

MANAGING DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS
MATTHEW SHIELDS
BEN WHITE

ACOUSTIC
LOGIC



The Ponds Shopping Centre

DA Environmental Noise Emission Assessment

SYDNEY
A: 9 Sarah St Mascot NSW 2020
T: (02) 8339 8000
F: (02) 8338 8399

SYDNEY MELBOURNE BRISBANE CANBERRA
LONDON DUBAI SINGAPORE GREECE

www.acousticlogic.com.au
ABN: 11 068 954 343

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1 INTRODUCTION

This report presents our assessment of potential environmental noise emissions from the proposed The Ponds Shopping Centre at the corner of Riverbank Drive and The Ponds Boulevard, The Ponds. The following noise sources have been assessed to determine the potential for adverse noise impacts to be produced:

- Loading Dock activities including trucks /semi-trailers movements, reverse alarm, air break noise, idling, loading/unloading, etc.
- Vehicle movements though carpark including door slamming, car start, etc.
- Internal shopping noise emissions.
- Traffic Noise Increase along neighbouring streets.

The assessment is based on the architectural drawings below.

Table 1 –Architectural Drawings Used for Assessment

Drawing No.	Issue
DA-03	6
DA-04	7
DA-05	7
DA-06	2
DA-07	2
DA-08	3
DA-09	2
ASK-13	8
ASK-14	9

2 PROJECT DESCRIPTION

The proposed development forms part of the proposed retail and community facility to serve the surrounding residential area. It will comprise a supermarket and a few specialty retail shops.

The project site is located on the south eastern corner of the intersection of the Ponds Boulevard and Riverbank Drive. A community facility is located west to the site. The south and east of the site has been developed with construction of new residential developments extending to the west and north. John Palmer Public School is located to the south of the site.

Parking for the retail development will be provided at-grade adjacent to the proposed development (some 90 spaces) and within a basement carpark (some 250 spaces). Access to these parking areas is proposed onto The Ponds Boulevard and onto Riverbank Drive.

The detailed proposed operation hours are as below.

Table 2 –Proposed Operation Hours

Item	Days	Operation Hours
Super Market	Monday to Sunday	6am to midnight
Retail Shop	Monday to Sunday	6am to midnight
Loading Dock	Monday to Saturday	7am to 10pm
	Sunday and Public Holiday	8am-10pm

Site investigation indicated that the nearest sensitive noise receiver locations are as below:

- Noise Receiver 1- Two storey residential dwellings located immediately across Pebble Crescent.
 - Noise Receiver 2- Two storey residential dwellings located immediately across Riverbank Drive.
 - Noise Receiver 3- Two storey residential dwellings located immediately across The Ponds Boulevard.
 - Noise Receiver 4- John Palmer Public School located adjacent to the southern boundary.
- Detailed site map and noise receiver locations refer to the Figure 1 below.



Figure 1 Site Map and Noise Receiver/ Monitor Locations

3 EXISTING BACKGROUND NOISE

The existing noise environment is dominated by traffic noise along neighbouring streets. Ambient noise monitoring was conducted around the proposed site using unattended noise monitors and manned background noise measurements during early morning period. The purpose of the monitoring was to:

- establish the background noise level in the vicinity ie the typical minimum noise level occurring at the potentially affected properties surrounding the development
- establish the impact of existing environmental noise sources in the vicinity at the properties potentially most affected by noise emissions.

3.1 ENVIRONMENTAL NOISE LEVELS

Environmental noise constantly varies in level, due to fluctuations in local noise sources including road traffic. Accordingly, a 15minute measurement interval is normally utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In the case of environmental noise three principle measurement parameters are used, namely L_{10} , L_{90} and L_{eq} .

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source depends on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of industrial noise.

3.2 UNATTENDED BACKGROUND NOISE MEASUREMENTS

Background noise measurements were obtained at two different locations over a number of days to characterise the existing noise environment.

3.2.1 Monitor 1

Noise Monitor 1 Location -The unattended background noise monitor was setup adjacent to the southern façade of the existing Sales Centre which is indicated in Figure 1. The plant noise from the existing Ponds site was inaudible therefore the measured background noise levels shall be representative.

The monitoring period for the 15th to 21st April 2011.

Background noise levels were continuously monitored using unattended noise monitor. The unattended monitor used continuously measures noise levels and every 15 minutes store statistical data within memory. The stored data was downloaded at the end of the measurement period.

This monitor location represents the background noise levels of Noise Receivers 2 & 3 because they are dominated by traffic noise generated along Riverbank Dr and The Ponds Boulevard.

3.2.2 Monitor 2

Noise Monitor 2 Location -The unattended background noise monitor was setup in front of #29 Pebble Crescent with microphone close to southern boundary. Detailed monitor location refers to Figure 1 afore.

The monitoring period for the 12th to 18th April 2013.

Equipment used consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode. There were no significant periods of adverse weather conditions during the measurement period.

This monitor location represents the background noise levels of Noise Receiver 1.

3.2.3 Rated Background Noise Levels

The monitored noise levels are given in Appendix 1 & 2. In all cases the typical averaged minimum noise level was used to determine the representative background noise level. This will give the most conservative estimate of noise impact. Table below lists the rating background noise levels.

Table 3 –Rating Background Noise Level dB(A)

Monitor Location	Rating Background Noise Levels dB(A) L ₉₀			
	6am-7am	7am-6pm	6pm-10pm	10pm-midnight
Monitor 1	40	39	38- 6pm to 8pm 35-8pm to 10pm	34
Monitor 2	39	34	34	30

Note: Noise data of Monitor 2 shall be applied to noise receiver 1- Residential dwellings along Pebble Crescent. Noise data of Monitor 1 shall be applied to noise receiver 2 & 3- Residential dwellings across Riverbank Dr and The Ponds Boulevard.

3.3 MANNED BACKGROUND NOISE MEASUREMENTS

3.3.1 Equipment Used

Noise measurements were obtained using a Norsonic type Nor 140 Sound Analyser was used for the noise measurements. The analyser was set to fast response and calibrated before and after the measurements using a Norsonics Sound Calibrator type 1251. No significant drift was noted.

3.3.2 Time of Noise Measurements

Manned background noise measurements were conducted between 7am and 8am on 12th April 2013.

3.3.3 Background Noise Measurement Location and Measured Noise Levels

Manned background noise measurement location and measured background noise levels have been presented below.

Table 4 – Manned Background Noise Measurements

Measurement Location	Time Period	Measured Background Noise Level* dB(A) L ₉₀
Front yard of #29 Pebble Cres*	8am-8:30am	38 dB(A)

4 ENVIRONMENTAL NOISE EMISSION CRITERIA

4.1 TO RESIDENTIAL NOISE RECEIVERS

Noise emissions from the project site shall comply with the *'provisions of the Protection of the Environment Operations Act 1997, EPA's Industrial Noise Policy and Noise Control Manual*

4.1.1 Noise emission limits

The NSW EPA Industrial Noise Policy provides guidelines for assessing noise impacts from industrial developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The EPA Industrial Noise Policy has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion. In addition, the EPA in its Environmental Noise Control Manual states that noise controls should be applied with the General intent to protect residences from sleep arousal.

4.1.2 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

4.1.3 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The EPA's Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

Table 5 provides the recommended ambient noise levels for the suburban residential receivers for the day, evening and night periods. For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm; and
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

Table 5 - EPA Recommended Acceptable Noise Levels

Type of Receiver	Indicative Noise Amenity Area	Time of day	Recommended Acceptable Noise Level dB(A) L_{eq}
Residential	Suburban	Day	55
		Evening	45
		Night	40

If the existing amenity noise levels due to industrial noise are close to or above the recommended acceptable noise levels then operation of the site shall be designed to a lower level than the acceptable noise level.

4.1.4 Sleep arousal

To minimise the potential for sleep arousal the L_1 (1 minute) noise level of any specific noise source does not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am. The L_1 noise level is the level exceeded for 1 per cent of the time and approximates the typical maximum noise level from a particular source. Where the typical repeatable existing L_1 levels exceed the above requirement then the existing L_1 levels form the basis for, sleep disturbance criteria.

4.1.5 Noise Assessment Objectives

Based on the EPA's Industrial Noise Table 6 provides a summary of the assessment criteria applicable to the subject premises at the neighbouring potentially affected residential properties

based on noise monitoring conducted for the subject site. The intrusiveness and amenity criteria for this project have been determined using the EPA guidelines and the noise monitoring results.

Table 6 –Noise Objective for Residential Noise Receivers

Receivers	Time of day	Measured Background Noise Level L ₉₀ dB (A)	Amenity Criteria L _{eq, period} dB (A)	Intrusiveness Criteria Background + 5 dB(A) L _{eq} dB (A)	Noise Objective L _{eq} dB (A)	Sleep Disturbance Objective L ₁ dB (A)
Receiver 1	Day	34	55	39	39	N/A
	Evening	34	45	39	39	N/A
	Night- 6am to 7am	39	40	44	40	54
	Night 10pm-midnight	30	40	35	35	45
Receiver 2 & 3	Day	39	55	44	44	N/A
	Evening	38 dB(A) 6pm-8pm 35 dB(A) 8pm-10pm	45	43 dB(A) 6pm-8pm 40 dB(A) 8pm-10pm	43 dB(A) 6pm-8pm 40 dB(A) 8pm-10pm	N/A
	Night- 6am to 7am	40	40	45	40	55
	Night 10pm-midnight	34	40	39	39	49

4.2 TO SCHOOL RECEIVER

Noise emission from the proposed shopping centre to the school adjacent to the southern boundary shall comply with the noise criteria recommended by NSW Road Noise Policy dated March 2011 which has been detailed below.

Table 7 –Noise Emission Limit to School

Space	Assessment Criteria
School Classroom	Day- L _{eq} (1 hour) 40 dB(A)
Outdoor Play Areas	Day- L _{eq} (1 hour) 55 dB(A) external

5 NOISE SOURCES

5.1 LOADING DOCK NOISE

The primary source of noise for activities conducted within the building will be the proposed loading dock area. All other activities carried out in other parts of the building are not expected to produce any noise emissions that would be audible at the sensitive receivers.

The noise calculation is based on the assumption below:

- Maximum one semi-trailer in or out per hour.
- Loading/unloading of vehicles using hand pallets and dock leveller.
- Waste storage and compacting.

The potential noise sources associated with the loading dock are listed in below along with the noise emission levels. The emission levels have been obtained from noise monitoring carried out at similar retail loading dock facilities. Noise measurements were obtained using a Norsonics SA 110 with (serial number 24692) or CEL-593 Type 1 sound level analysers (serial number C1. T 116962), set to fast response. The sound level analysers were calibrated before and after the measurements using a Rion NC-73 calibrator. No significant drift was recorded.

Table 8 - Noise Source Emission Levels

Noise Source	Sound Power Level dB(A)	Type of Noise Source
Semi-Trailer Idle	99	Quasi-Steady
Semi- Trailer Manoeuvring	103	Intermittent
Truck reversing alarm	108 including 5 dB(A) tonality correction	Intermittent
Truck Air Brakes	114	Intermittent
Dock Leveller	88	Intermittent
Waste Truck compacting load	103	Quasi-Steady

5.2 CAR PARK NOISE

Noise from average noise emissions and peak noise event will be assessed below.

The traffic noise from the proposed carpark has been predicted to the nearest residential receivers. The modelling is based on the assumption as below.

- In accordance with traffic report prepared by Colston Budd Hunt & Kafes Pty Ltd, the proposed development would generate some 770 vehicles per hour two way during the Thursday afternoon peak hour period. It is assumed that vehicle movements during night time period will be up to 10% of total carpark space during night time period.

- Vehicles move at 10km/hour speed with typical sound power level 86 dB(A) (noise data from other projects by this office).
- Car stop at carpark and door closed. The typical door close noise levels SEL 71 dB(A) @ 5m distance (noise data from other projects by this office).
- Car Start at carpark. The typical car start noise levels SEL 67 dB(A) @ 5m distance (noise data from other projects by this office).

5.3 INDOOR SHOPPING NOISE

The finish inside the shopping centre was assumed to be acoustically "hard" with an indoor noise level of 75dB(A) L_{eq} .

The noise level at the nearest residents was predicted using the above data and by taking into account any expected noise reduction provided by the building fabric, distance losses, directivity, barrier effects, etc. Predicted indoor noise impact is lower than the noise emissions from outdoor noise sources.

6 NOISE PREDICTIONS

Noise emission from the proposed shopping centre have been predicted based on the noise source data above, distance attenuation, barrier effect and recommended acoustic treatments in Section 7. Detailed predicted noise levels are below.

6.1 L_{EQ} – AVERAGED SOUND ENERGY LEVEL

Table 9 - Predicted dB(A) L_{eq} - Highest Averaged Sound Energy Level during 15 minutes period

To Noise Receiver	Predicted Noise Level	Criteria		Comply ?
Receiver 1	39	Day	39	Yes
	39	Evening	39	Yes
	≤ 30	Night 6am-7am	40	Yes
	≤ 30	Night 10pm- Mid night	35	Yes
Receiver 2	39	Day	44	Yes
	39	Evening	43 dB(A) 6pm-8pm 40 dB(A) 8pm-10pm	Yes
	≤ 30	Night 6am-7am	40	Yes
	≤ 30	Night 10pm- Mid night	39	Yes
Receiver 3	43	Day	44	Yes
	43	Evening	43 dB(A) 6pm-8pm 40 dB(A) 8pm-10pm	Yes- 6pm to 8pm Marginal -8pm to 10pm
	≤ 30	Night 6am-7am	40	Yes
	≤ 30	Night 10pm- Mid night	39	Yes
Receiver 4	47 -Outdoor Play Area	55		Yes
	< 35- Inside Classroom	40		Yes

7 TRAFFIC NOISE INCREASE BY THE PROJECT SITE

7.1.1 Traffic Noise Increase Criteria

Additional traffic noise along neighbouring streets generated by the proposed development shall comply with the criteria below.

NSW Road Noise Policy dated March 2011 setup the following traffic noise criteria for residential land uses.

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use development, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

7.1.2 Predicted Additional Traffic Noise Levels

The following additional traffic volumes have been provided by Colston Budd Hunt & Kafes Pty Ltd for the project site.

Table 3.1: Existing Two-Way (Sum of Both Directions) Peak Hour Traffic Flows Plus Development Traffic

Road/Location	Thursday Afternoon Peak Hour		
	Existing	Plus Retail Development	Plus Community Centre
The Ponds Boulevard			
- north of Riverbank Drive	355	+120	+10
- north of Teague Street	340	+240	+10
- north of Jetty Street	365	+240	+10
- north of Stanhope Parkway	400	+240	+10
Riverbank Drive			
- east of The Ponds Boulevard	335	+120	+10
- west of The Ponds Boulevard	270	+270	+30
Stanhope Parkway			
- east of The Ponds Boulevard	1,365	+120	+10
- west of The Ponds Boulevard	1,245	+30	-
Teague Street			
- east of The Ponds Boulevard	95	-	-
Jetty Street			
- west of The Ponds Boulevard	125	-	-
Mallard Drive			
- south of Stanhope Parkway	70	+60	-

The additional traffic noise generated by the project site has been predicted below. Detailed prediction results have been presented as below.

Table 10 –Predicted Traffic Noise Increase

Road	Traffic Noise Increase dB(A)_{Leq}	Criteria dB(A) _{Leq}	Comply ?
The Ponds Boulevard North of Riverbank Dr North of Teague St North of Jetty St North of Stanhope Parkway	+1 +2 +2 +2	≤ 2	Yes
Riverbank Dr -East of The Ponds Boulevard - West of The Ponds Boulevard	+1 +3	≤ 2	Yes Marginal*
Stanhope Parkway -East of The Ponds Boulevard -West of The Ponds Boulevard	+0.4 +0.1	≤ 2	Yes
Mallard Dr -South of Stanhope Parkway	+3	≤ 2	Marginal*

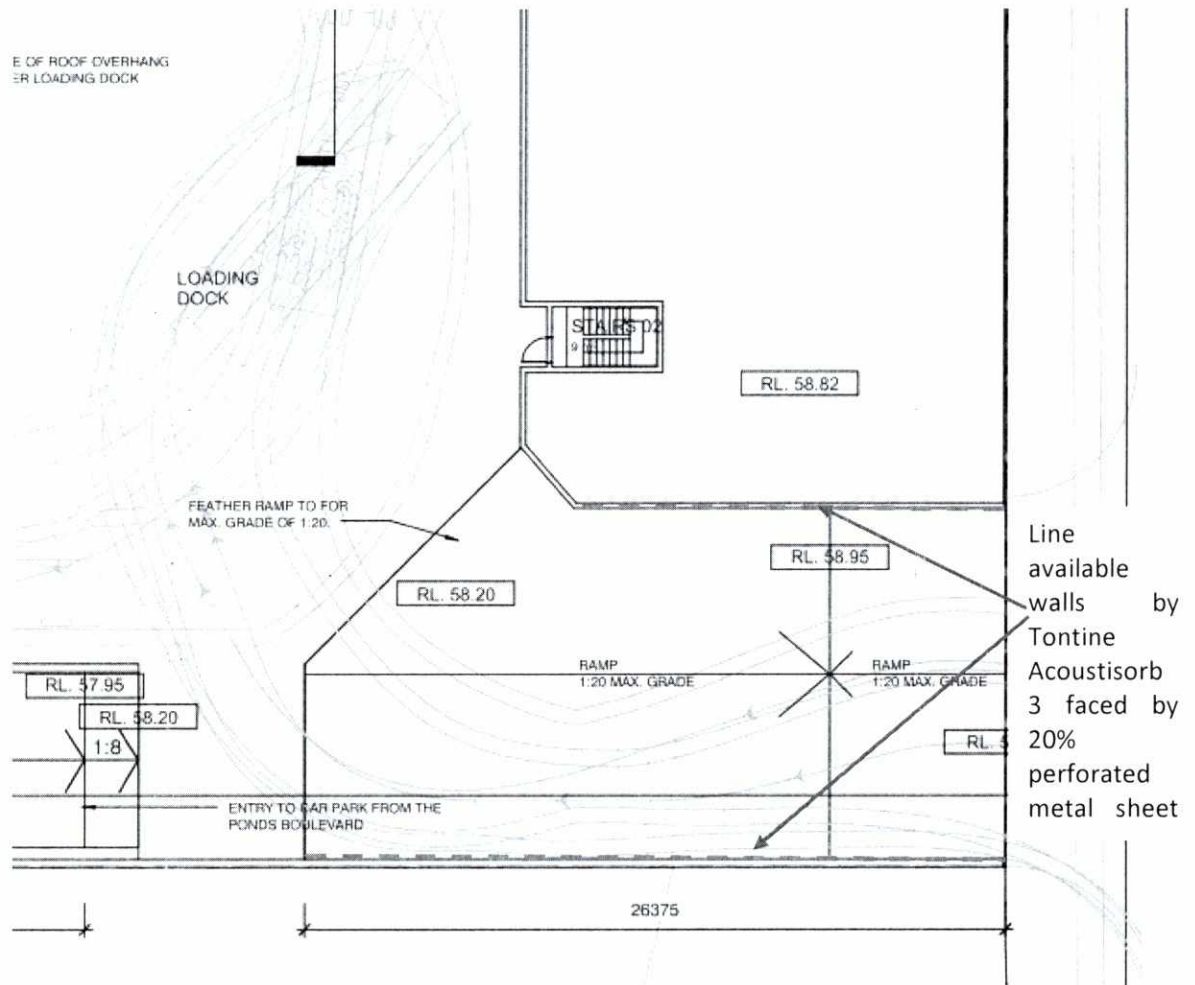
*Note: 1 dB(A) exceed is imperceptible and the areas around the project site is developing therefore people shall expect traffic noise increase in the future.

8 RECOMMENDED TREATMENTS

The following building and management controls are required to ensure that the noise emissions from the site fully comply with the requirements of EPA Industry Noise Policy.

Loading Dock

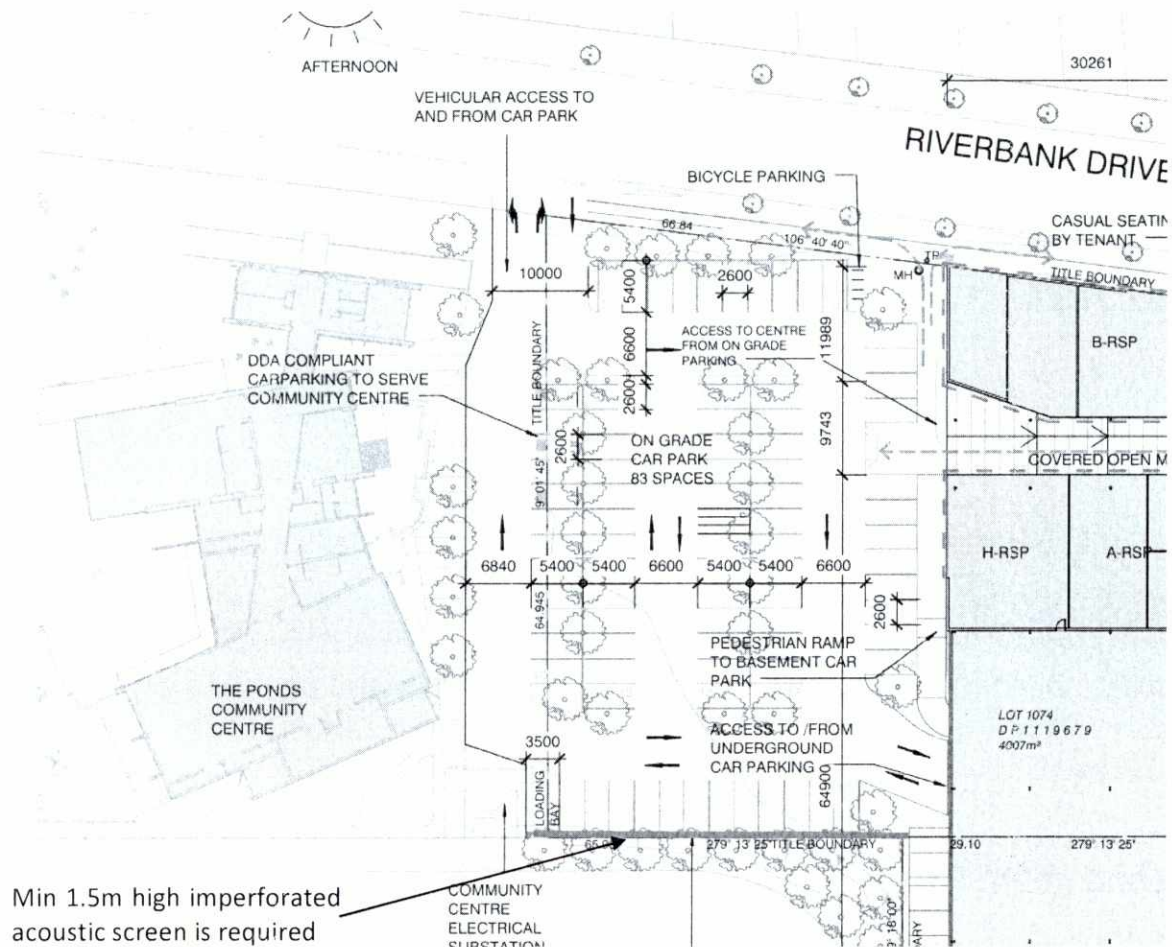
- Operation of loading dock shall be 7am to 10pm Monday to Saturday and 8am to 10pm on Sunday and Public Holidays.
- Line the available walls around ramp facing The Ponds Boulevard by 75mm thick Tontine Acoustisorb 3 faced by 20% open perforated metal sheet or FC sheet.



Carpark

- Install 1.5m high imperforated fence along Pebble Crescent. Detailed acoustic screen location refers to Figure below.
- Prominent notices shall be placed to remind people that a minimum amount of noise is to be generated when leaving the premises.

- No speed humps is allowed on ground level car park.
- Garbage compacting can only occur during day time period during week days.



9 CONCLUSION

The potential environmental noise emissions from the proposed The Ponds Shopping Centre, The Ponds has been carried out. Provided acoustic treatments in Section 7 of this report the overall noise emissions shall fully comply with the requirements of NSW EPA Industrial Noise Policy. We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'George Wei', written in a cursive style.

Acoustic Logic Consultancy Pty Ltd
George Wei

Senior Acoustic Engineer