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# 10 Young Street, West Gosford

DA Acoustic Assessment

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# **1** INTRODUCTION

Acoustic Logic have been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed mix-used development to be constructed at 10 Young Street, West Gosford. This document addresses noise and vibration impacts associated with the following:

- Traffic noise impacts from Central Coast Highway A49 (mainly).
- Existing noise impacts from surrounding industrial / commercial developments.
- Noise emissions from future occupancy within the proposed development including café, roof top communal spaces, loading dock, car park (level 1 and level 2), as well as mechanical plant servicing the project site.
- Noise and vibration impact during construction stage.

This office has referenced the following documents and regulations in the noise and vibration assessment of the development:

- Gosford Development Control Plan 2013;
- NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)';
- NSW Department of Planning and Environment's document 'State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007';
- Australian and New Zealand AS/NZS 2107:2016 'Recommended design sound levels and reverberation times for building interiors';
- NSW EPA Noise Policy for Industry (NPfl) 2017;
- EPA Interim Construction Noise Guideline (IGNG);
- Australian Standard 2436-2010 "Guide to Noise Control on Construction Maintenance and Demolition Site";
- The NSW Environment Protection Authority's (EPA) publication "Assessing Vibration: A Technical Guideline" (Feb 2006);
- German Standard DIN 4150-3 (1999-02);
- British Standard BS 7385 Part 2 1993; and
- Australian Standard AS 2670.2 1990.

This assessment has been conducted using the architectural drawings provided by Marchese Partners, dated 04/03/2022 for the DA submission.

# **2** SITE DESCRIPTION

The proposed development will consist of:

- Ground floor:
  - Hotel Lobby and Reception, Lounge and Café.
  - Residential Lobby.
  - Loading dock.
- Level 1 and level 2 will consist of carparking (50 hotel car spaces, 58 residential car spaces).
- Level 3 and level 4 will consist of hotel accommodation, and gym for use by hotel occupants.
- Level 5 to level 12 will consist of residential apartments.
- Rooftop communal areas on Level 5 and Level 13.

In addition to the above, the proposal includes a boundary re-alignment with 61 Central Coast Highway, and formalisation of access via the right of way through 1 Racecourse Road. Refer to the image in Figure 1 below.



Figure 1 – Proposed Boundary Realignment

Development in the vicinity of the site consists of:

- The proposed development is bounded by existing commercial / industrial buildings to the north, east and south-east.
- To the south of the site is an existing commercial development and a vacant land (DA approved Fast Food), further to the south is Central Coast Highway A49.
- To the west of the site is Racecourse Road, further to the west is The Entertainment Grounds.
- To the north-east of the site is Young Street, further to the north are existing residential dwellings.

Site investigation indicates that the Central Coast Highway A49 carries high volumes of traffic, mostly light passenger traffic and heavy rigid vehicles. Racecourse Road carries medium to low volumes of traffic, mostly light passenger traffic.

The nearest residential noise receivers around the project site include:

- Receivers 1 (C1) Commercial / industrial receivers situated to the north of the site, located at 12 Young Street, West Gosford and 1A Racecourse Road, West Gosford.
- Receivers 2 (PoW2) Gosford Presbyterian Church (Place of worship), located at 14 Young Street, West Gosford.
- Receivers 3 (C3) Commercial / industrial receiver situated to the south of the site, located at 1 Racecourse Road, West Gosford.
- Receivers 4 (C4) Commercial / industrial receivers to situated to the east of the site.
- Receivers 5 (R5) Residential dwellings located from 11-13 Young Street, West Gosford, situated to the north-east of the site.
- Receivers 6 (R6) Residential apartment located at Level 5 (Unit503) within the proposed development.
- Receivers 7 (R7) Residential apartment located at Level 5 (Unit507) within the proposed development.

A site map, measurement description and surrounding receivers are presented in Figure 2 below.



Figure 2: Site Map, Measurement Locations and Receiver Locations (Sourced from SIXMaps NSW)



# **3 ENVIRONMENTAL NOISE DESCRIPTORS**

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20-minute measurement interval is 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 analysing environmental noise, three-principle measurement parameters are used, namely L10, L90 and Leq.

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<sub>10</sub> 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 will depend 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 15-minute period.  $L_{eq}$  is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

# 4 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment is categorised by moderate background noise levels during the day and medium background noise levels during the evening due to traffic movements and operating noise from the surrounding commercial and industrial developments. Low background noise levels during the night as most of the volume of traffic has finished for the day and most of the commercial and industrial developments are closed for the day.

Acoustic monitoring was conducted at the site to establish the background noise levels which will be used as basis for this assessment.

# 4.1 BACKGROUND NOISE LEVELS

Background noise levels which will be used as a basis for this assessment are detailed in the following sections.

#### 4.1.1 Measurement Equipment

Attended noise measurements were obtained using a Norsonic 140 Sound Level Analyser, set on A- weighted fast response. The sound level meter was calibrated before and after the measurements using a Norsonic 1251 Sound Level Calibrator. No significant drift was recorded.

Unattended noise monitoring was conducting using one 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 each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

#### 4.1.2 Measurement Locations and Period

The measurement locations are shown in Figure 2 and discussed below.

#### 4.1.2.1 Attended Noise Measurements

An attended background noise measurement was carried out at 4:00pm on 11<sup>th</sup> May 2020 at Location 1.

#### 4.1.2.1.1 Measured Background Noise Levels (attended)

Measured background noise level from the attended noise monitoring is presented below.

# Table 1- Measured Background Noise Levels (Attended)

Location	Time of day	Measured Background Noise Level dB(A)L90(15min)
Location 1	4:00pm,	47
is roung street, west doslord	011 11 Way 2020	

#### 4.1.2.2 Unattended Noise Monitoring

An unattended noise monitor was installed on street level at location 4 (refer to Figure 2). The noise monitor was on site from the 30<sup>th</sup> April 2020 to 11<sup>th</sup> May 2020. The measured background noise levels have been corrected for meteorological conditions (excessive wind and/or rain), as required by section 3.4 of the EPA Industrial Noise Policy. Weather zone data for observations recorded at Gosford, periods of precipitation or extraneous wind conditions have been removed from the data and have not been used in the assessment of existing background noise levels as detailed in Appendix 1.

#### 4.1.2.2.1 Measured Background Noise Levels

The results of noise monitoring are included in Appendix 1.

Rating background noise levels obtained from unattended noise monitoring are presented in Table 2 below.

Location	Time of day	Rating Background Noise Level dB(A)L <sub>90(period)</sub>	
Location 4 15m from road kerb of Central Coast Highway A49	Day 7am to 6pm	55	
	Evening 6pm to 10pm	50	
	Night 10pm to 7am	37	

# Table 2- Rating Background Noise Levels

# **5 TRAFFIC NOISE INTRUSION**

Acoustic Logic has conducted an attended noise measurement and unattended noise monitoring to determine traffic noise levels impacting the project site. We note, due to the Covid-19 control measures in place during the measurement period, the level of traffic movements are below typical levels results in lower than normal traffic noise levels.

Therefore, AL has reviewed and referenced AADT in 2018, 2019 and 2020 from Traffic Volume Viewer - Roads and Maritime Services to predict post-pandemic traffic noise volume surrounding the project site in normal circumstances.

# 5.1 ACOUSTIC CRITERIA

Traffic noise will be assessed to the following criteria:

- Gosford Development Control Plan 2013.
- NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)'.
- NSW Department of Planning and Environment's document 'State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007'.
- Australian and New Zealand AS/NZS 2107:2016 'Recommended design sound levels and reverberation times for building interiors'.

#### 5.1.1 Gosford Development Control Plan 2013;

3.5.4.5 'Site Constraints' of Chapter 3.5: 'Residential Subdivision Section', in Gosford Development Control Plan 2013 states the following:

d. Provision for Noise Control

Where a street or road has projected traffic volumes in excess of 3000 vehicles/day, an acoustic study is required to demonstrate that traffic noise will not exceed 58dB(A) L10 measured at the building setback line. This study may require allotments to have greater depth than normally to accommodate a greater building setback distance. Where this situation applies the appropriate setback is to be incorporated as a restriction to user on the title.

If the development is to rely on the construction of acoustic barriers to reduce noise levels, these works must be completed as part of the subdivision works and detailed with the application.

The abovementioned noise controls are more likely to apply to Multi Dwelling Housing in residential subdivisions as opposed to Residential Flat Buildings on existing roads. Therefore, noise criteria in State Environmental Planning Policy (SEPP Infrastructure) 2007 will be adopted for residential use of the proposed development.

We note that the NSW Department of Planning and Environment *State Environmental Planning Policy* (*Infrastructure*) 2007 is applicable to residential development, but not for hotel accommodation. As such, the recommended design sound levels in the Australian Standard AS2107:2016 Recommended design sound levels and reverberation times for building interiors will be adopted for hotel accommodation, detailed below.

# 5.1.2 Australian and New Zealand AS/NZS 2107:2016 '*Recommended design sound levels and reverberation times for building interiors*'

The standard specifies allowable internal noise levels for internal spaces within buildings based on the building type and type of occupancy/activity.

As per Table 1 in Section 5 of AS2107-2016, recommended design sound levels applicable to the development are outlined in the table below.

# Table 3 – AS2107:2016 Recommended Design Sound Level

Building Type	Space /Activity Type	Recommended Design Sound Level <sup>1</sup>
Residential (Hotels and Motels	Sleeping Areas (Night Time)	35-40dB(A)L <sub>eq(9hr)</sub>
in inner city areas or entertainment districts or near major roads)	Living Areas (Day Time)	35-45dB(A)L <sub>eq(15hr)</sub>

# 5.1.3 NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)'

Section 3.5 of the NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)' states:

"The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.

- If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L<sub>Aeq</sub> levels are not exceeded:
  - in any bedroom in the building: 35dB(A) at any time 10pm-7am
  - anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."

# 5.1.4 State Environmental Planning Policy (SEPP Infrastructure) 2007

The road traffic noise intrusion criteria, as specified in the Infrastructure SEPP, additionally applies to this site as the development lies adjacent to a major roadway.

Clause 102 & Clause 87 of the SEPP states:

"This clause applies to development for any of the following purposes that is on land in or adjacent to, a rail corridor (Clause 87) <u>OR</u> a road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) (Clause 102) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

(a) a building for residential use,

If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following  $L_{Aeq}$  levels are not exceeded:

(a) in any bedroom in the building – 35 dB(A) at any time between 10 pm and 7am,

(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time."

Map 7 of the traffic volume maps for the Infrastructure SEPP on the RTA website classifies the Central Coast Highway A49 as a road with > 20,000 and < 40,000 AADT, hence a noise intrusion assessment is recommended.



Figure 2: Site location from SEPP Map

# 5.1.5 Summary of Noise Intrusion Criteria

This assessment for residential use of the proposed development shall be conducted in accordance with the most stringent criteria specified above. This is presented in Table 4 below:

# Table 4 – Summary of Noise Intrusion Criteria

Space /Activity Type	Maximum Design Sound Level	
Hotel Accommodation – Sleeping Areas	40dB(A)L <sub>eq(9hr)</sub>	
Hotel Accommodation – Living Areas	35-45dB(A)L <sub>eq(15hr)</sub>	
Residential - Sleeping Areas	35dB(A)L <sub>eq(9hr)</sub>	
Residential - Living Areas	40dB(A)L <sub>eq(15hr)</sub>	

#### 5.2 TRAFFIC NOISE MEASUREMENTS

Existing traffic noise levels impacting the site were determined by attended and unattended noise measurements. Site investigation indicated that traffic noise from Central Coast Highway A49 is the major noise source with regard to noise intrusion impacts on the proposed development.

#### 5.2.1 Unattended Noise Measurements

Unattended noise measurements were obtained using an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The noises monitor 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.

An unattended noise monitor was installed street level at location 4 (refer to figure 1), which is 15m away from the road kerb of Central Coast Highway A49. The noise monitor was on site from the 30<sup>th</sup> April 2020 to 11<sup>th</sup> May 2020. Refer to Appendix 1 for detailed noise monitoring results. Measured traffic noise levels are summarised below:

# Table 5 – Unattended Traffic Noise Measurement Levels

Location	Time of Day	Traffic Noise Level
Location 4 15m from road kerb of Central Coast	Day	63dB(A) L <sub>eq(15hr)</sub>
Highway A49; with 160 degrees of view on Central Coast Highway A49	Night	60dB(A) L <sub>eq(9hr)</sub>

# 5.2.2 Attended Noise Measurements

Attended noise measurements were conducted on site on 7<sup>th</sup> April 2020 between 4:00pm and 5:00pm. Measurements were conducted using a Norsonic 140 Type 1 sound analyser set on A-weighted fast response mode. Calibration of the meter was checked at the beginning and end of the measurement period, and no significant drift was noted. Attended traffic noise measurements are summarised below:

# **Table 6 – Attended Traffic Noise Measurement Levels**

Location	Traffic Noise Level L <sub>Aeq(15min)</sub>
Location 1	
2m from road kerb of Young Street;	54
with 180 degrees of view on Young Street	
Location 2	
15m from road kerb of Central Coast Highway A49;	65
with 160 degrees of view on Central Coast Highway A49	
Location 3	
2m from road kerb of Racecourse Road;	61
with 180 degrees of view on Racecourse Road	

#### 5.2.3 Resultant Traffic Noise Levels

The resultant traffic noise levels are listed in Table 7 below.

Location	Time of Day	Traffic Noise Level
LOCATION		L <sub>eq((9hr/15hr)</sub>
At the south façade of the	Day	61dB(A) L <sub>eq(15hr)</sub>
proposed development	Night	57dB(A) L <sub>eq(9hr)</sub>
At the west façade of the proposed development	Day	61dB(A) L <sub>eq(15hr)</sub>
	Night	57dB(A) L <sub>eq(9hr)</sub>
At the east façade of the	Day	54dB(A) L <sub>eq(15hr)</sub>
proposed development	Night	50dB(A) L <sub>eq(9hr)</sub>

# **Table 7 – Resultant Traffic Noise Levels**

#### 5.2.4 Discussion

The Central Coast Highway A49 named replaced M1 Pacific Motorway between Kariong and West Gosford. This means traffic volume changes in M1 Pacific Motorway indirectly reflected traffic volume changes in M1 Pacific Motorway due to Covid-19 control measures. AL has reviewed and referenced the survey of AADT (all days) for the last two years (2018 and 2019) and current AADT (2020) on M1 (refer to Traffic Volume Viewer - Roads and Maritime Services). This is summarised below.

	2018	2019	2020
Ť	40,567	39,291	34,158
↓ s	40,563	37,490	33,761
N ↓ S	81,130	76,781	67,919

Figure 3: AADT (all days) of M1 Pacific Motorway in 2018, 2019 and 2020

Predicted increase/decrease in traffic volume has been presented in Table 8 below:

Year	AADT (all days) Combined Northbound and Southbound Traffic	Decreased AADT (all days) 2020 vs. Recent years	% decrease 2020 vs. Recent years
2020 Vs. 2018	81130	13211	16%
2020 Vs. 2019	76781	8862	12%

A summary of predicted traffic noise levels based on increase/ decrease in traffic volume, have been presented in Table 9 below:

Location	Time of Day	Current Traffic Noise Level	Decrease in Noise Level From 2018 to 2020	Decrease in Noise Level From 2019 to 2020	Predicted Noise Level In 2018	Predicted Noise Level In 2019
At the south façade of the	Day	61dB(A) L <sub>eq(15hr)</sub>	0.8 dB(A)	0.6 dB(A)	61.8 L <sub>eq(15hr)</sub>	61.6 L <sub>eq(15hr)</sub>
proposed development	Night	57dB(A) L <sub>eq(9hr)</sub>	0.8 dB(A)	0.6 dB(A)	57.8 L <sub>eq(9hr)</sub>	57.6 L <sub>eq(9hr)</sub>
At the west façade of the	Day	61dB(A) L <sub>eq(15hr)</sub>	0.8 dB(A)	0.6 dB(A)	61.8 L <sub>eq(15hr)</sub>	61.6 L <sub>eq(15hr)</sub>
proposed development	Night	57dB(A) L <sub>eq(9hr)</sub>	0.8 dB(A)	0.6 dB(A)	57.8 L <sub>eq(9hr)</sub>	57.6 L <sub>eq(9hr)</sub>
At the east	Day	54dB(A) L <sub>eq(15hr)</sub>	0.8 dB(A)	0.6 dB(A)	54.8 L <sub>eq(15hr)</sub>	54.6 L <sub>eq(15hr)</sub>
proposed development	Night	50dB(A) L <sub>eq(9hr)</sub>	0.8 dB(A)	0.6 dB(A)	50.8 L <sub>eq(9hr)</sub>	50.6 L <sub>eq(9hr)</sub>

# **Table 9 – Predicted Traffic Noise Levels**

In light of the information above, we note:

- The current (2020) AADT (all days) has decreased by up to 16 per cent on the M1 Pacific Motorway (in comparison with AADT (all days) in the year of 2018 and 2019).
- The current traffic noise has decreased by up to 0.8dB(A). Therefore, the current AADT (all days) in 2020 will be increased by maximum 16 per cent in normal circumstances.
- This means future or post-pandemic traffic noise level will be increased by maximum 0.8dB(A) accordingly.

Considering the information above, this office will adopt an increase of 1dB(A) for all measured traffic noise levels presented above. The resultant façade noise levels are summarised in Table 10 below.

Location	Time of Day	Traffic Noise Level L <sub>eq((9hr/15hr)</sub>
At the south façade of the	Day	62dB(A) L <sub>eq(15hr)</sub>
proposed development	Night	58dB(A) L <sub>eq(9hr)</sub>
At the west façade of the proposed development At the east façade of the proposed development	Day	62dB(A) L <sub>eq(15hr)</sub>
	Night	58dB(A) L <sub>eq(9hr)</sub>
	Day	55dB(A) L <sub>eq(15hr)</sub>
	Night	51dB(A) L <sub>eq(9hr)</sub>

# Table 10 – Adjusted Traffic Noise Levels

# 5.3 COMPLYING CONSTRUCTIONS

Traffic noise intrusion into the residential use of the proposed development was assessed using the measured external noise levels reported above as a basis.

Calculations were performed taking into account the orientation of windows, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted.

Internal noise levels will primarily be as a result of noise transfer through the windows and doors as these are relatively light building elements that offer less resistance to the transmission of sound. Noise transfer through the masonry elements will not be significant and need not be considered further.

The constructions necessary to achieve the noise levels are detailed below. The predicted noise levels have been based on the expected level and spectral characteristics of the external noise, the area of building elements exposed to traffic noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

#### 5.3.1 Glazed Windows and Doors

The following constructions are recommended to comply with the traffic noise objectives stated in Section 5.1. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria listed below. Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

Glazing recommendations for residential and hotel use of the development are presented in Appendix 2 - Glazing Mark-up.

In addition to complying with the minimum scheduled glazing thickness, the R<sub>w</sub> rating of the glazing fitted into operable frames and fixed into the building opening should not be lower than the values listed in the table below.

Where nominated, this will require the use of acoustic seals equal to Schlegel Q-lon series The frame will need to be sealed into the building opening using a flexible 100% polyurethane sealant equal to Selly's Pro Series Flreblock. Note that mohair seals and/or mohair/plastic fin combination seals in windows and doors are not acceptable where acoustic seals are required.

It is recommended that only window systems have test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

# Table 11 – Minimum R<sub>w</sub> of Glazing Requirements

Glazing Assembly	Minimum R <sub>w</sub> of Installed Window	Acoustic Seals
6mm float	29	Yes
6.38mm laminated	31	Yes

#### 5.3.2 External Walls

The proposed concrete elements external wall construction will be acoustically acceptable and will not require any acoustic treatment. Any external wall systems constructed from lightweight elements should be reviewed at CC stage to determine suitable acoustic treatment.

There should not be vents on the internal skin of external walls. All penetrations in the internal skin of external walls should be acoustically sealed.

## 5.3.3 Roof/Ceiling

The proposed external roof of first floor is a concrete roofing construction, this will not require further acoustic upgrading to ensure compliance with project criteria.

#### 5.3.4 Ventilation requirements

With respect to natural ventilation of the dwelling, the NSW Department of Planning document "Development near Busy Roads and Rail Corridors - Interim Guideline" dictates that:

"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

Considering the above, we note:

- Habitables areas on the northern and eastern façade (residential apartment from level 5 to level 12) can achieve suitable internal noise levels with windows open.
- Windows to **habitable areas on all other facades** will not be capable of satisfying "windows open" internal noise levels, however these windows are still permitted to be operable. A mechanical engineer is to confirm if supplementary ventilation (to meet Australian Standard AS1668.2 requirements) will be required to these rooms.
- Any supplementary ventilation should also be designed to ensure that the acoustic performance of the façade is not compromised, and noise emissions to external receivers are satisfied in line with the requirements of Section 6.

# 6 NOISE EMISSION ASSESSMENT

Noise emissions from the site have been assessed for the following noise sources:

- Noise emissions from mechanical plant (in principle).
- Noise emissions from ground floor café.
- Noise from gym on Level 3.
- Noise from roof top communal spaces.
- Noise from carpark vehicles (Level 1 to Level 2); and
- Noise from loading dock.

#### 6.1 NOISE EMISSION CRITERIA

Noise emission assessment criteria for the project site have been developed with reference to the following documents:

- Gosford Development Control Plan 2013;
- NSW EPA Noise Policy for Industry (NPfI); and

## 6.1.1 Gosford Development Control Plan 2013

Gosford Development Control Plan 2013 does not contain any specific noise criteria. Therefore, the criteria nominated below will be adopted based on NSW EPA guidelines, which are typically referenced in standard Council conditions of consent.

### 6.1.2 NSW EPA Noise Policy for Industry (NPfl) 2017

The NPfI provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The NPfI has two requirements - an amenity criterion and an intrusiveness criterion. The intrusiveness criterion only applies to residential receivers.

### 6.1.2.1 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. The applicable intrusiveness trigger levels are presented in Table 13 below:

Receiver	Time of day	Background Noise Level dB(A)L <sub>90</sub>	Intrusiveness Criteria (Background + 5dB(A)L <sub>eq(15min)</sub> )
	Day	55	60
Residential	Evening	50	55
	Night	37	42
Commercial	When in use	N/A	N/A

# Table 12 – NPfl Intrusiveness Criteria

### 6.1.2.2 Amenity Criteria

The guideline is intended to limit the absolute noise level from all industrial noise sources to a level that is consistent with the general environment. The NPfI sets out acceptable noise levels for various localities. Table 2.2 on page 11 of the policy indicates 3 categories to distinguish different residential areas. They are rural, suburban and urban interface.

Table 14 below summarises the recommended amenity noise levels for urban residential receivers and other receivers near the subject site. 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.

Type of Receiver	Time of day	Recommended Acceptable Noise Level dB(A) L <sub>eq(period)</sub>
	Day (7am-6pm)	58
Residential – Suburban	Evening (6pm-10pm)	48
	Night (10pm-7am)	43
Commercial	When in Use	63

# Table 13 – NPfl Recommended Amenity Noise Levels

#### 6.1.2.3 Resultant Project Noise Emission Criteria

Based on the requirements stated in the sections above, table below provides a summary of the assessment criteria applicable to the future residential development at the project site. The assessment criteria are also based on the background noise monitoring data conducted at the proposed development location.

# Table 14 – Resultant Noise Emission Criteria

Location	Time Period	Assessment Background Noise Level dB(A)L90	Project Amenity Criteria dB(A) L <sub>eq</sub>	Intrusiveness Criteria Background + 5 dB(A) L <sub>eq(15min)</sub>	Resultant criteria
	Day	55	58	60	58
Nearby Residences	Evening	50	48	55	48
Residences	Night	37	43	42	42
Commercial	When in use	N/A	63	N/A	63

### 6.1.3 Sleep Arousal Criteria

The Noise Policy for Industry recommends the following noise limits to mitigate sleeping disturbance:"

*Where the subject development / premises night -time noise levels at a residential location exceed:* 

- *L<sub>Aeq,15min</sub>* 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- *L<sub>AFmax</sub> 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.*

a detailed maximum noise level even assessment should be undertaken."

# ReceiverRating Background Noise Level<br/>(Night)<br/>dB(A)L90Emergence LevelResidences Surrounding Site<br/>Night (10pm – 7am)37dB(A) L9042dB(A)Leq, 15min;<br/>52dB(A)LFmax

# Table 15 - Sleep Arousal Criteria for Residential Receivers

#### 6.2 MECHANICAL PLANT NOISE EMISSION

A detailed plant design and selection has not been undertaken at this stage. Therefore, a detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to levels complying with the noise emission criteria in Section 6.1.2.

The main source of external mechanical noise emissions will be plant that located within plant area on the open roof top. The noise criteria presented in Section 7.1.2 are achievable either through the use of quiet plant, the adoption of fan speed capacity control (as the evening and night time capacity requirements are typically significantly lower than the design day requirement), by installing mitigations such as acoustic louvres/in-duct lining or attenuators, or a combination of the above.

#### 6.3 NOISE EMISSION FROM THE ROOFTOP COMMUNAL SPACES

The proposed communal spaces are located as follows:

- Roof top communal space in level 5.
- Roof top communal space in level 13.

We note that no surrounding residential receivers overlook the proposed development. The inclusion of outdoor community spaces is seen as a desirable design outcome to enhance the amenity of apartment buildings. In this respect, use of the communal area could be compared to a typical residential backyard provided suitable management controls are adopted. In light of the above, the following general management controls are recommended:

- Building management is to ensure that the outdoor common area is not to be used for parties, such that normal vocal levels would be expected as opposed to raised voices.
- Music is not to be played in communal spaces.
- Use of any communal space is to be limited to 7:00am to 10:00pm.

#### 6.4 NOISE EMISSION FROM THE GROUND FLOOR CAFE

This office has been advised that as follows:

- The operating hours is 7am to 6pm, Monday to Sunday.
- No amplified music is to be played within the café.

In light of the above, the following general controls are recommended:

- Background music only within the cafe from speakers should be limited to 75dB(A) as a spatially averaged sound pressure level.
- Doors to the café should remain closed except for patron ingress/egress.
- Signs are to be displayed at the entrance to the cafe reminding patrons to minimise noise.
- Façade of the proposed cafe (Ground Level) to be constructed of 6.38mm laminated glazing (fixed glazing with Minimum R<sub>w</sub>31).

# 6.5 NOISE FROM LEVEL 3 GYM

The gym is expected to be used only by hotel occupants, as opposed to a commercially operated gym. Noise impacts to external receivers outside of the development will be minimal.

In light of the above, the following general controls are recommended:

- Music noise level within the gym from speakers should be limited to 80dB(A) as a spatially averaged sound pressure level.
- Signs are to be displayed at the entrance to the gym reminding patrons to minimise noise.
- Façade of the proposed gym (Ground Level) to be constructed of 6.38mm laminated glazing (fixed glazing with Minimum R<sub>w</sub>31).

Notwithstanding the above, acoustic treatment to gym flooring and equipment is to be determined at design stage once the use of the space is determined.

#### 6.6 NOISE EMISSION FROM LOADING DOCK

This office has been advised that operating hours of proposed loading dock is 7am to 6pm, Monday to Sunday.

Noise from the loading dock and its impact on the nearest residence – as follows:

- Receivers 5 (R5) Residential dwellings located from 11-13 Young Street, West Gosford, situated to the north-east of the site; and
- Receivers 7 (R7) Residential apartment located at Level 5 (Unit507) within the proposed development.

Noise emissions are assessed with reference to Section 7.12 of this report. Noise emissions from the loading dock are predicted on the following assumptions:

- That the dock is used by medium rigid vehicles, sound power up to 95dB(A).
- That the loading dock is used only between 7am and 6pm.
- That there is not forklift used for loading/unloading.
- That the engine is switched off during unloading. If there is a refrigeration compressor on the truck, the loading dock door must be closed during unloading.
- During a typical 15-minute period during daytime usage, we have assumed there would be up to:

 1 inbound and 1 outbound Medium Rigid Vehicle movements to the proposed loading dock at Ground Floor. (from 7am to 6pm)

Predicted noise levels are presented in Table 19 below:

# Table 16 - Loading Dock Noise Emission Assessment to R5 and R7

Receiver Location	Noise Source	Predicted Noise Level	Permitted Noise Level	Compliance
Receivers 5 (R5) - Southern façade of Residential Properties	Truck Engine	44dB(A)L <sub>eq(15min)</sub>	53dB(A)L <sub>eq(15min)</sub>	Complies
Receivers 7 (R7) - Balcony of Unit 507	Truck Engine	49 dB(A)L <sub>eq(15min)</sub>	53dB(A)L <sub>eq(15min)</sub>	Complies

## 6.6.1 Recommendations

The following building and management conditions are recommended as best practice to ensure that noise impacts from the operation of the proposed loading dock are minimised:

- Floor finish within development should be broom finish to avoid tyre squealing noise.
- Rubberised speedbumps (as opposed to metal) should be used to minimise noise.
- As much as possible, trucks should turn off engines when idling in the loading dock and not needed for on-board refrigeration or the like.
- Signage shall be placed on the walls of project site to remind operators to minimise noise at any time.

# 6.7 SLEEP AROUSAL ASSESSMENT (CARPARK)

Short duration, intermittent peak noise events are typically assessed for potential sleep disturbance. It is noted that the carpark in level 1 and level 2 of the proposed development is an open-air car park.

This assessment addresses vehicle noise within (level 1 and level 2) carpark spaces, associated with operating noise of door slamming/ car starting as the typical loudest instantaneous peak noise events which would be likely to occur during the night-time period.

In predicting vehicle noise emissions from vehicle movement within carpark spaces, assumptions have been made based on conservative estimates as follows:

- 16 total traffic generation per hour potential associated within (level 1 and level 2) carpark spaces.
- During a typical 15-minute period during daytime usage, we have assumed there would be up to 8 inbound/outbound vehicle movements within carpark;
- A sound power of 84dB(A) has been adopted for all car movements (at 10km/h); and
- The loudest typical peak noise event from a vehicle will be from a car door closing or a car starting, both with an approximate sound power level of approximately 95dB(A)L<sub>Fmax</sub>.

Noise Source	Receiver	Predicted Noise Level	Noise Limit (Sleep Disturbance)	Compliance
Vehicle movement noise	R6 - Residential apartment	<35dB(A)L <sub>eq, 15min</sub>	42dB(A)L <sub>eq, 15min</sub>	Yes
Door closing or a car starting	located at Level 5 (unit 503)	<50dB(A) L <sub>Fmax</sub>	52dB(A)L <sub>Fmax</sub>	Yes

# Table 17 - Sleep Arousal Assessment

Predicted noise levels indicate no exceedances of the NSW EPA sleep disturbance criteria will occur at the nearest residential balconies to the open air carparks.

# 7 CONSTRUCTION NOISE AND VIBRATION

# 7.1 NOISE MANAGEMENT

Noise management associated with construction noise for the project site will be developed with reference to the following documents:

- Gosford Development Control Plan 2013;
- Australian Standard 2436-2010 "Guide to Noise Control on Construction Maintenance and Demolition Site"; and
- EPA Interim Construction Noise Guideline.

## 7.1.1 Gosford Development Control Plan 2013

Gosford Development Control Plan 2013 does not contain any specific noise criteria/guideline. Therefore, the following criteria below will be adopted.

# 7.1.2 Australian Standard 2436-2010 "Guide to Noise Control on Construction Maintenance and Demolition Site"

The Australian Standard AS2436 states that where all reasonable and available measures have been taken to reduce construction noise, mitigation strategies may be put in place to reduce levels noise levels to within a reasonable and acceptable level.

For the control and regulation of noise from construction sites AS2436:1981 "Guide to noise control on construction, maintenance and demolition sites" nominates the following:

- a. That reasonable suitable noise criterion is established,
- b. That all practicable measures be taken on the building site to regulate noise emissions, including the siting of noisy static processes to locations of the site where they can be shielded, selecting less noisy processes, and if required regulating construction hours, and
- c. The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the construction site.

The guideline reflects on feasible and reasonable mitigation strategies, management controls and public liaising in the effort to reach realistic comprises between construction sites and potential noise affected receivers.

Based on these criteria the following procedure will be used to assess noise emissions:

- Predict and measure noise levels produced by typical construction activities at the sensitive receivers.
- Adopt management conditions as per AS2436 in the event of a non-compliance.

#### 7.1.3 EPA Interim Construction Noise Guideline

The EPA Interim Construction Noise Guideline assessment requires:

- Determination of noise emissions goals based on long term noise monitoring
- Review of operational noise levels at nearby development
- If necessary, recommendation of noise control strategies in the event that compliance with noise emission goals is not possible.

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences for construction during the recommended standard hours:

- "Noise Affected" level Where construction noise is predicted to exceed the "noise affected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the noise affected level. For residential properties, the noise affected level occurs when construction noise exceeds the rating background noise level by more than 10dB(A).
- *"Highly Noise Affected"* level Where noise emissions are such that nearby properties are "highly noise affected", noise controls such as respite periods should be considered. For residential properties, the highly noise affected level occurs when construction noise exceeds 75dB(A)L<sub>eq(15min)</sub> at nearby residences.

In addition to the above goals for residential receivers, the ICNG nominates a Management Level of 45dB(A)L<sub>eq(15min)</sub> internally for '*Places of Worship*'. Further, Section 4.1.2 '*Other sensitive land uses*' states that:

"A conservative estimate of the difference between internal and external noise levels is 10 dB for buildings other than residences. Some buildings may achieve greater performance, such as where windows are fixed (that is, cannot be opened)." Therefore, the Management Level of 'Place of Worship' shall be externally 55dB(A) L<sub>eq(15min)</sub>.

Moreover, section 4.1.3 Commercial and industrial premises of the ICNG states the following:

"Due to the broad range of sensitivities that commercial or industrial land can have to noise from construction, the process of defining management levels is separated into three categories. The external noise levels should be assessed at the most-affected occupied point of the premises: industrial premises: external  $L_{Aeq}$  (15 min) 75 dB(A)"

The project specific management levels determined using the ICNG are summarised in the Table 21 below:

# Table 18 - IGNG External Noise Management Levels

Receiver	Management Lev	els, dB(A) L <sub>eq(15min)</sub>	
Offices and Potail	70		
	External noise level		
Places of worship	45		
	Internal noise level		
	Noise Affected Level	Highly Noise Affected Level	
Residential	Background + 5	75	
	External noise level	External noise level	

It is noted that with the exception of the residential receivers, the remaining receivers (mostly commercial) are largely within air-conditioned buildings with fixed facades or facades that are normally closed. For these buildings the management levels can be based on the internal noise levels. The following table lists the applicable internal noise levels from AS 2107 which the IGNG indicates is a useful basis for determining appropriate construction noise management levels.

Receiver	Maximum Recommended Noise Levels, L <sub>eq(15min)</sub>
Offices	45
Retail (Specialty)	45
Retail (General)	50
Department Store (Main Floor)	55

# Table 19 - AS 2107 Maximum Recommended Noise Levels

It is generally accepted that construction noise (being of a temporary nature) may exceed the maximum recommended levels in AS 2107 (which are intended to apply to a permanent situation).

Accordingly, it is proposed that:

- The maximum noise levels in AS 2107 be used as a noise management level where reasonable and feasible measures should be employed when noise levels exceed these levels.
- After the application of reasonable and feasible measures, if noise levels exceed the AS 2107 maximum recommended levels by 10-15 dB(A), additional mitigation should be applied, for example appropriate respite periods.

In respect of Receivers 2(PoW2) – Gosford Presbyterian Church (Place of worship), it is appropriate that during hours of chapel that the noise level does not exceed the maximum noise level recommended in the Table 22. During hours of chapel, a noise management level of 45 dB(A) may be adopted. Outside of hours of chapel there is no requirement to limit noise levels.

# 7.2 VIBRATION CRITERIA

Vibration caused by any proposed activities on site, at any residence or structure outside the subject site, will be assessed against the following provisions:

- Gosford Development Control Plan 2013;
- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures; and*
- For human exposure to vibration, the evaluation criteria presented in NSW Environmental Protection Authority (EPA) "Assessing Vibration: A Technical Guideline" guideline.

The criteria and the application of these standards are discussed in separate sections below.

### 7.2.1 Gosford Development Control Plan 2013

Gosford Development Control Plan 2013 does not contain any specific construction vibration criteria/guideline. Therefore, the following criteria and the application of these standards below will be adopted.

# 7.2.2 Building Damage Criteria

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in table below.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

TYPE OF STRUCTURE		PEAK PARTICLE VELOCITY (mms <sup>-1</sup> )				
		At Fou	Plane of Floor of Uppermost Storey			
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies	
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15	
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8	

# Table 20 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

#### 7.2.3 Assessing Amenity (Human Comfort)

The NSW Environment Protection Authority's (EPA) publication "Assessing Vibration: A Technical Guideline" (Feb 2006), outlines vibration criteria to assess the effects on human exposure to vibration from industry, transportation and machinery. This will ensure the amenity of tenants within surrounding residential properties is not adversely impacted.

This document classifies vibrations in buildings into continuous (with magnitudes varying or remaining constant with time), impulsive (such as shocks) or intermittent (with the magnitude of each event being either constant or varying with time). Criteria stipulated in this publication is based on the type of vibrations generated by the source.

Criteria relevant to the proposed excavation and construction activities on site are detailed below.

		RMS acceleration (m/s <sup>2</sup> )		RMS velocity (mm/s)		Peak velocity (mm/s)		
Place	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum	
Continuous Vibration								
Residences		0.01	0.02	0.2	0.4	0.28	0.56	
Offices	Daytime	0.02	0.04	0.4	0.8	0.56	1.1	
Workshops		0.04	0.08	0.8	1.6	1.1	2.2	
Impulsive Vibration								
Residences		0.3	0.6	6.0	12.0	8.6	17.0	
Offices	Daytime	0.64	1.28	13.0	26.0	18.0	36.0	
Workshops		0.64	1.28	13.0	26.0	18.0	36.0	

# Table 21 – EPA Recommended Human Comfort Vibration Criteria

Note 1: Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g. continuous construction or maintenance activity. (DECC, 2006)

Note 2: Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g. occasional loading and unloading, or dropping of heavy equipment. (DECC, 2006)

# 7.3 EXISTING AMBIENT ENVIRONMENT AND CONSTRUCTION NOISE MANAGEMENT LEVELS

Management levels for other than residential receivers are provided in the table below.

# 7.3.1 External Background Noise Levels

The background noise levels measured by the unattended noise monitor will be used to determine appropriate management levels in accordance with the IGNG. IGNG indicated 'recommended standard hours' for normal construction work in Section 2.2 – as repeated":

- Monday to Friday 7 am to 6 pm
- Saturday 8 am to 1 pm
- No work on Sundays or public holidays"

Measured Background Noise Level during 'recommended standard hours' are summarised in the table below.

# Table 22 – Measured Background Noise Level

Time of Day	Measured Background Noise Level dB(A)L <sub>90</sub>
Daytime (7am – 6pm) Monday to Friday	55
Daytime (8am – 1pm) Saturday	53
No work on Sundays or public holidays	N/A

#### 7.3.2 Residential Construction Noise Management Levels

Residential construction noise management levels during 'recommended standard hours' in IGNG are presented in the table below.

Location	Day	Time zone	Rating Background Noise Level dB(A)L <sub>90(period)</sub>	Construction Noise Management Level* dB(A) L <sub>eq, 15min</sub>
Boundary of any surrounding	Monday to Friday	7am to 8am	55	65
affected (residential) receiver	Saturday	8am to 1pm	53	63

# **Table 23 – Construction Noise Management Level**

\* Highly noise affected management level of 75 dB(A) Leq, 15min.

Section 4.1 of IGNG also indicates that residential construction noise management levels during 'outside recommended standard hours' is "Noise affected RBL + 5 dB".

# 7.4 CONSTRUCTION VIBRATION OBJECTIVES

The vibration criteria at receivers' location are summarised in the table below to minimise building damage risk.

# Table 24 - Vibration Criteria

Location	Time	Vibration Criteria, mm/s PPV	
Residential	Anytime	Type 2 as per Table 23	
Commercial	Anytime	Type 1 as per Table 23	

The vibration levels in Section 8.2.2 should also be adopted as management levels that should be achieved where feasible and reasonable. It is noted that regenerated noise from vibration should me managed in accordance with the principles recommended to control noise levels generally.

#### 7.5 DISCUSSION

A preliminary evaluation of construction noise and vibration has been undertaken. A detailed assessment of construction noise and vibration cannot be undertaken at this stage given that detailed demolition, excavation and construction methodologies have not been determined. Consequently, a general assessment based on typical methodologies employed for similar developments will be undertaken.

It is noted that the existing site is currently using as an outdoor carpark. The highest level of noise and vibration impact will generally occur during the demolition/site establishment and excavation phases of the project. Once construction of the building commences, noise and (in particular) vibration levels will decrease.

During demolition and excavation, the highest noise and vibration levels are likely to be generated by excavator mounted hydraulic hammers (if applicable).

Additional safeguards should be employed to ensure vibration and noise levels do not exceed the desired management levels for PoW2 and R5 situated to the north of the site, because of the stringent requirements. Therefore, safe working distances for building damage risk mitigation, and for noise during performances should be established at the commencement of work phases.

Use of hydraulic hammers (depending on the size of hammer used) is likely to produce exceedances of the noise management levels and potentially the highly noise affected management levels. These items will likely require the imposition of respite periods to manage noise impacts. Typically, a respite period between 7 and 8am would be employed for hammering, as well as an additional hour during the day do provide respite to commercial receivers, as well as any respite to prevent impacts during chapel operating hours within Gosford Presbyterian Church.

As a minimum, vibration monitoring should be undertaken close to northern boundary of the site. During the demolition and excavation phases to ensure vibration levels do not exceed the established assessment objectives.

# 7.6 PRELIMINARY RECOMMENDATIONS TO CONTROL NOISE AND VIBRATION DURING CONSTRUCTION

The following recommendations are made with respect to construction noise and vibration control:

- A detailed construction noise and vibration management plan should be developed prior to works commencing on site. The plan should be developed in accordance with Section 7 of the IGNG. The Plan would include the identification of sensitive receivers and setting of appropriate management levels, predictions of noise and vibration impact for the proposed methodologies during the various phases or work, an analysis of feasible and reasonable mitigation and proposed methods and treatment, the need for additional respite, liaison and community consultation, response to complaints and exceedances, recommended noise and vibration monitoring, management practices and training, etc.
- As a minimum vibration monitoring (with monitors equipped with SMS remote alarm capabilities) should be employed at the R5 – residential dwellings and PoW2 - Gosford Presbyterian Church (Place of worship) during the demolition and excavation phases. In certain cases, it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.
- Respite between 7 and 8am should be applied to the use of hydraulic hammers and other plant causing exceedances of the residential and hotel highly noise affected management level. Other respite periods should be provided for activities causing audible noise within the PoW2 Gosford Presbyterian Church (Place of worship) during performances, and to ameliorate impacts to other receivers where noise levels exceed the management levels by more than 10-15 dB(A).

# 8 CONCLUSION

This report presents an acoustic assessment of potential noise impacts associated with the proposed mix-used development to be constructed at 10 Young Street, West Gosford. The following documents have been referenced in the assessment of noise and vibration impacts associated with the proposed development:

- Gosford Development Control Plan 2013;
- NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)';
- NSW Department of Planning and Environment's document 'State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007';
- Australian and New Zealand AS/NZS 2107:2016 'Recommended design sound levels and reverberation times for building interiors';
- NSW EPA Noise Policy for Industry (NPfl) 2017;
- EPA Interim Construction Noise Guideline (IGNG);
- Australian Standard 2436-2010 "Guide to Noise Control on Construction Maintenance and Demolition Site";
- German Standard DIN 4150-3 (1999-02);
- British Standard BS 7385 Part 2 1993; and
- Australian Standard AS 2670.2 1990.

Complying constructions for residential and hotel use of the proposed development has been presented in Section 5 and Appendix 2 of this report, based on internal noise criteria.

Noise emissions from proposed communal spaces, cafe, gym, loading dock have been assessed and acoustic treatments management controls recommended in Section 6 of this report. Sleep arousal assessment associated with vehicle noise within carpark facilities (level 1 and level 2) has also been conducted in Section 6 of this report.

Detailed acoustic control measures for the plant servicing the proposed development will be determined at CC stage.

Construction noise and vibration management levels have been determined for the various receiver types around the site to protect amenity. Preliminary recommendations have been made regarding noise and vibration controls and monitoring. The report recommends that a detailed construction noise and vibration management plan be developed prior to construction to regulate activity on the site and minimise impact.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd Artie Rattananikom

# **APPENDIX 1 – UNATTENDED NOISE MONITORING DATA**





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**APPENDIX 2 - GLAZING MARK-UP** 







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