from the development, include:

- Carwash and vacuum units.

The calculations were based in the sound power levels listed in Table 4.1.

TABLE 4.1 – CAR WASH SOUND POWER LEVELS

Plant Item	Sound Power Level dB(A)
Vacuum Units	89
Self Carwash Water Jets	94
Auto Car Wash Equipment	84

The modelling was carried out with all car wash bays and vacuum units operating simultaneously to obtain results for a worst-case scenario.

The above noise sources need to comply with the following assigned noise levels:

L_{A10} - Carwash and vacuum units

5. RESULTS

Calculations were undertaken to all the residences noted on Figure 3.1. as there are multiple residences within Residential Lot 1, the highest noise level within the lot is presented as R1. The resultant noise levels are listed in Tables 5.1 and 5.2.

NOTE: The results for those sources exempt of the regulations are attached in Appendix B.

TABLE 5.1 – WORST CASE CALCULATED NOISE LEVELS
NOISE SOURCES REQUIRING COMPLIANCE

Item	Calculated Noise Levels (dB(A))			
	C1	C2	C3	R1
Carwash and Vacuum Units	55	40	47	41

6. ASSESSMENT

The following provided the acoustic assessment for the noise sources requiring compliance, as listed in Table 5.1.

For those sources that are exempt from the Regulations, the assessments are attached in Appendix B.

6.1 L_{A10} NOISE EMISSIONS – CARWASH

During operation, noise emissions from the carwash would at times occur for more than 10% of the time. Thus, noise received at the neighbouring residences needs to comply with the assigned L_{A10} noise levels.

Given the resultant noise level at the residences and likely background noise level associated noise from vehicles travelling along Pinjar Road, we believe that it is unlikely that noise received at the neighbouring residences would be tonal. The only equipment operating at the carwash that could be considered tonal would be the vacuum cleaners. Further analysis of the Soundplan modelling shows that the contribution from the vacuum cleaners is greater than 5dB lower than the total noise received at the commercial tenancies and residential receivers. This means that the vacuum cleaners are not contributing significantly to the received noise and thus the overall noise should not be assessed as tonal in nature.

Based on the information above, the resultant noise levels is shown in Table 6.1.

TABLE 6.1 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{A10} NOISE LEVELS, dB(A)
CARWASH WORST CASE SCENARIO (WITH BARRIER)

Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
C1	55	-	-	-	55
C2	40	-	-	-	40
C3	47	-	-	-	47
R1	41	-	-	-	41

Table 6.2 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated with the carwash for the night period using the noise levels from Table 6.1. Compliance with this period implies compliance during all periods.

TABLE 6.3 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS CARWASH (NIGHT PERIOD)

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	55	All Hours	60	Complies
R2	40	All Hours	60	Complies
R3	47	All Hours	60	Complies
R4	41	Night Period	43	Complies

The carwash was modelled as having all car-wash units, wash bays and vacuums running simultaneously. We not that this is a worst-case scenario and given the diversity of operations is unlikely to occur in practice.

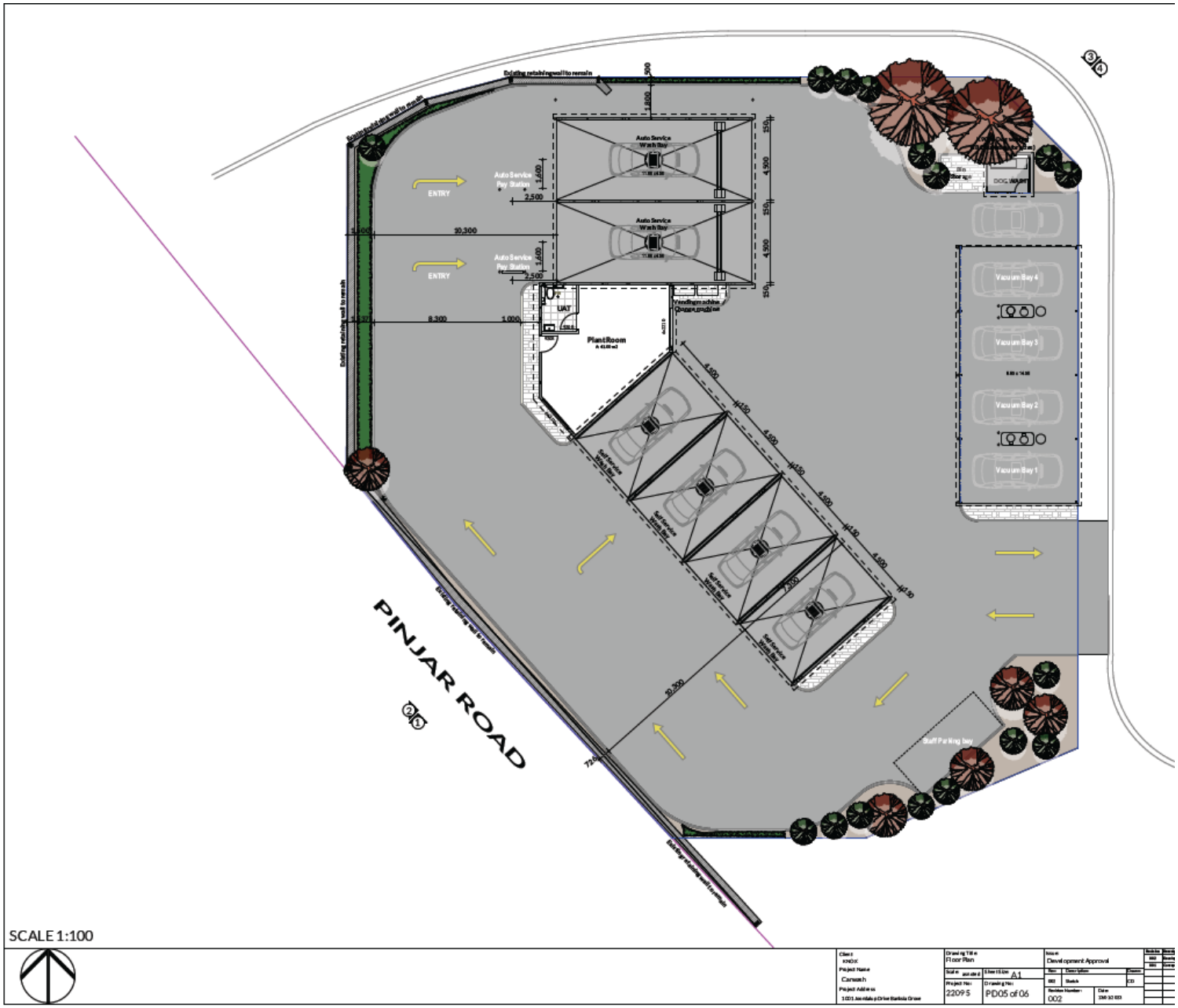
It is also understood that the automatic car wash bays are to be operated without blowers (drying units). In this situation, compliance can be achieved with the roller doors of the auto bays open. However, it is to be noted that if blowers were to be run then noise levels would rise by a typical level of 10dB(A) and the car wash would no longer be acoustically compliant. In this scenario, the car wash would require the rear roller doors to be closed during operation to achieve compliance.

From the above assessments, it can be seen that noise received at the neighbouring residences, complies with the requirements of the *Environmental Protection (Noise) Regulations 1997* during all periods, with the following noise mitigation applied to the carwash:

- Vacuum units to be acoustically hooded.
- Auto car wash bays permitted to operate with roller doors up on the condition that no blowers are utilised.

APPENDIX A

PLANS


PINJAR ROAD
Auto Service Wash Bay
Auto Service Wash Bay
Auto Service Pay Station
Auto Service Pay Station
ENTRY
ENTRY
UAT
Plant Room
Vacuum Bay 4
Vacuum Bay 3
Vacuum Bay 2
Vacuum Bay 1
Staff Parking bay
10,300
8,300
SCALE 1:100