



461 Chapel Road, Bankstown

Noise and Vibration Impact Assessment

Sustainable Development Group Limited

Level 4, 233 Castlereagh Street
Sydney, NSW, 2000

Prepared by:

SLR Consulting Australia

SLR Project No.: 610.032332.00001

4 February 2026

Revision: 2.2

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0.1	17 February 2025	Brandon Nguyen Khuong	Tom Candalepas	Tom Candalepas
0.2	5 March 2025	Brandon Nguyen Khuong	Tom Candalepas	Tom Candalepas
1.0	27 March 2025	Brandon Nguyen Khuong	Tom Candalepas	Tom Candalepas
1.1	28 March 2025	Brandon Nguyen Khuong	Tom Candalepas	Tom Candalepas
1.2	6 May 2025	Brandon Nguyen Khuong	Tom Candalepas	Tom Candalepas
2.0	26 September 2025	Brandon Nguyen Khuong	Tom Candalepas	Tom Candalepas
2.1	29 September 2025	Brandon Nguyen Khuong	Tom Candalepas	Tom Candalepas
2.2	4 February 2026	Tom Candalepas	Mark Irish	Tom Candalepas

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Sustainable Development Group Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.



Table of Contents

Basis of Report	i
1.0 Introduction	5
1.1 Relevant Documents	5
1.2 The Site.....	6
1.3 The Proposed Development.....	6
1.4 Assessment Requirements.....	9
1.4.1 SEARs	9
1.4.2 Response to Council Submissions	9
2.0 Existing Noise Environment.....	11
2.1 Nearest Receivers.....	11
2.2 Unattended Noise Monitoring	11
2.3 Attended Noise Monitoring	12
3.0 Existing Vibration Environment	13
3.1 Existing Vibration Environment.....	13
3.2 Future Vibration Environment.....	13
4.0 Noise and Vibration Criteria	14
4.1 Construction Noise Management Levels	14
4.1.1 Residential Receivers.....	14
4.1.2 Other Sensitive Land Uses and Industrial receivers	15
4.1.3 NML for Residential receivers.....	15
4.2 Construction Vibration Criteria.....	15
4.2.1 Human Comfort Criteria.....	15
4.2.2 Effects on Building Contents.....	16
4.2.3 Structural and Cosmetic Damage Vibration	16
4.2.4 Minimum Woking distances for Vibration	17
4.3 Operational Noise Emission Criteria	18
4.3.1 Project Noise Trigger Levels.....	20
4.3.2 Operation of Community Multipurpose Halls.....	21
4.3.3 Cumulative Noise Impacts	21
4.3.4 Sleep Disturbance	22
4.3.5 Correction for Annoying Characteristics	22
4.3.6 Residual Impacts.....	23
4.3.7 Traffic on Surrounding Roads.....	24
4.3.8 Loading Dock Activities	25
4.3.9 Childcare Centre Criteria – Noise Emission.....	25



4.4	Noise Intrusion Criteria	26
4.4.1	Department of Planning: Development Near Rail Corridors and Busy Roads – Interim Guideline	26
4.4.2	AS/NZS 2107-2016 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors	27
4.4.3	Internal Noise Intrusion – Non-residential uses	28
4.4.4	Childcare Noise Intrusion – Traffic Noise	28
5.0	Methodology	29
5.1	Construction noise and Vibration	29
5.1.1	Construction Activities	29
5.1.2	Hours of Construction	29
5.2	Operational Noise Emissions	30
5.2.1	Mechanical Plant	30
5.2.2	Operation of Community Multipurpose Halls and Foyer	31
5.2.3	Off-Site Road Traffic	32
5.2.4	Weather Conditions	32
5.3	Traffic Noise Intrusion	32
5.4	Loading Dock Operation	33
5.5	Childcare Operation	33
5.5.1	Childcare Centre- Outdoor Play Area	33
5.5.2	Childcare Centre – Indoor Play Area	34
5.5.3	Childcare Centre – Mechanical Plant	34
5.5.4	Childcare Centre – Vehicle within Premises	34
5.5.5	Noise Emission – Sleep Disturbance	35
6.0	Assessment of Impacts	36
6.1	Construction Noise	36
6.2	Construction Vibration	39
6.3	Operational Noise Assessment	39
6.3.1	Mechanical Plant	39
6.3.2	Cumulative Impacts	41
6.3.3	Traffic Noise Intrusion	42
6.3.4	Loading Dock Operation	43
6.3.5	Sleep Disturbance	44
6.3.6	Childcare Centre Operation	44
6.3.7	Community Hall Operation	48
7.0	Mitigation Measures	51
7.1	Construction Noise and Vibration Mitigation and Management Measures	51



7.2	Mechanical Plant Treatment Recommendation	54
7.3	Façade Treatment Recommendation	56
7.4	Community Halls and Foyer Spaces Operational Noise Controls	57
7.4.1	Community Halls and Foyer Spaces Noise Management Plan	58
8.0	Conclusion.....	59

Tables

Table 1	SEARs Compliance Table	9
Table 2	Response to Submissions	9
Table 3	Surrounding Sensitive Receivers	11
Table 4:	Summary of Unattended Noise Logging Results.....	12
Table 5	Operator Attended Ambient Noise Survey	12
Table 6	ICNG NMLs for Residential Receivers	14
Table 7	Construction NMLs for ICNG 'Other Sensitive' Receivers	15
Table 8	Project Specific NML for Residential Receivers	15
Table 9	Vibration Dose Values for Intermittent Vibration.....	16
Table 10	BS 7385 Transient Vibration Values for Minimal Risk of Damage	17
Table 11	Recommended Minimum Working Distances from Vibration-intensive Equipment	18
Table 12	Residential Receiver Amenity	19
Table 13	Residential Receiver Amenity Category Assessment.....	20
Table 14	Project Noise Trigger Levels – Industrial Noise.....	20
Table 15	Intrusiveness Criteria during Community Multipurpose Hall Proposed Operation.....	21
Table 16	Sleep Disturbance Screening Levels	22
Table 17	NPfI Modifying Factor Corrections	22
Table 18	NPfI Significance of Residual Noise Impacts	24
Table 19	NPfI Examples of Receiver-based Treatments to Mitigate Residual Noise Impacts	24
Table 20	RNP/NCG Criteria for Assessing Traffic on Public Roads	24
Table 21	Loading Dock Activity Noise Criteria	25
Table 22	Project Noise Emission Criteria for Outdoor Play	25
Table 23	Project Noise Emission Criteria for Activities not including Outdoor Play	26
Table 24	Recommended Internal Noise Levels – sourced from AS 2107-2016	28
Table 25	Internal Noise Level Criteria – residential.....	28
Table 26	Internal Noise Criteria – Non-residential uses	28
Table 27	Sound Power Levels for Construction Equipment	29



Table 28	Residential air conditioning condensers.....	31
Table 29	Level 2 Plantroom equipment	31
Table 30	Typical Source Spectrum Sound Pressure Levels	32
Table 31	Measured Day and Night L_{Aeq} Levels	32
Table 32	Loading Dock Noise Sources.....	33
Table 33	Proposed Number of Children per Age Range.....	33
Table 34	Effective Sound Power Levels for Groups of 10 Children Playing – Sourced from <i>Table 1 AAAC Guideline</i>	34
Table 35	Vehicle Sound Power Level – Sourced from Table 3 AAAC Guideline.....	34
Table 36	Construction noise levels at nearby receiver locations, dBA	37
Table 37	Recommended Minimum Working Distances from Vibration-intensive Equipment in Worst-Case Scenario	39
Table 38	Predicted Onerous Façade Noise Level to Off-site Receivers due to Balcony Condenser Operation	40
Table 39	Predicted Onerous Façade Noise Level to Off-site Receivers due to Level 2 Plantroom Operation.....	41
Table 40	Predicted Traffic Noise Level Summary	42
Table 41	Predicted Onerous Façade Noise Level to On-site Receivers due to Loading Dock Operation.....	43
Table 42	Predicted Onerous Façade Noise Level to Off-site Receivers due to Loading Dock Operation.....	44
Table 43	Predicted Façade Noise Level to On-site Receivers due to Outdoor Play Area Operation.....	45
Table 44	Predicted Façade Noise Level to Off-site Receivers due to Outdoor Play Area Operation.....	46
Table 45	Predicted Façade Noise Level to On-site Receivers due to Childcare Carpark Operation.....	47
Table 46	Predicted Façade Noise Level to Off-site Receivers due to Childcare Carpark Operation.....	47
Table 47	Predicted Noise Levels from Community Hall Operation at the closest Off-site Residential Receivers	48
Table 48	Predicted Noise Levels from Community Hall Operation at the closest Off-site Childcare Receiver	49
Table 49	Predicted Noise Levels from Community Hall Operation at the closest On-site Receiver	49
Table 50	CNVG Standard Mitigation and Management Measures.....	51
Table 51	Acoustic treatment recommendations for air cooled package units.....	55
Table 52	Minimum Façade Acoustic Performance.....	56
Table 53	Operational Noise Control measures for Community Halls and Foyer Space.....	57



Figures

Figure 1	Site Location, Noise Monitoring Locations and Surrounding Receivers.....	8
Figure 2	Acoustic Assessment Screening for Residential Flat Buildings – sourced from <i>DoP Guideline (Figure 3.4(b))</i>	27
Figure 3	Preliminary Mechanical Plant Layout	30
Figure 4	Outdoor Play Area	45

Appendices

Appendix A	Acoustic Terminology
Appendix B	Statistical Ambient Noise Levels
Appendix C	Operational Traffic Façade Noise Maps



1.0 Introduction

This report is submitted to the Department of Planning, Housing and Infrastructure on behalf of the Anglican Church Property Trust Diocese of Sydney under Sydney Anglican Property (SAP) in support of a State Significant Development Application (SSDA) (SSD-79709963) for a mixed-use development, comprising residential accommodation (including social and affordable housing), a place of public worship, community facilities, commercial premises and a centre based childcare facility at 459-461 Chapel Road, Bankstown (the site)

SAP was formed on 1 January 2024 to provide a unified, co-ordinated approach to all diocesan property matters. A key objective of SAP is to put the Sydney Anglican Diocese's property on mission by delivering high-quality projects that provide much-needed community infrastructure, including upgraded ministry facilities, affordable housing and childcare.

As part of this mission, SAP, in partnership with Anglicare, is working with the Government to deliver a 20 storey 100% social and affordable housing development on its landholdings in the Bankstown City Centre. The affordable housing will be accompanied by community and renewed ministry facilities, childcare and retail and commercial uses within the podium.

SLR is suitably qualified and endorsed by the Planning Secretary to produce this noise impact assessment. SLR is a member firm of the Association of Australasian Acoustical Consultants (AAAC).

The acoustic report is reviewed and certified by a suitably qualified acoustic consultant who is a member of the Australian Acoustical Society.

This report summarises the assessment of the potential construction and operational noise impacts associated with the mixed use apartment building. The following report uses specialist acoustic terminology, with an explanation of common acoustic terms is provided in **Appendix A**.

It is noted that this report has been updated in response to key issues raised by Council during the public exhibition of the SSDA and to provide an assessment of the revised design scheme.

1.1 Relevant Documents

The following standards, guidelines, drawings and relevant documents have been used to establish the project specific acoustic design requirements for the development.

- Architectural drawings, prepared by Plus Architecture dated 27 January 2026 (Architectural Drawings)
- IGS Mechanical Schematics dated 7 October 2025 (Mechanical Information)
- Canterbury Bankstown Council Submission to the State Significant Development Application (SSD-79709963) – St Paul's Anglican Church, Bankstown issued 31 July 2025 (council SSDA submission)
- Secretary's Environmental Assessment Requirements for SSD – 79709963 issued 5 February 2025 (SEARs)
- Environmental Impact Statement prepared by Beam Planning (EIS)
- State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP)
- NSW EPA's Noise Policy for Industry, dated October 2017 (NPfI)
- NSW EPA's Road Noise Policy, dated March 2011 (RNP)



- Australian / New Zealand Standard AS/NZS 2107:2016 'Acoustics – Recommended design sound levels and reverberation times for building interiors' (AS/NZS 2107).
- NSW EPA's Interim Construction Noise Guideline, dated July 2009 (ICNG).
- Transport for NSW's Construction Noise and Vibration Guideline, dated September 2023 (CNVG).
- Association of Australasian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment Version 3.0, dated September 2020 (AAAC Guideline)
- AS 2670.2:1990 Evaluation of Human Exposure to Whole-Body Vibration Part 2: Continuous and Shock-Induced Vibration in Buildings (1 to 80 Hz) (AS 2670.2).
- AS 2436:2010 (R2016) Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites (AS2436).
- BS 6472:1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz) (BS 6472).
- BS 7385.2:1993 Evaluation and Measurement for Vibration in Buildings Part 2: Guide to Damage Levels from Ground-borne Vibration (BS 7385.2).
- NSW Department of Environment and Conservation – Assessing Vibration: A Technical Guideline, dated February 2006 (AVTG).
- Department of Planning, Housing and Infrastructure's Development Near Rail Corridors and Busy Roads – Interim Guideline (DoP Guideline).
- Traffic and Parking Impact Assessment prepared by McLaren Traffic Engineering & Road Safety Consultants, dated 26 September 2025 (Traffic Impact Assessment)
- City of Canterbury Bankstown Council's Local Environmental Plan (LEP).
- City of Canterbury Bankstown Council's Development Control Plan 2023 (DCP).

1.2 The Site

The site is located at 459-461 Chapel Road, Bankstown within the City of Canterbury Bankstown Council, formerly Bankstown Council (LGA). It is located 500m of the Bankstown Station and City Centre and as such, is located within the Bankstown TOD Accelerated Precinct.

The site comprises three allotments, which are all owned by the Anglican Church Property Trust Diocese of Sydney and are legally described as Lots 26A, 27A and 28A in DP7058. Combined, the site has an approximate area of 2,179m². It is located on a corner and has a street frontage of 52m to French Avenue to the north and 43m to Chapel Road to the west. **Figure 1** provides an aerial map of the site.

The site currently comprises an existing 350 capacity church building, known as Saint Paul's Anglican Church, as well as an associated ministry building and an additional building containing a range of community uses.

1.3 The Proposed Development

Following detailed design development and public exhibition of the SSDA, minor design refinements have been made to the proposed development. Specifically, the proposed development comprises the following scope of works:



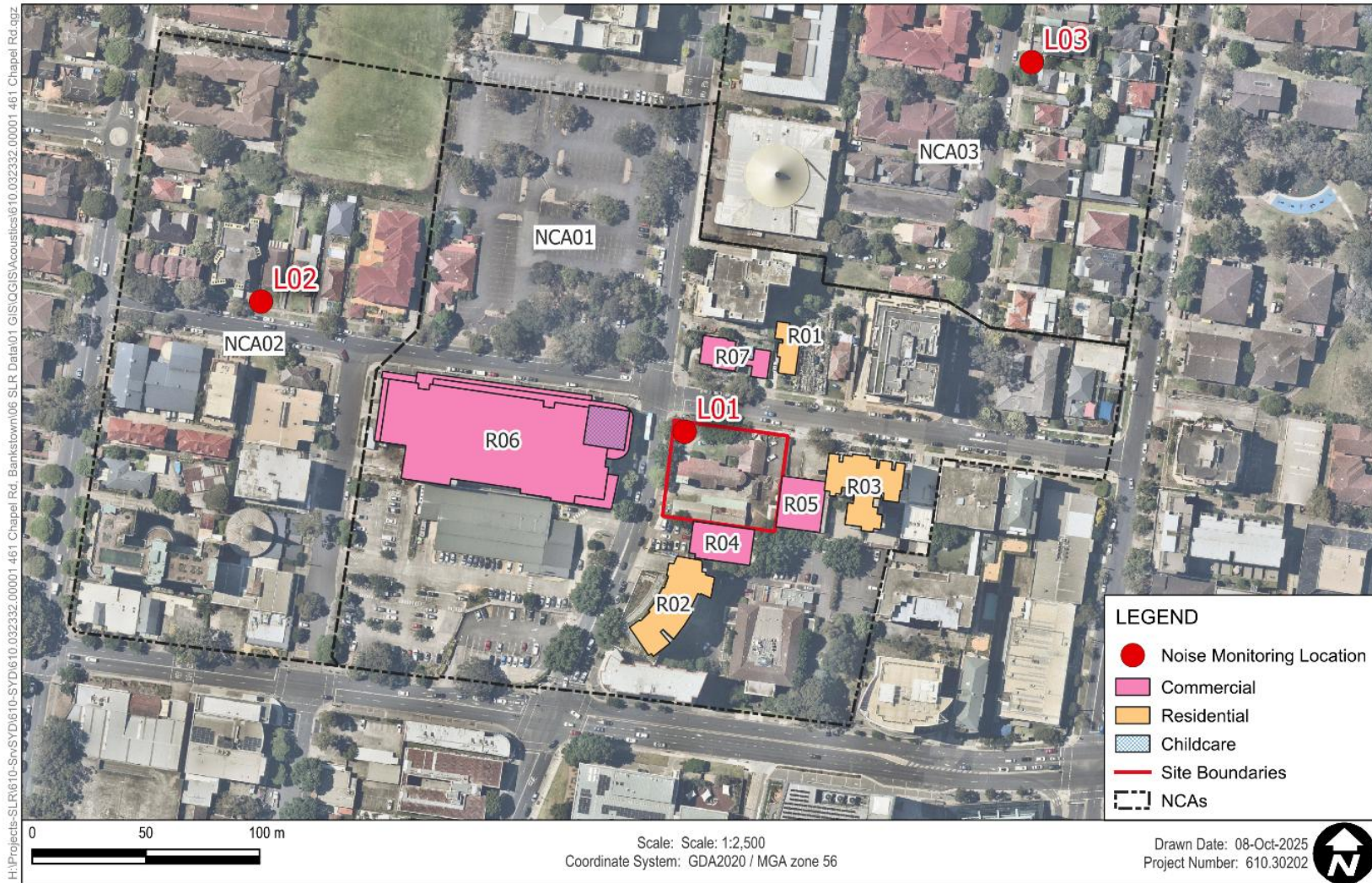
- Site preparation and excavation works, including demolition of all structures on the site.
- Construction of a new mixed-use 20 storey building, comprising the following:
 - One storey basement, comprising of plant areas
 - Carparking on Ground and Mezzanine, which will be accessed via French Avenue. An at-grade shared carpark will be provided along the eastern boundary.
 - Ground floor loading dock which is fully enclosed inside the building.
 - Ground, mezzanine and Level 1 commercial floor space to be used for ministry areas (offices and community halls) and a child care centre for 60 children.
 - The childcare centre will include an outdoor open space on Level 1, which will be shared with the community facility and place of public worship after hours and on weekends and only during the day time and evening periods – 7am to 10pm).
 - Approximately 186 dwellings from Level 2 and above, which will be used for the purpose of affordable housing, with the exception of one four-bedroom dwelling located on Level 2, which will be allocated to the church and therefore, is proposed to be ancillary to the place of public worship.
- Associated landscaping and public domain works.
- Extension and augmentation of physical infrastructure and utilities as required.

For a detailed project description, refer to the Environmental Impact Statement prepared by Beam Planning, as well as the Submissions and Amendment Report prepared by Beam Planning and the revised architectural drawings prepared by Plus.

Figure 1 shows the location of the proposed development, noise monitoring locations, and the surrounding noise-sensitive receivers.



Figure 1 Site Location, Noise Monitoring Locations and Surrounding Receivers



1.4 Assessment Requirements

1.4.1 SEARs

This Noise and Vibration Impact Assessment addresses the relevant Secretary's Environmental Assessment Requirements (SEARs) set out in **Table 1**.

Table 1 SEARs Compliance Table

SEARS Request	Response / Location in Report
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.	Sections 3.0, 4.0, 5.0, 6.0, 7.0 and 8.0

This assessment has been prepared in accordance with the above requirement and is deemed suitable for submission in support of the State Significant Development Application.

1.4.2 Response to Council Submissions

The report has been updated to respond to submissions and comments raised during the public exhibition of the SSDA. **Table 2** below provides a summary of the key comments raised in relation to noise and a reference to where they have been addressed within this report.

Table 2 Response to Submissions

Council Comments	Response / Location in Report
The Bankstown Montessori Academy Childcare Centre located opposite the site at 462 Chapel Road should be considered a sensitive receiver.	Refer to Sections 2.1. 4.1.2. 4.3.1. 4.3.2 and 7.1.
There is the potential for construction noise to impact the childcare centre, particularly if construction works for this proposal and the proposed Bankstown Hospital at 500 Chapel Road are concurrent.	The construction noise impacts have been updated to include the childcare as a receiver. See Sections 4.1.2, 6.1 and 7.1.
The impact of traffic noise generated from the future hospital is not considered for the proposed childcare centre and residential premises.	We anticipate that the hospital will assess as part of their Noise Impact Assessment.



Council Comments	Response / Location in Report
The operation of the multipurpose halls and the associated noise impact on the childcare centre during nap/quiet time should be noted.	Noise from community hall operation has been assessed to the external childcare centre. See Sections 4.3.2 and 6.3.7.
The construction material of the proposed 1.2 metre solid perimeter barrier for the childcare centre should be clearly specified.	Due to childcare centre reconfiguration, the noise barrier has been deleted.



2.0 Existing Noise Environment

2.1 Nearest Receivers

The closest existing receivers to the site immediately north, south, east and west of the site boundary, and are summarised in **Table 3**. Additionally, the site's boundary, receiver's location and unattended noise monitoring locations are depicted in **Figure 1**.

As part of this assessment, we will consider the existing receivers for construction and for the operation of the future development.

Table 3 Surrounding Sensitive Receivers

ID	Receiver Type	Address	Approximate distance from site boundary (m)
R01	Residential	15 French Ave, Bankstown NSW 2200	25
R02	Residential	443 Chapel Rd, Bankstown NSW 2200	20
R03	Residential	10-12 French Ave, Bankstown NSW 2200	25
R04	Commercial	457 Chapel Rd, Bankstown NSW 2200	5
R05	Commercial	14 French Ave, Bankstown NSW 2200	5
R06	Commercial	462 Chapel Rd, Bankstown NSW 2200	30
	Childcare centre		
R07	Commercial	463 Chapel Rd, Bankstown NSW 2200	25

2.2 Unattended Noise Monitoring

Unattended noise monitoring was conducted at the site between 5 December and 13 December 2024. The measured noise levels have been used to determine the existing noise environment and to set the criteria used to assess the potential impacts on nearby noise sensitive receivers.

The monitoring equipment was positioned on-site to measure the existing noise levels, representing the nearest receivers most likely to be affected by the noise emissions from both the potential construction and operational impacts associated with the proposed mixed use apartment building.

The noise monitoring equipment continuously measured existing noise levels in 15-minute periods during the daytime, evening and night-time. All equipment carried current *National Association of Testing Authorities (NATA)*, or manufacturer calibration certificates and equipment calibration was confirmed before and after each measurement with the drift in calibration not exceeding ± 0.5 dB (as required by *AS 1055*).

The measured data has been processed in accordance with the *NSW Environment Protection Authority's (EPA's) Noise Policy for Industry (NPfI)* and the *NSW Road Noise Policy (RNP)* to exclude noise from extraneous events and periods affected by adverse weather conditions, such as strong wind or rain measured at the Bureau of Meteorology *BANKSTOWN AIRPORT AWS - BOM* weather station, to establish representative existing noise levels.

The noise monitoring locations are shown in **Figure 1** and the results are summarised in **Table 4**. Details of the unattended monitoring together with graphs of the measured daily noise levels are provided in **Appendix B**.



Criteria and NMLs have been derived for each noise catchment area (NCAs) by using the noise measurements for each noise logger location (L01, L02 and L03).

Table 4: Summary of Unattended Noise Logging Results

Logger/ NCA ID ³	Measured Noise Levels (dBA)							
	Background Noise (RBL) ¹				Average Noise (L _{Aeq} , 15 minutes) ²			
	Day	Evening	Night-time (10pm to midnight)	Night-time	Day	Evening	Night-time (10pm to midnight)	Night-time
L01/ NCA01	55	53	44	39	66	65	62	60
L02/ NCA02	41	41	37	33	54	53	49	49
L03/ NCA03	50	47	41	39	60	58	54	54

Note 1: The RBL noise level is representative of the 'average minimum background sound level', or simply the background level.

Note 2: The L_{Aeq} is essentially the '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.

Note 3: Noise logger locations are as follows: L01 (On-site 461 Chapel Road), L02 (17 Conway Road), L03 (35 French Avenue).

2.3 Attended Noise Monitoring

Additionally, attended noise monitoring measurements were conducted at each monitoring location. The attended measurement was performed on-site within close-proximity to the noise logger to supplement and confirm the unattended noise monitoring data as representative of the area and its surrounds. These measurements were then used to qualify and quantify the noise levels in the area and hence justify the chosen noise logger locations. A summary of the attended measurements is provided in **Table 5**.

Table 5 Operator Attended Ambient Noise Survey

Location	Date/ Time	Measured Noise Levels	
		L _{A90}	L _{Aeq}
L01 On-site 461 Chapel Road	5 December 2024 @ 12:05 pm	54	64
L02 17 Conway Road	5 December 2024 @ 12:56 pm	42	51
L03 35 French Avenue	5 December 2024 @ 1:44 pm	51	59



3.0 Existing Vibration Environment

3.1 Existing Vibration Environment

There are currently no major existing vibration sources in the project area. The closest being the Bankstown rail line which is 500m away. We note that the Bankstown Metro line is currently being constructed, with a scheduled completion date being Q4 2025.

3.2 Future Vibration Environment

The future vibration environment is not anticipated to significantly change from that of the existing environment.



4.0 Noise and Vibration Criteria

4.1 Construction Noise Management Levels

The *NSW Interim Construction Noise Guideline (ICNG)* is used to assess and manage impacts from construction noise on residences and other sensitive land uses in NSW.

The *ICNG* contains procedures for determining project specific Noise Management Levels (NMLs) for sensitive receivers based on the existing background noise in the area. The 'worst-case' noise levels from construction of a proposal are predicted and then compared to the NMLs in a 15-minute assessment period to determine the likely impact of the proposal.

The NMLs are not mandatory limits, however, where construction noise levels are predicted or measured to be above the NMLs, feasible and reasonable work practices to minimise noise emissions are to be investigated.

4.1.1 Residential Receivers

The *ICNG* approach for determining NMLs at residential receivers is shown in **Table 6**.

Table 6 ICNG NMLs for Residential Receivers

Time of Day	NML LAeq(15minute)	How to Apply
Standard Construction Hours Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or public holidays	Noise affected RBL ¹ + 10 dB	- The noise affected level represents the point above which there may be some community reaction to noise - Where the predicted or measured LAeq(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 dBA	- The Highly Noise Affected (HNA) 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 restructuring the hours that the very noisy activities can occur, taking into account: - 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 - If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside Standard Construction 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 practises have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.

Note 1: RBL is the Rating Background Level and the *ICNG* refers to the calculation procedures in the *NSW Industrial Noise Policy (INP)*. The *INP* has been superseded by the *NSW EPA Noise Policy for Industry (NPfi)*.



4.1.2 Other Sensitive Land Uses and Industrial receivers

Non-residential land uses have been identified in the study area. The NMLs for 'other sensitive' receivers are shown in **Table 7**.

Table 7 Construction NMLs for ICNG 'Other Sensitive' Receivers

Land Use	Noise Management Level LAeq(15minute) (dBA) (applied when the property is in use)	
	Internal	External
Commercial	-	70
Childcare centres – activity areas ¹	45	67
Childcare centres – sleeping areas ¹	40	62

Note 1: It is assumed that these receivers have fixed windows which conservatively results in internal noise levels being around 22 dB lower than the external noise level.

4.1.3 NML for Residential receivers

The construction NMLs for residential receivers have been determined using the results from the unattended noise monitoring and are shown in **Table 8**.

Out of hours NMLs would be applicable should works be required to be undertaken outside ICNG standard construction hours. As this development is likely to be constructed during Standard Construction Hours, approval should be sought as such, with out of hours construction works to be part of a separate approval.

Table 8 Project Specific NML for Residential Receivers

NCA	Noise Management Level (LAeq(15minute) – dBA)
	Standard Construction (RBL +10 dB) ¹
	Daytime
NCA01	65
NCA02	51
NCA02	60

Note 1: RBL = Rating Background Level.

Note 2: Daytime out of hours is 7 am to 8 am and 1 pm to 6 pm on Saturday, and 8 am to 6 pm on Sunday and public holidays.

4.2 Construction Vibration Criteria

The effects of vibration from construction works can be divided into three categories:

- Those in which the occupants of buildings are disturbed (human comfort).
- Those where building contents may be affected (building contents).
- Those where the integrity of the building may be compromised (structural or cosmetic damage).

4.2.1 Human Comfort Criteria

People can sometimes perceive vibration impacts when vibration generating construction works are located close to occupied buildings.



Vibration from construction works tends to be intermittent in nature and the EPA's *Assessing Vibration: a technical guideline* (2006) provides criteria for intermittent vibration based on the Vibration Dose Value (VDV). The 'preferred' and 'maximum' VDV's for human comfort impacts are shown in **Table 9**.

Table 9 Vibration Dose Values for Intermittent Vibration

Building Type	Assessment Period	Vibration Dose Value ¹ (m/s ^{1.75})	
		Preferred	Maximum
Critical Working Areas (eg operating theatres or laboratories)	Day or night-time	0.10	0.20
Residential	Daytime	0.20	0.40
	Night-time	0.13	0.26
Offices, schools, educational institutions and places of worship	Day or night-time	0.40	0.80
Workshops	Day or night-time	0.80	1.60

Note :1 The VDV accumulates vibration energy over the daytime and night-time assessment periods, and is dependent on the level of vibration as well as the duration.

4.2.2 Effects on Building Contents

People perceive vibration at levels well below those likely to cause damage to building contents. For most receivers, the human comfort vibration criteria are the most stringent and it is generally not necessary to set separate criteria for vibration effects on typical building contents.

Exceptions to this can occur when vibration sensitive equipment, such as electron microscopes, are located in buildings near to construction works. No such items of equipment have been identified in the proposal area.

4.2.3 Structural and Cosmetic Damage Vibration

If vibration from construction works is sufficiently high, it can cause damage to structural elements of affected buildings. The levels of vibration required to cause cosmetic damage tend to be at least an order of magnitude (10 times) higher than those at which people can perceive vibration.

Examples of damage that can occur includes cracks or loosening of drywall surfaces, cracks in supporting columns and loosening of joints. Structural damage vibration limits are contained in British Standard *BS 7385*.

BS 7385

British Standard *BS 7385* recommends vibration limits for transient vibration judged to give a minimal risk of vibration induced damage to affected buildings. The limits for residential and industrial buildings are shown in **Table 10**.



Table 10 BS 7385 Transient Vibration Values for Minimal Risk of Damage

Group	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

Note 1: Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%.

For heritage buildings, the standard states that “*a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive*”.

4.2.4 Minimum Working distances for Vibration

Minimum working distances for typical vibration-intensive construction equipment are provided in the Roads and Maritime (now Transport for NSW) *Construction Noise and Vibration Guideline (CNVG)* and are shown in **Table 11**. The minimum working distances are for both cosmetic damage (from *BS 7385*) and human comfort (from the *NSW EPA Vibration Guideline*). They are based on empirical data which suggests that where works are further from receivers than the quoted minimum distances then impacts are not considered likely.



Table 11 Recommended Minimum Working Distances from Vibration-intensive Equipment

Plant Item	Rating/Description	Minimum Distance	
		Cosmetic Damage	Human Response (NSW EPA Guideline)
		Residential and Light Commercial (BS 7385)	
Vibratory Roller	<50 kN (1–2 tonne)	5 m	15m to 20m
	<100 kN (2–4 tonne)	6 m	20 m
	<200 kN (4–6 tonne)	12 m	40 m
	<300 kN (7–13 tonne)	15 m	100 m
	>300 kN (13–18 tonne)	20 m	100 m
	>300 kN (>18 tonne)	25 m	100 m
Small Hydraulic Hammer	300 kg (5 to 12 t excavator)	2 m	7 m
Medium Hydraulic Hammer	900 kg (12 to 18 t excavator)	7 m	23 m
Large Hydraulic Hammer	1,600 kg (18 to 34 t excavator)	22 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 m
Piling Rig – Bored	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Hand held	1 m (nominal)	2 m

The minimum working distances are indicative and will vary depending on the particular item of equipment and local geotechnical conditions. The distances apply to cosmetic damage of typical buildings under typical geotechnical conditions.

4.3 Operational Noise Emission Criteria

The NSW *Noise Policy for Industry (NPfI)* was released in 2017 and sets out the requirements for the assessment and management of operational noise from industry in NSW.

The *NPfI* defines how to determine ‘trigger levels’ for noise emissions from industrial developments. Where a development is likely to exceed the trigger levels at existing noise-sensitive receivers, feasible and reasonable noise management measures are required to be considered to reduce the impacts.

There are two types of trigger levels – one to account for ‘intrusive’ noise impacts and one to protect the ‘amenity’ of particular land uses:

- The **intrusiveness** of an industrial noise source is generally considered acceptable if the L_{Aeq} noise level of the source, measured over a period of 15-minutes, does not exceed the representative background noise level by more than 5 dB. Intrusive noise levels are only applied to residential receivers. For other receiver types, only the amenity levels apply.
- To limit continual increases in noise levels from the use of the intrusiveness level alone, the ambient noise level within an area from all industrial sources should remain below the recommended **amenity** levels specified in the *NPfI* for that particular land use.



Intrusive and amenity noise levels are not used directly as regulatory limits, they are used to assess the potential impact of noise, assess feasible and reasonable mitigation options and subsequently determine achievable noise requirements.

The *NPfI* provides guidance on assigning residential receiver amenity noise categories based on the site-specific features shown in **Table 12**.

Table 12 Residential Receiver Amenity

Receiver Category	Typical Planning Land Use Zoning	Typical Existing Background Noise Levels (RBL)	Description
Rural	RU1 – primary production RU2 – rural landscape RU4 – primary production small lots R5 – large lot residential E4 – environmental living	Daytime <40 dBA Evening <35 dBA Night <30 dBA	Rural – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse. Note: Where background noise levels are higher than those presented due to existing industry or intensive agricultural activities, the selection of a higher noise amenity area should be considered.
Suburban residential	RU5 – village RU6 – transition R2 – low density residential R3 – medium density residential E2 – environmental conservation E3 – environmental management	Daytime <45 dBA Evening <40 dBA Night <35dBA	Suburban – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the 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 >45 dBA Evening >40 dBA Night >35 dBA	Urban – an area with an acoustical environment that: • 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.

Amenity noise categories for the surrounding receivers have been determined with reference to the *NPfI* with our recommendations presented in **Table 13**.



Table 13 Residential Receiver Amenity Category Assessment

Receiver Area	Land Use Zoning	Existing Background Noise Levels RBL (dBA)			Resulting Amenity Classification	Discussion
		Day	Eve	Night		
Residential receivers surrounding the site	Mixed Use	55	53	39	Urban	Land use classification is zoned as mixed use to promote future residential and commercial.

4.3.1 Project Noise Trigger Levels

The trigger levels for industrial noise from the proposal are summarised in **Table 14**. The Project Noise Trigger Levels (PNTLs) are the most stringent of the intrusiveness and amenity trigger level for each period and are highlighted in bold below.

Table 14 Project Noise Trigger Levels – Industrial Noise

Receiver Area	NCA	Period	Recommended Amenity Noise Level $L_{Aeq, period}$ (dBA)	Measured Noise Level (dBA)		Project Noise Trigger Levels $L_{Aeq, 15minute}$ (dBA)	
				RBL ¹	$L_{Aeq, 15 minutes}$	Intrusiveness	Project Amenity ²
Residential-Urban	NCA01	Day	60	55	66	60	58
		Evening	50	53	65	58	53³
		Night (10pm to midnight) ⁴	45	44	62	49	50 ³
		Night	45	39	60	44	48³
	NCA02	Day	60	41	54	46	58
		Evening	50	41	53	46	48
		Night (10pm to midnight) ⁴	45	37	49	42	43
		Night	45	33	49	38	43
	NCA03	Day	60	50	60	55	58
		Evening	50	47	58	52	48
		Night (10pm to midnight) ⁴	45	41	54	46	43
		Night	45	39	54	44	43
Educational (childcare)	NCA01	When in use	35 (internal) ⁵ 57 (external)	-	-	-	35 (internal)
Commercial	-	When in use	65	-	-	-	63

Note 1: RBL = Rating Background Level.



- Note 2: The project amenity noise levels have been converted to a 15-minute level by subtracting 5 dB from the Recommended Amenity Noise Level and adding 3 dB, as outlined in the *NPfI*.
- Note 3: The measured LAeq noise level was dominated by existing road traffic noise and exceeds the recommended amenity noise level by 10 dB or more, therefore, the 'high traffic project amenity noise level' is the existing LAeq(traffic) noise level minus 15 dB, as outlined in the *NPfI*.
- Note 4: As the plant and equipment for community centre will only operate until midnight. Background noise levels up to midnight have been used to determine the community centre noise emission criteria for industrial noise sources.
- Note 5: The criterion is specified as an internal noise level for this receiver category (35 dBA). The eastern façade of R06 accommodates a childcare centre. We have assumed a 22dB reduction through a fully enclosed façade, which is considered conservative. We would expect that during nap / sleep time that the façade would be fully enclosed, particularly during the day time when the traffic noise levels along Chapel Road is 66dBA.

4.3.2 Operation of Community Multipurpose Halls

The development proposes two levels of community multipurpose halls and associated spaces are proposed to operate between 7am and midnight. These spaces are expected to host functions and events which may include music and raised speech from large crowds and are typically controlled by the intrusiveness criterion (RBL + 5) during the proposed operating periods. This has been summarised in **Table 15**.

Table 15 Intrusiveness Criteria during Community Multipurpose Hall Proposed Operation

Receivers	Period	RBL (dBA)	Intrusiveness Criteria L _{Aeq, 15minute} (dBA)
Residential	Day (7am to 6pm)	55	60
	Evening (6pm to 10pm)	53	58
	Night (10pm to midnight)	44	49
Childcare	Day (7am to 6pm)	55	60 external 35 internal (sleep areas)

4.3.3 Cumulative Noise Impacts

The NSW Government *Cumulative Impact Assessment Guidelines for State Significant Projects* requires that the potential combined effect of cumulative impacts from all nearby industrial developments to be considered when assessing potential noise impacts from state significant projects. The guideline references the *NPfI* when determining the approach to assessing the cumulative industrial noise impacts.

The *NPfI* states that it aims to limit continuing increases in cumulative industrial noise through the application of amenity noise levels, which are applicable to all industrial noise sources in an area.

The *NPfI* requires that the amenity noise levels which are applied to an individual project be reduced by 5 dB to allow for the potential cumulative impact from multiple sources of industrial noise in an area (including existing and new).

By doing this, the policy accounts for potential cumulative impacts by lowering the criteria for each individual development to ensure that the ambient noise level within an area from all industrial noise sources combined remains below the recommended amenity noise levels, where feasible and reasonable. The *NPfI* states that “*where the project amenity noise level applies and it can be met, no additional consideration of cumulative industrial noise is required*”.

The potential cumulative impacts from the proposal and other sources of industrial noise in the area are therefore accounted for in the proposal-specific PNTLs (see **Table 14**) and have not been considered further.



4.3.4 Sleep Disturbance

The potential for sleep disturbance from maximum noise level events from the proposal during the night-time period is required to be considered. This is applicable only to residential receivers.

The *NPfl* defines the sleep disturbance screening level as:

- 52 dBA L_{AFmax} or the prevailing background level plus 15 dB, whichever is greater
- 40 dBA $L_{Aeq, 15min}$ or the prevailing background level plus 5 dB, whichever is greater.

Table 16 Sleep Disturbance Screening Levels

NCA	Noise Level (dBA)	
	Sleep Disturbance Screening Levels ¹	
	$L_{Aeq, 15min}$	L_{AFmax}
NCA01	44	54
NCA02	40	52
NCA03	44	54

A detailed maximum noise level event assessment should be completed where the sleep disturbance screening level is exceeded. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

The *NPfl* in turn refers to the *Road Noise Policy* (RNP) for additional information regarding sleep disturbance.

The *RNP* goes on to conclude that from the research on sleep disturbance to date:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to awaken people from sleep.

One or two events per night with maximum internal noise levels of 65-70 dBA are not likely to affect health and wellbeing significantly.

4.3.5 Correction for Annoying Characteristics

Sources of industrial noise can cause greater annoyance where they contain certain characteristics, such as tonality, intermittency or dominant low-frequency content. The *NPfl* specifies the following modifying factor corrections, shown in **Table 17**, which are to be applied where annoying characteristics are present. The corrections are to be added to the noise level at the receiver before comparison with the Project Noise Trigger Levels.

Table 17 *NPfl* Modifying Factor Corrections

Factor	Assessment/ Measurement	When to Apply	Correction ¹
Tonal noise	One-third octave or narrow band analysis	Level of one-third octave band exceeds the level of the adjacent bands on both sides by the levels defined in the <i>NPfl</i> .	5 dB ²
Low-frequency noise	Measurement of source contribution C-weighted and A-weighted level	Measure/assess source contribution C and A weighted $L_{eq,t}$ levels over same time period. Correction to be applied where the C minus A level is 15 dB or more	2 or 5 dB ²



Factor	Assessment/ Measurement	When to Apply	Correction ¹
	and one-third octave measurements	and the level to which the thresholds defined in the NPfl are exceeded.	
Intermittent noise	Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level	The source noise heard at the receiver varies by more than 5 dB and the intermittent nature of the noise is clearly audible. The NPfl further defines intermittent noise as noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB, for example, equipment cycling on and off. The EPA has confirmed⁴ that the intermittent correction does not apply to short-term events that emerge above the general industrial noise level and is therefore not applicable to industrial or commercial sites that have vehicle or plant movements at night, including audible reversing alarms. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.	5 dB ³
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated.	Maximum correction of 10 dB ² (excluding duration correction)

Note 1: Corrections to be added to the measured or predicted levels.

Note 2: Where a source emits tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.

Note 3: Adjustment to be applied to night-time only.

Note 4: How to Apply the Noise Policy for Industry Intermittent Modifying Factor Corrections, NSW Environment Protection Authority, Acoustics Australia Vol. 50, No. 3, September 2022.

At the time of writing, specific noise sources are yet to be determined. Through the detail design phase of the project, these details will be available, and the necessary corrections will be applied. In our experience, these corrections are capable of being designed out during the detail phases of the project.

4.3.6 Residual Impacts

The *NPfl* defines residual noise impacts as exceedances of the Project Noise Trigger Levels which remain after all feasible and reasonable source and pathway mitigation measures have been considered.

The significance of residual noise impacts, as defined in the *NPfl*, is shown in **Table 18**. Examples of receiver-based treatments that can be used to mitigate residual impacts are shown in **Table 19**.



Table 18 NPfl Significance of Residual Noise Impacts

If the Predicted Noise Level minus the Project Noise Trigger Level is:	And the Total Cumulative Industrial Noise Levels is:	Then the Significance of the Residual Noise Level is:
≤ 2 dBA	Not applicable	Negligible
≥ 3 but ≤ 5 dBA	< recommended amenity noise level or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1dB	Marginal
≥ 3 but ≤ 5 dBA	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1 dB	Moderate
> 5 dBA	≤ recommended amenity noise level	Moderate
	> recommended amenity noise level	Significant

Table 19 NPfl Examples of Receiver-based Treatments to Mitigate Residual Noise Impacts

Significance of Residual Noise Impact	Example of Potential Treatment
Negligible	The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.
Marginal	Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity.
Moderate	As for 'marginal', but also upgraded facade elements, such as windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels.
Significant	May include suitable commercial agreements were considered feasible and reasonable.

4.3.7 Traffic on Surrounding Roads

The potential impacts from proposal-related traffic on the surrounding public roads are assessed using the *NSW EPA Road Noise Policy (RNP)*.

An initial screening test is first applied to evaluate if existing road traffic noise levels are expected to increase by more than 2.0 dB. Where this is considered likely, further assessment is required using the *RNP* criteria shown in **Table 20**.

Table 20 RNP/NCG Criteria for Assessing Traffic on Public Roads

Road Category	Type of Project / Land Use	Assessment Criteria (dBA)	
		Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq(1hour) 55 (external)	LAeq(1hour) 50 (external)



4.3.8 Loading Dock Activities

The site proposes to include a loading dock within the carpark along French Avenue. Noise emission related to heavy vehicle access will be controlled by the intrusiveness criteria as summarised in **Table 21**.

Table 21 Loading Dock Activity Noise Criteria

Activity	Time of Day	Noise Criteria, L_{eq} dB(A) (RBL + 5)
Loading dock activities	Day (7am – 6pm)	60
	Evening (6pm – 10pm)	58

4.3.9 Childcare Centre Criteria – Noise Emission

The childcare centre's operation is to be assessed in accordance with the document 'Association of Australasian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment' (AAAC) (Version 3.0) dated September 2020.

As such, this has been adopted for the assessment and the relevant criteria are discussed in the sections below.

It should be noted that at this stage, the assessment provided in this report are preliminary in nature and the selected operator of the childcare centre may choose to submit a modification to council based on their proposed operation.

To date, we understand that as part of this assessment, the childcare centre is seeking approval for the operating hours Monday to Friday 7am – 6pm and caters up to 60 children. This assumption is carried forward to establish the relevant criteria.

This report assesses the noise emission from the outdoor play areas to both onsite and offsite receivers.

4.3.9.1 Noise Emission- Outdoor Play Area

The AAAC Guideline recommends that noise from the outdoor play area as measured at the receiver should not exceed the background noise level by more than 10 dB where outdoor play time is limited to 2 hours during the morning and 2 hours during the afternoon for a total of 4 hours over the entire day.

Where outdoor play time is expected to exceed more than 4 hours during the day, the contributed noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.

The site-specific noise criteria related to outdoor play has been summarised in **Table 22**. This encompasses the scenario where playtime is limited and not limited to 4 hours per day.

Table 22 Project Noise Emission Criteria for Outdoor Play

Activity	Up to 4 hours per Day	More than 4 hours per Day
	Noise criteria, L_{Aeq} dB(A) (RBL+10)	Noise criteria, L_{Aeq} dB(A) (RBL+5)
Outdoor Play Area	65	60

Note 1: The 'Rating Background Level' (RBL) has been used to determine the existing background level. This is a conservative approach as the RBL represents the lower bounds of the measured background noise levels.



4.3.9.2 Childcare Noise Emission (Mechanical Plant, Indoor Play, Pick-up and Drop off Area)

The SEPP in Schedule 6, Chapter 3, Item 6 states:

6 Noise

A new building or (if the development is an alteration or addition to an existing building for the purpose of changing its use) an existing building that is to be used for the purpose of a school or school-based child care must be designed so as not to emit noise exceeding an L_{Aeq} of 5 dB(A) above background noise when measured at any property boundary.

Therefore, the cumulative $L_{eq,15\text{-minute}}$ noise emission level resulting from the use and operation of the childcare centre includes the noise emission resulting from:

- Indoor play
- Mechanical plant
- Drop off and pick up
- Other activities/operations (not including outdoor play)

Therefore, the noise emission criteria for the aforementioned activities have been summarised in **Table 23**.

Table 23 Project Noise Emission Criteria for Activities not including Outdoor Play

Activity	Noise Criteria, L_{eq} dB(A) (RBL + 5)
Child Care Centre activities	60

4.3.9.3 Commercial and Other Sensitive Receivers

The cumulative $L_{eq,15\text{minute}}$ noise level emitted from the use and operation of the childcare centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within any commercial or other sensitive property boundary.

4.4 Noise Intrusion Criteria

4.4.1 Department of Planning: Development Near Rail Corridors and Busy Roads – Interim Guideline

The DoP's *Development near Rail Corridors and Busy Roads – Interim Guideline* governs the required maximum internal noise levels averaged over certain periods within bedrooms and living areas for development's adjacent or near busy roads or rail corridors. The guideline supports the specific rail and road provisions of the State Environmental Planning Policy (Transport and Infrastructure) 2021, which states:

"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 L_{Aeq} levels are not exceeded:

- *In any bedroom in the residential accommodation – 35 dBA at any time between 10.00 pm and 7.00 am,*



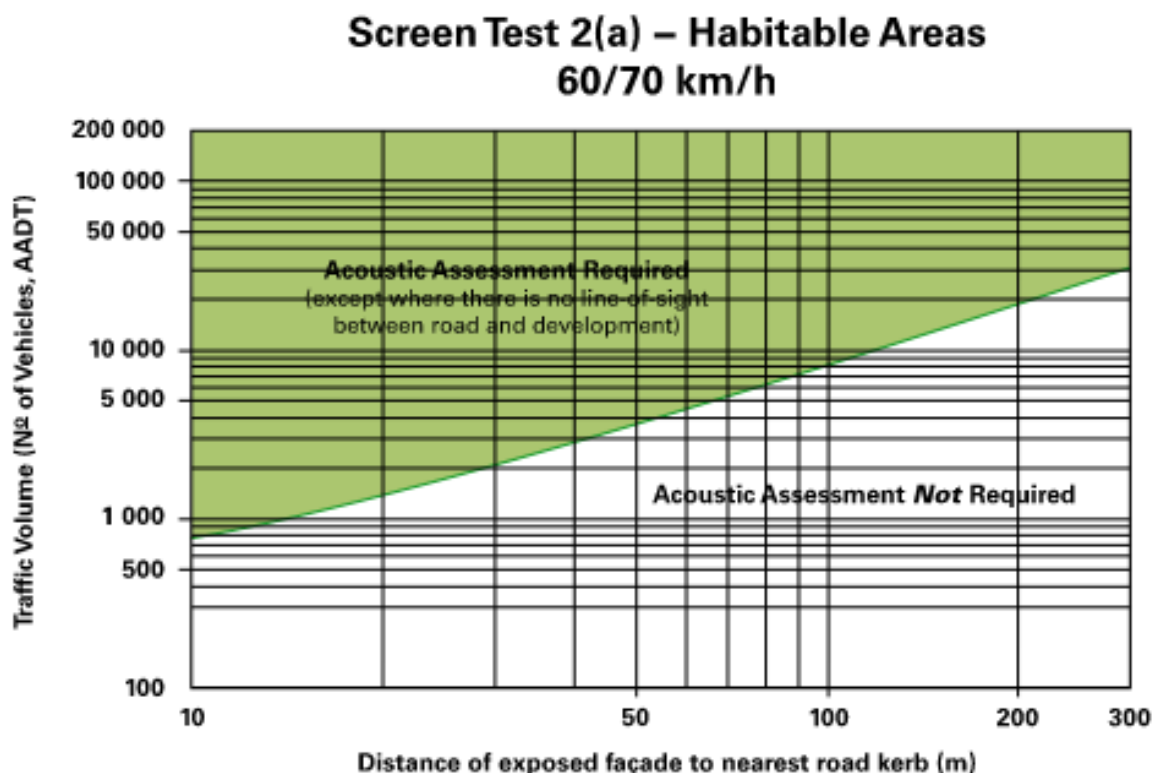
- *Anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway) – 40 dBA at any time."*

The DoP's *Development near Rail Corridors and Busy Roads – Interim Guideline* also states the following with regard to an open windows assessment:

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

The guideline provides a screening test for habitable units to determine whether an acoustic assessment is required based on the site's distance to the road's curb and the road's traffic volume which is depicted in **Figure 2**.

Figure 2 Acoustic Assessment Screening for Residential Flat Buildings – sourced from DoP Guideline (Figure 3.4(b))



The nearest motorway and arterial roads to the site are the Hume Highway, approximately 780m to the north, and Stacey Street (A6), approximately 620m to the east of the proposed site. Therefore, due to the significant distances from the site to any busy roads, the requirements as per the SEPP (Transport and Infrastructure) 2021 are not applicable to this assessment.

4.4.2 AS/NZS 2107-2016 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors

This standard provides recommended design criteria within building interiors to ensure a healthy, comfortable and productive environment for the occupants and the users. As the site is not within close proximity to any major roads or rail, it is expected that acoustic



amenity of the site will be mostly suburban once developed. Therefore, the design sound level range for relevant occupancies are adopted and summarised in **Table 24**.

Table 24 Recommended Internal Noise Levels – sourced from AS 2107-2016

Type of Occupancy	Design Sound Level Range, dBA L_{Aeq}
<i>Houses and apartments in suburban areas or near minor roads</i>	
Sleeping areas (night-time)	30 – 35
Living areas	30 – 40

The upper limit of the design sound level range for each occupancy has been adopted as the internal noise criteria for the site and is summarised in **Table 25**.

Table 25 Internal Noise Level Criteria – residential

Type of Occupancy	Internal Noise Level, dBA L_{Aeq}
Sleeping areas	35 L_{Aeq} , Night-time
Living areas	40 L_{Aeq} , Day

4.4.3 Internal Noise Intrusion – Non-residential uses

All internal non-residential areas should be designed to mitigate external noise intrusion to the recommended internal noise criteria based upon their use in *AS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors* as summarised in **Table 26**.

Table 26 Internal Noise Criteria – Non-residential uses

Type of space	Applicable Time Period	Assessment Noise Metric	Internal Noise Criteria – dB(A)
Multipurpose hall	When in use	L_{Aeq} , Period	40
Office areas	When in use	L_{Aeq} , Period	45
Restaurants and cafeterias	When in use	L_{Aeq} , Period	50

4.4.4 Childcare Noise Intrusion – Traffic Noise

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry for the child care centre in accordance with the AAAC Guideline is summarised during the hours when the Centre is operating as follows:

- at any location within the outdoor play or activity area should not exceed $L_{Aeq,1hr}$ 55 dB(A).
- at any indoor location shall be capable (ie with doors and / or windows closed) of achieving $L_{Aeq,1hr}$ 40 dB(A) within indoor activity areas and $L_{Aeq,1hr}$ 35 dB(A) in sleeping areas.



5.0 Methodology

5.1 Construction noise and Vibration

5.1.1 Construction Activities

The construction activities required for building the development, along with the sound power levels for individual equipment and the overall activity, are presented in **Table 27**.

The assessment uses 'realistic worst-case' scenarios to determine the impacts from the noisiest 15-minute period that are likely to occur for each work scenario, as required by the *ICNG*.

Table 27 Sound Power Levels for Construction Equipment

Construction Activity	Plant Equipment	Operating minutes in 15-min period ²	Sound Power Level L _w (dBA)
Excavation & Demolition	Excavator - Rock Breaker	5	121
	Excavator 30T	10	109
	Excavator 15T	10	97
	Articulated Dump Truck (40t)	10	107
	20T Roller	15	117
	Truck (Water Cart)	10	107
	Compactor	10	108
	Piling – bored	15	111
	Concrete Mixer Truck	10	103
	Mobile crane – Franna	15	98
	Roller - Vibratory (>18 tonne)	15	109
Construction	Mobile Crane (100t)	15	100
	Mobile Crane - Franna	15	98
	Hand Tools	10	94
	Truck (water cart)	10	107
	Concrete Pump	10	106
	Concrete Mixer Truck	10	103
	General delivery trucks	10	101
	Tower crane (Fixed)	10	105
	Concrete vibrator	10	99

Note 1: The *ICNG* requires 'annoying' activities (such as jackhammering, rock breaking and power saw operations) to have a 5 dB 'penalty' applied to the source sound power level.

Note 2: This refers to the amount of time in minutes that individual items of equipment would likely be in use for during the worst-case 15-minute assessment period.

5.1.2 Hours of Construction

Based on the SLR previous experience and the *ICNG* recommendations, the standard hours of construction is used as follows:

- Monday to Friday 7 am to 6 pm



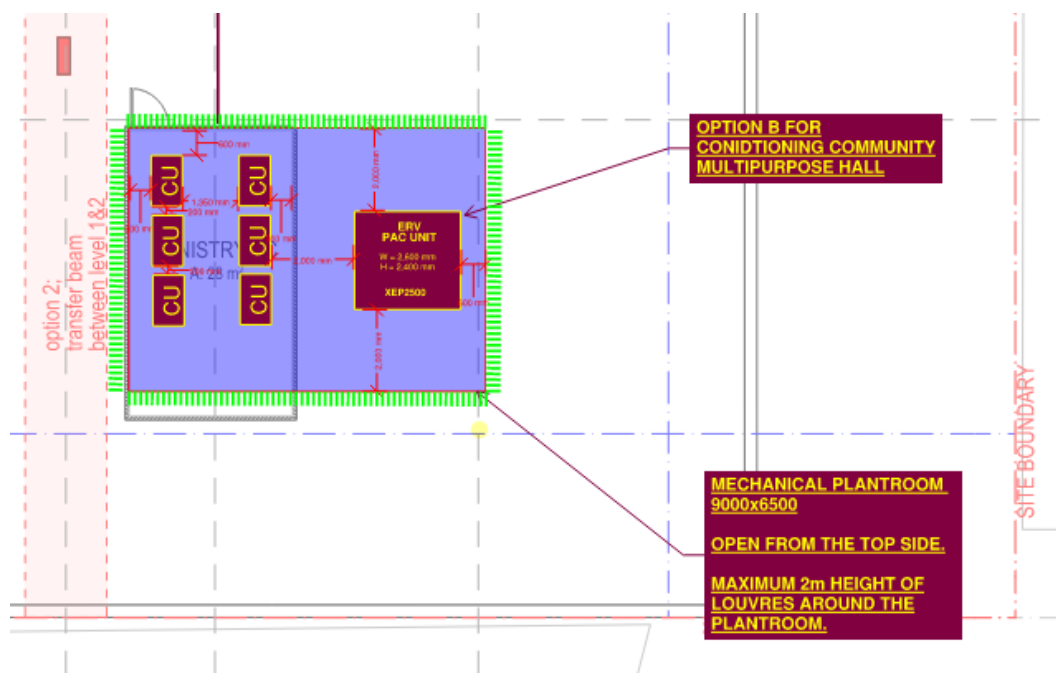
- It is assumed that any work outside of standard hours will be included in a separate submission to the authorities, as required.

Upon reviewing the design documentation prepared for the Development Application, the acoustic elements to consider for the proposed development include operational noise emissions from:

- ### 5.2.1 Mechanical Plant

The main sources of externally located mechanical plant noise at the proposal would be the AC Condenser units located on the balconies of each apartment and the plantroom located on Level 2 as depicted in **Figure 3**.

Figure 3 Preliminary Mechanical Plant Layout



5.2.1.1 Residential A/C Condensers

Regarding the residential A/C condensers located on the balcony, we have made the following assumptions:



- Day time (7am to 6pm): 50% of A/C condensers operating
- Evening (6pm to 10pm): 60% of A/C condensers operating
- Night-time (10pm to 7am): 20% of A/C condensers operating and set to night time mode (8dBA lower)

The operational hours and maximum allowable sound power level adopted for these condensers are summarised in **Table 28**.

Table 28 Residential air conditioning condensers

Noise Source	Location	Maximum Allowable Sound Power Level (dBA)	Operational Hours
A/C Condensers	Balconies on each apartment	64	Assumed operational 24/7

5.2.1.2 Level 2 Plantroom (serving ground, mezzanine and level 1)

The operational hours and maximum allowable sound power level adopted for these Level 2 Plant room are summarised in **Table 29**. These may be subject to change and revised during detailed design.

Table 29 Level 2 Plantroom equipment

Noise Source	Quantity	Maximum Allowable Sound Power Level (dBA)	Operational Hours
Heat Recovery Units ¹	6	89	Assumed operational 7am to midnight
Air Cooled Package Unit	1	89	
Kitchen Make Up Fan	1	71	7am – 10pm

5.2.2 Operation of Community Multipurpose Halls and Foyer

We understand that both foyers (located on ground and level 1) may be used as a pre function space where music will not be played. On the other hand, we understand that music will be played in the community halls on ground level and level 1. This music may take form of congregation singing, bands and amplified DJ music. To simulate the operation of the community halls and foyer, we have used our previous experience on similar projects to estimate internal noise levels, which are presented in **Table 30**.

The following scenarios have been modelled in our assessment of the spaces:

- Scenario 1 – Up to 300 people with background music in each foyer with windows and / or doors open and closed
- Scenario 2 – Amplified DJ music or congregation singing in the community multipurpose halls
- Scenario 3 – Band music in the community multipurpose halls



Table 30 Typical Source Spectrum Sound Pressure Levels

Noise Source	Reverberant Sound Pressure Level, dB Leq,15minute Octave Band Centre Frequency, Hz								Overall, dBA
	63	125	250	500	1k	2k	4k	8k	
Typical background music and patron noise levels (300 patrons)	86	83	80	81	79	75	68	62	83
Amplified DJ music	86	91	94	95	92	85	79	71	96
Live bands	93	107	101	106	101	96	88	77	106

Noise breakout from the site has been predicted for each of the aforementioned scenarios based on the internal reverberant noise levels breaking out through the western façades.

5.2.3 Off-Site Road Traffic

The Traffic Impact Assessment states that the traffic generation of this mixed-use development will be 59 vehicle trips in the AM peak period and 58 vehicle trips in the PM peak period.

The site's predicted AM/PM peak traffic generation, when compared to the existing traffic volume on surrounding roadways, is expected to cause less than a 60% increase in traffic during peak hours. This increase correlates to a relative noise increase of less than 2 dB, which is considered negligible.

As such, no further assessment of off-site traffic noise is required.

5.2.4 Weather Conditions

Fact Sheet D of the *NPfl* requires noise assessments to consider the potential effects of noise-enhancing weather conditions, such as wind from the source to the receiver and/or temperature inversions.

The nearest sensitive receivers are within 50 m of the proposal site and the effects of weather on noise levels are expected to be minimal.

5.3 Traffic Noise Intrusion

A noise monitoring survey was conducted on-site at logger location L01 to establish the existing road traffic noise environment at the intersections of Chapel Road and French Avenue.

The measured noise levels were adopted as part of the traffic noise model validation process.

The results from the noise monitoring have been analysed to establish the road traffic noise levels in terms of the daytime LAeq,15-hour and night-time LAeq,9-hour values as shown in **Table 31**.

Table 31 Measured Day and Night LAeq Levels

Time Period	Measured Levels
Day (7am – 10pm)	66 dB(A) LAeq,15-hour
Night (10pm – 7am)	60 dB(A) LAeq,9-hour



The measured road traffic noise levels are incorporated in the traffic noise assessment detailed in **Section 6.3.3**.

5.4 Loading Dock Operation

Typical sound power levels from a heavy vehicle accessing the site's carpark and undertaking waste disposal have been included in **Table 32**.

Table 32 Loading Dock Noise Sources

Noise Source	Sound Power Level (dBA) ¹	Typical Duration of Use in Worst-case 15-minute Period
Truck reversing alarm	107	30 seconds
Air brakes	118	1 second
Heavy truck movement	108	5 minutes

Note 1: SWLs based on measurement data, where appropriate.

5.5 Childcare Operation

The *AAAC Guideline* requires the cumulative noise emission from the operation of the childcare centre discussed in the sections below to be assessed at the receivers.

The childcare centre is expected to accommodate up to 60 children with the following age spread summarised in **Table 33**.

Table 33 Proposed Number of Children per Age Range

Age Range	Children Capacity
0 to 2 years (infant)	20
2 to 3 years (toddlers)	20
3 to 5 years (preschoolers)	20

The cumulative impact from the childcare centre's operation at sensitive receivers will be assessed with the following assumptions and parameters detailed in the sections below.

5.5.1 Childcare Centre- Outdoor Play Area

The *AAAC Guideline* stipulates that noise emissions from outdoor play areas are associated with noise from children. Various factors influence the overall perceived noise level including:

- Number of children vocal at any one time (assumed to be one in 2).
- Activity that the children are engaged in.
- Type of voice (shout to whisper).
- Age of the children.
- Directionality of voice.
- Distance between the children and the receiver point for outdoor and indoor areas.
- Height of the child (i.e. whether standing or seated) for outdoor areas.
- Reverberation ('echo') in the room for indoor or semi-enclosed areas.

Specifically, the age of children greatly influences the overall noise emissions, and this has been categorised for groups of 10 children by age range summarised in **Table 34**.



Table 34 Effective Sound Power Levels for Groups of 10 Children Playing – Sourced from Table 1 AAAC Guideline

Age of Children (years)	Sound Power Levels dB at Octave Band Centre Frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
0 to 2	54	60	55	72	74	71	67	64
2 to 3	61	67	73	79	81	78	74	70
3 to 5	64	70	75	81	83	80	76	72

Note 1: If applicable, an adjustment to the above sound power levels of -6 dB could be applied in each age group for children involved in passive play.

Note 2: For simplicity, based upon a review of World Health Organization (WHO) data, a single recommended source height of 1 metre is suggested as the source heights

5.5.2 Childcare Centre – Indoor Play Area

It is anticipated that the building will be mechanically ventilated, and windows/doors will be closed during indoor learning periods and other activities. It is also anticipated that the building and glazing systems will be of standard construction, e.g.:

- External walls – brick or metal cladding with plasterboard lining and cavity insulation ($R_w > 45$).
- Glazing – 6 mm float glass with weather seals to openable sections ($R_w > 30$).

As windows would be closed, it is assumed that internal noise levels would not contribute to the external noise levels at the nearest receivers.

5.5.3 Childcare Centre – Mechanical Plant

The mechanical plant related to the childcare centre's operation are contained within the level 2 plantroom. The methodology for assessing noise emissions from the level 2 plant items is discussed in **Section 5.2.1**.

5.5.4 Childcare Centre – Vehicle within Premises

The noise from cars and small delivery vans arriving at the centre may be a significant source of noise and should be considered. Typical sound power levels for vehicles within the car park area of a child care centre are provided in **Table 35**.

Table 35 Vehicle Sound Power Level – Sourced from Table 3 AAAC Guideline

Vehicle	Sound Power Level dBA
Car	81
Delivery Van	86

The typical operating hours for a childcare centre are between 7am and 6pm. It is expected that drop-offs will occur between 7am and 9am, and pick-ups will take place between 4pm and 6pm.

The Traffic Impact Assessment states that the traffic generation of the Childcare centre will be approximately 48 trips in the peak hour. The childcare centre is expected to accommodate approximately 15 carparks bays on the ground level.



5.5.5 Noise Emission – Sleep Disturbance

As the typical operating hours for a childcare centre is between 7am – 6pm, this falls outside the period assessable for sleep disturbance. Therefore, this is not further assessed.



6.0 Assessment of Impacts

6.1 Construction Noise

The following overview is based on the predicted impacts at the most affected receivers and is representative of the worst-case noise levels that are likely to occur during construction.

The assessment shows the predicted impacts based on the exceedance of the management levels.

A summary of the predicted noise levels (without mitigation) for the various work activities is shown in **Table 36**. For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted, as the noise levels presented in this report are based on each scenario occurring at the site boundary which is the closest point to each receiver.

In reality, there would frequently be periods when construction noise levels are much lower than the worst-case levels predicted as well as times when no equipment is in use and no noise impacts occur.



Table 36 Construction noise levels at nearby receiver locations, dBA

Plant Equipment	R01		R02		R03		R04		R05		R06				R07	
											Commercial		Childcare			
	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies
EXCAVATION & DEMOLITION																
Excavator - Rock Breaker	77	N(-12)	78	N(-13)	76	N(-11)	88	N(-18)	88	N(-18)	76	N(-6)	76	N(-14)	77	N(-12)
Excavator 30T	68	N(-3)	69	N(-4)	67	N(-2)	79	N(-9)	79	N(-9)	67	Y	67	N(-5)	68	N(-3)
Excavator 15T	56	Y	57	Y	55	Y	67	Y	67	Y	55	Y	55	Y	56	Y
Articulated Dump Truck (40t)	66	N(-1)	67	N(-2)	65	Y	77	N(-7)	77	N(-7)	65	Y	65	N(-3)	66	N(-1)
20T Roller	77	N(-12)	78	N(-13)	77	N(-12)	89	N(-19)	89	N(-19)	77	N(-7)	77	N(-15)	77	N(-12)
Truck (Water Cart)	66	N(-1)	67	N(-2)	65	Y	77	N(-7)	77	N(-7)	65	Y	65	N(-3)	66	N(-1)
Compactor	67	N(-2)	68	N(-3)	66	N(-1)	78	N(-8)	78	N(-8)	66	Y	66	N(-4)	67	N(-2)
Piling - bored	71	N(-6)	72	N(-7)	71	N(-6)	83	N(-13)	83	N(-13)	71	N(-1)	71	N(-9)	71	N(-6)
Concrete Mixer Truck	62	Y	63	Y	61	Y	73	N(-3)	73	N(-3)	61	Y	61	Y	62	Y
Mobile crane - Franna	58	Y	59	Y	58	Y	70	Y	70	Y	58	Y	58	Y	58	Y
Roller - Vibratory (12 tonne)	69	N(-4)	70	N(-5)	69	N(-4)	81	N(-11)	81	N(-11)	69	Y	69	N(-7)	69	N(-4)
CONSTRUCTION																
Mobile Crane (100t)	60	Y	61	Y	60	Y	72	N(-2)	72	N(-2)	60	Y	60	Y	60	Y
Mobile Crane - Franna	58	Y	59	Y	58	Y	70	Y	70	Y	58	Y	58	Y	58	Y
Hand Tools	53	Y	54	Y	52	Y	64	Y	64	Y	52	Y	52	Y	53	Y
Truck (water cart)	66	N(-1)	67	N(-2)	65	Y	77	N(-7)	77	N(-7)	65	Y	65	N(-3)	66	N(-1)



Plant Equipment	R01		R02		R03		R04		R05		R06				R07	
											Commercial		Childcare			
	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies	Noise level	Complies
Concrete Pump	65	Y	66	N(-1)	64	Y	76	N(-6)	76	N(-6)	64	Y	64	N(-2)	65	Y
Concrete Mixer Truck	62	Y	63	Y	61	Y	73	N(-3)	73	N(-3)	61	Y	61	Y	62	Y
General delivery trucks	60	Y	61	Y	59	Y	71	N(-1)	71	N(-1)	59	Y	59	Y	60	Y
Tower crane (Fixed)	64	Y	65	Y	63	Y	75	N(-5)	75	N(-5)	63	Y	63	N(-1)	64	Y
Concrete vibrator	58	Y	59	Y	57	Y	69	Y	69	Y	57	Y	57	Y	58	Y

Concrete pump will operate only during concrete pours (one day per 2-3 weeks) and forms part of the mitigation measures to the sensitive receivers and therefore would be considered highly affected.



6.2 Construction Vibration

The major potential sources of vibration from the proposed construction activities would likely be during:

- 'Demolition' when vibratory roller is being used
- Early works and excavation where piling activities will occur

Vibration offset distances have been determined from the CNVG minimum working distances for cosmetic damage and human comfort (see **Table 11**). The assessment for the potential worst-case scenario adopts the use of a large vibratory roller (>18 tonnes) and pile boring.

Minimum safe working distances have been included in **Table 37**.

Table 37 Recommended Minimum Working Distances from Vibration-intensive Equipment in Worst-Case Scenario

Plant Item	Rating/Description	Minimum Distance	
		Cosmetic Damage	Human Response (NSW EPA Guideline)
		Residential and Light Commercial (BS 7385)	
Vibratory Roller	> 300kN (>18 tonne)	25m	100m
Pile Boring	≤ 800mm	2m (nominal)	4m

6.3 Operational Noise Assessment

6.3.1 Mechanical Plant

6.3.1.1 Residential Condensers

Based on our understanding, we have undertaken a preliminary assessment of the residential condenser units with the operational assumptions identified in **Section 5.2.1**.

Further to the aforementioned condenser unit constraints, we have calculated the noise levels at all residential receivers surrounding the proposal and presented our findings in **Table 38**. The predicted worst-case levels are compared to the Project Noise Trigger Levels to assess the potential impact of the proposal.

We note that condenser selections are yet to be made, and a further analysis may be warranted during the detail phase of the project.



Table 38 Predicted Onerous Façade Noise Level to Off-site Receivers due to Balcony Condenser Operation

ID	Receiver Type	Period	Noise Level LAeq(15minute) (dBA)		Compliance
			Predicted	Noise Criteria	
R01	Residential	Day	25	58	Yes
		Evening	25	48	Yes
		Night	18	43	Yes
R02	Residential	Day	30	58	Yes
		Evening	30	48	Yes
		Night	22	43	Yes
R03	Residential	Day	23	58	Yes
		Evening	23	48	Yes
		Night	16	43	Yes
R04	Commercial	When in use	39	63	Yes
R05	Commercial	When in use	27	63	Yes
R06	Commercial	When in use	24	63	Yes
	Childcare	When in use	24	54	Yes
R07	Commercial	When in use	25	63	Yes

6.3.1.2 Level 2 Plantroom

SLR developed a SoundPLAN noise model to assess the noise breakout from the rooftop plant room on L02 to the nearest on-site and off-site sensitive receivers. The preliminary mechanical plant layout and operational procedures assumed are summarised in **Section 5.2.1**.

The proposed design currently has a total barrier height of 2.8m of which the first 1.7m are solid and the remainder is acoustically transparent. The plantroom is not fully enclosed and is exposed to allow for adequate air circulation.

The existing scenario has been assessed and the predicted noise levels to the surrounding off-site receivers are summarised in **Table 39**.

We note that the closest residences have been assessed for noise emission. Compliance at these locations implies compliance at residential locations which are further away.



Table 39 Predicted Onerous Façade Noise Level to Off-site Receivers due to Level 2 Plantroom Operation

ID	Receiver Type	Address	Time of Day	Predicted Façade Noise Level LAeq, period dB(A)	Noise Criteria	Compliance
R01	Residential	15 French Ave, Bankstown NSW 2200	Day	< 30	58	Yes
			Evening	< 30	53	Yes
			Night-time (10pm-12am)	< 30	49	Yes
			Night-time	< 30	44	Yes
R02	Residential	443 Chapel Rd, Bankstown NSW 2200	Day	50	58	Yes
			Evening	50	53	Yes
			Night-time (10pm-12am)	46	49	Yes
			Night-time	39	43	Yes
R03	Residential	10-12 French Ave, Bankstown NSW 2200	Day	47	58	Yes
			Evening	47	53	Yes
			Night-time (10pm-12am)	44	49	Yes
			Night-time	37	43	Yes
R04	Commercial	457 Chapel Rd, Bankstown NSW 2200	When in use	55	63	Yes
R05	Commercial	14 French Ave, Bankstown NSW 2200	When in use	55	63	Yes
R06	Commercial	462 Chapel Rd, Bankstown NSW 2200	When in use	45	63	Yes
	Childcare			45	54	Yes
R07	Commercial	463 Chapel Rd, Bankstown NSW 2200	When in use	< 30	63	Yes

6.3.2 Cumulative Impacts

The NSW Government *Cumulative Impact Assessment Guidelines for State Significant Projects* requires that the potential combined effect of cumulative impacts on all nearby industrial developments be considered when assessing potential noise impacts from state-significant projects.



Cumulative impacts can be caused by the compounding effects of multiple projects in an area, and by the accumulation of effects from past, current and future activities as they arise.

The *Noise Policy for Industry* states that it aims to limit continuing increases in cumulative industrial noise through the application of amenity noise levels, which are applicable to all industrial noise sources in an area.

The policy accounts for potential cumulative impacts by lowering the criteria for each individual development to ensure that the ambient noise level within an area from all industrial noise sources combined remains below the recommended amenity noise levels, where feasible and reasonable. As such (as discussed in **Section 4.3.3**), the potential cumulative impacts from the proposal and other potential sources of industrial noise in the area are accounted for in the proposal-specific PNTLs and, therefore, do not require further consideration.

6.3.3 Traffic Noise Intrusion

6.3.3.1 Operational Traffic Noise

SLR developed a SoundPLAN noise model for the study area to predict traffic noise from the surrounding roadways at the site's façade.

The model's accuracy was verified by comparing the predicted road traffic noise levels in SoundPLAN (expressed as L_{Aeq} , 15-hour values) with the measured road traffic noise levels provided in **Table 31**.

The calculation point in the noise model was placed to align with the location and height of the noise logger and microphone used during the noise monitoring (refer to **Figure 1**). The model includes ground topography, buildings, and representative traffic noise sources from the proposal.

The predicted noise levels at the façade for each building and the childcare centre on the site is summarised in **Table 40** and a detailed 3D façade noise map is included in **Appendix C**.

Table 40 Predicted Traffic Noise Level Summary

Occupancy	Façade/Location	Level	Worst- Case Predicted Noise Levels L_{Aeq} period dB(A)	
			Day 7am – 10pm	Night-time 10pm – 7am
Community Halls	Western (along Chapel Rd N)	GL	69	64
	Southern	L1	58	52
Residential	Western (along Chapel Rd N)	L2 – L17	68	62
	Northern (along French Ave)		65	59
	Eastern		54	48
	Southern		65	59
Childcare Centre	Northern (along French Ave)	L1	56	N/A ¹



Occupancy	Façade/Location	Level	Worst- Case Predicted Noise Levels LAeq period dB(A)	
			Day 7am – 10pm	Night-time 10pm – 7am
Meeting Rooms	Eastern		44	
	Outdoor Play Area		50	
	Northern (along French Ave)	L1	56	-
	Western (along Chapel Rd N)		63	-

Note 1: Childcare centre operational hours are Monday to Friday 7am – 6pm.

The predicted façade noise levels have been used to determine the minimum acoustic performance for external glazing summarised in **Section 7.3** to achieve compliance with the relevant internal noise criteria outlined in **Section 4.3**.

6.3.4 Loading Dock Operation

The predicted noise levels due to the operation of the loading dock during each period of the day has been assessed to on-site and off-site receivers as per **Table 41** and **Table 42** respectively.

Table 41 Predicted Onerous Façade Noise Level to On-site Receivers due to Loading Dock Operation

Occupancy	Period	Façade/ Location	Level	Predicted Onerous Façade Noise Level LAeq(15 minute) dB(A)	Noise Criteria ¹	Compliance
Residential	Day	Western (along Chapel Rd N)	L2 – L17	39	60	Yes
		Northern (along French Ave)		51		Yes
		Eastern		52		Yes
		Southern		35		Yes
	Evening	Western (along Chapel Rd N)	L2 – L17	39	58	Yes
		Northern (along French Ave)		51		Yes
		Eastern		52		Yes
		Southern		35		Yes



Table 42 Predicted Onerous Façade Noise Level to Off-site Receivers due to Loading Dock Operation

ID	Receiver Type	Period	Noise Level LAeq(15minute) (dBA)		Compliance
			Predicted	Noise Criteria	
R01	Residential	Day	58	60	Yes
		Evening	58	58	Yes
R02	Residential	Day	37	60	Yes
		Evening	37	58	Yes
R03	Residential	Day	53	60	Yes
		Evening	53	58	Yes
R04	Commercial	When in use	32	63	Yes
R05	Commercial	When in use	45	63	Yes
R06	Commercial	When in use	46	63	Yes
	Childcare	When in use	46	60	Yes
R07	Commercial	When in use	58	63	Yes

Based on the loading dock assessment, it is expected that noise emissions during heavy vehicle access to the site is expected to comply to off-site and on-site receivers during the day and evening periods.

6.3.5 Sleep Disturbance

The *NPfl* requires a detailed maximum noise level assessment to be completed where night-time noise levels exceed the screening level. We understand that at night, the L_{Amax} noise levels will be largely from light vehicle pass by from local traffic. We have undertaken a preliminary assessment for L_{Amax} traffic from our site to the surrounding receivers and are able to report that the noise level will not exceed 62 dB(A) for on-site receivers.

Therefore, based on the *RNP* noise emission levels presented in **Section 4.3.4**, awakenings for off-site receivers are not likely. This is based on the *RNP* guidance that maximum internal noise levels below 50 dBA to 55 dBA are unlikely to awaken people from sleep. This equates to an external noise level of 65 dBA when assuming a 10 dB loss for partially open windows for ventilation.

6.3.6 Childcare Centre Operation

As previously discussed, indoor play area noise emission is not expected to be an issue based on the assumption that the centre will be mechanically ventilated with all operable facades closed.

6.3.6.1 Outdoor Play Area Noise Emissions

Outdoor childcare operational noise has been assessed based on the assumption that outdoor play time is limited to 4 hours, 2 hours in the day and 2 hours in the afternoon.

The assessment assumes the following:

- Up to 60 children at any given time using the outdoor play area.
- Children are engaged in 'active play'.



- Children are a mix of age ranges from 0 to 5 years.

The outdoor play area is depicted as shown in **Figure 4**.

Figure 4 Outdoor Play Area



As per the noise levels established by the AAAC summarised in **Table 33**, the predicted onerous noise levels measured at the façade of the on-site and off-site receivers are summarised in **Table 43** and **Table 44** respectively.

Table 43 Predicted Façade Noise Level to On-site Receivers due to Outdoor Play Area Operation

Occupancy	Façade/Location	Level	Predicted Façade Noise Level LAeq, period dB(A)	Noise Criteria	Compliance
Residential	Western (along Chapel Rd N)	L2 – L17	61	65	Yes
	Northern (along French Ave)		64	65	Yes
	Eastern		57	65	Yes
	Southern		44	65	Yes



Table 44 Predicted Façade Noise Level to Off-site Receivers due to Outdoor Play Area Operation

ID	Receiver Type	Address	Predicted Façade Noise Level L _{Aeq} , period dB(A)	Noise Criteria	Compliance
R01	Residential	15 French Ave, Bankstown NSW 2200	46	65	Yes
R02	Residential	443 Chapel Rd, Bankstown NSW 2200	44	65	Yes
R03	Residential	10-12 French Ave, Bankstown NSW 2200	56	65	Yes
R04	Commercial	457 Chapel Rd, Bankstown NSW 2200	40	65	Yes
R05	Commercial	14 French Ave, Bankstown NSW 2200	50	65	Yes
R06	Commercial	462 Chapel Rd, Bankstown NSW 2200	53	65	Yes
	Childcare		53	65	Yes
R07	Commercial	463 Chapel Rd, Bankstown NSW 2200	50	65	Yes

The predicted noise levels due to the outdoor play area operation are expected to comply with the criteria at all assessed on-site and off-site receivers.

Based on compliance at the boundary, this suggests that noise from the outdoor play area will comply at all receivers set further back from the site.

Additionally, the predicted noise level assumes the maximum allowable number of children are engaged in 'active play' simultaneously resulting in an onerous scenario that may not be realistic. Therefore, it is likely that the actual noise emission from the outdoor play area will be considerably lower.

6.3.6.2 Noise Emissions from Mechanical Plant, Indoor Play, Pick-up and Drop off Area

The childcare centre's mechanical plant has not been finalised at this Stage of the development. However, an assessment of the site's cumulative operational plant noise emissions from the L2 plantroom has been assessed to surrounding on-site and off-site receivers in **Section 6.3.1.2**.

Indoor play area noise emissions are not expected to be an issue based on the assumption that the centre will be mechanically ventilated with all operable facades closed.

Noise emissions associated with the movement of vehicles related to the childcare centre has been modelled as per the methodology summarised in **Section 5.5.4**. It is assumed that all vehicles will enter the site from French Avenue and will park within the dedicated childcare parking spots located on the enclosed ground level carpark.

The predicted noise levels once the vehicle enters/exits the site has been assessed and is summarised in **Table 45** and **Table 46** for on-site and off-site receivers respectively.



Table 45 Predicted Façade Noise Level to On-site Receivers due to Childcare Carpark Operation

Occupancy	Façade/Location	Level	Predicted Façade Noise Level LAeq, period dB(A)	Noise Criteria ¹	Compliance
Residential	Western (along Chapel Rd N)	L2 – L17	<30	60	Yes
	Northern (along French Ave)		35	60	Yes
	Eastern		35	60	Yes
	Southern		<30	60	Yes

Table 46 Predicted Façade Noise Level to Off-site Receivers due to Childcare Carpark Operation

ID	Receiver Type	Address	Predicted Façade Noise Level LAeq, period dB(A)	Noise Criteria ¹	Compliance
R01	Residential	15 French Ave, Bankstown NSW 2200	40	60	Yes
R02	Residential	443 Chapel Rd, Bankstown NSW 2200	<30	60	Yes
R03	Residential	10-12 French Ave, Bankstown NSW 2200	36	60	Yes
R04	Commercial	457 Chapel Rd, Bankstown NSW 2200	<30	65	Yes
R05	Commercial	14 French Ave, Bankstown NSW 2200	<30	65	Yes
R06	Commercial	462 Chapel Rd, Bankstown NSW 2200	<30	65	Yes
	Childcare		<30	65	Yes
R07	Commercial	463 Chapel Rd, Bankstown NSW 2200	41	65	Yes

6.3.6.3 Childcare Centre Noise Management Plan

At this stage of the project, the operator of the childcare centre has not been finalised. However, a noise management plan including the following standard directives are detailed and should be further developed once an operator has been determined:

- Outdoor play area time is limited to 2 hours in the morning and afternoon for a total of 4 hours per day
- The maximum allowable number of children allowed in the outdoor play area at any given time is summarised in **Section 6.3.6.1**
- Children aged 0 to 3 years and 3 to 5 years should be located in their dedicated play areas as depicted in **Figure 4**
- Signs should be erected at appropriate, prominent locations, to advise the following:



- that parents not call out to their children when delivering or collecting their children
- that gates are not slammed (soft closers)
- contact details of the facility manager in the event someone needs to complain.
- children who are loudly crying outdoors should be comforted by staff and if the child continues to cry loudly then they should be taken inside.
- no music should be played in any outdoor areas at any time.
- outdoor play may generally be ambulatory (unrestricted). However, activities that could promote shouting by groups of children for sustained periods (races/competitive activities/group sports/group singing) should have an educator assigned to supervise. The educator should be briefed to manage behaviour such that groups of children shouting for sustained periods does not occur. This is recommended to ensure that typical noise generation is consistent with AAAC data for children's activity noise.
- doors should be closed in the event that a musical activity is conducted within an internal area.
- actions taken in the event of a complaint

6.3.7 Community Hall Operation

Predicted noise impacts to future on-site residents and off-site sensitive receivers have been undertaken for the proposed scenarios outlined in **Section 5.2.2** and are summarised in **Table 47**, **Table 48** and **Table 49**.

Table 47 Predicted Noise Levels from Community Hall Operation at the closest Off-site Residential Receivers

Scenario	Door and Window Operation	Predicted Noise Level LAeq, period dB(A)	Noise Criteria			Compliance		
			Day	Evening	Night-time	Day	Evening	Night-time
1	Open	45	60	58	49	Yes	Yes	Yes
	Closed	<30				Yes	Yes	Yes
2	Open	54				Yes	Yes	No
	Internal foyer door or external façade closed	30				Yes	Yes	Yes
3	Open	64				No	No	No
	Internal foyer door or external façade closed	41				Yes	Yes	Yes



Table 48 Predicted Noise Levels from Community Hall Operation at the closest Off-site Childcare Receiver

Scenario	Door and Window Operation	Predicted Noise Level LAeq, period dB(A)		Noise Criteria		Compliance	
		External	Internal ¹	External	Internal	External	Internal
1	Open	53	31	60	35	Yes	Yes
	Closed	31	<30			Yes	Yes
2	Open	51	<30			Yes	Yes
	Internal foyer door or external façade closed	<30	<30			Yes	Yes
3	Open	61	39			No	No
	Internal foyer door or external façade closed	38	<30			Yes	Yes

Note 1: It is assumed that these receivers have fixed windows which conservatively results in internal noise levels being around 22 dB lower than the external noise level.

Table 49 Predicted Noise Levels from Community Hall Operation at the closest On-site Receiver

Scenario	Door and Window Operation	Predicted Noise Level LAeq, period dB(A)	Noise Criteria			Compliance		
			Day	Evening	Night-time	Day	Evening	Night-time
1	Open	51	60	58	49	Yes	Yes	No
	Closed	<30				Yes	Yes	Yes
2	Open	58				Yes	Yes	No
	Internal foyer door or external façade closed	33				Yes	Yes	Yes
3	Open	68				No	No	No
	Internal foyer door or external façade closed	44				Yes	Yes	Yes

The outcome of the predicted noise levels from the operation of the multipurpose halls at the nearest sensitive receiver are as follows:



Off-site Residential Receivers

- Scenario 1 – This report demonstrates that compliance will be achieved during all assessment periods for the operational assumptions presented in **Section 5.2.2**.
- Scenario 2 – This report demonstrates that compliance will be achieved during the day and evening assessment periods based on the assumptions presented in **Section 5.2.2**. Night-time operations will require mitigation controls to minimise impacts as outlined in **Section 7.4**.
- Scenario 3 – Mitigation controls will be required during all assessment periods, with the operational requirements presented in **Section 5.2.2**. All periods of operations will require mitigation controls to minimise impacts as outlined in **Section 7.4**.

Off-site Childcare Centre Receiver

- Scenario 1 – This report demonstrates that compliance will be achieved for the operational assumptions presented in **Section 5.2.2**.
- Scenario 2 – This report demonstrates that compliance will be achieved for the operational assumptions presented in **Section 5.2.2**.
- Scenario 3 – Mitigation controls will be required with the operational requirements presented in **Section 5.2.2**. During the off-site childcare's operational hours, mitigation controls to minimise impacts are outlined in **Section 7.4**.

On-site Receiver

- Scenario 1 – This report demonstrates that compliance will be achieved during the day and evening assessment periods based on the operational assumptions presented in **Section 5.2.2**. Night-time operations will require mitigation controls to minimise impacts as outlined in **Section 7.4**.
- Scenario 2 – This report demonstrates that compliance will be achieved during the day and evening assessment periods based on the operational assumptions presented in **Section 5.2.2**. Night-time operations will require mitigation controls to minimise impacts as outlined in **Section 7.4**.
- Scenario 3 – Mitigation controls will be required during all assessment periods, with the operational requirements presented in **Section 5.2.2**. All periods of operations will require mitigation controls to minimise impacts as outlined in **Section 7.4**.

Based on the assessment presented in this report / section, operational noise controls and minimum façade constructions are detailed in **Section 7.4**.



7.0 Mitigation Measures

7.1 Construction Noise and Vibration Mitigation and Management Measures

The impacts during the construction of the proposal are predicted to be consistent with major construction work near sensitive receivers. No works outside of Standard Construction Hours are currently proposed.

The use of standard mitigation measures to minimise the impacts is considered sufficient to control the majority of the impacts. Examples of measures that could be applied to the work are provided in the Transport for NSW *Construction Noise and Vibration Guideline* is shown in **Table 50**.

Table 50 CNVG Standard Mitigation and Management Measures

Action Required	Applies To	Details
Management measures		
Implementation of any project specific mitigation measures required.	Airborne noise	Implementation of any project specific mitigation measures required.
Implement community consultation or notification measures.	Airborne noise Ground-borne noise & vibration	Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night-time period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required. Please contact Roads and Maritime Communication and Stakeholder Engagement for guidance. Website (If required) Contact telephone number for community Email distribution list (if required) Community drop-in session (if required by approval conditions).
Site inductions	Airborne noise Ground-borne noise & vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: - all project specific and relevant standard noise and vibration mitigation measures - relevant licence and approval conditions - permissible hours of work - any limitations on high noise generating activities - location of nearest sensitive receivers - construction employee parking areas - designated loading/unloading areas and procedures



Action Required	Applies To	Details
		- site opening/closing times (including deliveries) - environmental incident procedures.
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Verification	Airborne noise Ground-borne noise & vibration	Where specified under Appendix C of the CNVG a noise verification program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.
Update Construction Environmental Management Plans	Airborne noise Ground-borne noise & vibration	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys	Vibration Blasting	Undertake building dilapidation surveys on all buildings located within the buffer zone prior to commencement of activities with the potential to cause property damage
Source controls		
Construction hours and scheduling	Airborne noise Ground-borne noise & vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.
Construction respite period during normal hours and out-of-hours work	Ground-borne noise & vibration Airborne noise	See Appendix C of the CNVG for more details on the following respite measures: - Respite Offers (RO) - Respite Period 1 (R1) - Respite Period 2 (R2) - Duration Respite (DR)
Montessori Childcare Centre	Airborne noise	The contractor should liaise with the child care operator during noisy activities as scheduled in Table 27 . Upon discussions with the child care operator, the contractor may offer respite during kids nap / sleep times.
Equipment selection.	Airborne noise Ground-borne noise & vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits. Ensure plant including the silencer is well maintained.



Action Required	Applies To	Details
Plant noise levels.	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix H of the CNVG. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturers specifications or Appendix H of the CNVG.
Rental plant and equipment.	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 2 of the CNVG.
Use and siting of plant.	Airborne-noise	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers. Only have necessary equipment on site.
Plan worksites and activities to minimise noise and vibration.	Airborne noise Ground-borne vibration	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm. Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters. If programmed night work is postponed the work should be re-programmed and the approaches in this guideline apply again.
Reduced equipment power	Airborne noise Ground-borne vibration	Use only the necessary size and power.
Non-tonal and ambient sensitive reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
Minimise disturbance arising from delivery of goods to	Airborne noise	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers.



Action Required	Applies To	Details
construction sites.		Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. Avoid or minimise these out of hours movements where possible.
Engine compression brakes	Construction vehicles	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.
Path controls		
Shield stationary noise sources such as pumps, compressors, fans etc.	Airborne noise	Stationary noise sources should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities.	Airborne noise	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when siting plant.
Receptor control		
Structural surveys and vibration monitoring	Ground-borne vibration	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted. At locations where there are high-risk receptors, vibration monitoring should be conducted during the activities causing vibration.
See Appendix C of the CNVG for additional measures	Airborne noise Ground-borne vibration	In some instances, additional mitigation measures may be required.

A Construction Noise and Vibration Management Plan (CNVMP) would be prepared before any work begins. This would identify all potentially impacted receivers, assess the potential noise and vibration impacts from the proposal and provide details regarding how the impacts would be minimised through the use of all feasible and reasonable mitigation measures. The CNVMP would also contain procedures for handling complaints, should they occur, and detail any compliance monitoring requirements.

7.2 Mechanical Plant Treatment Recommendation

Carpark exhaust fans, garbage exhaust fans, and noisy equipment such as air conditioning condensers and other mechanical noise-generating sources should be strategically located and thoughtfully designed such that the noise emissions meet the requirements of the project criteria detailed in **Section 4.3**.

Mitigation measures during detail design for the mechanical plant should be considered during the design development stage to ensure compliance with the outlined criteria at the nearest sensitive receivers. These mitigation measures could include but not limited to the following:



- Positioning mechanical plant away from nearby receivers.
- Acoustic attenuators fitted to duct work.
- Screening around mechanical plant.
- Acoustic insulation within duct work.

It should be noted that the noise reduction requirements will be refined once the mechanical plant and equipment selections and designs have been progressed further during the detailed design of the proposed development.

Based on the preliminary plant and equipment selections provided, an assessment has been undertaken to determine the feasibility of the proposed equipment and locations (**Figure 3**). Based on the selections presented in **Table 29** and our assessment in **Section 6.3.1**, operation of the plant items located within the level 2 plantroom should require the following acoustic mitigation measures:

- Air cooled package units will require treatment as per **Table 51**.

As previously mentioned, the air-conditioning condensers within the level 2 plantroom will operate on a quiet mode at night (between 10pm and 7am) that provides a noise reduction of at least 8 dB.

Table 51 Acoustic treatment recommendations for air cooled package units

Plant Item	Example Treatment	Location	Insertion Loss in dB per Octave Band Centre Frequency (Hz)					
			125	250	500	1k	2k	4k
Air cooled package units	2m lined ductwork	Outlet	2	3	12	16	8	8
	2m lined ductwork	Inlet	2	3	12	16	8	8

Additionally, the following general allowances should be made for in the design:

- Support points for major plant items should be structurally rigid. Mid span areas of floor slab should be avoided where practical. Ideally columns, thick structural slabs or very strong beams should be provided in such cases
- 200mm concrete slabs and precast/in-situ concrete walls surrounding plant rooms
- Vibration isolators for equipment rotating plant and machinery located in plant rooms with >90% isolation efficiency
- Plant complete with associated motor and drive assemblies should be mounted on rigid integral steel chassis or concrete inertia blocks
- All penetrations to plant rooms should be properly dimensioned, packed and sealed
- Main services ducts and pipes to have their own individual penetrations, with suitable spacing to allow good sealing
- Allowance for acoustic attenuation treatments e.g. internal lining to air inlets and discharges to meet external noise emission criteria
- Speed controllers, if used, should be of good quality and compatible with the motor model. Poor quality controllers can result in significant increase in motor noise, as much as 10dB(A), with an offensive characteristic such as high frequency tone



- Selection of low noise fans, allowance for smooth airflow conditions in ductwork, use of attenuators and lined duct work while minimising regenerated noise at bends, take-offs and transitions

Selection of plant and accommodation for acoustic mitigation measures detailed above will ensure that compliance with the project noise trigger levels summarised in **Section 4.3** is achieved.

7.3 Façade Treatment Recommendation

Noise from traffic noise from surrounding roadways has been predicted at the façade (**Section 6.3.3**). Based on the predicted noise levels at the façade, the minimum acoustic performance for glazed elements is derived to achieve compliance with the internal noise criteria summarised in **Section 4.4.2**.

At this stage of the project, it is expected that building layout, namely window sizing and balcony (with respect to shielding) may be subject to minor changes. Therefore, a more detailed assessment should be undertaken during the detailed design stage once the building's layout and façade design are finalised. This may yield different glazing system requirements.

The preliminary glazing recommendations are summarised in **Table 52** and may be subject to revision during detail design. Predicted façade noise level are presented in **Appendix C**.

Table 52 Minimum Façade Acoustic Performance

Occupancy	Façade Noise Level Range dB	Surface Area m²	Minimum R _w	Typical Construction
Living	66 – 63	< 10	33	6.38mm laminated
		≥ 10	35	10.38mm laminated OR 6mm / 12mm airgap / 6mm
Bedroom		< 2	30	6 mm monolithic
		≥ 2	35	10.38mm laminated
Living	< 63	All glazing	30	6 mm monolithic
Bedroom				
Childcare	≤ 52	All glazing	33	6.38mm laminated

It should be noted that the minimum specified performance refers to the system's overall performance including glazing and frame. It is recommended that the preferred system incorporates suitable acoustic seals to ensure the acoustic performance is achieved.



7.4 Community Halls and Foyer Spaces Operational Noise Controls

The minimum acoustic performance of all glazing elements (operable and fixed) along the western external façade and internally separating the foyer from the multipurpose hall are required to achieve a minimum acoustic performance of Rw 30 (doors Rw 25) which can be achieved with 6mm monolithic glass.

It should be noted that the minimum specified performance refers to the system's overall performance including glazing and frame. It is recommended that the preferred system incorporates suitable acoustic seals to ensure the acoustic performance is achieved.

For non-glazed elements, we recommend a minimum performance of Rw 45.

Based on the scenarios identified in **Section 5.2.2**, operational noise controls have been developed for each period to comply to on-site receivers and the nearest offsite sensitive receivers surrounding the site. The noise controls are summarised in **Table 53**.

Table 53 Operational Noise Control measures for Community Halls and Foyer Space

Scenario	Description	Period	Operable Foyer Façade Control	Community Hall Doors Control
1	<u>Community Hall 01:</u> Up to 300 patrons with background music in each pre-function space	Day 7am to 6pm	Open	External community hall door closed.
		Evening 6pm to 10pm	Open	External community hall door closed.
		Night 10pm to 12am	Closed	External community hall door closed.
	<u>Community Hall 02 and 03:</u> Up to 300 patrons with background music in each pre-function space	Day 7am to 6pm	Open	-
		Evening 6pm to 10pm	Open	-
		Night 10pm to 12am	Closed	-
2	<u>Community Hall 01:</u> Amplified DJ music in community multipurpose halls	Day 7am to 6pm	External foyer door can remain open.	External community hall door closed. Internal community hall door to foyer can remain open.
		Evening 6pm to 10pm	External foyer door can remain open.	External community hall door closed. Internal community hall door to foyer can remain open.
		Night 10pm to 12am	External community hall door closed. Close either external foyer door or internal community hall doors.	



Scenario	Description	Period	Operable Foyer Façade Control	Community Hall Doors Control
3	<u>Community Hall 02 and 03:</u> Amplified DJ music in community multipurpose halls	Day 7am to 6pm	Open	Open
		Evening 6pm to 10pm	Open	Open
		Night 10pm to 12am	Close either external foyer door or internal community hall doors.	
	<u>Community Hall 01:</u> Live band music in community multipurpose halls	Day 7am to 6pm	External community hall door closed. Close either external foyer door or internal community hall doors.	
		Evening 6pm to 10pm	External community hall door closed. Close either external foyer door or internal community hall doors.	
		Night 10pm to 12am	External community hall door closed. Close either external foyer door or internal community hall doors.	
	<u>Community Hall 02 and 03:</u> Live band music in community multipurpose halls	Day 7am to 6pm	Close either external foyer door or internal community hall doors.	
		Evening 6pm to 10pm	Close either external foyer door or internal community hall doors.	
		Night 10pm to 12am	Close either external foyer door or internal community hall doors.	

7.4.1 Community Halls and Foyer Spaces Noise Management Plan

We recommend a noise management plan including the following standard directives are detailed and should be further developed as required, such as:

- The maximum allowable number of patrons allowed in the function area
- Signs should be erected at appropriate, prominent locations, to advise the following:
 - Patrons to keep quiet when outdoors
 - Doors are not slammed (soft closers)
 - Contact details of the facility manager in the event someone needs to complain.
- The manning of ensuring that doors of the community centre are kept closed during noisy functions.
- No amplified (only background) music in the pre-function area should be played at any time.
- Actions taken in the event of a complaint.



8.0 Conclusion

SLR has been engaged to prepare a Noise and Vibration Impact Assessment (NVIA) for the proposed multi-use development at 461 Chapel Road, Bankstown. The proposal includes a mixed-use development including residential, commercial and a childcare centre.

The potential impacts from the proposal have been assessed against the Secretary's Environmental Assessment Requirements (SEARs) for SSD – 79709963 issued 5 February 2025.

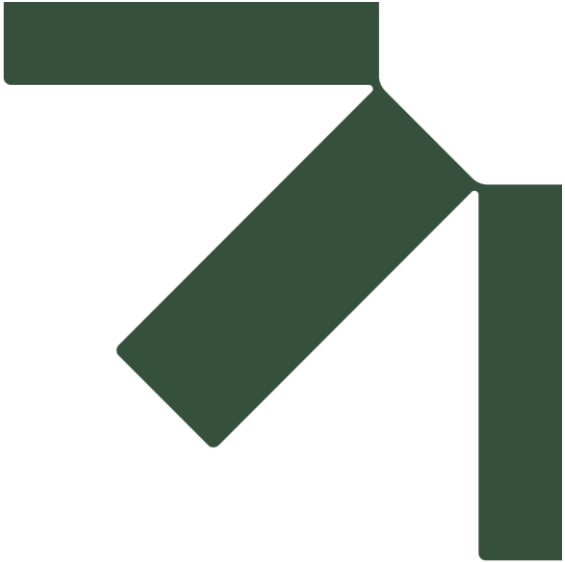
A construction noise and vibration management plan has been incorporated in the NVIA to determine the potential impacts to existing surrounding receivers.

Operational noise from the site including; noise emission from the site's L2 plantroom and equipment, child care centre, multipurpose halls, place of worship, operation and traffic generation have been undertaken, with the predicted noise levels to both onsite and offsite receivers being determined.

The existing traffic noise impacts to the site from surrounding roadways has been determined based on SoundPLAN noise modelling and verified via on-site long-term noise monitoring.

SLR Consulting believe there are no site conditions, statutory or other requirements that would preclude this development from complying with the criteria defined in this report.





Appendix A Acoustic Terminology

461 Chapel Road, Bankstown

Noise and Vibration Impact Assessment

Sustainable Development Group Limited

SLR Project No.: 610.032332.00001

4 February 2026

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB

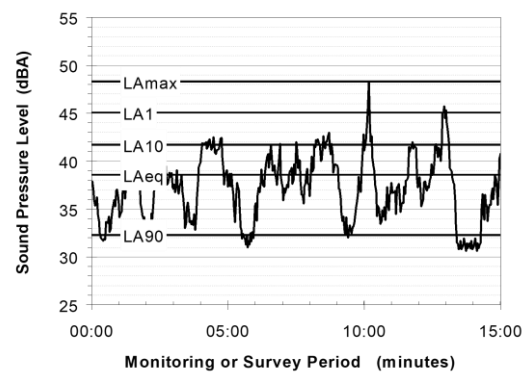
or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

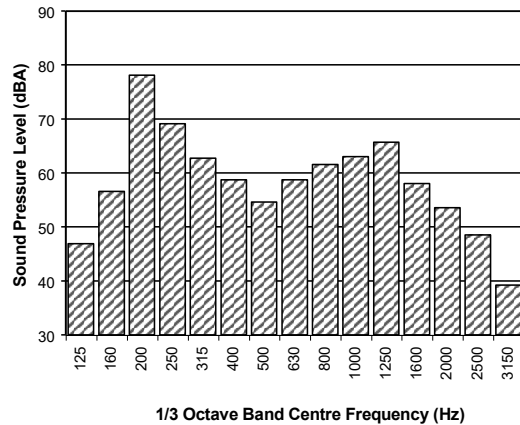
The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)



The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V , expressed in mm/s can be converted to decibels by the formula $20 \log (V/V_0)$, where V_0 is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

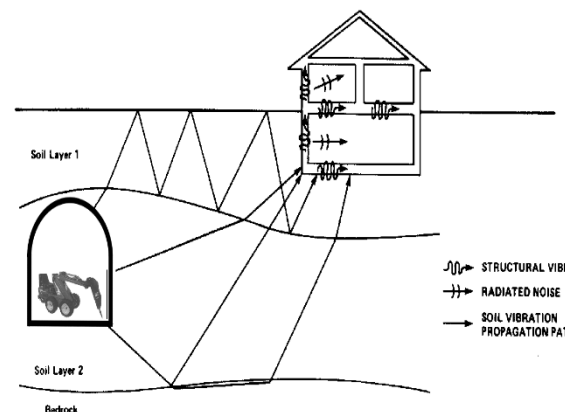
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

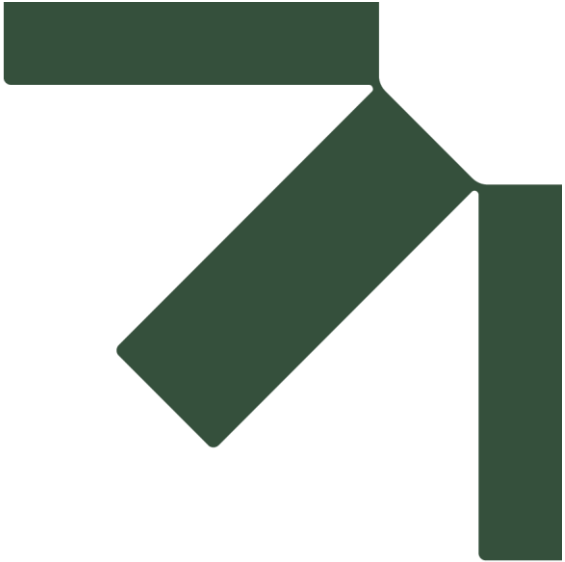
Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.





Appendix B Statistical Ambient Noise Levels

461 Chapel Road, Bankstown

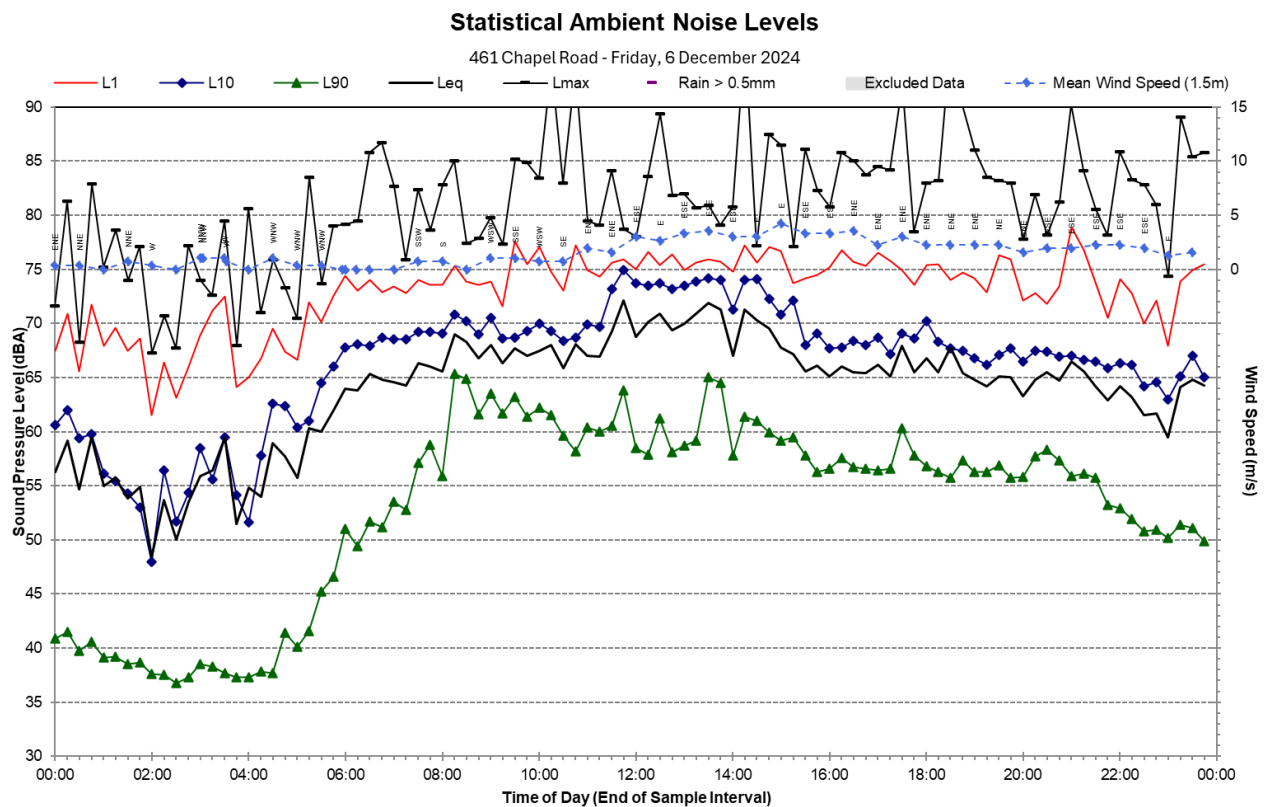
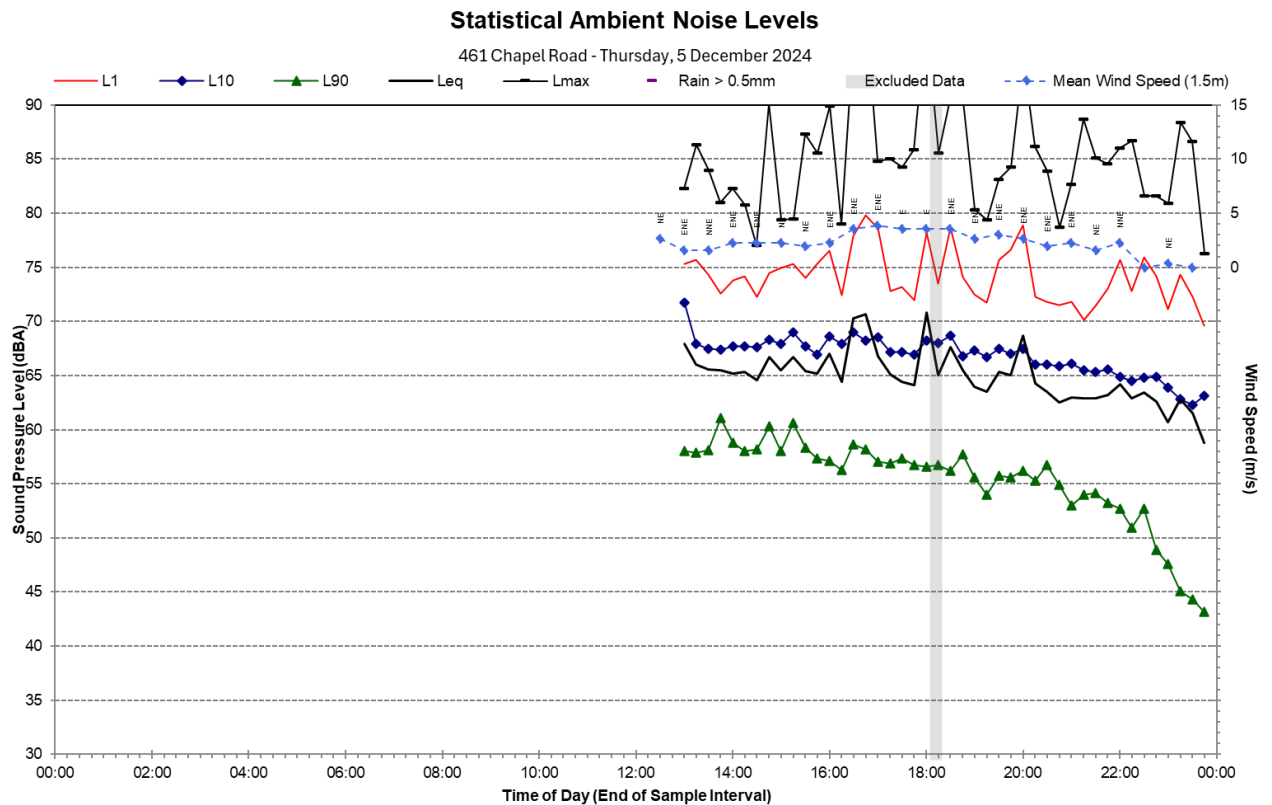
Noise and Vibration Impact Assessment

Sustainable Development Group Limited

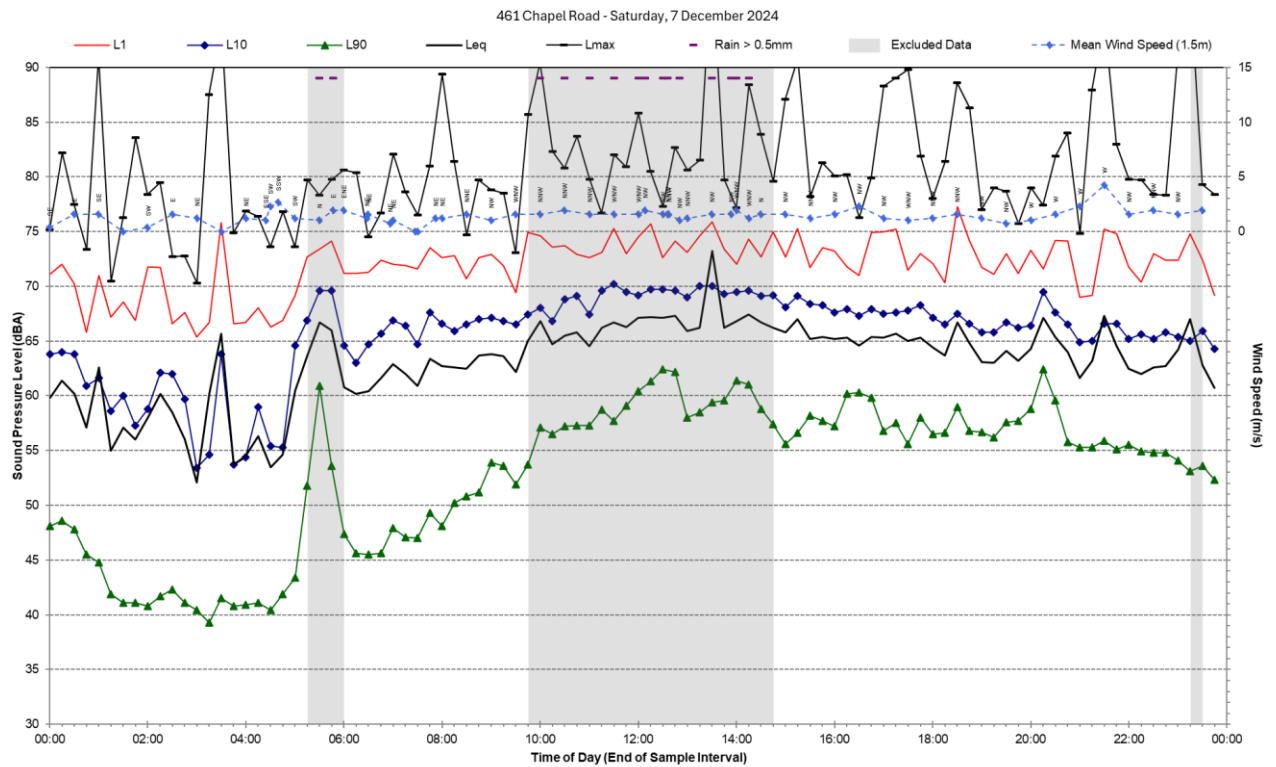
SLR Project No.: 610.032332.00001

4 February 2026

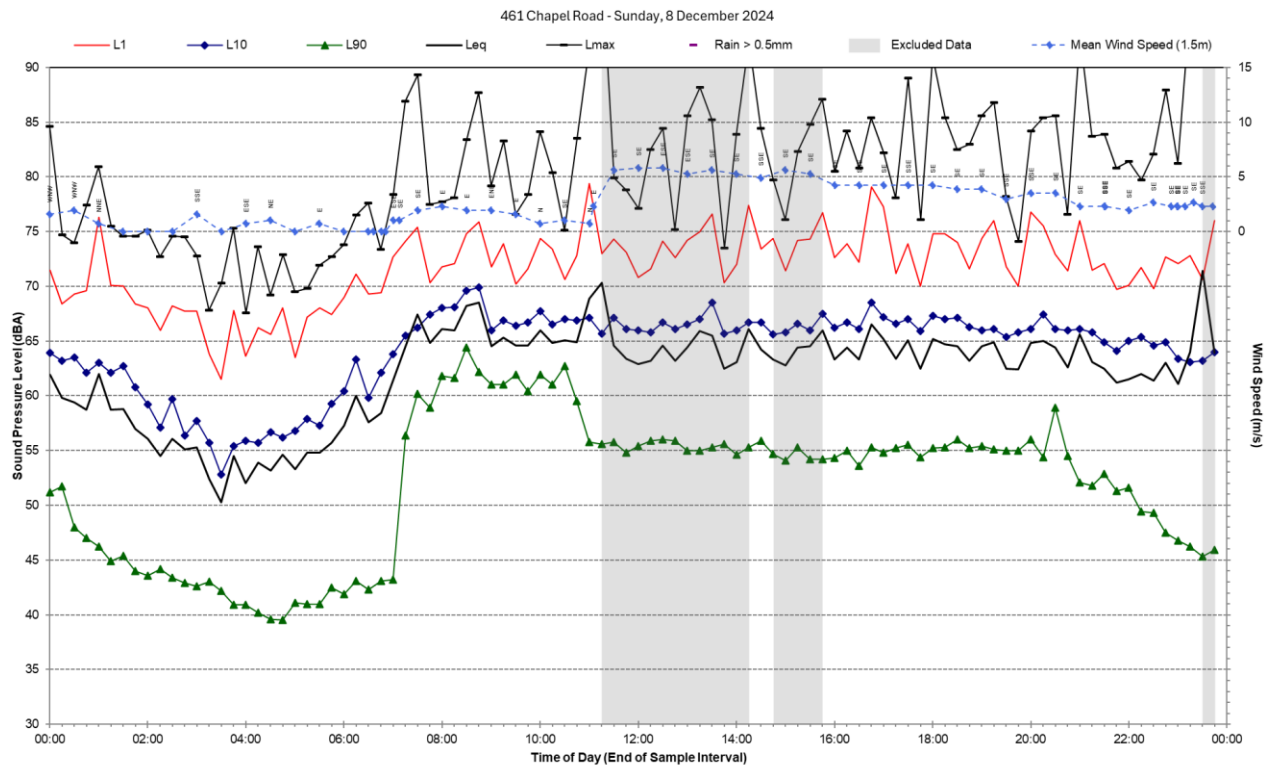
Logger L01 Location



Statistical Ambient Noise Levels

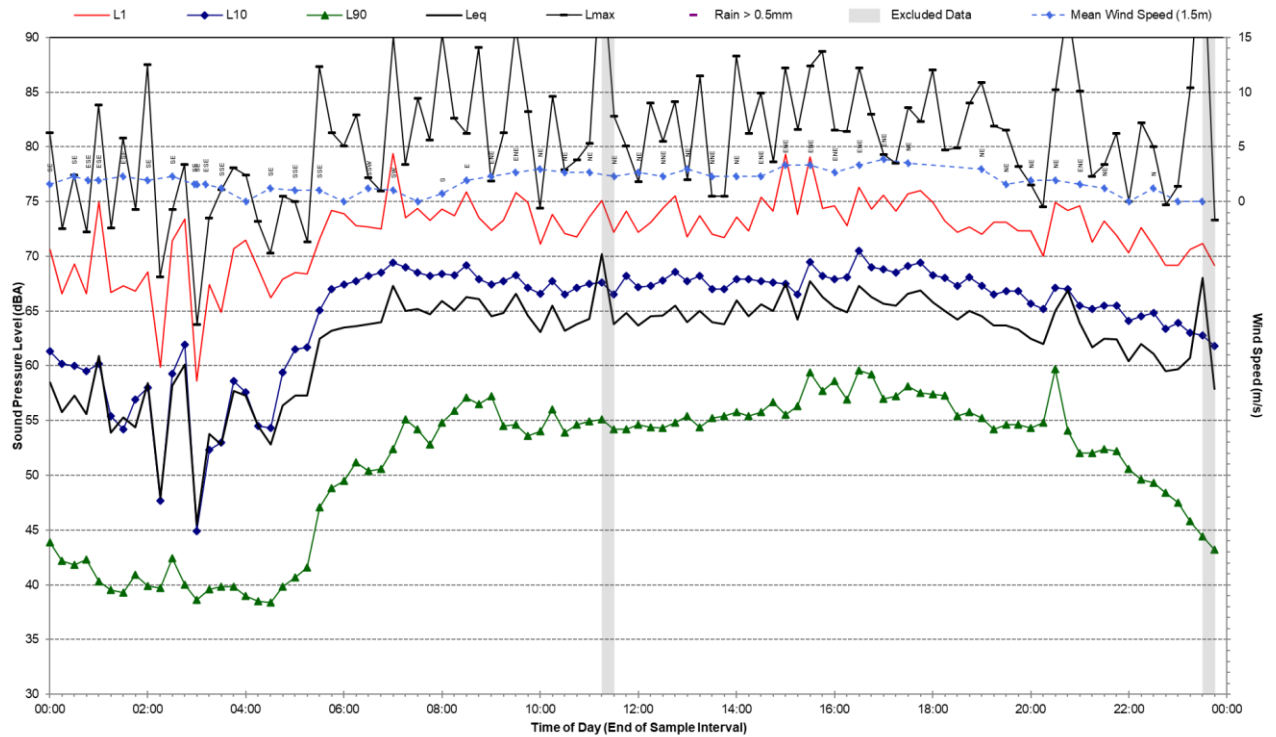


Statistical Ambient Noise Levels



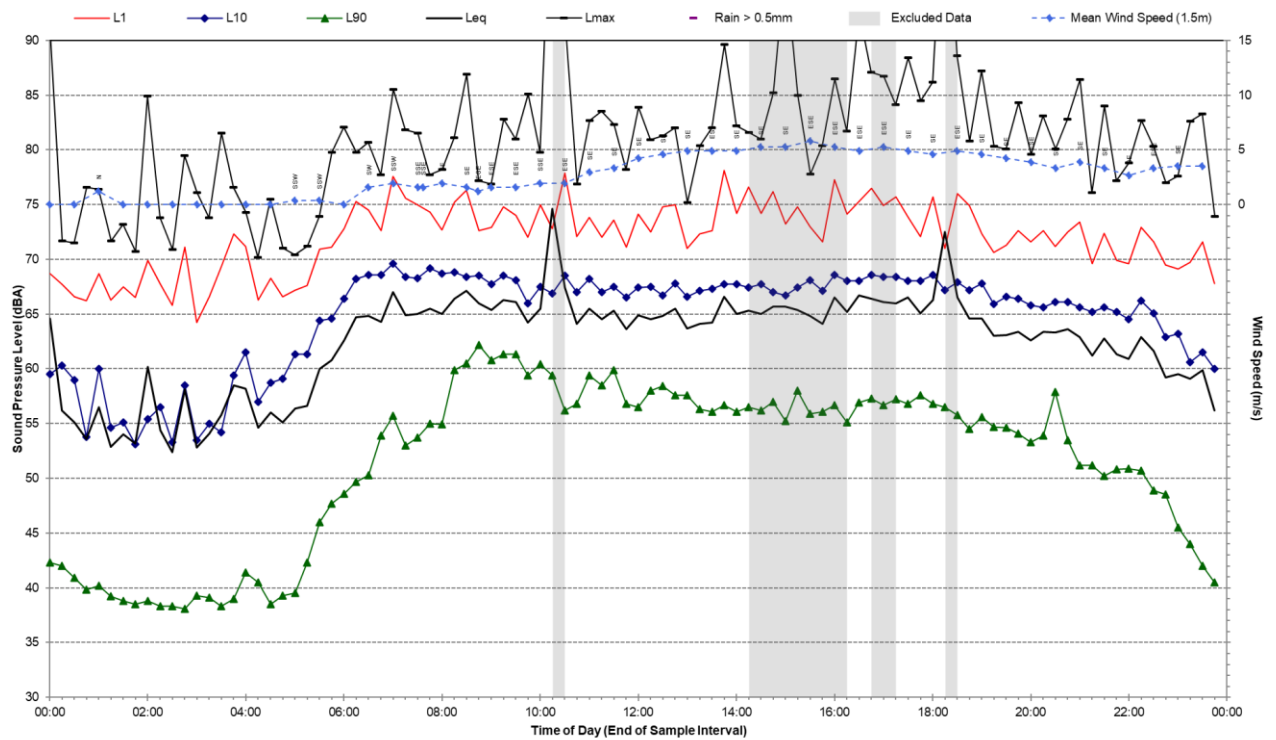
Statistical Ambient Noise Levels

461 Chapel Road - Monday, 9 December 2024



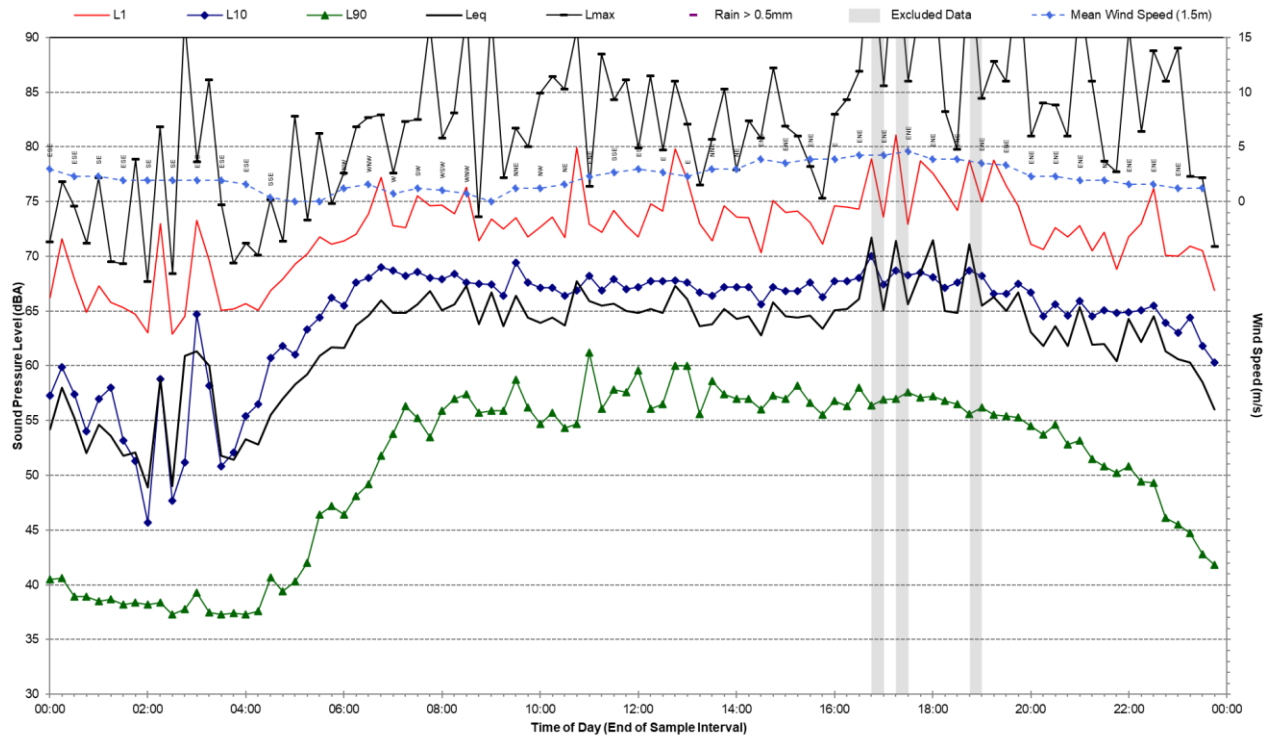
Statistical Ambient Noise Levels

461 Chapel Road - Tuesday, 10 December 2024



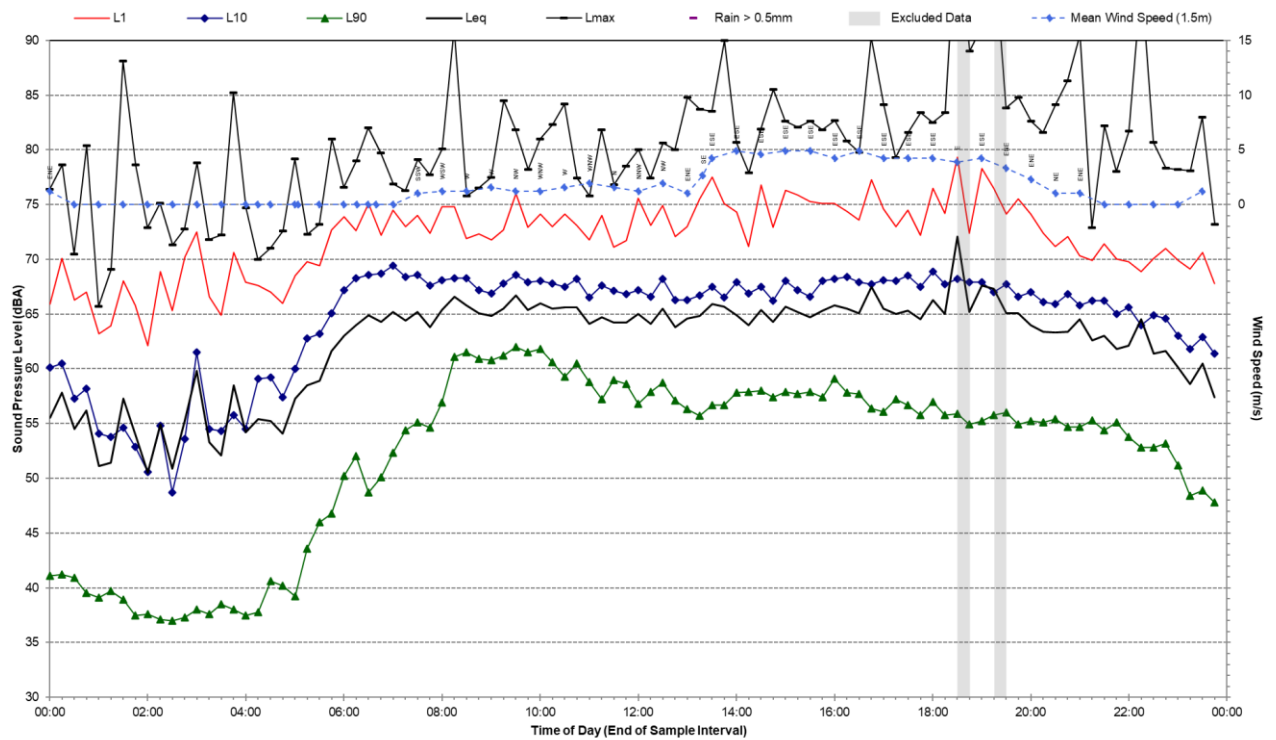
Statistical Ambient Noise Levels

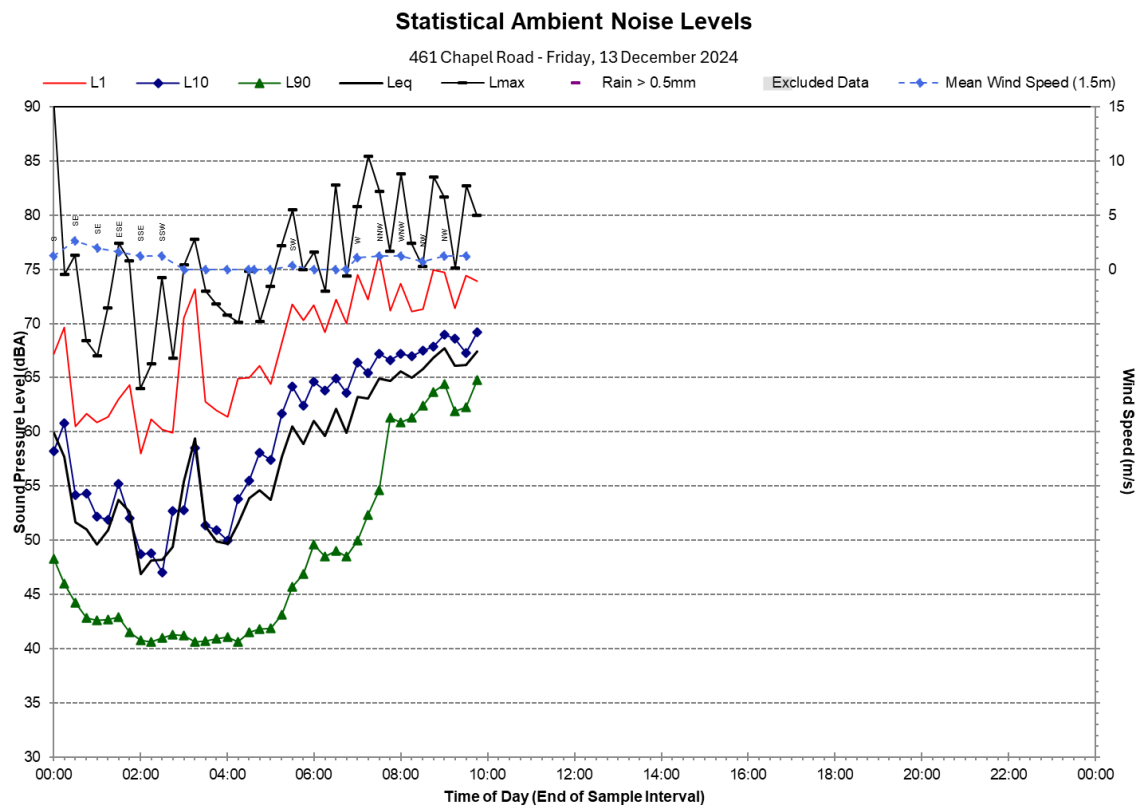
461 Chapel Road - Wednesday, 11 December 2024



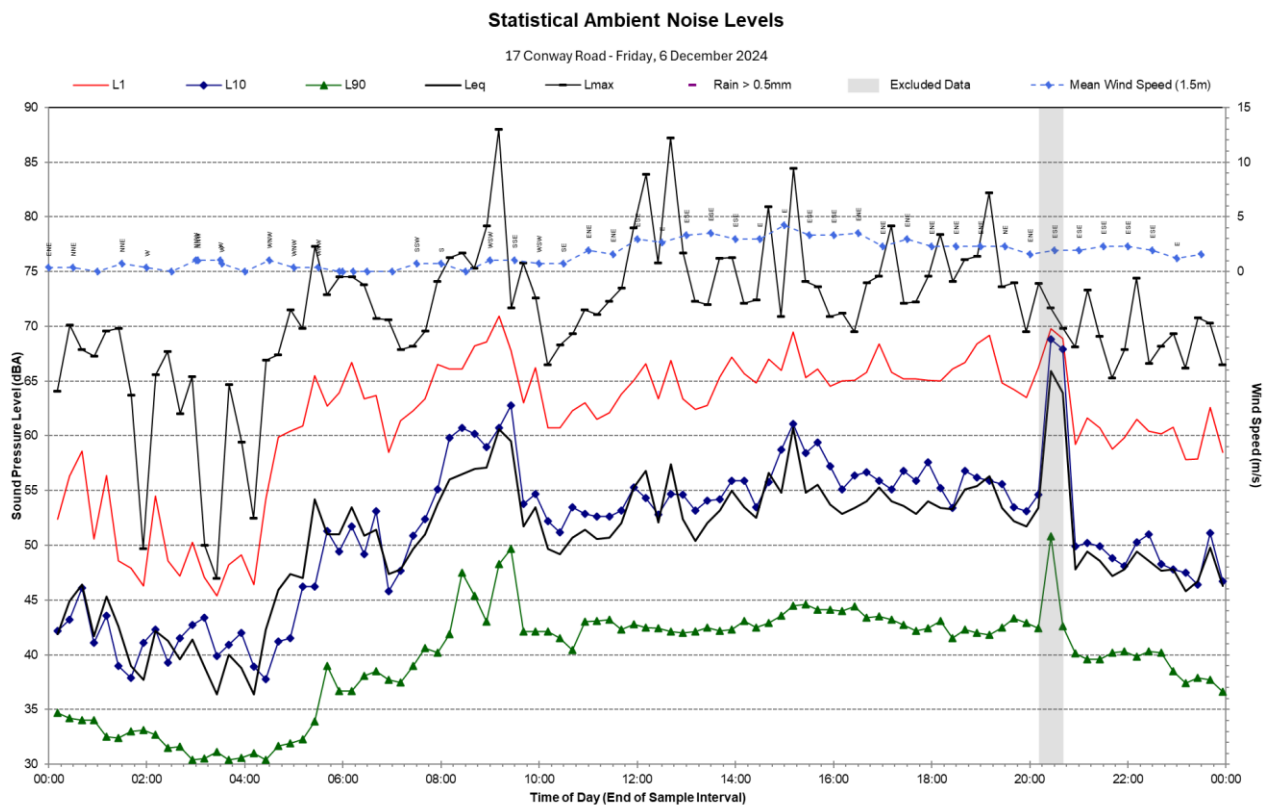
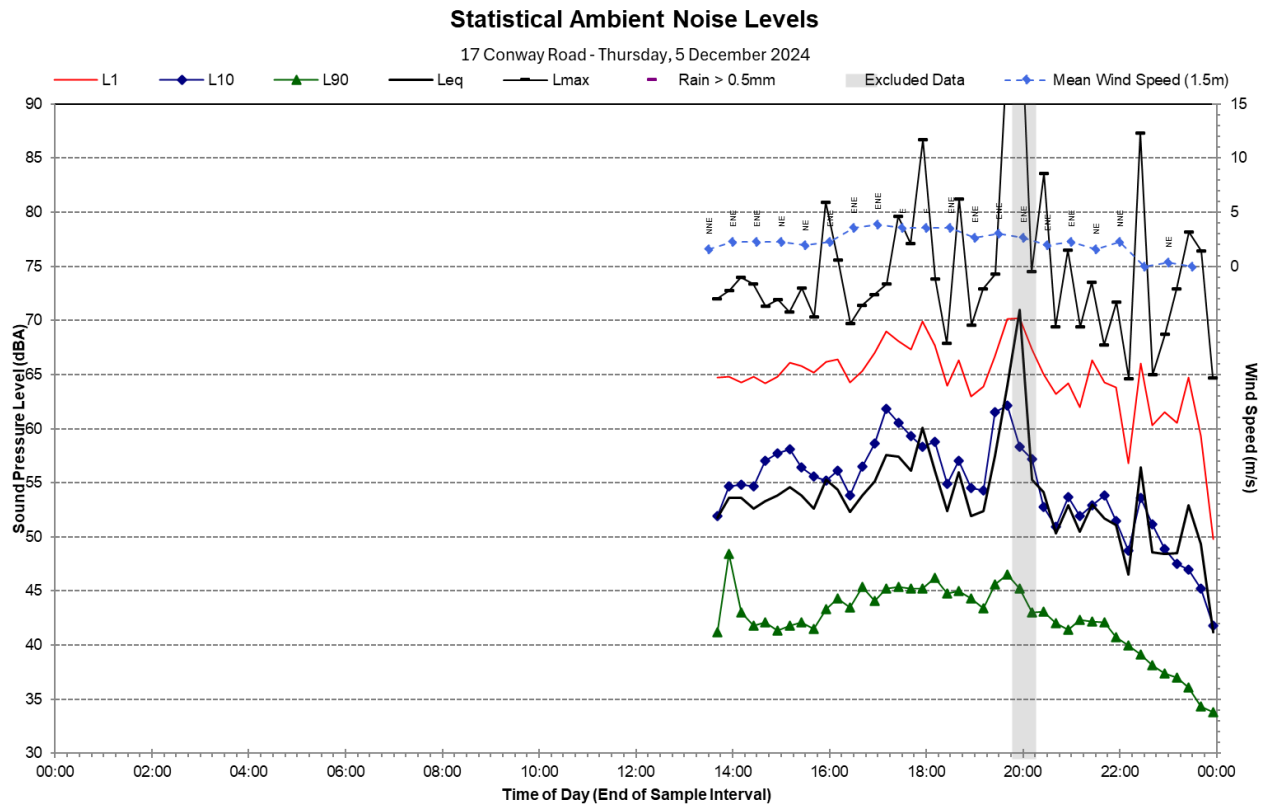
Statistical Ambient Noise Levels

461 Chapel Road - Thursday, 12 December 2024



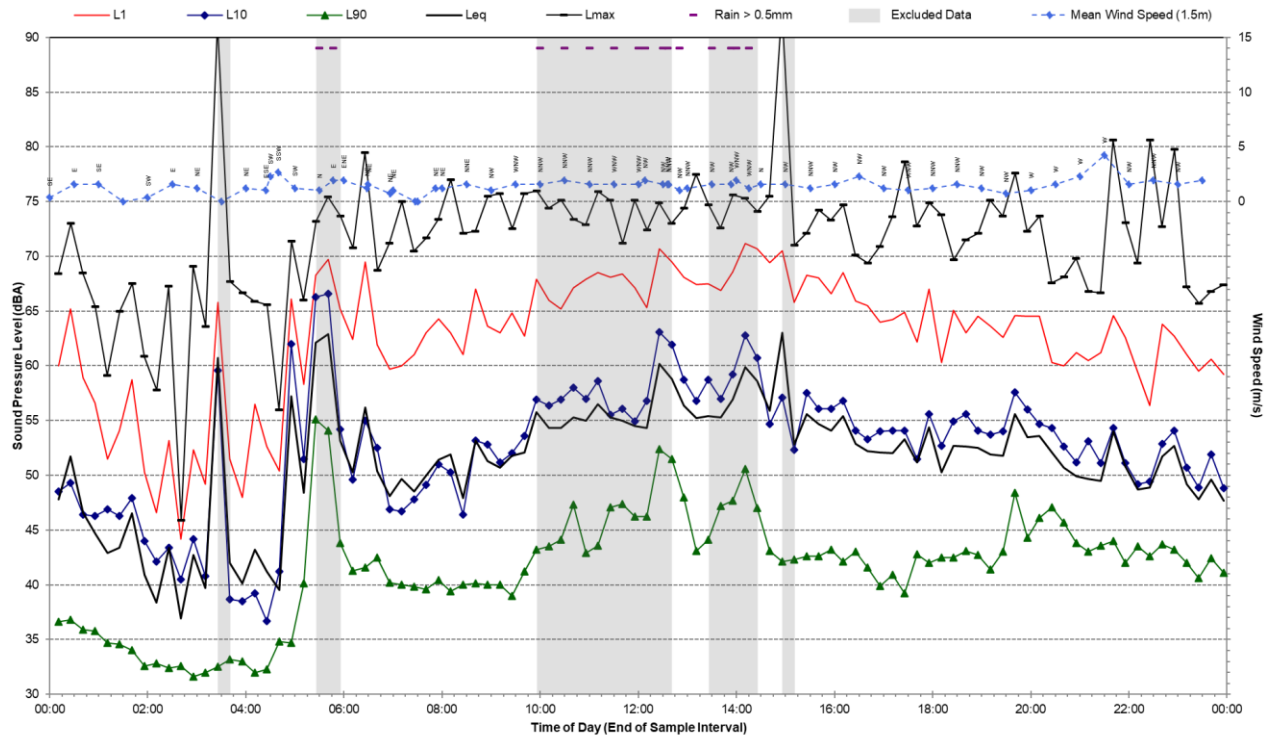


Logger L02 Location



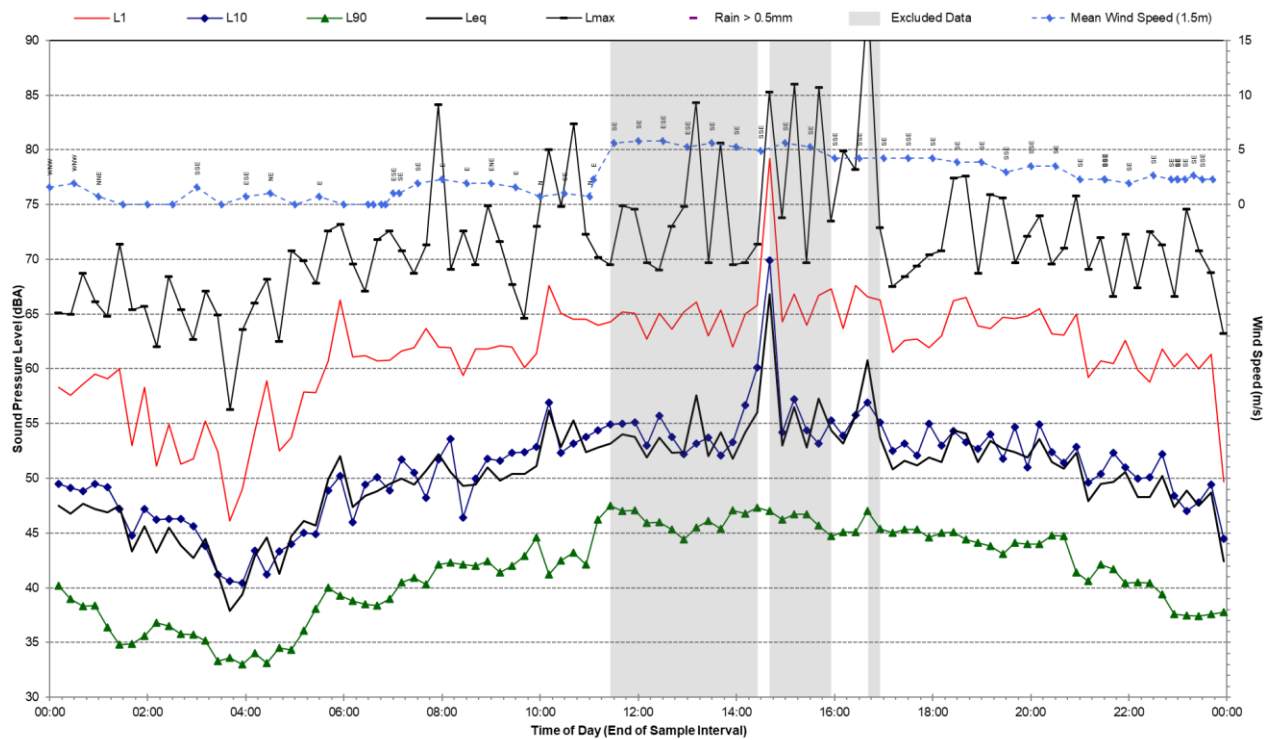
Statistical Ambient Noise Levels

17 Conway Road - Saturday, 7 December 2024



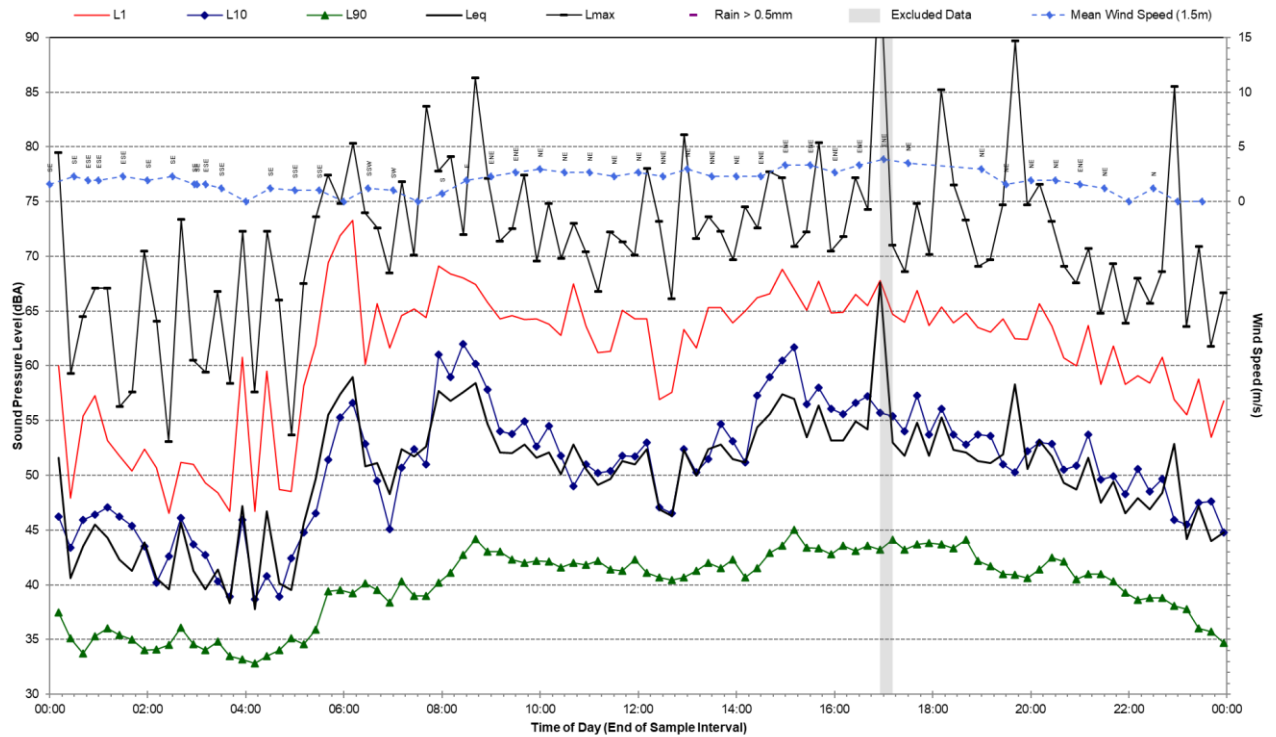
Statistical Ambient Noise Levels

17 Conway Road - Sunday, 8 December 2024



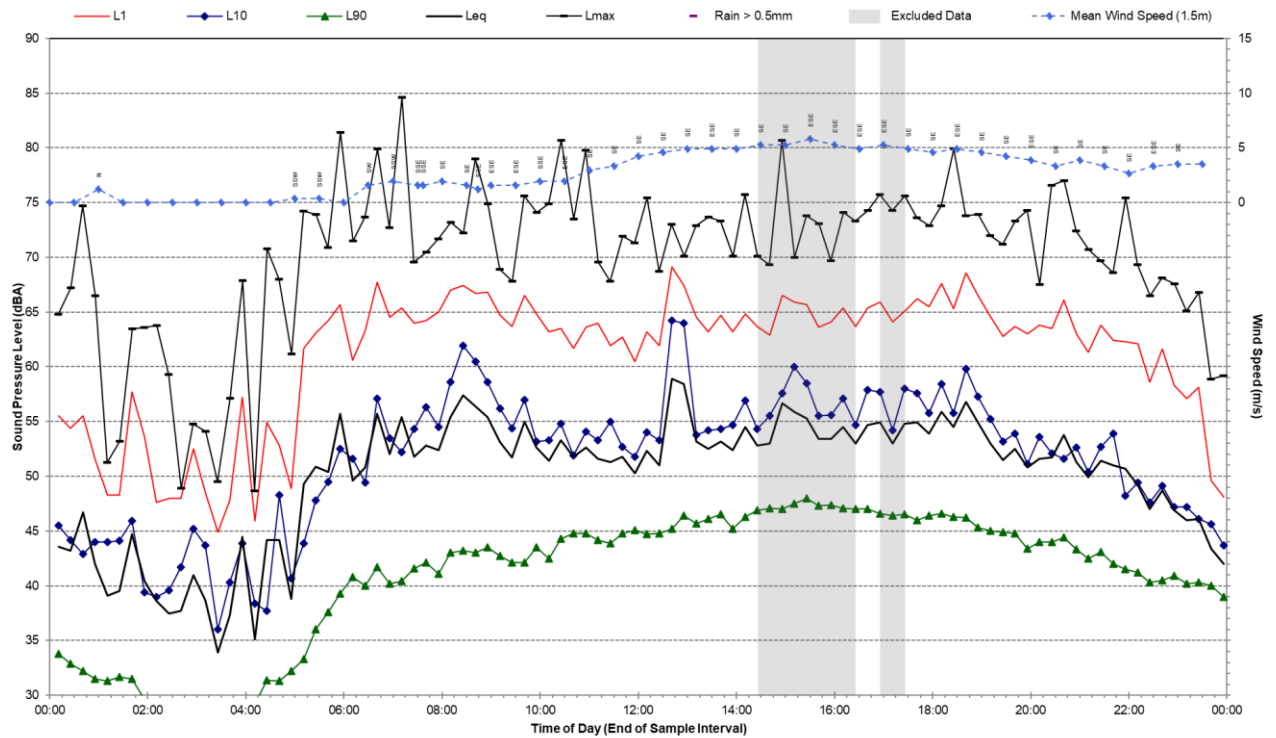
Statistical Ambient Noise Levels

17 Conway Road - Monday, 9 December 2024



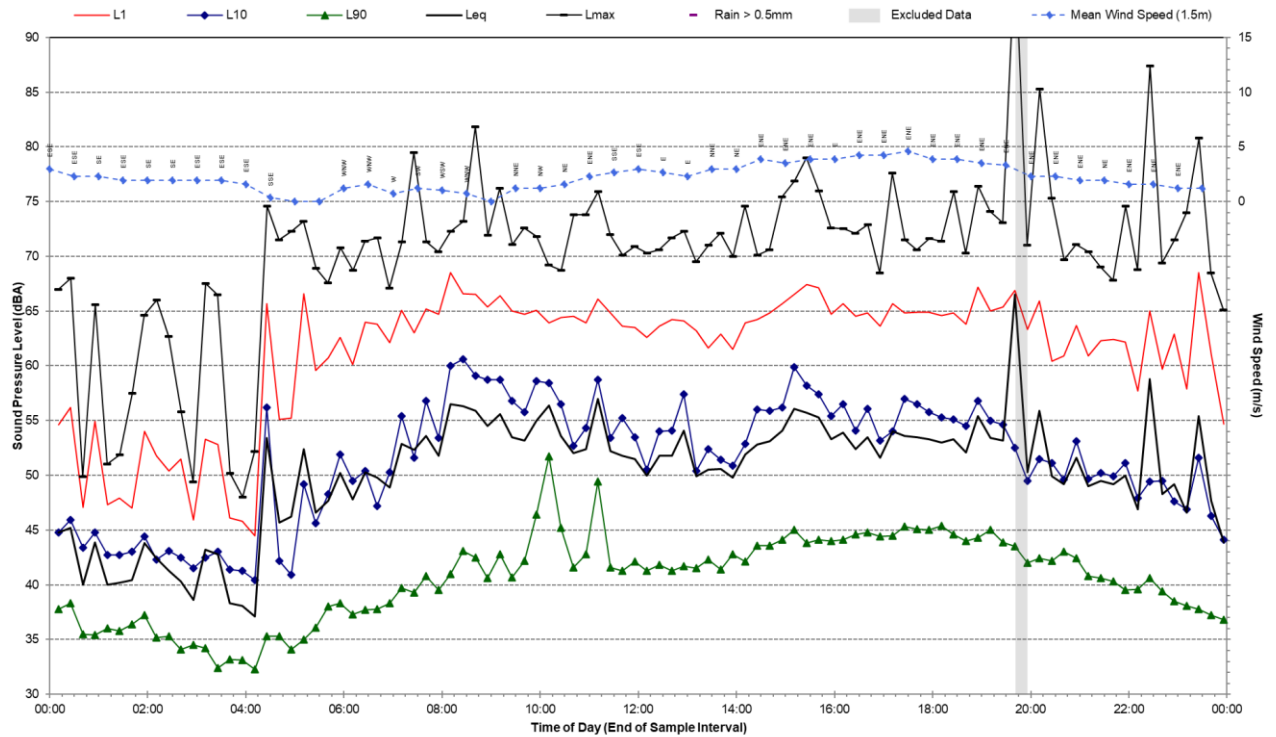
Statistical Ambient Noise Levels

17 Conway Road - Tuesday, 10 December 2024



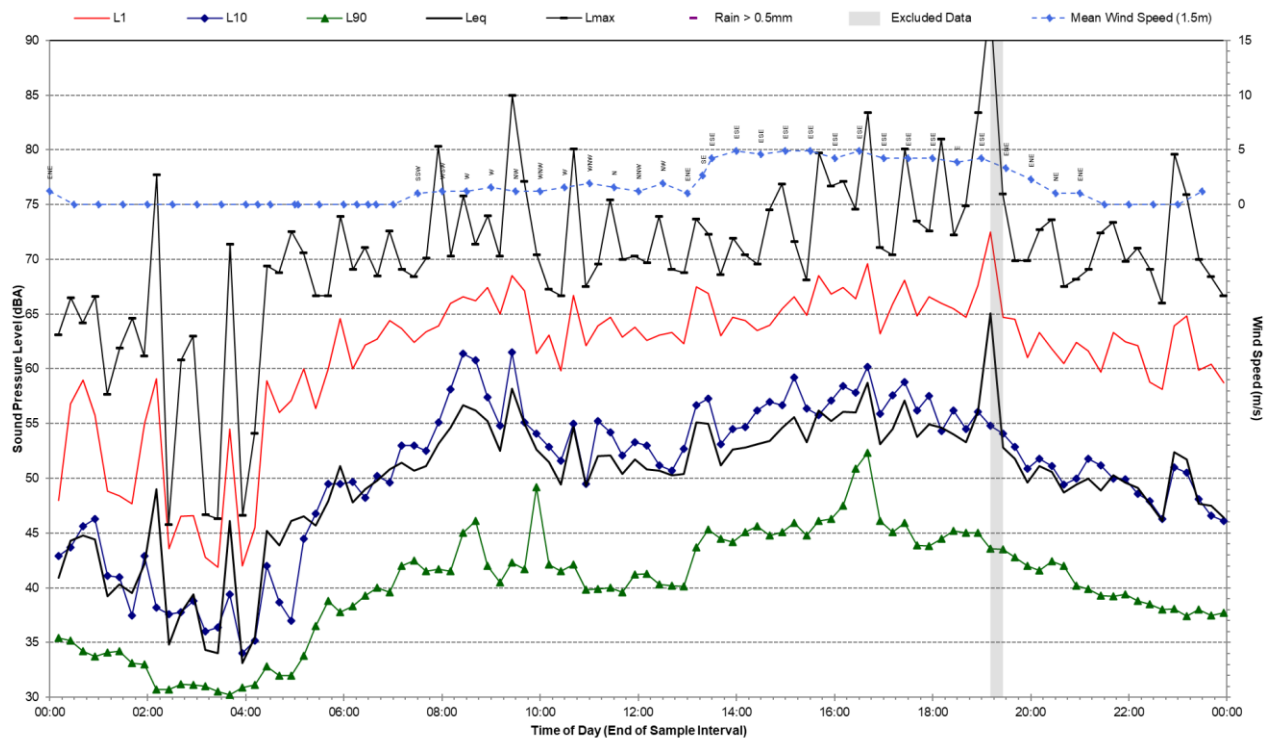
Statistical Ambient Noise Levels

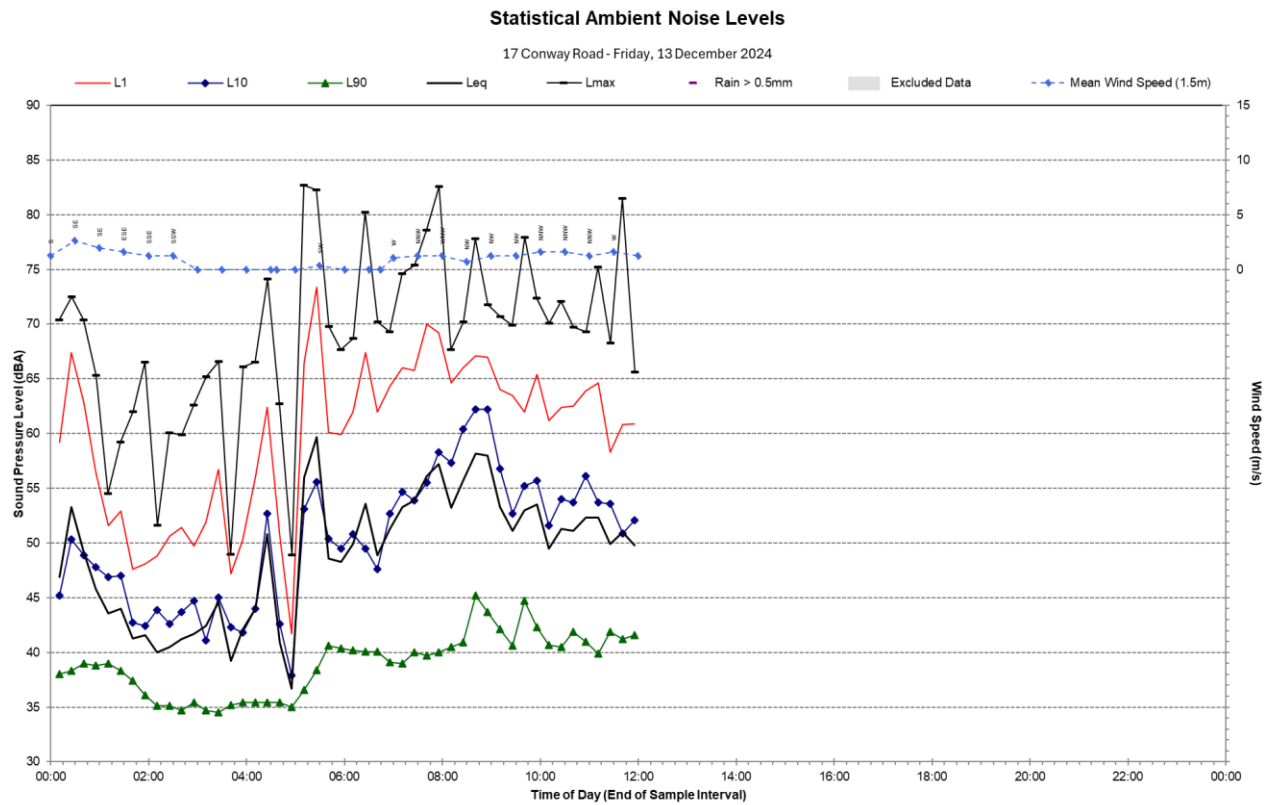
17 Conway Road - Wednesday, 11 December 2024



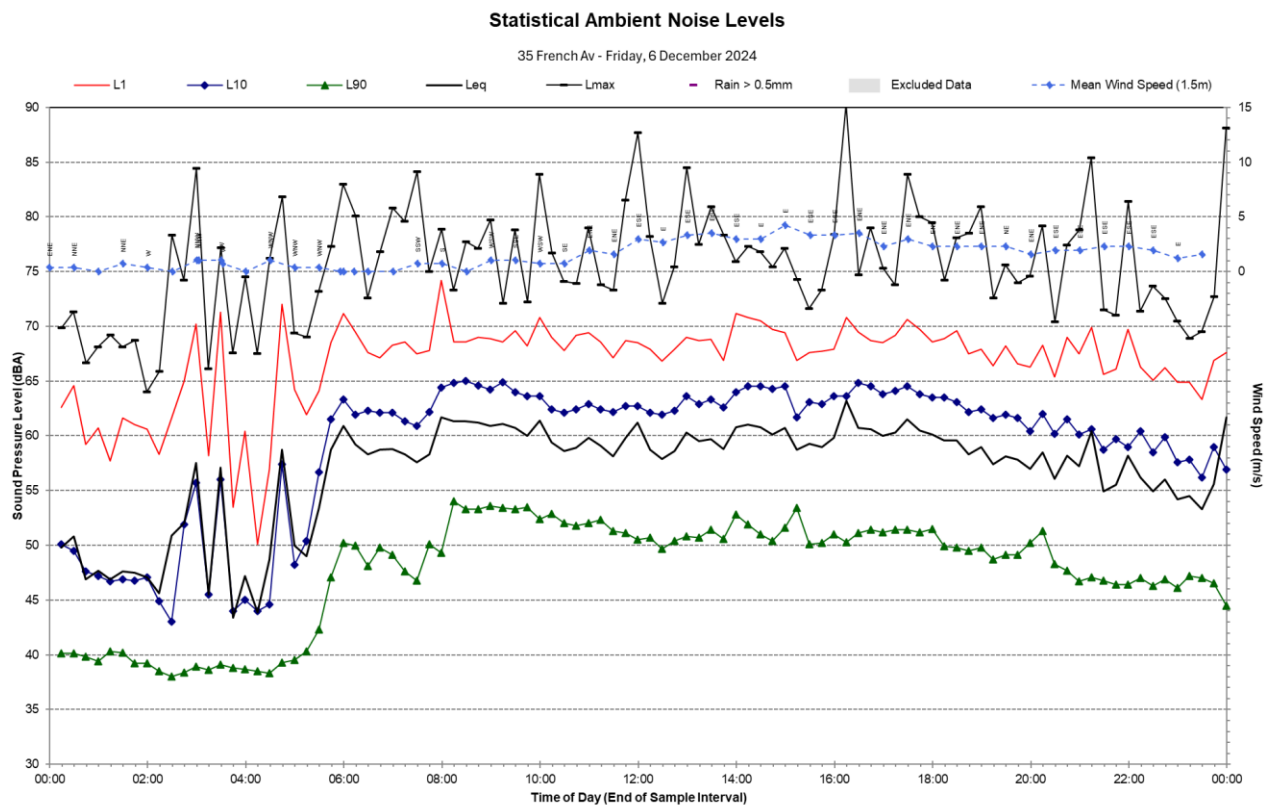
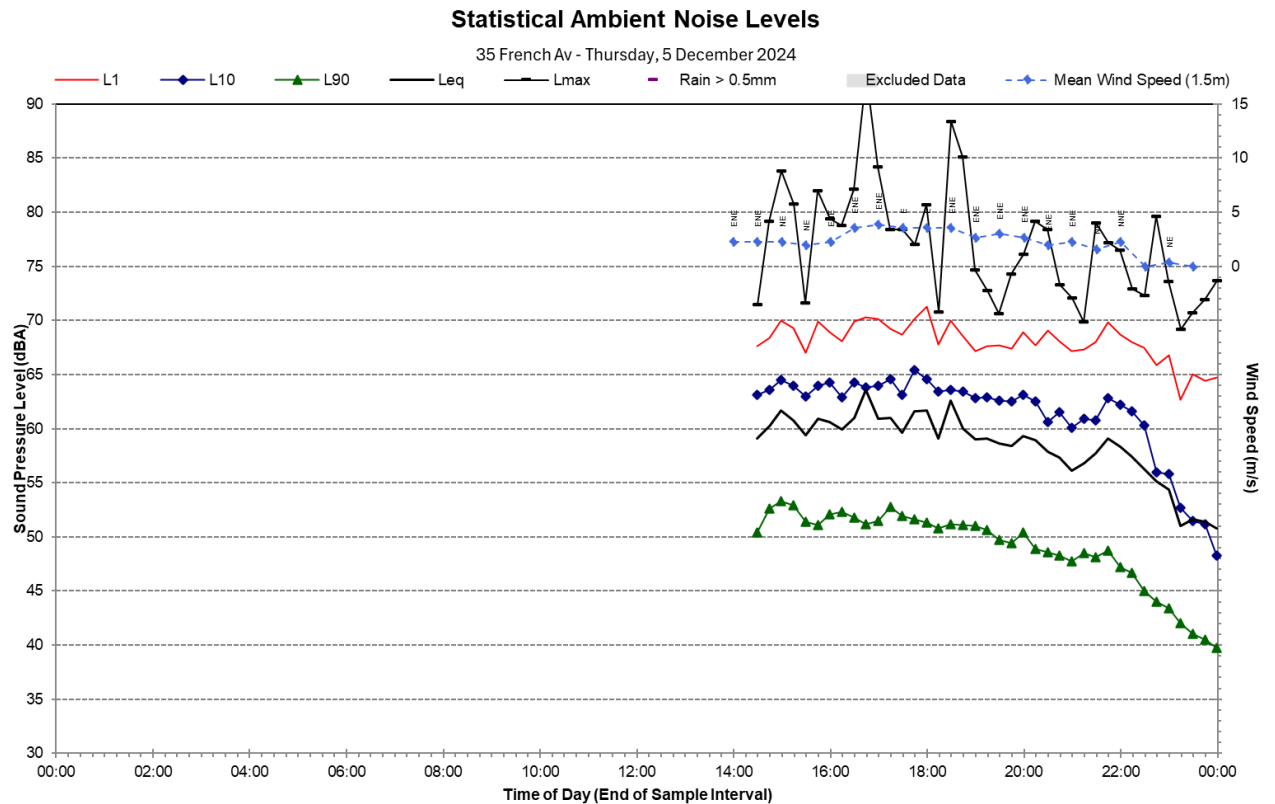
Statistical Ambient Noise Levels

17 Conway Road - Thursday, 12 December 2024



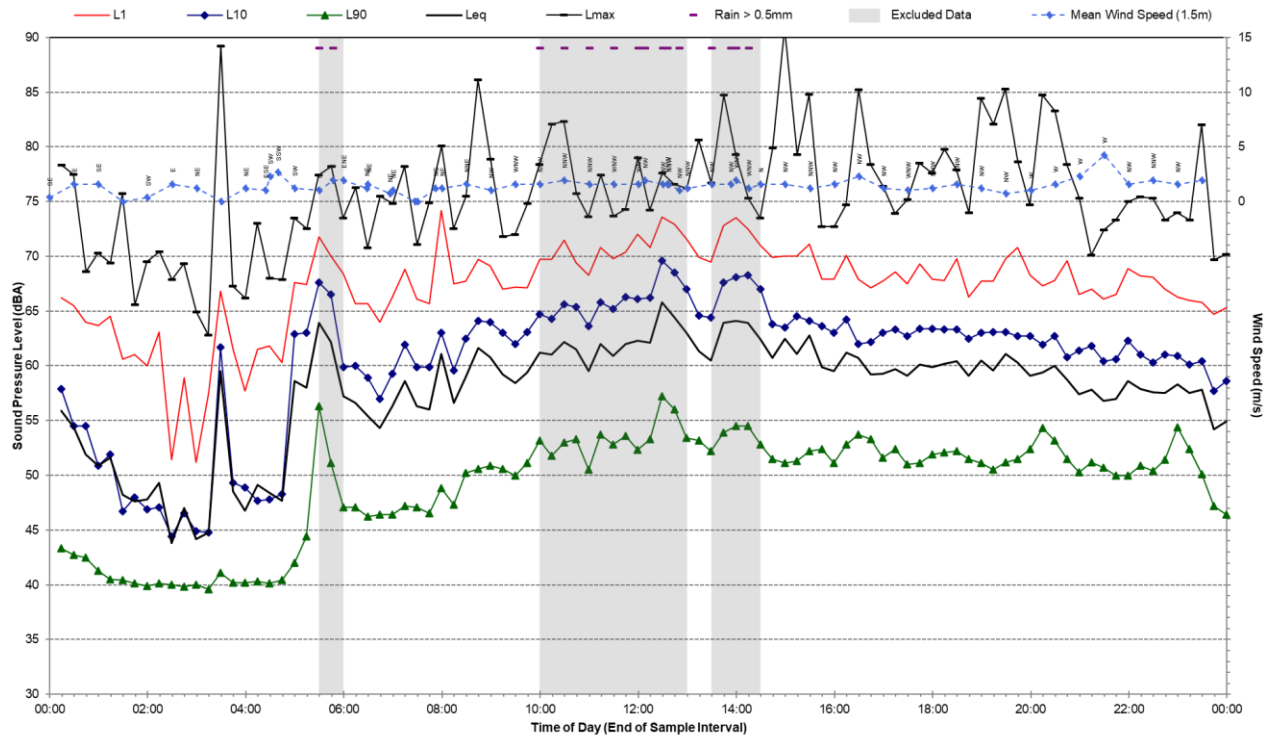


Logger L03 Location



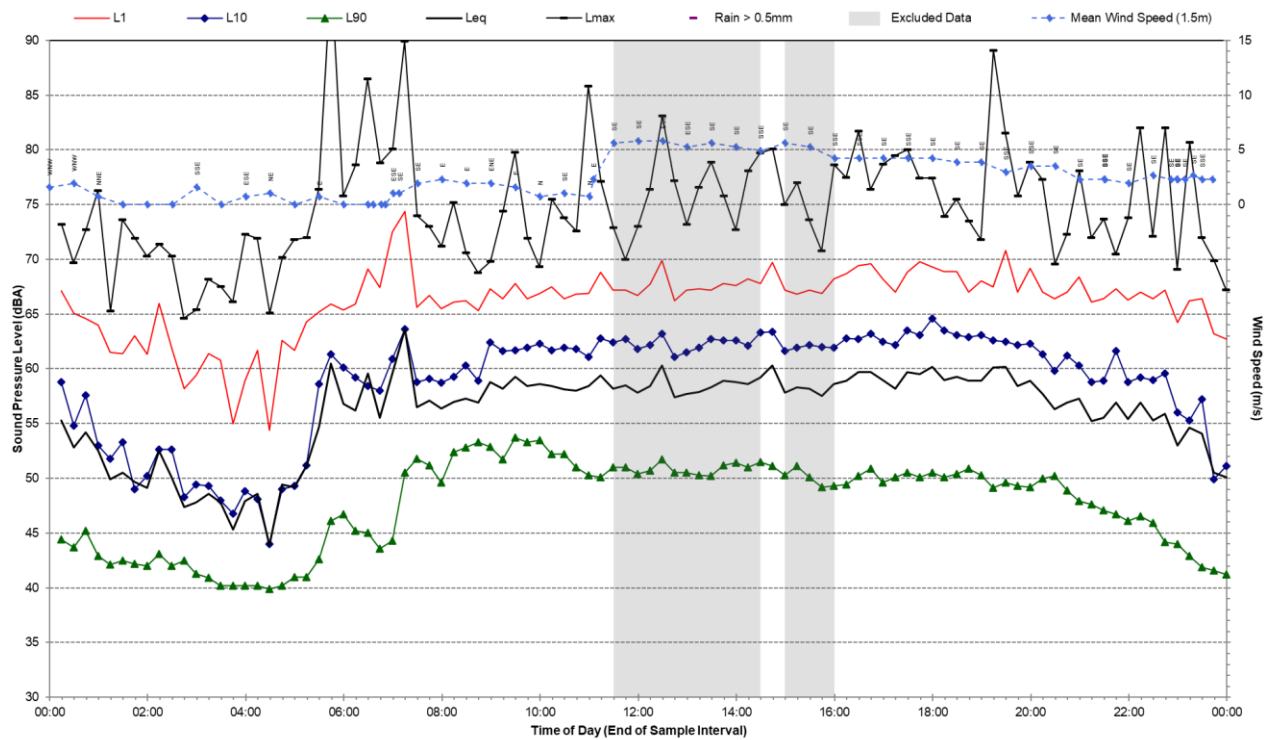
Statistical Ambient Noise Levels

35 French Av - Saturday, 7 December 2024



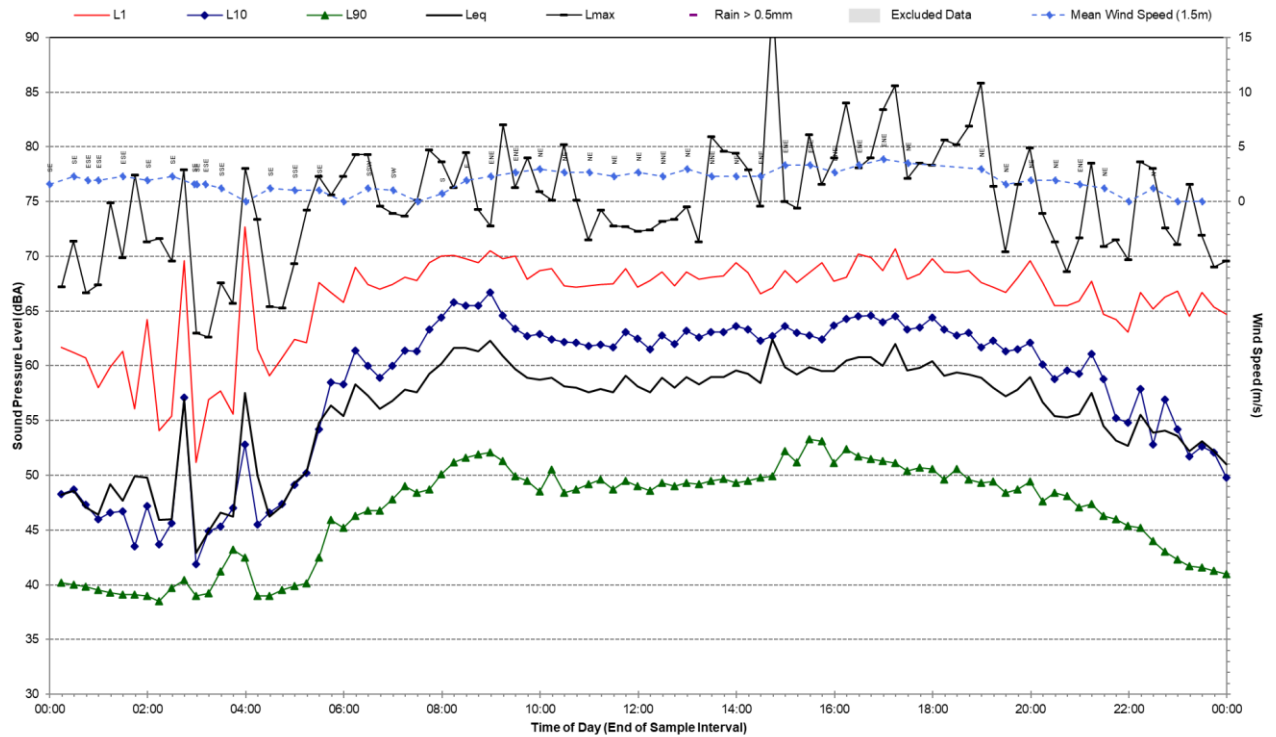
Statistical Ambient Noise Levels

35 French Av - Sunday, 8 December 2024



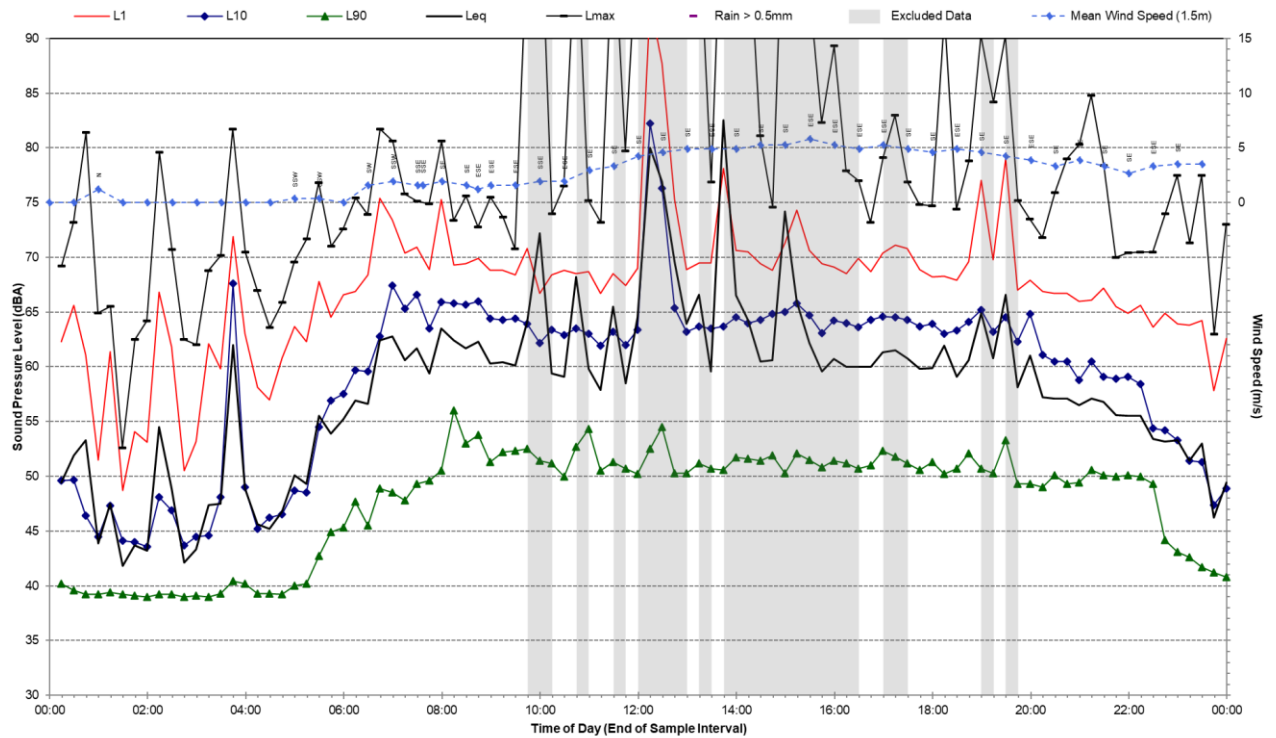
Statistical Ambient Noise Levels

35 French Av - Monday, 9 December 2024



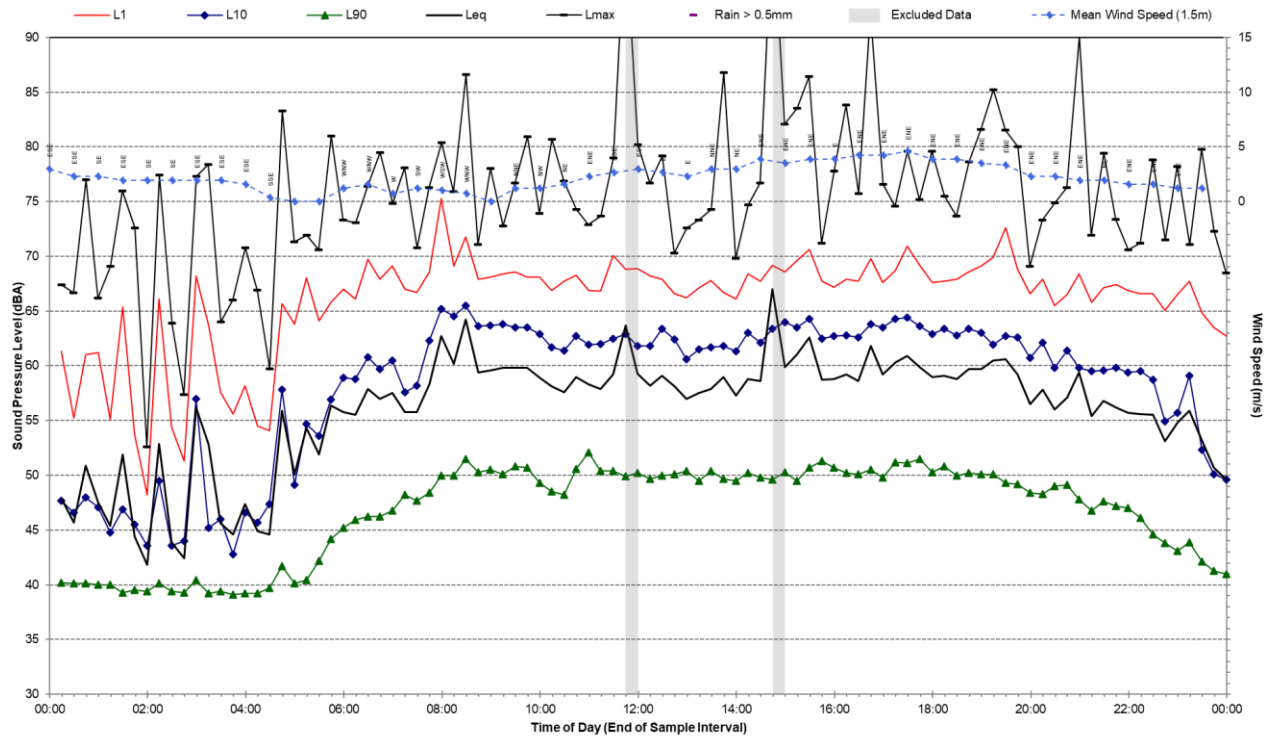
Statistical Ambient Noise Levels

35 French Av - Tuesday, 10 December 2024



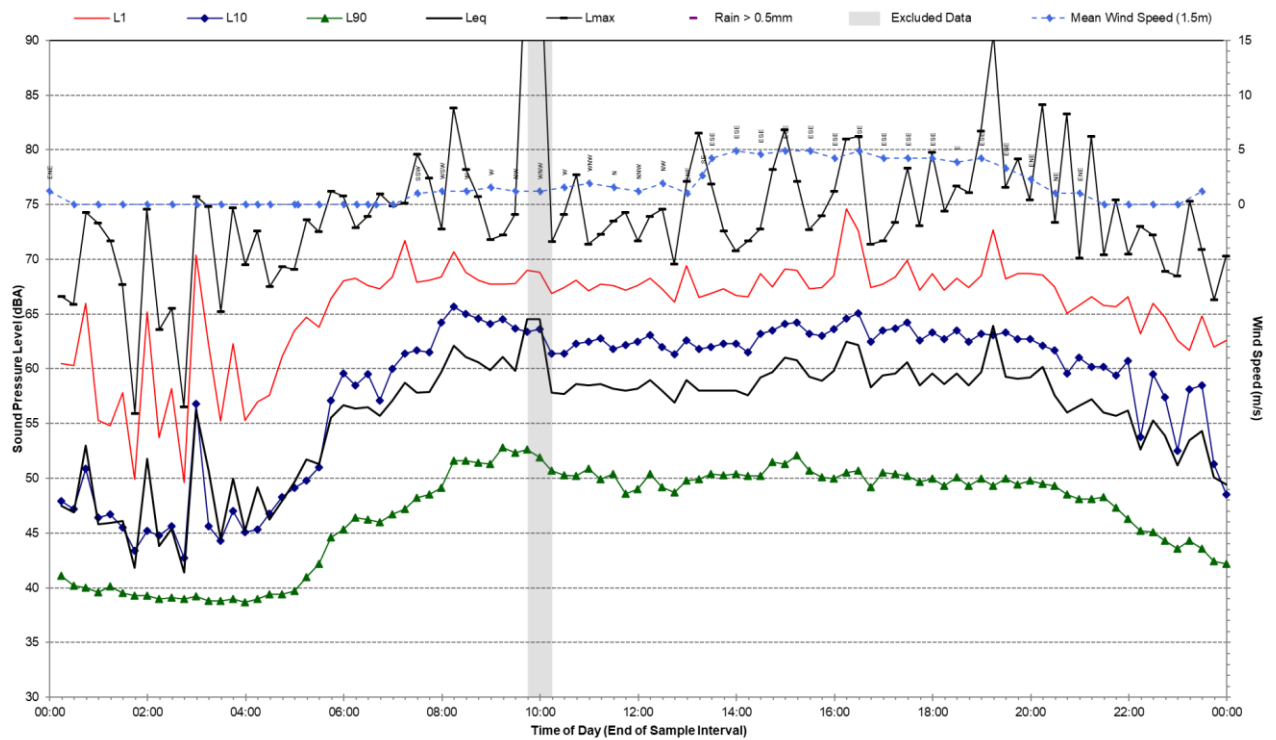
Statistical Ambient Noise Levels

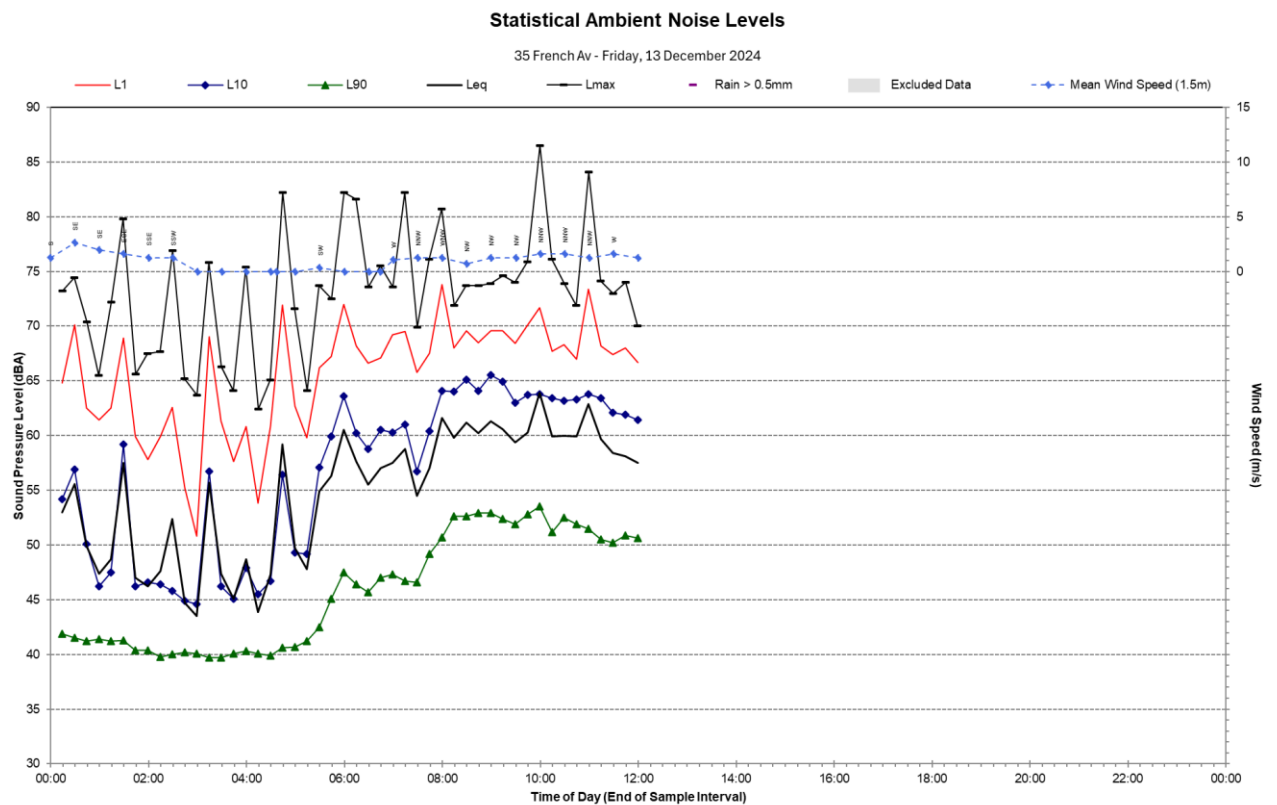
35 French Av - Wednesday, 11 December 2024

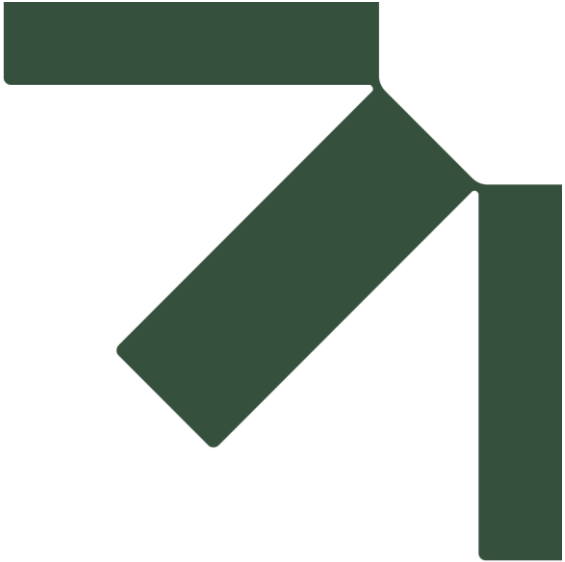


Statistical Ambient Noise Levels

35 French Av - Thursday, 12 December 2024







Appendix C Operational Traffic Façade Noise Maps

461 Chapel Road, Bankstown

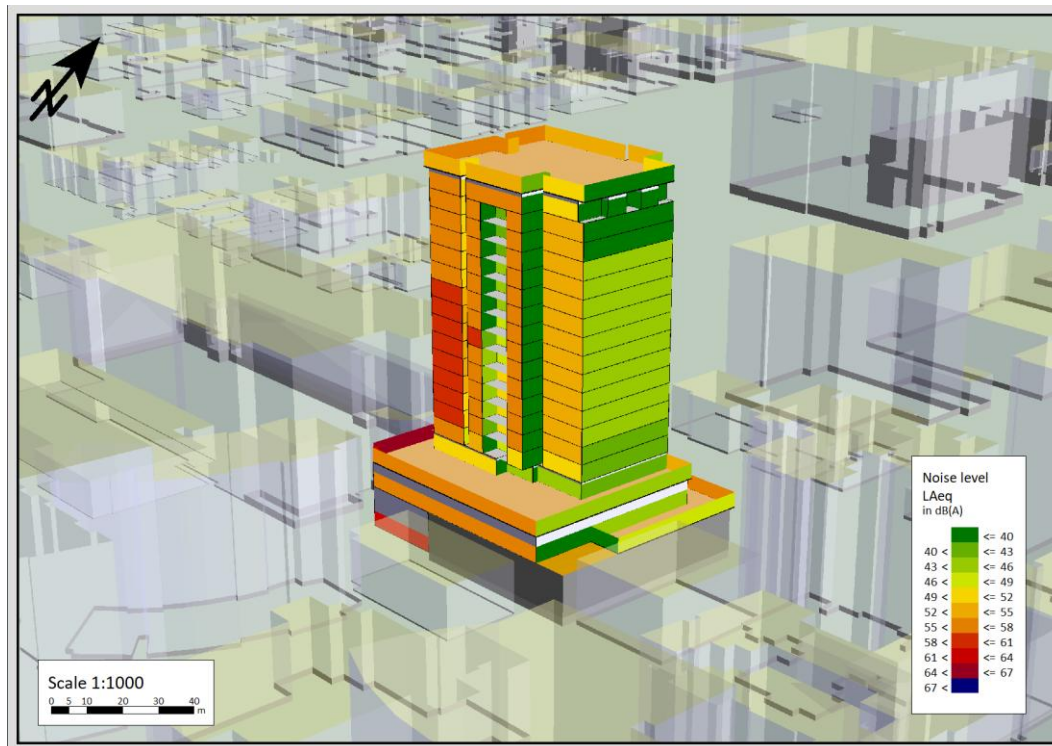
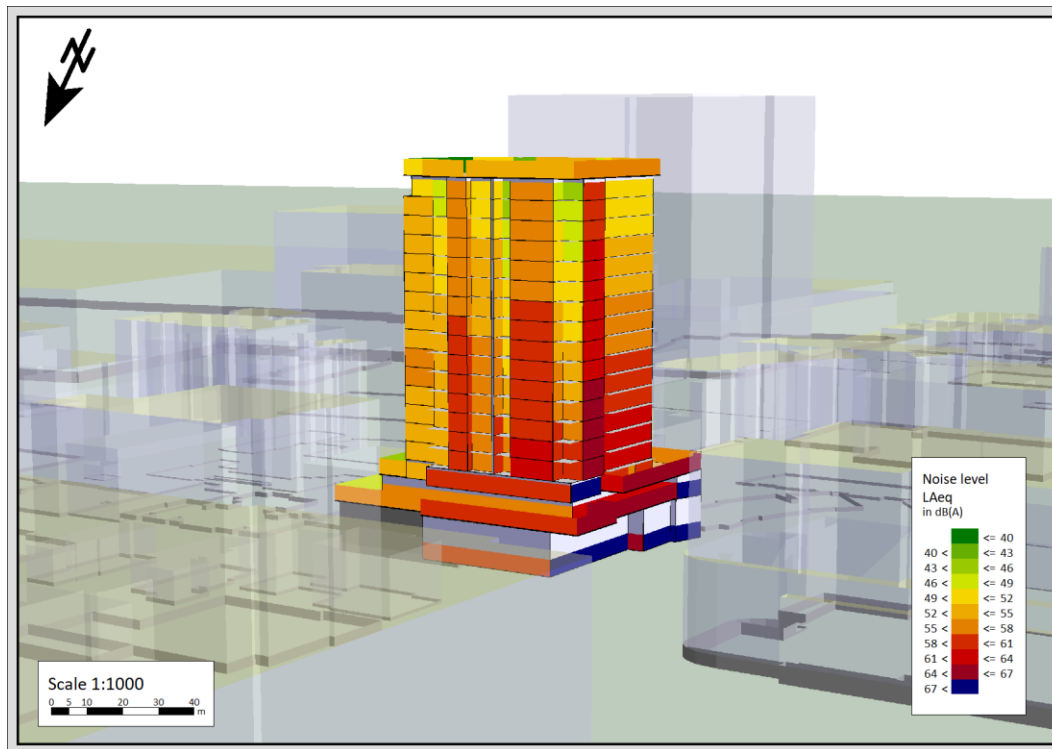
Noise and Vibration Impact Assessment

Sustainable Development Group Limited

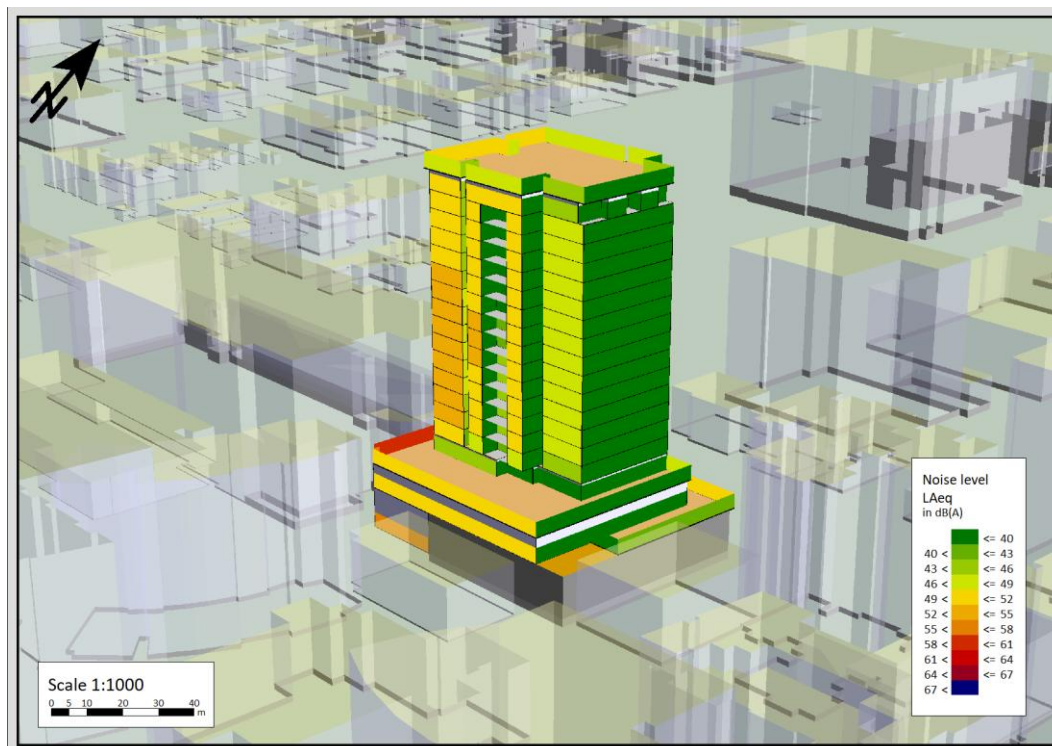
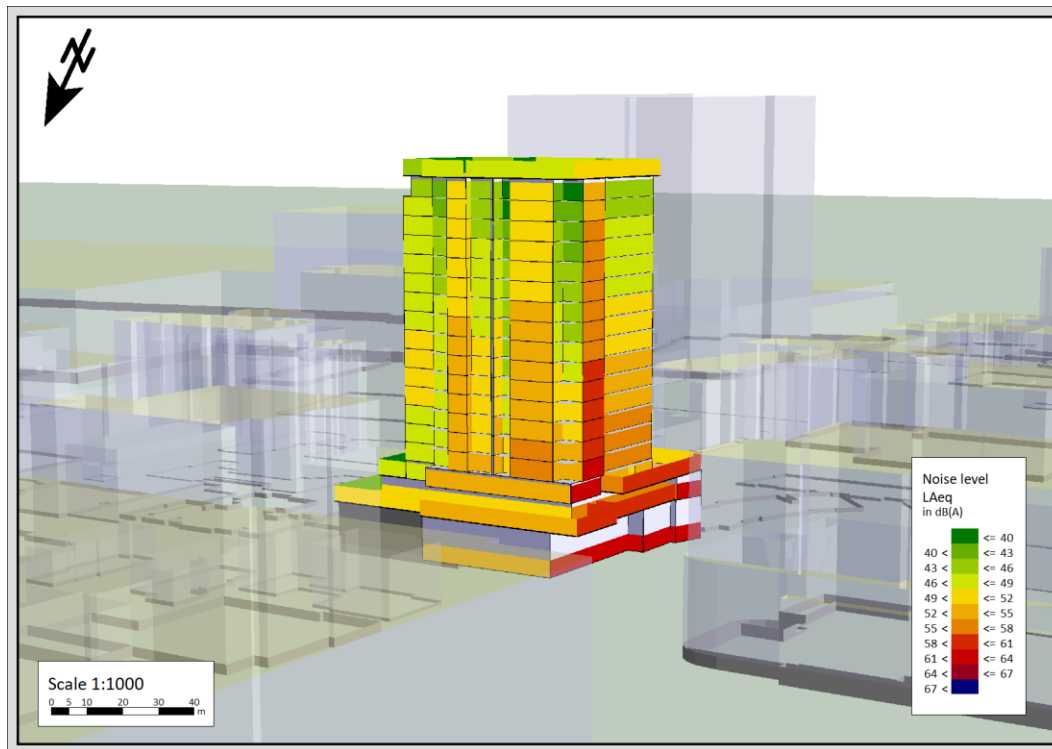
SLR Project No.: 610.032332.00001

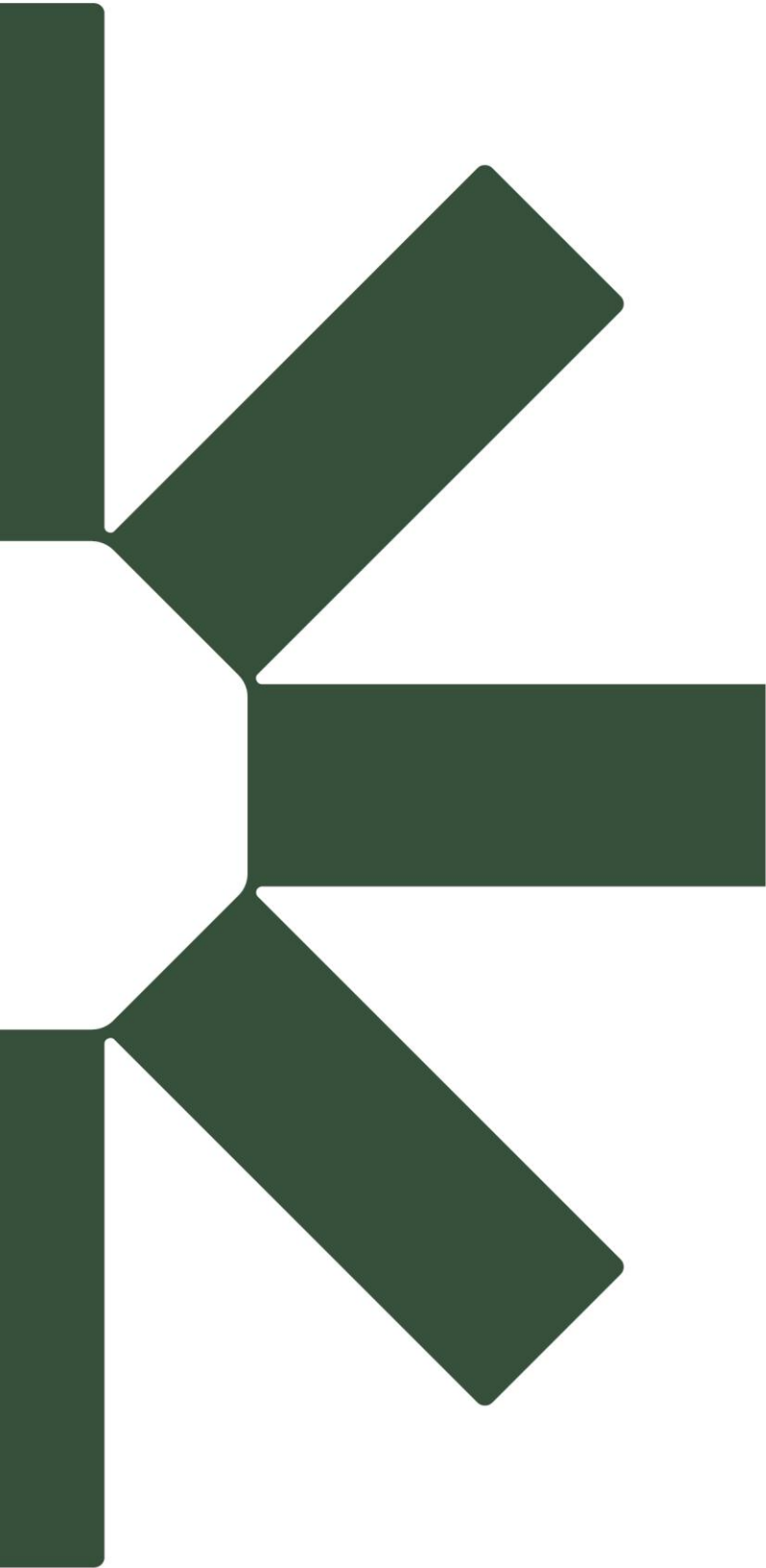
4 February 2026

Day Traffic Noise



Night-time Traffic Noise





Making Sustainability Happen