



Lots 4-5, 6-7 and 8 Buchan Avenue, Edmondson Park

SSD Noise & Vibration Impact Assessment

Urban Property Group

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CONTENTS

1	INTRODUCTION	6
1.1	Planning Secretary’s Environmental Assessment Requirements (SEARs)	6
1.2	SEARs Satisfaction Table	6
1.3	Relevant Guidelines	7
1.4	The Proposal	7
1.4.1	Rezoning Proposal	7
1.4.2	State Significant Development Application	8
1.5	Site Description.....	8
1.6	Surrounding Receivers.....	9
2	NOISE AND VIBRATION SURVEY	11
2.1	Noise Measurements.....	11
2.1.1	Unattended Noise Monitoring	11
2.1.1.1	Results in accordance with NSW EPA Noise Policy for Industry (NPI) 2017 (RBL’s)	12
2.1.1.2	Results in accordance with the NSW Department of Planning, Housing and Infrastructure (DPHI) “Road Noise Policy”	13
2.1.2	Attended Noise Survey	13
2.1.3	Summary of Measured/Assumed RBLs	14
3	NOISE AND VIBRATION CRITERIA.....	15
3.1	External Noise Emission Criteria.....	15
3.1.1	NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021	15
3.1.2	NSW EPA Noise Policy for Industry (NPI) 2017	15
3.1.2.1	Intrusive Noise Impacts (Residential Receivers).....	15
3.1.2.2	Protecting Noise Amenity (All Receivers)	15
3.1.2.3	Residential Receivers – Area Classification	16
3.1.2.4	Maximum Noise Level Event (Sleeping Disturbance)	19
3.1.2.5	Project Specific External Noise Emission Criteria	20
3.1.3	NSW EPA (Formerly DECCW) NSW Road Noise Policy (RNP) 2011	20
3.2	Noise Intrusion Criteria	21
3.2.1	NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021	21
3.2.2	NSW Government Legislation – State Environmental Planning Policy (Transport and Infrastructure)	21
3.2.3	NSW Department of Planning and Environments Development Near Rail Corridors and Busy Roads – Interim Guideline 2008	21
3.2.4	Australian/New Zealand Standard AS/NZS 2107:2016 – Acoustics – Recommended design sound levels and reverberation times for building interiors	22
3.2.5	Summary of Project Requirements.....	23
3.3	Vibration Criteria (Operational).....	23
3.3.1.1	NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021....	23
3.3.1.2	Vibration Criteria – Human Comfort	24
3.3.1.3	Vibration Criteria – Building Contents and Structure.....	24
3.3.1.3.1	British Standard BS 7385 Part 2 – 1993	25
3.3.1.3.2	German Standard DIN 4150 Part 3 - 1999	26
3.4	Construction Noise and Vibration Criteria	26
3.4.1	Construction Noise Criteria	26



3.4.1.1	NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021	26
3.4.1.2	NSW EPA (Former DECC) Interim Construction Noise Guideline (ICNG) 2009	26
3.4.2	Vibration Criteria (Construction)	28
3.4.2.1	NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021	28
3.4.2.2	Vibration Criteria – Human Comfort	28
3.4.2.3	Vibration Criteria – Building Contents and Structure.....	30
	3.4.2.3.1 British Standard BS 7385 Part 2 – 1993	30
	3.4.2.3.2 German Standard DIN 4150 Part 3 - 1999	31
3.4.3	Construction Traffic Noise Criteria.....	32
4	EXTERNAL NOISE INTRUSION ASSESSMENT	33
4.1	Glazing Recommendations	33
4.2	External Wall Construction	35
4.3	External Roof Construction	35
4.4	Mechanical Ventilation.....	36
5	NOISE EMISSION ASSESSMENT (OPERATIONAL NOISE).....	37
5.1	Onsite Vehicle Noise	37
5.2	Additional Traffic on Public Roads.....	37
5.3	Internal and Outdoor Communal Spaces.....	38
5.4	Mechanical Plant & Equipment	41
5.5	Library Noise (Site 03).....	42
5.6	Retail Noise – Site 05.....	43
5.7	Child Care Noise – Site 05.....	45
5.8	Gym – Site 05.....	45
6	NOISE AND VIBRATION MANAGEMENT PLAN	47
6.1	Construction Activity Noise Assessment.....	47
6.2	Construction Traffic Noise Assessment	47
6.3	Vibration Assessment	47
6.4	Acoustic Management Procedures.....	48
6.4.1	Summary of Management Procedures	48
6.4.2	Allocation of Noise Management Procedures.....	49
6.4.3	Allocation of Vibration Management Procedures	49
6.5	Site Specific Noise Mitigation Measures	50
6.5.1	General Comments	50
6.5.2	Noise Monitoring	50
6.5.3	Vibration Monitoring	51
6.5.4	Noise Mitigation Measures for Non-Residential Receivers.....	51
6.5.5	Alternate Equipment or Process	51
6.5.6	Acoustic Enclosures/Screening.....	51
6.5.7	Vibration Mitigation Measures.....	51
	6.5.7.1 General Comments	51
6.6	Community Consultation	52
6.7	Complaints Management System	52
6.8	Contingency Plans.....	52
6.9	General Mitigation Measures (Australia Standard 2436-2010).....	52
6.9.1	Adoption of Universal Work Practices	53



6.9.2	Plant Equipment	53
6.9.3	On Site Noise Mitigation	53
6.9.4	Work Scheduling	53
6.9.5	Source Noise Control Strategies	54
6.9.6	Miscellaneous Comments	54
7	CONCLUSION	55
	APPENDIX A – ACOUSTIC TERMINOLOGY.....	56
	APPENDIX B – UNATTENDED NOISE MONITORING – LOCATION 1 – SOUTHERN CORNER OF SITE 5 ALONG THE RAIL CORRIDOR.....	59
	APPENDIX C – UNATTENDED NOISE MONITORING – LOCATION 2 – EASTERN CORNER OF SITE 5 ALONG BUCHAN AVENUE	66
	APPENDIX B – UNATTENDED NOISE MONITORING – LOCATION 3 – NORTHEASTERN CORNER SITE 3	72

Figures

Figure 1	Aerial Image of Site.....	9
Figure 2	- Project Site Location – Sources from Google Earth	10
Figure 3	NSW ePlanning Spatial Viewer.....	17
Figure 4	NPI Extract – Table 2.3 Determining which of the residential receiver categories applies	18
Figure 5	- BS 7385 Part 2 – 1993, Graph of transient vibration values for cosmetic damage	25
Figure 6	- BS 7385 Part 2 – 1993, Graph of transient vibration values for cosmetic damage	31
Figure 7	Extract of Project Traffic Report – Peak Traffic Generation (Private Vehicles)	38
Figure 8	Extract – NSW Noise Policy for Industry (NPI) 2017	40
Figure 9	Site 03 – Library.....	42
Figure 10	Site 05 – Ground Level – Supermarket, Retail, F&B and Through-Site Link.....	43
Figure 11	Site 05 – F&B Awning	44
Figure 12	Site 05 – Child Care Centre Slab Extension.....	45

Tables

Table 1	SEARs Satisfaction Table.....	6
Table 2	Measured Ambient Noise Levels corresponding to the NPI’s Assessment Time Periods.....	12
Table 3	Measured Ambient Noise Levels corresponding to the “Road Noise Policy” Assessment Time Periods... ..	13
Table 4	Measured Attended Noise Measurements.....	14
Table 5	Assumed Noise Levels vs. Receiver Locations (RBL’s)	14
Table 6	NSW NPI – Recommended L_{Aeq} Noise Levels from Noise Sources	19
Table 7	External Noise Level Criteria in accordance with the NSW NPI.....	20
Table 8	Recommended design sound levels as per Standard AS/NZS 2107:2016	22
Table 9	Summary of Internal Noise Level Criteria	23
Table 10	Continuous vibration acceleration criteria (m/s ²) 1 Hz-80 Hz.....	24
Table 11	Impulsive vibration acceleration criteria (m/s ²) 1 Hz-80 Hz.....	24
Table 12	Intermittent vibration impacts criteria (m/s ^{1.75}) 1 Hz-80 Hz.....	24
Table 13	Transient vibration criteria as per standard BS 7385 Part 2 – 1993	25
Table 14	Structural damage criteria as per standard DIN 4150 Part 3 – 1999.....	26



Table 15	NMLs for Quantitative Assessment at Residences	27
Table 16	NMLs as Bases for the Acoustic Assessment	28
Table 17	Continuous vibration acceleration criteria (m/s ²) 1 Hz-80 Hz	29
Table 18	Impulsive vibration acceleration criteria (m/s ²) 1 Hz-80 Hz	29
Table 19	Intermittent vibration impacts criteria (m/s ^{1.75}) 1 Hz-80 Hz	30
Table 20	Transient vibration criteria as per standard BS 7385 Part 2 – 1993	30
Table 21	Structural damage criteria as per standard DIN 4150 Part 3 – 1999	32
Table 22	Recommended Glazing Construction	33
Table 23	Recommended Light Weight External Wall Construction	35
Table 24	“Offensive Noise” Test	40
Table 25	Recommended indicative safe working distances for vibration intensive plant	48
Table 26	Summary of mitigation procedures	48
Table 27	Allocation of noise management procedures – residential receivers	49
Table 28	Allocation of vibration management procedures	50



1 INTRODUCTION

This Noise and Vibration Impact Assessment is submitted to the Department of Planning, Housing and Infrastructure (DPHI) on behalf UPG Edmondson Parkland Pty Ltd (UPG) (the Applicant), to support a State Significant Development Application (SSDA) and Concurrent Rezoning Report for the construction of a new multi stage residential project at Lots 4-5, 6-7, and 8 Buchan Avenue, Edmondson Park (known as Sites 3, 4 and 5) (the site). The proposed development comprising a mix of shop-top housing, residential flat buildings (RFB), co-living housing, and affordable housing, together with public domain improvements including a new publicly accessible plaza, a public library and through-site pedestrian links.

The project has been identified by the NSW Housing Delivery Authority (HDA) as a key development to accelerate the delivery of well-located, diverse and affordable housing across Greater Sydney, with the HDA playing a coordinating role across government agencies to unlock complex sites through strategic planning, infrastructure coordination and streamlined assessment pathways. On 19 February 2025, the HDA recommended that the proposed development on Sites 4 and 5 (6-7 and 8 Buchan Avenue, Edmondson Park), as outlined in EOI application 232588 dated 17 January 2025, be declared State Significant Development (SSD) under section 4.36(3) of the Environmental Planning and Assessment Act 1979, followed by a similar recommendation on 2 June 2025 for Site 3 (4-5 Buchan Avenue, Edmondson Park) as described in EOI application 246574 dated 14 March 2025. These recommendations were formalised through the Minister’s issuance of State Significant Development Declaration Order (No. 9) 2025 on 12 June 2025, with the proposals to be facilitated by a concurrent amendment to the State Environmental Planning Policy (Precincts – Western Parkland City) 2021.

1.1 Planning Secretary’s Environmental Assessment Requirements (SEARs)

This report addresses the relevant Secretary’s Environmental Assessment Requirements (SEARs), namely:

10. Noise and Vibration

- Provide a noise and vibration impact 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.

1.2 SEARs Satisfaction Table

In addressing the requirements of SEARs item 10 above, each item is addressed in the following section:

Table 1 SEARs Satisfaction Table

Acoustic Assessment SEARs Satisfaction Table		
SEAR	SEAR Requirements	Document Reference
10	<i>Provide a noise and vibration impact assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines</i>	Refer to Section 3
	<i>The assessment must detail construction and operational noise, and vibration impacts on nearby sensitive receivers and structures</i>	Refer to Section 4 and 6



... and outline the proposed management and mitigation measures that would be implemented.

Refer to Section 4 and 6

1.3 Relevant Guidelines

Acoustic criteria that have been adopted in this assessment include requirements from the following guidelines or legislative documents:

- NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021.
- NSW State Environmental Planning Policy (SEPP) (Transport & Infrastructure SEPP) 2021.
- NSW EPA Noise Policy for Industry (NPI) 2017.
- NSW Interim Construction Noise Guideline, 'Interim Construction Noise Guideline' published by the Department of Environment and Climate Change NSW (DECC 2009/265) dated July 2009,
- NSW 'Development Near Rail Corridors and Busy Roads- Interim Guideline' dated December 2008,
- 'NSW Road Noise Policy' prepared by the Department of Environment, Climate Change and Water NSW (DECCW NSW) dated March 2011.
- Assessing Vibration: A Technical Guideline published by the Department of Environment and Conservation (NSW EPA), February 2006,
- Structural damage criteria as presented in German Standard DIN4150-Part 3 "Structural vibration in buildings – Effects on structures"
- British Standard BS7385-Part 2: 1993 "Evaluation and Measurement for Vibration in Buildings.

1.4 The Proposal

1.4.1 Rezoning Proposal

- To facilitate the proposed development described in Section 1.4.2, a Rezoning Proposal is sought to seek the following amendments to the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* (Precincts SEPP):
- Amend the Height of Buildings Map to apply a suite of maximum building heights across the site, ranging from 52m – 135m;
- Amend the Floor Space Ratio Map to apply maximum FSRs of 3.7:1 - 5.4:1 across the site;
- Remove the requirement for a Development Control Plan for the site;
- Permit development for the purposes of 'commercial premises' on Site 5.



1.4.2 State Significant Development Application

- The proposed amendments to the Precincts SEPP, as outlined above, will facilitate the following development, sought via a concurrent SSDA. Specifically, the proposed works sought under the SSDA include:
- Construction of fourteen residential towers (ranging in height between 6 to 40 storeys) over five podiums (ranging in height between 2-5 storeys), comprising:

Mixed use podiums in Site 5.

Public library in Site 3.

A total of 1,805 residential apartments located above in a combination of build-to-sell, affordable, and co-living formats.

- Basement car parking.
- Associated landscaping and public domain improvements, including a new publicly accessible plaza, public library and through-site links.
- It is noted that the project will commit to providing 15% of the GFA as affordable housing for a minimum of 15 years, to be managed by a registered Community Housing Provider (CHP).
- For a detailed description of the proposed development, refer to the Environmental Impact Statement (EIS) prepared by Beam Planning, and the Architectural Drawings prepared by Plus Architecture.

1.5 Site Description

The combined site is located at 4-5, 6-7, and 8 Buchan Avenue, Edmondson Park, and is legally described as Lots 4, 5, 6, 7 and 8 in DP1275478. The site has a total area of approximately 3.1 hectares, with a primary street frontage of approximately 298m to Buchan Avenue, and a secondary street frontage of approximately 186m to Horrie Road. The combined site is owned by UPG Edmondson Parkland Pty Ltd.

The site is located approximately 330m from the Edmondson Park Train Station and directly adjacent to a future high school (currently under construction). The site is also approximately 400m northwest of Frasers Ed Square Town Centre, placing it in a highly accessible and active urban precinct. The site and its surroundings are currently undeveloped presenting a significant opportunity for coordinated and well-integrated urban development.

It is noted that earthworks, subdivision, and the construction of the major and minor roads surrounding the site has been undertaken under previous development consents.

Figure 1 below provides an aerial image for the site.

Figure 1 Aerial Image of Site



1.6 Surrounding Receivers

The nearest sensitive noise receivers to the site are identified below.

- Receiver 1:** Edmondson Park Public School and High School
- Receiver 2:** Clermont Park Recreation Area
- Receiver 3:** Residential Dwellings (under construction)
- Receiver 4:** Future Residential Dwellings, B1 classified land under development
- Receiver 5:** Future Residential Dwellings, B1 classified land under development

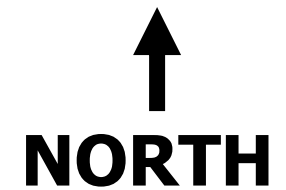
A map showing the site location and all measurement locations as well as nearest receivers is provided in Figure 2 below.

Figure 2- Project Site Location – Sources from Google Earth



Legend

- Project Sites
- Residential Receivers (proposed)
- Educational Receivers
- Public Recreation
- Unattended Noise Monitor (L"x")
- Attended Noise Monitor (A"x")





2 NOISE AND VIBRATION SURVEY

2.1 Noise Measurements

Measured onsite noise levels from the onsite noise survey are outlined below.

2.1.1 Unattended Noise Monitoring

Three (3) unattended noise monitors were deployed to the site to survey existing background noise levels as well as ambient L_{Aeq} noise levels.

The first monitoring location included one (1) unattended noise monitor in the southern corner of site 5 parallel to the rail corridor, referred to as 'L1' in Figure 2 above, to determine the existing background noise levels and ambient noise levels from the rail corridor and surrounding receivers.

The second location was on the eastern corner of site 5 along Buchan Avenue, referred to as 'L2' in the Figure 2 above, to determine the existing background noise levels and ambient noise levels for receivers along Buchan Avenue.

A third noise monitor was put on the northeastern corner of site 3 to determine the existing background noise levels and ambient noise levels for receivers north of the site.

Onsite acoustic noise survey was conducted from Tuesday 25th November 2025 to Thursday 4th December 2025. All data in the graphs presented in Appendix B, C and D have not been corrected (i.e., raw data is presented).

During the monitoring period, the measurements were significantly influenced by ongoing construction activities at surrounding sites. These external works occurred typically be limited to daytime hours between 7:00am and 5:00pm on weekdays and 8:00am to 1:00pm on Saturdays (as the approved construction hours), resulting in elevated noise levels during these times. To ensure representative baseline conditions, the determination of daytime RBL's has relied on data collected on Sunday, when no surrounding construction was active. As no construction activities were observed during evening and nighttime periods; the project's RBL's for these periods will be determined using the entire monitoring period.

Instrumentation for the survey comprised three (3) Rion NL-42 sound level meter (serial number 00998081, 01000233 and 00998079). Calibration of the monitors were checked prior to and following the measurements. Drift in calibration did not exceed ± 0.5 dB. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Charts presenting summaries of the measured daily noise data are attached in Appendix B for Location 1 and Appendix C for location 2 and Appendix D for location 3. The charts present each 24-hour period and show the L_{A10} , L_{Aeq} and L_{A90} noise levels for the corresponding 15-minute periods. This data has been filtered to remove periods affected by adverse weather conditions based on weather information.

Based on the unattended noise measurements, the results of the survey have been presented below.



2.1.1.1 Results in accordance with NSW EPA Noise Policy for Industry (NPI) 2017 (RBL’s)

In order to assess the acoustical implications of the development at nearby noise sensitive receivers, the measured background noise data of the logger was processed in accordance with the NSW EPA’s Noise Policy for Industry (NPI, 2017).

The Rating Background Noise Level (RBL) is the background noise level used for assessment purposes at the nearest potentially affected receiver. It is the 90th percentile of the daily background noise levels during each assessment period, being day, evening and night. RBL L_{A90} (15minute) and L_{Aeq} noise levels are presented in Table 2

Data affected by adverse meteorological conditions and by spurious and uncharacteristic events have been excluded from the results and excluded from the data used to determine the noise emission criteria. Meteorological information has been obtained from the Bankstown Airport (ID 066137) which is located approximately 13km away. Levels presented below are processed results with extraneous weather events removed.

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

Measurement Location ⁴	Daytime ¹ 7:00 am to 6:00 pm		Evening ¹ 6:00 pm to 10:00 pm		Night-time ¹ 10:00 pm to 7:00 am	
	L_{A90} ² (dBA)	L_{Aeq} ³ (dBA)	L_{A90} ² (dBA)	L_{Aeq} ³ (dBA)	L_{A90} ² (dBA)	L_{Aeq} ³ (dBA)
Location 1 – Southern corner of site 5 along the rail corridor (Figure 2)	38 ⁴	56 ⁴	43	57	37	55
Location 2 – Eastern corner of site 5 along Buchan Ave (See Figure 2)	38 ⁴	56 ⁴	43	57	37	57
Location 3 – Northeastern corner Site 3 (See Figure 2)	39 ⁴	48 ⁴	41	51	38	50

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

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

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

Note 4 As mentioned above, daytime measurements have been influenced by surrounding construction noise. As such the measured noise level presented for this period is limited to Sunday (when construction works do not occur).

Based on analysis of the measured noise levels and onsite observations we note:

- Measured L_{A90} noise levels during the day, evening and night periods have exceeded the above the minimum prescribed noise levels outlined in the NPI (i.e., 35dBA L_{A90} (7:00am to 6:00pm) and 30 dBA L_{A90} (6:00pm to 10:00pm)). As such project trigger noise levels will be based on the onsite measured noise levels, oppose to a minimum.
- Ambient L_{Aeq} noise levels are like those typically found in an urban type area.
- L_{A90} noise levels show consistency between all three (3) unattended noise monitors.



2.1.1.2 Results in accordance with the NSW Department of Planning, Housing and Infrastructure (DPHI) “Road Noise Policy”

In determining the noise impact from the generation of additional traffic on public roads, in accordance with the internal noise level requirements of Department of Planning, Housing and Infrastructure (DPHI) “Road Noise Policy”, measured noise levels are shown based on the time periods defined by the SEPP below.

Table 3 Measured Ambient Noise Levels corresponding to the “Road Noise Policy” Assessment Time Periods

Measurement Location	Daytime ¹ 7:00 am to 10:00 pm L _{Aeq} (whole period) ² (dBA)	Night-time ¹ 10:00 pm to 7:00 am L _{Aeq} (whole period) ² (dBA)
Location 1 – Southern corner of site 5 along the rail corridor (Figure 2)	55 ⁴	55
Location 2 – Eastern corner of site 5 along Buchan Ave (See Figure 2)	58 ⁴	54
Location 3 – Northeastern corner Site 3 (See Figure 2)	62 ⁴	50

Note 1 For Monday to Sunday, Daytime 7:00 am – 10:00 pm; Night-time 10:00 pm – 7:00 am.

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

Note 3 As mentioned above, daytime measurements have been influenced by surrounding construction noise. As such the measured noise level presented for this period is limited to Sunday (when construction works do not occur).

2.1.2 Attended Noise Survey

In addition to the unattended noise surveys detailed above, an onsite attended noise surveys have been undertaken around the site to support the measurements above.

Locations of the attended noise measurements are detailed in Figure 2 above. Noise measurements have been undertaken along all boundaries adjacent to existing receivers.

Attended noise level testing was undertaken using a Svantek 977 Sound Level Meter (SLM). The meter was calibrated before and after testing and no significant drift was recorded. The attended and unattended noise locations were selected to obtain suitable noise levels for the assessment of background noise levels (L_{90(t)}) as well as the impact from traffic movements (L_{Aeq(Period)}).

The attended noise survey was undertaken on Monday 8th December 2025 between 11:30am and 1:00pm. Results from this survey are presented below. It is to be noted that during the measurement period, there was significant construction on surrounding sites which affected the measured levels.



Table 4 Measured Attended Noise Measurements

Measurement Location	Measured Noise Level (dBA)		Measurement Observation
	L _{A90} (15-minutes) ¹ (dBA)	L _{Aeq} (15-minutes) ² (dBA)	
Day Survey – 11:30am to 1:00pm			
Location 1 – Northern corner of site 3 (See Figure 2)	58	61	Construction noise dominated
Location 2 – Corner of Buchan Ave and Bezentin Ridge Road (See Figure 2)	64	66	Noise from lunchtime at Edmondson Park Public School
Location 3 – Northern boundary of site 3 and 4 (See Figure 2)	59	70	Construction noise dominated
Location 4 – Corner of Horrie Road and Buchan Ave (See Figure 2)	61	69	Construction and traffic noise dominated
<p><i>Note 1 The LA90 noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.</i></p> <p><i>Note 2 The LAeq is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.</i></p>			

2.1.3 Summary of Measured/Assumed RBLs

Based on the measured noise levels obtained above, the following table outlines the relevant Rating Background Noise Level (RBL) at each receiver location. These are formulated based on the unattended noise monitoring, attended noise survey and onsite observations.

Table 5 Assumed Noise Levels vs. Receiver Locations (RBL's)

Measurement Location ⁴	Daytime ¹ 7:00 am to 6:00 pm		Evening ¹ 6:00 pm to 10:00 pm		Night-time ¹ 10:00 pm to 7:00 am	
	L _{A90} ² (dBA)	L _{Aeq} ³ (dBA)	L _{A90} ² (dBA)	L _{Aeq} ³ (dBA)	L _{A90} ² (dBA)	L _{Aeq} ³ (dBA)
Receiver 1	N/A ⁶	N/A ⁶	N/A ⁶	N/A ⁶	N/A ⁶	N/A ⁶
Receiver 4	38 ⁴	56 ⁴	43	57	37	55
Receivers 2 and 3	38 ⁴	56 ⁴	43	57	37	57
Receiver 5	39 ⁴	48 ⁴	41	51	38	50
<p><i>Note 1 For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.</i></p> <p><i>Note 2 The LA90 noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.</i></p> <p><i>Note 3 The LAeq is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.</i></p> <p><i>Note 4 Determined based on the differences between the attended and unattended noise measurements at other locations during similar times.</i></p> <p><i>Note 5 As mentioned above, daytime measurements have been influenced by surrounding construction noise. As such the measured noise level presented for this period is limited to Sunday (when construction works do not occur).</i></p> <p><i>Note 6 Educational receivers PTNL's are not a background based criteria.</i></p>						



3 NOISE AND VIBRATION CRITERIA

All relevant noise and vibration criteria for the project is presented below. It has been separated into four main components: external noise emission criteria, building envelope criteria (façade), vibration criteria and construction noise/vibration criteria. Each are discussed in detail below.

3.1 External Noise Emission Criteria

3.1.1 NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021

A detailed review of the NSW SEPP Precincts – Western Parkland City (2021) has been undertaken, from this review we can confirm there is no numerical objectives to be assessed against. As such, the objective based criteria detailed below will be adopted.

3.1.2 NSW EPA Noise Policy for Industry (NPI) 2017

In NSW, the control of noise emissions is the responsibility of Local Governments and the NSW Environment Protection Authority (NSW EPA).

The NSW EPA has recently released a document titled Noise Policy for Industry (NSW NPI) which provides a framework and process for determining external noise criteria for the assessment of noise emission from industrial developments. The NSW NPI criteria for industrial noise sources have two components:

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

3.1.2.1 Intrusive Noise Impacts (Residential Receivers)

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

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

3.1.2.2 Protecting Noise Amenity (All Receivers)

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

The amenity assessment is based on noise criteria specified for a particular land use and corresponding sensitivity to noise. The cumulative effect of noise from industrial sources needs to be considered in assessing the impact.



These criteria relate only to other continuous industrial-type noise and do not include road, rail or community noise. If the existing (measured) industrial-type noise level approaches the criterion value, then the NSW NPI sets maximum noise emission levels from new sources with the objective of ensuring that the cumulative levels do not significantly exceed the criterion.

Project amenity noise level for industrial developments is specified as the recommended amenity noise level (Table 2.2 of the NPI) minus 5 dB(A). To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the $L_{Aeq,15min}$ will be taken to be equal to the $L_{Aeq,period} + 3$ decibels (dB).

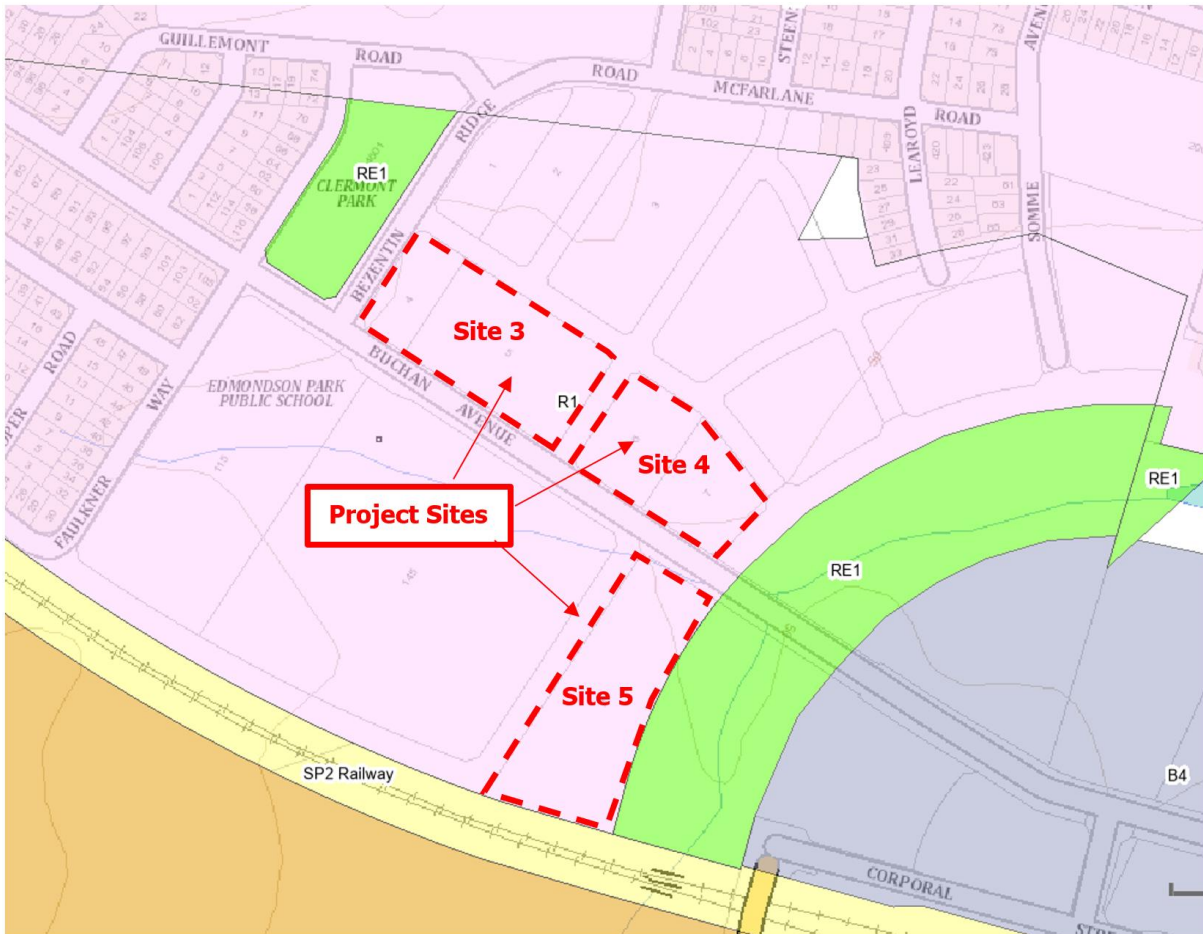
Where the resultant project amenity noise level is 10 dB or more lower than the existing traffic noise level, the project amenity noise levels can be set at 15 dB below existing traffic noise levels (i.e. $L_{Aeq,period(traffic)} \text{ minus } 15 \text{ dBA}$).

3.1.2.3 Residential Receivers – Area Classification

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

- *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 above.*

Figure 3 NSW ePlanning Spatial Viewer



As shown above, the site and its surrounding receivers are within an area made up of R1 type developments (General Residential), RE1 (Public Recreation), SP2 (Infrastructure, Railway) and B1 (Mixed use). Based on classification of R1, using table 2.3 of the NPI (see below), we believe that the most appropriate classification for the development site is urban.

Figure 4 NPI Extract – Table 2.3 Determining which of the residential receiver categories applies

Table 2.3: Determining which of the residential receiver categories applies.

Receiver category	Typical planning zoning – standard instrument*	Typical existing background noise levels	Description
Rural residential	RU1 – primary production RU2 – rural landscape RU4 – primary production small lots R5 – large lot residential E4 – environmental living	Daytime RBL <40 dB(A) Evening RBL <35 dB(A) Night RBL <30 dB(A)	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 in column 3 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	Daytime RBL <45 dB(A) Evening RBL <40 dB(A) Night RBL <35dB(A)	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 RBL > 45 dB(A) Evening RBL > 40 dB(A) Night RBL >35 dB(A)	Urban – an area with an acoustical environment that: <ul style="list-style-type: none"> • 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.

Notes: *As cited in Standard Instrument – Principal Local Environmental Plan, New South Wales Government, Version 15 August 2014. RBL = rating background noise level.

Resultant amenity levels for urban receivers are shown below:



Table 6 NSW NPI – Recommended L_{Aeq} Noise Levels from Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day ¹	Recommended Amenity Noise Level ($L_{Aeq, period}$) ² (dBA)
Residence	Urban	Day	60
		Evening	50
		Night	45
<p><i>Note 1 For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am</i></p> <p><i>Note 2 The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound</i></p>			

3.1.2.4 Maximum Noise Level Event (Sleeping Disturbance)

Section 2.5 of the NPI states the following:

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

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

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater, a detailed maximum noise level event assessment should be undertaken.

Based on the requirements above as well as the onsite measured noise levels discussed above, the following maximum noise level event criterion applies as per below:

- Receiver 1 and 4
 - 43 dBA L_{Aeq} (15-minute); and
 - 56 dBA L_{Max}
- Receiver 2 and 3
 - 42 dBA L_{Aeq} (15-minute); and
 - 62 dBA L_{Max}
- Receiver 5
 - 42 dBA L_{Aeq} (15-minute); and
 - 62 dBA L_{Max}



3.1.2.5 Project Specific External Noise Emission Criteria

The intrusive, amenity and maximum noise event criteria for noise emissions, derived from the measured data, are presented in Table 7. These criteria are nominated for the purpose of determining the operational noise limits for building services associated with the development which can potentially affect noise sensitive receivers.

For each assessment period, the lower (i.e., the more stringent) of the amenity or intrusive criteria are adopted. These are shown in bold text in Table 1Table 7Table 7 External Noise Level Criteria in accordance with the NSW NPI.

Table 7 External Noise Level Criteria in accordance with the NSW NPI

Receiver Type	Time of Day ¹	Project Amenity Noise Level, $L_{Aeq, period}^{2,4}$ (dBA)	Measured $L_{A90, 15 min}$ (RBL) ³ (dBA)	Measured $L_{Aeq, period}$ Noise Level ⁴ (dBA)	Intrusive $L_{Aeq, 15 min}$ Criterion ⁴ for New Sources (dBA)	Amenity $L_{Aeq, 15 min}$ Criterion ^{4,5} for New Sources (dBA)
Receiver 1 (Educational)	When in use	35	-	-	-	33
Receiver 2 and 3 (Recreation)	Day	55	38	56	43 ⁷	58
	Evening	45	43	57	48	48
	Night	40	37	57	42	43
Receiver 4 (Residential)	Day	55	38	56	43 ⁷	58
	Evening	45	43	57	48	48
	Night	40	37	55	42	43
Receivers 5 (Residential)	Day	55	39	48	44 ⁷	58
	Evening	45	41	51	46	48
	Night	40	38	50	43	43

Note 3 For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 1:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am.

Note 4 Project Amenity Noise Levels corresponding to "Suburban" areas, equivalent to the Recommended Amenity Noise Levels minus 5 dBA.

Note 5 L_{A90} Background Noise or Rating Background Level.

Note 6 The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound

Note 7 According to Section 2.2 of the NSW NPI, the $L_{Aeq, 15 minutes}$ is equal to the $L_{Aeq, period} + 3$ dB.

Note 8 Project Noise Trigger Levels are shown in bold.

Note 9 Section 2.3 of the policy suggests that the evening intrusiveness criteria should not be set higher than the daytime criteria. In this instance the evening is higher due to Monday to Saturday noise measurements being excluded due to the construction activities happening within the area. As such, the evening is a true representation, and the daytime is a conservative low assumption due to the exclusion of Monday to Saturday. Therefore, we are not proposing to reduce the evening time as the true RBL during the day is expected to be higher than the measured result of a Sunday.

3.1.3 NSW EPA (Formerly DECCW) NSW Road Noise Policy (RNP) 2011

For existing residences and other sensitive land uses affected by additional traffic on existing roads, the NSW Road Noise Policy states that for noise associated with increased road traffic generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB during both day and night-time periods. An increase of 2 dB represents a minor impact that is considered barely perceptible to the average person.



3.2 Noise Intrusion Criteria

3.2.1 NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021

A detailed review of the NSW SEPP Precincts – Western Parkland City (2021) has been undertaken, from this review we can confirm there is no numerical objectives to be assessed against. As such, the objective based criteria detailed below will be adopted.

3.2.2 NSW Government Legislation – State Environmental Planning Policy (Transport and Infrastructure)

In 2021 the NSW Government Legislation including the SEPP Transport and Infrastructure requirements which states the following:

2.100 Impact of rail Noise or Vibration on non-rail development

1. *This section applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration—*
 - a) *residential accommodation,*
 - b) *a place of public worship,*
 - c) *a hospital,*
 - d) *an educational establishment or centre based childcare facility.*
2. *Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.*
3. *If the development is for the purpose of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded-*
 - a) *In any bedroom in the residential accommodation – 35 dB(A) at any time between 10:00 pm and 7:00 am,*
 - b) *Anywhere else in the residential accommodation (other than a garage, kitchen, bathroom, or hallway) – 40 dB(A) at any time.*

Note: Compliance with the legislation is achieved, see section 4 below.

3.2.3 NSW Department of Planning and Environments Development Near Rail Corridors and Busy Roads – Interim Guideline 2008

NSW Department of Planning's document DNRCBR adopts the same internal noise criteria outlined in the SEPP infrastructure (previous 2008, now updated 2021) see below. However, table 3.1 from the policy states:



Table 3.1: Noise criteria

Residential Buildings		
Type of occupancy	Noise Level dBA	Applicable time period
Sleeping areas (bedroom)	35	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	40	At any time
Non-Residential Buildings		
Type of occupancy	Recommended Max Level dBA	
Educational Institutions including child care centres	40	
Places of Worship	40	
Hospitals	- Wards	35
	- Other noise sensitive areas	45

Note: airborne noise is calculated as $L_{eq}(9h)$ (night) and $L_{eq}(15h)(day)$. Groundborne noise is calculated as L_{max} (slow) for 95% of rail pass-by events.

3.2.4 Australian/New Zealand Standard AS/NZS 2107:2016 – Acoustics – Recommended design sound levels and reverberation times for building interiors

In relation to design internal noise levels, standard AS/NZS 2107:2016 recommends a range with lower and upper levels (rather than “satisfactory” and “maximum” internal noise levels) for building interiors based on room designation and location of the development relative to external noise sources. This change has occurred due to the fact that sound levels below ‘satisfactory’ could be interpreted as desirable, but the opposite may in fact be the case. Levels below those which were listed as ‘satisfactory’ can lead to inadequate acoustic masking resulting in loss of acoustic isolation and speech privacy.

The levels for areas relevant to this development are given in the table below. In this report we will confine our recommendations to dBA levels, however, where the background noise appears to be unbalanced, standard AS/NZS 2107:2016 provides direction in terms of suitable diagnostic tools that can be used to assess the spectrum distribution of the background noise.

Section 6.18 of standard AS/NZ 2107:2016 notes that the presence of discrete frequencies or narrow band signals may cause the sound level to vary spatially within a particular area and be a source of distraction for occupants. Where this occurs, the sound level shall be determined as the highest level measured in the occupied location(s).

Table 8 below includes the recommended internal noise levels included within AS2107:2016 for various spaces.

Table 8 Recommended design sound levels as per Standard AS/NZS 2107:2016

Type of Occupancy/Activity	Design sound level range (dBA $L_{Aeq,t}$)	Project Design Criteria (i.e. to be adopted) (dBA $L_{Aeq,t}$)
Retail Areas	45 - 55	55
Reception Areas	40 - 45	45
General Office Areas / Open plan office areas	40 - 45	45
Corridors and Lobbies	45 – 50	50
Apartment common areas (e.g., foyer, lift lobby)	45 – 50	50
Residential – Living/working areas	35 – 45	45



Type of Occupancy/Activity	Design sound level range (dBA LAeq,t)	Project Design Criteria (i.e. to be adopted) (dBA LAeq,t)
Residential - Sleeping areas (night-time)	35 – 40	40

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

3.2.5 Summary of Project Requirements

Based on the requirements listed in the sections above, the project resulting internal noise levels requirements are summarised in the table below.

Table 9 Summary of Internal Noise Level Criteria

Room Type	Project Internal Environmental Noise Level Requirements dBA LAeq,(Period)	Governing Document
Bedrooms	35 dBA LAeq 9 hour (10pm - 7am)	SEPP/ DNRCBR
Habitable Spaces	40 dBA LAeq 15 hour (7am – 10pm)	SEPP/ DNRCBR
Retail Areas	55 dBA LAeq anytime	AS/NZS 2107:2016
Commercial Areas	45 dBA LAeq anytime	AS/NZS 2107:2016
Reception/Common Areas	45 dBA LAeq anytime	AS/NZS 2107:2016
General Office Areas / Open plan office areas	45 dBA LAeq anytime	AS/NZS 2107:2016
Corridors and Lobbies	50 dBA LAeq anytime	AS/NZS 2107:2016
Apartment common areas (e.g. foyer, lift lobby)	50 dBA LAeq anytime	AS/NZS 2107:2016

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

3.3 Vibration Criteria (Operational)

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

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

3.3.1.1 NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021

A detailed review of the NSW SEPP Precincts – Western Parkland City (2021) has been undertaken, from this review we can confirm there is no numerical objectives to be assessed against. A such, the objective based criteria detailed below will be adopted.



3.3.1.2 Vibration Criteria – Human Comfort

Vibration effects relating specifically to the human comfort aspects of the project are taken from AV-TG. This type of impact can be further categorised and assessed using the appropriate criterion as follows:

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

Table 10 Continuous vibration acceleration criteria (m/s²) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Anytime	0.020	0.014	0.04	0.028

Table 11 Impulsive vibration acceleration criteria (m/s²) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Anytime	0.64	0.46	1.28	0.92

Table 12 Intermittent vibration impacts criteria (m/s^{1.75}) 1 Hz-80 Hz

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80

3.3.1.3 Vibration Criteria – Building Contents and Structure

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

- For transient vibration: British Standard BS 7385: Part 2-1993 “Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration” (BSI 1993); and



- For continuous or repetitive vibration: German DIN 4150: Part 3 – 1999 “Effects of Vibration on Structure” (DIN 1999).

3.3.1.3.1 British Standard BS 7385 Part 2 – 1993

For transient vibration, as discussed in standard BS 7385 Part 2-1993, the criteria are based on peak particle velocity (mm/s) which is to be measured at the base of the building. These are summarised in Table 20 and illustrated in Figure 6.

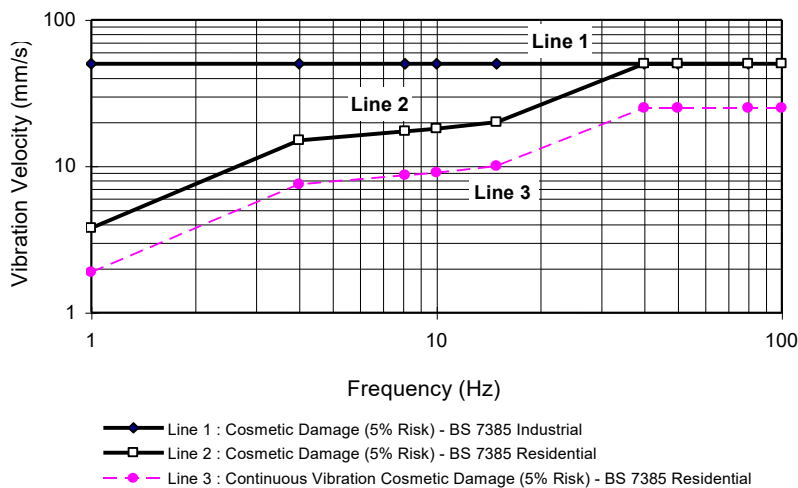
Table 13 Transient vibration criteria as per standard BS 7385 Part 2 – 1993

Line in Figure 6	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Standard BS 7385 Part 2 – 1993 states that the values in Table 20 relate to transient vibration which does not cause resonant responses in buildings.

Where the dynamic loading caused by continuous vibration events is such that it results in dynamic magnification due to resonance (especially at the lower frequencies where lower guide values apply), then the values in Table 20 may need to be reduced by up to 50% (refer to Line 3 in Figure 6).

Figure 5 - BS 7385 Part 2 – 1993, Graph of transient vibration values for cosmetic damage



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



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

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

3.3.1.3.2 German Standard DIN 4150 Part 3 - 1999

For continuous or repetitive vibration, standard DIN 4150 Part 3-1999 provides criteria based on values for peak particle velocity (mm/s) measured at the foundation of the building; these are summarised in Table 21. The criteria are frequency dependent and specific to particular categories of structures.

Table 14 Structural damage criteria as per standard DIN 4150 Part 3 – 1999

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

3.4 Construction Noise and Vibration Criteria

3.4.1 Construction Noise Criteria

Relevant construction noise criteria applicable to this project are outlined below.

3.4.1.1 NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021

A detailed review of the NSW SEPP Precincts – Western Parkland City (2021) has been undertaken, from this review we can confirm there is no numerical objectives to be assessed against. A such, the objective based criteria detailed below will be adopted.

3.4.1.2 NSW EPA (Former DECC) Interim Construction Noise Guideline (ICNG) 2009

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



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

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

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

Table 15 NMLs for Quantitative Assessment at Residences

Time of Day	Noise Management Level $L_{Aeq(15minute)}$ ^{1,2}	How to Apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected (NAL) RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected (HNAL) 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences). 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside the recommended standard hours above	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise affected level, the proponent should notify the community.



Note 1 Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Note 2 The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy (EPA 2000) (Now NSW EPA NPI 2017).

Based on the measured background noise levels summarised in section 2, and the NMLs outlined above, the construction noise criteria to be used in this assessment are listed in section 2.

Table 16 NMLs as Bases for the Acoustic Assessment

Receiver Types		NML, dB LAeq(15minute)	
		Standard Hours Monday to Friday: 7:00am to 6:00pm Saturday: 8:00am to 1:00pm	Outside Standard Hours All hours not listed in the adjacent column.
Residences (Measured externally)	Receivers 2 & 3	NAL: 48 (RBL (38) + 10dB) HNAL: 75	RBL + 5dB
	Receiver 4	NAL: 48 (RBL (38) + 10dB) HNAL: 75	RBL + 5dB
	Receiver 5	NAL: 49 (RBL (39) + 10dB) HNAL: 75	RBL + 5dB

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

For Receiver 1 (Education) the ICNG recommends *Classrooms at schools and other educational institutions to have an internal noise level of 45dBA LAeq (15-minute)*.

3.4.2 Vibration Criteria (Construction)

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

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

3.4.2.1 NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021

A detailed review of the NSW SEPP Precincts – Western Parkland City (2021) has been undertaken, from this review we can confirm there is no numerical objectives to be assessed against. As such, the objective based criteria detailed below will be adopted.

3.4.2.2 Vibration Criteria – Human Comfort

Vibration effects relating specifically to the human comfort aspects of the project are taken from AV-TG. This type of impact can be further categorised and assessed using the appropriate criterion as follows:



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

Table 17 Continuous vibration acceleration criteria (m/s²) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Anytime	0.020	0.014	0.04	0.028

Table 18 Impulsive vibration acceleration criteria (m/s²) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Anytime	0.64	0.46	1.28	0.92



Table 19 Intermittent vibration impacts criteria (m/s^{1.75}) 1 Hz-80 Hz

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80

3.4.2.3 Vibration Criteria – Building Contents and Structure

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

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

3.4.2.3.1 British Standard BS 7385 Part 2 – 1993

For transient vibration, as discussed in standard BS 7385 Part 2-1993, the criteria are based on peak particle velocity (mm/s) which is to be measured at the base of the building. These are summarised in Table 20 and illustrated in Figure 6.

Table 20 Transient vibration criteria as per standard BS 7385 Part 2 – 1993

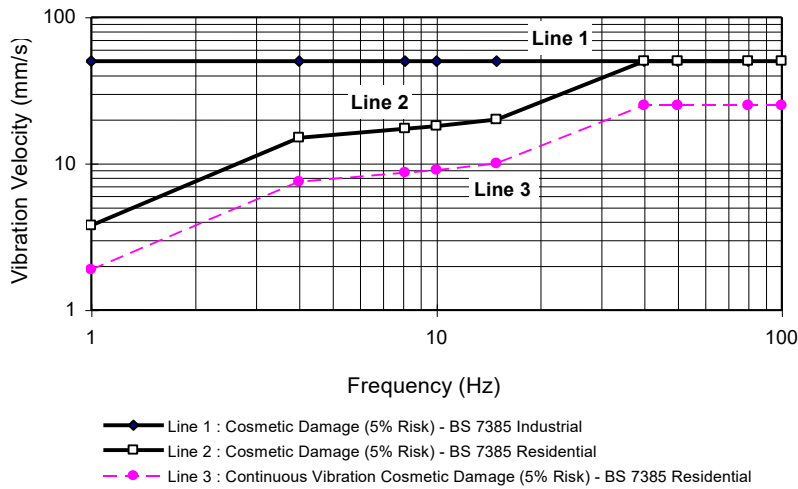
Line in Figure 6	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Standard BS 7385 Part 2 – 1993 states that the values in Table 20 relate to transient vibration which does not cause resonant responses in buildings.

Where the dynamic loading caused by continuous vibration events is such that it results in dynamic magnification due to resonance (especially at the lower frequencies where lower guide values apply), then the values in Table 20 may need to be reduced by up to 50% (refer to Line 3 in Figure 6).



Figure 6 - BS 7385 Part 2 – 1993, Graph of transient vibration values for cosmetic damage



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

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

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

3.4.2.3.2 German Standard DIN 4150 Part 3 - 1999

For continuous or repetitive vibration, standard DIN 4150 Part 3-1999 provides criteria based on values for peak particle velocity (mm/s) measured at the foundation of the building; these are summarised in Table 21. The criteria are frequency dependent and specific to particular categories of structures.



Table 21 Structural damage criteria as per standard DIN 4150 Part 3 – 1999

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

3.4.3 Construction Traffic Noise Criteria

For existing residences and other sensitive land uses affected by additional traffic on existing roads, the NSW Road Noise Policy (RNP) states that for noise associated with increased road traffic generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB during both day and night-time periods. An increase of 2 dB represents a minor impact that is considered barely perceptible to the average person.



4 EXTERNAL NOISE INTRUSION ASSESSMENT

4.1 Glazing Recommendations

The recommended sound transmission loss requirement required to satisfy the specified internal noise level criteria outlined above are summarised in the table below.

Please note for windows, this performance is not only subject to the glazing selection but also to the construction of the window frame and the frame seal selection. Therefore, it is recommended that the window manufacturer should confirm that the required sound insulation can be achieved. It is anticipated that the window system should comprise Q-Lon (or equivalent) or fin seals with deep C channels as part of the window track (**i.e., Performance levels outlined above need to be achieved with glazed panels + frame + seals**).

Table 22 Recommended Glazing Construction

Façade	Space	Indicative Construction	Minimum System Rating Requirements
Site 3			
Façade facing Buchan Ave	Living Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Sleeping Spaces	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)
	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Commercial	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
Façade facing Bezentin Ridge Road	Living Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Sleeping Spaces	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)
	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Commercial	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
All other facades	Living Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Sleeping Spaces	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)
	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Commercial	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
Any façade adjacent to a Driveway	Bedroom or Living Space	10.38mm Laminate	R _w (C;Ctr): 35 (-1,-3)
Site 4			
Façade facing Buchan Avenue	Living Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Sleeping Spaces	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)



	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Commercial	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
All other facades	Living Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Sleeping Spaces	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)
	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Commercial	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
Any façade adjacent to a Driveway	Bedroom or Living Space	10.38mm Laminate	R _w (C;Ctr): 35 (-1,-3)
Site 5			
Façade facing Buchan Avenue	Living Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Sleeping Spaces	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)
	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Supermarket, Retail, Gym and Child Care	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
Façade facing Horrie Road	Living Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Sleeping Spaces	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)
	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
	Supermarket, Retail, Gym and Child Care	6.38mm Laminate	R _w (C;Ctr): 33 (-1,-3)
Façade facing the Train corridor	Living Areas	10.38mm Laminate	R _w (C;Ctr): 35 (-1,-3)
	Sleeping Spaces	10.38mm Laminate	R _w (C;Ctr): 35 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)
	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 31 (-1,-3)
	Supermarket, Retail, Gym and Child Care	6.38mm Laminate	R _w (C;Ctr): 31 (-1,-3)
Other Façade	Living Areas	6.38mm Laminate	R _w (C;Ctr): 31 (-1,-3)
	Sleeping Spaces	6.38mm Laminate	R _w (C;Ctr): 31 (-1,-3)
	Wet Areas	4mm Float	R _w (C;Ctr): 27 (-1,-3)
	Communal Areas	6.38mm Laminate	R _w (C;Ctr): 31 (-1,-3)



	Supermarket, Retail, Gym and Child Care	6.38mm Laminate	R _w (C;Ctr): 31 (-1,-3)
Any façade adjacent to a Driveway	Bedroom or Living Space	10.38mm Laminate	R _w (C;Ctr): 35 (-1,-3)

Note 1 These are preliminary selections will be confirmed in the detailed design stage once the layouts and façade orientations are finalised.

It is recommended prior to the issue of a Construction Certificate (CC) a further detailed review be undertaken once the final layouts and façade openings are confirmed, and façade detailing/systems has completed/being selected.

4.2 External Wall Construction

External wall constructions which are constructed from a concrete or masonry construction will be acoustically sufficient and no further acoustic upgrading is required.

However, for wall systems constructed from a lightweight cladding system, the following construction is recommended.

Table 23 Recommended Light Weight External Wall Construction

Façade	Space	Indicative Construction	Minimum System Rating Requirements
Site 3, 4 and 5			
All Facades	Living Areas	Architectural Cladding + min. 92mm Steel Studwork with 50mm thick 11kg/m ³ glasswool insulation + 1 x 13mm Standard Plasterboard OR 1 x 9mm Fibre Cement Sheeting	R _w 40
	Sleeping Spaces		
	Wet Areas		
	Communal Areas		
	Commercial		

Note 1 These are preliminary selections will be confirmed in the detailed design stage once the layouts and façade orientations are finalised.

If penetrations through any external skin are required, all gaps remaining in the penetration are to be filled with an acoustic grade sealant which provides an equal or better performance to the system being penetrated.

It is recommended prior to the issue of a Construction Certificate (CC) a further detailed review be undertaken once the final layouts and façade openings are confirmed, and façade detailing/systems has completed/being selected.

4.3 External Roof Construction

External roof constructions which are constructed from a concrete construction will be acoustically sufficient and no further acoustic upgrading is required.

If penetrations through any external skin are required, all gaps remaining in the penetration are to be filled with an acoustic grade sealant which provides an equal or better performance to the system being penetrated.

It is recommended prior to the issue of a Construction Certificate (CC) a further detailed review be undertaken once the final layouts and façade openings are confirmed



4.4 Mechanical Ventilation

A detailed review of the resulting façade incident noise levels across all sites, buildings and facades have been undertaken. At this stage we do not believe the requirement for alternate source of ventilation (i.e. open windows + 10dBA requirement) is triggered on any site. Therefore no additional acoustic mitigation measures are required to be implemented. Compliance with the NSW 'Development Near Rail Corridors and Busy Roads- Interim Guideline' dated December 2008 is achieved.



5 NOISE EMISSION ASSESSMENT (OPERATIONAL NOISE)

5.1 Onsite Vehicle Noise

Located across all three sites are a combination of driveways (passenger vehicles and trucks), basement parking areas, enclosed parking floors and loading docks. All are required to comply with the established Project Trigger Noise Levels (PTNL's) as detailed in this report. With respect to each of these items we note:

- Any basement carparking level will comply with the sites formulated Project Trigger Noise Levels (PTNL's) as they are contained and do not include any openings for noise to escape. As such no additional acoustic mitigation measures are required to be implemented.
- For the elevated parking levels (Site 04) several façade opens are provided for ventilation purposes. A review of the potential noise impacts associated with noise breaking out these openings has been undertaken. Given the open size (being a small portion in isolated facades), distance to neighbouring properties, anticipated traffic movements and noise levels for car manoeuvring within the carpark, compliance with the sites formulated Project Trigger Noise Levels (PTNL's) will be achieved without the need for additional acoustic measures.
- For the loading docks located within Sites 03 and 04, these proposed to serve the residential buildings only (mostly for garbage removal and removalist). For the loading docks at Site 05, refer to the detailed discussion outlined in section 5.6 below. Given the infrequent use of the residential loading dock, location of the loading docks being within the building envelope we believe the two dedicated loading docks/areas for Site 03 and 04 are acoustically acceptable without the need for additional acoustic mitigation measures.
- Located on all three sites (03, 04 and 05) are entry driveways between the public road and basement or elevated parking level (Site 04 only). Based on the location of driveways, number of vehicles during any peak movement (as provided by the traffic engineer), compliance is likely at any external sensitive receiver to the site. As an additional acoustic mitigation measure for the apartments which façade directly towards any of the entry driveways, upgraded glazing constructions (i.e. 10.38mm Laminated Glazing) have been provided in section 4.1 to ensure the acoustic amenity for the future occupants is maintained.

5.2 Additional Traffic on Public Roads

Noise impacts from the increase in vehicle movements along the surrounding roadways is to be assessed in accordance with the NSW EPA Road Noise Policy (RNP) 2011.

PWNA understand the proposed am and peak movements associated with additional vehicle movements on surrounding roadways (combined for Site 03, 04 and 05) are detailed below:



Figure 7 Extract of Project Traffic Report – Peak Traffic Generation (Private Vehicles)

The design provides safe and functional servicing for all land uses, including a segregated supermarket loading dock on Site 5, avoiding conflicts with customer and residential movements.

- Active transport access is strongly supported through direct frontage to existing cycle lanes on Buchan Avenue, connections to the broader shared-path network, and compliance with the Town Centre North bicycle parking requirements.
- The proposal is anticipated to generate an additional:
 - Active transport: 62 trips in the AM peak hour and 68 trips in the PM peak hour
 - Public transport: 188 trips in the AM peak hour and 203 trips in the PM peak hour
 - Private vehicle: 348 trips in the AM peak hour and 406 trips in the PM peak hour
- In terms of impacts:
 - Walking and cycling: The additional active-transport trips generated by the development can be comfortably accommodated, as the surrounding pedestrian and cycling network operates with low existing demand and no identified capacity constraints.

As shown above the PM peak will potentially generate the highest number of trips (assuming 406 over a one (1) hour period). Given the nature of the overall masterplan for Edmondson Park we don't believe these levels are significantly higher than which would have been assessed during the master planning/subdivision phase. Therefore, we believe this is deemed acoustically acceptable.

5.3 Internal and Outdoor Communal Spaces

Located across all three (3) sites are a number of internal and outdoor communal spaces for the future residences to use. Outlined below are a list of the relevant spaces:

- Site 03:
 - Upper Ground Floor
 - Building A & B:
 - Outdoor Communal Area (348m²).
 - Building C & D:
 - Outdoor Communal Area (783m²).
 - Level One (1):
 - Building A & B:
 - Outdoor Communal Area (205m²).
 - Level Seven (7):
 - Building B:
 - Outdoor Communal Area (180m²).
 - Building C:
 - Outdoor Communal Area (180m²).



- Level Eight (8):
 - Building B:
 - Outdoor Communal Area (493m²).
 - Building C:
 - Outdoor Communal Area (493m²).
- Level Ten (10):
 - Building A:
 - Outdoor Communal Area (180m²).
 - Building D:
 - Outdoor Communal Area (180m²).
- Site 04:
 - Level Five (5):
 - Indoor Communal Room (120m²).
 - Outdoor Communal Area (2770m²).
- Site 05:
 - Level One (1):
 - Indoor Communal Room (99m²).
 - Indoor Communal Room (170m²).
 - Indoor Communal Room (149m²).
 - Level Two (2):
 - Building A & B:
 - Indoor Communal Room (383m²).
 - Indoor Communal Room (112m²).
 - Indoor Communal Room (115m²).
 - Outdoor Communal Area (2005m²).
 - Building C & D:



- Outdoor Communal Area (916m²).
- Level Twelve (12):
 - Outdoor Communal Area (304m²).

The NSW EPA Noise Policy for Industry (2017) and NSW Noise Guide for Local Council are recommended. See below.

In accordance with section 1.5 of the NSW EPA NPI (2017) domestic / neighbourhood noise is strictly excluded and is not to be assessed under the policy, see Figure 8 below.

Figure 8 Extract – NSW Noise Policy for Industry (NPI) 2017

1.5 What has been excluded from the policy?

The policy does not apply to:

- vehicles associated with an industrial premise that are on a public road
- transportation corridors (roadways, railways, waterways and air corridors)
- noise from sporting facilities, including motor sport facilities
- construction activities
- **noise sources covered by regulations (domestic/neighbourhood noise)**
- blasting activities
- shooting ranges
- internal or occupational noise within any workplace regulated by SafeWork NSW
- wind farms
- amplified music/patron noise from premises including those licensed by Liquor and Gaming NSW.

Other government policies, guidelines and legislation typically cover these noise sources.

Therefore, use of the Communal Open Space (being neighbourhood type noise) is not required to comply with the Project Trigger Noise Levels (PTNL’s) as outlined from the NSW EPA NPI 2017 above.

In the absence of any requirements for neighbourhood noise / the fact that it specifically excluded from the NSW NPI 2017, guidance is sought from the NSW Government Noise Guide for Local Council. See below.

A review of the Noise Guide for Local Council indicates that no numerical objectives apply to the use of Communal Open Space or Private Open Spaces in NSW. As such we believe in the absence of any formal noise framework around this issue consideration to an Offense Noise Test in accordance the POEO Act. An assessment of offensive noise is undertaken below for the use of the Communal Open Space.

Table 24 “Offensive Noise” Test

Definition Part	PWNA Discussion	Outcome
<i>Level, nature, character, or quality, or</i>	<ul style="list-style-type: none"> • A determined above, noise from neighbourhood noise does not have specific noise objectives. As such no breach of a noise level condition/consent will occur. • The use of amplified music is not recommended for all time periods. • The use of the communal open space is recommended to be limited to 7:00am to 10:00pm all days. This is to avoid the sensitive night period. • Noise from the use of the area will not include screeching, squealing, high-pitched, whining or low frequency noise. 	Not Offensive



Definition Part	PWNA Discussion	Outcome
<i>Time at which is made, or</i>	<ul style="list-style-type: none"> The use of the communal open space is recommended to be limited to 7:00am to 10:00pm all days. This is to avoid the sensitive nighttime period. 	Not Offensive
<i>Any other circumstances, or</i>	<ul style="list-style-type: none"> Being a residential development including residents nearby, noise from the communal open space will be typical. 	Not Offensive
<i>it is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted or interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted.</i>	<ul style="list-style-type: none"> The noise associated with the communal open space will not be harmful to anyone outside the premise (including the residents within the proposed development). 	Not Offensive

Based on the corresponding “Offensive Noise” test, PWNA can confirm the use of communal open space is not likely to result in a noise which is deemed “Offensive” in accordance with the POEO Act and therefore is acoustically acceptable. However, the following mitigations are to be implemented.

- Use of the communal open space is to be limited to 7:00am to 10:00pm every day to avoid the sensitive nighttime period.
- Signs shall be installed at the entryway and within the communal open space to remind users to be mindful of noise.
- Amplified music is not permitted in any COS at any time.

5.4 Mechanical Plant & Equipment

At this stage of the project, the exact locations of key plant items, and the selection of items to be installed, have not been selected. As such, a detailed assessment of noise associated with engineering services cannot be undertaken.

All future plant and equipment are to be acoustically treated to ensure the noise levels at all surrounding receivers and internal receivers comply with the relevant Project Trigger Noise Levels (PTNL’s) as detailed in this report. Experience with similar projects indicates that it is both possible and practical to treat all mechanical equipment such that the relevant noise levels are achieved. Examples of the possible acoustic treatments to mechanical equipment includes the following:

- Supply and Exhaust Fans – location of fans within the building and treated using internally lined ductwork or acoustic silencers.
- General supply and exhaust fans – general exhaust and supply fans such as toilet, kitchen, lobby and other small mechanical fans can be acoustically treated using acoustic flex ducting or internally lined ducting.
- Residential Condensers – The project may include external residential condenser units which will likely be located on the roof-top or individually balconies. Providing condenser equipment is selected using suitable noise level data, then acoustic treatments can be implemented such as screening and treatment to exhaust to ensure that the relevant noise emission criteria will be achieved.

- Refrigeration Plant – In regard to the location for refrigeration plant associated with Site 05, two (2) dedicated plant spaces are contained within the building envelope as shown below. Given the distance to any existing/future external receiver compliance with the relevant Project Trigger Noise Levels (PTNL’s) as detailed in this report will be achieved. Subject to any final selections, compliance to sensitive receiver within the site will need to be further developed.

Experience with similar projects indicates that the acoustic treatment of whatever mechanical equipment is to be installed on the project is both possible and practical, in order to meet the relevant criteria at surrounding receivers, as well as the relevant noise intrusion criteria for internal receivers within the development.

Note: Prior to the issue of the Construction Certificate the recommended acoustic treatments for the engineering services should be reviewed to ensure final selections and mechanical airflow requirements are achieved.

5.5 Library Noise (Site 03)

Situated on the upper ground floor and level one (1) in the southeast corner of site 03 is a proposed two (2) storey library, see below.

Figure 9 Site 03 – Library



Access to the library is via pedestrian access located on the corner of Buchan Avenue and Bezentin Ridge Road. In addition to the internal areas of the library an outdoor courtyard is proposed on level one (1) as shown in the figure above.

With regard to any noise impact associated with the internal areas of the proposed library we don’t believe this is an acoustic concern given the quiet nature of a library (this is both externally to the site and to apartments located above).

For the noise associated with outdoor courtyard proposed on level one (1) we also don’t believe the space would generate high levels of noise given the associated use is for the library to which would likely include people reading or studying, all which are quiet activities.

Given this, no additional acoustic mitigation measures are required to be implemented.

5.6 Retail Noise – Site 05

Located on the ground floor level of site 05 is a proposed supermarket, seven general retail tenancies and a single food and beverage offering. As shown in the figure below these tenancies will be accessed via on-foot access along Horrie Road, Buchan Avenue and future internal road. Additionally, a through-site link is proposed between Horrie Road and the Internal Road. The through-site link will also have access to the basement parking via an escalator.

Figure 10 Site 05 – Ground Level – Supermarket, Retail, F&B and Through-Site Link



To service the delivery requirements of the proposed tenancies on the ground level, two (2) dedicated loading docks are proposed. A dedicated loading dock is proposed along the southern boundary of site 05 (along the southern façade) to serve the supermarket. Given this loading dock will be opposite the existing rail corridor and the nearest residential receiver is some distance away (>150m) this location is deemed acoustically acceptable will not require any additional acoustic mitigation measures. This assumes 24-hour use of the loading dock.

Further to this, given the loading dock is located within the building envelope and the level one (1) buffer between the ground level and first level of residential above (being level 2) we also believe the loading dock in this location is acoustically acceptable and will not require any additional acoustic mitigation.

The second loading dock proposed is along the eastern boundary along the internal road, similar to the loading dock discussed above this location is also contained within the building envelope. Similar to above, the use of the loading dock is 24-hours and contains a significant distance to existing sensitive receiver as such the use is considered acoustically acceptable. Finally, given the position of the loading dock within the building envelope this is also considered acceptable in regard to the first level of residences on level two (2) of the tower above.

At this stage the exact tenancy and likely operating parameters for the supermarket are unknown. However, from our experience we would anticipate any future operation would occur from 6:00am and close at 12:00am (midnight) (assuming a typical national supermarket operation). For similar reasons to the loading dock discussion detailed above, the supermarket is contained within the building envelope with fixed facades. Given the distance to neighbouring properties (including above) the operation of the supermarket will be acoustically acceptable.

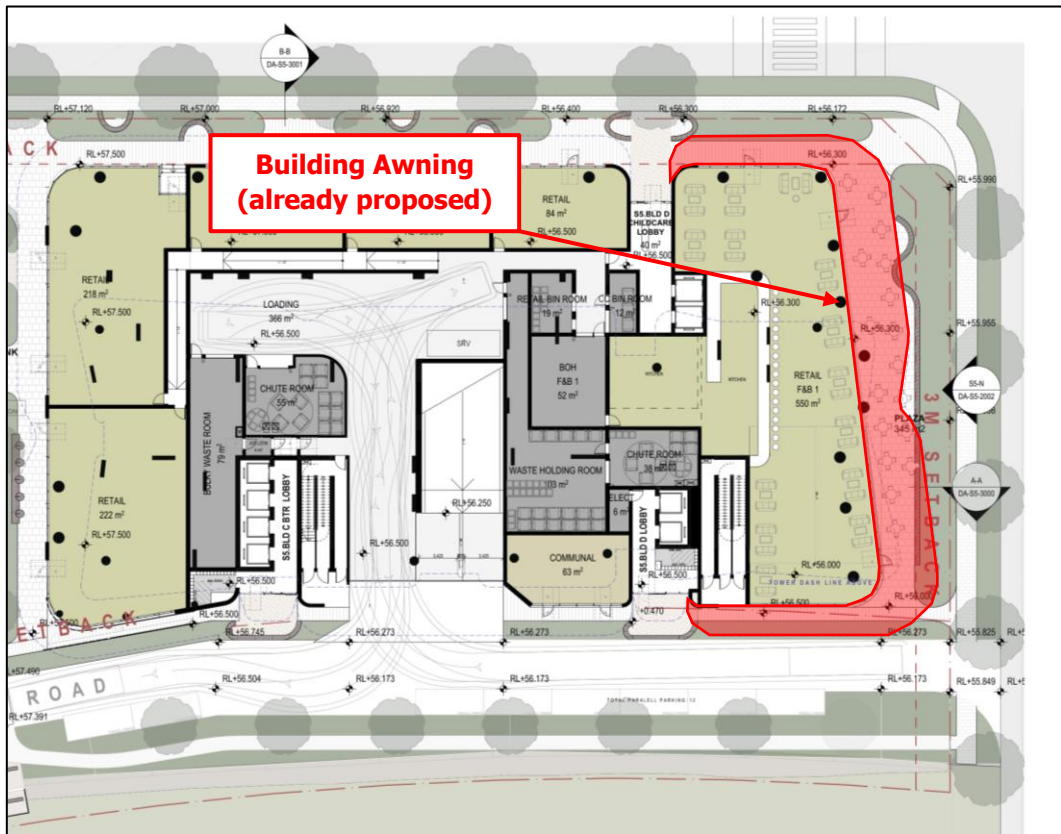
Note: Notwithstanding this, a detailed review of any future building services will need to be undertaken prior to installation to ensure compliance with the Project Trigger Noise Levels (PTNL's) detailed in this report are complied with (also refer to section 5.4 above for further discussion).

Similarly, the future operations of the retail spaces are not known. Given typical retail operations (8:00am to 10:00pm) and contained within the building envelope with a fixed façade, compliance with the relevant Project Trigger Noise Levels (PTNL's) as detailed in this report will be complied with.

Located along the northern façade of the building situated along Buchan Avenue is a proposed food and beverage offering. For identical reasons the exact operations are not known at this stage. The current proposal also includes a combination of internal and external areas. However, it is likely any future offering would operate from 7:00am to 12:00am (midnight) and to ensure the operation complies at the nearest sensitive receivers (being above and across at site 04) the following acoustic mitigation measures have been implemented (a combination of building and management):

- Operation hours should be limited to 7:00am to 12:00am (midnight).
- Use of the external area should cease at 10:00pm.
- External amplified music in the outdoor areas should not occur.
- After 10:00pm all façade systems to the tenancy should remain closed with exception of entry and exiting.
- Amplified music is permitted within the tenancy.
- A solid awning above the outdoor area will be required to provide screening benefits to the residential tower located directly above, see below (already incorporated into the design – refer to figure below).

Figure 11 Site 05 – F&B Awning



Based on the acoustic mitigation measures detailed above, we believe the use of the ground floor retail areas will be acoustically acceptable.

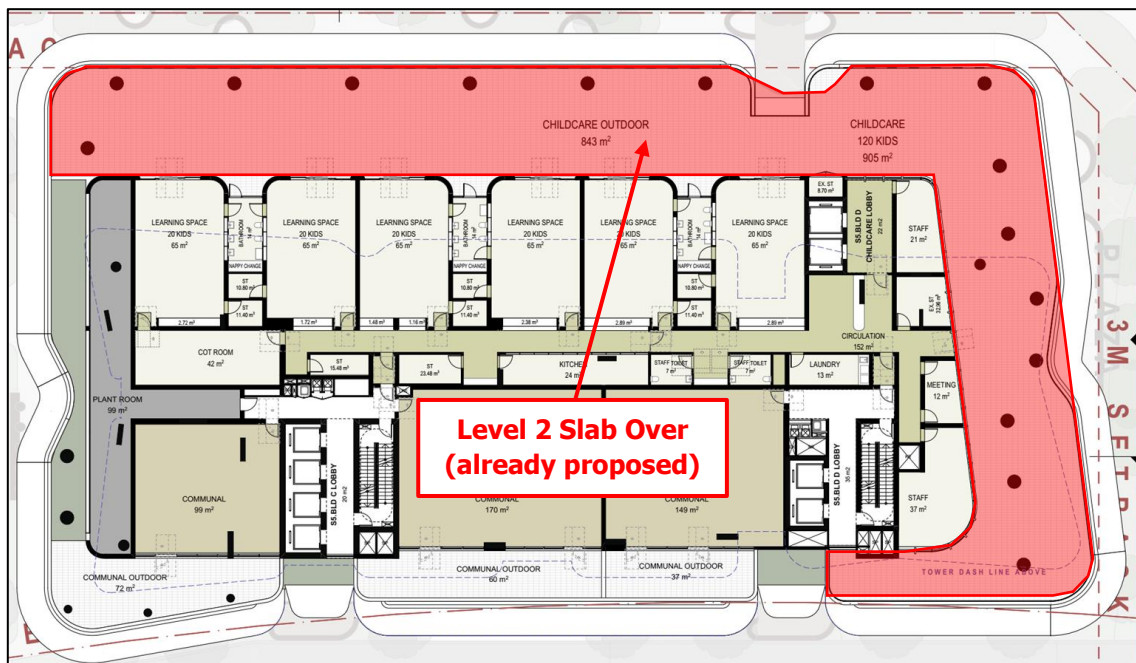
5.7 Child Care Noise – Site 05

Located above the northern retail tenancies on level one (1) is a proposed one hundred and twenty (120) place childcare centre with internal teaching spaces, external play areas and staff/operational amenities (see figure below).

Outside the number of children proposed, the exact operating parameters of the childcare centre are not known (i.e. timing, routines, distribution of children etc.). Notwithstanding this, we have implemented a number of acoustic mitigation measures to ensure noise is controlled from the childcare centre, these include:

- Operation hours of the Child Care Centre are limited to 7:00am to 6:00pm, Monday to Friday.
- Facades to the internal areas of the childcare centre are acoustically upgraded to R_w 31 Glazing (including the use of acoustic seals).
- Through site planning, the location of the internal learning space open to Horrie Road, away from the residences opposite along Buchan Avenue. To which Edmonson Park High School (another educational establishment) is opposite.
- Similar strategy to the awning for the Food and Beverage tenancy discussion above, the level 2 slab has been extended over the majority of the outdoor areas of the childcare centre, see below. The extension of the concrete slab will create a significant acoustic barrier for any noise traveling to the residences above.

Figure 12 Site 05 – Child Care Centre Slab Extension



5.8 Gym – Site 05

Located to the south of the childcare centre on level two (2) is a proposed gym. The space will include a range of fitness spaces, amenities, front of house areas and a pool. Similar to the spaces discussed above, the exact operating parameters are not known at the stage.



However, given its location relative to any existing/future (external of the site) sensitive receivers we anticipate compliance with the relevant Project Trigger Noise Levels (PTNL's) detailed in this report will be achieved.

Notwithstanding this, the gym is proposed to be located below the future residential apartments on level two (2). Locating gym facilities in multi-storey mixed-use developments is a common occurrence, and we do not see any significant issues with this proposal.

In order to protect the future acoustic amenity of the residential apartments located above a number of key acoustic mitigation measures will need to be further developed during design and/or future planning applications:

- Consideration of the placement certain gym activities on the floor. For example the tower above is located in the southeast corner, it would be recommended (if possible) to move any activities with the potential to create structure-borne noise to be outside the tower footprint.
- Implement acoustically rated gymnasium type acoustic flooring where necessary.
- Restrict the dropping of any weights for all patrons and staff (i.e. no drop policy).
- Ensure all future members and staff are adequately trained/educated on the gym policies.



6 NOISE AND VIBRATION MANAGEMENT PLAN

6.1 Construction Activity Noise Assessment

A review of the noise levels likely to be emitted from the site because of the construction works has been undertaken. Based on the proximity of the surrounding receivers and the works area, we expect there is likely to be periods where noise emission is likely to exceed the *Noise Affected Level (NAL)* and in some cases the *Highly Noise Affected Level (HNAL)*. As such the works will require a site-specific *Construction Noise & Vibration Sub Plan (CNVMSP)* to be prepared for the site.

This plan should be undertaken in accordance with the relevant NSW EPA documents around noise and vibration (such as the ICNG and Assessing Vibration- a technical guideline.).

Outlined in sections 6.4 to 6.9 PWNA have provided detailed list of possible mitigation measures which could be implemented to reduce these expected noise levels at neighbouring properties. These are all to be considered as part of the preparation of this plan prior to the issue of a Construction Certificate (CC).

6.2 Construction Traffic Noise Assessment

From the criteria, it is noted that vehicle numbers on surrounding roads would need to increase by around 60% from existing traffic flows, for a 2 dB increase in road traffic noise to occur. As noted previously, a 2 dB increase in road traffic noise is not considered to be noticeable.

Based on the number of vehicles projected over each of the construction phases, it is concluded that noise impacts from construction traffic is unlikely to have an impact at the nearest affected properties. As a result, no further assessment is required

6.3 Vibration Assessment

In order to maintain compliance with the human comfort vibration criteria discussed in Section 3.3, it is recommended that the indicative safe distances listed in Table 25 should be maintained. These indicative safe distances should be validated prior to the start of construction works by undertaking measurements of vibration levels generated by construction equipment to be used on site.

Additionally, any vibration levels should be assessed in accordance with the criteria discussed in Section 3.4. This information should also be included as part of a Construction Noise Vibration Management Plan (CNVMP).



Table 25 Recommended indicative safe working distances for vibration intensive plant

Plant	Rating / Description	Safe Working Distances (m)	
		Cosmetic Damage (BS 7385: Part 2 DIN 4150: Part 3)	Human Comfort (AVTG)
Vibratory roller	< 50 kN (Typically 1 – 2 tonnes)	5	15 – 20
	< 100 kN (Typically 2 – 4 tonnes)	6	20
	< 200 kN (Typically 4 – 6 tonnes)	12	40
	< 300 kN (Typically 7 – 13 tonnes)	15	100
	> 300 kN (Typically more than 13 tonnes)	20	100
Small hydraulic hammer	300 kg, typically 5 – 12 tonnes excavator	2	7
Medium hydraulic hammer	900 kg, typically 12 – 18 tonnes excavator	7	23
Large hydraulic hammer	1600 kg, typically 18 – 34 tonnes excavator	22	73
Vibratory pile driver	Sheet piles	2 – 20	20
Jackhammer	Hand held	1	Avoid contact with structure and steel reinforcements

6.4 Acoustic Management Procedures

6.4.1 Summary of Management Procedures

Table 26 below summarises the management procedures recommended for airborne noise and vibration impacts. These procedures are also further discussed in the report. Hence, where applicable, links to further references are provided.

Table 26 Summary of mitigation procedures

Procedure	Abbreviation	Description
General Management Measures	GMM	Introduce best-practice general mitigation measures in the workplace which are aimed at reducing the acoustic impact onto the nearest affected receivers.
Project Notification	PN	Issue project updates to stakeholders, discussing overviews of current and upcoming works. Advanced warning of potential disruptions can be included. Content and length to be determined on a project-by-project basis.
Verification Monitoring	V	Monitoring to comprise of an attended acoustic survey at the start of each new phase of works (civil works, structure works, fit out works and landscaping works). The purpose of the monitoring is to confirm measured levels are consistent with the predictions in the acoustic assessment, and to verify that the mitigation procedures are appropriate for the affected receivers. If the measured levels are higher than those predicted, then the measures will need to be reviewed, and the management plan will need to be amended.



Complaints Management System	CMS	All complaints management will be undertaken with the managing contractors' procedures and site-specific procedures.
Specific Notification	SN	Notification of upcoming works to noise and vibration affected surrounding receivers.
Respite Offer	RO	Offer provided to stakeholders subjected to an ongoing impact.
Alternative Construction Methodology	AC	Contractor to consider alternative construction options that achieve compliance with relevant criteria. Alternative option to be determined on a case-by-case basis. It is recommended that the selection of the alternative option should also be determined by considering the assessment of on-site measurements (refer to Verification Monitoring above).

The application of these procedures is in relation to the exceedances over the relevant criteria. For airborne noise, the criteria are based on NMLs. The allocation of these procedures is discussed in Section 6.4.2.

For vibration, the criteria either correspond to human comfort, building damage or scientific and medical equipment. The application of these procedures is discussed in Section 6.4.3.

6.4.2 Allocation of Noise Management Procedures

For residences, the management procedures have been allocated based on noise level exceedances at the affected properties, which occur over the designated NMLs. The allocation of these procedures is summarised in Table 27 below.

Table 27 Allocation of noise management procedures – residential receivers

Construction Hours	Exceedance over NML (dB)	Management Procedures (see definition above)
Standard Hours	0 - 3	GMM, CMS, AC
Mon – Fri: 7:00 am to 6:00 pm	4 - 10	GMM, CMS, AC, V ¹
Sat: 8:00 am – 1:00 pm	11 - 20	GMM, CMS, PN, AC, V ¹
	≥ 21	GMM, CMS, PN, AC, SN, V ¹
	≥ 75dBA	GMM, CMS, PN, AC, SN, RO, V ¹
Outside Standard Hours (If applicable)	Specific NMP will be undertaken should this be required.	

Note 1 Verification monitoring to be undertaken upon complaints received from affected receivers.

6.4.3 Allocation of Vibration Management Procedures

Table 28 below summarises the vibration management procedures to be adopted based on exceedance scenarios (i.e., whether the exceedance occurs over human comfort criteria, building damage criteria, or criteria for scientific and medical equipment). Please note these management procedures apply for any type of affected receiver (i.e., for residences as well as non-residential receivers).



Table 28 Allocation of vibration management procedures

Construction Hours	Exceedance over NML (dB)	Management Procedures (see definition above)
Standard Hours	0 - 3	GMM
Mon – Fri: 8:00 am to 5:30 pm	4 - 10	GMM, PN, V ¹ , CMS, AC
Sat: 8:00 am – 3:30 pm	> 10	GMM, PN, V, CMS, SN, AC
Outside Standard Hours	0 - 10	GMM, AC
Mon – Fri: 7:00 am to 8:00 am	11 - 20	GMM, PN, V ¹ , CMS, AC
Sat: 7:00 am to 8:00 am	> 20	GMM, PN, V, CMS, SN, RO, AC

Note 1 Verification monitoring to be undertaken upon complaints received from affected receivers

6.5 Site Specific Noise Mitigation Measures

6.5.1 General Comments

The contractor will, where reasonable and feasible, apply best practice noise mitigation measures. These measures shall include the following:

- Maximising the offset distance between plant items and nearby noise sensitive receivers.
- Preventing noisy plant working simultaneously and adjacent to sensitive receivers.
- Minimising consecutive works in the same site area.
- Orienting equipment away from noise sensitive areas.
- Carrying out loading and unloading away from noise sensitive areas.

In order to minimise noise impacts during the works, the contractor will take all reasonable and feasible measures to mitigate noise effects.

The contractor will also take reasonable steps to control noise from all plant and equipment. Examples of appropriate noise control include efficient silencers and low noise mufflers.

The contractor should apply all feasible and reasonable work practices to meet the NMLs and inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels, duration of noise generating construction works, and the contact details for the proposal.

6.5.2 Noise Monitoring

Noise measurements is an effective way of providing feedback to the contractor which acoustic mitigation measures are providing community benefit. As such the site-specific *Construction Noise and Vibration Management Sub Plan (CNVMSP)* should detail the strategy being proposed.

The survey methodology and any equipment should comply with the requirements discussed in Standard AS 1055.1-1997.



6.5.3 Vibration Monitoring

When vibration intensive works are being undertaken within close proximity of existing buildings measurements will be required to provide feedback to the contractor. As such the site-specific *Construction Noise and Vibration Management Sub Plan (CNVMSP)* should detail the strategy being proposed.

6.5.4 Noise Mitigation Measures for Non-Residential Receivers

Where exceedances have been identified in Section 3, the following mitigation measures are recommended:

- Undertake general mitigation measures
- Issue project updates to tenants in affected premises. The updates can include overview of current and upcoming works, as well as advanced warning of potential disruptions.
- Signage to be posted in order to provide stakeholders information regarding project details, emergency contacts and enquiry contact information.

6.5.5 Alternate Equipment or Process

Exceedance of the site's NMLs should result in an investigation as to whether alternate equipment could be used, or a different process could be undertaken.

In some cases, the investigation may conclude that the use of other equipment is not possible, however, a different process could be undertaken.

6.5.6 Acoustic Enclosures/Screening

Typically, on a construction site there are three different types of plant that will be used: mobile plant (i.e., excavators, skid steers, etc.), semi mobile plant (i.e., hand tools generally) or static plant (i.e., diesel generators).

For plant items which are static it is recommended that, in the event exceedances are being measured due to operation of the plant item, an acoustic enclosure/screen is constructed to reduce impacts. These systems can be constructed from Fibre Cement (FC) sheeting or, if airflow is required, acoustic attenuators or louvres.

For semi mobile plant, relocation of plant should be investigated to either be operated in an enclosed space or at locations away from a receiver.

With mobile plant it is generally not possible to treat these sources. However, investigations into the machine itself may result in a reduction of noise (i.e., mufflers/attenuators etc).

6.5.7 Vibration Mitigation Measures

6.5.7.1 General Comments

As part of the CNVMSP, the following vibration mitigation measures should be implemented:

- Any vibration generating plant and equipment is to be in areas within the site in order to lower the vibration impacts.
- Investigate the feasibility of rescheduling the hours of operation of major vibration generating plant and equipment.
- Use lower vibration generating items of construction plant and equipment; that is, smaller capacity plant, where feasible



- Minimise conducting vibration generating works consecutively in the same area (if applicable).
- Schedule a minimum respite period in accordance with Condition 69.
- Use only dampened rock breakers and/or “city” rock breakers to minimise the impacts associated with rock breaking works.

6.6 Community Consultation

The communication, however, should not be limited to the beginning of the onsite works but throughout, providing the community with constant updates on the progress and upcoming works. In our experience these could include:

- Project website.
- Email notifications; and
- Letterbox drops.

6.7 Complaints Management System

Should complaints arise they must be dealt with in a responsible and uniform manner, therefore, a management system to deal with complaints will be in accordance with the procedures of the managing contractor.

6.8 Contingency Plans

Contingency plans are required to address noise or vibration problems if excessive levels are measured at surrounding sensitive receivers and/or if justified complaints occur. Such plans include:

- Stop the onsite works.
- Identify the source of the main equipment within specific areas of the site which is producing the most construction noise and vibration at the sensitive receivers; and
- Review the identified equipment and determine if an alternate piece of equipment can be used or the process can be altered.
- In the event an alternate piece of equipment or process can be used, works can re-commence.
- In the event an alternate piece of equipment or process cannot be determined implement a construction assessment to be performed by a suitably qualified acoustic consultant.

The Superintendent shall have access to view the Contractor’s noise measurement records on request. The Superintendent may undertake noise monitoring if and when required.

6.9 General Mitigation Measures (Australia Standard 2436-2010)

As well as the above project specific noise mitigation controls, AS 2436-2010 “Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites” sets out numerous practical recommendations to assist in mitigating construction noise emissions. Examples of strategies that could be implemented on the subject project are listed below, including the typical noise reduction achieved, where applicable.



6.9.1 Adoption of Universal Work Practices

- Regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration.
- Regular identification of noisy activities and adoption of improvement techniques.
- Avoiding the use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby sensitive receivers.
- Where possible, avoiding the use of equipment that generates impulsive noise.
- Minimising the need for vehicle reversing for example (particularly at night), by arranging for one-way site traffic routes.
- Use of broadband audible alarms on vehicles and elevating work platforms used on site.
- Minimising the movement of materials and plant and unnecessary metal-on-metal contact.
- Minimising truck movements.

6.9.2 Plant Equipment

- Choosing quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks.
- Selecting plant and equipment with low vibration generation characteristics, where feasible.
- Operating plant and equipment in the quietest and most efficient manner.

6.9.3 On Site Noise Mitigation

- Maximising the distance between noise activities and noise sensitive land uses.
- Installing purpose-built noise barriers, acoustic sheds and enclosures around static plant.

6.9.4 Work Scheduling

- Providing respite periods which could include restricting very noisy activities to time periods that least affect the nearby noise sensitive locations, restricting the number of nights that after-hours work is conducted near residences or by determining any specific requirements.
- Scheduling work to coincide with non-sensitive periods.
- Planning deliveries and access to the site to occur quietly and efficiently and organising parking only within designated areas located away from the sensitive receivers.
- Optimising the number of deliveries to the site by amalgamating loads where possible and scheduling arrivals within designated hours.
- Including contract conditions that include penalties for non-compliance with reasonable instructions by the principal to minimise noise or arrange suitable scheduling.



6.9.5 Source Noise Control Strategies

Some ways of controlling noise at the source are:

- Where reasonably practical, noisy plant or processes should be replaced by less noisy alternatives.
- Modify existing equipment: Engines and exhausts are typically the dominant noise sources on mobile plant such as cranes, graders, excavators, trucks, etc. In order to minimise noise emissions, residential grade mufflers should be fitted on all mobile plant utilised on site.
- Siting of equipment: locating noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area; or orienting the equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise.
- Regular and effective maintenance.

6.9.6 Miscellaneous Comments

- Deliveries should be undertaken, where possible, during standard construction hours.
- Maximise hammer penetration (and reduce blows) by using sharp hammer tips. Keep stocks of sharp profiles at site and monitor the profiles in use.
- Where practicable, the use of quackers will be used to ensure noise impacts on surrounding noise sensitive receivers are minimised. This will not be implemented where it is deemed the use of quackers (as opposed to standard vehicle notification devices) would compromise the safety of construction staff or members of the public.
- No public address system should be used on site (except for emergency purposes).

7 CONCLUSION

This Noise and Vibration Impact Assessment (NVIA) has been prepared by Pulse White Noise Acoustics on behalf of Urban Property Group for the construction and operation of the proposed mixed-use development to be constructed at Lots 4-5, 6-7 and 8 Buchan Avenue, Edmondson Park NSW 2174 (the site).

This report has been prepared to review and assess the noise and vibration elements of the development including operational noise on surrounding existing developments, noise and vibration intrusion from external sources (road and rail) and noise and vibration impacts associated with the construction of the development. This report also describes the relevant noise and vibration criteria and recommended acoustic mitigation measures required to ensure compliance.

A review of the existing onsite noise levels from the nearby roadways/rail corridors has resulted in recommended acoustic treatments to the future buildings facades to ensure internal noise levels are within permissible limits.

To control noise impacts at external receivers, recommended indicative treatments for major engineering services have been provided in section. From our review we have formulated the following opinion:

- At this stage of the project the exact selections/locations of plant items are not known. A preliminary assessment, however, has been carried out using our experience with similar types of developments and the typical plant items installed in each type of plant room.
- From this review we recommend acoustic treatment to ensure that the operation of the plant items comply with the project criteria. Therefore, it is recommended that prior to the issue of a Construction Certificate (CC) a detailed acoustic assessment is undertaken to ensure all cumulative noise from engineering services (including the roof plant room) comply with the requirements as listed in section 3.

An assessment of the impacts associated with the number of vehicles on surrounding public roads around the site predicted the impact to be less than 2dBA and is therefore compliant with the NSW EPA RNP.

Prior to the issue of the Construction Certificate, it is recommended that a *Construction Noise and Vibration Management Plan (CNVMP)* be undertaken to formulate relevant compliance with the objectives detailed above.

If you have any additional questions, please contact us should you have any further queries.

Regards,

A handwritten signature in blue ink, appearing to read 'M. Furlong'.

Matthew Furlong
Principal Acoustic Engineer
Pulse White Noise Acoustics
AAS Member and AAAC Member Firm



APPENDIX A – ACOUSTIC TERMINOLOGY



<i>Sound power level</i>	The total sound emitted by a source																						
<i>Sound pressure level</i>	The amount of sound at a specified point																						
<i>Decibel [dB]</i>	The measurement unit of sound																						
<i>A Weighted decibels [dB(A)]</i>	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).																						
<i>Decibel scale</i>	<p>The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:</p> <table border="1"> <tr> <td>0dB(A)</td> <td>Threshold of human hearing</td> </tr> <tr> <td>30dB(A)</td> <td>A quiet country park</td> </tr> <tr> <td>40dB(A)</td> <td>Whisper in a library</td> </tr> <tr> <td>50dB(A)</td> <td>Open office space</td> </tr> <tr> <td>70dB(A)</td> <td>Inside a car on a freeway</td> </tr> <tr> <td>80dB(A)</td> <td>Outboard motor</td> </tr> <tr> <td>90dB(A)</td> <td>Heavy truck pass-by</td> </tr> <tr> <td>100dB(A)</td> <td>Jackhammer/Subway train</td> </tr> <tr> <td>110 dB(A)</td> <td>Rock Concert</td> </tr> <tr> <td>115dB(A)</td> <td>Limit of sound permitted in industry</td> </tr> <tr> <td>120dB(A)</td> <td>747 take off at 250 metres</td> </tr> </table>	0dB(A)	Threshold of human hearing	30dB(A)	A quiet country park	40dB(A)	Whisper in a library	50dB(A)	Open office space	70dB(A)	Inside a car on a freeway	80dB(A)	Outboard motor	90dB(A)	Heavy truck pass-by	100dB(A)	Jackhammer/Subway train	110 dB(A)	Rock Concert	115dB(A)	Limit of sound permitted in industry	120dB(A)	747 take off at 250 metres
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30dB(A)	A quiet country park																						
40dB(A)	Whisper in a library																						
50dB(A)	Open office space																						
70dB(A)	Inside a car on a freeway																						
80dB(A)	Outboard motor																						
90dB(A)	Heavy truck pass-by																						
100dB(A)	Jackhammer/Subway train																						
110 dB(A)	Rock Concert																						
115dB(A)	Limit of sound permitted in industry																						
120dB(A)	747 take off at 250 metres																						
<i>Frequency [f]</i>	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.																						
<i>Ambient sound</i>	The all-encompassing sound at a point composed of sound from all sources near and far.																						
<i>Equivalent continuous sound level [L_{eq}]</i>	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.																						
<i>Energy Equivalent Sound Pressure Level [L_{A,eq,T}]</i>	'A' weighted, energy averaged sound pressure level over the measurement period T.																						
<i>Percentile Sound Pressure Level [L_{Ax,T}]</i>	'A' weighted, sound pressure that is exceeded for percentile x of the measurement period T.																						
<i>Sound Pressure Level, LP dB</i>	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.																						
<i>Sound Power Level, Lw dB</i>	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt																						
<i>Noise Reduction</i>	The difference in sound pressure level between any two areas. The term "noise reduction" does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply																						
<i>Audible Range</i>	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.																						
<i>Background Sound Low</i>	The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources. Usually taken to mean the LA90 value																						
<i>Character, acoustic</i>	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.																						



<i>Loudness</i>	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
<i>LMax</i>	The maximum sound pressure level measured over a given period.
<i>LMin</i>	The minimum sound pressure level measured over a given period.
<i>L1</i>	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
<i>L10</i>	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
<i>L90</i>	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
<i>Leq</i>	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.



APPENDIX B – UNATTENDED NOISE MONITORING – LOCATION 1 – SOUTHERN CORNER OF SITE 5 ALONG THE RAIL CORRIDOR

Site 5, Edmondson Park Ambient noise monitoring report



Item	Information
Logger Type	NL-42
Serial number	1000233
Address	Site 5, Edmondson Park
Location	Site 5 , Edmondson Park
Facade / free field	Free field
Environment	

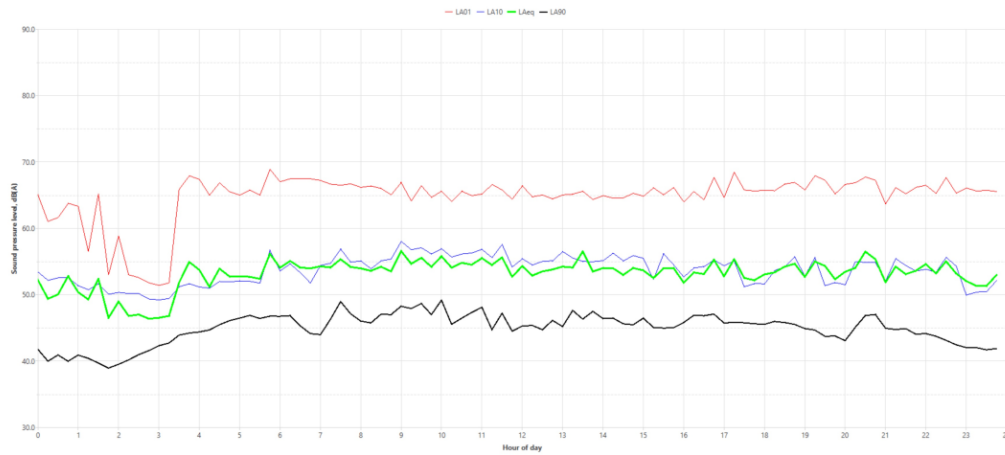
Measured noise levels

Logging date	Rating Background Level			L _{Aeq,period}		
	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am
Tue 25 Nov 2025	-	23	-	-	23	-
Wed 26 Nov 2025	-	42	-	-	57	-
Thu 27 Nov 2025	47	43	43	58	57	56
Fri 28 Nov 2025	48	46	37	59	57	56
Sat 29 Nov 2025	47	43	40	60	59	55
Sun 30 Nov 2025	38	42	35	56	57	52
Mon 01 Dec 2025	45	40	36	59	58	55
Tue 02 Dec 2025	45	44	34	59	59	54
Wed 03 Dec 2025	47	46	38	58	58	55
Thu 04 Dec 2025	-	-	-	57	-	57
Summary	47	43	37	58	57	55

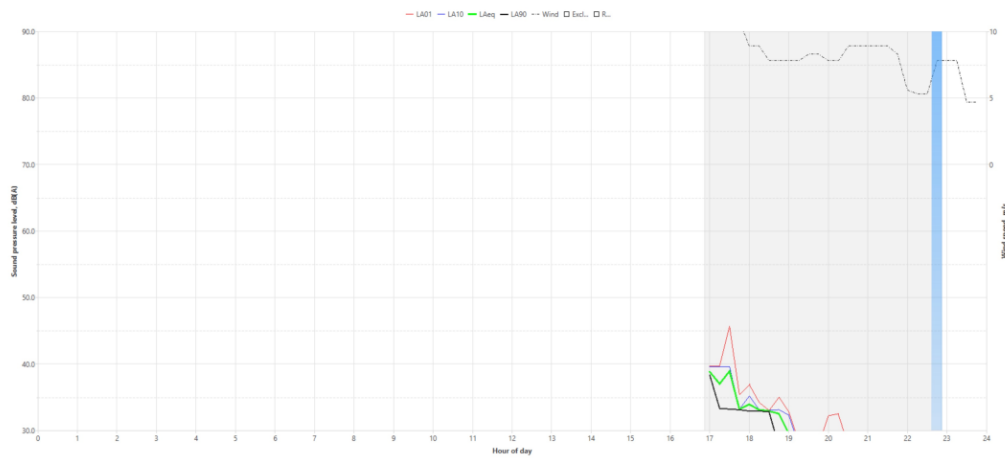
Note: Results with a '-' identify that there were not enough measurements available to correctly calculate the level, in accordance with the Noise Policy for Industry. The data has been excluded either from weather or manual exclusions. See the charts for more information

Logger location	Logger deployment photo

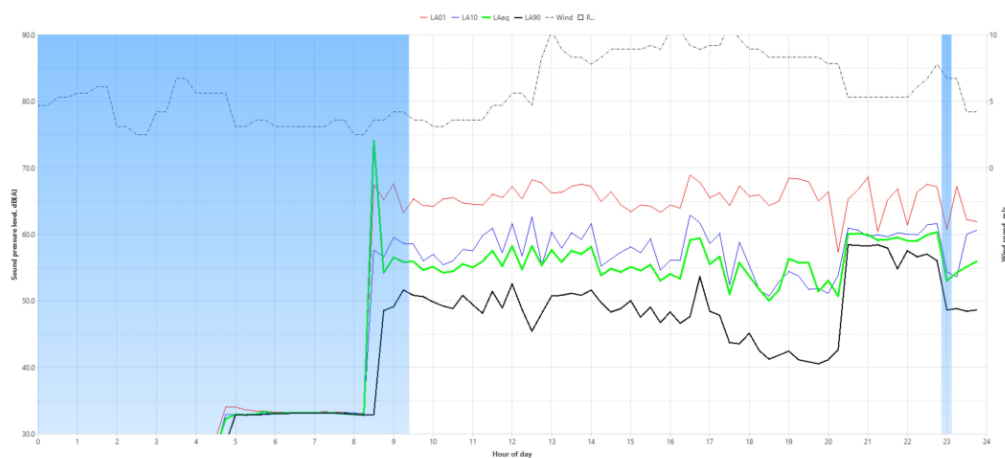
Typical Day



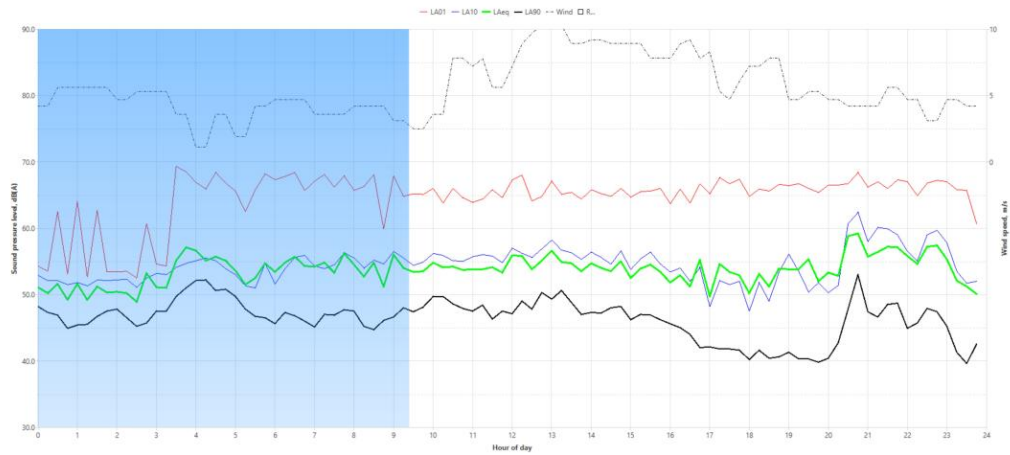
Tuesday, 25 November 2025



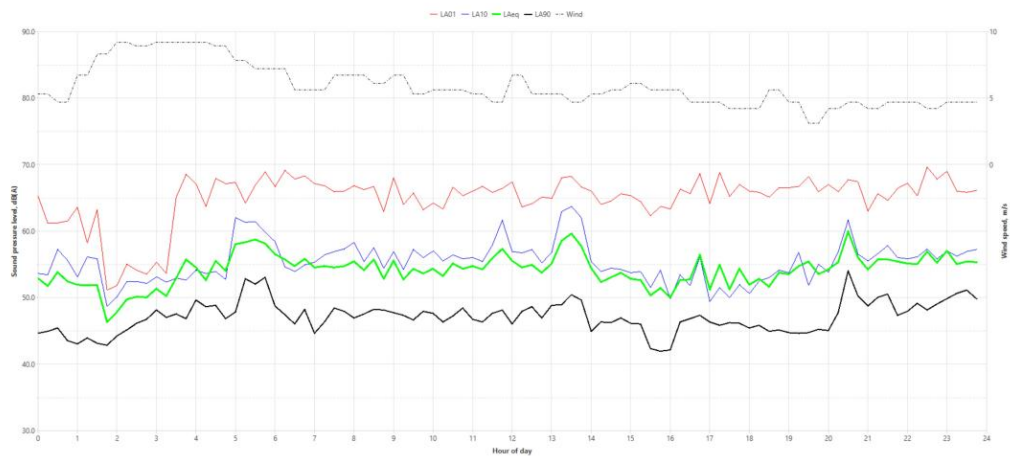
Wednesday, 26 November 2025



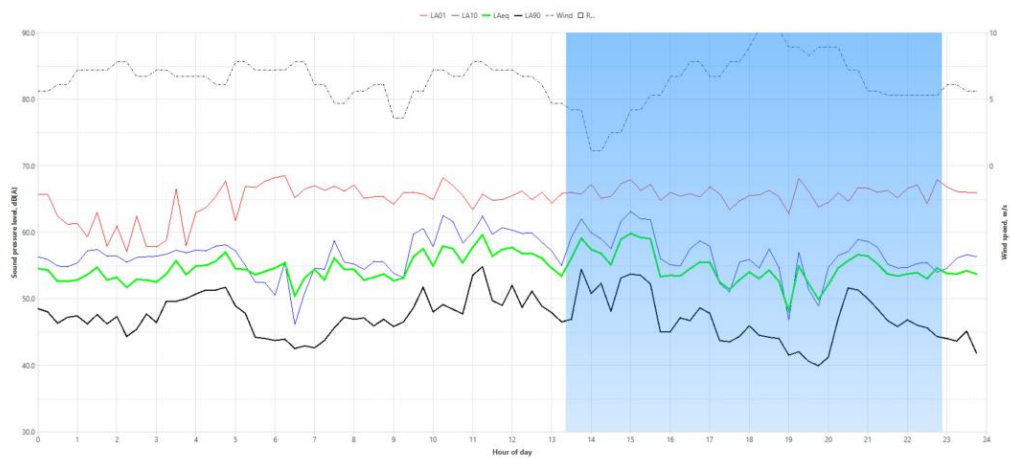
Thursday, 27 November 2025



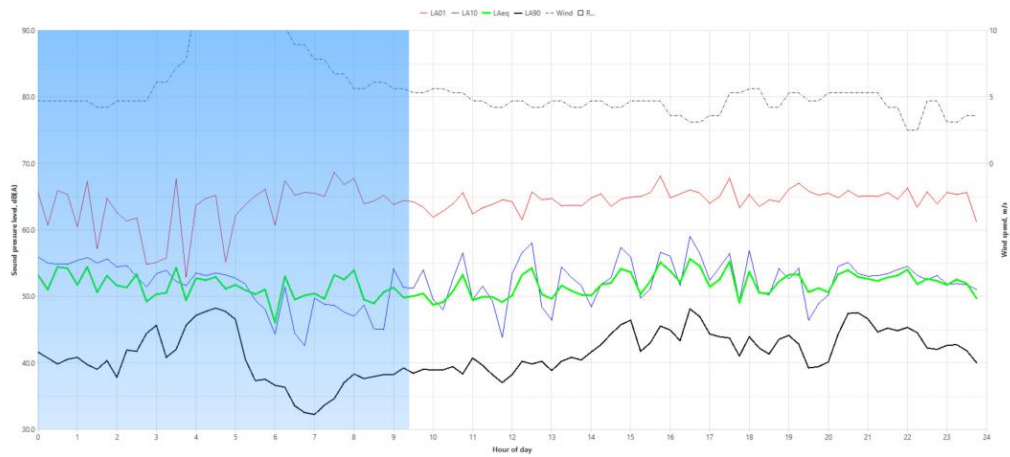
Friday, 28 November 2025



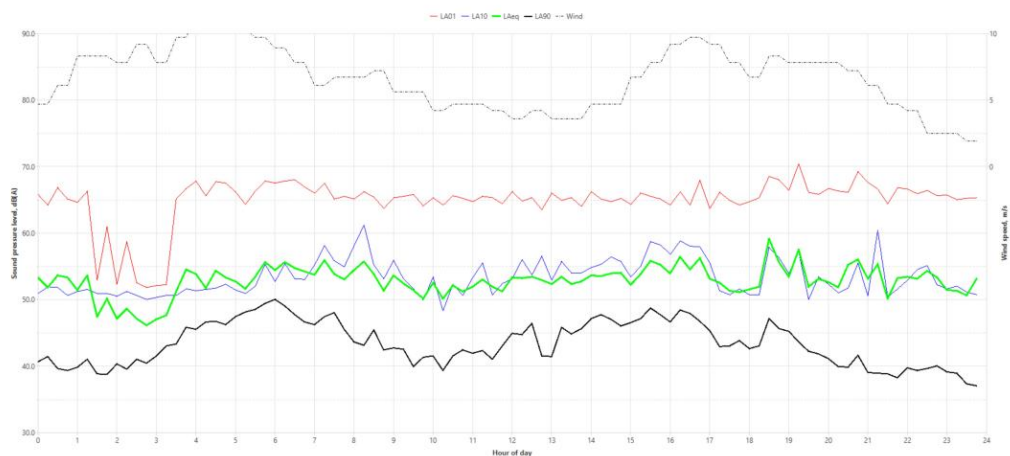
Saturday, 29 November 2025



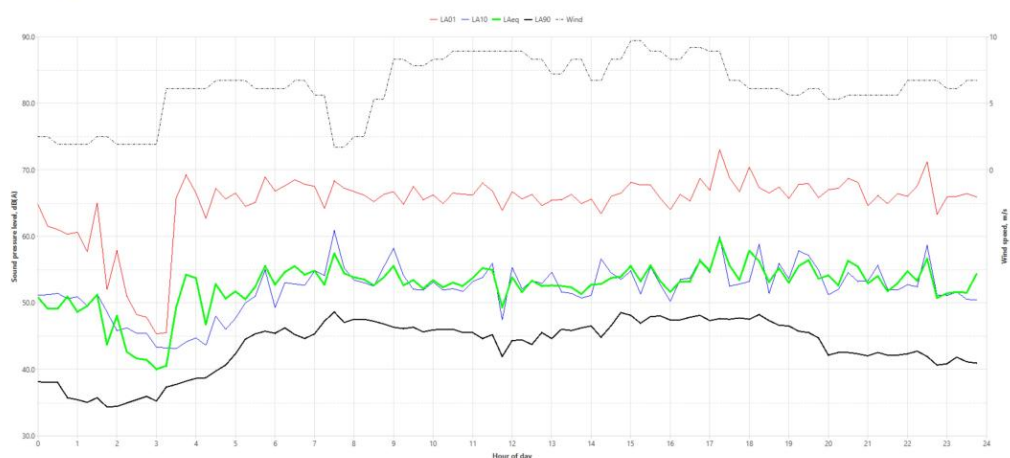
Sunday, 30 November 2025



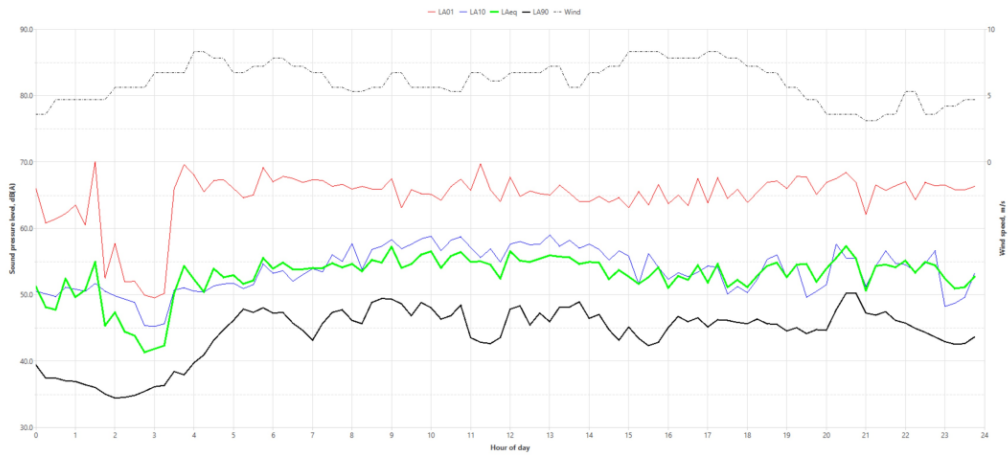
Monday, 1 December 2025



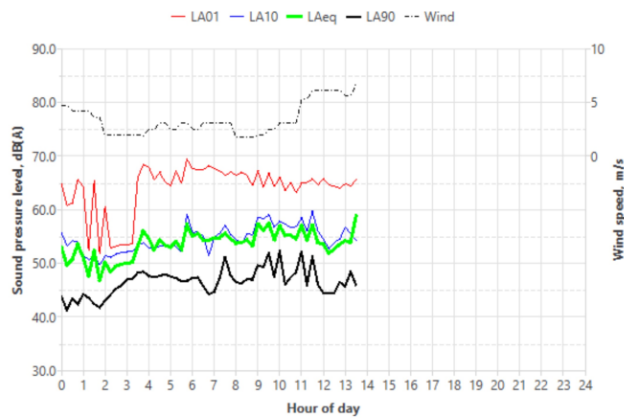
Tuesday, 2 December 2025



Wednesday, 3 December 2025



Thursday, 4 December 2025







APPENDIX C – UNATTENDED NOISE MONITORING – LOCATION 2 – EASTERN CORNER OF SITE 5 ALONG BUCHAN AVENUE

Buchan Ave, Edmondson Park

Ambient noise monitoring report



Item	Information
Logger Type	NL-42
Serial number	00998079
Address	Buchan Ave, Edmondson Park
Location	Buchan Ave, Edmondson Park
Facade / free field	Free field
Environment	

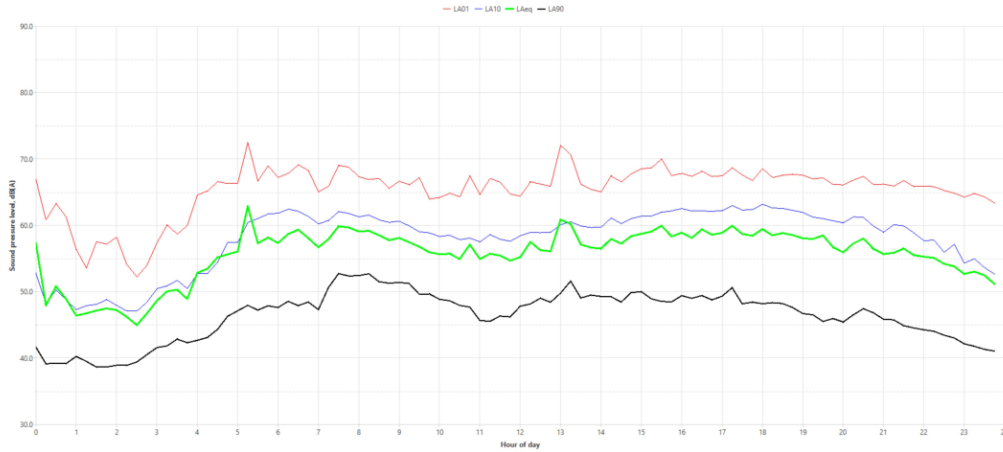
Measured noise levels

Logging date	Rating Background Level			L _{Aeq,period}		
	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am
Tue 25 Nov 2025	-	23	-	23	23	23
Wed 26 Nov 2025	23	42	23	60	57	48
Thu 27 Nov 2025	47	43	43	58	57	56
Fri 28 Nov 2025	48	46	37	59	57	56
Sat 29 Nov 2025	47	43	40	60	59	55
Sun 30 Nov 2025	38	42	35	56	57	52
Mon 01 Dec 2025	45	40	36	59	58	55
Tue 02 Dec 2025	45	44	34	59	59	54
Wed 03 Dec 2025	47	46	38	58	57	55
Thu 04 Dec 2025	-	-	-	58	-	57
Summary	46	43	37	58	57	54

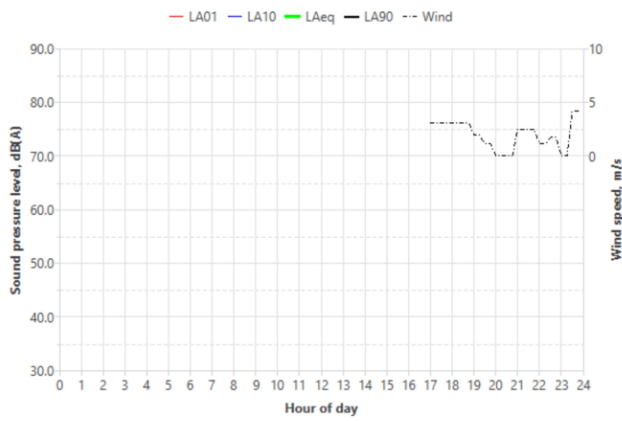
Note: Results with a '-' identify that there were not enough measurements available to correctly calculate the level, in accordance with the Noise Policy for Industry. The data has been excluded either from weather or manual exclusions. See the charts for more information

Logger location	Logger deployment photo
<p>Buchan Ave, Edmondson Park</p>	<p>Page 1</p>

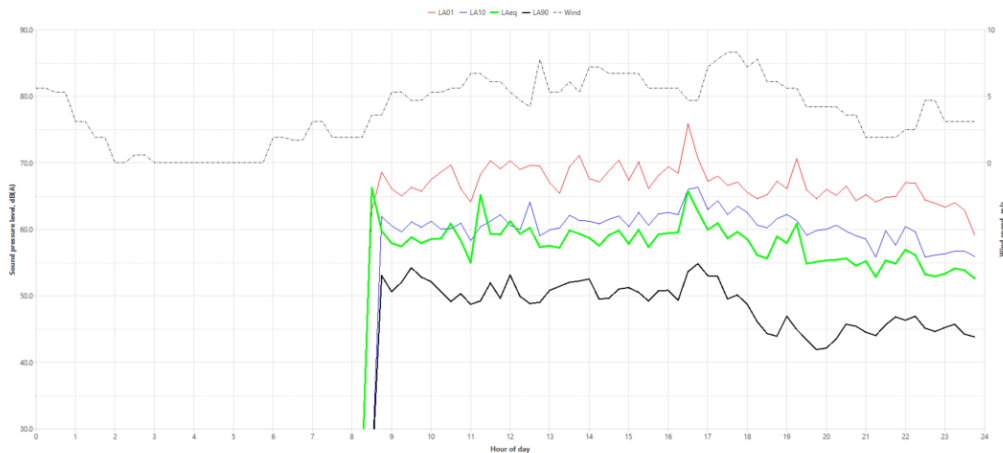
Typical Day



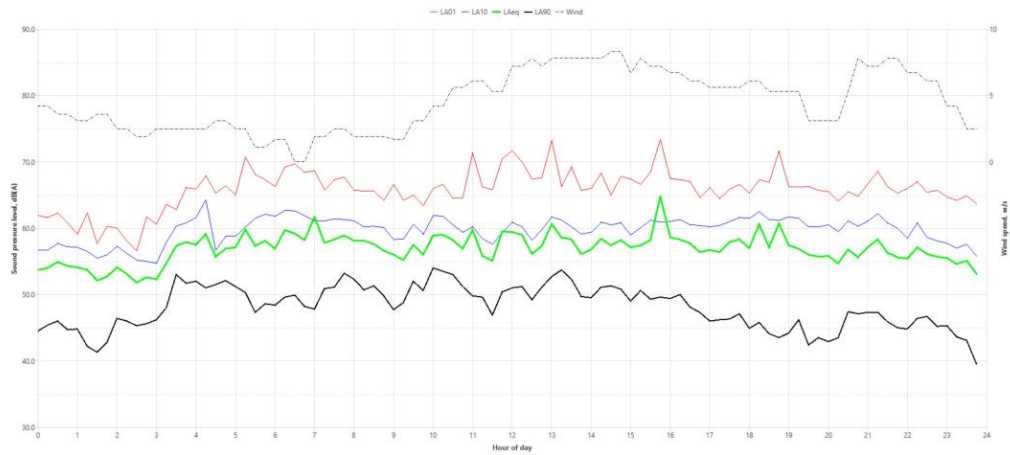
Tuesday, 25 November 2025



Wednesday, 26 November 2025



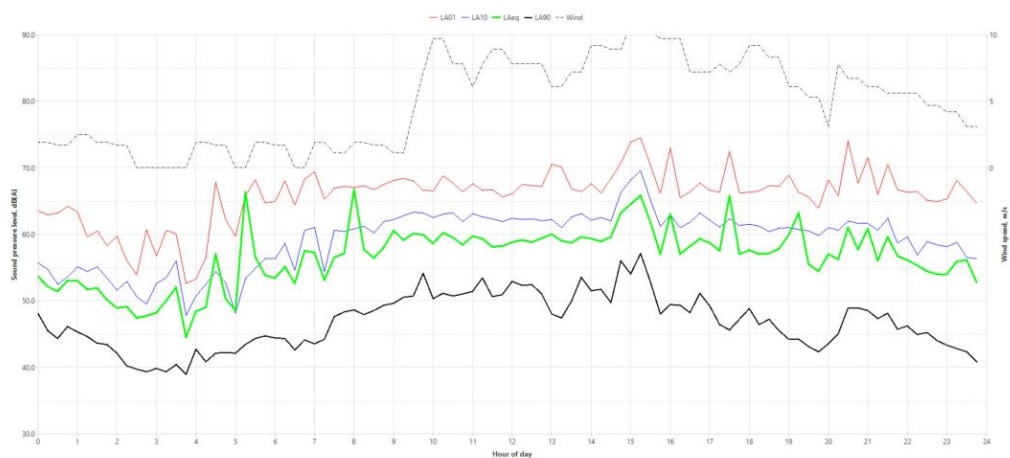
Thursday, 27 November 2025



Friday, 28 November 2025



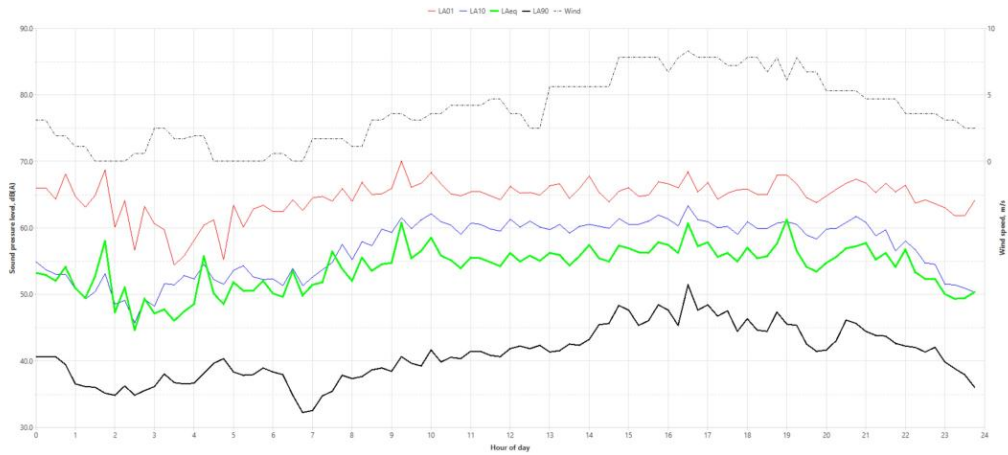
Saturday, 29 November 2025



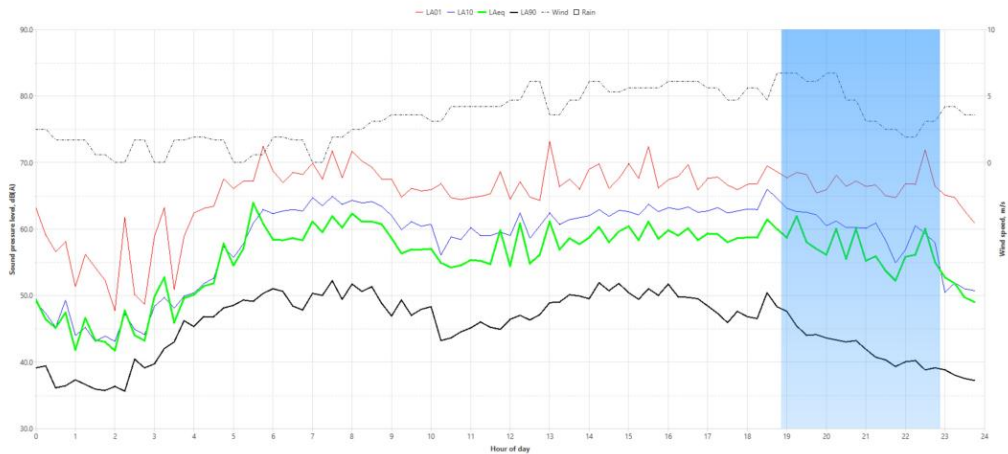
Buchan Ave, Edmondson Park

Page 3

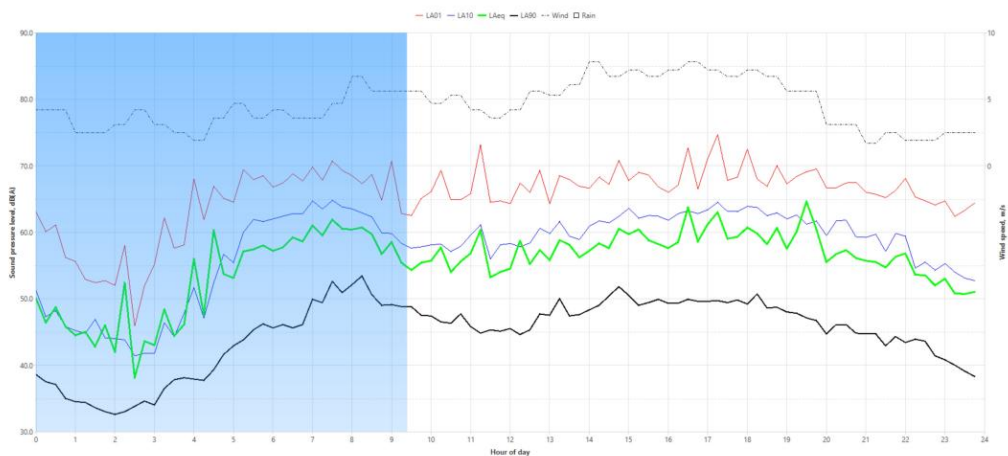
Sunday, 30 November 2025



Monday, 1 December 2025



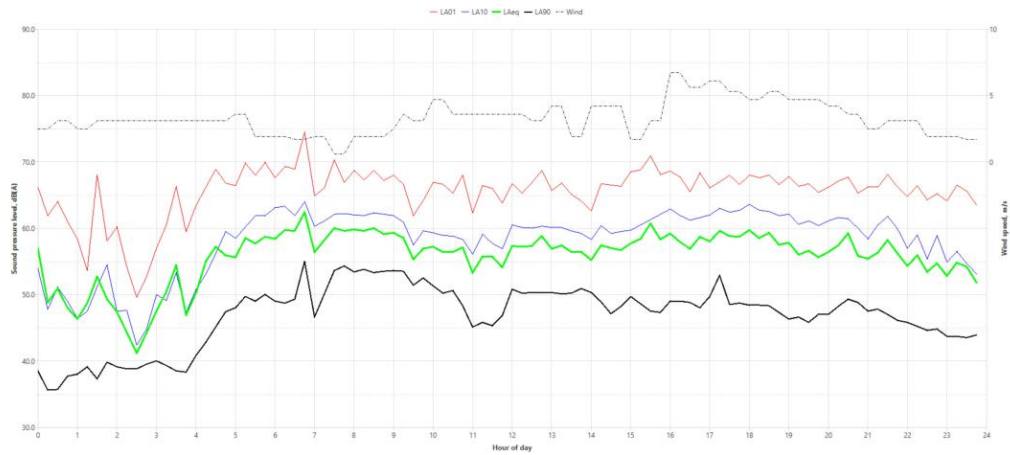
Tuesday, 2 December 2025



Buchan Ave, Edmondson Park

Page 4

Wednesday, 3 December 2025



Thursday, 4 December 2025





APPENDIX B – UNATTENDED NOISE MONITORING – LOCATION 3 – NORTHEASTERN CORNER SITE 3

Site 3, Edmondson Park Ambient noise monitoring report



Item	Information
Logger Type	NL-42
Serial number	998081
Address	Site 3, Edmondson Park
Location	Site 3, Edmondson Park
Facade / free field	Free field
Environment	

Measured noise levels

Logging date	Rating Background Level			L _{Aeq,period}		
	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am	Daytime 7am-6pm	Evening 6pm-10pm	Night-time 10pm-7am
Tue 25 Nov 2025	-	24	-	27	25	24
Wed 26 Nov 2025	24	40	24	61	48	41
Thu 27 Nov 2025	45	40	39	65	50	52
Fri 28 Nov 2025	48	44	32	71	54	52
Sat 29 Nov 2025	44	41	41	57	51	51
Sun 30 Nov 2025	39	41	38	48	49	47
Mon 01 Dec 2025	43	38	38	58	50	49
Tue 02 Dec 2025	48	44	37	62	53	52
Wed 03 Dec 2025	47	45	38	65	50	51
Thu 04 Dec 2025	-	-	-	61	-	51
Summary	44	41	38	64	51	50

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

Logger location



Site 3, Edmondson Park

Logger deployment photo

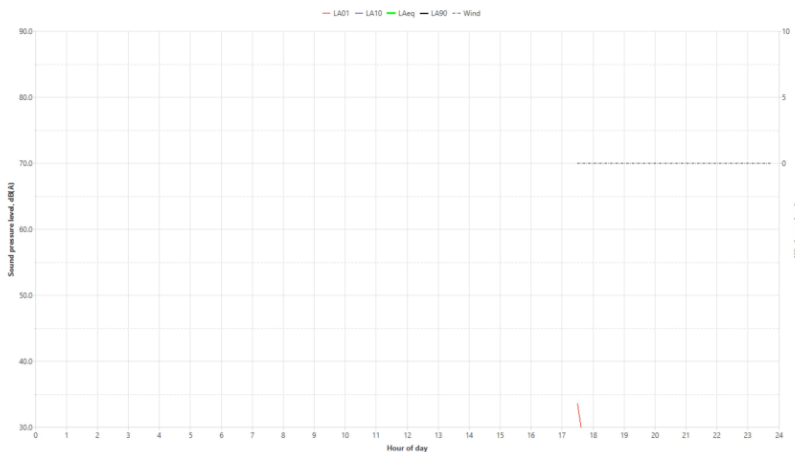


Page 1

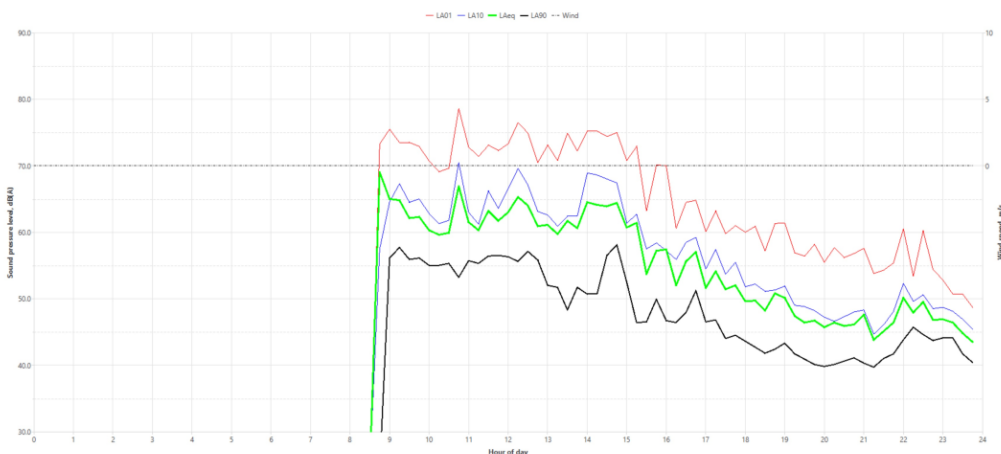
Typical Day



Tuesday, 25 November 2025



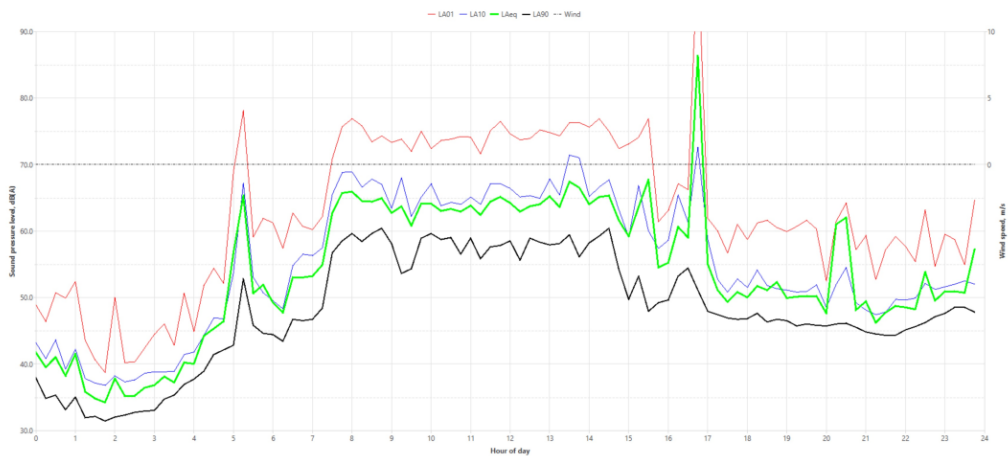
Wednesday, 26 November 2025



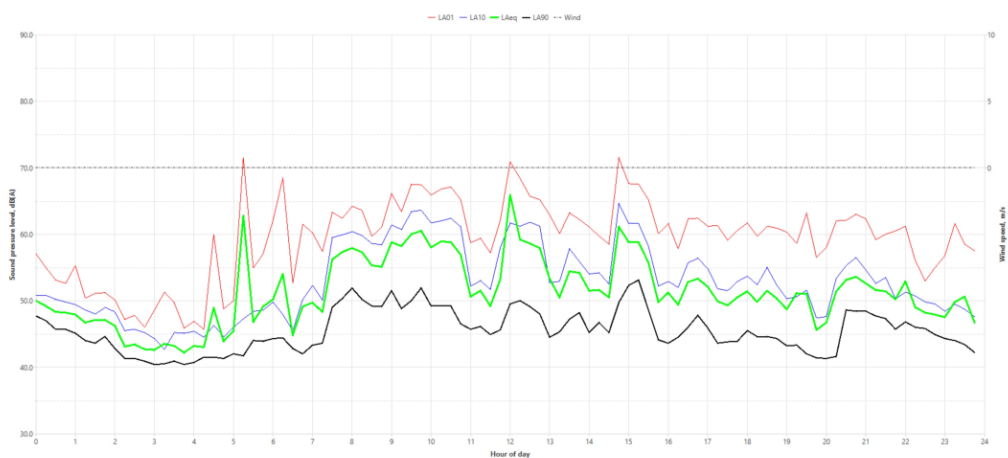
Thursday, 27 November 2025



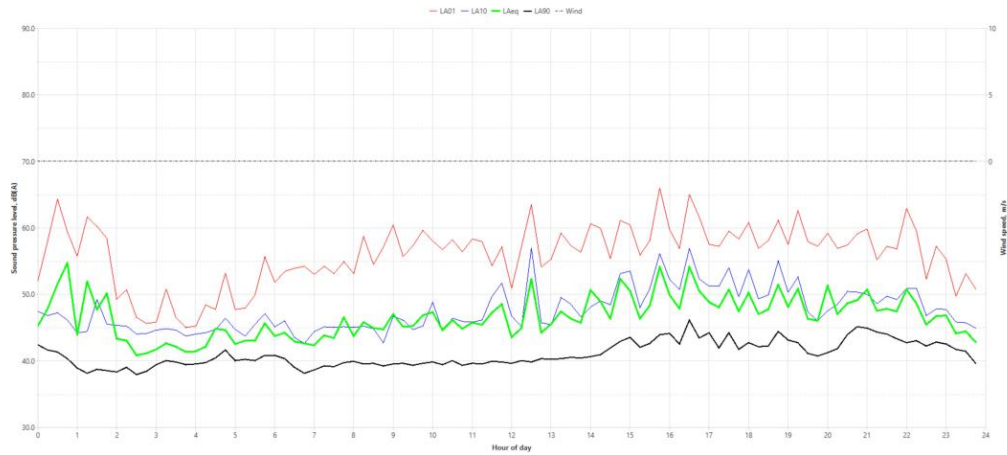
Friday, 28 November 2025



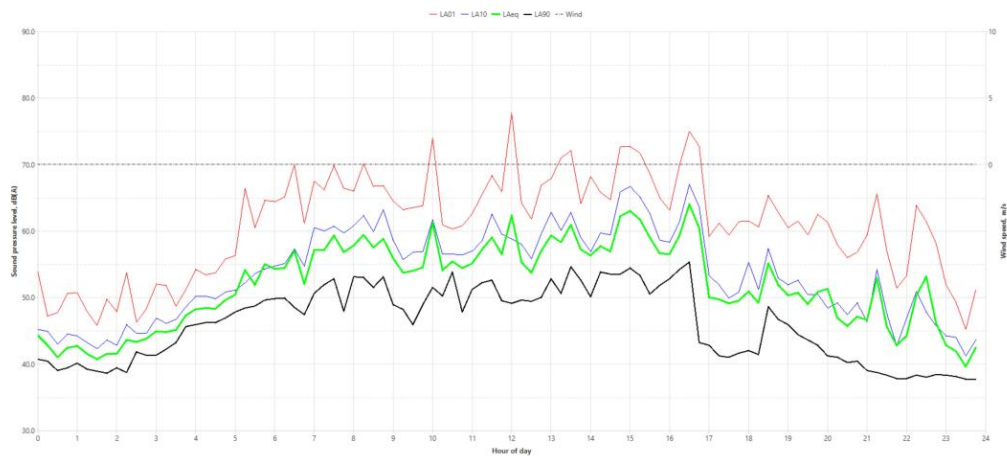
Saturday, 29 November 2025



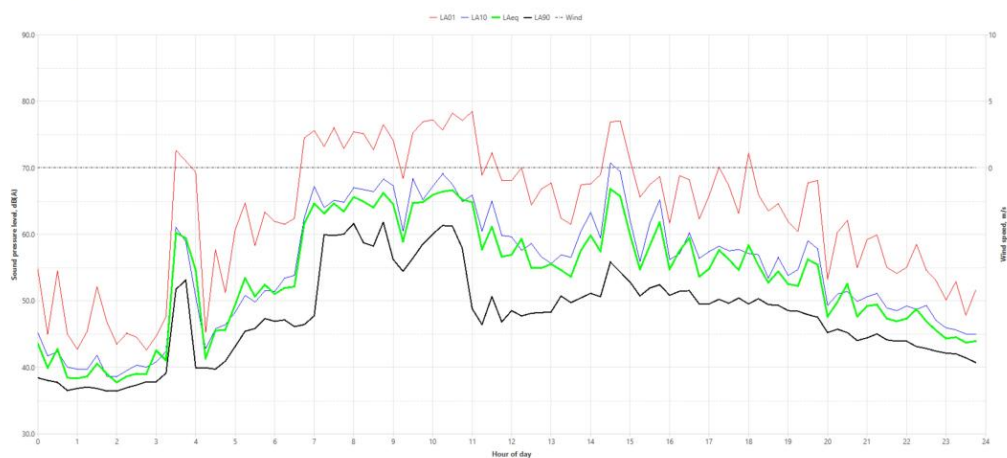
Sunday, 30 November 2025



Monday, 1 December 2025



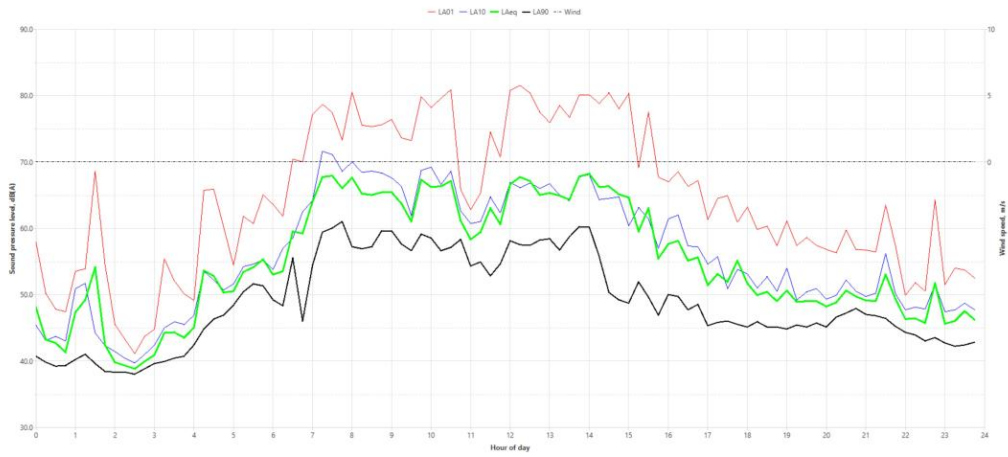
Tuesday, 2 December 2025



Site 3, Edmondson Park

Page 4

Wednesday, 3 December 2025



Thursday, 4 December 2025

