

Gosford Library

## Development Application Acoustic Assessment

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Project ID	20200327.1
Document Title	Development Application Acoustic Assessment
Attention To	Central Coast Council

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	17/09/2020	20200327.1/1709A/R0/JM	JMzz		
1	23/09/2020	20200327.1/2309A/R1/JM	JMzz		TA
2	21/10/2020	20200327.1/2110A/R2/JM	RG		TA
3	27/07/2021	20200327.1/2707A/R3/JMZZ	AZ		VF

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## 1 INTRODUCTION

Acoustic Logic have been engaged to conduct an acoustic assessment of potential operational noise impacts associated with the proposed new Gosford Library to be constructed at 123A Donnison Street, Gosford.

Acoustic Logic have utilised the following documents and regulations in the assessment of noise emanating from the development:

- Gosford City Centre Development Control Plan (DCP) 2018; and
- NSW Environmental Protection Authority (EPA) document – ‘*Noise Policy for Industry (NPfI) 2017*’.

This assessment has been conducted using the architectural drawing set issued by Lahznimmo, dated 23<sup>rd</sup> July 2021, issued for DA.

## 2 SITE DESCRIPTION

The proposed new Library will serve as the Gosford Regional Library. The new building will be a four-storey construction containing offices, amenities, communal areas and a multi-use hall as well general library spaces.

The proposed operating hours for the library fall between 9:00am and 6:00pm Monday to Friday, excluding Thursday which is open until 8pm, and 10am to 2pm on Weekends. The multipurpose hall will be used during library hours as well as outside of these hours when specifically hired, where it is proposed it could remain open until 12am.

Onsite acoustic investigation has been carried out by this office regarding the surrounding acoustic environment around the proposed development.

The nearest noise receivers around the project site include:

### **Residential Receivers**

- RR1: Multistorey residential apartment building located 180m south of the project site at 127 Henry Parry Drive.

### **Non-Residential Receivers**

- NR1: Multistorey mixed use (ground floor retail and offices on upper levels) located immediately west of the project site, at 91 Mann St / 115 Donnison Street Gosford.
- NR2: Public Park / Courtyard located north of the project site across Donnison Street, at 124 Donnison St / 21 William Street, Gosford.
- NR3: Double storey office building located immediately east of the project, at 123-125 Donnison Street, Gosford.
- NR4: TAFE NSW Gosford located south of the project site over Henry Parry Drive, at 137-145 Henry Parry Drive, Gosford.

A site map and surrounding receivers are presented in figure 1 below.





**Figure 1 – Aerial View of Site & Receivers**  
(Sourced from Six Maps 2020)

- Project Site
- Residential Receiver
- Non-Residential Receiver



### 3 EXISTING ACOUSTIC ENVIRONMENT

Given the proposed new library is exclusively surrounded by non-residential receivers, with the closest residential receiver located 180-meters away, the minimum background noise levels as defined in NSW EPA Noise Policy for Industry (NPfI) will be assumed to determine noise levels criteria for the residential receivers.

It should also be noted that the Gosford Town Centre may be in transition, however, future developments in the area will be required to assess the surrounding acoustic environment, including this development, at the time of application.

#### 3.1 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-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  $L_{10}$ ,  $L_{90}$  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 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 NOISE EMISSION CRITERIA

A noise emission assessment has been carried out to ensure noise emitted from the use of the site is in accordance with the requirements listed below:

- Gosford City Centre Development Control Plan (DCP) - 2018
- NSW EPA Noise Policy for Industry (NPfI) - 2017

### 4.1 GOSFORD CITY CENTRE DEVELOPMENT CONTROL PLAN (DCP) 2018

The Gosford City Centre DCP does not have any specific noise emission criteria. Therefore, the NSW EPA *Noise Policy for Industry (NPfI) 2017* will be adopted. This will also satisfy the non-measurable objectives listed in section 8.7 of the Gosford City Centre DCP.

### 4.2 NSW EPA NOISE POLICY FOR INDUSTRY (NPFI) - 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 which both have to be complied with, namely an intrusiveness criterion and an amenity criterion.

#### 4.2.1 Intrusiveness Criterion

Given the proposed new library is exclusively surrounded by non-residential receivers, with the closest residential receiver located 180-meters away, the minimum background noise levels as defined in NSW EPA Noise Policy for Industry (NPfI) will be assumed to determine intrusive noise levels.

#### **Section 2.3: Project Intrusiveness Noise Level**

*"The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the  $L_{Aeq}$  descriptor), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.*

*Minimum assumed RBLs apply in this policy. These result in minimum intrusiveness noise levels as follows:"*

**Table 2.1: Minimum assumed RBLs and Project Intrusiveness noise levels.**

Time of Day	Minimum assumed rating background noise level (dB[A])	Minimum project intrusiveness noise levels ( $L_{Aeq,15min}$ dB[A])
Day	35	40
Evening	30	35
Night	30	35

#### 4.2.2 Amenity Criterion

##### **Section 2.4: Amenity Noise Levels and Project Amenity Noise Levels**

*"To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance.*

*The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location."*

Table 2.2 on page 11 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. The subject site has been assessed against noise emission criteria in accordance with the 'urban' category.

**Table 1 – NPfl Amenity Criteria**

Type of Receiver	Time of day	Recommended Acceptable Noise Level dB(A) $L_{eq}(15min)^{(1)}$
Residential (Urban)	Day (7:00am-6:00pm)	58
	Evening (6:00pm-10:00pm)	48
	Night (10:00pm-7:00am)	43
Place of Worship	When in Use	40 (Internally)
Education / Classrooms	When in Use	35 (Internally)
Active Recreation	When in Use	55
Passive Recreation	When in Use	50
Commercial	When in Use	63

<sup>(1)</sup> All noise levels are external noise levels unless stated otherwise.



#### 4.2.3 Noise Emission Objectives

The noise emission objectives to govern the project have been established from the intrusive and amenity criterion under the NPfl and are presented in the Table below. Noise emissions shall comply with the strictest of the two criteria.

**Table 2 – Summary of Noise Emission Criteria**

Type of Receiver	Time of day	Recommended Acceptable Noise Level dB(A) $L_{eq(15min)}^{(1)}$
Residential	Day (7:00am-6:00pm)	40
	Evening (6:00pm-10:00pm)	35
	Night (10:00pm-7:00am)	35
Place of Worship	When in Use	40 (Internally)
Education / Classrooms	When in Use	35 (Internally)
Active Recreation	When in Use	55
Passive Recreation	When in Use	50
Commercial	When in Use	63

### 4.3 CONSTRUCTION NOISE AND VIBRATION IMPACTS

#### 4.3.1 EPA Interim Construction Noise Guidelines

For residential development impacted by construction noise, EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- *"Noise affected" level.* Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than:
  - 10dB(A) $L_{eq(15min)}$  for work during standard construction hours (7am-6pm Monday to Friday and 8am to 1pm on Saturdays) and
  - 5dB(A) $L_{eq(15min)}$  for work outside of standard construction hours.
- *"Highly noise affected level".* Where noise emissions are such that nearby properties are "highly noise effected", noise controls such as respite periods should be considered. For residential properties, the "highly noise effected" level occurs when construction noise exceeds 75dB(A) $L_{eq(15min)}$  at nearby residences.

A summary of EPA recommended noise levels for both residential and other relevant land uses is presented below.

**Table 6 – Construction Noise Emission Goals**

<b>Location</b>	<b>“Noise Affected” Level - dB(A)<sub>Leq(15min)</sub></b>	<b>“Highly Noise Affected” Level - dB(A)<sub>Leq(15min)</sub></b>
Commercial Development	70	N/A

#### 4.3.2 Construction Vibration

##### 4.3.2.1 Building Damage - German Standard DIN 4150-3 (1999-02)

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 1.

**Table 7 - DIN 4150-3 (1999-02) Safe Limits for Building Vibration**

<b>CATEGORY</b>	<b>TYPE OF STRUCTURE</b>	<b>At Foundation at a Frequency of:</b>				<b>Plane of Floor of Uppermost Storey</b>
		<b>&lt; 10Hz</b>	<b>10Hz to 50Hz</b>	<b>50Hz to 100Hz</b>		<b>All Frequencies</b>
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

Based on the building types in the vicinity of the site, those buildings would be considered as Category 1 with respect to building damage sensitivity

#### 4.3.2.2 Amenity Impacts

Vibration goals for the amenity of nearby land users are those recommended by the EPA document *Assessing Vibration: A technical guideline*. These levels are presented below:

**Table 8 – Construction Vibration Goals**

Location	Time	Peak velocity (mm/s)	
		Preferred	Maximum
Continuous Vibration			
Commercial	When in use	0.56	1.1
Impulsive Vibration			
Commercial	When in use	18	26

## 5 NOISE EMISSION ASSESSMENT

### 5.1 CAR PARK & LOADING DOCK

The proposed library includes the provision of existing car park spaces located at the rear of the site at 123B-125A Donnison Street (Lot 11 DP 746819). As such, noise levels from use of these 20 vehicle spaces are expected to remain unchanged.

An internal loading dock is located on ground floor on the rear eastern corner of the development. The loading dock will be accessed via the car park located at the rear of the site. Access to this car park is via Henry Parry Drive and involves traveling through other car parks located at the rear of receiver NR3 and NR4 (an office building and place of worship).

The potential noise sources associated with the loading dock are listed in table 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.

Assessment has been based on rigid trucks up to 6m in length and the loading dock operation during day and evening only.

**Table 3 - Noise Source Emission Levels**

Noise Source	Sound Power Level dB(A)	Type of Noise Source
Truck Idle	99	Quasi-Steady
Trucks Manoeuvring	103	Intermittent
Truck reversing alarm	108 including 5 dB(A) tonality correction	Intermittent
Truck Air Brakes	114	Intermittent
Dock Leveller	88	Intermittent
Loading Dock Door Operation	85	Intermittent
Waste Truck compacting load	103	Quasi-Steady

See section 6 for recommendations to ensure loading dock operations are compliant with noise emission criteria outlined in section 4 of this report.

## 5.2 PATRON NOISE

The proposed development includes a number of locations patrons can gather/utilise. These areas are as follows:

- Multi-Use Hall
- Ground Floor external undercover landscape area called 'Neighbourhood Room'
- The external flexible break-out spaces on Levels 1 & 2
- A number of reading spaces, meeting rooms and the like all located internally.

The patron capacities include 300 persons for the multi-use hall and 925 persons for the building.

The areas in which patrons congregate which are internal spaces will have glazing to protect the acoustic amenity of the surrounding receivers. It is also proposed to have a large Multi-Use Hall on level 1 which is completely enclosed.

Level 1 and 2 covered external corridors will be used as breakout spaces. Patrons will be able to congregate in these areas, chatting, and background music may be desired on occasion. These breakout spaces overlook the Neighbourhood Room which will typically be used as an entry with no amplified music.

Events/markets may be held within the neighbourhood room on occasion. Any special events with amplified music would be subject to a separate application / case-by-case assessment.

See section 6 for recommendations to ensure development's operations are compliant with noise emission criteria outlined in section 4 of this report.

### 5.3 MECHANICAL PLANT NOISE

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services plant to the closest residential receiver should comply with the noise emission criteria in Section 4.

### 5.4 CONSTRUCTION NOISE AND VIBRATION

With respect to excavation or construction noise, the impacts on nearby development will be dependent on the activity in question and where on the site the activity is undertaken.

Use of bulk excavation equipment (hydraulic hammer, rock-saw) is the loudest activity likely to be associated with the proposed works.

#### 5.4.1 Construction Noise Predictions

Predictions of excavation and construction noise are based the following:

- Assumed sound power of equipment items are follows
  - Dozer - hydraulic hammer/saw attachment (rock excavation): 114dB(A).
  - Rock Ripper (rock excavation): 110dB(A).
  - Dozer – bucket attachment (soil excavation): 105dB(A).
  - Concrete vibrator/slab finishing equipment: 105dB(A).
  - Powered hand tools: 100dB(A)

In the table below, a range of noise levels is predicted, being the noise level predicted when working on the property boundary nearest the noise effected property (worst case scenario) to the noise level when working at the far end of the site.

**Table 11 – Excavation and Construction Noise Impact**

Location	Target Noise Level (as per table 2)	Activity	Predicted Noise Level
Closest Receiver (Commercial)	70dB(A) <sub>Leq</sub>	Hydraulic Hammer/Rock Saw Ripper Other equipment	90-81dB(A) <sub>Leq</sub> 75-64dB(A) <sub>Leq</sub> <78dB(A) <sub>Leq</sub>



#### 5.4.2 Construction Noise and Vibration - Discussion

With respect to the above, we note:

- For the nearest receivers to the site (commercial):
  - A high exceedance of the 70dB(A) Noise Affected Management Level is expected when using pneumatic hammers.
  - Use of percussive equipment (hydraulic hammers) is the primary vibration generating activity during the demolition process.
  - Given the proximity to nearby buildings and the likely exceedance of the Noise Management Level, EPA practice recommends that reasonable and feasible noise mitigation measures be investigated.
  - In this case, we recommend a construction noise and vibration management plan be undertaken in the construction phase once detailed demolition/construction methodology has been determined.

## 6 RECOMMENDATION

### 6.1 MINIMUM CONSTRUCTIONS

#### Glazing

- All glazing along the northern façade shall be fitted with minimum 6.38mm laminate glazing, with both glass and frame to achieve a minimum  $R_w$  rating of 31.
- The Multi-Use Hall glazing on the southern façade is to be fixed glazing only and is to be minimum 10.38mm laminate with both glass and frame to achieve  $R_w$  rating of 35.
- All remaining glazing can be fitted with 6mm thick glass.

#### Loading Dock

- The loading dock roller door is to be solid, not perforated, and the motor and tracks are to be vibration isolated from the building structure.

#### Balustrades

- Install a 1-meter high solid balustrade round all exposed sides of the top floor reading deck, level 1 and level 2 breakout corridors. The balustrade can be constructed from glass, Perspex, timber, metal sheet or masonry elements.

#### Multi-Use Hall

- All speakers installed within the Multi-Use Hall are to be vibration isolated from the building structure.
- The Multi-Use Hall glazing on the southern façade is to be fixed glazing only and is to be minimum 10.38mm laminate with both glass and frame to achieve  $R_w$  rating of 35.

### 6.2 MANAGEMENT CONTROLS

- The loading dock roller door is to be closed when the loading dock is in use.
- Trucks within the loading dock are to turn off the engines during loading.
- Conduct a detailed acoustic review of mechanical plant at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels (following final equipment selections)
- Any special events to be held within the Neighbourhood Room which incorporates moderate to high level amplified music will need to be reviewed on a case by case basis by council. Noise emissions from high level amplified music within this space will not feasibly be compliant with traditional noise emission criteria at receiver NR2 (the park across Donnison Street). However, due to the community benefit provided, the consent authority may grant temporary exceedances of noise criteria, as is typical for infrequent community events in public spaces.

## 7 CONCLUSION

This report presents an acoustic assessment of potential noise impacts associated with the proposed new Gosford Reginal Library.

This document addresses noise impacts associated with noise emissions from operation of the building (in principle).

Provided the recommendations outlined in section 6 of this report, noise emissions can comply with the following criteria:

- Gosford City Centre Development Control Plan (DCP) 2018.
- NSW Environmental Protection Authority (EPA) document – '*Noise Policy for Industry (NPfI) 2017*'.

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

Please contact us should you have any further queries.

Yours faithfully,



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