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Vipac Engineers & Scientists

Maroochydore Spotlight Property 2 Pty Ltd

53-91 Dalton Drive East, Maroochydore

Acoustic Report - Stage 1

70Q-17-0188-TRP-6950073-2-draft

28 March 2019

Report Title: Acoustic Report - Stage 1 **Job Title: Blueprint – Maroochydore Stage 1 DA Noise Assessment**	
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EXECUTIVE SUMMARY

Vipac Engineers & Scientists Ltd (Vipac) has completed a noise impact assessment for the proposed large format retail development including a Spotlight and other tenancies, to be located on Lot 1 on SP202103, 53-91 Dalton Drive East, Maroochydore. The impacts of noise emissions from the development on neighbouring Noise Sensitive Receivers have been considered and assessed according to Economic Development Queensland (EDQ), State Planning Policy 5/10 (SPP 5/10) and the Department of Environment and Heritage Protection (EHP) noise criteria.

Noise sources associated with the proposed development that may potentially impact on NSRs include:

- Car parking;
- Refuse collection,
- Truck deliveries; and
- Mechanical plant.

The following noise mitigation is proposed by Vipac for noise levels at NSRs to comply with applicable noise limits:

- A 2m high noise barrier is required with no gaps adjacent to the residential townhouses along the eastern site boundary as shown in Figure 5-2;

  Noise barriers should be constructed in accordance with Chapter 7 (Integrated Noise Barrier Design) of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013. Barriers should have no gaps between palings, or between palings and posts and ground. A minimum surface density of 12.5kg/m^2 should be used;

- Selection of the total mechanical plant system (including rooftop plant, plant rooms, exhaust and inlet vents and any other plant) to have a total sound power level of 86 dB(A). Higher noise levels may be permitted with additional noise mitigation measures such as acoustic screens or enclosures or by locating plant away from nearby residences;

- Truck deliveries should not occur (and forklifts should not operate) between the hours of 10pm and 7am; and

- Refuse collection should not occur between the hours of 10pm and 7am.

In conclusion, noise impacts associated with the proposed development can be controlled to an acceptable level by implementing the recommendations in this report.

TABLE OF CONTENTS

1 INTRODUCTION

Vipac Engineers & Scientists Ltd (Vipac) was commissioned by Maroochydore Spotlight Property 2 Pty Ltd to provide a noise impact assessment for the proposed large format retail development including a Spotlight and other tenancies, to be located on Lot 1 on SP202103, 53-91 Dalton Drive East, Maroochydore.

The purpose of this assessment is to determine the impacts of any potential noise emissions from the development onto neighbouring noise sensitive receivers (NSRs).

Noise impacts have been assessed in accordance with Economic Development Queensland (EDQ), State Planning Policy 5/10 (SPP 5/10) and the Department of Environment and Heritage Protection (EHP) noise criteria.

2 PROPOSED DEVELOPMENT AND SURROUNDING AREA

The proposed development is to consist of a Spotlight and other tenancies located in an area zoned as Principal Centre (CBD) Zone under the Maroochydore City Centre Priority Development Area Development Scheme.

The following information about the surrounding area was observed on site and presented in Figure 2-1:

- North: Vacant land and golf course;
- East: Two storey townhouses on Dalton Drive and golf course;
- South: Dalton Drive, and further south two storey townhouses on Dalton Drive; and
- West: Dalton Drive, and large commercial and retail spaces (Bunnings, Officeworks etc.).

The nearest NSRs are the two storey townhouses immediately east of the development at 47 to 49 Dalton Drive and the townhouses south of the site at 54 Dalton Drive.

Noise sources associated with the proposed development that may potentially impact on NSRs include:

- Car parking;
- Refuse collection,
- Truck deliveries; and
- Mechanical plant.

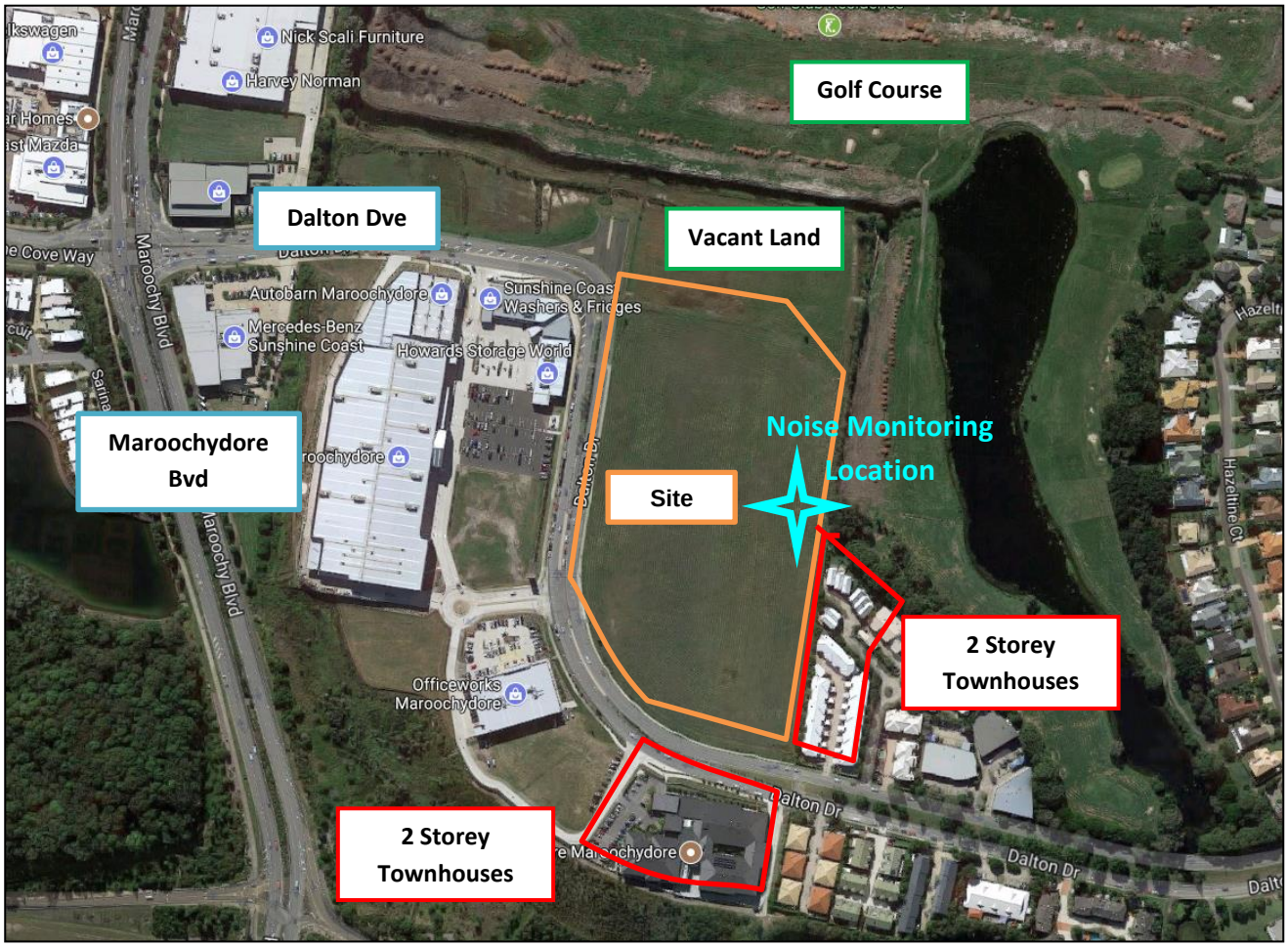

Figure 2-1: Aerial Photograph of the Site, NSRs and Noise Monitoring Location [Google Earth 2017]

3 EXISTING NOISE LEVELS

Unattended noise logging was conducted to obtain background noise levels for the purposes of calculating noise limits.

An environmental noise logger was used to measure the existing noise levels on site. The location of the noise logger is shown in Figure 2-1. Noise monitoring was conducted between 7th of November, 2014 and the 18th of November 2014 on site. A Bruel & Kjaer 4231 calibrator was used to calibrate the instruments, with less than 0.5dB drift before and after the measurement. The instrumentation, measurement details and measurement results are presented in Appendix A.

Background noise levels used to determine noise limits are presented in Table 3-1.

Table 3-1: Measured Background Noise Levels Used to Calculate Noise Limits

Noise Descriptor	Day (7am to 6pm)	Evening (6pm to 10 pm)	Night (10pm to 7am)
L_{A90}	45	50	46

4 NOISE POLICY

The major noise sources and the applicable noise criteria are summarised in Table 4-1.

Table 4-1: Noise Sources and Applicable Noise Policies

Noise Source	Applicable Noise Criteria
Mechanical plant noise	Environmental Protection Act 1994 (Current as at 3 July 2017), Division 3, Default Noise Standards, Section 440U Air Conditioning and Section 440V Refrigeration Equipment (EPA 1994) Economic Development Queensland's (EDQ's) PDA Guideline no. 14, "Environmental values and sustainable resource use" State Planning Policy 5/10 Guideline, "Air Noise and Hazardous Materials" Environmental Protection (Noise) Policy 2008 - Acoustic Quality Objectives
Truck deliveries, refuse collection, car parking	Economic Development Queensland's (EDQ's) PDA Guideline no. 14, "Environmental values and sustainable resource use" State Planning Policy 5/10 Guideline, "Air Noise and Hazardous Materials" Environmental Protection (Noise) Policy 2008 - Acoustic Quality Objectives

Based on the noise criteria presented in Table 4-1 and the noise monitoring results presented in Section 3, the applicable noise limits for all noise sources are presented in Table 4-2. The noise limits have been derived from the strictest noise limits in the applicable noise policies. A full discussion of all applicable noise criteria is presented in Appendix B.

Table 4-2: All Applicable Noise Limits

Noise Source	Noise Criteria	Noise Limit	Period	Where
Air-conditioning and mechanical plant	EPP 2008 Acoustic Quality Objectives	50 dB(A) L_{Aeq}	Day (7am to 6pm)	At the external façade of neighbouring residences
		50 dB(A) L_{Aeq}	Evening (6m to 10pm)	At the external façade of neighbouring residences
		35 dB(A) L_{Aeq}[1]	Night (10pm to 7am)	At the external façade of neighbouring residences
Truck deliveries, refuse collection, car parking	EPP 2008 Acoustic Quality Objectives	65 dB(A) L_{A1}	Day (7am to 10pm)	At the external façade of neighbouring residences
		65 dB(A) L_{A1}	Evening (6m to 10pm)	At the external façade of neighbouring residences
		45 dB(A) L_{A1}[1]	Night (10pm to 7am)	At the external façade of neighbouring residences

[1] *Noise limit includes a 5 dB(A) factor for attenuation of noise from outdoors to indoors, assuming partially open windows*

5 NOISE MODELLING METHODOLOGY

Noise calculations were carried out using SoundPLAN noise modelling software. A 3D computational model was created based on the data in Table 5-1 and the drawings in **Error! Reference source not found.**.

Table 5-1: Data and Assumptions Used in Noise Modelling

Parameter	Data
Neighbouring residence locations	Site inspection and Google Earth geographical software
Neighbouring residence receiver heights	1.8m above and 4.6m above natural terrain as obtained from elevation data for ground floor and first floor receivers respectively
Calculation method	International standard ISO 9613 2:1996, "Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation" (ISO 9613) as implemented in SoundPLAN software.
Terrain Data	2014.11.11-From Civil N-B9083.30 - X - SURVEY.dwg, received from Cardno HRP 24/11/2014
Site Layout	717006 – Maroochydore Stage 1 Coordination Package (D), received on 22/8/2018

5.1 CAR PARK NOISE

Potential car park noise emissions include:

- Engine starts,
- Car travelling along the carpark access road
- Car revving; and
- Car door slams.

Car door slams

The highest noise emissions associated with a car park is typically a car door slam. A point noise source was entered in the noise model to represent noise emissions in a representative worst-case location. An L_{Amax} sound power spectra with an overall level of 93 dB(A) was used for the point source. This value has been previously measured by Vipac.

The location of the car park noise source is presented in Figure 5-1.

Car travelling along the carpark access road

The carpark access road is located along the eastern boundary of the site adjacent to the neighbouring two storey townhouses. A line noise source with a sound power level of 84 dB(A) was entered in the noise model to represent noise emissions along the access road. This value has been previously measured by Vipac.

5.2 TRUCK DELIVERIES NOISE

Delivery trucks will enter and exit from the southern end of the site off Dalton Drive and deliver to the main receiving dock.

The highest noise source associated with delivery trucks is the reverse beepers. A truck reverse beeper noise source with a sound power of 104 dB(A) (including a tonal penalty of 5 dB(A)) has been entered into the noise model. Noise sources were also entered in the noise model to represent the noise emissions from truck engine noise. Sound power spectra with an overall level of 94 dB(A) previously measured by Vipac was used for these noise sources.

Forklifts may help transfer the delivered items from the loading bay into the building via the service lift and the roller doors. Noise sources associated with forklifts include forklift engine noise, pallet jack noise, and reverse beepers. Of these, the highest noise source is expected to be forklift reverse beepers. A forklift reverse beeper noise source with a sound power of 104 dB(A) (including a tonal penalty of 5 dB(A)) has been entered into the noise model near the main receiving dock area of the Spotlight building in close proximity to the service lift.

5.3 REFUSE COLLECTION NOISE

Refuse collection was modelled as a bin being lifted by a truck by means of a hydraulic system and then being put down (dropped) on the ground The sound power levels used for the bin lifting and dropping noise sources were 88 dB(A) for the hydraulic lift system and 108 dB(A) for the bin dropping.

Additionally, a truck engine noise source was incorporated in the noise model to predict truck movements. A sound power level of 94 dB(A) for engine noise been has been used for this noise source. Refuse trucks will enter and exit from the west entrance of the site off Dalton Drive to the main receiving dock where the bin area will be located.

Bin lifting and dropping noise sources were located at the bin area at the main loading dock as presented in Figure 5-1.

5.4 MECHANICAL PLANT NOISE

At this stage, mechanical plant specifications are unknown. In order to predict noise impacts, two point sources (as shown in Figure 5-1) were entered in the noise model. The purpose was to determine a maximum permitted sound power level that would achieve compliance with the noise criteria.

A sound power spectrum with overall level of 83 dB(A) L_{Aeq} was used for each of these noise source. The location of the mechanical plant noise source is presented in Figure 5-1.

5.5 NOISE SOURCE LOCATIONS

Figure 5-1 shows the location of all the noise sources, as entered in the noise model.

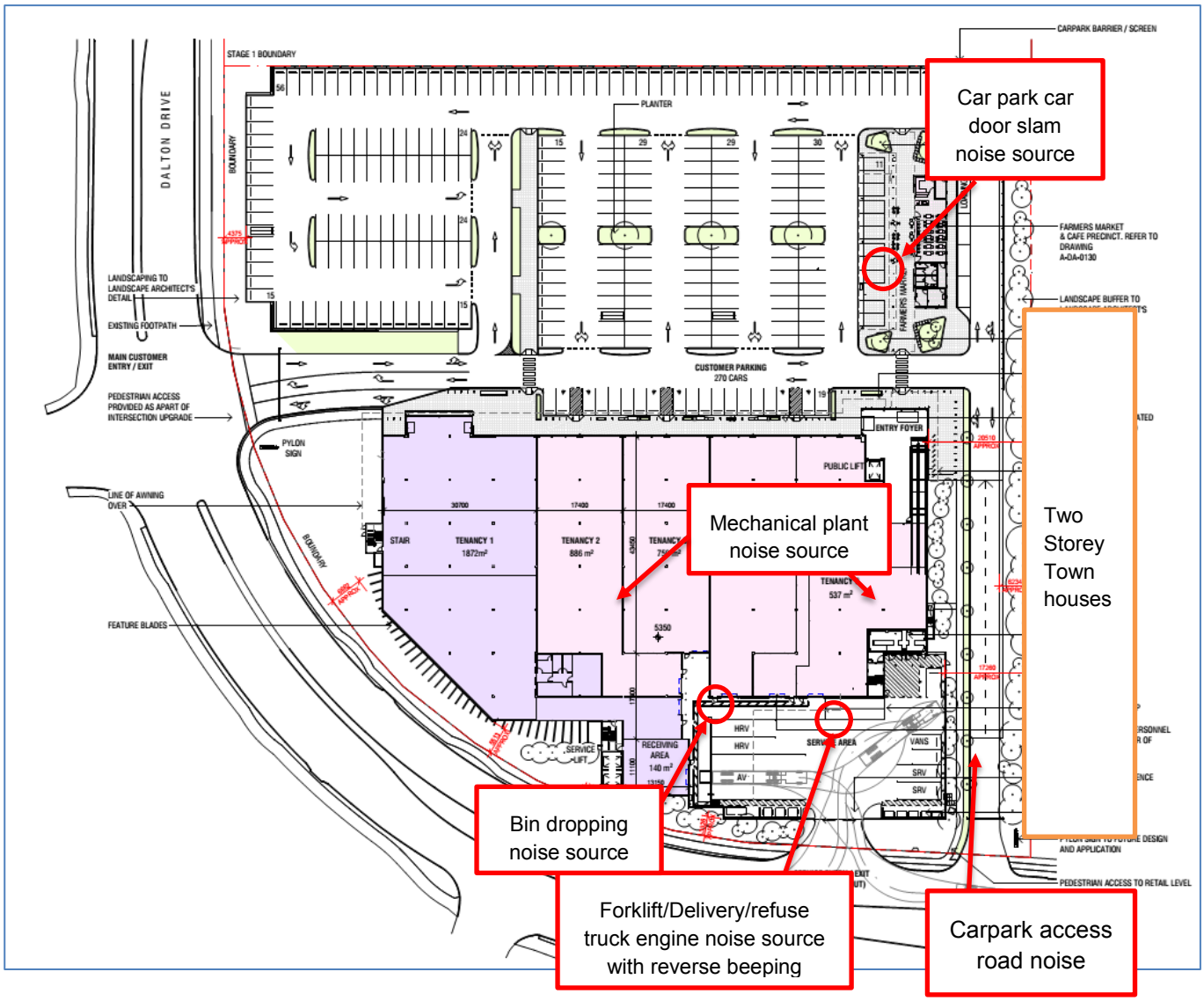

Figure 5-1 Location of noise sources in the SoundPLAN Model

5.6 ACOUSTIC FENCE

A 2m high noise barrier is recommended with no gaps adjacent to the residential townhouses along the eastern site boundary, as presented in Figure 5-2. The noise modelling results include the 2m noise barrier. RL at the bottom of the noise barrier is based on the current terrain which ranges approximately between 3.0m and 3.4m.

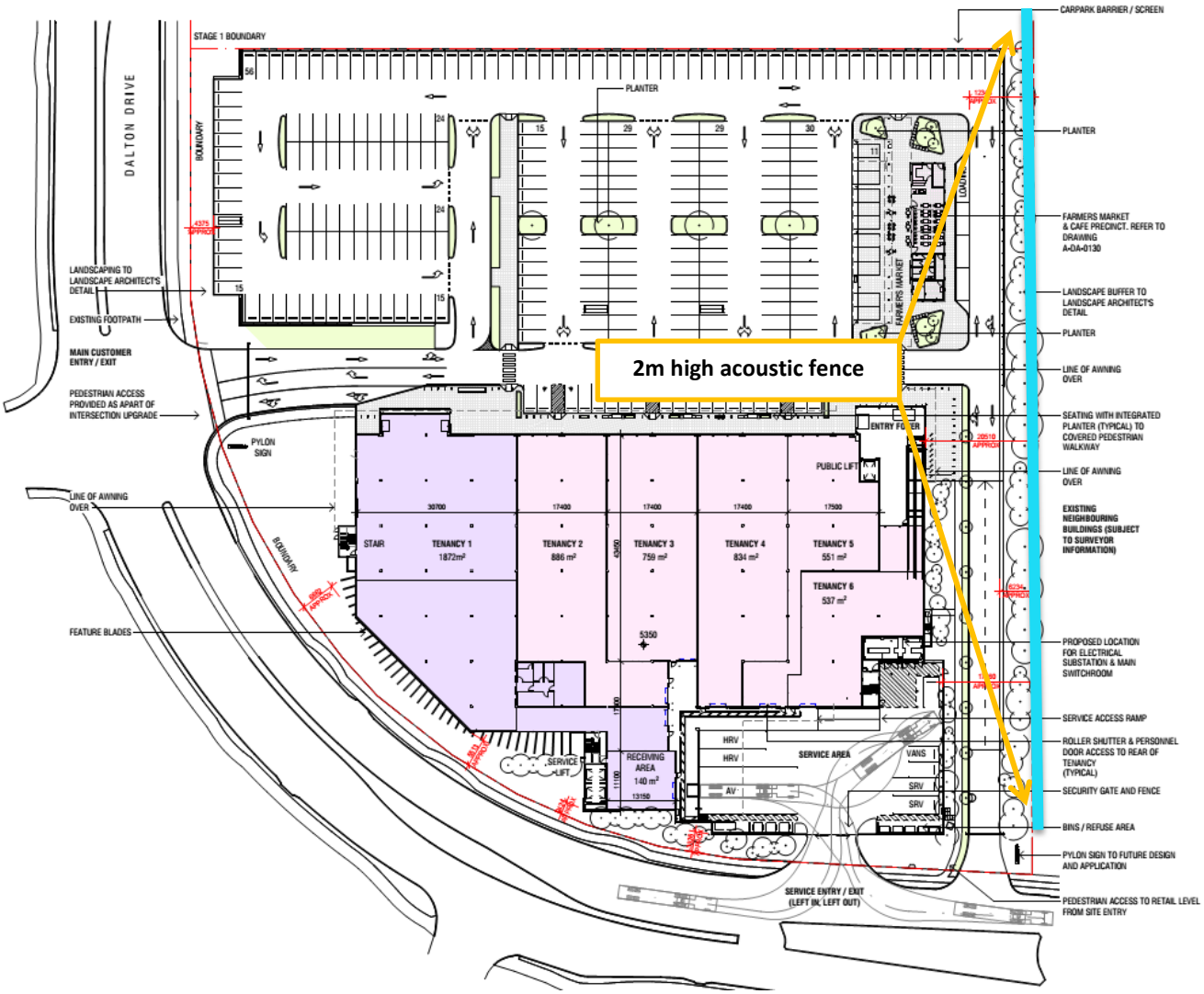

Figure 5-2: Recommended 2m Noise Barrier

6 NOISE MODELLING RESULTS

6.1 CAR PARK NOISE PREDICTIONS

Table 6-1 shows the results of the car park noise predictions at the most exposed NSR. Table 6-2 shows the results of the noise predictions for cars travelling along the eastern carpark access at the most exposed NSR.

Table 6-1: Car Park Noise Predictions at the Most Exposed NSR with a 2m Acoustic Fence

Noise Source	Predicted Outdoors L_{A1}, in dB(A)	Outdoors L_{A1} noise criteria, in dB(A)			Noise criteria exceedance, in dB(A)		
		Day	Evening	Night	Day	Evening	Night
Car door slam	49	65	65	45	Complies	Complies	4

Table 6-2: Predictions for cars travelling along the eastern carpark access at the Most Exposed NSR with a 2m Fence

Noise Source	Predicted Outdoors L_{Aeq}, in dB(A)	Outdoors L_{Aeq} noise criteria, in dB(A)			Noise criteria exceedance, in dB(A)		
		Day	Evening	Night	Day	Evening	Night
Cars travelling along access	42	50	50	35	Complies	Complies	7

Car park noise complies with applicable noise limits during the day and evening, and exceeds the applicable noise limits at night.

The car park is not expected to be used by patrons outside the hours of 7am to 10pm, as the store will be closed during this period.

6.2 TRUCK DELIVERIES NOISE PREDICTIONS

Table 6-3 shows the results of truck deliveries noise and forklift noise predictions at the most exposed NSR.

Table 6-3: Truck Deliveries and Fork Lift Noise Predictions at the Most Exposed NSR with a 2m Acoustic Fence

Noise Source	Predicted Outdoors L_{A1}, in dB(A)	Outdoors L_{A1} noise criteria, in dB(A)			Noise criteria exceedance, in dB(A)		
		Day	Evening	Night	Day	Evening	Night
Truck engine with Reverse Beeper	60	65	65	45	Complies	Complies	15
Forklift Reverse Beeper	58	65	65	45	Complies	Complies	13

Predicted noise levels comply with applicable noise limits during the day and evening, and exceed the applicable noise limits at night. It is recommended that deliveries do not occur (and forklift should not operate) between the hours of 10pm and 7am to comply with the applicable noise limits.

6.3 REFUSE COLLECTION NOISE PREDICTIONS

Table 6-4 shows the results of refuse collection noise predictions at the most exposed NSR.

Table 6-4: Refuse Collection Noise Predictions at the Most Exposed NSR with a 2m Acoustic Fence

Noise Source	Predicted Outdoors L_{A1}, in dB(A)	Outdoors L_{A1} noise criteria, in dB(A)			Noise criteria exceedance, in dB(A)		
		Day	Evening	Night	Day	Evening	Night
Truck Engine & Bin dropping	63	65	65	45	Complies	Complies	18

Predicted noise levels comply with applicable noise limits during the day and evening, and exceed the applicable noise limits at night. It is recommended that refuse collection does not occur between the hours of 10pm and 7am to comply with the applicable noise limits.

6.4 MECHANICAL PLANT NOISE PREDICTIONS

Table 6-5 shows the results of mechanical plant noise predictions at the most exposed NSR.

Table 6-5: Mechanical Plant Noise Predictions at the Most Exposed NSR with a 2m Acoustic Fence

Noise Source	Predicted Outdoors L_{A90}, in dB(A)	Outdoors L_{A90} noise criteria, in dB(A)			Noise criteria exceedance, in dB(A)		
		Day	Evening	Night	Day	Evening	Night
Mechanical Plant	34	50	50	35	Complies	Complies	Complies

The maximum sound power level for the total mechanical plant system (as shown in Figure 5-1) that results in compliance with the noise criteria is 86 dB(A). Higher levels may be permitted with additional noise treatments such as noise screens, or placing mechanical plant noise sources away from the closest residences.

7 RECOMMENDATIONS

- A 2m high noise barrier is required with no gaps adjacent to the residential townhouses along the eastern site boundary as shown in Figure 5-2;

  Noise barriers should be constructed in accordance with Chapter 7 (Integrated Noise Barrier Design) of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013. Barriers should have no gaps between palings, or between palings and posts and ground. A minimum surface density of 12.5kg/m^2 should be used;
- Selection of the total mechanical plant system (including rooftop plant, plant rooms, exhaust and inlet vents and any other plant) to have a total sound power level of 86 dB(A). Higher noise levels may be permitted with additional noise mitigation measures such as acoustic screens or enclosures or by locating plant away from nearby residences;
- Truck deliveries should not occur (and forklifts should not operate) between the hours of 10pm and 7am; and
- Refuse collection should not occur between the hours of 10pm and 7am.

8 CONCLUSIONS

Vipac Engineers & Scientists Ltd (Vipac) has completed a noise impact assessment for the proposed large format retail development including a Spotlight and other tenancies, to be located on Lot 1 on SP202103, 53-91 Dalton Drive East, Maroochydore. The impacts of noise emissions from the development on neighbouring Noise Sensitive Receivers have been considered and assessed according to Economic Development Queensland (EDQ), State Planning Policy 5/10 (SPP 5/10) and the Department of Environment and Heritage Protection (EHP) noise criteria.

A 2m noise adjacent to the residential townhouses along the eastern site boundary will be sufficient to comply with the noise criteria applicable for the development. Additional recommendations are given in this report for noise impacts to reduce noise emissions associated with the development.

In conclusion, noise impacts associated with the proposed development can be controlled to an acceptable level by implementing the recommendations in this report.

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Appendix A NOISE MEASUREMENT DETAILS

Table A-1: Instrumentation

Instrument	Serial Number	Lab calibration due (at time of measurement)	Field Calibration
Larson Davis LD-831 Noise logger	831-7	17-Mar-2016	<0.5dB deviation between start and end of measurement
Ono Sokki SC2120 Calibrator	35100926	4-Dec-2014	N/A

Table A-2: Measurement Details for Noise Monitoring

Microphone Height	1.5m
Microphone Orientation	Pointing vertically upwards
SLM Time Weighting	Fast
SLM Frequency Weighting	A
Measurement Interval Period	15 minute intervals
Logger location	On the site as presented in Figure 2-1
Measurement weather	Some rain, noise measurement data was excluded for the 7th and 8th of November. Weather data is included in Section A.1
Date of measurement	Between the 7th of November, 2014 and the 18th of November 2014

Table A-3: Noise Monitoring Results (Free Field)

Noise Descriptor	Noise Level (dB(A))
Average LA10, 18hr (6am to 12am)	51
Average LA90, 8hr (10pm to 6am)	46
LAmax (24hr)	91
LAmax,Night (10pm to 7am)	79
Average LAeq,Day(7am to 6pm)	52
Average LAeq,Evening(6pm to 10pm)	56
Average LAeq,Night (10pm to 7am)	51
LAeq,Max 1hr Day (7am to 6pm)	57
LAeq,Max 1hr Evening(6pm to 10pm)	58
LAeq,Max 1hr Night(10pm to 7am)	54
Average LAeq, 15hr (7am to 10pm)	54
Average LAeq, 9hr (10pm to 7am)	51
Average LA90(7am to 6pm)	45
Average LA90(6pm to 10pm)	50
Average LA90(10pm to 7am)	46
RBL Day	43
RBL Evening	45
RBL Night	42

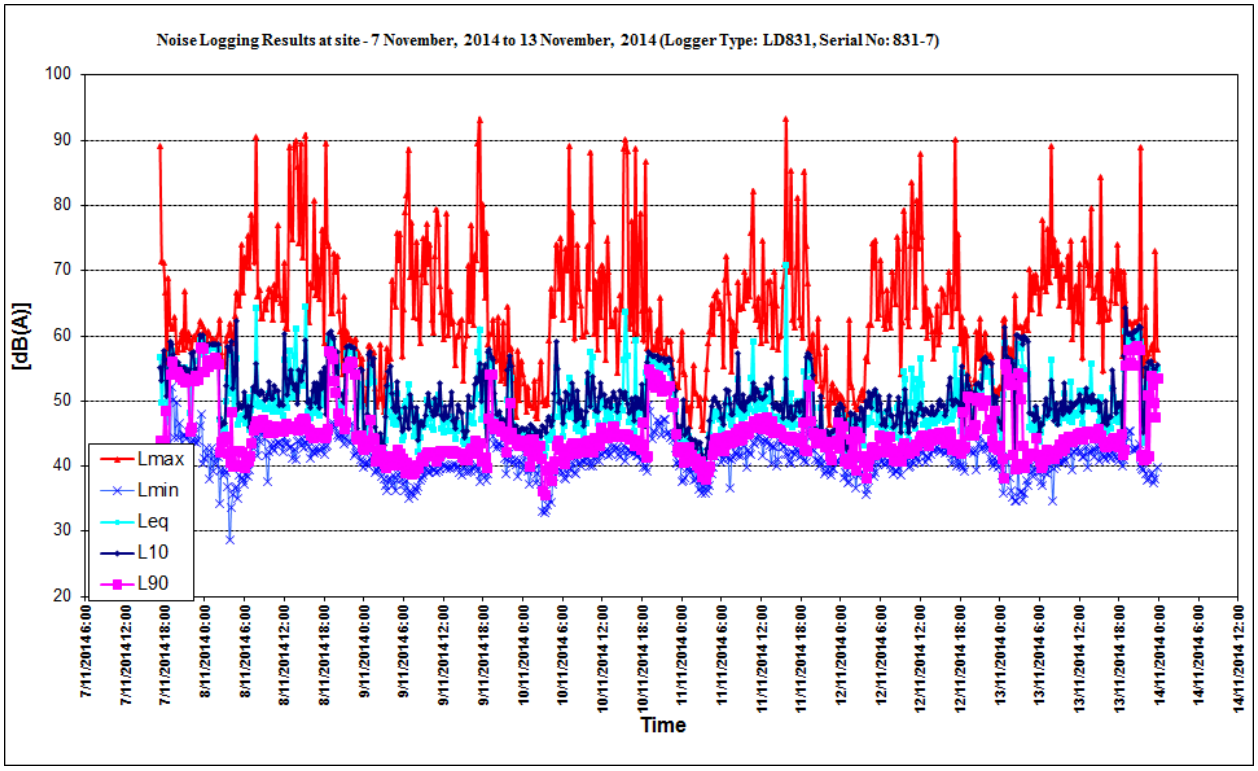

Figure A-1: Monitoring Results (Free Field) – 7th to 13th of November

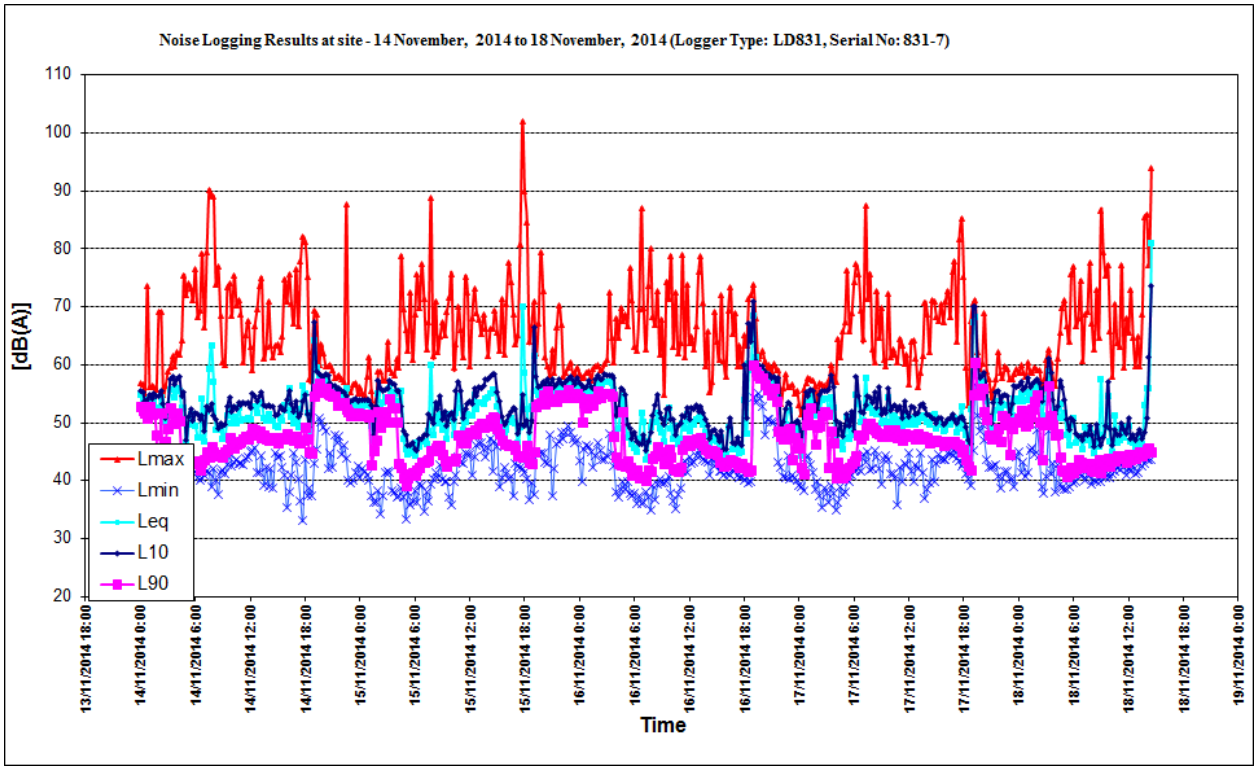

Figure A-2: Monitoring Results (Free Field) – 14th to 18th of November

A.1 Weather Data

Weather data during the measurement period was obtained from the Bureau of Meteorology weather station 040861 (Sunshine Coast Airport) and is presented in Table A- 4. Noise measurement data for the 7th and 8th of November was excluded due to rain.

Table A- 4: Weather During Logging Period

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Sa	19.0	28.1	0			NNE	56	14:47	26.6	63		N	28	1015.6	26.4	71		NNE	39	1010.1
2	Su	19.7	30.0	0			SE	43	14:11	26.8	63		NW	13	1014.6	25.7	69		SE	26	1015.2
3	Mo	21.4	24.0	0			SE	43	03:48	22.6	69		SE	28	1021.5	22.5	61		ESE	26	1020.4
4	Tu	20.8	25.9	0			E	37	02:42	22.8	54		E	20	1023.7	24.2	47		E	19	1020.6
5	We	15.6	26.4	0			NE	30	16:50	24.3	53		ENE	17	1021.4	24.8	51		ENE	19	1017.5
6	Th	15.3	27.3	0			NNE	46	15:17	25.5	44		NNE	22	1016.0	25.5	68		NNE	33	1012.1
7	Fr	17.4	27.4	8.4			NNE	30	12:02	24.2	74		NE	13	1017.5	26.3	65		NE	24	1015.4
8	Sa	20.2	26.7	2.8			ESE	33	07:42	24.0	64		SE	22	1021.3	25.3	58		ESE	22	1018.5
9	Su	14.0	27.2	0			E	26	12:53	24.4	55		ESE	13	1020.5	25.6	52		NE	19	1017.7
10	Mo	16.7	28.0	0			NE	33	13:36	26.1	60		NE	13	1019.4	25.9	58		NE	24	1016.4
11	Tu	16.0	27.5	0			NNE	39	12:23	26.1	53		NE	19	1017.3	26.0	56		NNE	28	1014.1
12	We	15.9	28.6	0			NNE	28	12:07	26.6	55		ENE	15	1017.2	26.9	57		ENE	20	1014.3
13	Th	17.2	28.7	0			NE	33	14:33	26.9	61		NE	17	1018.2	26.5	58		NE	24	1016.1
14	Fr	17.6	29.9	0			NNE	50	13:47	27.2	57		NNE	26	1019.2	26.7	65		NNE	39	1014.5
15	Sa	19.3	33.3	0			NNE	57	13:44	29.6	52		NNW	20	1014.2	28.4	64		N	43	1008.1
16	Su	22.1	41.0	0			NNE	50	13:17	32.0	48		WNW	24	1008.7	28.3	68		NNE	30	1003.2
17	Mo	21.8	28.9	0			SE	43	09:05	28.3	66		SSE	31	1012.8	25.6	65		SE	24	1012.1
18	Tu	23.7	29.4	0			NNE	31	10:48	25.6	85		NE	11	1016.0	24.3	90		NE	17	1012.8
19	We	20.1	28.5	5.0			NNE	39	16:17	24.7	82		NNE	19	1017.7	25.6	81		NNE	24	1014.3
20	Th	16.4	29.0	7.8			NNE	37	16:00	25.2	73		ENE	6	1018.5	27.7	70		NNE	28	1015.1
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22	Sa	22.7	30.5	0			N	52	15:07	30.2	59		N	22	1015.6	28.0	68		NNE	35	1012.2
23	Su	22.0	29.6	0			NNE	39	10:17	27.2	67		NNE	26	1018.3	27.6	63		NNE	28	1015.0
24	Mo	19.6	29.5	0			NNE	46	15:06	27.1	65		NNE	24	1018.3	27.6	66		NNE	35	1013.6
25	Tu	17.5	31.0	0			NNE	43	13:15	28.2	42		NNW	19	1016.1	28.3	68		NNE	28	1012.2
26	We	20.4	29.7	0			NE	33	14:18	26.5	75		NNE	17	1017.3	27.5	64		NE	24	1014.9
27	Th	19.5	30.2	0			NE	30	12:21	27.8	63		NE	15	1016.6	28.6	60		NE	20	1013.4
28	Fr	20.3	26.5	9.0			ESE	48	17:56	24.8	78		ESE	19	1018.3	23.8	78		ESE	26	1017.1
29	Sa	21.3	27.4	3.4			E	39	06:07	26.0	48		SE	22	1018.9	25.5	49		ESE	22	1016.7
30	Su	13.4	28.3	0			ENE	28	15:13	25.4	50		E	15	1017.1	26.1	51		ENE	19	1014.3

Appendix B NOISE POLICY

B.1 Applicable Noise Policies

The development is located in a "Priority Development Area". Therefore, Economic Development Queensland's (EDQ's) PDA Guideline no. 14, "Environmental values and sustainable resource use" is applicable.

The EDQ policy refers to the Environmental Protection Act 1994 (EPA 1994), the Environmental Protection (Noise) Policy 2008 (EPP 2008) and State Planning Policy 5/10 Guideline, "Air Noise and Hazardous Materials". (SPP 5/10). SPP 5/10 has no specific noise limits, but in turn refers to the EPA 1994 and EPP 2008. Therefore, the EPP 2008 and EPA 1994 are the applicable noise policies.

The major noise sources and the applicable noise policies are summarised in Table B-5.

Table B-5: Noise Sources and Applicable Noise Policies

Noise Source	Applicable Noise Criteria
Mechanical plant noise	Environmental Protection Act 1994 (Current as at 3 July 2017), Division 3, Default Noise Standards, Section 440U Air Conditioning and Section 440V Refrigeration Equipment (EPA 1994) Environmental Protection (Noise) Policy 2008 - Acoustic Quality Objectives
Truck deliveries, refuse collection, car parking	Environmental Protection (Noise) Policy 2008 - Acoustic Quality Objectives

B.2 Mechanical Plant Associated With the Proposed Development

B.2.1 EPA 1994

Sections 440U and 440V of the *Environmental Protection Act 1994* apply to premises at or for which there is air conditioning equipment and refrigeration equipment, respectively.

An occupier of premises must not use, or permit the use of, the equipment on any day-

- Before 7a.m., if it makes a noise of more than 3 dB(A) above the background level; or
- From 7a.m. to 10 p.m, if it makes a noise of more than 5 dB(A) above the background level; or
- After 10p.m, if it makes a noise of more than 3 dB(A) above the background level.

B.2.2 EPP 2008

The acoustic quality objectives from the Environmental Protection (Noise) Policy 2008 (EPP 2008) have been adopted to assess noise emissions from mechanical plant. The acoustic quality objectives are included in Table B-6.

Table B-6: EPP 2008 Acoustic Quality Objectives

NSRs	Time of Day	Acoustic Quality Objectives, dB(A)		
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$
Dwelling (Outdoors)	Day and Evening (7am –10pm)	50	55	65
Dwelling (Indoors)	Day and Evening (7am –10pm)	35	40	45
Dwelling (Indoors)	(10pm – 7am)	30	35	40
Commercial and Retail activity (Indoors)	When the activity is open for business	45	-	-

The applicable noise limit during the day / evening is 50 dB(A) $L_{Aeq,1hr(7am\ to\ 10pm)}$ at the external façade of a residence.

During the night period (10pm to 7am), the applicable noise limit is 30 dB(A) $L_{Aeq,1hr(10pm\ to\ 7am)}$, indoors. A factor of 5 dB(A) has been added to take into account noise attenuation from outdoors to indoors, assuming partially open windows, to obtain a night-time noise limit of 35 dB(A) $L_{Aeq,1hr(7am\ to\ 10pm)}$ at the external façade of a residence.

B.3 Refuse Collection, Truck Deliveries and Car Parking

Noise from truck deliveries, refuse collection, and car parking is transient, and has been described using the L_{A1} noise descriptor. The applicable EPP 2008 Acoustic Quality Objective noise limit during the day /evening is 65 dB(A) L_{A1} at the external façade of a residence.

During the night period (10pm to 7am), the applicable noise limit is 40 dB(A) L_{A1}, indoors (as presented in Table B-6). A factor of 5 dB(A) has been added to take into account noise attenuation from outdoors to indoors, assuming partially open windows, to obtain a night-time noise limit of 45 dB(A) L_{A1} at the external façade of a residence.

B.4 Noise Limits

Based on the noise criteria presented in Sections B.2 to B.3 and the noise monitoring results presented in Section 3, the applicable noise limits for all noise sources are presented in Table B-7. The noise limits for air conditioning and mechanical plant have been derived from the strictest of the EPA 1994 and the EPP 2008 Acoustic Quality Objective noise limits.

Table B-7: All Applicable Noise Limits

Noise Source	Noise Criteria	Noise Limit	Period	Where
Air-conditioning and mechanical plant	EPP 2008 Acoustic Quality Objectives	50 dB(A) L_{Aeq}	Day (7am to 6pm)	At the external façade of neighbouring residences
		50 dB(A) L_{Aeq}	Evening (6m to 10pm)	At the external façade of neighbouring residences
		35 dB(A) L_{Aeq}[1]	Night (10pm to 7am)	At the external façade of neighbouring residences
Refuse collection, truck deliveries, car parking	EPP 2008 Acoustic Quality Objectives	65 dB(A) L_{A1}	Day (7am to 10pm)	At the external façade of neighbouring residences
		65 dB(A) L_{A1}	Evening (6m to 10pm)	At the external façade of neighbouring residences
		45 dB(A) L_{A1}[1]	Night (10pm to 7am)	At the external façade of neighbouring residences

[1] *Noise limit includes a 5 dB(A) factor for attenuation of noise from outdoors to indoors, assuming partially open windows*