



# ACOUSTIC REPORT

## Noise and Vibration Impact Assessment – SSDA 72393459

Homes NSW

CONFIDENTIAL

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# 1 INTRODUCTION

This acoustic report has been prepared by NDY on behalf of Homes NSW for a State Significant Development Application (SSD-72393459) for construction of a residential flat building ranging in height between three and eight storeys with a total of 126 social and affordable housing apartments at 792-794 Botany Road and 33-37 Henry Kendal Crescent, Mascot.

The purpose of this acoustic report is to assess the potential noise and vibration environmental impacts that could arise from construction and operation the development and to address the Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 24 July 2024 which identified the specific assessment requirements outlined in Section 1.4.

## 1.1 THE SITE

The site is located at 792-794 Botany Road and 33-37 Henry Kendal Crescent, Mascot and is located within Bayside Local Government Area (LGA).

The site has a total site area of 4,904 square metres (sqm) and has three street frontages; Henry Kendal Crescent to the west, Coward Street to the south and Botany Road to the east.

The site comprises 25 social housing dwellings within five two storey brick buildings including three walkup apartments buildings and two town house style buildings which were constructed in the 1960s. There are number of mature street trees located along Botany Road, Coward Street and Henry Kendal Crescent. Refer to Figure 1.

The site is located opposite Mascot Memorial Park on Coward Street, a large public park which provides a range of passive and active recreation, including children's playground, formal gardens, and tennis courts.

The site is accessible by public transport (buses and trains) with frequent bus services that run along Botany Road. Mascot Train Station is also located within 850m of the site.



FIGURE 1: SITE LOCATION

## 1.2 PROPOSED DEVELOPMENT

The proposed development comprises demolition of existing buildings and construction of a residential flat building ranging in height between three and eight storeys to accommodate 126 social and affordable housing apartments, a communal room and on grade car parking including tree removal, associated landscaping and public domain works.

Refer to proposed Site Plan below.



FIGURE 2: SITE PLAN

This report shall not be relied upon as providing any warranty or guarantee of the building, its services or equipment.

### 1.3 AUTHORS

This report was prepared by Jim Wu, member of the Australian Acoustical Society (M.A.A.S) and Acoustical Society of New Zealand (M.A.S.N.Z). Quality assurance was carried out by Victoria Rastelli, member of the Acoustical Society of New Zealand (M.A.S.N.Z). NDY is a member organisation of the Association of Australasian Acoustical Consultants (A.A.A.C).

### 1.4 ACOUSTIC ASSESSMENT REQUIREMENT

The Secretary's Environmental Assessment Requirements (SEARs, app. Number SSD 72393459) for the project set out the following requirements with regards to the assessment of Noise and Vibration Impact within the residential development. The SEARs applicable for noise and vibration to this project are the below:

#### 12. Noise and Vibration

- Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.

The table below outlines the individual SEARs matters relevant to Noise and Vibration and where each of these requirements has been addressed in this report and the accompanying technical studies.

TABLE 1: SEARS NOISE AND VIBRATION REQUIREMENTS

ITEM	SEARS ISSUES AND ASSESSMENT REQUIREMENTS	SECTION/LOCATION
12	Provide a noise and vibration impact assessment:	
	<ul style="list-style-type: none"> <li>In accordance with the relevant NSW Environment Protection Authority (EPA) guidelines.</li> </ul>	Section 5
	<ul style="list-style-type: none"> <li>Construction noise and vibration</li> <li>Proposed management and mitigation measures</li> </ul>	Section 8
	<ul style="list-style-type: none"> <li>Operational noise and vibration</li> <li>Proposed management and mitigation measures</li> </ul>	Section 7

## 1.5 PURPOSE

The purpose of this report is to provide acoustic design input into the following areas:

- Baseline noise survey of the area
- Statement of environmental effect such as noise emissions to the boundary from onsite plant equipment
- Construction Noise and vibration assessment to the boundary
- Control of external noise intrusion and facade design
- Architectural acoustic considerations

## 1.6 AUTHORITY

Authority to undertake this report was provided by Andrew McConnell of Homes NSW.

## 1.7 INFORMATION SOURCES

The report is based upon the following information:

- NSW Noise Policy for Industry (NPfI) 2017
- NSW Interim Construction Noise Guideline (ICNG) 2009
- NSW Road Noise Policy (RNP) 2011
- NSW Government Department of Planning Development Near Rail Corridors and Busy Roads – Interim Guidelines (2008)
- NSW EPA Assessing Vibration: A Technical Guideline 2006
- State Environmental Planning Policy (Transport and Infrastructure) 2021
- Botany Council Development Control Plan 2013 part 4C amendment 9 and part 3J Development affecting operations at Sydney airport
- AS / NZS 2107:2016 Acoustics, Recommended design sound levels and reverberation times for building interiors
- NSW Department of Environment & Climate Change (DECC), Interim Construction Noise Guideline, 2009
- DEFRA 2005 Data base, including the existing construction noise database on BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration control on construction and open sites Part 1 Noise and Part 2 Vibration
- NSW Interim Construction Noise Guideline 2009
- German DIN 4150: Part 3 – 1999 “Effect of Vibration on Structure” (DIN 1999)
- Australian Standard AS 2670.2 1990 – Evaluation of Human Exposure to Whole Body Vibration – Part 2: Continuous and Shock Induced Vibration in Building (1 Hz to 80 Hz)
- British Standard BS 6472 – 2008 – Evaluation of Human Exposure Vibration in Buildings (1 Hz to 80 Hz)
- Building Services – Concept Spatial Sketches prepared by NDY, dated 18.07.2024
- Sydney Airport Australian Noise Exposure Forecast 2033, dated 03.12.2012
- Sydney Airport ANEF 2039
- Planning Secretary’s Environmental Assessment Requirements for application SSD 72393459, DATED 24.07.24
- Architectural drawings Issued for SSDA Issue revision A prepared by SJB Architects, dated 10.10.2024

- Building Services – Concept Spatial Sketches revision 3.0 prepared by NDY, dated 06.09.2024.
- AS2021:2015 Acoustics – Aircraft Noise Intrusion – Building Siting and Construction
- Operational Waste Management Plan, version HNSW\_MSC\_A2 prepared by Waste Audit & Consultancy Services, dated 27/09/24

## 2 PROJECT INFORMATION

The project involves the construction of residential units at 792-794 Botany Road and 33-37 Henry Kendall Crescent, Mascot, NSW 2020. The proposed development consists of a residential flat building ranging in height from 3 and 8 storeys, and a common ground level carpark which includes 57 parking spaces as well as other communal services and storages areas for the units.

### 2.1 SITE LOCATION AND DESCRIPTION

The proposed site at 792-794 Botany Road is located within a R4 – High Density Residential Zone. There are several different zones nearby, including:

- North: R2 – Low Density Residential and E1 – Local Centre
- East: E1 – Local Centre
- South: RE1 – Public Recreation
- West: R2 – Low Density Residential

Based on the Sydney Airport 2033 ANEF contours presented in the Sydney Airport Master Plan 2013, the site is located within the ANEF 20-25 contour of Sydney Airport. The approximate site location on the ANEF contours is presented in Figure 3:

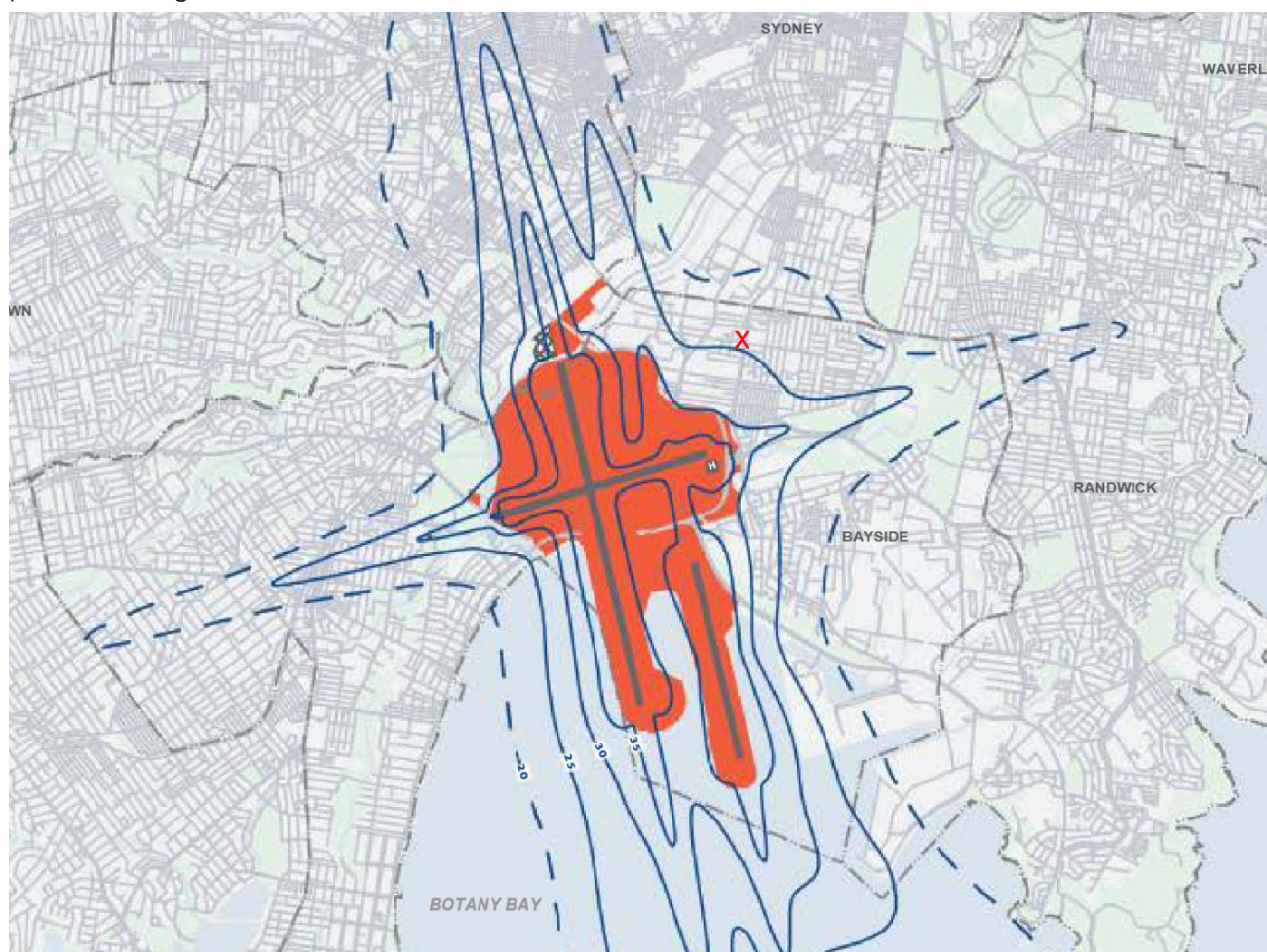


FIGURE 3: SYDNEY AIRPORT ANEF CONTOURS, WITH APPROXIMATE SITE LOCATION MARKED WITH A RED X

The approximate site location along with the surrounding zones can be seen in Figure 4.

The project involves the construction of a residential block ranging from 3 to 8 levels in height. The buildings all generally consist of residential units, however there is a communal outdoor space between the buildings on level 1. The ground level consists primarily of 57 car parking spaces (4 accessible) with some services plants

(switch room, fire sprinkler pump room and waste rooms) and storage areas.

Due to the residential use, the project is a sensitive development. Mechanical plant serving the buildings are understood to generally be located on the roof level (centralized hot water plant, ODU units, supply and exhaust fans in each building), and minor mechanical equipment such as supply and extract fans.

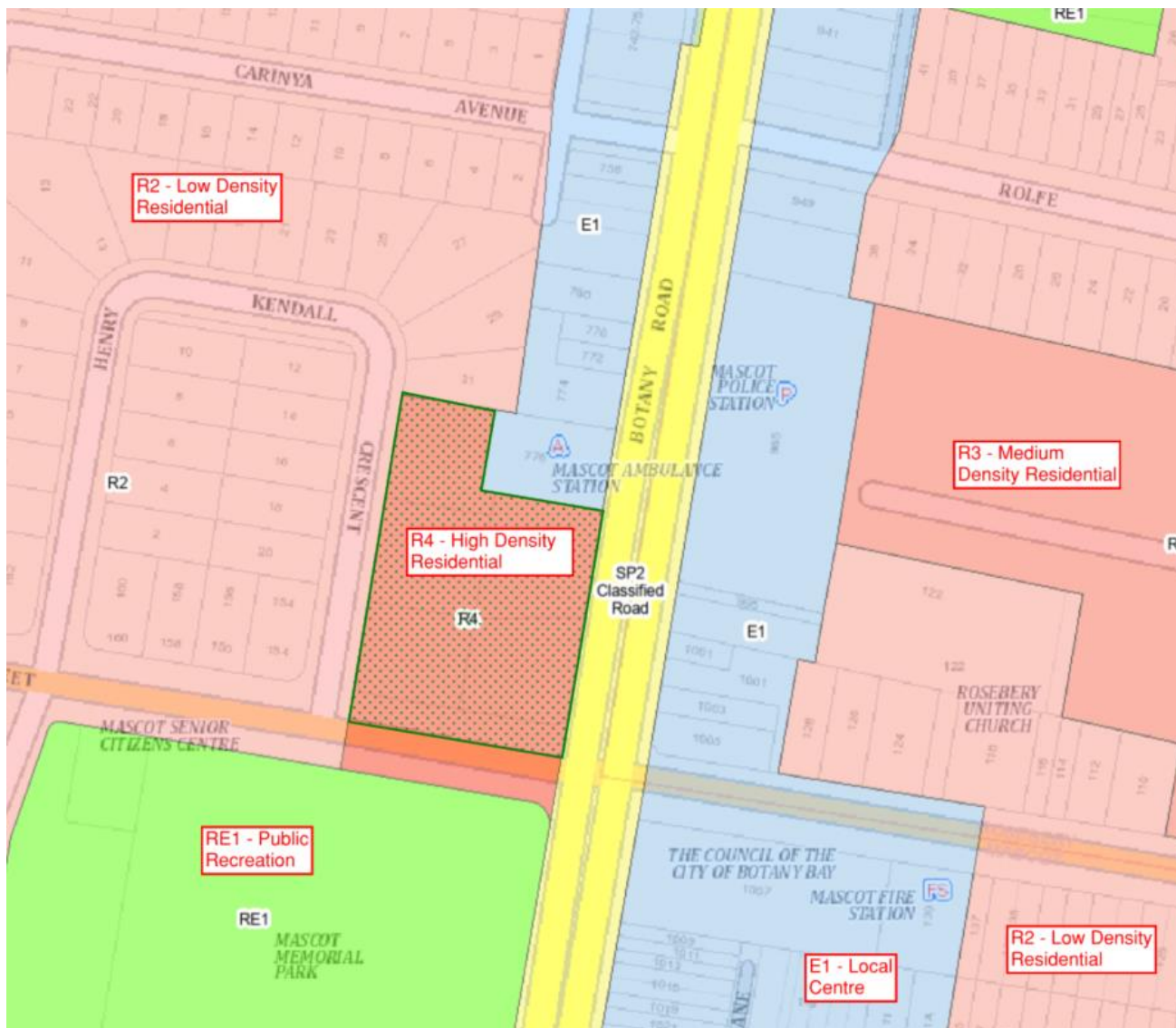


FIGURE 4: ZONING MAP SHOWING LOCATION OF SITE (IN GREEN) AND NEARBY ZONES

## 2.2 NEARBY RECEIVERS

The closest receivers to the site are located as per table below:

TABLE 2: NEARBY RECEIVERS

RECEIVER	DISTANCE (APPROXIMATE)	TYPE OF RECEIVER / ZONE
154 Coward Street	25m	Residential Properties

RECEIVER	DISTANCE (APPROXIMATE)	TYPE OF RECEIVER / ZONE
12, 14, 16, 17, 20 Henry Kendall Crescent	27m	Commercial
31 Henry Kendall Crescent	9m	
991 – 1005 Botany Road	30m	
776 Botany Road (Mascot Ambulance Station)	10m	

These receivers are all located adjacent to the site or across Henry Kendall Crescent.

### 3 METHODOLOGY

This report was prepared using the below methodology:

- Review of local zoning, council requirements for noise and vibration and NPfl amenity levels for the project type of zoning.
- Review the most affected receivers.
- Review of possible busy roads near the site and location of rail corridors or aircraft paths.
- Consultation with local plans and planner consultants to determine any particular additional planning requirements for noise and vibration.
- Site visits to conduct aircraft and traffic noise measurements taken on 10/07/2024 and 23/07/2024.
- Aircraft noise was assessed per the AS 2021 standard. An average noise level of 30 aircraft overpasses was used for the calculation.
- Considering the above elements in addition to noise monitoring conducted from 10/07/2024 to 23/07/2024 and noise amenity levels for the type of zoning according to the NPfl, determine project noise trigger levels.
- Selection of logger's location was based on:
  - Critical receivers
  - Location of the receivers
- To assess the operative noise and vibration sources, a comprehensive coordination was made with the mechanical, electrical and fire protection teams to understand their noise sources locations and operating times. Other consultants involved were included such as traffic and garbage collection.
- To assess the construction noise and vibration sources, coordination was done with the client, project manager to understand the approximate construction programme and phases.
  - Note that for construction noise assessment, the DA / SSSA Phase includes a preliminary estimation, using the information existing at the time, if predicted noise levels exceed 75 dBA, then it is necessary a detailed construction noise and vibration management plan be undertaken.

From the operational noise sources, as services and other facility specific plant have not been finalised yet, general noise estimations were conducted and noise control recommendations have been included in this report.

## 4 ACOUSTIC ASSESSMENT OF THE EXISTING ENVIRONMENT

An assessment of the existing acoustic environment at the proposed site location was carried out from 10/07/2024 to 23/07/2024. This included:

- A logger deployed for this period of 14 days at the proposed site
- Short-term handheld measurements taken on 10/07/2024 and 23/07/2024 to assess aircraft flyby noise and traffic noise from nearby roads.

The conditions and data collected during this time are presented in this section.

### 4.1 METEOROLOGICAL DATA

To verify that the noise data was obtained during suitable meteorological conditions, weather data such as rain and wind speed were obtained from the Weather Underground service, specifically station ISYDNE3492 as a representative site located approximately 1250m from the proposed site.

Noise data is excluded (as per the NSW NPfl methodology) from the results in case of:

- Rain observed during any 15-minute noise measurement period and/or;
- Wind speeds exceeded 5 m/s during any 15-minute noise measuring period (18 km/h).

The weather results are summarised in Table 3.

TABLE 3: SUMMARY OF METEOROLOGICAL HISTORY FOR LOGGING PERIOD

DATE	PRECIPITATION [MM]	MAXIMUM WINDSPEED [KM/H]
10/07/2024	0	9.7
11/07/2024	0	8.3
12/07/2024	0	12.6
13/07/2024	0	15.5
14/07/2024	0	13.7
15/07/2024	0	18
16/07/2024	0	18.7 <sup>1</sup>
17/07/2024	0	14.8
18/07/2024	0	21.2 <sup>2</sup>
19/07/2024	0	14.8
20/07/2024	0	26.3 <sup>3</sup>
21/07/2024	0	16.2
22/07/2024	0	9.4
23/07/2024	0	10.8

<sup>1</sup> Exceedances of 18km/h were a peak event and only occurred during daytime hours

<sup>2</sup> Exceedances of 18km/h were a peak event and only occurred during evening hours

<sup>3</sup> Exceedances of 18km/h were noted during daytime and evening hours, but not night time hours

## 4.2 INSTRUMENTATION

Noise levels were measured using noise loggers. Table 4 provides information relating to each noise loggers/sound level meter.

TABLE 4: NOISE LOGGER AND SOUND LEVEL METER INFORMATION

NOISE LOGGER/SOUND LEVEL METER	TYPE	SERIAL NUMBER	DATE OF LAST CALIBRATION
<b>Svantek SVAN 977</b>	Class 1	36172	21/03/2024
<b>B&amp;K Type 2270</b>	Class 1	2644676	05/12/2022

The equipment calibration was checked prior to, and after the noise survey using a 94 dB external calibration tone at 1 kHz.

The noise loggers were configured to record all relevant noise parameters including background noise ( $L_{A90}$ ) and equivalent continuous noise levels  $L_{Aeq}$ . Samples were recorded at 15-minute A-weighted continuous intervals. The noise monitor responses were set to fast response. The analysers are Class 1 and Class 2 compliant with AS IEC 61672.2-2004.

## 4.3 NOISE LOGGERS LOCATIONS

The Svantek SVAN 977 (S/N: 36172) was deployed as a long-term noise logger through the entire period of the measurement. This was deployed at the corner of Botany Road and Coward Street to capture the highest expected noise levels from the traffic from both roads. This is expected to represent a worst-case noise level to the most affected sensitive receivers.

The short-term noise measurements were taken at two locations along Botany Road and Coward Road. These locations were selected to determine the noise levels along the two roads.

Below is a layout of the noise logger and measurement location, which based on our assessment is appropriate in representing noise levels of sensitive receivers surrounding the site.

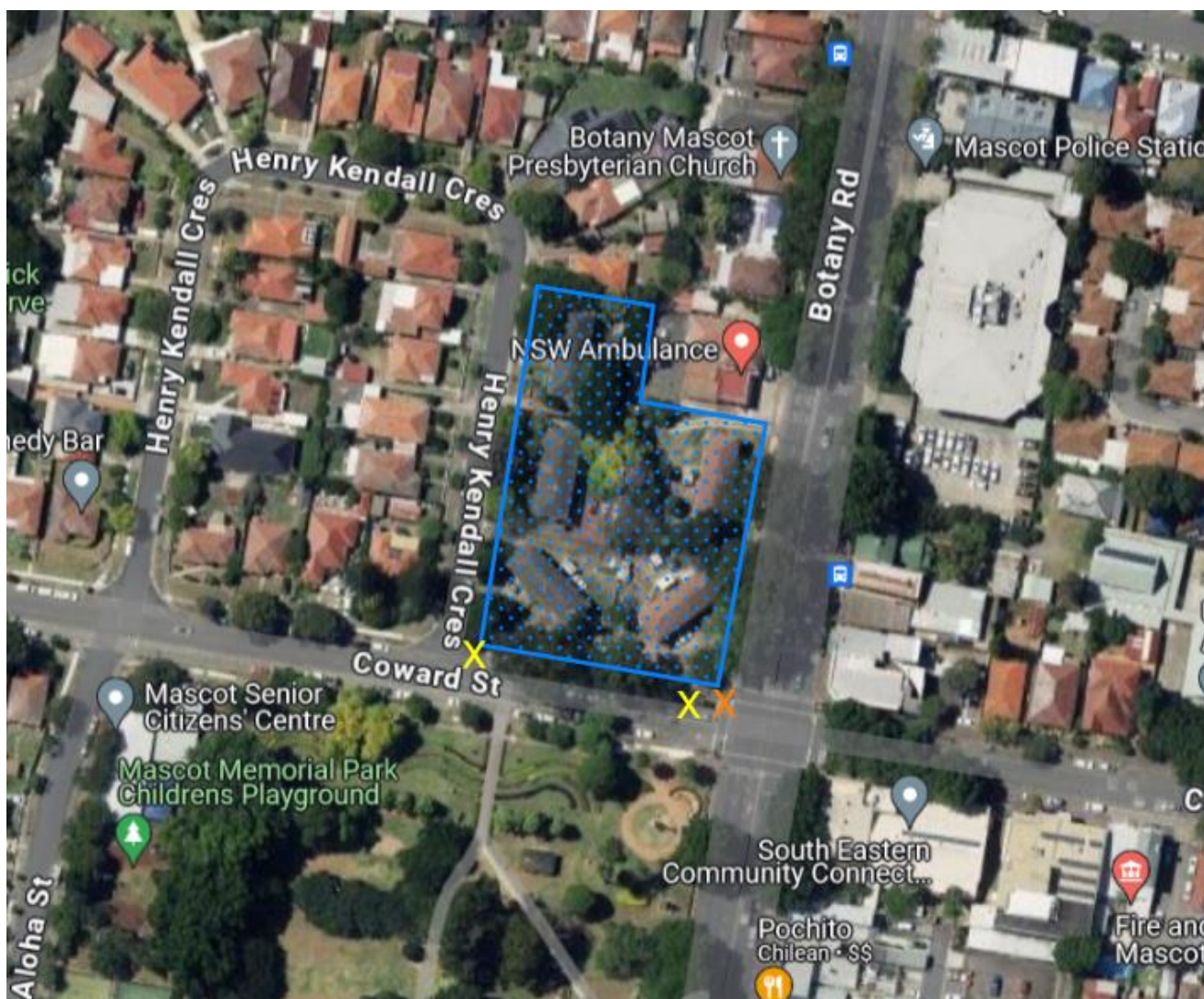


FIGURE 5: LOGGERS DEPLOYMENT AREAS, WITH APPROXIMATE LOCATIONS OF LONG TERM LOGGER (ORANGE) AND SHORT TERM MEASUREMENTS (YELLOW)

### 4.3.1 LONG TERM LOGGING RESULTS

The logger was deployed over 13 days at the corner of Botany Road and Coward Road. The results of this are summarised in Table 5.

TABLE 5: SUMMARY OF LOGGING RESULTS LA90

MEASUREMENT DATE	DAY (0700 - 1800) [DB LA90]	EVENING (1800 - 2200) [DB LA90]	NIGHT (2200 - 0700) [DB LA90]
<b>Wednesday 10 July, 2024</b>	-	-	68.7
<b>Thursday 11 July, 2024</b>	74.2	72.0	68.8
<b>Friday 12 July, 2024</b>	75.7	70.5	67.4
<b>Saturday 13 July, 2024</b>	71.6	74.3	67.0
<b>Sunday 14 July, 2024</b>	71.7	70.3	68.6
<b>Monday 15 July, 2024</b>	74.5	72.6	70.2

MEASUREMENT DATE	DAY (0700 - 1800) [DB L <sub>A90</sub> ]	EVENING (1800 - 2200) [DB L <sub>A90</sub> ]	NIGHT (2200 - 0700) [DB L <sub>A90</sub> ]
Tuesday 16 July, 2024	*	71.5	68.8
Wednesday 17 July, 2024	73.9	70.5	70.0
Thursday 18 July, 2024	73.4	*	70.8
Friday 19 July, 2024	74.7	72.7	67.7
Saturday 20 July, 2024	*	*	65.5
Sunday 21 July, 2024	71.9	71.1	69.1
Monday 22 July, 2024	73.7	71.1	69.1
<b>Period Average</b>	<b>73.7</b>	<b>71.8</b>	<b>68.8</b>

\*Periods where windspeeds exceeded 18km/h resulting in measurements during these periods being invalidated.

### 4.3.2 SHORT TERM NOISE MEASUREMENTS – TRAFFIC

Short-term measurements were taken with the B&K Type 2270 a short distance from the intersection to capture traffic noise at the corners between Coward Street and Botany Road, and Coward Street and Henry Kendall Crescent.

In addition to the long-term noise monitoring, short term measurements were conducted:

TABLE 6 – SHORT TERM NOISE MEASUREMENTS IN OCTAVE BANDS

LOCATION	SOUND PRESSURE LEVEL (dB) PER FREQUENCY BAND (HZ)								dBA
	63	125	250	500	1000	2000	4000	8000	
Corner of Botany Road and Coward Street	76	73	69	67	65	62	56	50	<b>70</b>
Corner of Henry Kendall Crescent and Botany Road	69	67	64	62	60	57	50	41	<b>65</b>

TABLE 7: EXISTING NOISE LEVELS (ATTENDED), DBA

SHORT TERM MONITORING LOCATION	DATE AND TIME	SHORT TERM ATTENDED MEASUREMENT	
		L <sub>Aeq</sub>	L <sub>90</sub>
Corner of Botany Road and Coward Street	10/07/2024 12:22pm	70	60
	10/07/2024 12:47pm	70	59
Corner of Henry Kendall Crescent and Botany Road	10/07/2024 1:08pm	65	53
	10/07/2024 1:24pm	64	54

### 4.3.3 SHORT TERM MEASUREMENTS – AIRCRAFT

Short-term measurements were taken with the B&K Type 2270 around the boundary of the proposed site to capture noise levels from aircraft flybys. Aircraft were tracked from Sydney Airport using the Flightradar24 app which provided information on the flight path and aircraft type. A total of 30 aircraft were measured over a

time period where aircraft noise was the dominant source of noise over the site (typically this was a 10-20 duration). A summary of the aircraft noise levels is presented in Table 8.

TABLE 8: SUMMARY OF NOISE LEVELS FROM AIRCRAFT MEASUREMENTS

AIRCRAFT	NOISE LEVEL [DB L <sub>ASMAX</sub> ]
Boeing 737-8FE	76
Boeing 737-8KG	80
Boeing 737-838	84
Boeing 737-838	79
Airbus A320-271N	77
Boeing 737 MAX 8	80
Boeing 737-838	82
Airbus A321-231	81
Boeing 737-838	83
Boeing 737-838	84
Boeing 737-8FE	81
Boeing 737-838	80
Boeing 737-8KG	78
Boeing 737-838	80
Boeing 737-838	79
Boeing 737-8FE	81
Airbus A320-232	79
Airbus A321-271NX	76
Boeing 737-8FE	76
Boeing 737-81D	83
Boeing 737-8EH	80
Boeing 717-2K9	74
Boeing 737-8FE	81
Boeing 737-838	83
Boeing 737-8FE	77
Boeing 737-838	80
Boeing 787-9 Dreamliner	80
Boeing 737-838	81
Boeing 737-8FE	77
Boeing 737-8FE	79

## 5 NOISE AND VIBRATION CRITERIA

### 5.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

SEARs noise and vibration criteria are presented in Section 1.4.

### 5.2 LOCAL CITY COUNCIL PLANNING CONTROLS

The site is located within an area which comes under the jurisdiction of the Bayside Council. The Bayside DCP 2022 (adopted and effective 2023) states the following aims:

*This Plan aims to make development control provisions for land in Bayside in accordance with Division 3.6 of the EP&A Act.*

*The particular aims and objectives of this Plan are as follows:*

- *To ensure development is economically, environmentally and socially sustainable;*
- *To protect and enhance the natural environment, in particular waterways and biodiversity;*
- *To ensure development respects desired existing and future local character as identified in this Plan;*
- *To ensure development is sited and designed, including through its density, height and bulk, that is appropriate to its context;*
- *To protect Aboriginal and European heritage items and heritage conservation areas;*
- *To ensure development achieves a high standard of design, and encourages design excellence, particularly in important and large-scale development;*
- *To provide an amount and choice of housing that caters for the needs of the Bayside community in appropriate locations, including focussing higher density development close to centres and public transport corridors;*
- *To promote the role of Bayside's centres and local hubs for vibrant cultural and economic activity, including surrounding communities;*
- *To retain and appropriately manage business, industrial and urban services land;*
- *To provide for an efficient and safe transport network that caters for all users, encourages more sustainable modes of transport such as public and active transport and supports the economic functioning of employment areas;*
- *To provide for an integrated, high amenity public open space network that caters for the needs of the Bayside community, including a diverse range of passive and active recreation uses;*
- *To ensure development respects and contributes to Bayside's distinct landscape and scenic features;*
- *To ensure development achieves high levels of amenity for occupants and adjoining properties, including through consideration of solar access, wind and visual and acoustic privacy;*
- *To reduce carbon emissions through improved management of energy, water and waste;*
- *To protect and grow the international trade gateways of Sydney (Kingsford Smith) Airport and Port Botany;*
- *To minimise land use conflict, particularly between residential and industrial land uses; and*
- *To ensure people and property are not exposed to unacceptable risk from urban or natural hazards.*

The Bayside DCP also sets noise limits and conditions on developments within the zone. These are presented in the sections below.

## 5.2.1 3.14 NOISE, WIND, VIBRATION AND AIR QUALITY

### 3.14.1 Noise and Vibration – General

Objective	Control
<p><b>O1.</b> Development:</p> <ul style="list-style-type: none"> <li>a. ensures appropriate noise and vibration attenuation measures are incorporated into building design and site layout</li> <li>b. ensures that any noise generated from the operation of the development is minimised and maintained at acceptable levels</li> <li>c. ensures that hours of operation are appropriate for the site and the interface between industrial/business park areas and residential areas</li> <li>d. avoids conflicts with existing and future land uses.</li> </ul> <p><b>Note:</b> Refer to Clause 6.8 of Bayside LEP 2021 for provisions relating to development in areas subject to aircraft noise.</p>	<p><b>C1.</b> The location of driveways, open space and recreation areas and ancillary facilities external to the development must be carefully planned to ensure minimal noise impact on adjoining residential properties.</p> <p><b>C2.</b> Where development is in a location that is exposed to high levels of external noise, an acoustic report that demonstrates compliance with these objectives and controls, must be prepared by a suitably qualified and experienced professional and be submitted as part of a development application.</p> <p>Locations exposed to high levels of external noise include sites subject to:</p> <ul style="list-style-type: none"> <li>• aircraft noise from Sydney Airport;</li> <li>• rail noise and road noise from main roads such as Princes Highway, Botany Road and The Grand Parade; or</li> <li>• adjoining land uses such as industrial, Port Botany port land and port related infrastructure (i.e. Port Botany Rail Line and Foreshore Road).</li> </ul> <p><b>Note:</b> this requirement is particularly relevant to sensitive uses such as child care centres, schools and nursing homes.</p> <p>Refer to the following sections for particular noise controls related to residential and non-residential development.</p> <p><b>C3.</b> Sources of noise such as garbage collection, deliveries, machinery, motors, parking areas and air conditioning plants are:</p> <ul style="list-style-type: none"> <li>a. to be sited away from adjoining properties;</li> <li>b. Generally to be located away from proposed residential units within the development, with details of attenuation and mitigation measures to be provided in the DA otherwise; and</li> </ul> <p>to be screened by walls or other acoustical treatments.</p>

**3.14.1 Acoustic Privacy – Residential**

Objective		Control	
<p><b>O1.</b></p> <p>Development:</p> <ul style="list-style-type: none"> <li>a. ensures appropriate noise and vibration attenuation measures are incorporated into building design and site layout;</li> <li>b. ensures that any noise generated from the operation of the development is minimised and maintained at acceptable levels;</li> <li>c. ensures that hours of operation are appropriate for the site and the interface between industrial/business park areas and residential areas; and</li> <li>d. avoids conflicts with existing and future land uses.</li> </ul>	<p><b>O2.</b></p> <p>To minimise the possibility of noise transmission to the occupants of adjoining or neighbouring properties.</p>	<p><b>C1.</b></p> <p>The location of driveways, open space and recreation areas and ancillary facilities external to the development must be carefully planned to ensure minimal noise impact on adjoining residential properties.</p> <p><b>C2.</b></p> <p>Bedrooms in a residential dwelling may share walls with living rooms of adjacent dwellings provided appropriate acoustic measures are considered for the proposed development and submitted to Council with the application.</p> <p><b>C3.</b></p> <p>Where party walls are provided, they must be carried to the underside of the roof.</p> <p><b>C4.</b></p> <p>All residential development (except dwelling houses) is to be insulated and to have an Impact Isolation between floors to achieve an Acoustical Star Rating in accordance with the standards prescribed by the Association of Australian Acoustical Consultants (AAAC) with a minimum:</p> <ul style="list-style-type: none"> <li>a. 3 Star for tiled areas within kitchens, balconies, bathrooms and laundries. Tiled areas within corridors, living areas and bedrooms is not permitted except at lowest habitable residential level;</li> <li>b. 4 star for timber flooring in any area; and</li> <li>c. 5 star for carpet in any area.</li> </ul> <p><b>C5.</b></p> <p>An Acoustic Report demonstrating compliance with relevant acoustic standards is to be submitted as part of a development application for new residential developments in locations that are exposed to high levels of external noise, including (but not limited to):</p> <ul style="list-style-type: none"> <li>a. Aircraft noise from Sydney Airport;</li> <li>b. Road noise from main roads such as Princes Highway, Botany Road and The Grand Parade; or</li> <li>c. Adjoining land uses such as industrial, Port Botany port land and port related infrastructure (i.e. Port Botany Rail Line and Foreshore Road).</li> </ul> <p>The Acoustic Report must be prepared by a suitably qualified acoustic consultant and also demonstrate the proposal's compliance with relevant controls and standards within state planning policies and NSW EPA guidelines (e.g. EPA Noise Policy for Industry 2017).</p> <p><b>C6.</b></p> <p>Residential development in or adjacent to a rail corridor is to:</p> <ul style="list-style-type: none"> <li>a. consider the impacts of associated rail noise or vibration on the structure and</li> </ul>	

Objective		Control	
			<p>users of the development</p> <p><b>b.</b> demonstrate its consistency with Division 15, Subdivision 2 of State Environmental Planning Policy (Transport and Infrastructure) 2021.</p> <p><b>C7.</b> Residential development in or adjacent to a road corridor of a freeway, a toll way, a transit way or any other road with an annual average daily traffic volume of more than 20,000 vehicles is to:</p> <p><b>a.</b> consider the impacts of associated road noise or vibration on the structure and users of the development</p> <p><b>b.</b> demonstrate its consistency with Division 17, Subdivision 2 of State Environmental Planning Policy (Transport and Infrastructure) 2021.</p> <p><b>C8.</b> For residential developments adjacent to classified roads, developers are to address the requirements of the Environmental Protection Authority's Criteria for Road Traffic Noise in relation to noise attenuation measures as part of an acoustic report to be submitted with the application.</p> <p><b>Note:</b> refer to <a href="http://www.epa.nsw.gov.au/noise/traffic.htm">http://www.epa.nsw.gov.au/noise/traffic.htm</a></p> <p><b>C9.</b> Buildings that are exposed to high levels of external noise are designed and constructed in accordance with AS3671 – Acoustics – Road Traffic Noise Intrusion, AS2107 – Recommended Design Sound Levels and Reverberation Times for Building Interiors, and AS 2021-2000 – Acoustics- Aircraft noise intrusion – Building siting and construction.</p> <p><b>C10.</b> New residential development, within proximity to Port Botany port land and, port related infrastructure (i.e. Port Botany Rail Line and Foreshore Road) and land zoned for industrial uses (irrespective of current use of the land), is to take noise attenuation for building interiors into consideration.</p> <p><b>C11.</b> For attached dwellings and multi-unit development, the internal layout should position circulation spaces and non-habitable rooms adjacent to party walls.</p> <p><b>C12.</b> Sources of noise such as garbage collection, deliveries, machinery, motors, parking areas and air conditioning plants are:</p> <p><b>a.</b> to be sited away from adjoining properties</p> <p><b>b.</b> not to be located immediately</p>

Objective		Control	
			<p>adjacent to a proposed residential units within the development</p> <p>c. to be screened by walls or other acoustical treatment.</p>

In addition to the above, the Bayside LEP 2021 also outlines the following:

### 6.8 Development in areas subject to aircraft noise

(1) The objectives of this clause are as follows—

- (a) to prevent certain noise sensitive developments from being located near the Sydney (Kingsford-Smith) Airport and its flight paths,
- (b) to assist in minimising the impact of aircraft noise from the airport and its flight paths by requiring appropriate noise attenuation measures in noise sensitive buildings,
- (c) to ensure that development in the vicinity of that airport does not hinder or have any other adverse impact on the ongoing, safe and efficient operation of the airport.

(2) This clause applies to development—

- (a) on land—
  - (i) near the Sydney (Kingsford-Smith) Airport, and
  - (ii) in an ANEF contour of 20 or greater, and
- (b) the consent authority considers is likely to be adversely affected by aircraft noise.

(3) In deciding whether to grant development consent to development to which this clause applies, the consent authority—

- (a) must consider whether the development will result in an increase in the number of dwellings or people affected by aircraft noise, and
- (b) must consider the location of the development in relation to the criteria set out in Table 2.1 (Building Site Acceptability Based on ANEF Zones) in AS 2021—2015, and
- (c) must be satisfied the development will meet the indoor design sound levels shown in Table 3.3 (Indoor Design Sound Levels for Determination of Aircraft Noise Reduction) in AS 2021:2015 for development for the following purposes—
  - (i) for development proposed to be located in an ANEF contour of 20 or greater—child care centres, educational establishments, entertainment facilities, hospitals, places of public worship, public administration buildings or residential accommodation,
  - (ii) for development proposed to be located in an ANEF contour of 25 or greater—business premises, hostels, hotel or motel accommodation, office premises or retail premises.

(4) In this clause—

**ANEF contour** means a noise exposure contour shown as an ANEF contour on the Noise Exposure Forecast Contour Map for the Sydney (Kingsford-Smith) Airport prepared by the Department of the Commonwealth responsible for airports.

**AS 2021:2015** means AS 2021:2015, Acoustics—Aircraft noise intrusion—Building siting and construction.

## 5.3 NSW DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS

These guidelines support specific rail and road provisions of the State Environmental Planning Policy (Infrastructure) SEPP Clauses 85, 86, 87, 102 and 103 and section 3.5.2 for rail and busy roads. The site does not feature rail corridors nearby, but Botany Road is expected to be considered a busy road. As a result, the following apply:

### 2.120 Impact of road noise or vibration on non-road development

(1) This section applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of TfNSW) and that the consent authority considers is likely to be adversely affected by road noise or vibration—

- (a) residential accommodation,
- (b) a place of public worship,
- (c) a hospital,
- (d) an educational establishment or centre-based child care facility.

(2) Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.

(3) If the development is for the purposes of residential accommodation, 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 LAeq levels are not exceeded—

- (a) in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,
- (b) anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.

(3A) Subsection (3) does not apply to a building to which State Environmental Planning Policy (Housing) 2021, Chapter 3, Part 7 applies.

(4) In this section, freeway, tollway and transitway have the same meanings as they have in the Roads Act 1993.

## 5.4 NSW NOISE POLICY FOR INDUSTRY (NPFI) 2017

For the purpose of the assessment, the measured noise data was processed into the following time periods:

- Daytime: 0700 to 1800 hrs.
- Evening: 1800 to 2200 hrs.
- Night-time: 2200 to 0700 hrs.

The measured background (LA90) and equivalent continuous (LAeq) noise levels during these defined time periods. The LA90 noise levels presented are *Rating Background Levels (RBLs)*, being the median of the background LA90 (i.e. of the lowest 10<sup>th</sup> percentile of samples) in each daytime, evening and night-time measurement period, for each 24-hour period during the noise survey.

The LAeq noise levels presented are the logarithmic average of all the LAeq samples taken in each of the daytime, evening and night-time periods.

TABLE 9: AMENITY NOISE LEVELS FOR NOISE LOGGERS, DBA

LOCATION	NOISE INDEX	NOISE LEVEL, DB RE 20 µPA		
		Daytime 0700 to 1800	Evening 1800 to 2200	Night - time 2200 to 0700
Logger 1	LA90 (RBL)	62	59	53
	LAeq,period	74	72	69

### 5.4.1 AMENITY AND INTRUSIVENESS CRITERIA

The NSW NPFI provides assessment methodologies, criteria and detailed information on the assessment of environmental noise emissions in NSW. The NSW NPFI criteria for noise sources consider two (2) components:

- Controlling intrusive noise impacts for residential receivers. Assessing intrusiveness generally requires noise measurements to quantify background (LA90) noise levels at a location considered representative of the

most potentially affected residential receiver(s). The intrusiveness criterion essentially means that the equivalent continuous noise level (L<sub>Aeq</sub>) of the source(s) under consideration should be controlled to not exceed background noise levels by more than 5 dB(A).

- Maintaining noise amenity for various categories of land use (including residential receivers and other sensitive receivers). The amenity criterion is based on the sensitivity of a particular land use to industrial-type noise. The recommended amenity noise levels detailed in Table 2.2 of NSW NPfI 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. This is to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area. The project amenity criteria for each new source of industrial noise is equalled to recommended amenity noise level minus 5dB(A).
- A +3dB(A) to be added to project amenity noise level for conversion from a period level to a 15-minutes level. Where the resultant project amenity noise level is 10dB or more below the existing industrial noise level, the project amenity noise levels can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.

TABLE 10: PROJECT SPECIFIC NSW NPFI AMENITY CRITERIA / TAKEN FROM TABLE 2.2 NPFI

TYPE OF RECEIVER	NOISE AMENITY AREA	TIME OF DAY	L <sub>AEQ</sub> DB(A)	AMENITY CRITERIA L <sub>AEQ</sub> DB(A) – 5 DB + 3 DB
<b>Residence</b>	Urban	Day 7:00 to 18:00	60	58
		Evening 18:00 to 22:00	50	48
		Night 22:00 to 7:00	45	43
<b>Commercial premises</b>	All	When in use	65	63
<b>Active recreation area</b>	All	When in use	55	53

The NSW NPfI characterise the above areas as per the below description:

Receiver category	Typical planning zoning – standard instrument*	Typical existing background noise levels	Description
Suburban residential	RU5 – village RU6 – transition	Daytime RBL<45 dB(A) Evening RBL<40 dB(A)	<b>Suburban</b> – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the

	R2 – low density residential R3 – medium density residential E2 – environmental conservation E3 – environmental management	Night RBL <35dB(A)	following characteristic: evening ambient noise levels defined by the natural environment and human activity.
Urban residential	R1 – general residential R4 – high density residential B1 – neighbourhood centre (boarding houses and shop-top housing) B2 – local centre (boarding houses) B4 – mixed use	Daytime RBL > 45 dB(A) Evening RBL > 40 dB(A) Night RBL >35 dB(A)	<b>Urban</b> – an area with an acoustical environment that: <ul style="list-style-type: none"> <li>• is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources</li> <li>• has through-traffic with characteristically heavy and continuous traffic flows during peak periods</li> <li>• is near commercial districts or industrial districts</li> <li>• has any combination of the above.</li> </ul>

FIGURE 6: NPFI EXTRACT – TABLE 2.3 DETERMINING WHICH OF THE RESIDENTIAL RECEIVER CATEGORIES APPLIES

We believe the Urban residential area description above is the one more suitable for our project location, considering the commercial properties located nearby, the through traffic and the existing background noise levels from both aircraft and traffic.

The NPFI recommends “Intrusive noise levels are only applied to residential receivers (residences)”. For other receiver types identified in Table 2.2, only the amenity levels apply. The project amenity and intrusive noise levels are listed below.

TABLE 11: PROJECT INTRUSIVENESS AND AMENITY NOISE CRITERIA AT RESIDENTIAL RECEIVERS

NOISE LEVEL, $L_{EQ, 15MIN}$ [DBA]		
Daytime 0700 to 1800	Evening 1800 to 2200	Night - time 2200 to 0700
<b>Project Amenity Assessment, <math>L_{Aeq, 15min}</math></b>		
64	62	59
<b>Project Intrusiveness Assessment, <math>L_{Aeq, 15min}</math></b>		
67	64	53

### 5.4.2 DETERMINATION OF PROJECT SPECIFIC NOISE TRIGGER LEVEL (PNTL)

The project Noise trigger noise levels (PNTL) are the most stringent noise levels of the NSW NPFI project intrusiveness and project amenity noise levels for day, evening and night-time periods and are project specific, as shown below:

TABLE 12: EXTERNAL PROJECT NOISE TRIGGER LEVEL (PNTL) FOR OPERATION NOISE

TIME	DESCRIPTOR	EXTERNAL PNTL [DBA]
<b>Daytime 0700 to 1800</b>	$L_{Aeq, Day}$	64
<b>Evening 1800 to 2200</b>	$L_{Aeq, Evening}$	62
<b>Night 2200 to 0700</b>	$L_{Aeq, Night}$	53

### 5.4.3 MODIFYING FACTOR' ADJUSTMENTS

Penalties may be applied if the noise from the development "... contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level."

To take into account the potential annoying character of the noise an adjustment of +2dB(A) or +5 dB(A) for each annoying character aspect and cumulative of up to a total of 10 dB(A), may be added to the measured value to penalise the noise for its potential greater annoyance aspect.

Table C1 of the NSW NPfI provides procedures for determining whether an adjustment should be applied for greater annoyance aspect.

### 5.4.4 SLEEP DISTURBANCE NOISE LIMITS

In accordance with NSW NPfI 2017, the potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is both awakenings and disturbance to sleep stages.

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

- $L_{Aeq,15min}$  40dB(A) or the prevailing RBL plus 5dB, whichever is the greater, and/or
- $L_{AFmax}$  52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

*a detailed maximum noise level event assessment should be undertaken."*

TABLE 13: SLEEP DISTURBANCE NOISE LIMITS

LOCATION	DESCRIPTOR	GIVEN NOISE LIMITS [DBA]	LIMITS BASED ON RBL [DBA]	SLEEP DISTURBANCE NOISE LIMITS [DBA]
<b>Residential Receivers</b>	$L_{eq,15mins, night}$	40	53	53
	$L_{Fmax, night}$	52	63	63

## 5.5 EPA NSW ROAD NOISE POLICY (RNP) 2011

Noise from the vehicles associated with the development will be assessed using NSW Road Noise Policy. presents the noise assessment criteria for the land use developments with potential to create additional traffic on existing local roads.

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 a.m.–10 p.m.)	Night (10 p.m.–7 a.m.)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from <b>new</b> freeway/arterial/sub-arterial road corridors	L <sub>Aeq</sub> , (15 hour) 55 (external)	L <sub>Aeq</sub> , (9 hour) 50 (external)
	2. Existing residences affected by noise from <b>redevelopment</b> of existing freeway/arterial/sub-arterial roads	L <sub>Aeq</sub> , (15 hour) 60 (external)	L <sub>Aeq</sub> , (9 hour) 55 (external)
	3. Existing residences affected by <b>additional traffic</b> on existing freeways/arterial/sub-arterial roads generated by land use developments		
Local roads	4. Existing residences affected by noise from <b>new</b> local road corridors	L <sub>Aeq</sub> , (1 hour) 55 (external)	L <sub>Aeq</sub> , (1 hour) 50 (external)
	5. Existing residences affected by noise from <b>redevelopment</b> of existing local roads		
	6. Existing residences affected by <b>additional traffic</b> on existing local roads generated by land use developments		

FIGURE 7: RNP TABLE 4 EXTRACT – NOISE ASSESSMENT CRITERIA FOR RESIDENTIAL LAND USES AFFECTED BY PROPOSED ROAD PROJECTS AND TRAFFIC GENERATING DEVELOPMENTS

## 5.6 SUMMARY OF OPERATIONAL NOISE CRITERIA

TABLE 14: SUMMARY OF NOISE CRITERIA

REGULATION	CRITERIA
<b>SEARS Requirements</b>	<ul style="list-style-type: none"> <li>In accordance with EPA guidelines.</li> </ul>
<b>Council LEP / DCP</b>	<ul style="list-style-type: none"> <li>&lt; 40 dB(A) L<sub>Aeq</sub> with closed windows and doors (for traffic)</li> <li>50 dB(A) L<sub>Smax</sub> in Sleeping areas, dedicated lounges (AS 2021:2015 criteria for aircraft noise intrusion)/ this would be the main lead criteria</li> </ul>
<b>EPA NSW Road Noise Policy (RNP) 2011</b>	Residential land uses: <ul style="list-style-type: none"> <li>Day (7am – 10pm): 55 dB L<sub>Aeq</sub>, (1 hour) (external)</li> <li>Night (10pm – 7am): 50 dB L<sub>Aeq</sub>, (1 hour) (external)</li> </ul>
<b>PTNL and fact sheet C (NPfl 2017)</b>	<ul style="list-style-type: none"> <li>Residential PNTLs:               <ul style="list-style-type: none"> <li>Day: 64 dB(A)</li> <li>Evening: 62 dB(A)</li> <li>Night: 53 dB(A)</li> </ul> </li> <li>Other PNTLs:               <ul style="list-style-type: none"> <li>Commercial premises: 63 dB(A)</li> <li>Active recreation area: 53 dB(A)</li> </ul> </li> </ul>
<b>Sleep disturbance criteria (NPfl 2017)</b>	<ul style="list-style-type: none"> <li>L<sub>eq,15mins, night</sub>: 53 dB(A)</li> <li>L<sub>Fmax, night</sub>: 63 dB(A)</li> </ul>

## 5.7 CONSTRUCTION NOISE AND VIBRATION CRITERIA

### 5.7.1 Interim Construction Noise Guideline

The NSW Interim Construction Noise Guideline was developed by the NSW-Department of Environment & Climate Change DECC, NSW which incorporates the EPA. The Guideline contains detailed procedures for the assessment and management of construction noise impacts.

The guideline presents two ways of assessing construction noise impacts – the quantitative method, which is generally suited to longer term construction works and the qualitative method, which is generally suited to short term works (usually not more than 3 weeks) such as infrastructure maintenance.

It is expected that the length of the construction works associated with the development would be more than 3 weeks and therefore a quantitative method has been used for this assessment.

Table 15 set out the management levels for noise at residence and sensitive land uses, respectively. Restrictions to the hours of construction may apply to activities that generate noise at residences above the 'highly noise affected management level' which is >75dBA.

Affected properties above 75 dBA might require community consultation and a Construction Noise & Vibration Management Plan (CNVMP). Based on the RBL of 62 dBA in the daytime, the recommended noise management level during all aspects of the construction program are summarised in Table 16 below.

TABLE 15: NOISE AT AFFECTED USING QUANTITATIVE ASSESSMENT

RECOMMENDED HOURS	EXTERNAL NOISE MANAGEMENT LEVEL (NML) $L_{EQ,15MIN}$ [dBA]	HOW TO APPLY
<b>Recommended standard hours</b>	72 dB(A) (RBL + 10)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq (15 minutes) noise level is greater than the affected level, the proponent should apply all feasible and reasonable* work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details
<b>Monday – Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays</b>	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite period by restricting hours that the very noisy activities can occur, taking into account: <ol style="list-style-type: none"> <li>1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences);</li> <li>2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ol>

RECOMMENDED HOURS	EXTERNAL NOISE MANAGEMENT LEVEL (NML) $L_{EQ,15MIN}$ [dBA]	HOW TO APPLY
<b>Outside Recommended standard hours</b>	53 dB(A) (RBL + 5) RBL from night time	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.22

\*Section 6, 'work practices' of the *Interim Construction Noise Guideline*, states: "there are no prescribed noise controls for construction works. Instead, all feasible and reasonable work practices should be implemented to minimise noise impacts. This approach gives construction site managers and construction workers the greatest flexibility to manage noise".

Definitions of the terms feasible and reasonable are given in Section 1.4 of the Guideline.

The Interim Construction Noise Guideline recommends the following noise levels for land uses other than residential, as shown in Table 16 below. The external noise levels should be assessed at the most affected occupied point on the premises. A conservative estimate of 10 dB is generally applied as the difference between the external and internal level for noise sensitive uses that require internal noise measurement.

## 5.7.2 NOISE MANAGEMENT LEVELS

Noise Management Levels (NML) associated with the construction works on the project site are presented in Table 16.

TABLE 16: CONSTRUCTION NOISE MANAGEMENT LEVELS,  $L_{EQ,15MIN}$

RECOMMENDED HOURS	PERIOD	RBL $L_{A90,15MINS}$ [dBA]	EXTERNAL NOISE MANAGEMENT LEVEL [dBA]
<b>Day time (standard construction hours)</b>	When in use	62	(62 + 10) = 72 dB(A) (Noise affected) 75 dB(A) (highly noise affected)

## 5.7.3 CONSTRUCTION VIBRATION CRITERIA

The effects of construction vibration upon buildings can be separated into three main categories:

1. Perceptibility of the occupants to the vibration and the possibility of them being disturbed or annoyed.
2. Vulnerability of the building structures to vibration induced damaged.
3. Vulnerability of the contents of the building that includes types of equipment, activities and processes.

### 5.7.3.1 Human Response to Vibration

Humans are very sensitive to vibration, and they can be disturbed, annoyed and have their work activities interfered with if the levels are too high. The Interim Construction Noise Guideline references "Assessing Vibration: a technical guideline" (Vibration Guideline) issued by the Department of Environment and Conservation NSW for measurement and assessment of vibration. The Vibration Guideline provides vibration criteria for continuous, impulsive and intermittent vibration

Continuous vibration	Impulsive vibration	Intermittent vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZECC (1990).	Trains, nearby intermittent construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer this would be assessed against impulsive vibration criteria.

The criteria are discussed in more detail in the following sections.

### 5.7.3.2 Continuous and impulsive vibration (1-80 Hz)

According to the Vibration Guideline for continuous and impulsive vibration, assessment of impact should be considered on the basis of weighted root-mean-square acceleration values and results are to be compared against the following preferred and maximum values given for each orthogonal axis. The frequency weightings as per BS6841:1987 (reproduced in Appendix B3 of the guideline) are to be applied to the RMS measurement values (1-80Hz).

The criteria in the Vibration Guideline are derived from the limiting values of the assessment curves and multiplying factors from BS 6472:1992 (the curves are no longer referenced in the superseded version of the standard BS 6472:2008).

**Table 2.2 Preferred and maximum weighted rms values for continuous and impulsive vibration acceleration (m/s<sup>2</sup>) 1–80 Hz**

Location	Assessment period <sup>1</sup>	Preferred values		Maximum values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
<b>Continuous vibration</b>					
Critical areas <sup>2</sup>	Day- or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day- or night-time	0.020	0.014	0.040	0.028
Workshops	Day- or night-time	0.04	0.029	0.080	0.058
<b>Impulsive vibration</b>					
Critical areas <sup>2</sup>	Day- or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day- or night-time	0.64	0.46	1.28	0.92
Workshops	Day- or night-time	0.64	0.46	1.28	0.92

<sup>1</sup> Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am

<sup>2</sup> Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specified above. Stipulation of such criteria is outside the scope of this policy, and other guidance documents (e.g. relevant standards) should be referred to. Source: BS 6472–1992

The Vibration Guideline notes “Activities should be designed to meet the preferred values where an area is not already exposed to vibration. Where all feasible and reasonable measures have been applied, values up to the maximum value may be used if they can be justified. For values beyond the maximum value, the operator should negotiate directly with the affected community. Situations exist where vibration above the preferred values can be acceptable, particularly for temporary disturbances and infrequent events of short-term duration. An example is a construction or excavation project.”

### 5.7.3.3 Intermittent vibration (1-80 Hz)

According to the Vibration Guideline for intermittent vibration, assessment of impact should be considered on the basis of vibration dose values (VDV). Acceptable values of vibration dose are given as follows.

**Table 2.4 Acceptable vibration dose values for intermittent vibration (m/s<sup>1.75</sup>)**

Location	Daytime <sup>1</sup>		Night-time <sup>1</sup>	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas <sup>2</sup>	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

1 Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am.

2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas.  
Source: BS 6472-1992

### 5.7.3.4 Vibration Criteria – Building Contents and Structure

The vibration effects on the building itself are assessed international standards as follows:

- For transient vibration: British Standard BS 7385: Part 2 – 1993 "Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration" (BSI 1993); and
- For continuous or repetitive vibration: German DIN 4150: Part 3 – 1999 "Effects of Vibration on Structure" (DIN 1999).

### 5.7.3.5 Standard BS 7385 Part 2 – 1993

For transient vibration, as discussed in standard BS 7385 Part 2- 1993, the criteria are based on peak particle velocity (mm/s) which is to be measured at the base of the building. These are summarised in Table 17 and illustrated in Figure 8.

TABLE 17: TRANSIENT VIBRATION CRITERIA AS PER STANDARD BS 7385 PART 2 – 1993

Line in	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	-
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Standard BS 7385 Part 2 – 1993 states that the value in Table 17 relate to transient vibration which does not cause resonant response in buildings. Where the dynamic loading caused by continuous vibration events is such that it results in dynamic magnification due to resonance (especially at the lower frequencies where lower guide values apply), then the values in Table 17 may need to be reduced by up to 50% (refer to Line 3 in Figure 8).

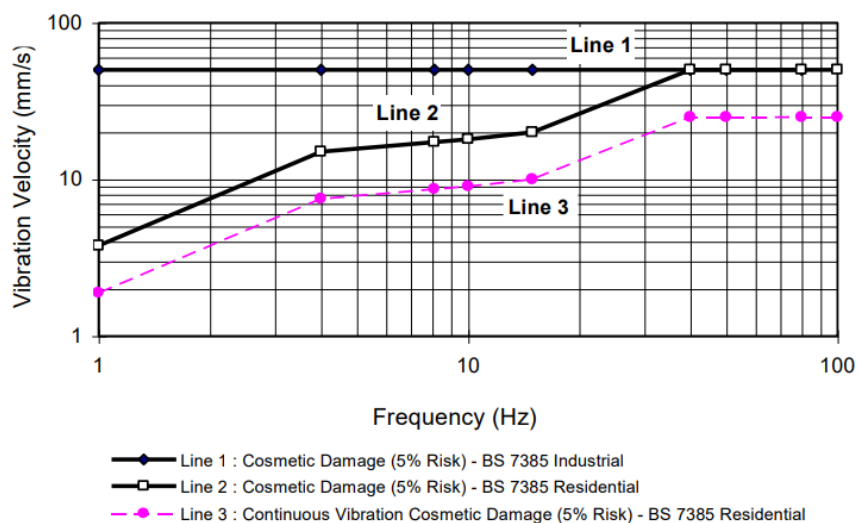


FIGURE 8 – BS 7385 PART 2 – 1993, GRAPH OF TRANSIENT VIBRATION VALUES FOR COSMETIC DAMAGES

In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the recommended values corresponding to Line 2 are reduced. Below a frequency of 4 Hz, where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

The standard also states that minor damage is possible at vibration magnitudes which are greater than twice those given in Table 17, and major damage to a building structure may occur at values greater than four times the tabulate values.

Fatigue considerations are also addressed in the standard and it is concluded that unless the calculation indicated that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the values in Table 17 should not be reduced for fatigue considerations.

#### 5.7.3.6 Structural Response to Vibration - German Standard DIN 4150-3:1999

The German Standard DIN 4150-3 Structural Vibration Part 3: Effects on building and structures is commonly used in Australia to evaluate the effects of vibration on structures primarily used for static loading.

The response of a building to vibration is affected by several factors that include its type of foundation, the underlying ground conditions, its construction and the state of the building. Please note the construction vibration limits are designed to ensure the structural integrity of nearby buildings and are not for human comfort. the limits are well above perceptibility.

According to DIN 4150 short term vibration refers to vibration which does not occur often enough to cause structural fatigue, and which does not produce resonance in the structure being evaluated. Long-term vibration refers to all types of vibration not covered by the definition of 'short-term vibration'. The criteria for short-term and long-term vibration are listed in the following.

#### 5.7.3.7 Guideline Values for evaluation of short-term vibration - DIN 4150-3:1999

The vibration limits of table 1 in DIN 4150-3:1999 (replicated in Table 18 below) refer to the evaluation of the effects of short-term vibration on structures.

It should however be noted that compliance with the vibration limits to avoid structural damage of buildings, cannot provide certainty. If damage occurs despite compliance with the standard, it is to be assumed that other causes are responsible, however, further investigations are necessary. And on the other hand, exceeding the limits does not necessarily lead to damage.

TABLE 18: DIN 4150-3 CONSTRUCTION VIBRATION LIMITS – SHORT TERM

TYPE OF STRUCTURES	GUIDELINE VALUES FOR VIBRATION VELOCITY (MM/S)			
	Vibration at the foundation at a frequency of			Vibration at horizontal plane of highest floor at all frequencies
	1Hz to 10Hz	10 to 50 Hz	50 to 100Hz (and above)	
<b>Buildings for commercial purposes, Industrial building and building of similar design</b>	20	20 to 40	40 to 50	40
<b>Dwellings and buildings of similar design and/or occupancy</b>	5	5 to 15	15 to 20	15
<b>Structures that because of their particular sensitivity to vibration, cannot be classified as above and are of great intrinsic value (e.g. listed buildings under preservation order)</b>	3	3 to 8	8 to 10	8

#### 5.7.3.8 Guideline Values for evaluation of long-term vibration - DIN 4150-3:1999

The vibration limits of Table 3 in DIN 4150-3:1999 refer to the evaluation of the effects of long-term vibration on structures.

The criteria are the peak particle velocities measured on the uppermost full storey of any building not related to the site and are listed in Table 19.

According to the standard, *exceeding the values listed below does not necessarily lead to damage.*

If a building is subject to harmonic vibration, then maximum values can occur in floors other than the top floor, or in the foundation. The values given also apply in these cases.

TABLE 19: DIN 4150-3 CONSTRUCTION VIBRATION LIMITS – LONG TERM

TYPE OF STRUCTURES	GUIDELINE VALUES FOR VELOCITY, VI, IN MM/S OF VIBRATION IN HORIZONTAL PLANE OF HIGHEST FLOOR, AT ALL FREQUENCIES
<b>Buildings for commercial purposes, Industrial building and building of similar design</b>	10
<b>Dwellings and buildings of similar design and/or occupancy</b>	5
<b>Structures that because of their particular sensitivity to vibration, cannot be classified as above and are of great intrinsic value (e.g. listed buildings under preservation order)</b>	2.5

## 5.7.4 SUMMARY OF CONSTRUCTION NOISE AND VIBRATION CRITERIA

Construction noise criteria for the areas surrounding the project are NML levels (between RBL + 10 dBA and max. 75 dBA) for standard construction hours. As per below:

- Noise Affected: 72 db(A)
- Highly Noise Affected: 75 dB(A)

We consider that for this project the vibration criteria will be as per DIN 4150 – 3:1999 construction vibration limits – long term. Residential receivers in the area will have a maximum vibration velocity criterion of 5 mm/s<sup>2</sup> and commercial buildings of 10 mm/s peak particle velocity criteria.

The SSDA construction noise assessment will utilize the information provided by the team at this stage and conduct a preliminary construction noise and vibration assessment, if predicted construction noise and vibration levels are not exceeding the limits, there is no need for a future Construction Noise and Vibration Management Plan.

## 6 EXTERNAL NOISE INTRUSION ASSESSMENT

The Bayside LEP and AS 2021 standard sets criteria for internal noise levels within residential developments from external noise and aircraft noise sources. In order to meet these limits, the façade construction has been considered.

Noise of the existing acoustic environment has been assessed previously, the details of this are presented in Section 4. Although the façade construction has not yet been finalised, the following construction and ratings are required to meet the noise criteria:

### 6.1 FAÇADE CONSTRUCTIONS

The façade constructions recommended are generally driven by noise levels of aircraft flying over the site. In order to control noise from this, the following façade constructions are required around the whole envelope of the development. Note that we did not receive a preferred façade system at this stage, this section can be updated in future issues.

Note that these are only indicative for this stage. An equivalent (or better) alternative may also be used.

#### 6.1.1 GLAZED SECTIONS

The following construction or an acoustical equivalent is required for all glazed façade sections:

- 6.38mm laminate
- 12mm airgap
- 6.38mm laminate

This glazing construction is based on calculations which assume up to 55% coverage of the total façade enclosure. This will be subject to further analysis and review prior to CC.

The performance of this construction is as listed in Table 20.

TABLE 20: ACOUSTIC PERFORMANCE OF GLAZING

GLAZING	TRANSMISSION LOSS [DB]								R <sub>w</sub> (C <sub>TR</sub> )
	63	125	250	500	1k	2k	4k	8k	
<b>6.38 laminate/12mm airgap/6.38mm float</b>	19	24	30	39	44	46	55	55	41 (-6)

#### 6.1.2 BRICKWORK/BLOCKWORK SECTIONS

The following construction can be used if brickwork or blockwork are to be used:

- 110mm brickwork
- 50mm-100mm cavity channel
- 110mm brickwork

Alternatively, the following construction is also acceptable:

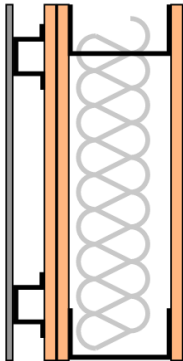
- 110mm brickwork
- 50mm-100mm cavity
- 90mm steel stud with insulation at 600mm centres
- 1x 16mm fire rate plasterboard (min. density 12.5kg/m<sup>2</sup>)

These constructions are expected to meet R<sub>w</sub> 52

#### 6.1.3 LIGHTWEIGHT SECTIONS

The following construction can be used if a lightweight construction is to be used:

TABLE 21: LIGHTWEIGHT FAÇADE CONSTRUCTION

CONSTRUCTION	ACOUSTIC RATING	DIAGRAM
<ul style="list-style-type: none"> <li>• 9mm Fibre cement sheet (min. 14 kg/m<sup>2</sup>)</li> <li>• 35mm top hats</li> <li>• 2 x 16mm fire rated plasterboard (12.5kg/m<sup>2</sup>)</li> <li>• Min. 92mm steel studs</li> <li>• 75mm fibreglass insulation (min. 14kg/m<sup>3</sup>)</li> <li>• 1 x 16mm fire rated plasterboard (12.5kg/m<sup>2</sup> each)</li> <li>• Nominal wall width: 184mm</li> </ul>	<p>Rw 50</p>	

## 7 OPERATIONAL NOISE & VIBRATION IMPACT ASSESSMENT

The following sections present our assessment of noise emission impacts from operational noise sources from the project. Predicted noise levels and associated mitigation measures are also provided according to the noise assessment and criteria.

### 7.1 WASTE COLLECTION

The proposed development features 4 separate waste rooms located at various locations on ground level. Waste from each room is amalgamated within the enclosed MRV Dock where they are collected by a waste truck.

The waste collection is understood to involve the following schedule:

- General waste: 2 collections per week
- Recycling: 1 collection per week
- FOGO: 0.5 collections per week (i.e. one collection a fortnight)

Waste collection activities are expected to occur during daytime hours (i.e. 0700-1800 hours).

Noise levels from movements of a medium-sized truck were used to predict the noise impact waste collection activities will have. These levels are summarised below:

TABLE 22: WASTE COLLECTION TRUCK NOISE LEVELS

ACTIVITY	DISTANCE [M]	NOISE LEVEL								DBA
		63	125	250	500	1K	2K	4K	8K	
Lorry Medium Passby	17	42	50	55	57	60	51	58	48	64

The location of the MRV dock is approximately 17m from the boundary of the property opposite (18 Henry Kendall Crescent). Due to the enclosed nature of the MRV Dock, this is expected to be the most exposed receiver as it has direct line of sight to the truck within the dock.

The noise levels to this property are expected to reach up to 63 dBA as a result of waste truck movements from a typical collection. This assumes the following activities:

- Truck arrival – 1 minute
- Truck in dock<sup>4</sup> – 3 minutes
- Truck leaving – 1 minute

Based on this, noise levels from waste collection to the nearby sensitive receivers will not exceed the daytime PNTLs of 64 dBA.

### 7.2 NOISE EMISSION FROM OUTDOOR AREAS

The development is expected to feature a communal outdoor area on level 1 at the centre of the site between the buildings. This area is shielded from the neighbouring receivers along all sides by the buildings aside from to the northern boundary.

It is understood that this area is intended primarily as an outdoor area for residents. No amplified speakers or other noise or music sources are expected aside from typical noise from the residents (i.e. only noise from voices are expected from this area). Based on this, noise levels to the closest NSW Ambulance property is expected to range from 36 dBA to 60 dBA, depending on the type of speech and location (these levels represent typical noise levels from relaxed normal speech up to very loud speech within one group of 3 people close to the

<sup>4</sup> Note this time is assuming the truck is running. This is expected to be conservative as the truck is expected to be switched off for an extended duration in the dock.

boundary). If speech is to occur further away from the boundary, these levels will drop with the increased distance.

For typical speech up to a “raised” level, the levels are expected to be compliant with all the PNTLs at all locations of the outdoor area. For louder voices, the levels are expected to be compliant with the day and evening PNTLs but can exceed the night time criteria, depending on the location. It was confirmed with NSW Ambulance that the facility at Mascot contains both an office (with operating hours of 0800-1600 hours) and an ambulance service (with 24 hour operating hours).

We recommend visual signage for users to keep a normal voice tone and refrain from shouting and turning on music in this space to minimize the impact.

Depending on the interpretation of the criteria to the NSW Ambulance property, the noise emissions can be compliant if the NSW Ambulance property is only expected to be sensitive to noise during the day or evening hours (0700-2200 hours). Additionally, loud speech here during the night-time hours is not expected to be a common occurrence and will likely cause more disturbance within the property than to that adjacent. As a result, we believe that no further mitigation is required here for compliance with the PNTLs.

### 7.3 NOISE EMISSIONS FROM CARPARK

A new carpark is included as a part of the new development, featuring parking for 57 cars. The carpark will be located on the ground level, largely enclosed however with several open areas, including the ramp and the northern side of the carpark which features an open façade. As such, noise emissions are expected to both the area around the entry/exit ramp along Henry Kendall Crescent as well as to the NSW Ambulance property to the north.

Note that the information presented within this section are based on average noise levels from cars. Due to the variability of vehicles and driver behaviours which can affect actual noise levels, the actual noise levels experienced on site may vary. For this assessment, the following noise levels from carpark activities have been used:

TABLE 23: CARPARK VEHICLE NOISE LEVELS

ACTIVITY	DISTANCE [M]	NOISE LEVEL							DBA
		63	125	250	500	1K	2K	4K	
Car start “average”	10	76	69	62	56	53	51	48	61

The carpark layout and location of the nearby boundary is shown in Figure 9.

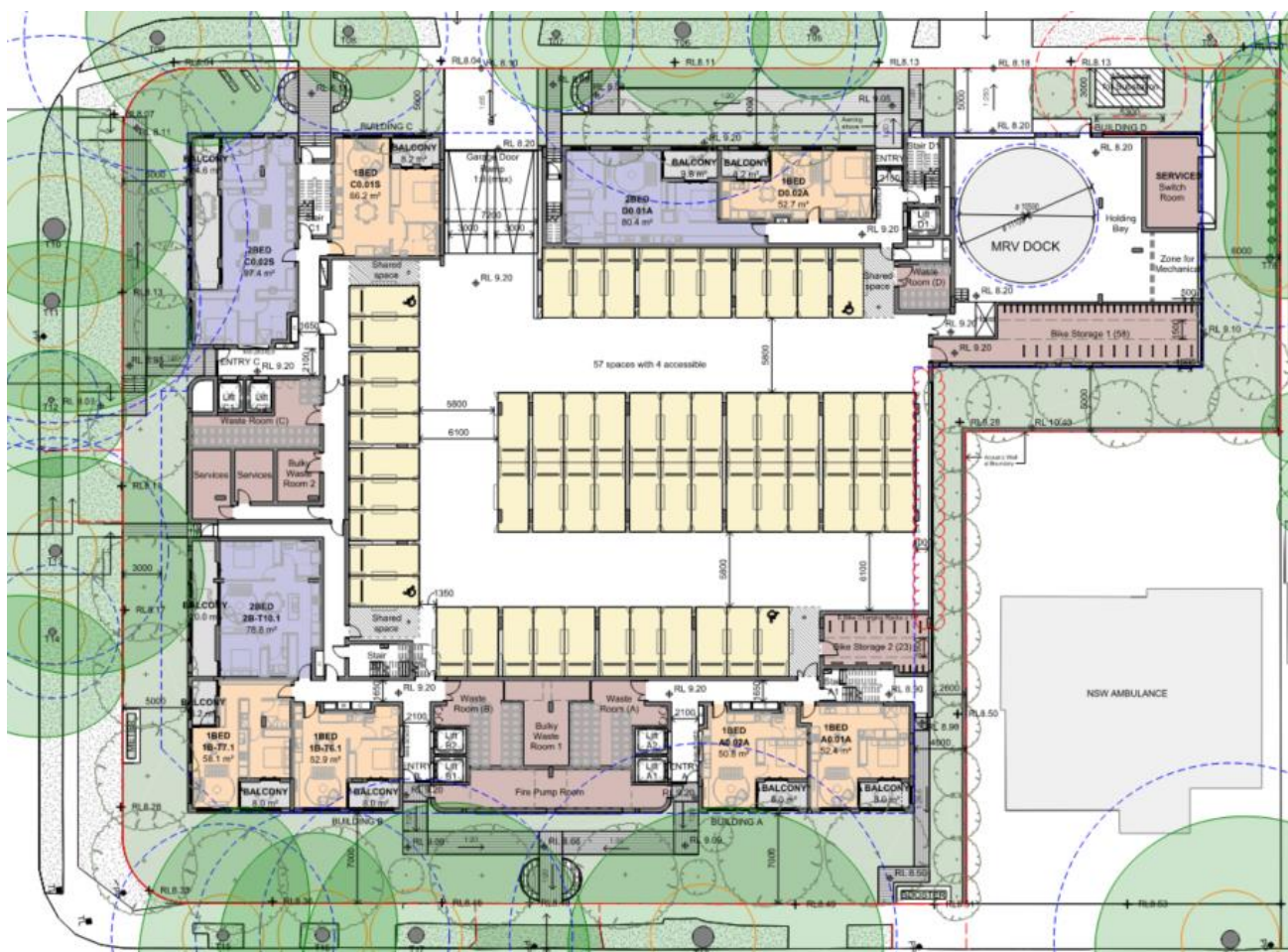


FIGURE 9: LOCATION OF CARPARK ON GROUND LEVEL. NOTE THAT A SECTION OF THE NORTHERN BOUNDARY OF THE CARPARK IS OPEN, THIS IS SHOWN CLOUDED.

### 7.3.1 CARPARK NOISE FROM RAMP

The location of the ramp is approximately 14m to the boundary of 14 Henry Kendall Crescent. Based on this and the fact that the majority of parking spaces are not located near the ramp, noise levels to the boundary from carpark activities are predicted to reach up to 52 dBA from the carpark. This level assumes that vehicle movements are largely from the closest parking location to the ramp and a 100% occupancy rate of the carpark, which are worst-case conditions. This does not exceed the PNTLs at any time.

### 7.3.2 CARPARK NOISE THROUGH FAÇADE

With the noise levels to the north of the site, the gaps in the façade are expected to expose the NSW Ambulance property to significant noise levels from the carpark. Calculations done from this case indicate that average noise levels at the property are expected at 59 dBA, assuming vehicles move at the parking spaces closest to the exposed façade. This number is compliant with the daytime and evening PNTLs to the property of 64dBA and 62dBA respectively, however exceeds the night-time PNTL of 53 dBA.

For the night-time period (2200-0700 hour period), vehicle movements are expected to be limited. Noise levels are predicted to reach up to 50 dBA during this period, assuming that vehicle movements are expected to have a 15% on-time during these hours (e.g. vehicle movements are expected for a cumulative 4.5 minutes over a given 30 minute time period). This is well within the night-time PNTL of 53 dBA.

It is recommended that signage be provided for people to not raise voices, use loud music, or stay in their cars for extended periods at night to ensure that this noise level can be met during this time period.

## 7.4

### 7.4 NOISE EMISSIONS FROM SERVICES

#### 7.4.1 MECHANICAL SERVICES

Mechanical ventilation and AC services will be installed as a part of the development. Some of these will have noise emissions to the neighbouring properties. These are expected to include the following:

- Outdoor units for AC units
- Ventilation fans
  - Waste room
  - Outdoor supply air
  - Toilet extract

We understand that three rooftop plant rooms are envisaged, with centralized hot water plant, ODU units and exhaust / supply fans as per below:

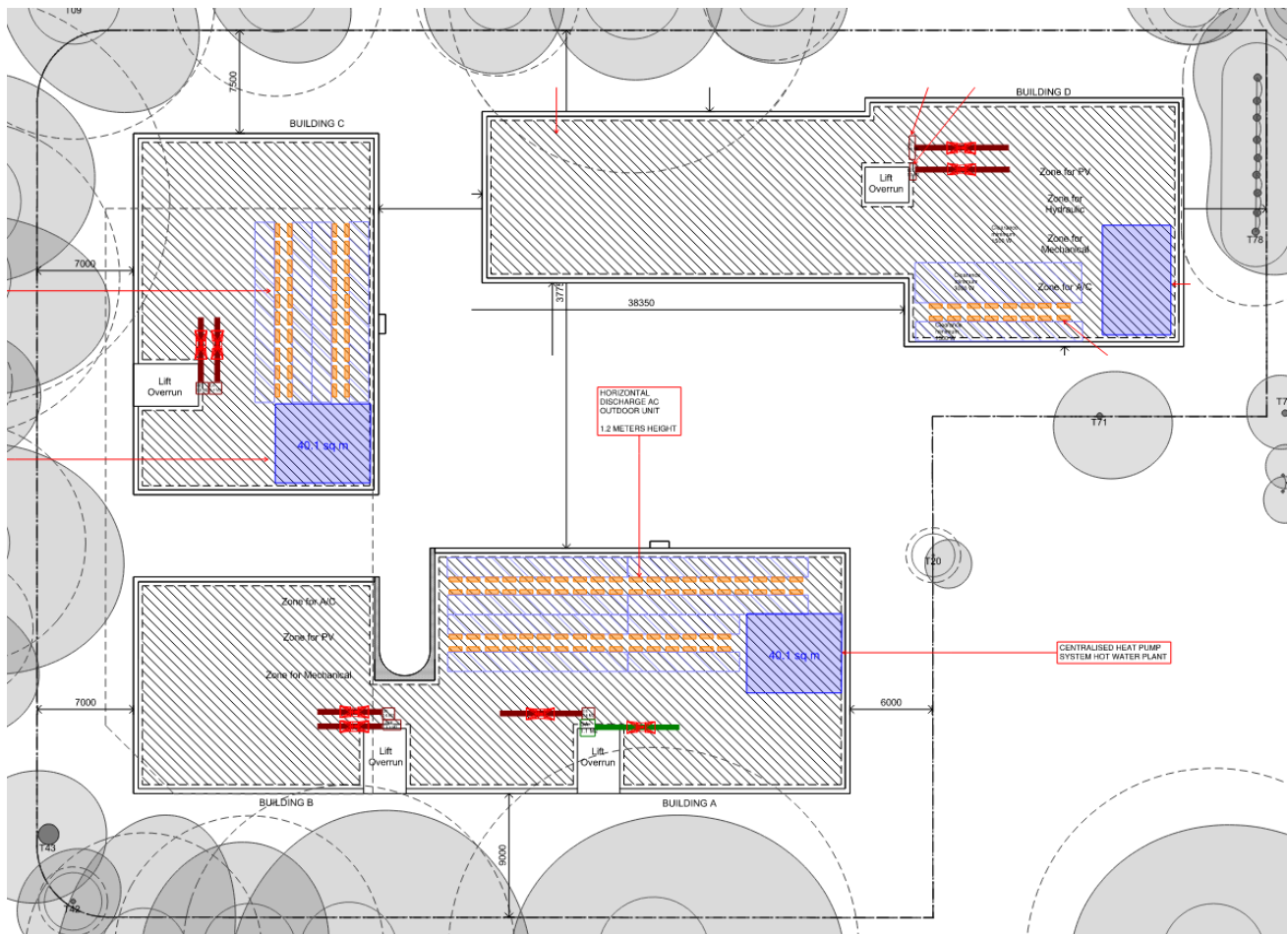


FIGURE 10: ROOFTOP MECHANICAL PLANT

In addition to the rooftop plant, there are also some AC outdoor units located on ground level. These are shown clouded in Figure 12.

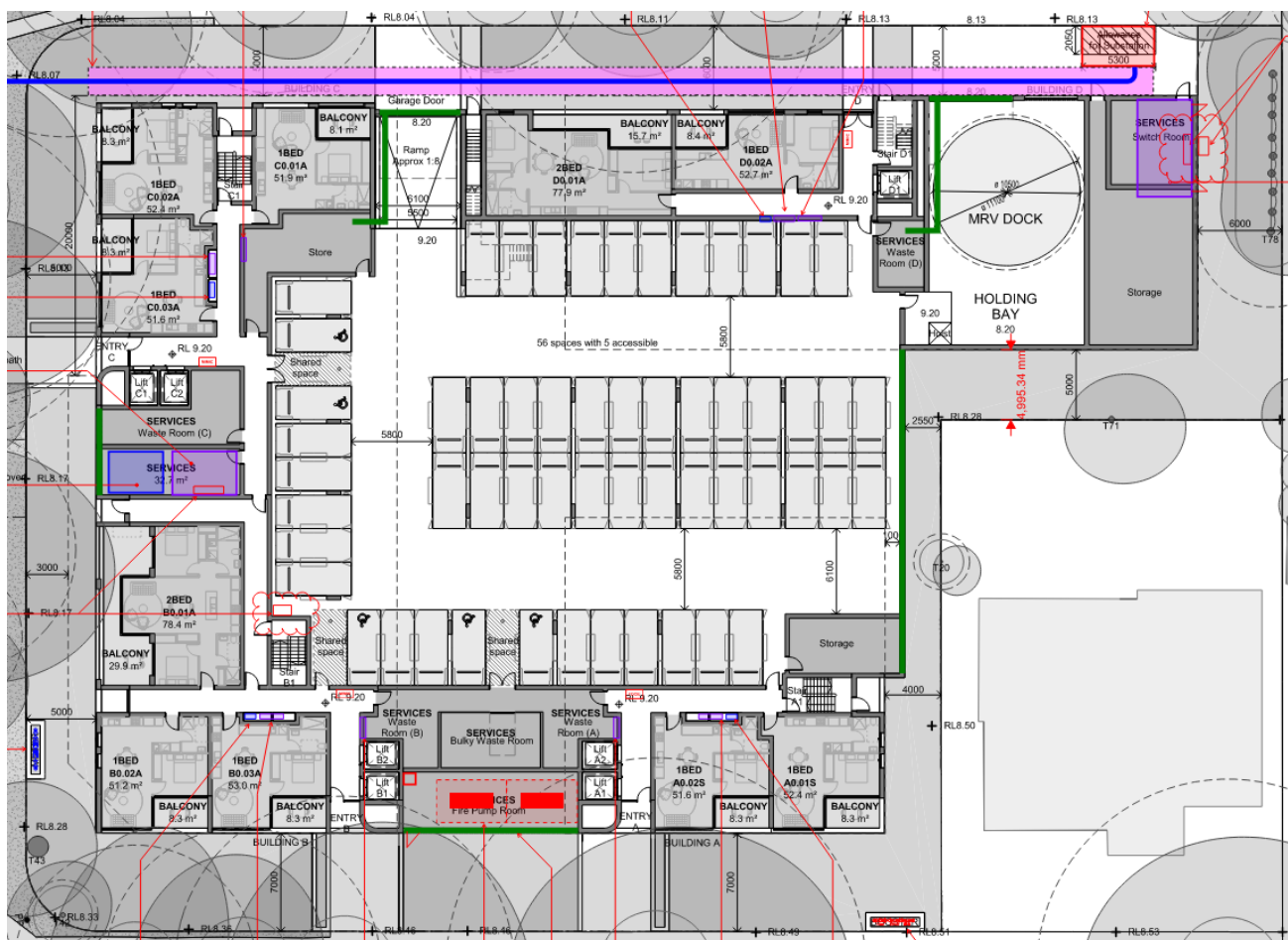


FIGURE 11: GROUND LEVEL MECHANICAL PLANT, SHOWN CLOUDED

The outdoor units for AC units are all generally expected to be installed at the roof level of each of the buildings, with a few located on ground level as well. The final AC unit selections have not been finalised, but a Daikin RSUYQ4A2VMA unit has been selected as an indicative unit for acoustic analysis.

TABLE 24 - SOUND POWER LEVELS FOR EXTERNAL AC EQUIPMENT

EQUIPMENT	SWL SOUND POWER LEVEL (dB) PER FREQUENCY BAND (HZ)								DB(A)
	63	125	250	500	1000	2000	4000	8000	
<b>Daikin RSUYQ4A2VMA</b>	66	66	68	64	59	55	54	47	65

Based on this unit, noise levels to the closest receivers have been calculated. A summary of the noise emissions from the unit locations are presented in Table 25.

TABLE 25: NOISE EMISSIONS FROM AC PLANT TO NEIGHBOURING RECEIVERS

RECEIVER	UNITS	NUMBER OF UNITS	DISTANCE [M]	NOISE LEVEL [DBA]	NIGHT TIME PNTL CRITERIA [DBA]
<b>31 Henry Kendall Crescent</b>	Daikin RSUYQ4A2VMA	44 + 1 on ground level	10-24, 5.5m on ground level	52	53
<b>154 Coward Street</b>	Daikin RSUYQ4A2VMA	32	15-28	43	53
<b>NSW Ambulance (Mascot)</b>	Daikin RSUYQ4A2VMA	38	7-32	51	53

Note that the levels presented above represent the worst-case noise levels, with all plant running at capacity. The noise levels from the mechanical outdoor unit plant are therefore expected to meet the PNTLs.

There are also some ducted fans which are expected to be installed. These are currently not finalised, however mitigation measures need to be applied to these to ensure that noise levels do not exceed the PNTLs, including duct elements such as duct lining or medium attenuators.

The final unit selections for the fans have also not been finalised. Noise emissions from these will be controlled by applying mitigation to the ductwork (e.g. lined duct or attenuators). These are outside of the scope of a SSDA report but will be finalised as the design progresses.

## 7.4.2 ELECTRICAL SERVICES

Due to the residential nature of the development, a generator is not expected to be required. A substation has been allowed for at the boundary of the property to Henry Kendall Crescent, however this is not expected to generate significant amounts of noise to the neighbouring properties.

## 7.4.3 FIRE PROTECTION SERVICES

The development is expected to feature fire sprinkler pumps. These are to be housed in a fire pump room located on the ground level of the building. In order to control noise emissions out of the fire pump room, the façade wall to the room is to be a solid wall of similar construction to the rest of the façade.

A ventilation shaft to the fire pump room will be required to ventilate the room, however noise emissions from this are expected to be mitigated by applying mitigation to the ductwork leading to the pumproom, using an acoustical enclosure to the pump room and a residential type of muffler for the pump exhaust. The following acoustic mitigation measures need to be considered and calculated once a fire pump is selected:

- Exhaust muffler type super critical with 50 dB attenuation.
- Walls and ceilings systems within the pump room must have a high acoustic rating (Rw 50 or more)
- Acoustic solid core access door with acoustic seals, min. Rw 36.
- Internal absorption to mitigate reverberation (min 20 sqm with min. NRC 0.8, on walls / ceilings, where available).
- Pump must be tested only during day time.
- Acoustic louver for ventilation or air supply / extraction fans with attenuators

This is outside the scope of a SSDA report and will be detailed as the design progresses.

## 7.5 OPERATIONAL VIBRATION

No particular mechanical equipment expected to generate significant amounts of vibration are proposed for the development. For controlling vibration emissions on mechanical plant (VRF, condensers and similar), it would be recommended that all condensers are installed on Embelton Supershearflex pads or equal. Ensuring compliance with the NSW EPA document Assessing Vibration: A technical guideline. However, as ODU units are small, we do not consider this will be a noticeable impact.

However the fire sprinkler pump is expected to generate vibration to the buildings. A detailed acoustic assessment including vibration control is highly recommended for the detailed design phase.

It should also be noted that these recommendations are provided for amenity of the residents of the proposed development and are not a requirement for controlling vibration to the neighbouring properties.

## 8 CONSTRUCTION NOISE & VIBRATION IMPACT ASSESSMENT

The construction works are expected to commence in October 2025 and will involve several construction phases.

The construction hours will depend on the consent conditions, however it is recommended that hours are maintained within the following to ensure that criteria for the recommended standard hours per the NSW Interim Construction Noise Guideline apply:

- Weekdays 0700 to 1800
- Saturdays 0800 to 1300
- Sundays and public holidays: no work

### 8.1 CONSTRUCTION PLANT NOISE LEVELS

Minimum construction equipment for the estimated construction phases is described below:

TABLE 26 TYPICAL EXTERNAL NOISE LEVELS OF DEMOLITION AND CONSTRUCTION MACHINERY/ACTIVITY

ITEM #	ACTIVITY/MACHINERY	SOURCE AND REFERENCE NUMBER (BS 5228 – 1:2009)	L <sub>eq</sub> SOUND PRESSURE LEVEL AT 10m (dBA)
<b>Excavation and Demolition</b>			
1	Tracked excavator 14t / 66kW	Table C2 Ref 25	69
2	Dumper truck 9T / 75 kW	Table C4 / Ref 4	76
<b>Structural Phase</b>			
3	Tracked excavator 14t / 66kW	Table C2 Ref 25	69
4	Dumper truck 9T / 75 kW	Table C4 / Ref 4	76
5	Mini piling rig (rock bolt) 250mm auger	Table C3 / Ref 18	74
6	Concrete pump + cement mixer truck (discharging) 8 T / 350 bar	Table C4/ Ref24	68
<b>Construction &amp; Fitout works</b>			
7	Handheld circular saw 3 Kw	Table C4 / Ref 72	79
8	Handheld cordless nail gun	Table C4 / Ref 95	73
9	Diesel generator	Table C4 / Ref 76	61
<b>Carpark Construction</b>			
10	Compactor 60kg / 3kW	Table C5 / Ref 29	83
11	Vibratory Roller passby, 3t / 20kW	Table C5 / Ref 27	73
12	Asphalt paver and tipper lorry 112kW / 12t hopper	Table C5 / Ref 30	76

#### Notes:

- Excavation and Demolition works were adjusted to the new plans, this phase is for the earthworks site preparation. As there is no basement, earthworks will be kept as a minimum.
- The above equipment shows every equipment noise level as per BS 5228 – 1:2009, the equipment inclusion in each phase is the general equipment that is used in this type of construction. A more detailed assessment will only be done if the preliminary assessment exceeds 75 dBA, if not, the above assessment is adequate for this type of report.

- NSW DECC 2009 Construction noise Guideline quotes on Appendix B Equipment Noise levels, the DEFRA 2005 database, which includes the above referenced BS 5228 – 1:2009 noise levels.

## 8.2 PREDICTED CONSTRUCTION NOISE

Based upon the above plant sound power levels, predicted construction noise levels for the various works phases are presented below:

TABLE 27 PREDICTED CONSTRUCTION NOISE  $L_{EQ,15MIN}$

RECEIVERS	RECOMMENDED HOURS	PERIOD	PREDICTED CONSTRUCTION NOISE LEVEL	EXTERNAL NOISE MANAGEMENT LEVEL
<b>Excavation and Demolition Phase</b>				
31 Henry Kendall Crescent	Monday Friday 7am to 6pm	Day	69 dB(A)	72 dB(A) (noise affected) 75dB(A) (highly noise affected)
154 Coward Street	Saturday 8am to 1pm		68 dB(A)	
Mascot Ambulance	No work on Sundays or Public Holidays		72 dB(A)	
<b>Structural Phase</b>				
31 Henry Kendall Crescent	Monday Friday 7am to 6pm	Day	71 dB(A)	72 dB(A) (noise affected) 75dB(A) (highly noise affected)
154 Coward Street	Saturday 8am to 1pm		70 dB(A)	
Mascot Ambulance	No work on Sundays or Public Holidays		72 dB(A)	
<b>Construction &amp; Fitout Works Phase</b>				
31 Henry Kendall Crescent	Monday Friday 7am to 6pm	Day	70 dB(A)	72 dB(A) (noise affected) 75dB(A) (highly noise affected)
154 Coward Street	Saturday 8am to 1pm		69 dB(A)	
Mascot Ambulance	No work on Sundays or Public Holidays		72 dB(A)	
<b>Carpark Construction Phase</b>				
31 Henry Kendall Crescent	Monday Friday 7am to 6pm	Day	72 dB(A)	72 dB(A) (noise affected) 75dB(A) (highly noise affected)
154 Coward Street	Saturday 8am to 1pm		72 dB(A)	
Mascot Ambulance	No work on Sundays or Public Holidays		71 dB(A)	

NB: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Notes:

- Some equipment will require time management in order to meet the noise criteria. These are listed in 8.4.3

- Where possible, equipment should be situated as far away as possible from the boundaries, particularly the northern and western boundaries of the site. A minimum 20m to the site boundaries should be targeted for equipment and activities that can (e.g. equipment such as dump truck activities and hand saws).
- The proposed acoustic barrier for the construction is listed in 8.4.4.
- Due to the closeness of the northern boundary, a construction noise barrier will be required to both 31 Henry Kendall Crescent and the Mascot Ambulance boundaries. This will need to be a minimum of 1.8m in height and is required at all phases of construction.
- Construction hours will only be during day-time.
- Construction site is considerably big and not all machinery is expected to be located at the same distance when assessing on a particular boundary.
- Not all machinery are to be working simultaneously.
- The above estimations are the critical scenario for construction noise.

As shown construction noise levels during all stages phases were predicted below the noise affected limit of 72 dB(A) as well as the highly noise affected limit of 75 dB(A). Under the ICNG, there is no requirements for construction noise to be managed as part of a construction noise and vibration management plan.

### 8.3 PREDICTED CONSTRUCTION VIBRATION

It is important to note that construction vibration levels depend on several factors, such as: activity, type of machine, geology of the ground and the distance between the affected buildings and the source. Surface works are expected to have a lower vibration impact than ground compacting/breaking works.

A geotechnical survey has been conducted for the site. The report prepared from this survey confirms that the soil conditions are generally soft with no rock breaking required unless excavation or piling works extend to bedrock level.

For the development, activities likely to cause some vibration are:

- Piling works
- Earthworks (compaction works): to be kept to a minimum as there will be no basement

Compliance with vibration limits for building damage is expected based on ensuring ground compacting equipment is selected to adhere to minimum safe working distances. While these magnitudes do not predict cosmetic/structural damage, it is anticipated that human response/comfort would be impacted at these distances. It should be noted, however, that due to the absence of a basement level, the earthworks are expected to be at a minimum.

The current RMS Construction Noise and Vibration Guideline sets safe working distances for vibrating plant and equipment. These are summarised below in Table 28. For this size of works, the use of large hydraulic hammers would not be recommended for these works. Hence it is recommended that the use of smaller rock breakers and handheld jackhammers are used for activity close to the nearest affected residential receivers.

TABLE 28 RMS PLANT VIBRATION SAFE OPERATING DISTANCES - Construction Noise and Vibration Guideline 2016

PLANT ITEM	RATING/DESCRIPTION	MINIMUM WORKING DISTANCE	
		Cosmetic Damage (BS 7385)	Human Response (OH&E Vibration Guideline)
<b>Small Hydraulic Hammer</b>	(300 kg - 5 to 12t excavator)	2 m	7 m
<b>Large Hydraulic Hammer</b>	(1600 kg – 18 to 34t excavator)	22 m	73 m
<b>Jackhammer</b>	Handheld	1 m (nominal)	2 m

Vibration predictions on Piling and reinstatement works are included below, using Table E.1 Empirical Predictors for groundborne vibration arising from mechanized construction works of the BS 5228 – 2.2009 part II Vibration.

## **8.4 GENERAL RECOMMENDATIONS ON CONSTRUCTION NOISE AND VIBRATION MANAGEMENT**

Predicted construction noise levels were determined not to exceed either the Noise Affected nor Highly Noise Affected noise levels, which have been specified in the Interim Guide for Construction Noise (ICNG). However, the Interim Guide for Construction Noise (IGCN) lists a number of typical best practice measures which can be used to reduce construction related impacts. In addition, Australian Standards 2436-2010 provides best practice measures to mitigate construction noise and vibration.

The following recommendations should be also considered in the development of a construction noise and vibration management plan for the site, when details of the contractor works methodology become finalised.

### **8.4.1 GENERAL/SITE MANAGEMENT ISSUES**

- All employees, contractors and subcontractors are to receive an environmental induction and should instruct all persons at the site with regard to all relevant project specific and standard noise mitigation measures, including but not limited to permissible hours or work, limitation of high noise generating activities, location of nearest affected noise receivers, construction employee parking areas, designated loading/unloading areas and procedures, site opening/closing times (including deliveries) and environmental incident procedures.
- A dedicated person will form a point of contact for dissemination of general information regarding site operations. Contact persons will also be defined to receive comment or complaints from the community.

### **8.4.2 CONSTRUCTION ACTIVITIES AND NOISE MITIGATION**

The following general construction noise source control measures may be required:

- Extended construction hours are not recommended, for evening hours, less intrusive works will be scheduled to be carried out and/or works will be carried out away from sensitive receivers;
- Activities that approach the highly noise affected criteria for the residential receivers to be carried out during times where receivers are less sensitive to noise;
- Avoid unnecessary revving of engines and turn off plant that is not being used/required;
- Where possible organise the site so that delivery trucks and haulage trucks only drive forward to avoid the use of reversing alarms;
- Where possible, avoid using tonal reverse alarm outside standard construction hours;
- Organise and schedule the equipment operations to limit the noisiest machines operating simultaneously;
- Site set up/ movement of plant / delivery of material/ waste removal to site should generally be restricted to day period;
- Truck drivers are to be informed of site access routes, acceptable delivery hours and must minimise extended periods of engine idling;
- Ensure there is no unnecessary shouting or loud stereo/radios on site. There must be no dropping of metal from heights, throwing of metal items or slamming of doors;
- Use less noise intensive equipment where reasonable and feasible;
- Where practical fixed plant should be positioned as far as possible from the sensitive receivers;
- Use temporary site buildings and material stockpile as noise barrier;
- Employ the use of solid barrier plywood hoardings if required;

### **8.4.3 TIME MANAGEMENT OF WORKS**

In order to meet the listed noise levels in Table 27, time management of works will be required. These are the following:

Structural Phase:

- 50% on-time for excavator when operating within 6m of northern boundary to Mascot Ambulance
- 50% on-time for mini piling rig when operating within 6m of northern boundary to Mascot Ambulance

Construction & Fitout Works Phase:

- 40% on-time for handheld circular saw (unless working inside the buildings and shielded from receivers)



## 9 CONCLUSIONS

The current SSDA Acoustic Report considers that the proposed Mascot development at 792-794 Botany Road is acceptable from a noise and vibration perspective according to the state and local regulations. The following summarises the findings of our assessment:

- The noise intrusion into the development from the neighbouring areas has been assessed in Section 6. The high noise levels from the environment will require a façade construction which offers significant noise reduction into the building of around  $R_w$  50. Some façade constructions have been recommended within the section.
- The operational noise and vibration from the development has been assessed in Section 7. As services plant is generally located on the roof level, noise levels to the surrounding receivers are not expected to require specific mitigation. As these units are still to be finalised, some mitigation may be required, these will be detailed as the design progresses.
- The construction noise and vibration effects associated with the development have been assessed with results and conclusions presented in Section 8. A noise barrier is expected to be required to the northern boundary of the site to control construction noise emissions. This will need to be a minimum of 2m in height and have a surface density of minimum 14 kg/m<sup>2</sup>.

There are details which will be confirmed as the design progresses, worst-case assumptions have generally been made for these where these details are not available. Adjustments may be required at a later stage of design when these are finalised.

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