

**Noise Impact Assessment  
Proposed Carwash  
206 High Street  
Maitland NSW**

**April 2023**

**Prepared for Brown Commercial Building Pty Ltd  
Report No. 23-2849-R1**

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**Building Acoustics-Council/EPA Submissions-Modelling-Compliance-Certification**

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# SECTION 1

## Introduction

## 1.1 INTRODUCTION

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Reverb Acoustics has been commissioned to conduct a noise impact assessment for a proposal to construct a carwash at 206 High Street, Maitland. This assessment considers noise sources such as mechanical plant (vacuum, air conditioning, compressor, pumps, etc), deliveries (including unloading, truck movements, etc), carwash activities, and customer vehicles entering and leaving the premises and manoeuvring on the site. Other noise sources include garbage collection and general site noise. Given the location of the development in relation to nearest residences, we believe assessment a road traffic noise is not required.

The assessment was requested by Brown Commercial Building Pty Ltd to form part of and in support of a Development Application to Maitland City Council (MCC) and to ensure any noise control measures required for the development are incorporated during the design stages.

## 1.2 TECHNICAL REFERENCE / DOCUMENTS

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Beranek, L.L and Istvan, L.V. (1992). *Noise and Vibration Control Engineering*. John Wiley and Sons, Inc.

Bies, D.A. and Hansen, C.H. (1996). *Engineering Noise Control: Theory and Practice*. London, E & F.N. Spon.

Gréhant B. (1996). *Acoustics in Buildings*. Thomas Telford Publishing.

Templeton, D. (1997). *Acoustics in the Built Environment*. Reed Education and Professional Publishing Ltd.

AS 2107-2016 “*Acoustics-Recommended Design Sound Levels and Reverberation Times for Building Interiors*”.

AS 1276.1-1999 “*Acoustics – Rating of sound insulation in buildings and of building elements. Part 1: Airborne sound insulation*”.

Roads and Maritime Services (4 December 2019). *Roads and Maritime Services Trip Generation Surveys. Car Wash & Cafes*.

NSW Environment Protection Authority (2017). *Noise Policy for Industry*

Office of Environment and Heritage (2010). *NSW Road Noise Policy*

NSW Roads and Maritime Services (2001). *Environmental Noise Management Manual*

Plans supplied by Brown Commercial Building Pty Ltd, Rev 1, dated 8 November 2022. Note that variations from the design supplied to us may affect the acoustic recommendations.

A Glossary of commonly used acoustical terms is presented in Appendix A to aid the reader in understanding the Report.

# **SECTION 2**

## **Project Description**

### **Existing Acoustic Environment**

### **Assessment Criteria**

## 2.1 PROJECT DESCRIPTION

Brown Commercial Building Pty Ltd seeks approval for a carwash at 206 High Street, Maitland. This assessment is based on typical mechanical design layouts. Expected carwash trading hours are 7am-10pm Monday to Sunday.

This assessment will focus on the noise impact at nearest receivers, and it should be acknowledged that compliance with criteria at these locations will ensure satisfactory results at more remote locations. Plans supplied by our client show the layout of the site and the location of nearby land uses. Potential noise sources which may impact nearby residents include mechanical plant (vacuum, air conditioning, compressor, pumps, etc), deliveries (including unloading, truck movements, etc), carwash activities, and customer vehicles entering and leaving the premises and manoeuvring on the site. Other noise sources include garbage collection and general site noise.

Figure 1: Site Plan



## 2.2 EXISTING ACOUSTIC ENVIRONMENT

Attended background noise level measurements were taken in December 2022 at nearest residential receivers (See Figure 1). Results of our noise surveys are shown below.

Table 1: Measured Noise Levels April 2023

Location	Time	Date	L90	Leq
Monitoring Loc'n 1	10:45	2/04/23	38.7	63.5
"	20:15	3/04/23	40.5	67.0



## 2.3 CRITERIA

### 2.3.1 Site Activities/Mechanical Plant Noise

Noise from industrial noise sources scheduled under the Protection of Environment Operations Act is assessed using the EPA's Noise Policy for Industry (NPfI). However, local Councils and Government Departments may also apply the criteria for land use planning, compliance and complaints management. The NPfI specifies two separate criteria designed to ensure existing and future developments meet environmental noise objectives. The first limits intrusive noise to 5dB(A) above the background noise level and the other is based on the total industrial noise in an area in relation to the noise levels from the development to be assessed. Project Noise Trigger Levels are established for new developments by applying both criteria to the situation and adopting the more stringent of the two.

The existing L(A)eq for the receiver areas is dominated by traffic on nearby roads, neighbourhood activity and some commercial activity during the day, evening and night. Reference to Table 2.2 of the NPfI shows that all receiver areas are classified as urban. The Project Amenity Level is derived by subtracting 5dB(A) from the recommended amenity level shown in Table 2.2. A further +3dB(A) adjustment is required to standardise the time periods to LAeq,15 minute. The adjustments are carried out as follows:

Recommended Amenity Noise Level (Table 2.2) – 5dB(A) +3dB(A)

Table 2 below specifies the applicable project intrusiveness and amenity noise trigger levels for the proposed redevelopment.

**Table 2: - Intrusiveness and Amenity Noise levels**

Period	Intrusiveness Criteria	Amenity Criteria
Day	44 (39+5)	58 (60-5+3)
Evening	44 (39+5)	48 (50-5+3)
Night	-	43 (45-5+3)
<b>Receiver Type: Urban (See EPA's NPfI - Table 2.1)</b>		

Project Noise Trigger Levels, determined as the more stringent of the intrusiveness criteria and the amenity / high traffic criteria, are as follows:

Day           **44dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.  
 Evening      **44dB LAeq,15 Minute** 6pm to 10pm  
 Night         **N/A** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

Commercial Premises           **62dB LAeq** when in use

### 2.3.2 Maximum Noise Level Event Assessment - Sleep Arousal

Section 2.5 of EPA's NPfI requires a detailed maximum noise level event assessment to be undertaken where the subject development/premises night-time noise levels exceed the following:

- LAeq (15 minute) 40dB(A) or the prevailing RBL plus 5dB whichever is greater, and/or
- LAFmax 52dB(A) or the prevailing RBL plus 15dB, whichever is greater.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night period. The development will not operate at night (10pm-7am) therefore assessment of Sleep Arousal is not required.

# SECTION 3

## Noise Impact Assessment



## 3.1 METHODOLOGY

### 3.1.1 Mechanical Plant/ Site Activities

No information is available regarding the exact location or type of mechanical plant for the site. The anticipated number and location of noise generating items associated with the development that have been adopted for assessment purposes are shown below.

Location	Plant Item
Carwash Plant/Store Room	Compressors (x4)
	Water Pumps (x4)
Carwash	Auto Wash Blower/Dryer (x2)
	Manual Pressure Washer (x2)
Vacuum Stations	Vacuum (x2)

Future noise sources on the site cannot be measured at this time, consequently noise levels produced by customer's vehicles, delivery trucks, mechanical plant and site activities have been sourced from manufacturers' data and/or our library of technical data. This library has been accumulated from measurements taken in many similar situations on other sites, and allows predictions of future environmental noise at each receiver and recommendations concerning noise control measures most likely to be required on this site.

All noise level measurements were taken with a Svan 912AE Sound and Vibration Analyser. This instrument is Class 1 accuracy, in accordance with the requirements of IEC 61672, and has the capability to measure steady, fluctuating, intermittent and/or impulsive sound, and to compute and display percentile noise levels for the measuring period. A calibration signal was used to align the instrument train prior to measuring and checked at the conclusion.

Difference in the two measurements was less than 0.5dB. Each measurement was taken over a representative time period to include all aspects of machine/process operation, including additional start-up noise where applicable. Items of equipment, which produced a brief burst of noise, were measured for a similarly brief time period to ensure the results were not influenced by long periods of inactivity between operations. Sound measurements were generally made around all sides of each machine, to enable the acoustic sound power (dB re 1pW) to be calculated. The sound power level of each item is then theoretically propagated to each receiver with allowances made for spherical spreading, directivity, molecular absorption, intervening topography or barriers and ground effects giving the received noise level at the receiver from that particular plant item.

Addition of the received Sound Pressure Level (SPL) for each of the individual operating sources gives the total SPL at each receiver, which is then compared to the relevant criterion. Where noise impacts above the criterion are identified, suitable noise control measures are implemented and reassessed to demonstrate satisfactory received noise levels.

The theoretical assessment is based on a worst-case scenario, where all fixed plant items are operating simultaneously and vehicles entering and leaving in a location most exposed to the surrounding residences. In reality, many items will not always be operating in the most exposed areas, so actual received noise levels are expected to be less than the predictions shown in this report, or at worst equal to the predicted noise levels for only part of the time.

Due to the non-continuous nature of some site activities (i.e. car/truck movements, etc), adjustments for duration have been made using the following mathematical formula. Note that fixed plant items such as air conditioning/exhaust plant will be continuous over the entire assessment period and no duration adjustment is necessary.

Equation 2:

$$L_{eq,T} = L_w - 10 \log(2\pi r^2) + 10 \log \frac{(D \times N)}{T}$$

Where  $L_w$  is sound power level of source (dB(A))  
 $R$  distance to receiver (m)  
 $D$  is duration of noise for each event (sec)

$N$  is number of events  
 $T$  is total assessment period (sec)

## 3.2 ANALYSIS

### 3.2.1 Received Noise – Site Operation

The Acoustic Power Levels ( $L_w$ 's) of plant and machinery expected for the site which were input into our computer model, are shown in the following Table for peak day and evening periods. The Table gives the A-weighted sound power levels for each listed plant item, principally based on manufacturers' data and our library of technical data. Also shown is the number of items expected at the site during a 15 minute assessment period.

**Table 3: Equipment/Activities (15 minute Assessment Period)**

Item/Activity	$L_w$ dB(A)	Enter Leave	Manual W Bay	Vacuum Stations	Auto W Bay	Plant Room	Waiting Areas
DAY / EVENING							
Vehicles	80/76	20	10	8	12		8
Compressor	82					4	
Water Pump	84					4	
Blower Dryer	92				2		
Pressure Washer	86		2				
Vacuum	85			4			

Preliminary calculations reveal that the following noise control modifications will be required to ensure compliance at nearest receivers:

- Acoustic fence 1200mm above FGL south side vacuum bay parking.
- Limiting SPL for automatic car wash blower and/or limiting SPL for plant output.
- Acoustic louvres in plant room walls that face residences, i.e. south side.
- All pumps, compressors, water pumps to be located in plant room/store.

Table 4 shows calculations to predict the cumulative noise impact from activities and equipment associated with the site, propagated to nearest residences south of the site (R1), with the above noise control in place.

**Table 4: Received Noise - Site Activities/Equipment dB(A),Leq (Day/Evening)  
 Propagated South to Nearest Residences R1**

Item/Activity	Lw dB(A)	Ave Dist Rec (m)	Duration (sec)	No. of Events	Barrier Loss/TL	Received dB(A)
Cars enter/exit	80	25	5	20	2	32
Cars park Manual WB	76	30	5	10	5	21
Cars wait Manual WB	76	30	30	2	2	25
Cars Park Vacuum Stn	76	25	5	8	5	21
Cars Park Auto WB	76	40	5	12	5	19
Cars wait Auto WB	76	40	30	6	2	27
Compressor in plant rm	82	45	600	4	18	27
Water pump in plant rm	84	45	600	4	18	29
Wash cycle Auto WB	80	45	200	6	6	34
Blower at auto wash	82	40	120	6	6	35
Pres wash at manual wash	85	30	60	5	8	34
Vacuum	85	25	120	4	9	37
<b>Combined</b>						<b>43</b>
<b>Crit (Day/Even)</b>						<b>44</b>
<b>Impact</b>						<b>0/0</b>

NOTE: Core deliveries trucks/vans will only visit the site during café trading hours.

As can be seen by the results in Table 4, the cumulative noise impact from all site activities and equipment is predicted to be compliant with the criteria at residences R1 and R2, providing acoustic modifications noted in Section 4 are incorporated into the design of the site.

Table 5 shows a summary of predicted noise impacts during all time periods at nearest receivers with noise control in place.

**Table 5: Summary Received Noise – All Nearby Receivers**

Receiver Loc'n	Received Noise (Day/Evening/Night)						
	Period	dB(A),Leq	Crit	Impact	dB(A),Lm	Crit	Impact
Apartments R1	Day	43	44	0	-	N/A	-
	Evening	43	44	0	-	N/A	-
	Night	-	N/A	0	-	N/A	-
Hotel Accom R2	Day	42	44	0	-	N/A	-
	Evening	42	44	0	-	N/A	-
	Night	-	N/A	0	-	N/A	-
Commercial R3	Day	46	63	0	-	N/A	-
	Evening	46	63	0	-	N/A	-
	Night	-	N/A	0	-	N/A	-
Commercial R4	Day	60	63	0	-	N/A	-
	Evening	60	63	0	-	N/A	-
	Night	-	N/A	0	-	N/A	-

As can be seen by results in the above Table, noise associated with site activities and equipment will generally be compliant with the criteria during all time periods at all nearby receivers, providing acoustic treatment detailed in Section 4 is implemented.

# SECTION 4

## Summary of Recommended Noise Control

## 4. NOISE CONTROL RECOMMENDATIONS

4.1 The following trading hours are acceptable:

Carwash                      7am-10pm      Monday to Sunday

4.2 Preference should be given to locating ventilation louvres to the plant room on the north facade of the plant/store room. All ventilation louvres to the plant room that face towards residences, i.e. south, must be acoustic louvres in preference to standard louvres. The louvres must have the following insertion loss values (typically Fantech SBL1, Nap Silentflo 300S Line or Robertson Type 7010):

*Required Insertion Loss Values for Acoustic Barriers/Plant Room Louvres – dB*

	Octave Band Centre Frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
NR	10	12	15	19	20	18	18	14
STL	4	6	9	13	14	12	12	8

4.3 Plant Room construction may consist of masonry, stud wall lined both sides compressed FC sheeting, or alternate materials approved by the acoustic consultant. Roof construction may consist of metal roof sheeting with no ventilation openings.

4.4 All pumps, compressors, etc, must be located in the plant/store room. All doors to the plant room must be shut when the car wash is in operation.

4.5 No acoustic treatment is required for mechanical plant that satisfies the following noise emission limits:

Item	Lw, dB(A)	SPL at 1m dB(A)	Comments
Pump, compressor	86	80	Located in Plant room
Pressure Washer	85	79	Manual Wash Bay
Blower	82	76	Auto Wash Bay
Vacuum	80	74	Vacuum Station

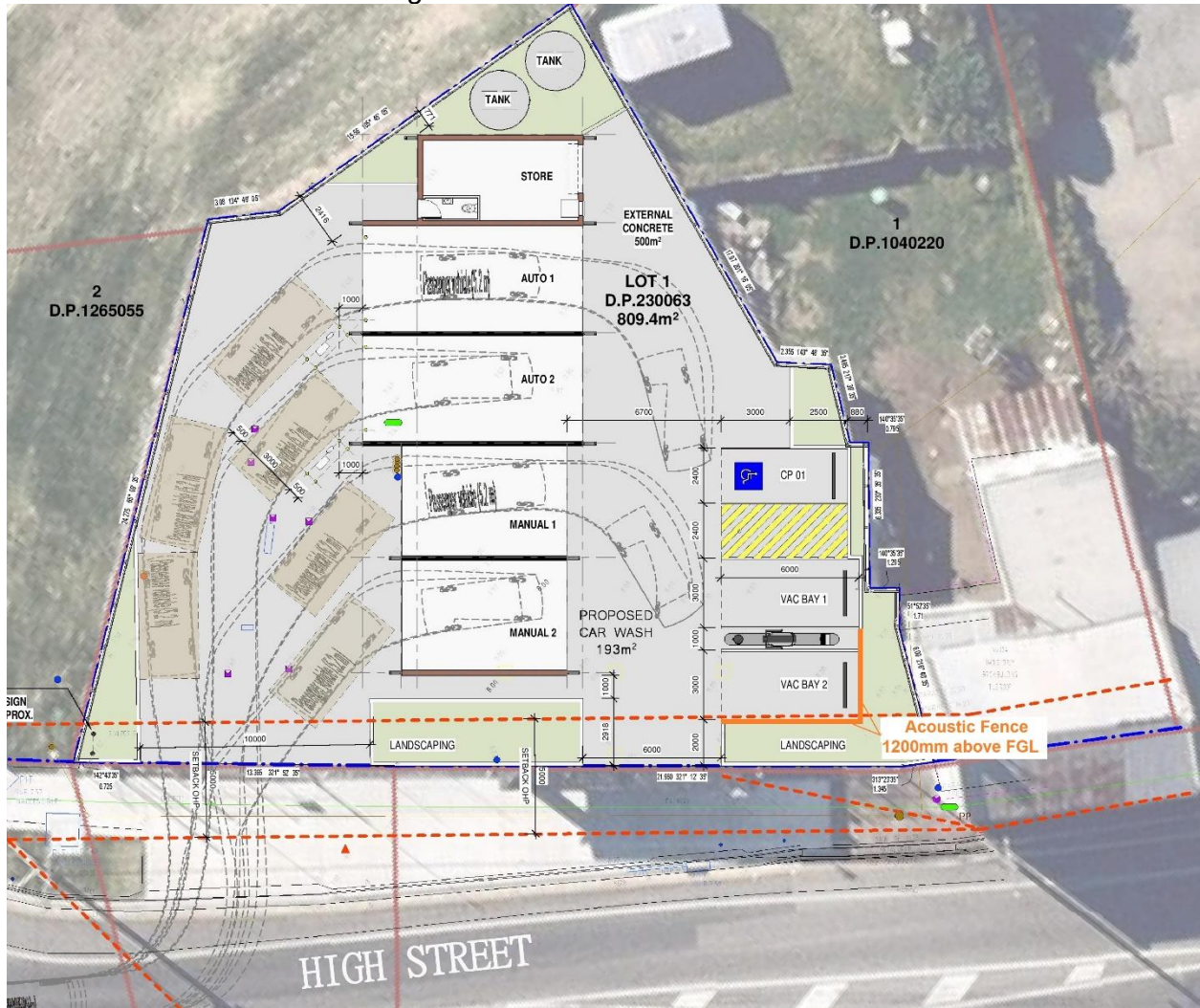
4.6 The blower/dryer to the automatic carwash must be shielded from south residences by other structural elements. If noise emissions from the auto carwash blower exceed the limits shown in Item 4.5 above, acoustic barriers must be constructed between the blower and residences. The barrier must intercept the line of sight towards any residence and may be constructed from Acoustisorb panels (available through Modular Walls) or other materials approved by the acoustic consultant.

4.7 The contractor responsible for supplying and installing mechanical plant must provide evidence that installed plant meets this noise emission limit, or that noise control included with the plant is effective in reducing the sound level to the specified limit. Once the plant layout has been finalised, details should be forwarded to the acoustic consultant for approval.

4.8 Construction Certificate documentation must be forwarded to Reverb Acoustics to ensure all recommendations within this report have been incorporated into the design of the site.

4.9 An acoustic fence is to be erected between Vacuum Bay 2 and south residences. Barrier construction should consist of lapped paling, Colorbond, Hebel Powerpanel or materials of equivalent surface mass. Details are to be forwarded to the acoustic consultant for approval.

Figure 2: Acoustic Fence Locations





# SECTION 5

## Conclusion



## 5.1 CONCLUSION

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A noise impact assessment for a proposal to construct a carwash at 206 High Street, Maitland, has been completed, resulting in noise control recommendations summarised in Section 4 of this Report. The site is suitable for the intended purpose providing recommendations outlined in this report are incorporated into the design. With these or equivalent measures in place, noise from the site will be either within the criteria or generally below the existing noise levels in the area for the majority of the time.

With relatively constant traffic on nearby roads, and the abundance of nearby commercial development, noise generated by the proposed site will be audible at times but not intrusive at any nearby residence. As the character and amplitude of activities associated with the site will be similar to those already impacting the area, it will be less intrusive than an unfamiliar introduced source and should be acceptable to residents.

Providing the recommendations presented in this report are implemented noise emissions from operation of the site will not have any long term adverse impact upon the acoustical amenity of nearby residents. We therefore see no acoustic reason why the proposal should be denied.

**Steve Brady M.A.S.A. A.A.A.S.**  
*Principal Consultant*

# APPENDIX A

## Definition of Acoustic Terms

## Definition of Acoustic Terms

Term	Definition
dB(A)	A unit of measurement in decibels (A), of sound pressure level which has its frequency characteristics modified by a filter ("A-weighted") so as to more closely approximate the frequency response of the human ear.
ABL	<i>Assessment Background Level</i> – A single figure representing each individual assessment period (day, evening, night). Determined as the L90 of the L90's for each separate period.
RBL	<i>Rating Background Level</i> – The overall single figure background level for each assessment period (day, evening, night) over the entire monitoring period.
Leq	Equivalent Continuous Noise Level - which, lasting for as long as a given noise event has the same amount of acoustic energy as the given event.
L90	The noise level which is equalled or exceeded for 90% of the measurement period. An indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise (usually in dBA).
L10	The noise level which is equalled or exceeded for 10% of the measurement period. L <sub>10</sub> is an indicator of the mean maximum noise level, and was previously used in Australia as the descriptor for intrusive noise (usually in dBA).

Time