



PROPOSED COMMERCIAL DEVELOPMENT

**323 – 325 GREAT EASTERN HIGHWAY
MIDVALE**

ENVIRONMENTAL ACOUSTIC ASSESSMENT

JUNE 2023

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ENVIRONMENTAL ACOUSTIC ASSESSMENT
323 – 325 GREAT EASTERN HIGHWAY
MIDVALE

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FOR

PEREGRINE CORPORATION

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1. INTRODUCTION

Herring Storer Acoustics were commissioned by Peregrine Corporation to undertake an acoustic assessment of noise emissions associated with the development of 323 – 325 Great Eastern Highway, Midvale.

This report assesses noise emissions from the premises with regards to compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*. The proposed development is a Service Station including:

- Sales of unleaded fuel, diesel fuel and EV charging facilities; and
- A control building with integrated convenience retail sales and a convenience retail drive-through facility.

Therefore, noise sources considered as part of this assessment include:

- Plant by way of the air conditioning, exhaust systems and refrigeration;
- Car movements on site;
- Car and Truck engine starts and doors closing;
- Truck movements on site using the service station and the refuelling truck; and
- Truck mounted refrigeration units.

We note that from information received from DWER, the bitumised area would be considered as a road, thus noise relating to 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. However, as requested by council and for completeness, they have been included in the assessment, for information purposes only.

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

2. SUMMARY

The closest neighbouring residences to this development are located to the north and east, on Victoria Parade. As the service station would be open 24 hours per day, noise received at the neighbouring noise (highly) sensitive premises from these noise sources needs to comply with the appropriate assigned noise levels for the night period.

The mechanical service would be located on the roof and with appropriate screening, noise received at the neighbouring premises would, comply with the assigned noise levels at all times. However, as the mechanical services would only be design as part of the next design phase, it is recommended that an acoustic review of the mechanical services be undertaken once the design has been finalised, to ensure compliance is achieved.

The noise associated with car and truck movements on site would be of a short term duration and compliance with the assigned L_{A1} noise levels, are required. Noise from the mechanical services would occur for more than 10% of the time, hence noise received at the neighbouring premises needs to comply with the assigned L_{A10} noise levels. Noise emissions from car and truck doors closing and engines starting, need to comply with the assigned L_{Amax} noise levels.

It is noted that as the development would be considered as a public place, noise emissions associated with the vehicles on site need to be considered individually.

The assessment indicates that noise emissions from cars and trucks on site would comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times with the inclusion of a 2.2 metre wall at the north east boundary of the development.

Based on the design provided, noise received at the neighbouring premises from the development would be deemed to comply with the Regulatory requirements at all times with noise mitigation further outlined in this report. However, as noted above, as the mechanical services would only be design as part of the next design phase, it is recommended that an acoustic review of the mechanical services be undertaken once the design has been finalised, to ensure compliance is achieved.

3. CRITERIA

The allowable noise level at the surrounding locales is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 & 8 stipulate maximum allowable external noise levels 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.

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
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	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:

- To the north and east of the development, with the closest residence being 7 Victoria Parade (as indicated on Figure 3.1) the zoning map from City of Mundaring and City of Swan Intramaps site.

As noted on the aerial photograph, the other adjacent premises on are commercial. For information, an aerial photograph of the area is shown below as Figure 3.2.

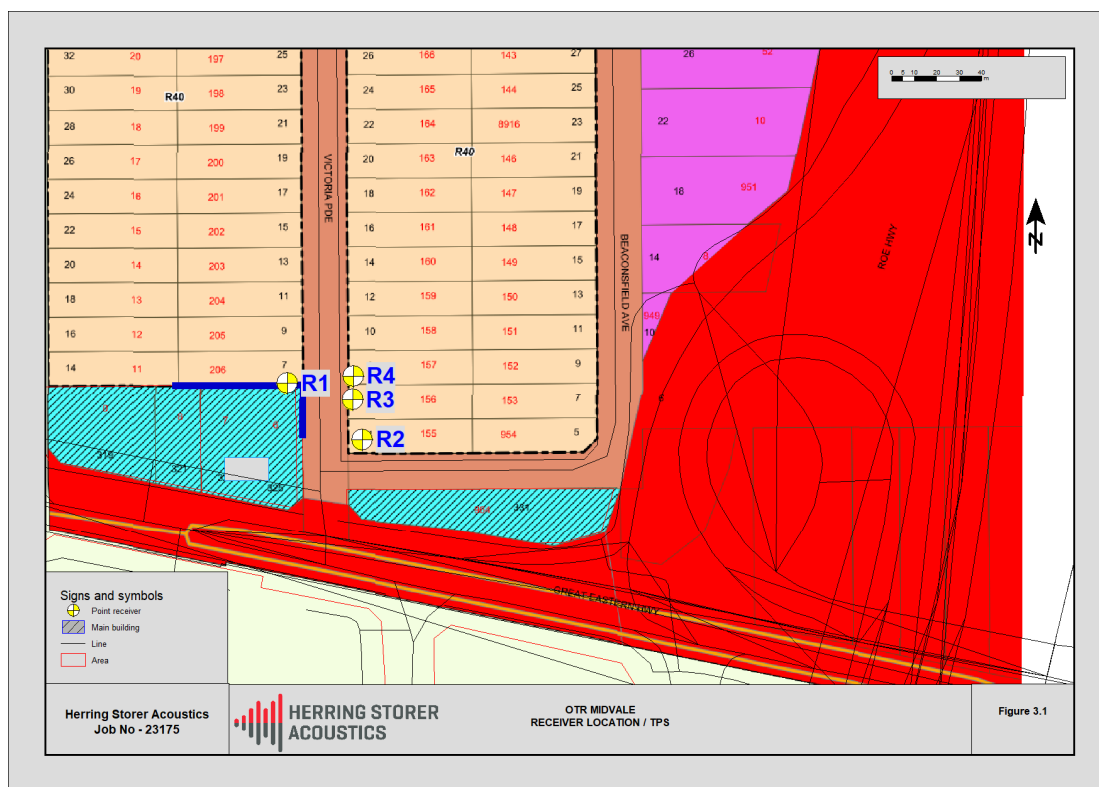


FIGURE 3.1 – AREA AROUND PROPOSED FACILITY

Based on the results of the noise modelling, the influencing factor (IF) at the worst case locations, as indicated on Figure 3.1 (with regards to noise received from the proposed facility) neighbouring residential premises has been conservatively estimated as listed in Table 3.3.

TABLE 3.3 – INFLUENCING FACTORS

Influencing Factor Parameter	Influencing Factor (dB)
Major Road within inner circle	Great Eastern Highway +6
Major Road within outer circle	-
Secondary Road within inner circle	-
Commercial Premises within inner circle	40% +2
Commercial Premises within outer circle	20% +1
Industrial Premises within inner circle	-
Industrial Premises within outer circle	30% +3
TOTAL IF	+12

Based on the above influencing factor, the assigned outdoor noise levels for the neighbouring residential locations are listed in Table 3.4.

TABLE 3.4 - ASSIGNED OUTDOOR NOISE LEVEL

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	57	67	77
	0900 - 1900 hours Sunday and Public Holidays	52	62	77
	1900 - 2200 hours all days	52	62	67
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	47	57	67
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.

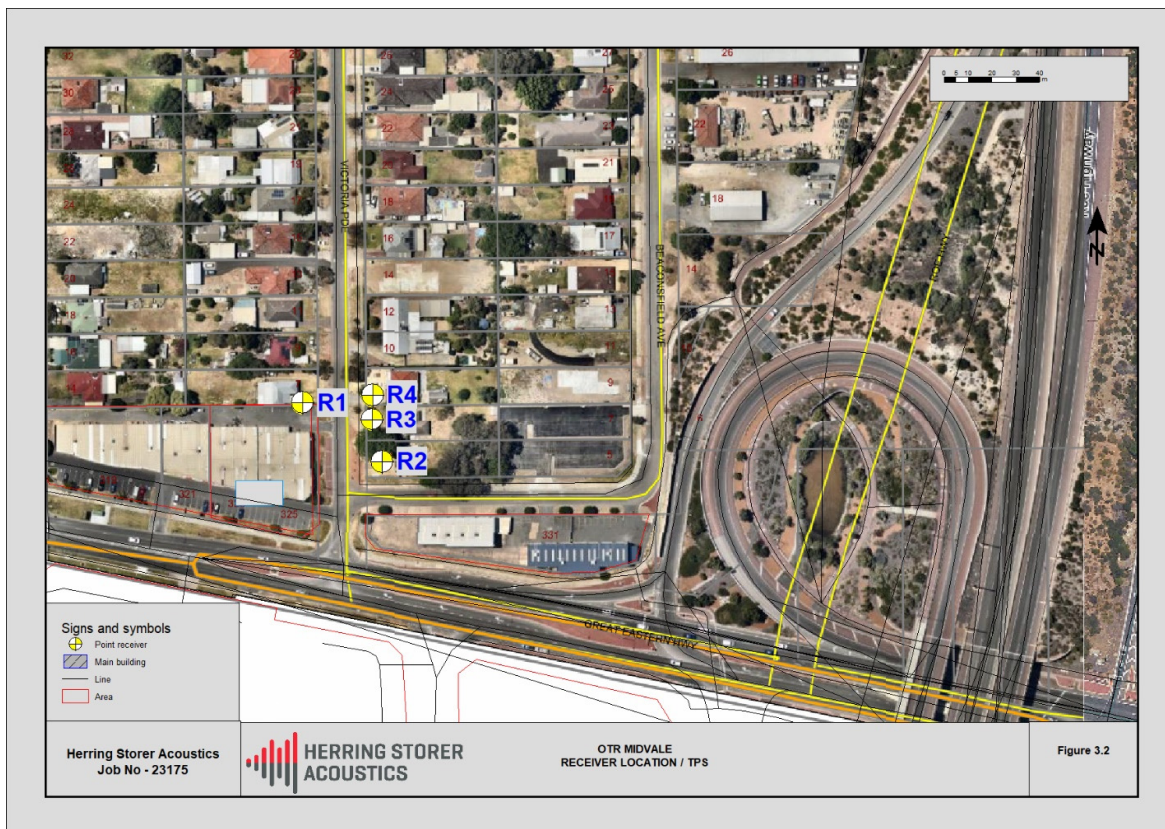


FIGURE 3.3 – AERIAL VIEW AROUND PROPOSED FACILITY

The assigned noise levels at the neighbouring commercial premises would be as listed in Table 3.3.

Additional to the above, with regards to vehicles accessing the site, we note that as anyone can access the site and the operators of the premises have no control on who can enter the car park these areas would be designated as public places. Regulation 6 of the *Environmental Protection (Noise) Regulations 1997* relates to noise emissions from public places and under this Regulation, "the person who is causing or permitting that noise to be emitted is to be treated as the occupier...". Therefore, noise emissions from each individual vehicle using the car park needs to comply with the assigned noise levels.

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 standard 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:

- Plant by way of the air conditioning, exhaust systems and refrigeration plant;
- Car movements on site;
- Drive-thru ordering speaker;
- Cars starting and doors closing;
- Truck movements on site, including refuelling tanker; and
- Trucks starting and doors closing.

To determine the noise received at the neighbouring premises, noise modelling was undertaken for the following scenarios:

- 1 Plant; air conditioning, exhaust systems, drive -thru speaker and refrigeration plant (including truck mounted refrigeration units).
- 2 Car movements on site.
- 3 Cars starting and doors closing.
- 4 Truck movements on site, including the refuelling tanker.
- 5 Trucks starting and doors closing.

With regards to noise emissions, the following are noted:

- 1 For the modelling of cars, the noise sources (ie cars) were located not only at the petrol bowers, parking bays, but also at the entry crossover point to the development. Thus, ensuring noise modelling was undertaken for the worst-case locations.
- 2 The trucks have been located at the petrol bowers, entry and exit routes and at the crossovers. Additionally, the truck mounted refrigeration unit has been located at the truck bowser area. Thus, ensuring noise modelling was undertaken for the worst-case locations.

- 3 Noise associated with the mechanical services does not take into account any diversity of operation. Such diversity would occur during the night period. Thus, this is a conservative assessment. At this stage of the project, the mechanical service has not been design. Therefore, the noise sources have been based on designs used for the same or similar tenancies.
- 4 The mechanical services would be located on the roof, which would be around 5.7 metres above ground. The mechanical services would be screened from the neighbouring premises, hence has been included in the assessment.
- 5 The refrigeration condensing units to be "Quiet" series / type condensing units.
- 6 The noise model assumes the boundary fence to the north of the development is 2.2 metres high and has a surface density of 15kg/m² or greater as shown in Appendix B.

The calculations were based in the sound power levels listed in Tables 4.1 to 4.2.

TABLE 4.1 – GENERAL SOUND POWER LEVELS

Item of Equipment	Sound Power Level, (dB(A))
Cars moving	79
Truck moving	89
Car Start	85
Car Door	87
Truck Start	94
Truck Door	95
Truck Mounted Refrigeration Unit	86

TABLE 4.2 – MECHANICAL SERVICES NOISE LEVELS

Tenancy	Plant Item	Noise Level dB(A)
Petrol Station Convenience Store	Air Conditioning Condensing Units	2 at 52 dB(A) @ 1m
	Refrigeration Condenser	1 at 61 dB(A) @ 1m
Tenancy 2 (Drive Thru))	Air Conditioning Condensing Units	2 at 57 dB(A) @ 1m
	Exhaust Fan	2 at 60 dB(A) @ 1m
	Ordering Speaker	1 at 76 dB(A) @1m

The above noise sources need to comply with the following criteria :

- L_{A10} - Mechanical services and truck mounted refrigeration unit.
- L_{A1} - Car and truck movements.
- L_{AMax} - Car and truck engine starts and doors closing.

5. RESULTS

Calculations were undertaken to all the premises located around the development, however, to simplify the analysis, the assessments have only been undertaken for the following worst case locations :

- R1. Residence to the north of the site on Victoria Parade.
- R2 to R4. Residence to the east of the site, on Victoria Parade.
- C1. Commercial to west.

The resultant noise levels listed in Table 5.1 for the residential locations are for the worst case operating conditions.

TABLE 5.1 – WORST CASE CALCULATED NOISE LEVELS

Item	Calculated Noise Levels (dB(A))				
	Residential			Commercial	
	R1	R2	R3	R4	C1
Mechanical services (including truck mounted refrigeration unit)	37	46	43	43	50
Cars (Movement)	36	32	29	30	34
Trucks (Movement)	35	52	51	47	63
Car Start	24	41	37	35	47
Car Door Slam	26	43	39	37	49
Truck Start	33	51	49	45	49
Truck Door Slam	35	53	51	47	51

6. ASSESSMENT

Given the above possible noise sources, we believe that assessments of the following scenarios are required.

6.1 L_{A10} NOISE EMISSIONS

Noise emissions from the mechanical services and truck mounted refrigeration units would be steady state and would operate for the majority of time. Hence noise received from these items need to comply with the assigned L_{A10} noise level.

With the location of the development on Great Eastern Highway, noise received at the neighbouring residences would not be considered tonal and no penalties would be applicable. Thus, the calculated noise levels, as listed in Table 5.1 would be the assessable noise levels.

Table 6.1 summarises the applicable Assigned Noise Levels, and assessable noise level emissions for the mechanical services and truck mounted refrigeration unit.

**TABLE 6.1 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
 MECHANICAL SERVICES AND TRUCK MOUNTED REFRIGERATION**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	37	Night Period	47	Complies
R2	46	Night Period	47	Complies
R3	43	Night Period	47	Complies
R4	43	Night Period	47	Complies
C1	50	All Hours	60	Complies

6.2 L_{A1} NOISE EMISSIONS

Noise emissions from car and truck movements on site need to comply with the assigned L_{A1} noise level. As the critical period for compliance for this source is the night period, this scenario includes noise emissions from the sources associated with L_{A1} noise levels. However, as under the Regulations, each of these sources needs to be considered individually, it is the highest calculated noise levels used for assessment, rather than the cumulative overall noise levels.

Based on the definitions of tonality, noise emissions from car and truck movements, being an L_{A1} , being present for less than 10% of the time, would not be considered tonal. Thus, no penalties would be applicable, and the assessment would be as listed in Table 5.1.

Tables 6.2 to 6.3 summarise the applicable Assigned Noise Levels, and assessable noise level emissions for each identified noise.

TABLE 6.2 – ASSESSMENT OF L_{A1} NOISE LEVEL EMISSIONS FROM CARS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A1} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	36	Night Period	57	Complies
R2	32	Night Period	57	Complies
R3	29	Night Period	57	Complies
R4	30	Night Period	57	Complies
C1	34	All Hours	75	Complies

TABLE 6.3 – ASSESSMENT OF L_{A1} NOISE LEVEL EMISSIONS FROM TRUCKS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A1} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	35	Night Period	57	Complies
R2	52	Night Period	57	Complies
R3	51	Night Period	57	Complies
R4	47	Night Period	57	Complies
C1	63	All Hours	75	Complies

6.3 L_{AMAX} NOISE EMISSIONS

Noise emissions from car and truck engine starts and doors closing on site need to comply with the assigned L_{AMax} noise level. As the critical period for compliance for this source is the night period, this scenario includes noise emissions from the sources associated with L_{AMax} noise levels. However, as under the Regulations, each of these sources needs to be considered individually, it is the highest calculated noise levels used for assessment, rather than the cumulative overall noise levels.

Based on the definitions of tonality, noise emissions from a car and truck starting, being an L_{AMax} , being present for less than 10% of the time, would not be considered tonal. Thus, no penalties would be applicable, and the assessment would be as listed in Table 5.1. However, noise associated with the closing of car and truck doors could be impulsive and to be conservative, a +10 dB(A) penalty for impulsiveness would be applied.

Tables 6.4 to 6.8 list the characteristics that should be included and the assessable noise levels and the assessable noise level.

**TABLE 6.4 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{AMAX} NOISE LEVELS
 WORST CASE LOCATION TO RESIDENCE R1**

Item	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	
Car Door	26	-	-	+10	36
Truck Door	35	-	-	+10	45

**TABLE 6.5 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{AMAX} NOISE LEVELS
WORST CASE LOCATION TO RESIDENCE R2**

Item	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	
Car Door	43	-	-	+10	53
Truck Door	53	-	-	+10	63

**TABLE 6.6 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{AMAX} NOISE LEVELS
WORST CASE LOCATION TO RESIDENCE R3**

Item	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	
Car Door	39	-	-	+10	49
Truck Door	52	-	-	+10	62

**TABLE 6.7 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{AMAX} NOISE LEVELS
WORST CASE LOCATION TO RESIDENCE R4**

Item	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	
Car Door	37	-	-	+10	47
Truck Door	47	-	-	+10	57

**TABLE 6.8 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{AMAX} NOISE LEVELS
WORST CASE LOCATION TO COMMERCIAL PREMISES**

Item	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	
Car Door	49	-	-	+10	59
Truck Door	51	-	-	+10	61

Tables 6.9 to 6.12 summarise the applicable Assigned Noise Levels, and assessable noise level emissions for each identified noise.

TABLE 6.9 – ASSESSMENT OF L_{AMAX} NOISE LEVEL EMISSIONS FROM CAR STARTS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{AMax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	34	Night Period	67	Complies
R2	51	Night Period	67	Complies
R3	47	Night Period	67	Complies
R4	45	Night Period	67	Complies
C1	57	All Hours	80	Complies

TABLE 6.10 – ASSESSMENT OF L_{AMAX} NOISE LEVEL EMISSIONS FROM CAR DOORS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{AMax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	36	Night Period	67	Complies
R2	53	Night Period	67	Complies
R3	49	Night Period	67	Complies
R4	47	Night Period	67	Complies
C1	59	All Hours	80	Complies

TABLE 6.11 – ASSESSMENT OF L_{AMAX} NOISE LEVEL EMISSIONS FROM TRUCK STARTS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{AMax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	43	Night Period	67	Complies
R2	61	Night Period	67	Complies
R3	59	Night Period	67	Complies
R4	55	Night Period	67	Complies
C1	59	All Hours	80	Complies

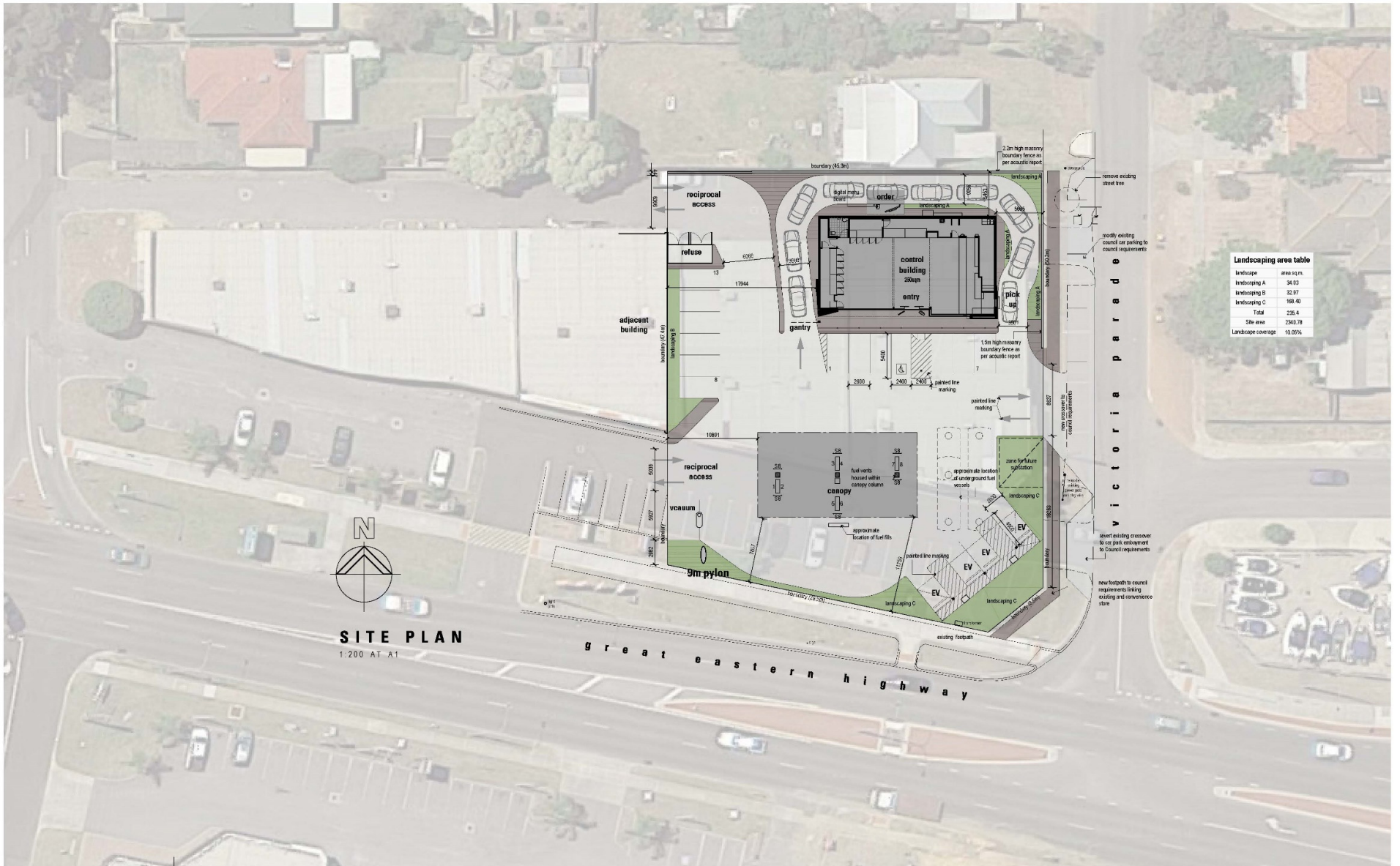
TABLE 6.12 – ASSESSMENT OF L_{AMAX} NOISE LEVEL EMISSIONS FROM TRUCK DOORS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{AMax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	45	Night Period	67	Complies
R2	63	Night Period	67	Complies
R3	61	Night Period	67	Complies
R4	57	Night Period	67	Complies
C1	61	All Hours	80	Complies

From the above assessments, it can be seen that noise received at the neighbouring residence, even using a conservative analysis, complies with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. However, as the mechanical services would only be design as part of the next design phase, it is recommended that an acoustic review of the mechanical services be undertaken once the design has been finalised, to ensure compliance is achieved.

APPENDIX A

PLANS



NEW SERVICE STATION COMPLEX
323-325 GREAT EASTERN HIGHWAY MIDVALE WA

DEVELOPMENT APPLICATION

27.06.23
23JIN1412 SK01g

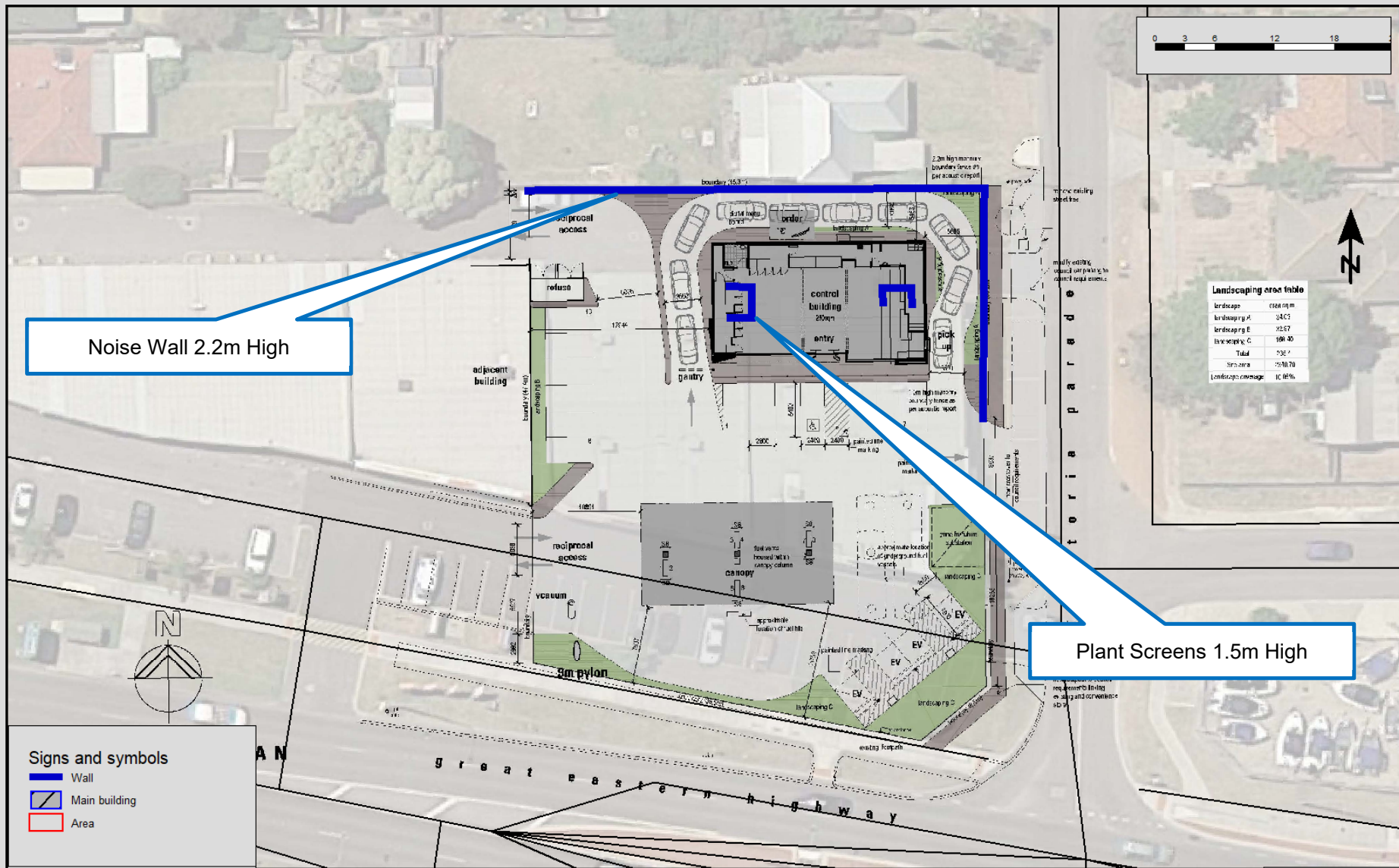
0 1 2 5 10 15m
Scale: 1:200 at A1

ADS Architects

93 Gilles Street Adelaide 5000 T:82232244

APPENDIX B

WALL / SCREENING LOCATION PLAN



Noise Wall 2.2m High

Plant Screens 1.5m High

Signs and symbols

- █ Wall
- █ Main building
- █ Area

Herring Storer Acoustics
Job No - 23175



OTR FACILITY MIDVALE
WALL LOCATION PLAN

Figure B1