300 Burns Bay Road, Lane Cove

SSDA Noise and Vibration Impact Assessment

Lane Cove Developments No.1 Pty Ltd

Report Reference: 250528 – 300 Burns Bay Road, Lane Cove – NIVA – R2

Date: 17 February 2026

Revision: R1

Project Number: 250528

PULSE WHITE NOISE ACOUSTICS Suite 601, L6, 32 Walker St, North Sydney NSW 2060
P 1800 4 PULSE (1800 478 573) **E** info@pwna.com.au **pwna.com.au** ABN 95 642 886 306

DOCUMENT CONTROL

Project Name:	300 Burns Bay Road, Lane Cove
Project Number:	250528
Report Reference:	250528 – 300 Burns Bay Road, Lane Cove – NIVA – R1
Client:	Lane Cove Developments No.1 Pty Ltd

Revision	Description	Reference	Date	Prepared	Checked	Authorised
0	For Information	250528 – 300 Burns Bay Road, Lane Cove – NIVA – R0	28/08/25	LB	BW	BW
1	For Review	250528 – 300 Burns Bay Road, Lane Cove – NIVA – R1	01/12/25	LB	BW	BW
2	For Submission	250528 – 300 Burns Bay Road, Lane Cove – NIVA – R2	17/02/26	LB	BW	BW

PREPARED BY:

Pulse White Noise Acoustics Pty Ltd
ABN: 95 642 886 306
Address: Suite 601, Level 6, 32 Walker Street, North Sydney, 2060
Phone: 1800 4 PULSE

CONTENTS

Figures

Tables

1 INTRODUCTION

This Noise and Vibration Impact Assessment prepared by Pulse White Noise Acoustics on behalf of Lane Cove Developments no.1 Pty Ltd ('the Applicant') in support of a concurrent Rezoning Proposal and State Significant Development Application (Rezoning and SSDA) for a mixed-use development for the site at 300 Burns Bay Road, Lane Cove (the site).

This SSDA seeks approval for:

- Demolition of existing structures on the site, tree removal and site excavation for basement levels.
- Construction of a new residential flat building ranging from 7-15 storeys and comprising 225 apartments including:
  - 198 market apartments;
  - 34 affordable apartments; and
  - Communal areas at lower ground, ground level with new recreation park at the eastern edge of the site, rooftop levels including a pool.
- Car and bicycle parking for residents and visitors at lower ground and two (2) basement levels, including:
  - 237 car parking spaces;
  - Garbage storage; and
  - Plant rooms and other associated services.
- Public domain and landscaping improvements, including:
  - New open space at the eastern edge of the site; and
  - Hard and soft landscaping works.

The concurrent Rezoning seeks the following amendments to the Lane Cove Local Environmental Plan 2010 (LCLEP 2010) to facilitate the proposed development:

- Amend the Height of Buildings Map under Clause 4.3 to increase the building height from 21m to 54m; and
- Amend the Maximum Floor Space Ratio Map under Clause 4.4 to change the maximum Floorspace Ratio (FSR) from 2:1 to 3.22:1.

For a further detailed project description, please refer to the Environmental Impact Statement and Rezoning Report prepared by Colliers Urban Planning.

This report should be read in conjunction with the Rezoning Request and Environmental Impact Statement prepared by Colliers Urban Planning, the Architectural Plans prepared by PBD Architects, and the other accompanying technical documents that form part of the State Significant Development Application.

This report has been prepared to address the Planning Secretary's Environmental Assessment Requirements (SEARs) for application number SSD-87925706 dated 18th of July 2025. In particular this addresses Requirement 12 of the SEARs as follows.

10. 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.

This assessment includes the acoustic investigation into the potential for noise impacts from the operation of the completed project as well as potential noise impacts on the site from existing noise sources within the vicinity of the site which predominantly includes traffic noise from surrounding roadways.

1.1 Project Details

The site is located at 300 Burns Bay Road, Lane Cove NSW 2066 and is legally described as Lot 15 DP1230609.

Situated within the Lane Cove Council (LCC) Local Government Area (LGA), the site is zoned R4 High Density Residential within the Lane Cove Local Environmental Plan 2009 (LCLEP). It has an area of 7,595 m2 and comprises an existing office building and warehouse extension on the eastern portion of the site. A single storey structure providing car parking occupies the western part of the site. Car parking is also provided at grade along the southern site boundary and a tennis court is located on the western part of the site.

The site has a sloping topography, with a high point at 22.15m (AHD) along the boundary with the properties to the north, sloping south to a low point of 18.83m (AHD) along the southern boundary, representing an approx. 3.5m level change across the site from north to south.

Vehicle and pedestrian access to the site is via Burns Bay Road. A right of carriageway extends along the western site boundary for driveway access to the neighbouring buildings at 292-298 Burns Bay Road.

The surrounding noise and vibration sensitive receivers to the site include the following:

Receiver 1: 290 BURNS BAY ROAD LANE COVE – Residential Receiver

Receiver 2: 280-288 BURNS BAY ROAD LANE COVE – Residential Receiver

Receiver 3: 292-298 BURNS BAY ROAD LANE COVE – Residential Receiver

Receiver 4: 300A-300B BURNS BAY ROAD LANE COVE – Residential Receiver

Receiver 5: 2 WATERVIEW DRIVE LANE COVE – Mixed-use Residential / commercial / Childcare centre

The site location is presented in Figure 1 below.

Figure 1 Site Location and Noise Measurement Locations

1.2 Project Description

The proposed project by Lane Cove Developments No.1 Pty Ltd located at 300 Burns Bay Road, Lane Cove 2066 is for a new multi-story residential flat building. The site is located within an urban area of the Lane Cove LGA.

The development is proposed to contain 221 residential apartments.

1. Residential GFA approximately 25,000 m^2
2. Basement parking in lower ground level.
3. Landscape including deep soil areas and communal open spaces

2 EXISTING ACOUSTIC ENVIRONMENT

This section of the report details the acoustic survey which has been undertaken at the site for the purpose of obtaining existing background noise levels, as well as noise levels incident to the future building façades.

2.1 Unattended Noise Monitoring

As part of this assessment an acoustic survey of the existing acoustic environment at the site and surrounding receivers was undertaken. The survey included long-term unattended noise logging between 26 September and 9 October 2024. Data affected by adverse meteorological conditions and by spurious and uncharacteristic events have been excluded from the results and also excluded from the data used to determine the noise emission criteria. Meteorological information has been obtained from the Sydney Observatory Hill (ID 066214).

Noise logging was undertaken at one location on the site using 1 x Rion NL-42 monitor with serial numbers 998081. Calibration of the noise logger was checked prior to and following the measurements. Drift in calibration did not exceed ±0.5 dB. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

The unattended noise monitor was located at 300 Burns Bay Road, Lane Cove (the project site), positioned along the southern boundary of the development site.

This monitor was used to determine the background noise to establish the maximum allowable noise for residential receivers.

The location of the noise logger is shown in Figure 1 above.

Graphs presenting summaries of the measured daily noise data are attached to this report in Appendix B. The graphs present each 24-hour period and show the LA10, LAeq and LA90 noise levels for the corresponding 15-minute periods. This data has been filtered to remove periods affected by adverse weather conditions based on weather information.

2.2 Attended Noise Measurements

The survey included attended noise level measurements which were undertaken on 09 October 2024. Testing was conducted during a period when there was no inclement weather. This allowed the existing noise levels at the site to be quantified.

The attended noise measurements were conducted using a SVANTEK 958A sound level meter (serial number 69812). Calibration of the sound level meter was checked prior to and following the measurements using a Brüel & Kjær Type 4231 sound calibrator (serial number 3009148). The calibrator emitted a calibration tone of 94 dB at 1 kHz. The drift in calibration did not exceed ±0.5 dB. All equipment carries appropriate and current NATA (or manufacturer) calibration certificates.

The results of the attended acoustic survey are detailed in Table 1 below.

Table 1 Results of attended noise survey at the site.

Measurement Location	Time of Measurement [1]	Measured Noise Level $L_{Aeq, 15min}$ dB(A) [2]	Comments
Attended Location 1: North-western corner of project site (refer to Figure 1)	11:00 – 11:30, 09 October 2024	62	Noise levels at the project site is dominated by Burns Bay Road traffic and general residential noises.
Attended Location 2: South-eastern corner of project site (refer to Figure 1)		52	Noise levels at the project site is dominated by Burns Bay Road traffic and general residential noises (e.g. cars manoeuvring carpark).

Note 1 For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2 The LAeq is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

2.3 Noise Descriptors & Terminology

Environmental noise constantly varies in level with time. Therefore, it is necessary to measure environmental noise in terms of quantifiable time periods and statistical descriptors. Typically, environmental noise is measured over 15 minute periods and relevant statistical descriptors of the fluctuating noise are determined to quantify the measured level.

Noise (or sound) consists of minute fluctuations in atmospheric pressure capable of detection by human hearing. Noise levels are expressed in terms of decibels, abbreviated as dB or dB(A), the "A" indicating that the noise levels have been frequency weighted to approximate the characteristics of normal human hearing. Because noise is measured using a logarithmic scale, 'normal' arithmetic does not apply, e.g., adding two sound sources of equal values result in an increase of 3 dB (i.e., 60 dB(A) plus 60 dB(A) results in 63 dB(A)). A change of 1 dB or 2 dB in the sound level is difficult for most people to detect, whilst a 3 dB – 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change roughly corresponds to a doubling or halving in loudness.

The most relevant environmental noise descriptors are the LAeq, LA01, LA10 and LA90 noise levels. The LAeq noise level represents the "equivalent energy average noise level". This parameter is derived by integrating the noise level measured over the measurement period. It represents the level that the fluctuating noise with the same acoustic energy would be if it were constant over the measured time period.

The LA01, LA10 and LA90 levels are the levels exceeded for 1%, 10% and 90% of the sample period. These levels can be considered as the maximum noise level, the average repeatable maximum and average repeatable minimum noise levels, respectively.

Specific acoustic terminology is used in this assessment report. An explanation of common acoustic terms is included as Appendix A.

2.4 Unattended Noise Monitoring Results

2.4.1 Results in accordance with the NSW *EPA Noise Policy for Industry (NPI) 2017* (RBL's)

In order to assess the potential noise impacts of the development on nearby sensitive receivers the measured background noise data was processed in accordance with the Environmental Protection Authority (EPA) Noise Policy for Industry (NPI).

The Rating Background Noise Level (RBL) is the background noise level used for assessment purposes at the nearest potentially affected receiver. It is the 90th percentile of the daily background noise levels during each assessment period, being day, evening and night. RBL levels LA90 (15minute) and LAeq noise levels are presented in Table 2.

Table 2 Measured Ambient Noise Levels corresponding to the NPI's Assessment Time Periods

Measurement Location See Figure 1	Daytime[1] 7:00 am to 6:00 pm		Evening[1] 6:00 pm to 10:00 pm		Night-time[1] 10:00 pm to 7:00 am	
	L_{A90}[2] (dB(A))	L_{Aeq}[3] (dB(A))	L_{A90}[2] (dB(A))	L_{Aeq}[3] (dB(A))	L_{A90}[2] (dB(A))	L_{Aeq}[3] (dB(A))
Noise Logger 01	43	42	36	57	54	50

Note 1 For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am

Note 2 The L_{A90} noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.

Note 3 The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

2.4.2 Results in accordance with the NSW EPA *Road Noise Policy (RNP) 2011*

The measured ambient noise level in accordance with the NSW EPA Road Noise Policy (RNP) 2011 are provided in Table 3.

Table 3 Measured Ambient Noise Levels corresponding to the EPA Road Noise Policy (RNP) 2011 Time Periods

Measurement Location	Measured Noise Level	
	Daytime[1] 7:00 am to 10:00 pm	Night-time[1] 10:00 pm to 7:00 am
	$L_{Aeq\ (15hour)}$[1] (dB(A))	$L_{Aeq\ (9hour)}$[1] (dB(A))
Noise Logger 01	56	50

Note 1 The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

3 INTERNAL NOISE LEVEL ASSESSMENT

3.1 The State Environmental Planning Policy (Infrastructure) 2021

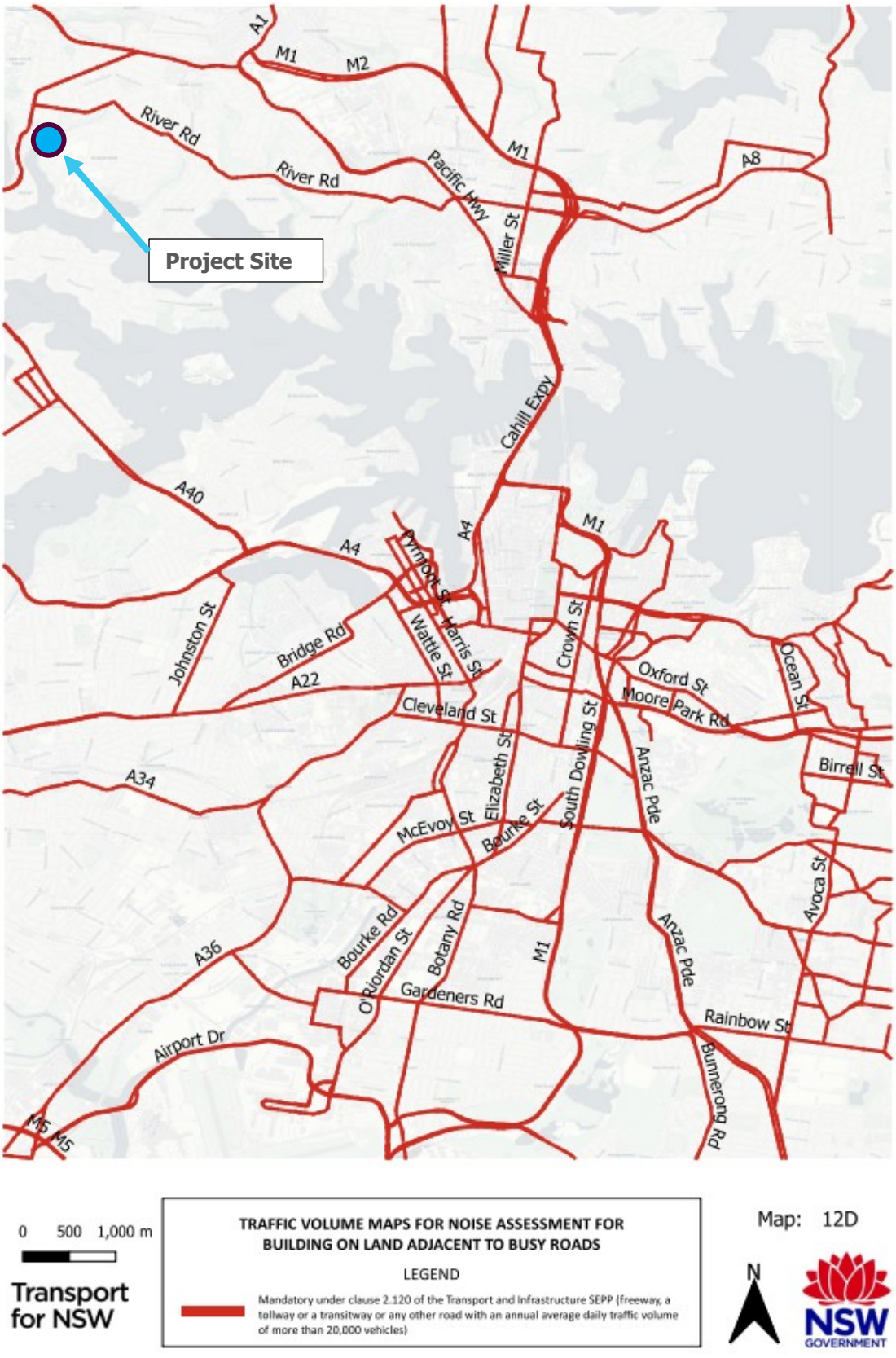
The development site is located with an area which is classified as urban residential area as defined by the NSW EPA *Noise Policy for Industry*. The exiting noise levels at the site are predominantly as a result from traffic noise within the vicinity of the site on surrounding roadways (namely Burns Bay Road).

The site is accessed via Burns Bay Road, which is partially defined as a busy road carrying over 20,000 Annual Average Daily Traffic (AADT) number as defined in Map 13A of the RTA's Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads. However, the section of Burns Bay Road that is designated as a busy road is located approximately 130 m from the footprint of the proposed development, with the section of Burns Bay Road that is used for site access is not considered a busy road.

Therefore, road traffic noise assessment in accordance with the *Development Near Rail Corridors and Busy Roads – Interim Guideline* is not required.

See Figure 2 below which includes the site location included on Map 12D of the RTA.

Figure 2 Site Location of Map 12D of the RTA's *Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads*



3.2 Australian Standards 2107:2016

As mentioned above, assessments of road traffic noise in accordance with the Department of Planning *Development Near Rail Corridor and Busy Roads – Interim Guideline* (DNRCBR) are not required. Internal noise levels within the future residential occupancies have been based on the relevant noise levels as detailed within the Australian Standard AS2107:2016 *Acoustics - Recommended design sound levels and reverberation times for building interiors*.

The recommended levels for various areas of the project are detailed in the following table. The recommended noise levels for residential dwellings near major roadways detailed within AS2107:2016 have been used as the basis of this assessment.

Table 4 Project Internal Environmental Noise Level Criteria

Type of Occupancy/Activity	Design sound level range ($L_{Aeq,t}$)
Residential Buildings – Houses and apartments in inner city areas or entertainment districts or near major roads	
Apartment common areas (e.g., foyer, lift lobby)	45 to 50
Living areas	35 to 45
Sleeping areas (nighttime)	35 to 40
Work areas	35 to 45

Generally, where the final noise levels are within +/- 2 dB of the specified level given above, the design criteria will be considered met. Both the upper and lower limits will need to be satisfied especially where privacy is important or where noise intrusion to be avoided.

3.2.1 Project Airborne Noise Requirements

Based on the details included in the section above, the project internal noise levels requirements are summarised in Table 5 below.

Table 5 Project airborne internal noise level requirements

Room Type	Internal Environmental Noise Levels (Traffic and Airborne Train Noise) – dB(A) $L_{Aeq\ (period)}$
Residential Buildings	
Apartment common areas (e.g., foyer, lift lobby)	50 dB(A) $L_{Aeq\ (15\text{-}hour)}$
Living areas	40 dB(A) $L_{Aeq\ (15\text{-}hour)}$
Sleeping areas (nighttime)	35 dB(A) $L_{Aeq\ (9\text{-}hour)}$
Work areas	45 dB(A) $L_{Aeq\ (15\text{-}hour)}$

4 ENVIRONMENTAL NOISE INTRUSION ASSESSMENT

This section of the report details the assessment of environmental noise intrusion into the proposed development and the recommended acoustic treatments to ensure the recommended internal noise levels detailed in the Sections above (including environmental noise intrusion) are achieved. Internal noise levels within the future areas of the development will result from the noise intrusion into the building through the external façade including glass, masonry and other façade elements. Typically, the acoustic performance of building elements including the relatively light weight elements of the building façade, including glass and/or plasterboard constructions, will be the determining factors in the resulting internal noise levels.

Calculations of internal noise levels have been undertaken based on the measured traffic and calculated environmental noise levels at the site and the characteristics of the building, including window openings, buildings constructions and the like.

4.1 External Glass Elements

The recommended acoustic constructions to the buildings external façade glass elements are detailed in Table 6 below to ensure the recommended internal noise levels detailed above are achieved, with the façade building openings closed.

Table 6 External Glass Acoustic Requirements

Building	Façade Orientation	Room Type	Recommended Glass Construction	Minimum Façade Acoustic Performance[1]
All buildings and levels	**Western Façade orientation**	Bedrooms	10.38 mm Laminated	Rw 35
		Living Rooms	10.38 mm Laminated	Rw 35
		Wet areas	6 mm float	Rw 29
	Northern Façade orientation	Bedrooms	6.38 mm Laminated	Rw 30
		Living Rooms	6.38 mm Laminated	Rw 30
		Wet areas	6 mm float	Rw 29
	Eastern Façade orientation	Bedrooms	6.38 mm Laminated	Rw 30
		Living Rooms	6.38 mm Laminated	Rw 30
		Wet areas	6 mm float	Rw 29
	Southern Façade orientation	Bedrooms	6.38 mm Laminated	Rw 30
		Living Rooms	6.38 mm Laminated	Rw 30
		Wet areas	6 mm float	Rw 29

Note 1 The acoustic performance of the external façade includes the installed glazing and frame including (but not limited to) the façade systems seals and frame. All external glazing systems are required to be installed using acoustic bulb seals.

The recommended glass constructions detailed in the table above include those required to ensure the acoustic requirements of the project are achieved. Thicker glazing may be required to achieve other project requirements such as structural, thermal, safety or other requirements and is to be advised by others.

4.2 External Building Elements

The proposed external building elements including masonry or concrete external walls and roof are acoustically acceptable without additional acoustic treatment.

Any lightweight external plasterboard walls should be constructed from a construction with a minimum acoustic performance of Rw 50.

4.3 External Roof

External roofing system will be a concrete construction. As such, no further acoustic treatments are required. If penetrations through any external skin are required, all gaps remaining in the penetration are to be filled with an acoustic grade sealant which provides an equal or better performance to the system being penetrated.

A detailed review of the roof should be assessed during the design phase of the project.

4.4 External Opening and Penetrations

All openings and penetrations are required to be acoustically treated such that the performance of the building construction is not compromised. This may require lining of duck work behind mechanical service openings/grills, treatments to ventilation opening and the like.

5 EXTERNAL NOISE EMISSION ASSESSMENT

This section of the report details the relevant noise level criteria for noise emissions generated on the site once completed.

The relevant authority which provides the required noise level criteria for noise levels generated on the site includes the NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPI).

For the assessment of the predicted operational noise emissions by the proposed development, the criteria have been derived in accordance with the Noise Policy for Industry (EPA, 2017), details are included in the following sections of this report.

Note that the proposed masterplan comprises of multiple buildings on-site. The established NPI noise emission criteria are applicable to the cumulative noise impacts from the entirety of the proposed development to the nearby sensitive receivers.

5.1 NSW Noise Policy for Industry

In NSW, the control of noise emissions is the responsibility of Local Government and the NSW Environment Protection Authority (NSW EPA). In October 2017, the NSW EPA released the Noise Policy for Industry (NSW NPI). The purpose of the policy is to ensure that noise impacts associated with particular industrial developments are evaluated and managed in a consistent and transparent manner. The policy aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

The NSW NPI criteria for industrial noise sources have two components:

- Controlling the intrusive noise impacts for residential receivers in the short-term; and
- Maintaining noise level amenity of particular land uses for residents and sensitive receivers in other land uses.

The project noise trigger level is derived from the more stringent value out of the project intrusiveness noise level and the project amenity noise level.

5.1.1 Intrusive Noise Impacts (Residential Receivers)

The NSW NPI states that the noise from any single source should not intrude greatly above the prevailing background noise level. Industrial noises are generally considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (LAeq), measured over a 15 minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). This is often termed the Intrusiveness Criterion.

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the NSW NPI. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

5.1.2 Protecting Noise Amenity (All Receivers)

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.2 of the NSW NPI. That is, the ambient LAeq noise level should not exceed the level appropriate for the particular locality and land use. This is often termed the 'Background Creep' or Amenity Criterion.

The amenity assessment is based on noise criteria specified for a particular land use and corresponding sensitivity to noise. The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. These criteria relate only to other continuous industrial-type noise and do not include road, rail or community noise. If the existing (measured) industrial-type noise level approaches the criterion value, then the NSW NPI sets maximum noise emission levels from new sources with the objective of ensuring that the cumulative levels do not significantly exceed the criterion.

5.1.3 Area Classification

The NSW NPI characterises the "Urban Residential" noise environment as an area that has the following characteristics:

- 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

- has through-traffic with characteristically heavy and continuous traffic flows during peak periods

- is near commercial districts or industrial districts

- has any combination of the above

Figure 3 is obtained from the NSW Planning ePlanning Spatial Viewer Zoning Maps and shows the land zoning map of the proposed development and the nearest sensitive receivers.

Figure 3 NSW Planning ePlanning spatial viewer zoning maps

As shown above, the site and all of its nearest surrounding receivers are located in an area defined as R4 (high density residential). The most appropriate zoning for the site and its surrounding receivers is therefore *Urban Residential*.

For residential and commercial receivers in an urban residential area, the recommended amenity criteria are shown in Table 7 below.

When the existing noise level from industrial noise sources is close to the recommended "Amenity Noise Level" (ANL) given above, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the NSW NPfI.

5.1.4 Project specific noise trigger levels

Table 7 NSW NPfI – Recommended LAeq noise levels from noise sources

Location	Time of Day	Project Amenity Noise Level, $L_{Aeq, period}$ [1] (dB(A))	Representative Background Noise level $L_{A90, 15\ min}$ (RBL) [2] (dB(A))	Measured $L_{Aeq, period}$ Noise Level (dB(A))	Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dB(A)) [3]	Amenity $L_{Aeq, 15\ min}$ Criterion for New Sources (dB(A)) [3, 4]
Residence (Urban)	Day	55	43	55	**48**	58
	Evening	45	42	54	**47**	48
	Night	40	36	50	**41**	43
Commercial Receiver	When in Use	60	-	-	-	**63**
Passive Recreation area	When in use	45	-	-	-	**48**

Note 1 Project Amenity Noise Levels corresponding to "Urban" areas, equivalent to the Recommended Amenity Noise Levels minus 5 dB(A)

Note 2 L_{A90} Background Noise or Rating Background Level, including L_{A90} Background Noise or Rating Background Level based on the assumed minimum rating of the EPA NPfI.

Note 3 Project Noise Trigger Levels are shown in bold

Note 4 According to Section 2.2 of the NSW NPI, the LAeq, 15 minutes is equal to the LAeq, period + 3 dB

6 OPERATIONAL ACOUSTIC ASSESSMENT

This section of the report details the assessment of potential noise generated as part of the proposed development.

The assessment of potential noise impacts from various sources of noise on the site are detailed in the following sections.

6.1 Mechanical Services Equipment

Detailed selections of the proposed mechanical plant and equipment to be used on the site are not available at this time. All future plant and equipment are to be acoustically treated to ensure the noise levels at all surrounding receivers comply with noise emission criteria detailed within this report. Experience with similar projects indicated that it is both possible and practical to treat all mechanical equipment such that the relevant noise levels are achieved. Examples of the possible acoustic treatments to mechanical equipment includes the following:

- Supply and Exhaust Fans – location of fans within the building and treated using internally lined ductwork or acoustic silencers.
- General supply and exhaust fans – general exhaust and supply fans such as toilet, kitchen, lobby and other small mechanical fans can be acoustically treated using acoustic flex ducting or internal lined ducting.

Details of the required mechanical services equipment and acoustic treatments to ensure the relevant noise level criteria is achieved will be provided as part of the CC submission of the project.

Experience with similar projects indicates that the acoustic treatment of the proposed mechanical equipment to be installed on the project is both possible and practical.

6.2 Onsite Vehicle and Car Parking Noise

The proposed vehicular movement is restricted to the western end of the development. There is one proposed vehicular entry and exit that connect to the basement car parking, from Burns Bay Road. As such it is anticipated that operational noise impacts to nearby receivers associated with onsite vehicular movements and car parking activities will be minimal as any noise will be sufficiently contained within basement.

Noise associated with the operations of the entry / exit doors such as roller doors or motorised gates must be designed and controlled to comply with the established NPI project noise trigger levels. Installation of the entry / exit doors must also be controlled such that any structure-borne noise within residential areas of the development does not exceed the established internal noise levels.

6.3 Waste and Garbage Collections

Noise resulting from the removal of waste and garbage from the site, including garbage trucks and the like will be undertaken in accordance with council's waste management requirements.

Noise resulting from the collection of waste from the site will include intermittent collection using approved waste collection vehicles. The resulting noise impact resulting from the site will be similar to noise levels currently experienced by exiting receivers from exiting waste collection services and vehicle movements on surrounding roadways.

The recommended acoustic treatments to the building facade detailed in this report include those required to ensure internal noise levels within the future dwellings of the project from the collection of waste will be acoustically acceptable and compliant with the recommended internal noise levels.

7 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

This section of the report details the construction noise and vibration impacts and the required mitigations and management controls required to be implemented as part of the construction of the building. The assessment of construction noise and vibration has been undertaken in accordance with the EPA's *Interim Construction Noise Guideline*.

7.1 Construction Noise

This section of the report details the assessment of noise associated with the proposed construction activities associated with the development. The assessment has been undertaken to assess the potential noise impacts from construction and demolition on surrounding receivers to the site.

The proposed construction and demolition activities to be undertaken on the site include the complete demolition of the warehouse extension located to the west of the office building that is proposed to be retained. The development will then be constructed using normal construction processes.

The assessment of construction noise impacts generated from the site has been undertaken in accordance with the requirements of the EPA Interim Construction Noise Guideline.

The EPA's Interim Construction Noise Guideline defines normal day time hours as the following:

2.2 Recommended standard hours

The recommended standard hours for construction work are shown in Table 1; however, they are not mandatory. There are some situations, as described below, where construction work may need to be undertaken outside of these hours. The likely noise impacts and the ability to undertake works during the recommended standard hours should be considered when scheduling work.

Table 1: Recommended standard hours for construction work

Work type	Recommended standard hours of work*
Normal construction	Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays
Blasting	Monday to Friday 9 am to 5 pm Saturday 9 am to 1 pm No blasting on Sundays or public holidays

* The relevant authority (consent, determining or regulatory) may impose more or less stringent construction hours.

7.1.1 Proposed Appliances

The typical construction appliances which will likely be used as part of the demolition and construction of the project are detailed in the table below.

Table 8 Noise Level from Expected Demotion Appliances

Tasks	Equipment	Sound Power Levels per task dB(A) L_{10}	Aggregate Sound Power Level per Task dB(A) L_{10}
Site Demolition works	Jack hammer mounted on excavator	118	122
	Excavators and bulldozers	115	
	Hand held jack hammer	111	
	Concrete saw	119	
	Skid steer	110	
	Power hand tools	109	
	Materials Movements	105	
Site Ground Works	Jack hammer mounted on excavator	118	122
	Saw cutting	119	
	Excavators and bulldozers	115	
	Materials Movements	105	
	Bulldozers	115	
	Trucks	109	
Construction Works	Piling	115	120
	Welder	101	
	Saw cutter	109	
	Dump truck	109	
	Concrete saw	119	
	Power hand tools	109	
	Cranes	110	

Note 1 Noise levels of proposed equipment to be used on the site based on the Australian Standard AS2436-2010 and noise level measurements previously undertaken of similar equipment on construction sites.

7.1.2 Construction Noise Criteria

This section of the report details the relevant construction noise criteria which is applicable to the site including the EPA's *Interim Construction Noise Guideline* (ICNG).

7.1.2.1 Interim Construction Noise Guideline

Noise criteria for construction and demolition activities are discussed in the Interim Construction Noise Guideline (ICNG). The ICNG also recommends procedures to address potential impacts of construction noise on residences and other sensitive land uses. The main objectives of the ICNG are summarised as follows:

- Promote a clear understanding of ways to identify and minimise noise from construction works;
- Focus on applying all "feasible" and "reasonable" work practices to minimise construction noise impacts;
- Encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours;
- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage; and

- Provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.

The ICNG contains a quantitative assessment method which is applicable to this project. Guidance levels are given for airborne noise at residences and other sensitive land uses.

The quantitative assessment method involves predicting noise levels at sensitive receivers and comparing them with the Noise Management Levels (NMLs). The NML affectation categories for receivers have been reproduced from the guideline and are listed in the table below.

Table 9 Noise Management Levels from Construction

Receiver Type	Time of Day	Noise Management Level $L_{Aeq(15minute)}$[1,2]	How to Apply
Residential	Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise 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.
		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 periods by restricting the hours that the very noisy activities can occur, taking into account: 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. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
	Outside recommended standard hours	Noise affected RBL + 5 dB	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 above the noise affected level, the proponent should negotiate with the community.

offices, retail outlets: external	When is use	$L_{Aeq\ (15\ min)}$ 70 dB(A)	During construction, the proponent should regularly update the occupants of the commercial and industrial premises regarding noise levels and hours of work.

Note 1 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.

Note 2 The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy (EPA 2000).

Table 10 Construction noise management levels – other receivers

Land use	Location applied	Noise management level, $L_{Aeq,15min}$
Places of worship	Internal noise level	45 dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level	65 dB(A)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level	60 dB(A)
Community centres	Refer to the recommended "maximum" internal levels in AS2107 for specific uses	
Industrial premises	External noise level	75 dB(A)
Offices, retail outlets	External noise level	70 dB(A)
Classrooms at schools and other educational institutions	Internal noise level	45 dB(A)

Based on the tables above the suitable construction noise management levels for works undertaken on the site is detailed in Table 6 below.

Table 11 Site Construction Noise Management Levels

Noise Source	Time Period	Receiver Type	Construction Noise Management Level[1]	'High Noise Affected' Level[1]
Construction Noise	During period of approved hours of works	Residential Receivers	53 dB(A) L_{Aeq} (15min)	75 dB(A) L_{Aeq} (15min)
		Commercial Receivers	70	N/A
		Childcare Centres (internal)	55[2]	N/A
		Passive Recreational	60	N/A

Note 1 Construction noise management levels based on the Interim Construction Noise Guideline.

Note 2 In accordance with the ICNG, the Australian Standard AS 2107:2016 has been used to determine an operational internal NML for a childcare centre. A 10 dB difference between inside and outside noise levels has been assumed to determine the external NML for this receiver. This 10 dB correction has been applied to the internal noise level, converting it to an external noise level criteria.

7.1.3 Construction Noise Management – Qualitative Assessment

Based on the assessment conducted of the expected construction noise levels generated from the site, levels are generally expected to require the building contractor to engage in management of activities on the site and engagement with the local community.

Notwithstanding, the following management controls are recommended to mitigate construction noise levels on the site:

1. Construction to be undertaken within the approved hours detailed within the projects *Conditions of Consent.*
2. All plant and equipment are to be maintained such that they are in good working order.
3. A register of complaints is to be recorded in the event of complaints being received, including location, time of complaint, nature of the complaint and actions resulting from the complaint.
4. If required a noise level measurement of the offending plant item generating complaints is to be conducted and noise mitigations undertaken to reduce noise levels to within Noise Management levels in the event magnitude of noise levels is found to be above suitable levels.
5. The use of percussive and concrete sawing should be undertaken behind a closed façade when possible.
6. The use of percussive equipment including hydraulic hammering should be limited such that they are not undertaken prior to 7.30 am on weekdays and prior to 8.30 am on Saturdays.
7. Where possible any excavation to be undertaken on the site is to include ripping of material where possible.

In addition to the recommended mitigations above details of the proposed construction (including demolition) works to be conducted on the site, including type of activities to be conducted as well as the expected duration of activities should be provided to the neighbouring receivers.

In the event noise levels are found to required additional noise reduction then all possible and practical mitigations are required to be included in the construction of the project. Possible acoustic treatments and controls may include the following:

1. Use of alternative appliances to complete the required works which result in reduced noise impacts on surrounding neighbours.
2. Period when noisy appliances are undertaken, such as undertaking noisy works on locations with the greatest distance to residential receivers during morning periods if possible.
3. Construction of acoustic screening to permanently located high noise generating equipment such as pumps and generators.
4. Scheduling of high noise generating works outside of noise sensitive periods if possible.
5. Other site-specific treatments and controls which may become possible once works commence.

7.1.4 Construction Noise Assessment – Quantitative Assessment

A quantitative assessment of the construction noise levels resulting from the proposed works to be undertaken as part of the project on surrounding receivers has been undertaken.

Sound power levels have been predicted for the construction tasks identified in the project program. The equipment anticipated for use in each task is based on previous project experience. The sound power levels for the equipment likely to be used for each of the listed tasks are provided in Table 12 below.

Table 12 Quantitative Assessment of Construction Noise to Neighboring Residence

Source Noise	Equipment	Sound Power Levels dB(A) re 1pW	Site Cumulative Sound Power Level dB(A) re 1pW
Ground works / Demolition / Site Excavation	Excavator	112	119
	Hydraulic Hammer	118	
	Piling Rig	110	
	Handheld jack hammer [1]	111	
	Dump truck [1]	104	
	Concrete saw [1]	114	
	Skid steer	110	
	Power hand tools	109	
Structure	Handheld jack hammer [1]	106	117
	Concrete saw [1]	114	
	Power hand tools	109	
	Welder	101	
	Concrete pump truck	110	
	Concrete agitator truck	108	
Internal Works	Power hand tools	109	109
Common and External Works	Concrete agitator truck	108	117
	Saw cutter[1]	104	
	Dump truck[1]	104	
	Concrete saw[1]	114	
	Power hand tools	109	

Note 1 An assumed time correction has been applied, this being 5 minutes of operation in any 15-minute interval.

Table 13 Receiver 1 – Residential – Summary of preliminary predicted construction noise levels.

Phase	Activity	Aggregate Sound Power Level (dB(A) re 1pW)	Predicted Individual Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Criteria dB(A) $L_{Aeq\ 15\ minutes}$	Summary of Result
Ground Works and Demolition	Excavator	119	61 to 70	66 to 75	**Standard Construction Hours:** **Monday to Friday** 7:00 am – 6:00 pm = 53 **Saturday** 8:00 am – 1:00 pm = 53 **Outside Standard Hours:** = 48 **Highly Noise Affected Level** Standard Construction Hours **75**	Works indicatively predicted to be non-compliant with the Noise Management Level (BG + 10 dB(A)) and above the Highly Noise Affected Level of 75 dB(A) during standard construction hours.
	Hydraulic Hammer		67 to 76			
	Piling Rig		59 to 68			
	Handheld jack hammer		55 to 64			
	Dump truck		48 to 57			
	Concrete saw		58 to 67			
	Skid steer		59 to 68			
	Power hand tools		58 to 67			
Structure	Handheld jack hammer	117	50 to 59	65 to 73		
	Concrete saw		58 to 67			
	Power hand tools		58 to 67			
	Welder		50 to 59			
	Concrete pump truck		59 to 68			
	Concrete agitator truck		57 to 66			
Internal Works	Power hand tools	109	53 to 62	53 to 62		
Common and External Works	Concrete agitator truck	117	57 to 66	63 to 72		
	Saw cutter		48 to 57			
	Dump truck		48 to 57			
	Concrete saw		58 to 67			
	Power hand tools		58 to 67			

Table 14 Receiver 2 – Residential – Summary of preliminary predicted construction noise levels.

Phase	Activity	Aggregate Sound Power Level (dB(A) re 1pW)	Predicted Individual Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Criteria dB(A) $L_{Aeq\ 15\ minutes}$	Summary of Result
Ground Works and Demolition	Excavator	119	62 to 74	67 to 79	**Standard Construction Hours:** **Monday to Friday** 7:00 am – 6:00 pm = 53 **Saturday** 8:00 am – 1:00 pm = 53 **Outside Standard Hours:** = 48 **Highly Noise Affected Level** Standard Construction Hours **75**	Works indicatively predicted to be non-compliant with the Noise Management Level (BG + 10 dB(A)) and above the Highly Noise Affected Level of 75 dB(A) during standard construction hours.
	Hydraulic Hammer		68 to 80			
	Piling Rig		60 to 72			
	Handheld jack hammer		57 to 69			
	Dump truck		50 to 62			
	Concrete saw		60 to 72			
	Skid steer		60 to 72			
	Power hand tools		59 to 71			
Structure	Handheld jack hammer	117	52 to 64	66 to 78		
	Concrete saw		60 to 72			
	Power hand tools		59 to 71			
	Welder		51 to 63			
	Concrete pump truck		60 to 72			
	Concrete agitator truck		58 to 70			
Internal Works	Power hand tools	109	54 to 66	54 to 66		
Common and External Works	Concrete agitator truck	117	58 to 70	64 to 76		
	Saw cutter		50 to 62			
	Dump truck		50 to 62			
	Concrete saw		60 to 72			
	Power hand tools		59 to 71			

Table 15 Receiver 3 – Residential – Summary of preliminary predicted construction noise levels.

Phase	Activity	Aggregate Sound Power Level (dB(A) re 1pW)	Predicted Individual Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Criteria dB(A) $L_{Aeq\ 15\ minutes}$	Summary of Result
Ground Works and Demolition	Excavator	119	66 to 84	71 to 89	**Standard Construction Hours:** **Monday to Friday** 7:00 am – 6:00 pm = 53 **Saturday** 8:00 am – 1:00 pm = 53 **Outside Standard Hours:** = 48 **Highly Noise Affected Level** Standard Construction Hours **75**	Works indicatively predicted to be non-compliant with the Noise Management Level (BG + 10 dB(A)) and above the Highly Noise Affected Level of 75 dB(A) during standard construction hours.
	Hydraulic Hammer		72 to 90			
	Piling Rig		64 to 82			
	Handheld jack hammer		61 to 78			
	Dump truck		54 to 71			
	Concrete saw		64 to 81			
	Skid steer		64 to 82			
	Power hand tools		63 to 81			
Structure	Handheld jack hammer	117	56 to 73	70 to 87		
	Concrete saw		64 to 81			
	Power hand tools		63 to 81			
	Welder		55 to 73			
	Concrete pump truck		64 to 82			
	Concrete agitator truck		62 to 80			
Internal Works	Power hand tools	109	58 to 76	58 to 75		
Common and External Works	Concrete agitator truck	117	62 to 80	68 to 86		
	Saw cutter		54 to 71			
	Dump truck		54 to 71			
	Concrete saw		64 to 81			
	Power hand tools		63 to 81			

Table 16 Receiver 4 – Residential – Summary of preliminary predicted construction noise levels.

Phase	Activity	Aggregate Sound Power Level (dB(A) re 1pW)	Predicted Individual Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Criteria dB(A) $L_{Aeq\ 15\ minutes}$	Summary of Result
Ground Works and Demolition	Excavator	119	63 to 78	68 to 83	**Standard Construction Hours:** **Monday to Friday** 7:00 am – 6:00 pm = 53 **Saturday** 8:00 am – 1:00 pm = 53 **Outside Standard Hours:** = 48 **Highly Noise Affected Level** Standard Construction Hours **75**	Works indicatively predicted to be non-compliant with the Noise Management Level (BG + 10 dB(A)) and above the Highly Noise Affected Level of 75 dB(A) during standard construction hours.
	Handheld jack hammer		69 to 84			
	Dump truck		61 to 76			
	Concrete saw		57 to 72			
	Skid steer		50 to 65			
	Power hand tools		60 to 75			
			61 to 76			
			60 to 75			
Structure	Handheld jack hammer	117	52 to 67	67 to 81		
	Concrete saw		60 to 75			
	Power hand tools		60 to 75			
	Welder		52 to 67			
	Concrete pump truck		61 to 76			
	Concrete agitator truck		59 to 74			
Internal Works	Power hand tools	109	55 to 70	55 to 70		
Common and External Works	Concrete agitator truck	117	59 to 74	65 to 80		
	Saw cutter		50 to 65			
	Dump truck		50 to 65			
	Concrete saw		60 to 75			
	Power hand tools		60 to 75			

Table 17 Receiver 5 – Residential – Summary of preliminary predicted construction noise levels.

Phase	Activity	Aggregate Sound Power Level (dB(A) re 1pW)	Predicted Individual Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Criteria dB(A) $L_{Aeq\ 15\ minutes}$	Summary of Result
Ground Works and Demolition	Excavator	119	59 to 64	64 to 69	**Standard Construction Hours:** **Monday to Friday** 7:00 am – 6:00 pm = 53 **Saturday** 8:00 am – 1:00 pm = 53 **Outside Standard Hours:** = 48 **Highly Noise Affected Level** Standard Construction Hours **75**	Works indicatively predicted to be non-compliant with the Noise Management Level (BG + 10 dB(A)) but below the Highly Noise Affected Level of 75 dB(A) during standard construction hours.
	Handheld jack hammer		65 to 70			
	Dump truck		57 to 62			
	Concrete saw		53 to 58			
	Skid steer		46 to 51			
	Power hand tools		56 to 61			
			57 to 62			
			56 to 61			
Structure	Handheld jack hammer	117	48 to 53	62 to 67		
	Concrete saw		56 to 61			
	Power hand tools		56 to 61			
	Welder		48 to 53			
	Concrete pump truck		57 to 62			
	Concrete agitator truck		55 to 60			
Internal Works	Power hand tools	109	51 to 56	51 to 56		
Common and External Works	Concrete agitator truck	117	55 to 60	61 to 66		
	Saw cutter		46 to 51			
	Dump truck		46 to 51			
	Concrete saw		56 to 61			
	Power hand tools		56 to 61			

Table 18 Receiver 5 – Commercial – Summary of preliminary predicted construction noise levels.

Phase	Activity	Aggregate Sound Power Level (dB(A) re 1pW)	Predicted Individual Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Criteria dB(A) $L_{Aeq\ 15\ minutes}$	Summary of Result
Ground Works and Demolition	Excavator	119	59 to 64	64 to 69	**All days** When in use = 70	Works indicatively predicted to be compliant with the Noise Management Level for commercial receivers.
	Handheld jack hammer		65 to 70			
	Dump truck		57 to 62			
	Concrete saw		53 to 58			
	Skid steer		46 to 51			
	Power hand tools		56 to 61			
			57 to 62			
			56 to 61			
Structure	Handheld jack hammer	117	48 to 53	62 to 67		
	Concrete saw		56 to 61			
	Power hand tools		56 to 61			
	Welder		48 to 53			
	Concrete pump truck		57 to 62			
	Concrete agitator truck		55 to 60			
Internal Works	Power hand tools	109	51 to 56	51 to 56		
Common and External Works	Concrete agitator truck	117	55 to 60	61 to 66		
	Saw cutter		46 to 51			
	Dump truck		46 to 51			
	Concrete saw		56 to 61			
	Power hand tools		56 to 61			

Table 19 Receiver 5 – Childcare Centre – Summary of preliminary predicted construction noise levels.

Phase	Activity	Aggregate Sound Power Level (dB(A) re 1pW)	Predicted Individual Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dB(A) $L_{Aeq\ 15\ minutes}$	Criteria dB(A) $L_{Aeq\ 15\ minutes}$	Summary of Result
Ground Works and Demolition	Excavator	119	49 to 54	54 to 59	**All days** When in use = 55 external noise level. (converted from a 45 dB(A) internal noise criteria with a 10 dB reduction)	Works indicatively predicted to have the potential to exceed the 45 dB(A) internal noise level (55 dB(A) external) limit for works which are undertaken in close proximity to the receiver.
	Handheld jack hammer		55 to 60			
	Dump truck		47 to 52			
	Concrete saw		43 to 48			
	Skid steer		36 to 41			
	Power hand tools		46 to 51			
			47 to 52			
			46 to 51			
Structure	Handheld jack hammer	117	38 to 43	52 to 57		
	Concrete saw		46 to 51			
	Power hand tools		46 to 51			
	Welder		38 to 43			
	Concrete pump truck		47 to 52			
	Concrete agitator truck		45 to 50			
Internal Works	Power hand tools	109	41 to 56	41 to 46		
Common and External Works	Concrete agitator truck	117	45 to 50	51 to 56		
	Saw cutter		36 to 41			
	Dump truck		36 to 41			
	Concrete saw		46 to 51			
	Power hand tools		46 to 51			

Based on the qualitative assessment of construction noise suitable management controls and community notifications are required to be conducted.

The required management of construction noise impacts are included in Section 7.1.3 above and the Community Consultation included in Section 7.4 of this report.

7.2 Construction Vibration Assessment

This section of the report details the assessment of construction vibration impacts on surrounding receivers.

Effects of ground borne vibration on buildings may be segregated into the following three categories:

- Human comfort – vibration in which the occupants or users of the building are inconvenienced or possibly disturbed. Refer to further discussion in Section 7.2.1.
- Effects on building contents – where vibration can cause damage to fixtures, fittings and other non-building related objects. Refer to further discussion in Section 7.2.2.
- Effects on building structures – where vibration can compromise the integrity of the building or structure itself. Refer to further discussion in Section 5.3.

7.2.1 Vibration Criteria – Human Comfort

Vibration effects relating specifically to the human comfort aspects of the project are taken from the guideline titled "Assessing Vibration – A Technical Guideline". (AVTG) This type of impact can be further categorised and assessed using the appropriate criterion as follows:

- Continuous vibration – from uninterrupted sources (refer to Table 20).
- Impulsive vibration – up to three instances of sudden impact e.g. dropping heavy items, per monitoring period (refer to Table 21).
- Intermittent vibration – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously (refer to Table 22).

Table 20 Continuous vibration acceleration criteria (m/s^2) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
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
		0.04	0.029	0.080	0.058
Workshops	Day or night-time	0.04	0.029	0.080	0.058

Table 21 Impulsive vibration acceleration criteria (m/s^2) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
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

Table 22 Intermittent vibration impacts criteria ($m/s^{1.75}$) 1 Hz-80 Hz

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
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

7.2.2 Vibration Criteria – Building Contents and Structure

The vibration effects on the building itself are assessed against 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).

7.2.3 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 23 and illustrated in Figure 4 below.

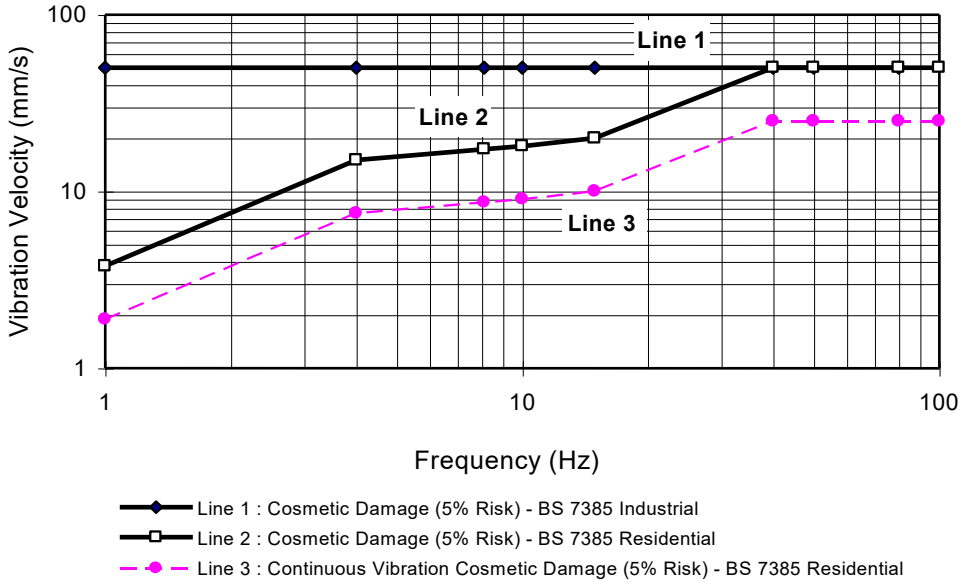
Table 23 Transient vibration criteria as per standard BS 7385 Part 2 - 1993

Line in Figure 5	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 values in Table 23 relate to transient vibration which does not cause resonant responses in buildings.

Where the dynamic loading caused by continuous vibration events is such as that results in dynamic magnification due to resonance (especially at the lower frequencies where lower guide values apply), then the values in Table 23 may need to be reduced by up to 50% (refer to Line 3 in the Figure below).

Figure 4 BS 7385 Part 2 – 1993, graph of transient vibration values for cosmetic damage



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 8, and major damage to a building structure may occur at values greater than four times the tabulated values.

7.2.4 Standard DIN 4150 Part 3 - 1999

For continuous or repetitive vibration, standard DIN 4150 Part 3-1999 provides criteria based on values for peak particle velocity (mm/s) measured at the foundation of the building; these are summarised in 10. The criteria are frequency dependent and specific to particular categories of structures.

Table 24 Structural damage criteria as per standard DIN 4150 Part 3 - 1999

Type of Structure	Peak Component Particle Velocity, mm/s			
	Vibration at the foundation at a frequency of			Vibration of horizontal plane of highest floor at all frequencies
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[1]	
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Note 1 For frequencies above 100 Hz, at least the values specified in this column shall be applied.

7.2.5 Project Vibration Criteria

Based on the details included in the sections above the project specific vibration criteria to protect the surrounding residential receivers from structural or architectural damage includes the following:

- Project construction vibration criteria at all surrounding building structures – 7.5 mm/s

7.2.6 Construction Vibration Impacts

The following vibration mitigation measures should be implemented:

- Any vibration generating plant and equipment is to be in areas within the site to lower the vibration impacts.
- Investigate the feasibility of rescheduling the hours of operation of major vibration generating plant and equipment.
- Use lower vibration generating items of construction plant and equipment; that is, smaller capacity plant.
- Minimise conducting vibration generating works consecutively in the same area (if applicable).
- Undertake the removal of concrete within the building using saw cutting or pulverising where possible.

To ensure the vibration impact criteria detailed in this report are complied with the following safe working mitigations and/or working distances should be implemented as detailed in the table below.

Table 25 Vibration mitigation requirements

Construction Phase	Activity	Vibration Mitigation
Demolition	Hydraulic hammering	Prior to the use of hydraulic hammers to removed concrete or structural elements separation of the neighbouring building is required to the maintained including removal of debris and saw cutting were required.
Excavation	Removal of Rock	Prior to the use of hydraulic hammering within 20 m of neighbouring building a saw cut to the perimeter of the basement to be excavated is required to the undertaken. Saw cutting of the perimeter of the excavation is required to be undertaken on each level of the excavation.
Construction	General Construction activities	General construction activities are not expected to exceed project vibration limits detailed in this report.

7.3 Noise and Vibration Measurements and Monitoring

As part of the management of noise from the proposed demolition, excavation and construction activities to be undertaken on the site the following noise and vibration measurements are recommended to be undertaken:

1. Noise – Attended noise level measurements of typical demolition, excavation and construction activities should be undertaken at site.

   Attended construction noise surveys of the site and surrounding impacts on neighbours should be undertaken during the following as a minimum:

   a. Commencement of any rock breaking or sawing on the site.
   b. In response to any ongoing complaints received from neighbours.

2. Vibration – Based on the proximity of the surrounding receivers to the works attended vibration measurements of typical demolition, excavation and construction activities should be undertaken at site.

   Attended construction vibration measurements at representative locations to the neighbouring building structures should be undertaken at the following times as a minimum:

   a. Measurements to be undertaken at a representative location from the activity being conducted with a similar distance to the potentially affected receiver.
   b. Activities with the potential to generate the greatest magnitudes of vibration include:
      a. Hydraulic hammering of concrete slabs.
      b. Hydraulic hammering during ground works within rock.
   c. In response to any ongoing complaints received from neighbours.

7.4 Community Engagement

During the proposed construction of the project (including excavation and construction) the building contractor is required to engage in community` interaction. The community interaction and notification is required to include the following:

1. Notification of the proposed works to be undertaken on the site and the periods when works will be conducted, including information regarding the programme of works such as demolition and excavation. This should include the expected period when activities such as hydraulic hammering, rock breaking, concrete or rock sawing is required to be undertaken.

2. Details of the relevant site representative where complaints can be registered.
3. Details of the methodology to respond to complaints raised from the surrounding receivers.
4. A register of complaints, to be kept on site including record of time and nature of the complaint as well as the outcomes and comments regarding investigations resulting from the complaint.

8 CONCLUSION

Pulse White Noise Acoustics Consultancy Pty Ltd (Pulse White Noise Acoustics) has been engaged to undertake the Noise and Vibration Impact Assessment of the proposed development to be located at 300 Burns Bay Road, Lane Cove 2066.

This report details the required acoustic constructions of the building's façade, including external windows, to ensure that the future internal noise levels comply with the relevant noise levels of the Australian Standard AS2107:2016 for environmental noise. Providing the recommended constructions detailed in this report are included in the construction of the project the required internal noise levels will be achieved.

External noise emissions from the site have been assessed and detailed in accordance with the NSW Environmental Protection Authorities *Noise Policy for Industry*. The future design and treatment of all building services and on-site basement car parking associated with the development are to be mitigated to ensure the cumulative noise emissions from the site comply with the EPA NPfI criteria including the following:

- Operation of mechanical services for all different buildings on the site
- Operation of on-site basement car parking

A preliminary assessment of construction noise and vibration has also been undertaken and recommendations for a detailed construction noise and vibration management plan and controls as well as community consultation required as part of the construction of the project, including those required to ensure works are undertaken in accordance with the EPA's Interim Construction Noise Guideline have been provided.

Regards

Ben White
Director
Pulse White Noise Acoustics

9 APPENDIX A: ACOUSTIC TERMINOLOGY

The following is a brief description of the acoustic terminology used in this report.

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A Weighted decibels [dB(A])	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:

0 dB(A)	Threshold of human hearing
30 dB(A)	A quiet country park
40 dB(A)	Whisper in a library
50 dB(A)	Open office space
70 dB(A)	Inside a car on a freeway
80 dB(A)	Outboard motor
90 dB(A)	Heavy truck pass-by
100 dB(A)	Jackhammer/Subway train
110 dB(A)	Rock Concert
115 dB(A)	Limit of sound permitted in industry
120 dB(A)	747 take off at 250 metres

Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Ambient sound	The all-encompassing sound at a point composed of sound from all sources near and far.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
Reverberation	The persistence of sound in a space after the source of that sound has been stopped (the reverberation time is the time taken for a reverberant sound field to decrease by 60 dB)

Air-borne sound	The sound emitted directly from a source into the surrounding air, such as speech, television or music
Impact sound	The sound emitted from force of one object hitting another such as footfalls and slamming cupboards.
Air-borne sound isolation	The reduction of airborne sound between two rooms.
Sound Reduction Index [R] *(Sound Transmission Loss)*	The ratio the sound incident on a partition to the sound transmitted by the partition.
Weighted sound reduction index [R_w]	A single figure representation of the air-borne sound insulation of a partition based upon the R values for each frequency measured in a laboratory environment.
Level difference [D]	The difference in sound pressure level between two rooms.
Normalised level difference [D_n]	The difference in sound pressure level between two rooms normalised for the absorption area of the receiving room.
Standardised level difference [D_{nT}]	The difference in sound pressure level between two rooms normalised for the reverberation time of the receiving room.
Weighted standardised level difference [$D_{nT,w}$]	A single figure representation of the air-borne sound insulation of a partition based upon the level difference. Generally used to present the performance of a partition when measured in situ on site.
C_{tr}	A value added to an R_w or $D_{nT,w}$ value to account for variations in the spectrum.
Impact sound isolation	The resistance of a floor or wall to transmit impact sound.
Impact sound pressure level [L_i]	The sound pressure level in the receiving room produced by impacts subjected to the adjacent floor or wall by a tapping machine.
Normalised impact sound pressure level [L_n]	The impact sound pressure level normalised for the absorption area of the receiving room.
Weighted normalised impact sound pressure level [$L_{n,w}$]	A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in a laboratory.
Weighted standardised impact sound pressure level [$L'_{nT,w}$]	A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in situ on site.
C_I	A value added to an L_{nW} or $L'_{nT,w}$ value to account for variations in the spectrum.
Energy Equivalent Sound Pressure Level [$L_{A,eq,T}$]	'A' weighted, energy averaged sound pressure level over the measurement period T.
Percentile Sound Pressure Level [$L_{Ax,T}$]	'A' weighted, sound pressure that is exceeded for percentile x of the measurement period T.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 *"Acoustics – Glossary of terms and related symbol"*

10 APPENDIX B: UNATTENDED NOISE LOGGING

300 Burns Bay Road, Lane Cove

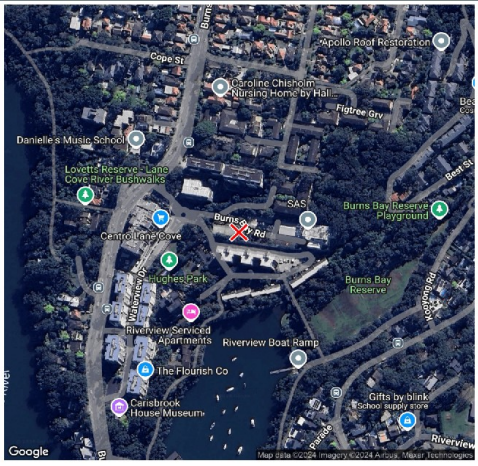
Ambient noise monitoring report

Item	Information
Logger Type	NL-42
Serial number	998081
Address	300 Burns Bay Road, Lane Cove
Location	300 Burns Bay Road, Lane Cove
Facade / free field	Free field
Environment	

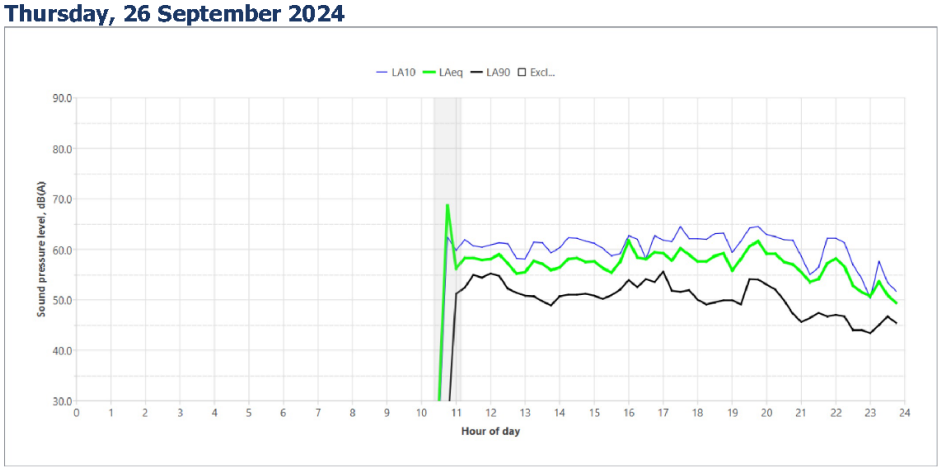
Measured noise levels

Logging date	Rating Background Level			$L_{Aeq,period}$		
	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am
Thu 26 Sep 2024	-	46	-	58	58	54
Fri 27 Sep 2024	47	44	39	58	56	53
Sat 28 Sep 2024	45	42	37	56	54	51
Sun 29 Sep 2024	42	40	36	49	47	46
Mon 30 Sep 2024	47	42	37	57	56	51
Tue 01 Oct 2024	43	41	36	54	55	51
Wed 02 Oct 2024	44	42	35	56	55	52
Thu 03 Oct 2024	43	42	36	49	47	46
Fri 04 Oct 2024	43	41	35	50	47	47
Sat 05 Oct 2024	43	42	36	53	47	46
Sun 06 Oct 2024	42	41	36	52	54	44
Mon 07 Oct 2024	42	40	36	49	46	47
Tue 08 Oct 2024	46	41	37	57	56	51
Wed 09 Oct 2024	-	-	-	59	-	52
Summary	**43**	**42**	**36**	**55**	**54**	**50**

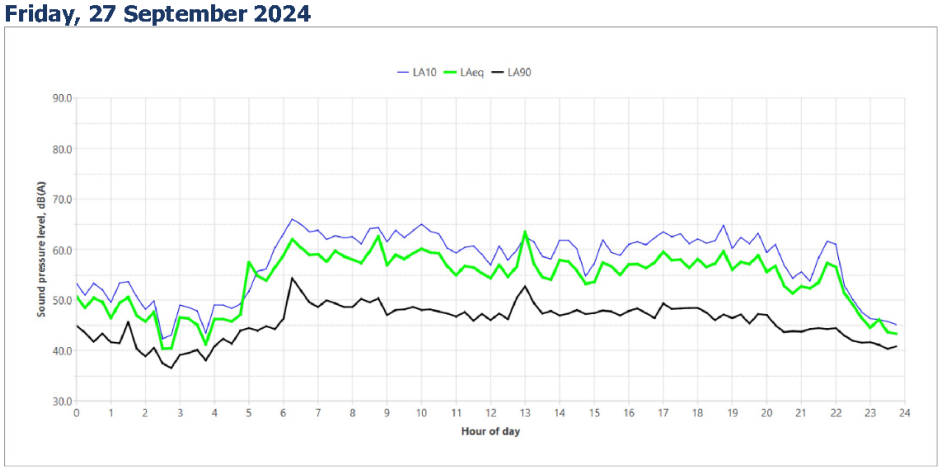
Note: Results with a '-' identify that there were not enough measurements available to correctly calculate the level, in accordance with the Noise Policy for Industry. The data has been excluded either from weather or manual exclusions. See the charts for more information

Logger location	Logger deployment photo
	

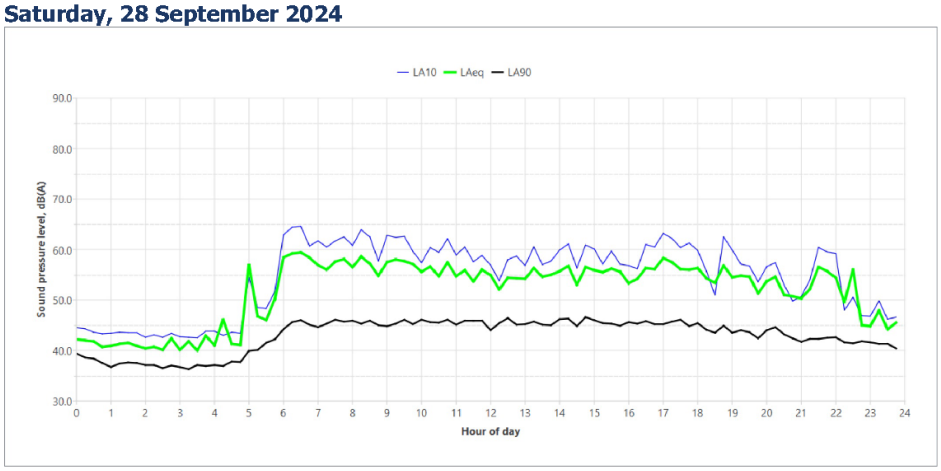
Thursday, 26 September 2024



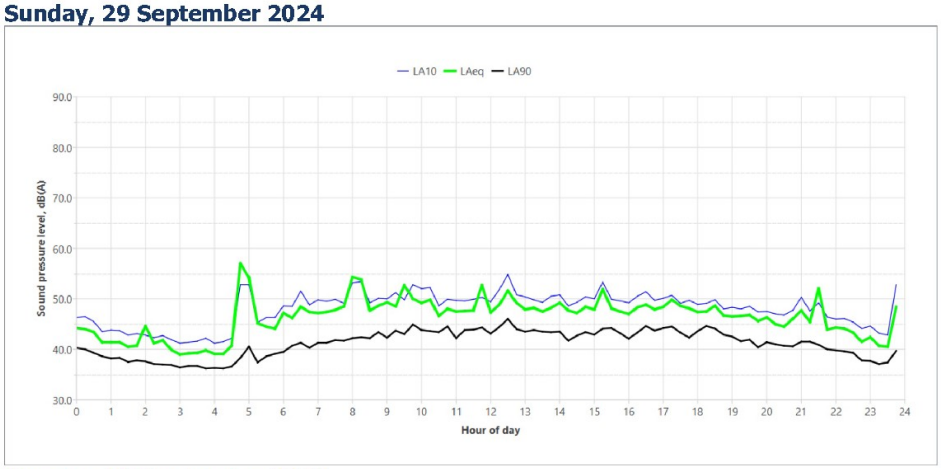
Friday, 27 September 2024



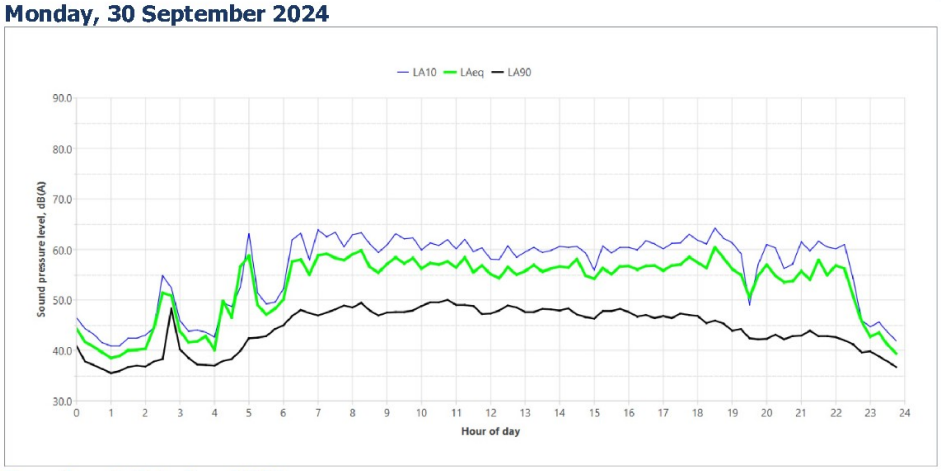
Saturday, 28 September 2024



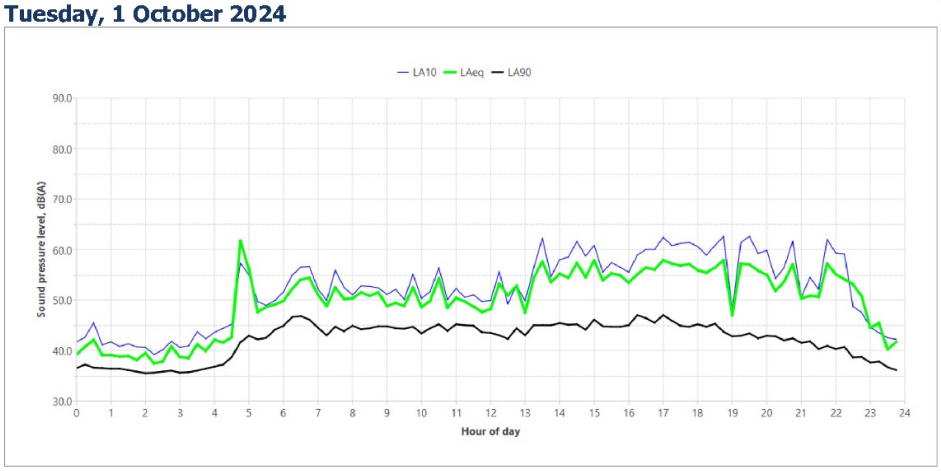
Sunday, 29 September 2024



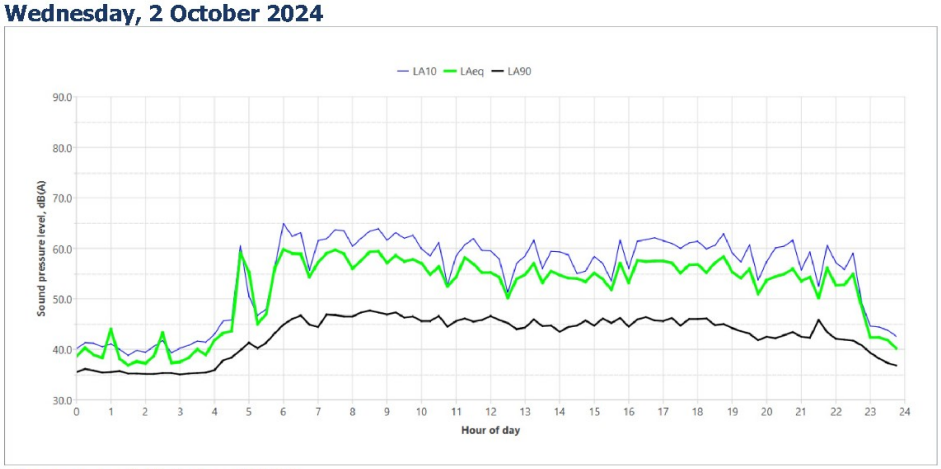
Monday, 30 September 2024



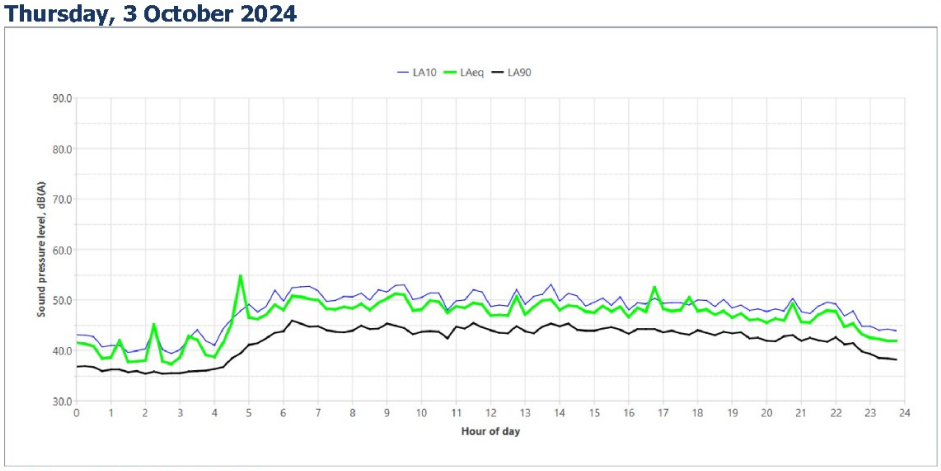
Tuesday, 1 October 2024



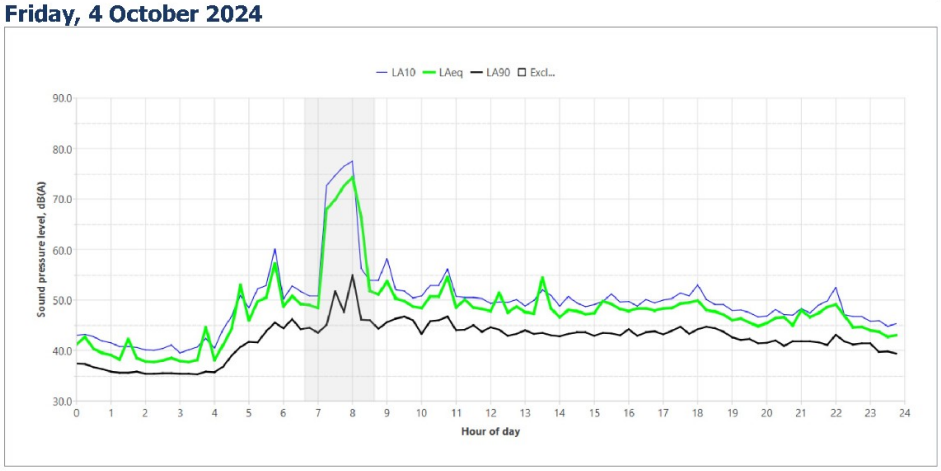
Wednesday, 2 October 2024



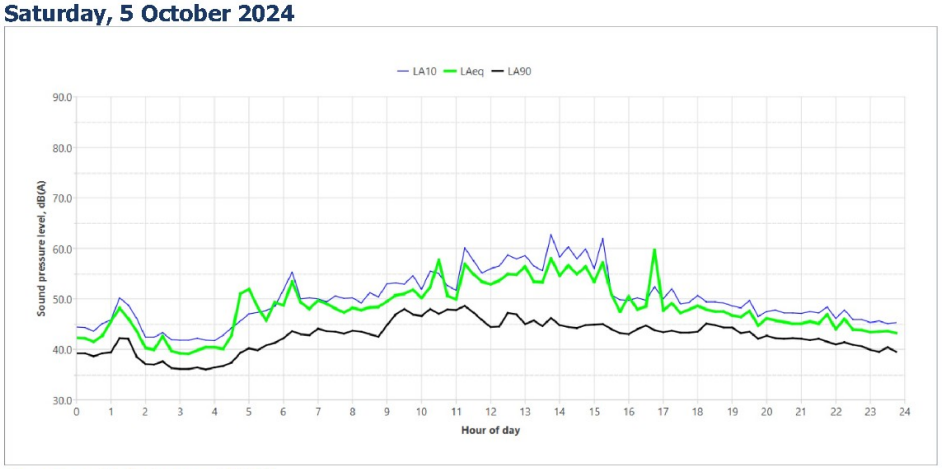
Thursday, 3 October 2024



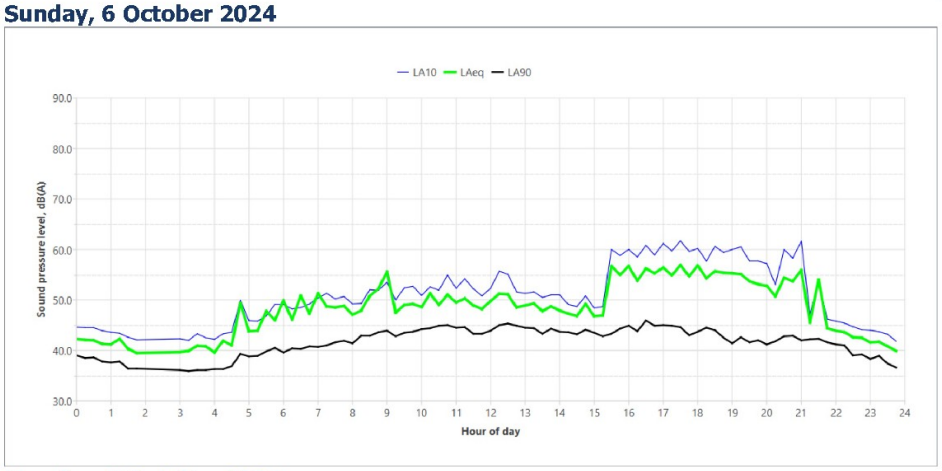
Friday, 4 October 2024



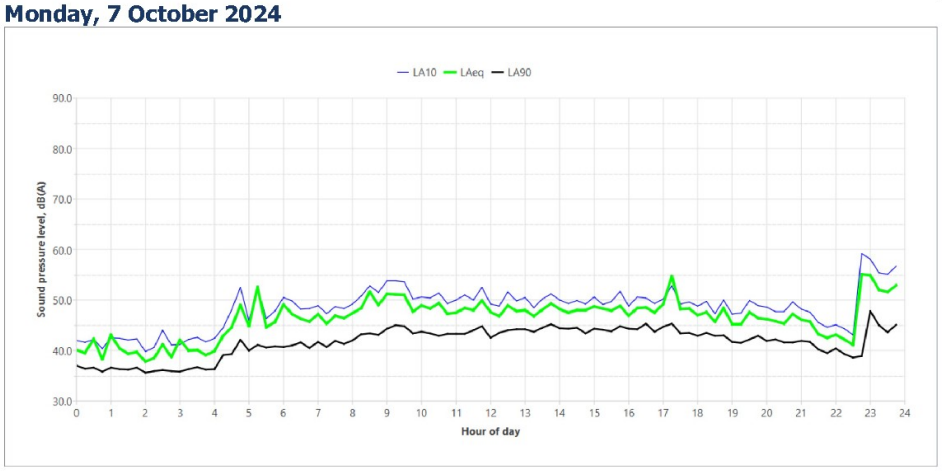
Saturday, 5 October 2024



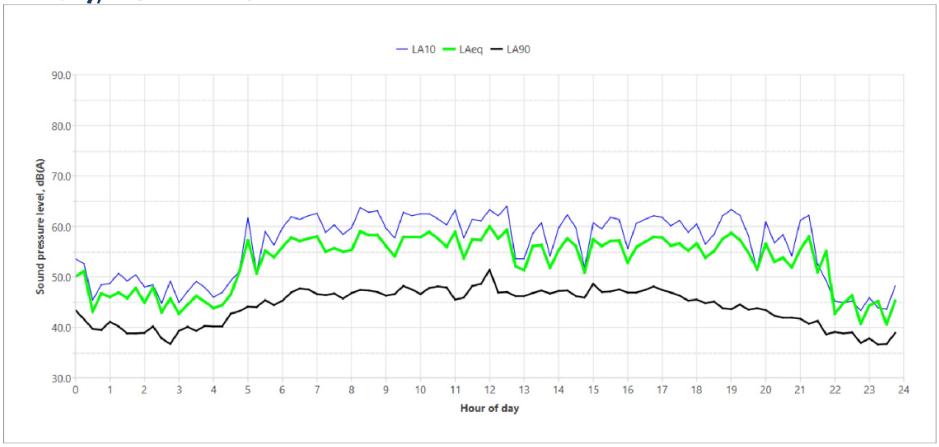
Sunday, 6 October 2024



Monday, 7 October 2024



Tuesday, 8 October 2024



Wednesday, 9 October 2024