

2-4 GIFFNOCK AVENUE

MACQUARIE PARK, NSW

NOISE AND VIBRATION IMPACT ASSESSMENT

RWDI # 2508944

19 November 2025

SUBMITTED TO

388 LCR Development

Suite 2, 2-4 Giffnock Avenue
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SUBMITTED BY

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

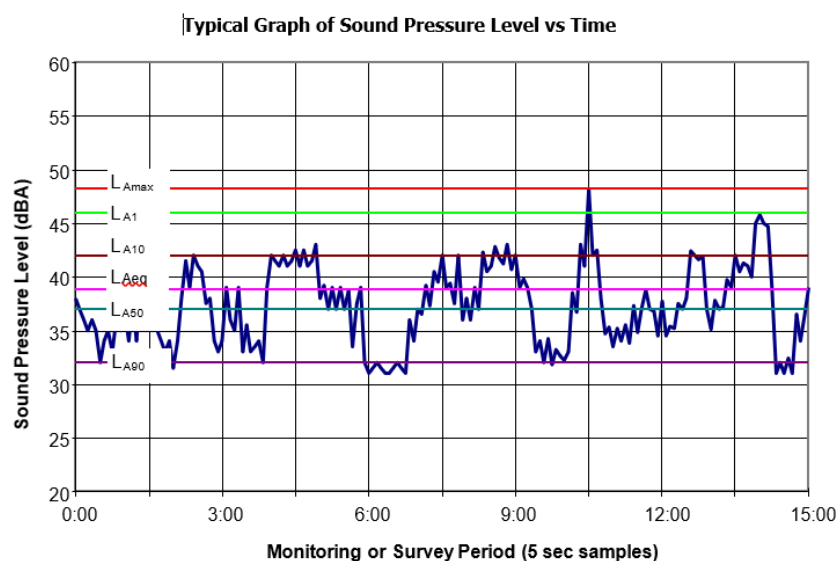
L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.





EXECUTIVE SUMMARY

This Noise and Vibration Impact Assessment has been prepared by RWDI to accompany a State Significant Development Application (SSDA) for a mixed-use development at 2-4 Giffnock avenue, Macquarie Park within the Ryde Local Government Area (LGA).

This report has been prepared to address the secretary's environmental assessment Requirements (SEARs) issued for the project (SSD-79017211) on 8 January 2025.

This report concludes that the proposed mixed-use development is suitable and warrants approval, provided that the recommendations for the building envelope shown in section 5.2 are implemented, to control noise intrusion from the surrounding major roads and neighbouring data centre. Noise emissions from the development to external receivers are anticipated to comply with relevant criteria during both construction and ongoing use.

Noise intrusion to the development's residences from internal noise sources (such as mechanical services noise or noise from the childcare centre) have been nominally considered in section 6.3, but should be further developed as the design progresses. The recommendations in section 5.2 do not include consideration of internal sources.

Due to the distance between site and the nearby metro line, vibration impacts from the metro line are anticipated to be negligible.



TABLE OF CONTENTS

1	INTRODUCTION	9
1.1	Objectives	10
2	SITE DESCRIPTION.....	12
2.1	Subject Site and Proposed Development.....	12
2.2	Surrounding Context.....	13
2.3	Noise Sensitive Receivers	13
2.4	Potential Sources of Noise and Vibration Intrusion.....	15
3	ENVIRONMENTAL NOISE SURVEY	16
3.1	Long-Term Noise Monitoring	17
3.2	Short-Term Noise Measurements	18
4	NOISE AND VIBRATION CRITERIA	19
4.1	External Noise and Vibration Intrusion Criteria	19
4.1.1	Noise Criteria	19
4.2	Noise Emission Criteria.....	21
4.2.1	NSW EPA Noise Policy for Industry 2017	21
4.2.2	Sleep Disturbance	24
4.2.3	Childcare	25
5	EXTERNAL NOISE INTRUSION ASSESSMENT	26
5.1	Sources of Noise Intrusion	26
5.1.1	Traffic Noise	26
5.1.2	NextDC Data Centre	26
5.2	Recommendations	26
5.2.1	Glazing and Glazed Doors	27
5.2.2	External Walls	27
5.2.3	Roof/Ceiling.....	27
5.2.4	Ventilation	28
6	OPERATIONAL NOISE ASSESSMENT	29
6.1	Operational Noise Sources.....	29
6.1.1	Vehicle Noise and Loading Dock	29
6.1.2	Childcare Centre	31
6.1.3	Mechanical Plant	33



6.2	Operational Noise Recommendations	33
6.2.1	Loading dock and car park ramp	33
6.2.2	Childcare Centre	33
6.2.3	Retail tenancies.....	34
6.2.4	Mechanical Plant	34
6.2.5	Communal Spaces on Level 2.....	34
6.3	Noise Impacts on Sensitive Spaces Within Development	34
6.3.1	Vehicle Noise.....	34
6.3.2	Mechanical Plant	35
6.3.3	Childcare Centre	35
6.3.4	Communal Spaces on Level 2.....	35
7	CONSTRUCTION NOISE & VIBRATION IMPACT ASSESSMENT	36
7.1	Acoustic Criteria / Management Levels	36
7.1.1	Noise – Interim Construction Noise Guideline (EPA, 2009).....	36
7.1.2	Vibration – Construction Noise & Vibration Strategy (TfNSW, 2018)	37
7.2	Proposed Construction Activities.....	38
7.2.1	Construction Hours.....	38
7.3	Construction Noise Assessment	38
7.3.1	Proposed Works	39
7.3.2	Predicted Construction Noise Impacts	40
7.3.3	Construction Noise Mitigation.....	42
7.4	Predicted Construction Vibration Impacts.....	43
7.5	Construction Traffic Noise Assessment.....	44
8	NATIONAL CONSTRUCTION CODE	45
9	CONCLUSION	47
	STATEMENT OF LIMITATIONS	50

LIST OF APPENDICES

Appendix A: Unattended Noise Monitoring

LIST OF FIGURES

Figure 2-1	Aerial View of the Existing Site and Surroundings (Source: Nearmap).....	12
Figure 2-2	Surrounding context (Source: Studio SC)	13
Figure 2-3	Site Plan – Aerial View of Site and Surrounding Receivers.....	14



Figure 3-1	Aerial Photograph showing logging locations.....	16
Figure 6-1	First Floor Childcare Centre	31
Figure 6-2	Second Floor Residences above Childcare Centre	32

LIST OF TABLES

Table 1-1	Secretary's Environmental Assessment Requirements (SEARs)	10
Table 3-1	Unattended Noise Measurements – Traffic (L_{eq}) Noise Levels	17
Table 3-2	Unattended Noise Measurements – Background (L_{90}) Noise Levels.....	17
Table 3-3	Attended Noise Measurement Results.....	18
Table 4-1	AS/NZS 2107:2016 Internal Noise Level Recommendations	20
Table 4-2	Summary of Internal Noise Level Recommendations.....	21
Table 4-3	NPI Project Intrusiveness Noise Level Criteria	21
Table 4-4	Recommended Amenity Noise Levels	22
Table 4-5	Project Amenity Noise Levels	24
Table 4-6	NPfI Overall Project Noise Trigger Level Criteria	24
Table 5-1	Recommended Minimum Acoustic Performance for Glazing	27
Table 6-1	SWL from Cars	29
Table 6-2	Predicted Noise Levels from Vehicle Movements	30
Table 6-3	Predicted Noise Levels from Childcare Centre	32
Table 7-1	Interim Construction Noise Guideline Criteria.....	36
Table 7-2	Site-Specific Construction Noise Management Levels	37
Table 7-3	Recommended Minimum Working Distances from Vibration Intensive Equipment.....	38
Table 7-4	Construction Noise Sources	39
Table 7-5	Predicted Construction Noise Impacts	40
Table 7-6	Indicative Construction Noise Mitigation Measures.....	42
Table 7-7	Vibration Intensive Equipment that Could Operate within the Minimum Recommended Distances of Sensitive Receivers	44
Table 8-1	NCC 2022 Sound Insulation Requirements.....	45

1 INTRODUCTION

RWDI was retained to conduct a noise and vibration impact assessment for the proposed mixed-use development to be located at 2-4 Giffnock Avenue, Macquarie Park, NSW.

This Noise and Vibration Impact Assessment is submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSDA) (SSD- 79017211). The SSDA seeks development consent for a mixed-use development at 2-4 Giffnock Avenue, Macquarie Park, comprising two tower elements above podiums, with retail premises, a childcare centre and residential uses within the building envelopes and recreation and road infrastructure uses on the remainder of the site.

Specifically, the SSDA seeks development consent for:

- demolition of two existing single storey buildings, one x two storey building and one car port
- site preparation and excavation works
- construction of two 44 storey towers, comprising:
 - a single basement, comprising 6 parking levels to service the entire development
 - ground floor retail premises
 - ground floor residential amenities and services
 - a centre based childcare centre (located on both ground and level 1 of northeastern only) accommodating 120 children and 20 staff
 - residential accommodation on the remaining levels (comprising a total of 741 units and dedication of affordable housing in perpetuity)
- landscaping and communal open space
- associated infrastructure and services
- streetscape upgrades including road widening to Drake Avenue by 2.5m (equivalent to 273m²) and Hyundai Drive by 4m (equivalent to 258m²)
- dedication of land for road infrastructure and open space purposes (equivalent to 4025m²) pursuant to Clause 7.13 of the (RLEP 2014) and the Macquarie Park Design Guide
- embellishment of the dedicated open space area
- easements for access and maintenance to the new substation and for the new pipe
- over the dedicated recreation area
- subdivision to create a separate lot

The purpose of the project is to facilitate the delivery of high-quality residential and non-residential uses at a strategically located site, delivering a built form outcome that is consistent with the desired future character of Macquarie Park, as established by the Macquarie Park Transport Oriented Development.

This report presents the project objectives, discusses the results from RWDI's on-site environmental noise survey, and provides our recommendations in order for the development to comply with the relevant acoustic requirements.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 8 January 2025 and issued for the SSDA (SSD-79017211). Specifically, this report has been prepared to respond to the SEARs requirement outlined in **Table 1-1**.

Table 1-1 Secretary's Environmental Assessment Requirements (SEARs)

Relevant SEARs	Response
<i>The EIS must:</i> <i>10. 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.</i>	Noise and vibration emissions associated with the construction and operation of the proposed development have been assessed against the relevant EPA and State guidelines, with noise and vibration mitigation recommendations provided to ensure that the acoustic amenity of sensitive receivers in the vicinity of the site is preserved. A preliminary assessment of construction noise and vibration impacts from the development has been presented in section 7, with noise and vibration mitigation strategies presented in section 7.3.3 to ensure that impacts are managed in accordance with the EPA's Interim Construction Noise Guideline.

The following documents have been referenced in establishing noise and vibration criteria for the proposed development:

- NSW Noise Policy for Industry (NPfi), NSW EPA, 2017,
- EPA's Interim Construction Noise Guideline (ICNG), 2009,
- Transport for NSW's (TfNSW) Construction Noise and Vibration Guideline (CNVG),
- NSW Road Noise Policy (RNP), DECCW, 2011;
- AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors
- Association of Australasian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment Version 3.0

Our assessment and recommendations have been based on the architectural drawings set supplied by Studio SC, dated 11 August 2025.

1.1 Objectives

The objectives of the assessment are to:

- Assess the impact of existing external noise sources on the proposed development (predominantly road noise sources) and provide recommendations for the sound isolation performance of the building envelope to achieve the internal noise requirements. Internal noise criteria for the development have been formulated with reference to the requirements of the NSW Department of Planning's (DoP) Development Near Rail Corridors and Busy Roads - Interim Guideline (NSW DoP, 2008), and Australian/New Zealand Standard (AS/NZS) 2017:2016 (AS/NZS, 2016).
- Assess vibration impacts on the development from the nearby underground rail corridor located under Waterloo Road with respect to the EPA's Assessing Vibration: A Technical Guideline (NSW EPA, 2006)



- Establish noise emission criteria for the development based on the requirements of the Ryde Council DCP, the NSW EPA Noise Policy for Industry (NPI) 2017 (NSW EPA, 2017).
- Assess noise impacts associated with additional traffic noise generation from the site.

2 SITE DESCRIPTION

2.1 Subject Site and Proposed Development

The site is located at 2-4 Giffnock Avenue, Macquarie Park in the Ryde LGA. It is legally described as Lot 1 in DP1310550. 2-4 Giffnock Avenue is bound by Pocock Street to the northwest, Giffnock Avenue and Hyundai Drive to the northeast, Lane Cove Road (which is a classified road) to the east and Drake Avenue to the south

As shown within the **Figure 2-3** below, the land being redeveloped as part of this SSD relates to part of Lot 235 in DP 1208568 and is referred to as 'the redevelopment site' throughout this report (see red shaded area below). The redevelopment site is irregular in shape and comprises an area of 12,720m². It is currently occupied by three commercial buildings, at-grade parking and vegetation.

The remaining area of the lot comprises the 'Veriu site' which comprises serviced apartments and is proposed to be subdivided from the redevelopment site.

2-4 Giffnock Avenue, Macquarie Park is zoned MU1 Mixed Use and E2 Commercial Centre pursuant to the *Ryde Local Environmental Plan 2014* and.



Figure 2-1 Aerial View of the Existing Site and Surroundings (Source: Nearmap)

The site is strategically located within the Macquarie Park Transport Orientated Development Accelerated Precinct and is approximately 190m walking distance from the Metro Station. It is also well serviced by buses which have stops on either side of Lane Cove Road.

2.2 Surrounding Context

The site directly interfaces commercial uses along all boundaries, with the exception of the northeastern corner of the site which interfaces with a 19-storey serviced apartment building.

As shown within **Figure 2-2** below, the broader locality is characterised by a mix of uses including established and newly developed commercial and residential buildings, the Macquarie Park Metro Station, Macquarie University, Macquarie University Hospital, shopping centres and recreational areas.

The site is also located approximately 16 kilometres from the Sydney CBD.



Figure 2-2 Surrounding context (Source: Studio SC)

2.3 Noise Sensitive Receivers

The nearest noise sensitive developments surrounding the site are:

- R1: 19-storey serviced apartment development located to the immediate south-east of the site;
- R2 – R8: Multi-storey commercial receivers surrounding the site on all other boundaries;
- R9: Low rise commercial receiver located to the south-west of the site on the southern side of Epping Rd;
- R10: Low rise residential receivers located to the south of the site on the southern side of Epping Rd;
- R11: Multi-storey residential receivers located to the south of the site on the southern side of Epping Rd;

- R12: Mutli-storey hotel located to the south-east of the site on the northern side of Epping Rd;
- R13 – R15: Mutli-storey commercial receivers located to the south-east of the site on the northern side of Epping Rd;

An aerial photo of the site and the surrounding development are presented in **Figure 2-3** below.

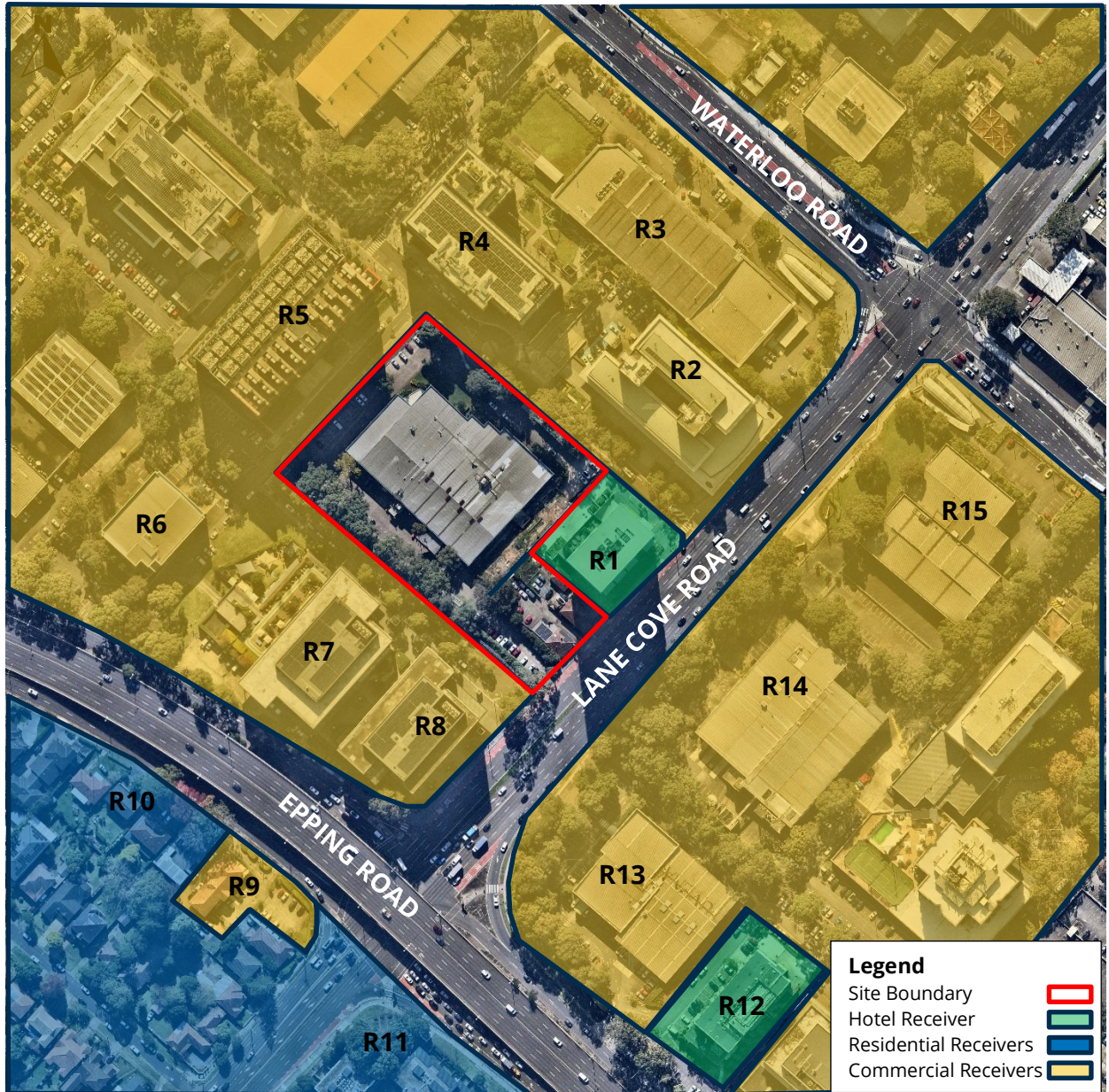


Figure 2-3 Site Plan – Aerial View of Site and Surrounding Receivers



2.4 Potential Sources of Noise and Vibration Intrusion

Notable potential sources of noise or vibration in the vicinity of the proposed development are:

- Traffic noise from the nearby busy roadways, primarily Lane Cove Road;
- Mechanical services noise from NextDC Data Centre to the northwest of the site (Receiver R5);
- Vibration from the Sydney Metro West line running approximately 40m beneath Waterloo Road; and
- Infrequent helicopter movements associated with the nearby helipad at 36-40 Waterloo Road.

The DoP *Development Near Rail Corridors and Busy Road – Interim Guideline* requires a structure-borne noise assessment to be conducted where buildings are within 60 metres of a rail corridor. The nearest boundary of the site is located 70 metres horizontally from the metro line beneath Waterloo Road. Based on this separation distance, vibration impacts from the metro are anticipated to be negligible and have not been further assessed.

The helipad at 36-40 Waterloo Road has an average of 14 helicopter flight movements per week, fluctuating across during times of the year. Helicopters are expected to fly between 7am and 6pm, with occasional movements between 6am-7am and 6pm-8.30pm. A typical busy day is likely to include two arrivals and two departures, not all of which would include flyover of the subject site. Due to the low number of movements and significantly greater rates of aircraft flyover, noise intrusion from helicopters is likely to be negligible, and has not been further assessed.

3 ENVIRONMENTAL NOISE SURVEY

To characterise the existing noise environment of the project location, RWDI personnel attended site to conduct short and long-term unattended noise measurements as described in the sub-section below.

The noise environment of the site consists primarily of traffic noise from Lane Cove Road, noise from the neighbouring data centre located to the northwest of site, and ambient noise from other surrounding commercial developments and roads.

Figure 3-1 shows the noise monitoring locations.



Figure 3-1 Aerial Photograph showing logging locations

3.1 Long-Term Noise Monitoring

Two unattended noise monitors were installed at the following locations to measure the traffic and background noise levels (refer also to **Figure 2-3**):

- Location 1 (L1): 16 metres from Lane Cove Road. The noise environment at this location was dominated by traffic noise and intermittent noise from the nearby service station (car wash, vacuum cleaner, trucks manoeuvring);
- Location 2 (L2): In the rear garden of 124A Epping Road, partially shielded from traffic noise from Epping Road and Lane Cove Road

The unattended noise measurements were conducted using noise monitors which were programmed to measure A-weighted, statistical noise levels stored at 15-minute intervals on fast response mode. The noise monitors were calibrated at the beginning and end of the monitoring period, with no significant drift being observed. Despite a successful installation and calibration, the monitor at L2 malfunctioned, resulting in no recorded data for the assessment period.

The noise monitor at L1 was installed between June 20 and June 30, 2023. The noise monitor at L2 was installed between September 16, 2021 and September 24, 2021.

The measured noise levels at the unattended noise monitoring locations are presented in **Table 3-1** and **Table 3-2**. Refer to Appendix A for a graph of the unattended noise monitoring data.

The unattended noise monitoring data has been analysed in conjunction with weather data obtained from the nearest weather station. Any noise measurement data that has been adversely affected by inclement weather as defined by the EPA Noise Policy for Industry (i.e., periods where average wind speeds exceed 5 m/s and periods that are rain affected) have been excluded in determining the existing noise levels on site.

Table 3-1 Unattended Noise Measurements – Traffic (L_{eq}) Noise Levels

Noise Monitor Location	Time of Day	Measured Ambient Noise Levels
L1	Day (7 am – 10 pm)	68 dBA $L_{eq, 15-hr}$
	Night (10 pm – 7 am)	67 dBA $L_{eq, 9-hr}$

Table 3-2 Unattended Noise Measurements – Background (L_{90}) Noise Levels

Noise Monitor Location	Time of Day	Rating Background Noise Level ¹
L2	Day (7 am – 6 pm)	51 dBA $L_{90,period}$
	Evening (6pm – 10 pm)	48 dBA $L_{90,period}$
	Night (10 pm – 7 am)	42 dBA $L_{90,period}$

Note 1: The rating background noise level has been calculated in accordance with the requirements of section B1.3 of the EPA Noise Policy for Industry 2017.

3.2 Short-Term Noise Measurements

RWDI personnel also conducted short-term attended noise measurements around the site to supplement the long-term unattended noise monitoring. The measurements were conducted on 23 July 2025 using a Class 1 NTi Audio XL2 Sound Level Meter. The sound level meter was calibrated at the beginning and end of the measurement periods and no significant drift was observed. The weather conditions during the attended noise measurements were clear with little to no wind.

Attended measurements were made of traffic noise on Lane Cove Road, to verify the validity of data recorded by the noise monitor, and of noise from the neighbouring data centre, to determine the likelihood of noise intrusion from this source.

The short-term noise measurement results are summarised in **Table 3-3** below.

Table 3-3 Attended Noise Measurement Results

Measurement Location (Refer to Figure 2-3)	Measurement Time	Measured Ambient Noise Level dBA Leq	Noted Noise Source(s)
A1: 19m from Lane Cove Road	5:51 pm	66	Traffic noise from Lane Cove Road
A2: Site Boundary opposite NextDC Data Centre (refer to Figure 3-1)	6:15 pm	60	Noise environment dominated by noise from data centre Lane cove road audible Est. L _{AF} 58 for data centre
A3: Site Boundary opposite NextDC Data Centre (refer to Figure 3-1)	6:20 pm	62	Noise environment dominated by noise from data centre Lane cove road audible Transient plane flyover Est. L _{AF} 61 for data centre
A4: Site Boundary opposite NextDC Data Centre (refer to Figure 3-1)	6:26 pm	59	Noise environment dominated by noise from data centre, lane cove road inaudible or barely audible Est. L _{AF} 58 for data centre

4 NOISE AND VIBRATION CRITERIA

The following sub-sections detail the acoustic criteria that are applicable to the proposed development.

4.1 External Noise and Vibration Intrusion Criteria

4.1.1 Noise Criteria

It is noted that the development is located along Lane Cove Road, which is a roadway with an annual average daily traffic (AADT) volume of more than 20,000 vehicles. As such, the acoustic requirements of the State Environmental Planning Policy (Transport and Infrastructure) 2021 apply to the development. Internal noise criteria from AS/NZS 2107:2016 will also be considered.

4.1.1.1 *State Environmental Planning Policy (Transport and Infrastructure) 2021*

Section 2.100 *Impact of rail noise or vibration on non-rail development* states the following:

- 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 child care facility.*
- 2) *Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.*
- 3) *If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded—*
 - (a) *in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,*
 - (b) *anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.*

Section 2.120 *Impact of road noise or vibration on non-road development* states the following:

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

- (b) a place of public worship,
 - (c) a hospital,
 - (d) an educational establishment or centre-based child care facility.
- 2) Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.
- 1.
- 3) If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded—
- (a) in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,
 - (b) anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.
- 3A) Subsection (3) does not apply to a building to which State Environmental Planning Policy (Housing) 2021, Chapter 3, Part 7 applies.
- 4) In this section, freeway, tollway and transitway have the same meanings as they have in the Roads Act 1993.

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

AS/NZS 2107:2016 provides recommended internal noise criteria for different spaces depending on their intended use. This internal noise recommendations apply to steady or quasi-steady state noise sources, including road traffic. The applicable internal noise criteria from the Standard that have been adopted for this development are presented in **Table 4-1** below.

Table 4-1 AS/NZS 2107:2016 Internal Noise Level Recommendations

Type of Occupancy	Time of Day	Internal Noise Criteria Leq,period dBA
Apartment Sleeping Areas	Night (10 pm – 7 am)	35 dBA Leq, 9-hr
Apartment Living Areas	Day (7 am – 10 pm)	45
Childcare	When in use	40 – 45
Indoor Communal Space	When in use	40 – 45
Small Retail Stores	When in use	50

Based on recommendations for Common Rooms in Hostels, Residential Halls and Barracks

4.1.1.3 Summary of Internal Noise Criteria

Based on the sub-sections above, a summary of the most stringent internal noise criteria for the development have been summarised in **Table 4-2**.

Table 4-2 Summary of Internal Noise Level Recommendations

Type of Occupancy	Time of Day	Internal Noise Criteria $L_{eq,period}$ dBA
Apartment Sleeping Areas	Night (10 pm – 7 am)	35
Apartment Living Areas	Day (7 am – 10 pm)	40
Childcare	When in use	40 – 45
Indoor Communal Space	When in use	40 – 45
Small Retail Stores	When in use	50

4.2 Noise Emission Criteria

4.2.1 NSW EPA Noise Policy for Industry 2017

The NPfl provides a framework for assessing environmental noise impacts from industrial premises and industrial development proposals in New South Wales.

The NPfl recommends the development of project noise trigger levels, which provide a benchmark for assessing a proposal or site. The project noise trigger levels should not be interpreted as mandatory noise criteria but, rather, as noise levels that, if exceeded, would indicate a potential noise impact on the community.

The project noise trigger level is the lower value of the project intrusiveness noise level and the project amenity noise level. The project intrusiveness noise level assesses the likelihood of noise being intrusive above the ambient noise level and is applied to residential receivers only. The project amenity noise level ensures the total industrial noise from all sources in the area does not rise above a maximum acceptable level.

4.2.1.1 Project Intrusiveness Noise Levels

The project intrusiveness noise criterion aims to protect residential receivers against significant changes in the noise environment due to new development. The project intrusiveness noise criterion states that noise emissions from new development should be no more than 5 dBA above the rated background noise level. Based on the rated background noise levels measured on site (presented in Section 3.1), the project intrusiveness noise levels are summarised in **Table 4-3** below.

Table 4-3 NPI Project Intrusiveness Noise Level Criteria

Receiver Location	Time of Day	Rating Background Noise Level dBA $L_{90(period)}$	Project Intrusiveness Noise Level Criteria dBA $L_{eq(15min)}$
R10	Day (7 am – 6 pm)	51	56
	Evening (6pm – 10 pm)	48	53
	Night (10 pm – 7 am)	42	47



4.2.1.2 Project Amenity Noise Levels

Project amenity noise levels aim to set a limit on continuing increases in noise levels from all industrial noise sources affecting a variety of receiver types; that is, the ambient noise level in an area from all industrial noise sources remains below recommended amenity noise levels.

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include transportation noise (when on public transport corridors), noise from motor sport, construction noise, community noise, blasting, shooting ranges, occupational workplace noise, wind farms, amplified music/patron noise.

The amenity noise level aims to limit continuing increases in noise levels which may occur if the intrusiveness level alone is applied to successive development within an area.

The recommended amenity noise level represents the objective for total industrial noise at a receiver location. The project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

To prevent increases in industrial noise due to the cumulative effect of several developments, the project amenity noise level for each new source of industrial noise is set at 5dBA below the recommended amenity noise level.

The following exceptions apply to determining the project amenity noise level:

- For high-traffic areas, the amenity criterion for industrial noise becomes the $L_{Aeq,period(traffic)}$ minus 15dBA.
- In proposed developments in major industrial clusters.
- If the resulting project amenity noise level is 10dB or more, lower than the existing industrial noise level, the project amenity noise level can be set at 10dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.
- Where cumulative industrial noise is not a consideration because no other industries are present in, or likely to be introduced into the area, the relevant amenity noise level is assigned as the project amenity noise level for the development.

Amenity noise levels are not used directly as regulatory limits. They are used in combination with the project intrusiveness noise level to assess the potential impact of noise, assess mitigation options and determine achievable noise requirements.

The project amenity noise levels are calculated from the recommended amenity noise levels presented in **Table 4-4**.

Table 4-4 Recommended Amenity Noise Levels

Receiver	Noise Amenity Area	Time of Day ¹	Recommended Amenity Noise Level $L_{eq,period}$ dBA
Residential	Rural	Day	50
		Evening	45

Receiver	Noise Amenity Area	Time of Day ¹	Recommended Amenity Noise Level Leq,period dBA
	Suburban	Night	40
		Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5dBA above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day.
School classroom-internal	All	Noisiest 1-hour period when in use	35
Hospital ward internal external	All	Noisiest 1-hour	35
Place of worship-internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Active recreation area (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	65
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5dB(A) to recommended noise amenity area

Note 1: Day = 7am – 6pm; Evening = 6pm – 10pm; Night = 10pm – 7am

The project amenity trigger level sets limits on the total noise level from all industrial noise sources affecting a receiver. Different amenity noise levels apply for different types of receivers (e.g. residential, commercial, industrial – or for areas specifically reserved for passive recreation) and different areas (e.g. urban, suburban, rural). The amenity noise level applies to the $L_{Aeq,period}$ during the full day (or evening or night). To ensure that industrial noise levels remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise. This is calculated as the recommended amenity noise level for the receiver type minus 5 dBA. Where noise sources are not continuous for the whole period it is allowable to add 3 dB to convert from a period level to a 15-minute level.

The project amenity noise levels for the Project are presented in **Table 4-5**.

Table 4-5 Project Amenity Noise Levels

Receiver	Time of Day	Recommended Amenity Noise Level Leq,period dBA	Project Amenity Noise Level LAeq,15min dBA
Residential premises	Day	60	58
	Evening	50	48
	Night	45	43
Commercial premises	When in use	65	63
Hotels	Day	65	63
	Evening	55	53
	Night	50	48

4.2.1.3 Project Noise Trigger Levels

The project noise trigger levels for the project are presented in **Table 4-6**.

Table 4-6 NPfI Overall Project Noise Trigger Level Criteria

Receiver Type	Time of Day	Project Intrusiveness Criteria dBA Leq(15min)	Amenity Criteria LAeq,15min dBA	Project Noise Trigger Criteria LAeq,15min dBA
R1, R12 Hotel	Day (7am-6pm)	-	63	63
	Evening (6pm – 10pm)	-	53	53
	Night (10pm-7am)	-	48	48
R2 – R9, R13 – R15 Commercial	When in use	-	63	63
R10 Residential	Day (7am-6pm)	56	58	56
	Evening (6pm – 10pm)	53	48	48
	Night (10pm-7am)	47	43	43

4.2.2 Sleep Disturbance

Guidance for assessing the potential for sleep disturbance impacts on nearby residences is provided in Section 2.5 of the NPfI, which states:

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



- $L_{Aeq,15min}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{Amax} 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

Due to the distance between the site and the nearest residential receiver, and the low L_{Amax} of sources anticipated to be operational during the night-time period, sleep disturbance impacts are unlikely, and no further assessment has been conducted.

4.2.3 Childcare

Criteria for the management of noise from the proposed childcare have been adopted from the Association of Australasian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment Version 3.0 (AAAC Guideline). The following criteria are recommended for sites which have a background noise level greater than 40 dBA:

Up to 4 hours (total) per day – *If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15}$ minute noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.*

More than 4 hours (total) per day – *If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15}$ minute noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.*

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

- 1.5m above ground level
- On a balcony at 1.5 m above floor level
- Outside a window on the ground or higher floors

The background noise level during the daytime (7am to 6pm) was measured to be 51 dBA as shown in **Table 3-2**. On this basis, the most stringent criteria potentially applicable to the childcare centre would be $L_{Aeq,15min}$ 56 dBA.



5 EXTERNAL NOISE INTRUSION ASSESSMENT

5.1 Sources of Noise Intrusion

5.1.1 Traffic Noise

The most significant source of external noise intrusion on the development will be from traffic noise from roads surrounding the site, primarily Lane Cove Road. Noise levels from Lane Cove Road have been modelled based on the unattended and attended monitoring discussed in section 3. Noise levels from Epping Road have been modelled based on traffic volumes and heavy vehicle percentage as shown on the TfNSW Traffic Volume Viewer Website. Recent data from the closest traffic count station was not available, so data has been extrapolated, based on growth patterns observed at other stations close by on Epping Road.

5.1.2 NextDC Sydney Data Centre (S2)

Noise levels emitted by the NextDC S2 Data Centre at 8 Giffnock Ave, Macquarie Park were estimated to range from 58-61 dBA at the site boundary, with the greatest contribution of noise coming from plant in the vicinity of the data centre entry driveway. The area of proposed site closest to the data centre will be open parkland. The noise levels from the data centre are greater than what is recommended in the NPfI for a passive recreation setting (refer to **Table 6-2**), however given the high levels of road noise in the area, the noise levels from the data centre are not uncharacteristic of the area, and are not likely to have a significant impact on the amenity within the park. The noise from the data centre is obviously directional however, which can contribute to a greater perceived noise intrusion compared to ambient sources.

The nearest building façade to the data centre is set back approximately 35 metres from the site boundary. Worst case noise levels at this location are predicted to be approximately 55 dBA, equal to or less than the contribution of the surrounding roads.

5.2 Recommendations

Noise modelling was performed using the modelling software CADNA (v2025) implementing the noise propagation algorithm ISO 9613:2024, to determine the internal noise levels within the development as a result of noise transmission through the building façade elements (glazing, external walls and roof/ceiling). This modelling considered the transmission loss performance of the façade elements, the estimated surface area of each façade element exposed to external noise and the absorption characteristics of the internal spaces due to room finishes.

Based on our analysis, the indicative weighted sound reduction index (R_w) performance for the building façade elements have been presented in the sub-sections below. These recommendations should be reviewed at detailed design stage once room layouts and glazing areas have progressed sufficiently to ensure that the internal noise criteria are achieved (refer to Section 4.1).

5.2.1 Glazing and Glazed Doors

The indicative minimum glazing performances for the development are presented in **Table 5-1** below. Glazing suppliers are to provide acoustic laboratory test reports confirming that the acoustic performance of their window systems (combined performance of the glass and window frame) meet the R_w requirements.

Tower B refers to the tower located to the northeast of site, and Tower A to the tower located to the southwest of site.

Table 5-1 Recommended Minimum Acoustic Performance for Glazing

Building	Room Type	Façade	Minimum Glazing and Frame Performance
Tower B All Levels	Apartment Bedrooms	Facing South and East	R_w 35
		Facing North and West	R_w 31
	Apartment Living Rooms	Facing North	R_w 29
		Facing South	R_w 35
		All other facades	R_w 31
Tower A Ground to Level 9	Apartment Bedrooms	Facing Lane Cove Road	R_w 35
		All other facades	R_w 31
	Apartment Living Rooms	Facing Lane Cove Road ¹	R_w 31
		All other facades	R_w 29
Tower A Level 10 to Level 44	Apartment Bedrooms	All facades	R_w 31
	Apartment Living Rooms	All facades	R_w 29

Note 1: None currently proposed

5.2.2 External Walls

Any proposed concrete or masonry external walls will provide adequate acoustic isolation to meet the internal noise requirements. No additional acoustic treatment is expected to be required for these external walls.

Any lightweight external walls should be reviewed at detailed design stage to determine the appropriate construction to meet in the internal noise requirements.

Any penetrations in the external walls (e.g. for services) should be adequately sealed so as not to reduce the acoustic performance of the external walls.

5.2.3 Roof/Ceiling

Any concrete roof will provide adequate acoustic isolation to meet the internal noise requirements. No additional acoustic treatment is expected to be required for the roof/ceiling to mitigate external noise intrusion.



Any lightweight roof constructions should be reviewed at detailed design stage to determine the appropriate construction to meet in the internal noise requirements.

5.2.4 Ventilation

Regarding natural ventilation of the dwelling, the NSW Department of Planning document *Development near Busy Roads and Rail Corridors - Interim Guideline* dictates that:

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

With windows open, the allowable internal noise goal is permitted to be 10dBA higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45dBA $L_{eq}(9hr)$).

Night-time internal level criteria cannot be achieved with windows open on most façades. Alternative systems required to be investigated to allow room to be ventilated so as to meet the requirements of AS1668.1. These mitigation treatments include:

- Partially enclosed balconies,
- Acoustically treated balconies;
- Acoustic plenums;
- Wintergardens;
- Trickle ventilation systems
- Mechanical ventilation/air-conditioning system

Any system that is installed should be acoustically designed such that the acoustic performance of the recommended constructions is not reduced by any element penetrating the wall/ceiling/roof.

Requirements for ventilation of apartments do not need to be achieved simultaneously with any acoustic criteria.

6 OPERATIONAL NOISE ASSESSMENT

The primary sources of noise generation from the site are as follows:

- Noise from vehicles accessing the underground car park and ground floor loading dock;
- Mechanical plant noise;
- Children in the outdoor play areas of the childcare on level 1; and
- People in the outdoor communal space on level 2

Modelling of noise emissions from the Proposal has been undertaken using the ISO 9613 noise prediction algorithm in the CadnaA modelling software, considering only noise from vehicles on site. Modelling of other sources should be conducted once details of sources are finalised during subsequent design stages.

At relatively large distances from a source, the resultant noise levels at receivers can be influenced by meteorological conditions, particularly temperature inversions and gradient winds. Where these factors are a feature of an area, their effect on resultant noise levels should be taken into account. The NPfI recommends that noise predictions be conducted under these meteorological conditions favourable for noise propagation.

ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level under meteorological conditions favourable for noise propagation.

We note that noise emissions from vehicles manoeuvring within the enclosed basement carpark are anticipated to have a negligible impact on the surrounding residences and so have not been considered in this assessment.

Our noise modelling methodology and noise predictions of the various noise sources are presented in the sub-sections below.

6.1 Operational Noise Sources

6.1.1 Vehicle Noise and Loading Dock

Access to the basement car park and the ground floor loading dock is to be provided via Hyundai Drive to the northeast of the site. Modelling of noise emissions from vehicle movements to the car park ramp within the site have been based on the following assumptions:

- The SWL noise emissions from a car are as presented in **Table 6-1** (based on measurements conducted by RWDI);

Table 6-1 SWL from Cars

Noise Source	Sound Power Level, L_{Aeq} , dBA
SWL Car Manoeuvring at 10 km/hr	85
SWL Car Idling	80
Truck Manoeuvring at 10 km/hr	99

- Light vehicle traffic volumes as advised by the traffic consultant:
 - Up to 195 light vehicle movements in or out during the AM peak hour
 - Up to 174 light vehicle movements in or out during the PM peak hour
- Up to two heavy vehicle movement to the loading dock per 15 minutes between 7am and 10pm
- Up to one heavy vehicle movement to the loading dock per 15 minutes between 10pm and 7am

We note that noise emissions from cars manoeuvring within the basement level carpark will be negligible and will have no appreciable contribution to noise impacts on surrounding receivers.

The predicted noise levels at the surrounding receivers from vehicle movements are presented in **Table 6-2**. Noise emissions will be assessed against the requirements of the project noise trigger levels of the NPfl (refer to section 4.2.1.3). Except where otherwise specified, **Table 6-2** presents the worst case results at any time of day, assessed against the most stringent criteria applicable at any time of day (night time criteria).

Our analysis indicates that noise emissions from vehicle movements will comply with the NPfl project noise trigger criteria.

Table 6-2 Predicted Noise Levels from Vehicle Movements

Receivers	Predicted Noise Level	NPfl Noise Criteria	Complies
	$L_{Aeq, 15min}$	$L_{Aeq, 15min}$	
R01	49/46 ¹	53/48 ¹	Yes
R02	47	63	Yes
R03	28	63	Yes
R04	34	63	Yes
R05	24	63	Yes
R06	<20	63	Yes
R07	<20	63	Yes
R08	<20	63	Yes
R09	<20	63	Yes
R10	<20	43	Yes
R11	23	63	Yes
R12	<20	48	Yes
R13	26	63	Yes
R14	28	63	Yes
R15	32	63	Yes

Note 1: Evening/Night time

6.1.2 Childcare Centre

The childcare centre is primarily located on the first floor of the northern building, with proposed capacity for 120 children and 20 staff. It comprises of an indoor space and two outdoor play spaces on the eastern and western sides of the building. The layout of the childcare centre is shown in **Figure 6-1**. The location of residences above the childcare is shown in **Figure 6-2**, including skylights within the northeastern section of the communal planters.



Figure 6-1 First Floor Childcare Centre



Figure 6-2 Second Floor Residences above Childcare Centre

The distribution of ages of children in care has not been provided. Indicatively, an assessment has been presented assuming the following ages and capacities, conservatively assumed to be all playing outside, distributed proportionally between the two outdoor play areas according to their GFA.

- Ages 0-2: 30 Children
- Ages 2-3: 40 Children
- Ages 3-5: 50 Children

The predicted noise levels at the surrounding receivers are presented in **Table 6-2**. Noise emissions have been assessed against the recommendations of the AAAC Childcare guideline (refer to section 4.2.3), assuming that the hours of operation of the childcare are between 7am and 6pm, and that there are no limitations on duration of time spent playing outdoors.

Conservatively, the criteria applicable to residential receivers has been applied to all receivers. Our analysis indicates that the childcare is capable of complying with the criteria from the AAAC guideline.

Table 6-3 Predicted Noise Levels from Childcare Centre

Receivers	Predicted Noise Level L _{Aeq} , 15min	AAAC Noise Criteria L _{Aeq} , 15min	Complies
R01	54	56	Yes
R02	51	56	Yes
R03	42	56	Yes
R04	48	56	Yes
R05	47	56	Yes

Receivers	Predicted Noise Level L _{Aeq} , 15min	AAAC Noise Criteria L _{Aeq} , 15min	Complies
R06	42	56	Yes
R07	40	56	Yes
R08	26	56	Yes
R09	<20	56	Yes
R10	30	56	Yes
R11	32	56	Yes
R12	31	56	Yes
R13	37	56	Yes
R14	38	56	Yes
R15	39	56	Yes

6.1.3 Mechanical Plant

At this stage, selections of specific mechanical equipment and the location of the equipment have not been finalised.

No details of specific mechanical plant have been determined at this stage of the project. Likely sources of noise from the proposed development will be the mechanical plant associated with building air-conditioning and ventilation.

A detailed review of noise from mechanical plant servicing the development should be conducted once specific mechanical system details are selected by the mechanical contractor. However, at the setback distance to the residences the use of conventional air condition systems and standard mitigation measures (screens and attenuators) the criteria are predicted to be able to be achieved. Generally, the noise contribution from mechanical plant should be controlled to 5dB below the trigger levels to allow headroom for the noise contribution from each building/tenancy.

6.2 Operational Noise Recommendations

6.2.1 Loading dock and car park ramp

Any speed bumps, drainage grates or expansion joint covering plates should be firmly secured down such that they do not generate any rattling noises when driven over by vehicles.

6.2.2 Childcare Centre

Compliance of noise emissions from the childcare has been demonstrated to be feasible based on the layout and capacity indicated in the EIS. This assessment assumes that the outdoor play areas are partially enclosed with a roof covering both outdoor play areas.



6.2.3 Retail tenancies

Separate retail and commercial tenancies (restaurant, gym) with the potential to create noise disturbances will be subject to separate applications, which would include a noise emission assessment.

6.2.4 Mechanical Plant

An acoustic review of mechanical plant should be undertaken at detailed design stage once plant selections and locations have been finalised. Noise from the mechanical plant should be designed to comply with the project noise trigger levels of the NPfI presented in **Table 4-6**.

6.2.5 Communal Spaces on Level 2

It has been assumed that the communal spaces on level 2 of the development will typically be used for small, unrelated groups to gather, rather than for large social functions, or events with amplified music and significant consumption of alcohol. Assessment of emissions should be considered once operational details are finalised.

Additionally, cumulative noise emissions from all operational sources — including mechanical plant, vehicle activity, and use of communal spaces — should be considered collectively during detailed design to ensure the total noise emissions comply with the NPfI Project Noise Trigger Levels at all relevant receivers.

6.3 Noise Impacts on Sensitive Spaces Within Development

Consideration should also be given to the impacts of noise-generating uses in the development on noise-sensitive uses within the site (primarily residential). As the noise-generating uses are in relatively close proximity to residential facades/residential outdoor living spaces, the design should account for adequate acoustic separation and sound isolation to mitigate excess noise impact at all noise-sensitive receptors.

In this section, the potential noise impact of noise-generating uses to on-site noise-sensitive uses are discussed at a high-level, since noise mitigation could be applied at the source and receptor to ensure the applicable criteria are met. Details of noise mitigation will need to be developed during the project detailed design.

The primary sources of noise generation identified for the proposed development are as follows:

- Noise from vehicles accessing the car parking ramp and loading dock
- Rooftop mechanical plant, including noise from any outdoor/uncovered units and ventilation openings;
- Childcare centre; and
- Outdoor and Indoor communal spaces.

6.3.1 Vehicle Noise

Noise impacts from vehicles accessing the basement car park or loading dock are not anticipated to be significant at residential facades, due to shielding by the non-residential podium levels.

6.3.2 Mechanical Plant

As discussed in section 6.2.4, selections of specific mechanical equipment and the location of the equipment have not been finalised. Given this, it is not possible to carry out an assessment of noise emissions of mechanical plant at this early stage.

It is recommended that a detailed acoustic assessment of the mechanical equipment is undertaken at detailed design stage.

Mitigation measures that are commonly employed to control noise emissions from mechanical equipment include:

- Locating mechanical equipment as far as practicable from noise sensitive receivers;
- Using in-duct treatments such as internally lined ductwork or silencers;
- Building barriers or enclosures around equipment;
- Using acoustic louvers.

6.3.3 Childcare Centre

The outdoor play areas of the child care centre (located in Building B as shown in **Figure 6-1**) could potentially have impacts on nearby apartments within the development, including those on level 1 of Building A, located approximately 17m to the south. Façade design of these residences should consider cumulative noise impacts including outdoor play noise.

Based on operations consistent with the assumptions presented in section 6.2.2, the greatest façade noise level at any residence within either Tower A or Tower B is anticipated to be approximately 56 dBA. This is compliant with the AAAC guideline for noise from childcare centres and therefore apartments in proximity to the childcare do not require any glazing upgrades for the management of noise from this source.

Assuming that the skylights are glazed, noise through this path is predicted to be negligible compared to the noise spill around the untreated openings at the edge to the outdoor play area. No specific treatment is required to the glazing of skylights to control noise spill from the outdoor areas.

6.3.4 Communal Spaces on Level 2

If the proposed use of either outdoor or indoor communal spaces is anticipated to include large, organised functions, amplified music, or service of alcohol, consideration should be given to how these will be managed whilst maintaining acoustic amenity for surrounding internal residences.

Regardless, management measures such as signage reminding patrons to be mindful of their neighbours should be considered.

The partition separating the internal communal space from the adjoining residential SOU is recommended to have a minimum sound isolation rating of R_w 50, in order to limit the transfer into the residence.

7 CONSTRUCTION NOISE & VIBRATION IMPACT ASSESSMENT

7.1 Acoustic Criteria / Management Levels

7.1.1 Noise – Interim Construction Noise Guideline (EPA, 2009)

The NSW EPA Interim Construction Noise Guideline (ICNG) requires project-specific Noise Management Levels (NMLs) to be established for noise affected receivers. In the event construction noise levels are predicted to be above the NMLs, all feasible and reasonable work practices are investigated to minimise noise emissions.

Having investigated all feasible and reasonable work practices, if construction noise levels are still predicted to exceed the NMLs then the potential noise impacts would be managed via site specific construction noise management plans, to be prepared in the detailed design phase. **Table 7-1** details the ICNG noise management levels.

Table 7-1 Interim Construction Noise Guideline Criteria

Time of Day	NML	How to Apply
Recommended Standard Hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise Affected RBL+10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq}(15min)$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences; 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside Recommended Standard Hours	Noise Affected RBL+5 dBA	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 dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

For non residential receivers, the ICNG specifies the following:

- Offices, retail outlets: external $L_{Aeq,15min}$ 70 dB(A)

Classification of hotels is not addressed in the ICNG, however they are conventionally treated as commercial receivers where construction noise is concerned.

Based on the above, presents the applicable noise management levels for construction activities at surrounding receivers that have been adopted for all applications.

Table 7-2 Site-Specific Construction Noise Management Levels

Location	Construction Noise Management Level (NMLs) - $L_{Aeq,15min}$				Highly Noise Affected Level
	Day Standard Hours ¹	Day OOH	Evening OOH ²	Night OOH ³	
R1, R12 Hotel	70	70	70	70	N/A
R2 – R9, R13 – R15 Commercial	70	70	70	70	N/A
R10 Residential	61	56	53	47	75

Note 1: Standard Hours (7am – 6pm Monday to Friday, 8am – 1am Saturday with no work on Sundays or Public Holidays)

Note 2: Evening OOH (6pm – 10pm)

Note 3: Night OOH (10pm – 7am)

7.1.2 Vibration – Construction Noise & Vibration Strategy (TfNSW, 2018)

Minimum working distances for typical vibration intensive construction equipment are provided in the Transport for NSW's (TfNSW) Construction Noise and Vibration Strategy (CNVS).

The minimum working distances presented in Appendix D of the CNVS are for both cosmetic damage (from BS 7358) and human comfort (from the NSW EPA Vibration Guideline) and are based on empirical data which suggests that where vibration intensive works are conducted outside the minimum distances, adverse vibration impacts are unlikely.

The recommended minimum working distances for vibration intensive activities from the CNVS are presented in Table 7-3.

Table 7-3 Recommended Minimum Working Distances from Vibration Intensive Equipment

Plant Item	Approx. Size / Weight / Model	Minimum Distance	
		Cosmetic Damage (BS 7385)	Human Response (NSW EPA Guideline)
Vibratory Roller	1-2 tonne	5 m	15 m to 20 m
	2-4 tonne	6 m	20 m
	4-6 tonne	12 m	40 m
	7-13 tonne	15 m	100 m
	13-18 tonne	20 m	100 m
	> 18 tonne	25 m	100 m
Small Hydraulic Hammer	300 kg (5 to 12t excavator)	2 m	7 m
Medium Hydraulic Hammer	900 kg (12 to 18t excavator)	7 m	23 m
Large Hydraulic Hammer	1600 kg (18 to 34t excavator)	22 m	73 m
Pile Driver – Vibratory	Sheet Piles	2 m to 20 m	20 m
Piling Rig – Bored	≤ 800 mm	2 m (nominal)	4 m
Piling Rig – Hammer	12 t down force	15 m	50 m
Jackhammer	Hand held	1 m (nominal)	Avoid contact with structure

7.2 Proposed Construction Activities

7.2.1 Construction Hours

Where possible, works should be completed during the standard daytime construction hours of Monday to Friday 7.00am to 6.00pm and Saturday 8.00am to 1.00pm. Where Out-of-Hours Works (OOHWs) are required (for emergency works/delivery, etc) it is likely that they would require separate approval.

7.3 Construction Noise Assessment

Noise modelling of the construction noise emissions was undertaken using the ISO 9613 noise prediction algorithm in the Cadna/A modelling software.

The noise model was constructed from a combination of aerial photography, existing ground topography, design ground topography and proposed design. The local terrain, receiver buildings and structures have been digitised in the noise model to develop a three-dimensional representation of the construction works and surrounding environment.

7.3.1 Proposed Works

This report provides a preliminary assessment of the potential construction noise and vibration impacts associated with the proposed development. The construction noise and vibration assessment has considered the following construction stages in-principle:

- Demolition and clearing works
- Excavation and piling
- Building construction

Sound power levels (SWLs) for the typical operation of construction equipment applied in the modelling are listed in **Table 7-4** and have been based on measurements conducted by RWDI and Appendix C of the CNVS. To assess construction noise levels against the NMLs, the noise levels have been converted to equivalent $L_{Aeq,15min}$ noise emissions based on the expected period of operation of the individual pieces of construction plant.

Table 7-4 Construction Noise Sources

Stage	Equipment	Operating minutes in 15-min period	Quantity	Sound Power Level (dB)		
				Individual Item (SWL)	L_{Aeq} Activity	L_{Amax} Activity
Demolition and Clearing	Excavator (30 t)	15	2	110	113	114
	Truck & Dog (30 t)	15	1	108	108	
Excavation and Piling	Dozer (D10)	10	2	116	117	122
	Truck & Dog (30 t)	15	2	108	111	
	Excavator (40 t)	15	2	115	118	
	Piling Rig	5	1	116	111	
	Concrete Truck	15	1	109	109	
Construction	Concrete Truck / Agitator	15	2	106	109	117
	Concrete Pump	15	1	109	109	
	Truck (20 t)	15	1	103	103	
	Mobile Crane	10	1	113	113	
	Hand Tools	7.5	5	105	109	
	Elevated Work Platform	10	2	97	98	

Consistent with the requirements of the ICNG, and to inform the scheduling of construction activity and management of noise during the detailed design phase, the construction noise impacts are based on an expected typical worst-case scenario. The ICNG recommends that the realistic worst-case or conservative noise levels from the source should be predicted for assessment locations representing the most noise exposed residences or other sensitive land uses. For each receiver area the noise levels are predicted at the most noise-exposed location, which would usually be the closest receiver.

For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted at the most-exposed receiver as the noise levels presented in this report are based on a realistic worst-case assessment.

7.3.2 Predicted Construction Noise Impacts

Preliminary noise impacts have been quantitatively assessed of construction activities for the NCAs surrounding the site. The activities considered are described in **Table 7-4**.

The typical $L_{Aeq,15min}$ noise levels at the surrounding NCAs are provided in **Table 7-5**. Each of the construction activities are representative of the 'noisiest' construction periods where there may be simultaneous operation of noise intensive construction plant on site.

Table 7-5 Predicted Construction Noise Impacts

Stage	Receivers	Predicted Noise Level	Noise Level – $L_{Aeq,15min}$ dBA			
			Noise Affected Noise Management Levels (NMLs)			
			Day ¹	Day	Eve	Night
			Standard	OOH	OOH ²	OOH ³
Demolition and Clearing	R01	71	70	70	70	70
	R02	69	70	70	70	70
	R03	65	70	70	70	70
	R04	69	70	70	70	70
	R05	71	70	70	70	70
	R06	65	70	70	70	70
	R07	69	70	70	70	70
	R08	68	70	70	70	70
	R09	57	70	70	70	70
	R10	59	61	56	53	47
	R11	51	70	70	70	70
	R12	58	70	70	70	70
	R13	60	70	70	70	70
	R14	62	70	70	70	70
	R15	57	70	70	70	70
Excavation and Piling	R01	82	70	70	70	70
	R02	77	70	70	70	70
	R03	72	70	70	70	70
	R04	77	70	70	70	70
	R05	79	70	70	70	70

Stage	Receivers	Predicted Noise Level	Noise Level – L _{Aeq,15min} dBA			
			Noise Affected Noise Management Levels (NMLs)			
			Day ¹	Day	Eve	Night
			Standard	OOH	OOH ²	OOH ³
	R06	74	70	70	70	70
	R07	80	70	70	70	70
	R08	81	70	70	70	70
	R09	67	70	70	70	70
	R10	69	61	56	53	47
	R11	63	70	70	70	70
	R12	65	70	70	70	70
	R13	69	70	70	70	70
	R14	70	70	70	70	70
	R15	64	70	70	70	70
Construction	R01	79	70	70	70	70
	R02	74	70	70	70	70
	R03	69	70	70	70	70
	R04	73	70	70	70	70
	R05	70	70	70	70	70
	R06	67	70	70	70	70
	R07	77	70	70	70	70
	R08	77	70	70	70	70
	R09	62	70	70	70	70
	R10	58	61	56	53	47
	R11	60	70	70	70	70
	R12	62	70	70	70	70
	R13	65	70	70	70	70
	R14	66	70	70	70	70
	R15	61	70	70	70	70

Note 1: Standard Hours (7am – 6pm Monday to Friday, 8am – 1am Saturday with no work on Sundays or Public Holidays)

Note 2: Evening OOH (6pm – 10pm)

Note 3: Night OOH (10pm – 7am)

Noise from demolition and clearing works are expected to comply with the noise affected NMLs at all residential receivers (R10), with exceedances of up to 9 dB at nearby commercial receivers, including the neighbouring hotel (R1).

Exceedances of up to 8 dB of the noise affected NMLs are anticipated at some residential receivers (R10) during excavation and piling works, with no exceedances to the highly noise affected level. Exceedances of up to 12 dB are predicted at commercial receivers, including the neighbouring hotel (R1).

Measures to manage construction noise emissions are discussed in Section 7.3.3.

7.3.3 Construction Noise Mitigation

As discussed in section 7.3.2, noise levels from construction activities during standard hours are predicted to exceed the NMLs of the ICNG at several receivers surrounding the site. Therefore, in accordance with the ICNG, all reasonable and feasible measures should be applied to manage construction noise emissions from the site. In particular, the following is recommended:

A detailed Construction Noise and Vibration Management Plan (CNVMP) should be prepared and should include, but not be limited to the following:

- Identification of nearby residences and other sensitive land uses;
- Description of approved hours of work;
- Description and identification of construction activities, including work areas, equipment and duration;
- Description of what work practices (generic and specific) will be applied to minimise noise;
- Consider the selection of plant and processes with reduced noise emissions;
- A complaints handling process;
- Noise monitoring procedures;
- Overview of community consultation required for identified high impact works;
- Overview of community consultation process and assessment required for identified additional works outside of standard construction hours; and
- Induction and training will be provided to relevant staff and sub- contractors outlining their responsibilities with regard to noise.

Examples of typical construction noise mitigation measures are provided in **Table 7-6**, along with the likely reduction in noise levels. Where reasonable and feasible, these measures should be employed during the construction of the development.

Table 7-6 Indicative Construction Noise Mitigation Measures

Mitigation Measure	Anticipated Noise Reduction, dBA
Administrative Controls	
Operate during approved hours	N/A
Undertake regular noise monitoring to determine the impact of operating plant on sensitive receivers	N/A
Appropriate training of onsite staff	N/A
Undertake community consultation and respond to complaints in accordance with established project procedures	N/A
Turning off machinery when not in use	0-5

Mitigation Measure	Anticipated Noise Reduction, dBA
Respite periods for pile drivers and rock breakers (if applicable)	N/A
Conducting regular maintenance of plant to ensure that they are operating as efficiently and quietly as practicable	N/A
Engineering Controls	
Portable temporary screens	5-10
Screen or enclosure for stationary equipment	10-15
Maximising the offset distance between noisy plant items and sensitive receivers	3-6
Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers	2-3
Orienting equipment away from sensitive receivers	3-5
Carrying out loading and unloading away from sensitive receivers	3-5
Using dampened tips on rock breakers	3-6
Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks	5-10
Selecting site access points and roads as far as reasonably practicable away from sensitive receivers	3-6
Using spotters, closed circuit television monitors, "smart" reversing alarms, or "squawker" type reversing alarms in place of traditional reversing alarms	2-5
Employ non noise-generating structures such as site offices, storage sheds, stockpiles and tanks as noise barriers	5-10

7.4 Predicted Construction Vibration Impacts

The main building of the neighbouring hotel is located approximately 16 metres east of the site.

Based on the CNVS's recommended minimum working distances for vibration sensitive equipment (refer to section 7.1.2), the vibration intensive activities that could potentially occur at distances less than the recommended minimum working distances from the sensitive receivers with respect to cosmetic building damage and human comfort are listed in **Table 7-7**.

Table 7-7 Vibration Intensive Equipment that Could Operate within the Minimum Recommended Distances of Sensitive Receivers

Equipment Potentially Operating Within Recommended Minimum Distances to Sensitive Receivers	
Cosmetic Damage (BS 7385)	Human Response (NSW EPA Guideline)
Vibratory Roller >13 tonne	Vibratory Roller (any)
	Medium Hydraulic Hammer
	Large Hydraulic Hammer
	Pile Driver – Vibratory
	Piling Rig – Hammer

Should these pieces of plant be operated within the minimum recommended distances of the CNVS of a sensitive receiver, or if there are any other vibration intensive plant items that the Contractor has concerns for causing disruption at neighbouring development, it is recommended that a preliminary vibration survey (typically attended vibration measurements) be undertaken of each vibration generating piece of plant.

This vibration survey will determine whether there will be any exceedances of the relevant construction vibration criteria. If exceedances are observed, vibration mitigation and management strategies can be developed to minimise vibration impacts as far as practicable, and ideally to be compliant with the vibration criteria.

The vibration management strategy may also include the installation of unattended vibration monitors at sensitive receivers to notify the contractor of any exceedances of the vibration criteria. Any such vibration management strategy should be developed as part of a CNVMP.

7.5 Construction Traffic Noise Assessment

Given the existing traffic volumes on surrounding roadways, it is unlikely that traffic generated during construction works will result in any appreciable change to the levels of road traffic noise currently experienced at surrounding receivers along the construction traffic route.

8 NATIONAL CONSTRUCTION CODE

The proposed development is classified as a Class 2 building under the National Construction Code 2022 (NCC 2022). Criteria for airborne and impact sound transmission for Class 2 buildings is documented in Volume 1 of the NCC 2022 Building Code of Australia. Provisions relating to sound transmission and insulation are documented in Part F7 of the NCC. There are no NCC requirements relating to communal spaces or childcare spaces.

The sound insulation requirements of NCC 2022 are reproduced in **Table 8-1**. Where apartments adjoin high-noise generating spaces (e.g. rooftop plant) the separating partition construction may be required to exceed the requirements of the NCC in order to maintain an adequate acoustic amenity for the apartment spaces.

Specific constructions required to meet the requirements of the NCC (or any more stringent requirements to preserve acoustic amenity) will be determined at detailed design stage.

Table 8-1 NCC 2022 Sound Insulation Requirements

Construction	NCC 2022	
	Laboratory Rating	Verification
Walls between sole occupancy units	$R_w + C_{tr}$ not < 50	$D_{nT,w} + C_{tr}$ not < 45
Walls between a bathroom, sanitary compartment, laundry or kitchen in one sole occupancy unit and a habitable room (other than a kitchen) in an adjoining unit	$R_w + C_{tr}$ not < 50 and Must have a minimum 20mm cavity between two separate leaves ¹	$D_{nT,w} + C_{tr}$ not < 45
Walls between sole occupancy units and a plantroom or lift shaft	R_w not < 50 and Must have a minimum 20mm cavity between two separate leaves ¹	$D_{nT,w}$ not < 45
Walls between sole occupancy units and a stairway, public corridor, public lobby or the like, or parts of a different classification	R_w not < 50	$D_{nT,w}$ not < 45
Door assemblies located in a wall between a sole-occupancy unit and a stairway, public corridor, public lobby or the like	R_w not < 30	$D_{nT,w}$ not < 25
Floors between sole-occupancy units or between a sole-occupancy unit and a plantroom, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification	$R_w + C_{tr}$ not < 50 $L_{n,w}$ not > 62	$D_{nT,w} + C_{tr}$ not < 45 $L_{nT,w}$ not > 62



Construction	NCC 2022	
	Laboratory Rating	Verification
Soil, waste, water supply and stormwater pipes and ductwork to habitable rooms	$R_w + C_{tr} \text{ not } < 40$	n/a
Soil, waste, water supply and stormwater pipes and ductwork to kitchens and other rooms	$R_w + C_{tr} \text{ not } < 25$	n/a
Intra-tenancy Walls	There is no statutory requirement for airborne isolation via intra-tenancy walls.	

Note 1: A wall must be of "discontinuous construction" if it separates a sole occupancy unit from a plantroom or lift shaft. Clause F7D4(3) defines "discontinuous construction" as a wall having a minimum 20mm cavity between two separate leaves with no mechanical linkage except at the periphery. For masonry walls, resilient wall ties must be used if wall ties are required.



9 CUMULATIVE IMPACT ASSESSMENT

9.1 Identification of Relevant Projects

As part of the cumulative impact assessment for the proposed mixed-use development at 2–4 Giffnock Avenue, Macquarie Park, consideration has been given to other significant developments in the immediate vicinity that may influence the acoustic environment for sensitive receivers associated with this application.

A key project identified is the NEXTDC S5 Data Centre at 269 Lane Cove Road (SSD-63168959), located directly across Lane Cove Road from the subject site. This project is subject to a State Significant Development Application lodged in 2024, with assessment documentation prepared by Arup in the form of a Noise and Vibration Impact Assessment (dated June 2024). The data centre is designed to operate continuously, with mechanical plant and cooling systems as the primary sources of environmental noise.

Other key projects are the planned developments at 396 Lane Cove Road, 36-38 Waterloo Road, and 1 Giffnock Avenue, Macquarie Park. This major redevelopment includes new commercial and residential towers and the relocation of the existing helipad to the rooftop.

9.2 Qualitative Assessment of Combined Noise Impacts

9.2.1 NEXTDC S5 Data Centre at 269 Lane Cove Road (SSD-63168959)

Standard Operation (45 dBA L_{Aeq} at night):

To estimate the potential impacts on the proposed 2–4 Giffnock Avenue towers, the Arup predictions for receiver R1 (or H2 in the Arup report) were used as a reference point. This approach is conservative, as the new towers will be located slightly further and are expected to be further shielded from direct noise emissions from the data centre. According to the Arup Noise and Vibration Impact Assessment, the predicted operational noise level at R1 (H2 in the Arup report) is up to 45 dBA L_{Aeq} during night-time periods. As the prevailing acoustic environment along Lane Cove Road is dominated by high traffic volumes, resulting in elevated background noise levels both day and night. As such, the contribution from the data centre is expected to be effectively masked by existing road traffic noise, and is not anticipated to be discernible or to exceed relevant residential noise criteria at the Giffnock Avenue development or other sensitive receivers in the area.

Emergency Operation (up to 63 dBA L_{Aeq}):

The Arup report also considers emergency scenarios, such as generator testing or power outages, during which noise emissions may temporarily reach up to 63 dBA L_{Aeq} . These events are infrequent and of limited duration, and will still be a minor contributor to overall noise levels when compared to traffic noise. As a result, the overall impact of such emergency events is expected to be minor and not result in sustained exceedances of applicable criteria.



9.2.2 396 Lane Cove Road, 36-38 Waterloo Road, and 1 Giffnock Avenue, Macquarie Park (SSD-77176968)

The relocated helipad associated with this redevelopment is expected to result in occasional helicopter movements over or near the Giffnock Avenue site. These events are infrequent, typically occur during daytime hours.

The noise impact assessment for the helipad relocation demonstrates that predicted noise levels will comply with relevant guidelines and are not expected to result in significant or sustained noise impacts at sensitive receivers, including the Giffnock Avenue development.

Other components of this redevelopment, including future buildings and uses, are not publicly available or sufficiently detailed at this stage. As such, no further comment can be made regarding their potential cumulative noise impacts until more information is released.

9.3 Conclusion

Based on the qualitative review of available information, including the findings of the Arup Noise and Vibration Impact Assessment (June 2024) for the 269 Lane Cove Road Data Centre SSD application (SSD-63168959), cumulative noise impacts at sensitive receivers associated with the Giffnock Avenue development are not expected to be significant. The standard operational noise emissions from the data centre are considered unlikely to exceed criteria or require further mitigation, given the masking effect of existing traffic noise. Emergency noise events are infrequent and not expected to result in adverse impacts.

No additional mitigation measures are recommended at this stage.



10 CONCLUSION

This report has presented a noise and vibration impact assessment for the proposed mixed-use development to be located at 2-4 Giffnock Avenue, Macquarie Park. This assessment has been prepared to address the noise and vibration clauses of the SEARs for the State Significant Development Application (SSD-79017211).

Existing ambient noise levels have been established via long-term unattended noise monitoring as presented in Section 3. The noise monitoring data has been processed in accordance with the NPfI to establish the criteria at nearby sensitive receivers. Short-term attended noise measurements were conducted to validate road traffic noise monitoring and estimate the noise impacts of mechanical services noise from the neighbouring data centre. Noise impacts from the proposed future data centre at receivers R14 and R15 were assessed based on the noise impact assessment prepared for that site, and are predicted to be negligible during standard operations.

Noise impacts associated with vehicle noise generated by the development have been assessed with reference to the NPfI as presented in section 4. The results of the assessment indicate in-principle that noise emissions from the site are capable of complying with relevant acoustic requirements through considered design and the implementation of appropriate acoustic treatments and noise management controls. Cumulative noise emissions from all vehicles and mechanical services must be designed to comply with the Project Trigger Noise Levels shown in section 4.

Compliance of the childcare centre with the relevant AAAC guideline has been demonstrated for receivers external to the development as well as within it, based on the occupancy rates assumed in the EIS.

Noise intrusion from road traffic noise from Lane Cove Road and Epping Road has been assessed with reference to the internal noise recommendations of NSW Department of Planning's Development Near Rail Corridors and Busy Roads (Interim Guideline) and AS2107. Indicative recommendations for the building façade construction have been presented in section 5 to achieve the internal noise requirements. These recommendations should be reviewed once the room layouts, glazing areas and ventilation systems have progressed sufficiently.

Noise and vibration impacts from the construction of the development have been assessed in-principle in section 7 of the report in accordance with the ICNG. Construction NMLs have been established for sensitive receivers based on the established RBL. A computer noise model has been developed to predict $L_{Aeq,15min}$ construction noise levels at sensitive receivers.

Construction noise levels have been predicted for a range of construction activities. The predicted $L_{Aeq,15min}$ construction noise levels are expected to exceed the established NMLs for some receivers including residential receivers during excavation and piling works. It is therefore recommended that a CNVMP be developed for the site and that all reasonable and feasible measures be applied to manage noise impacts during construction in accordance with the ICNG.



STATEMENT OF LIMITATIONS

This report entitled 2-4 Giffnock Avenue Noise and Vibration Impact Assessment was prepared by RWDI Australia Pty Ltd ("RWDI") for 388 LCR Development ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

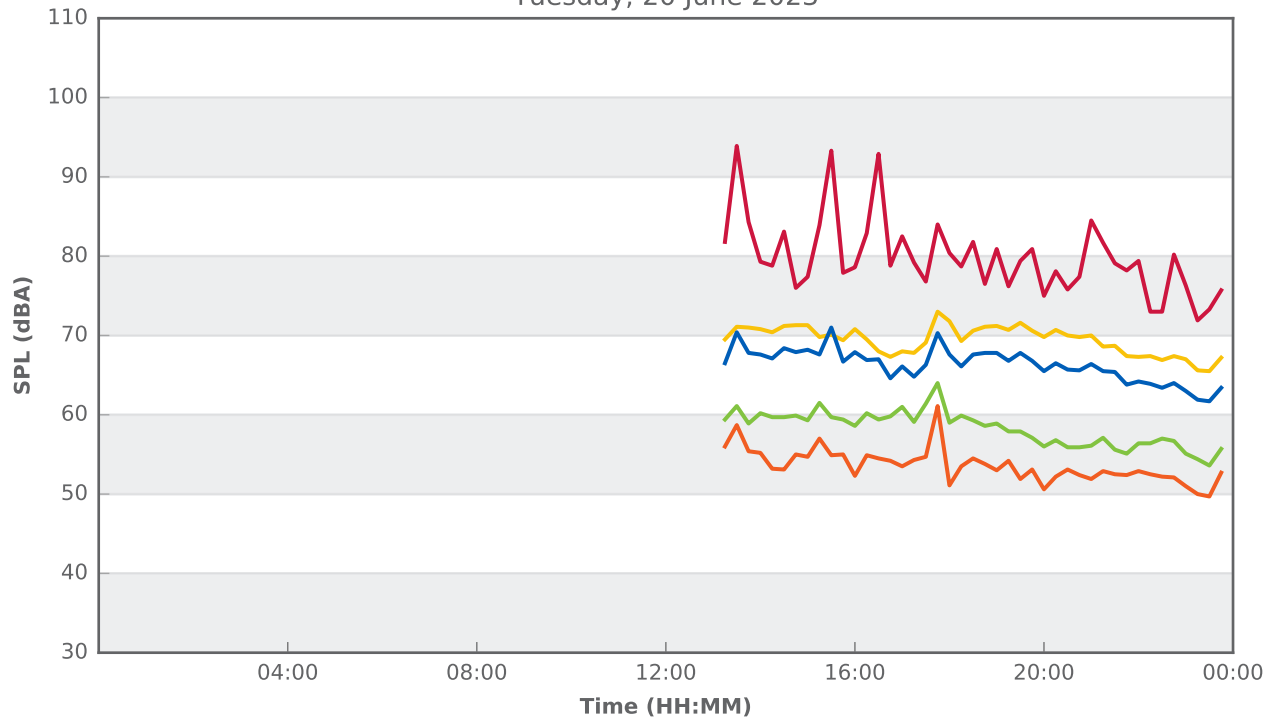


APPENDIX A: UNATTENDED NOISE MONITORING

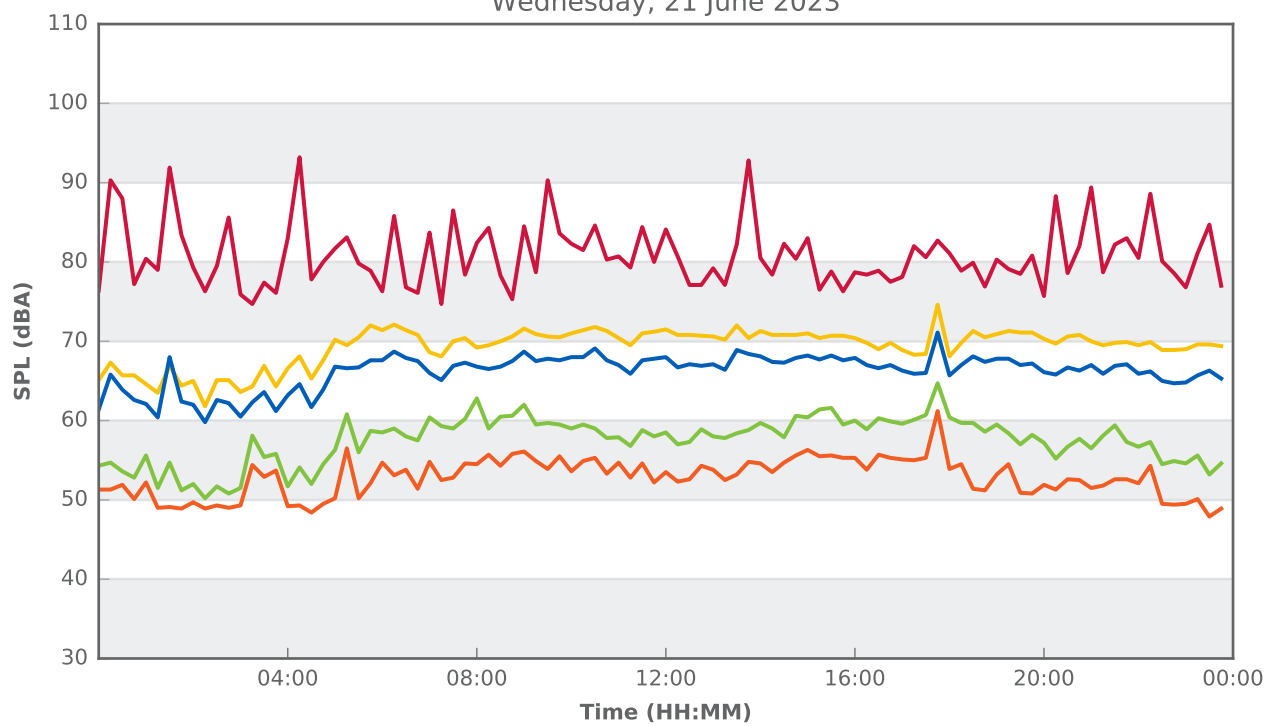
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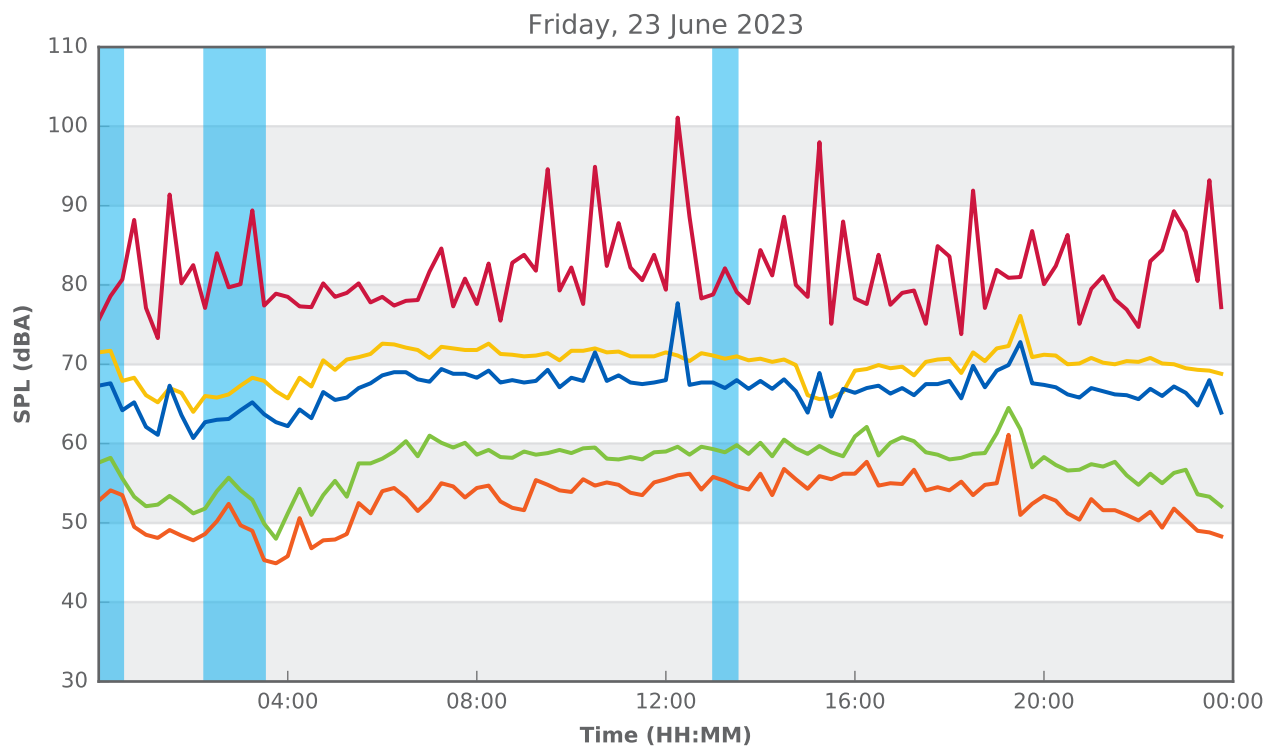
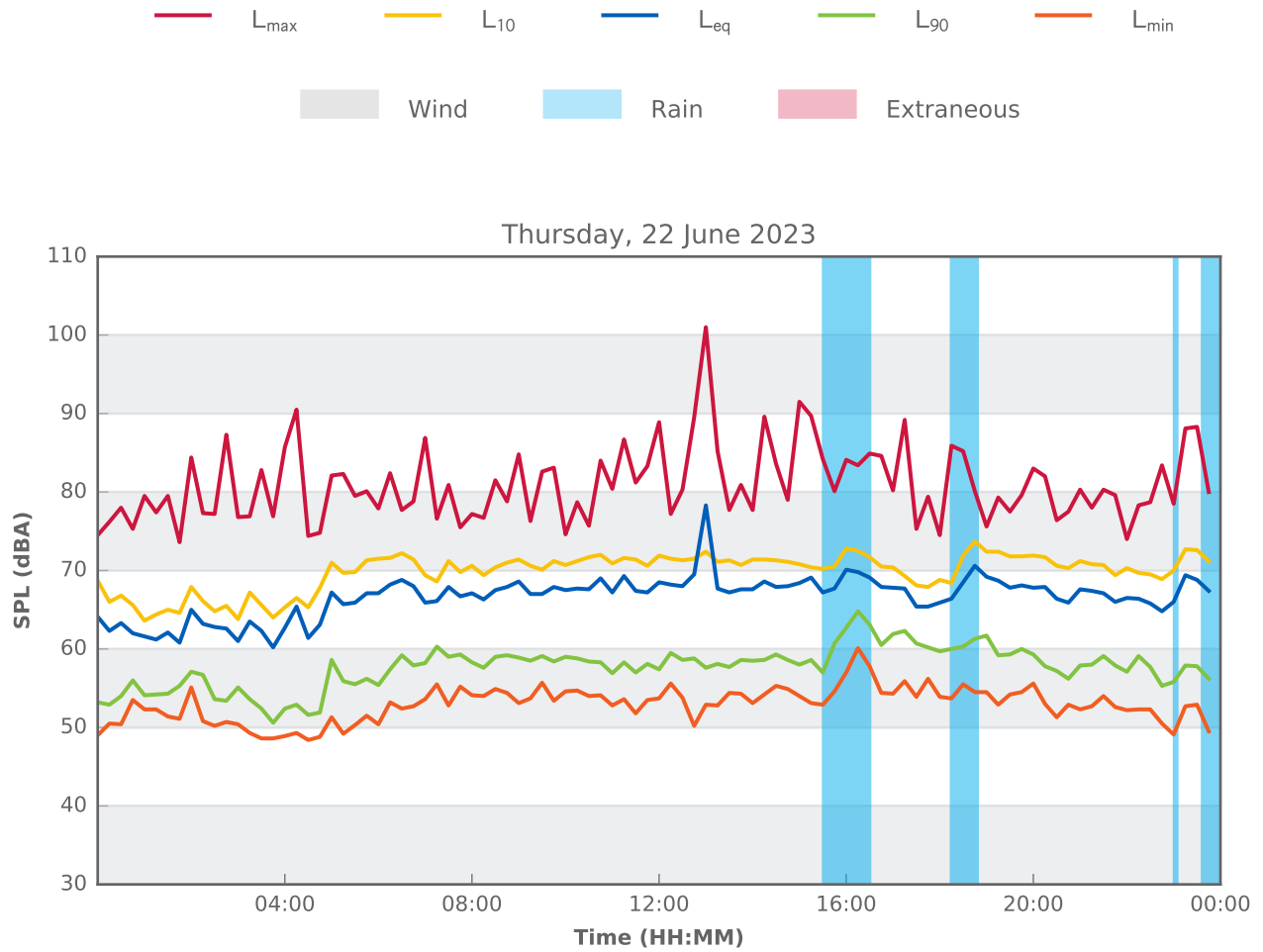
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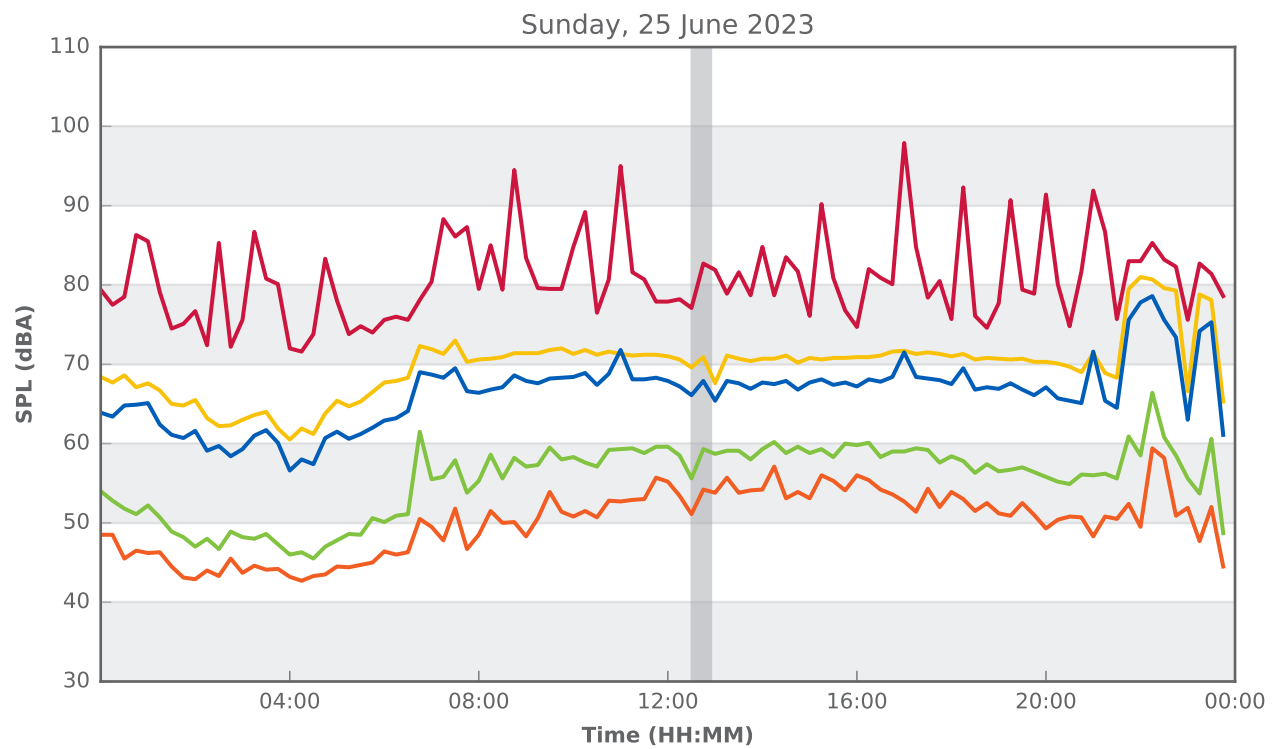
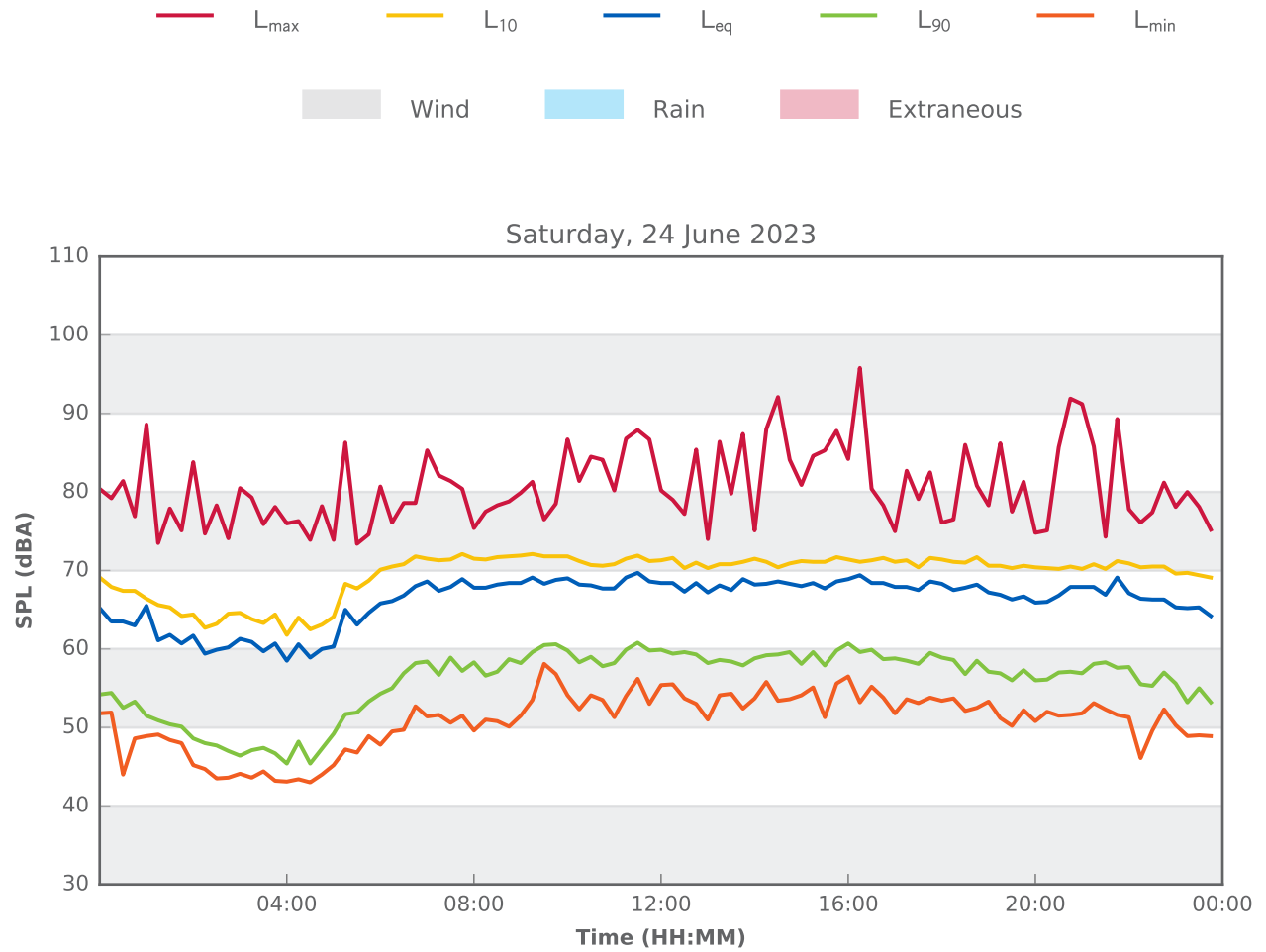
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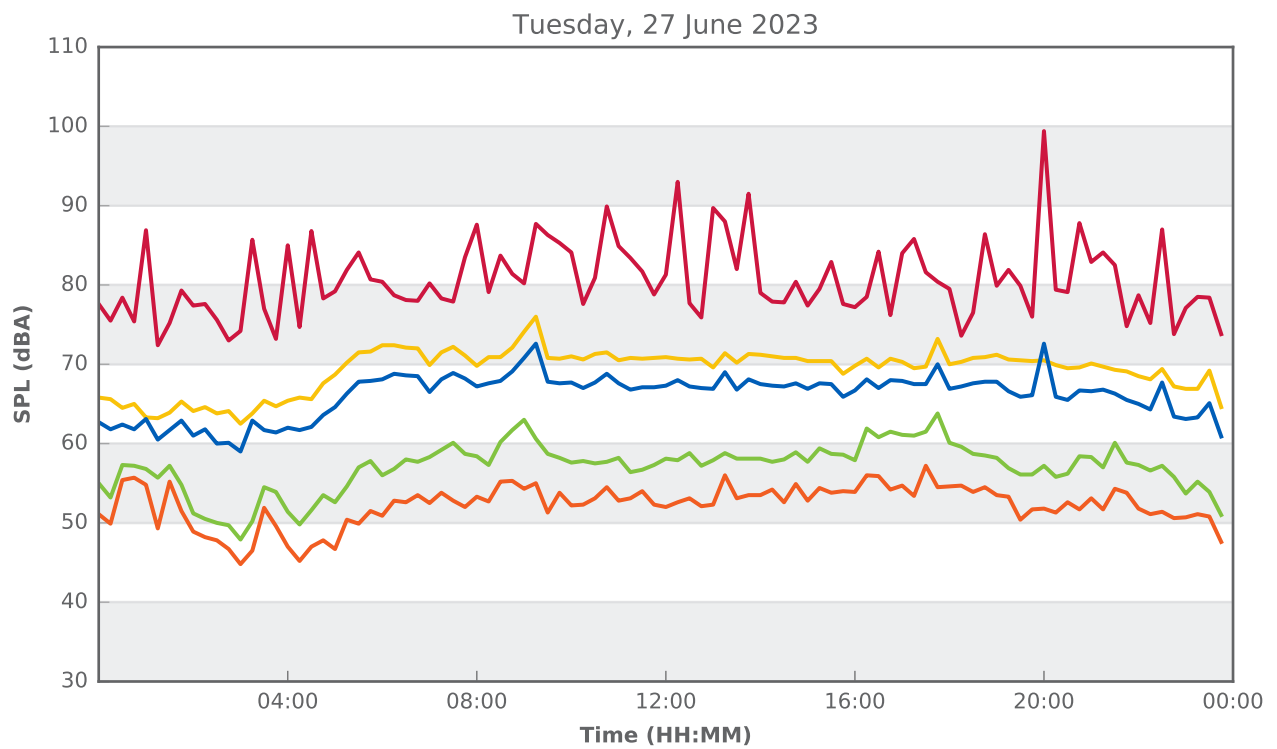
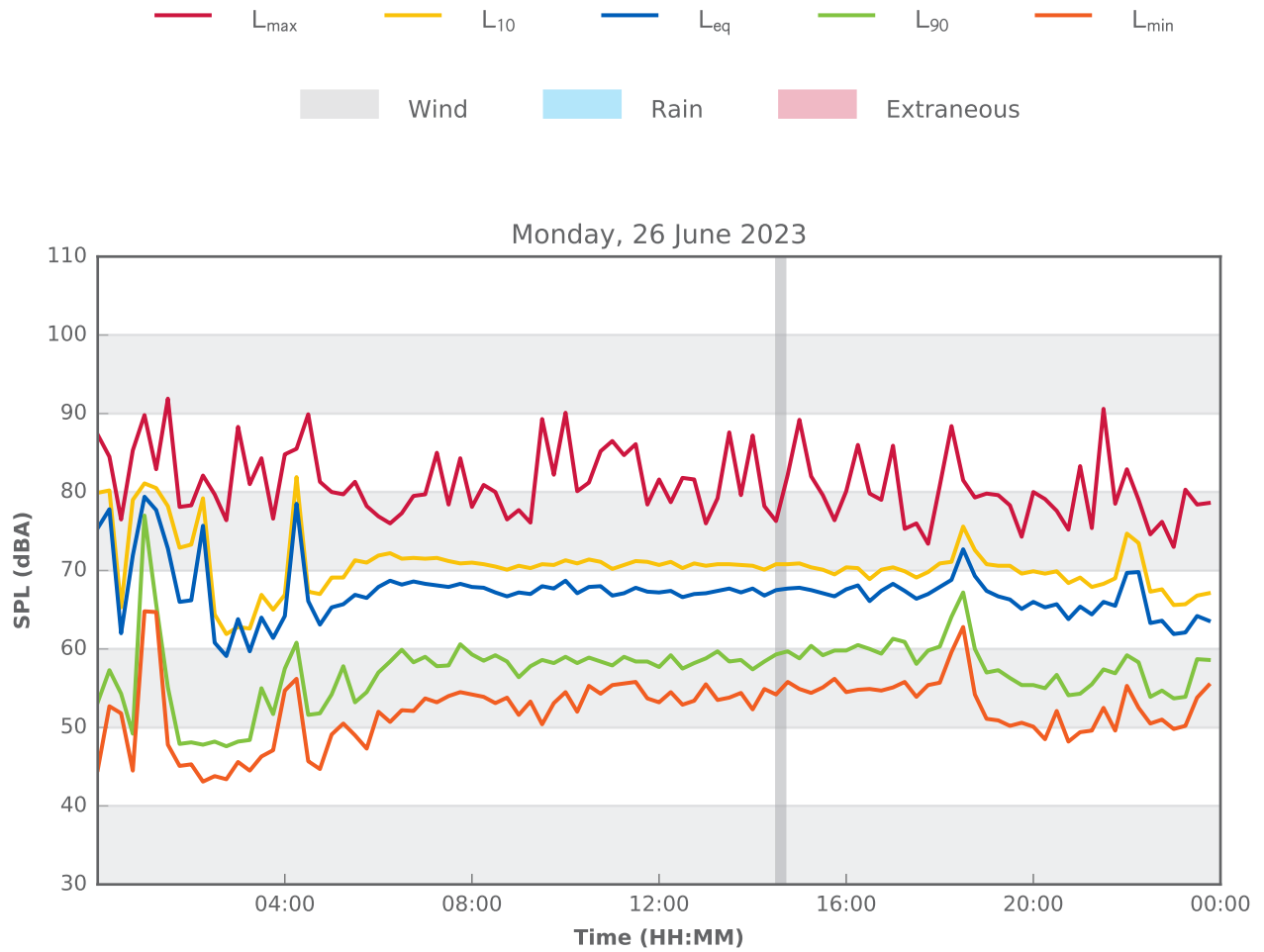
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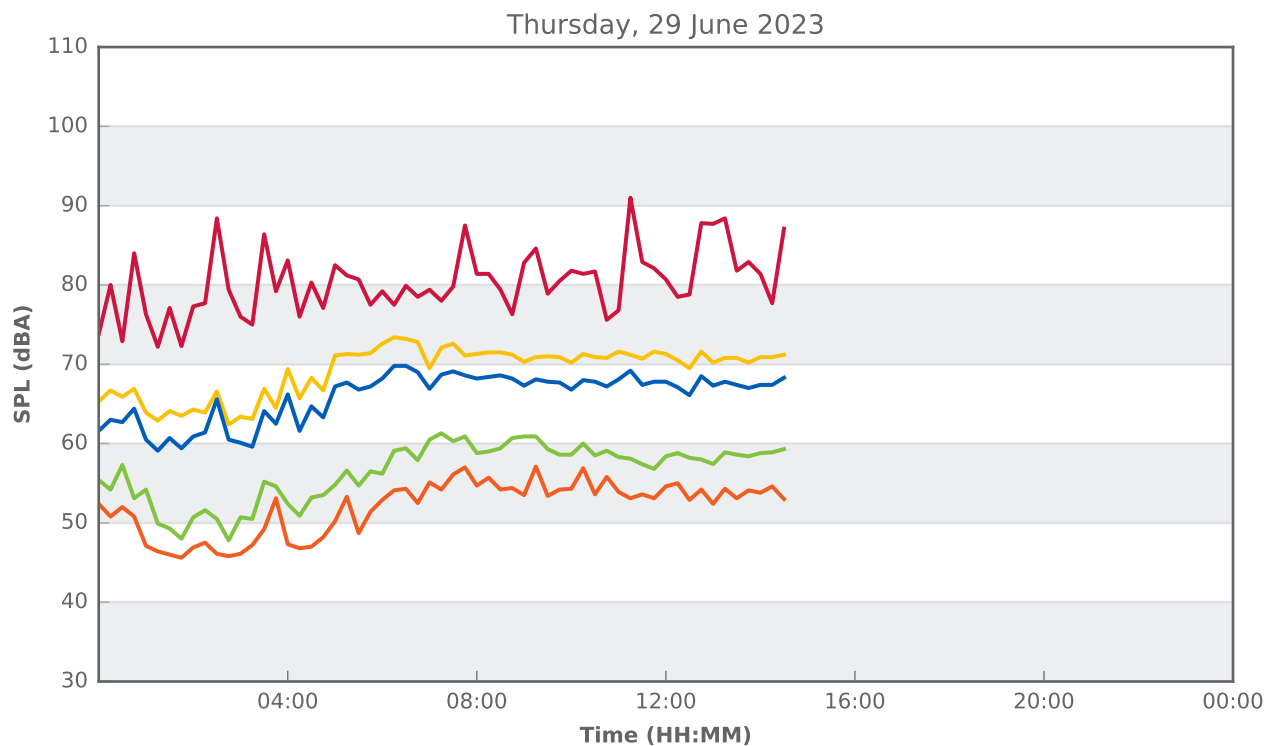
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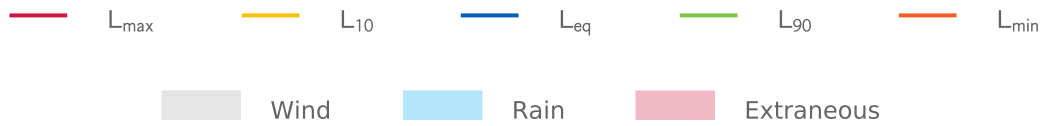
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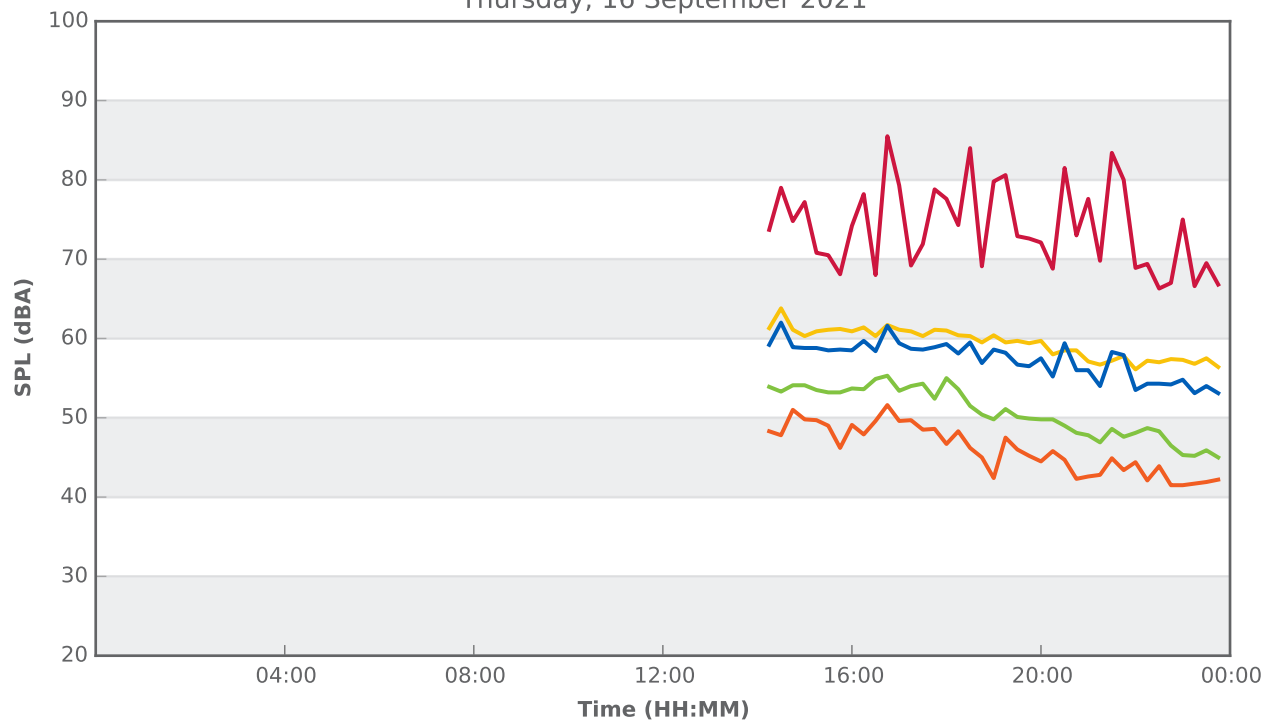
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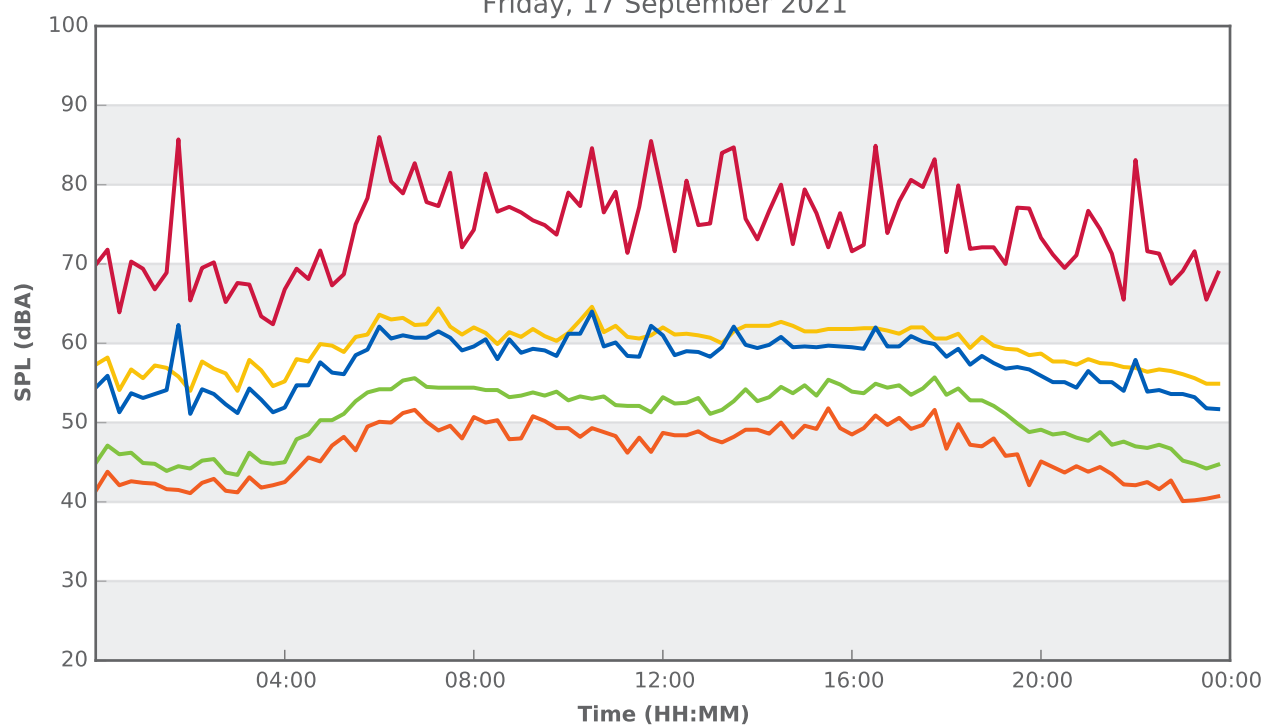
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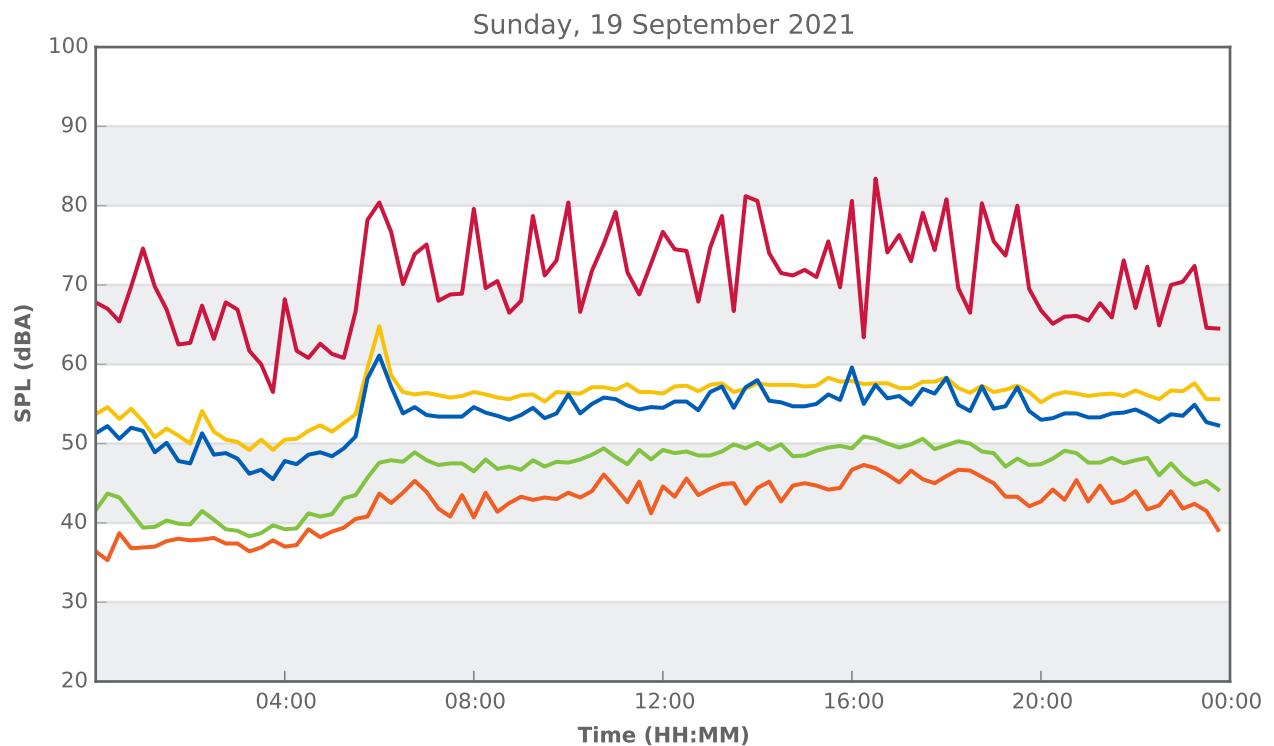
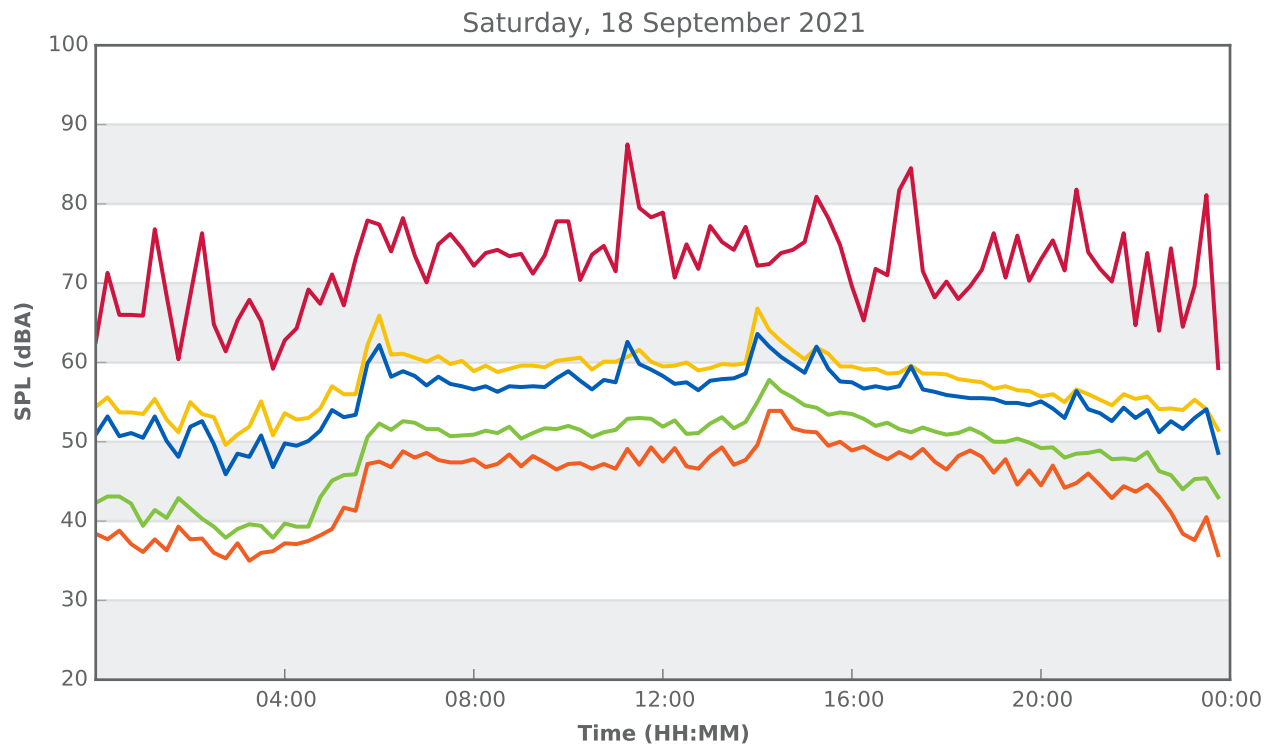
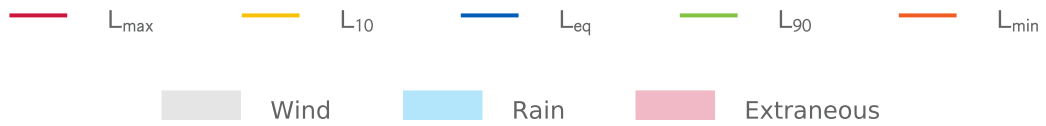
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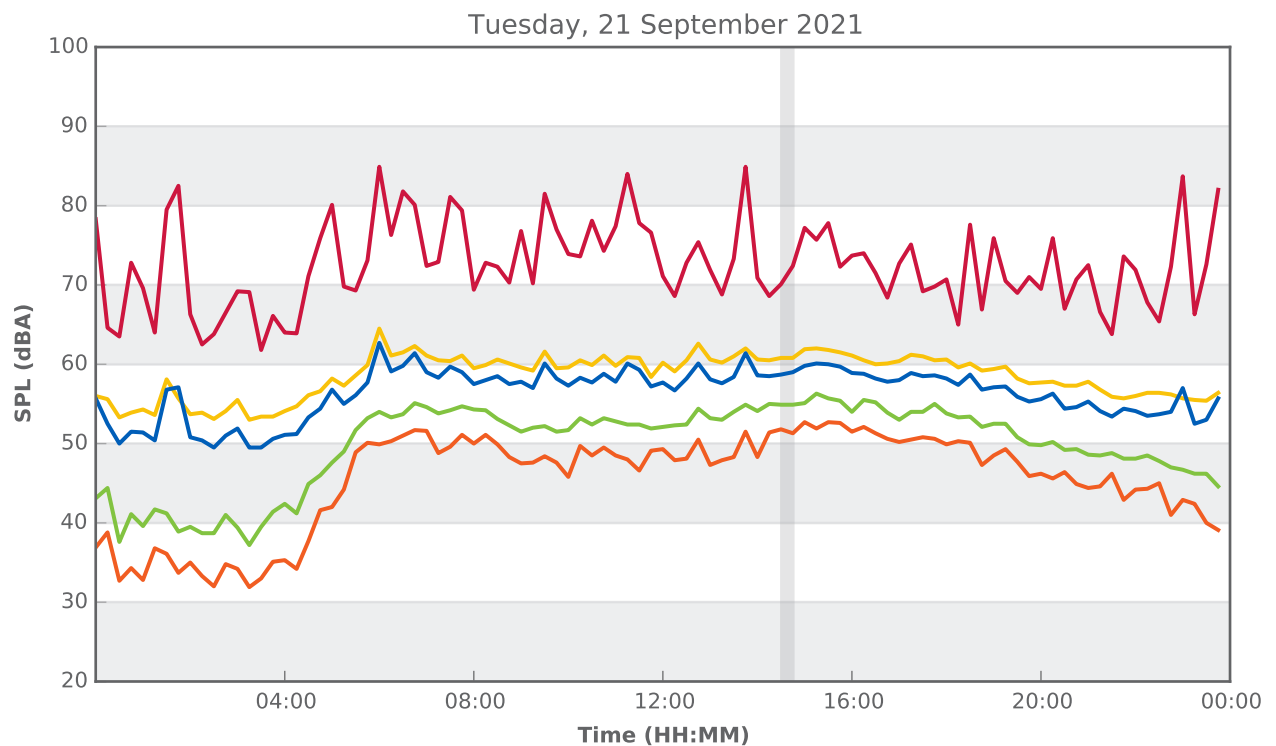
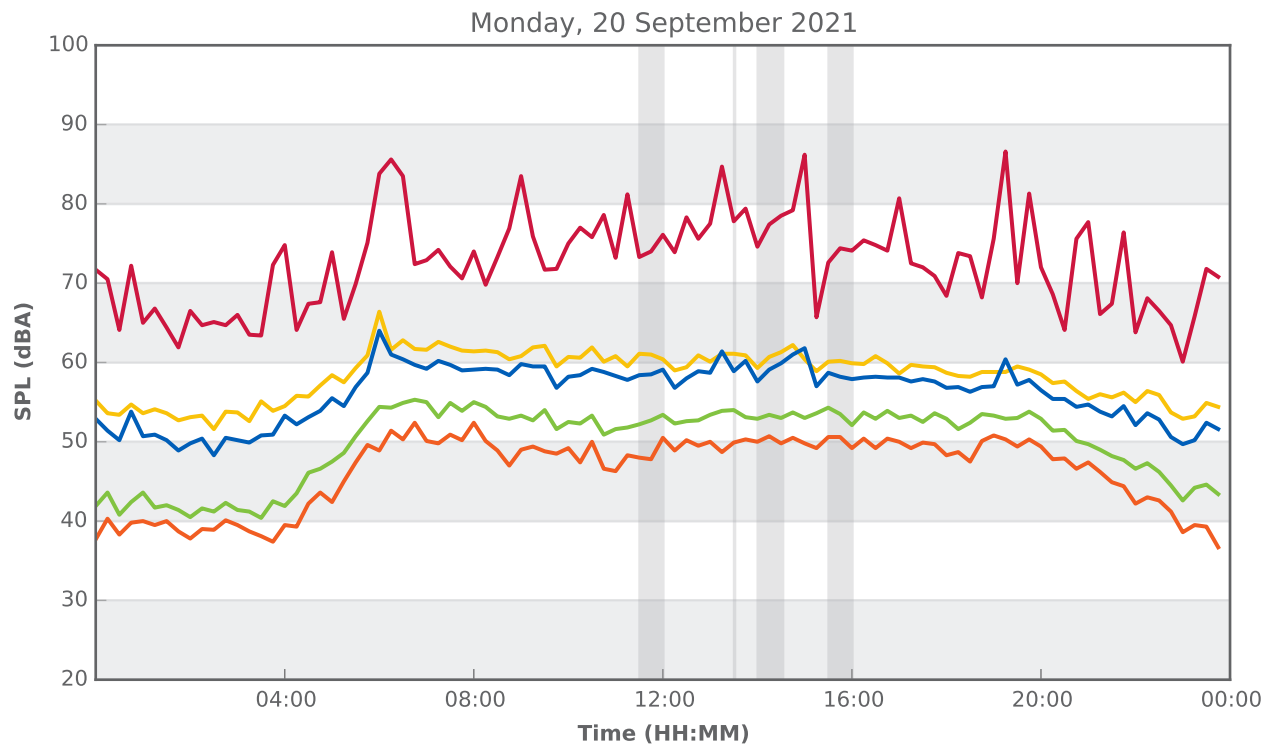
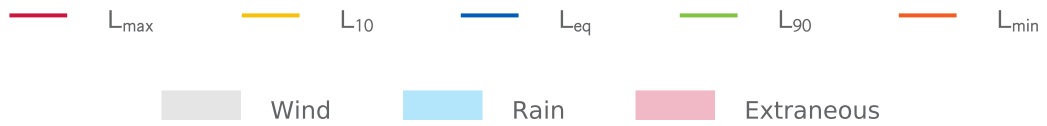
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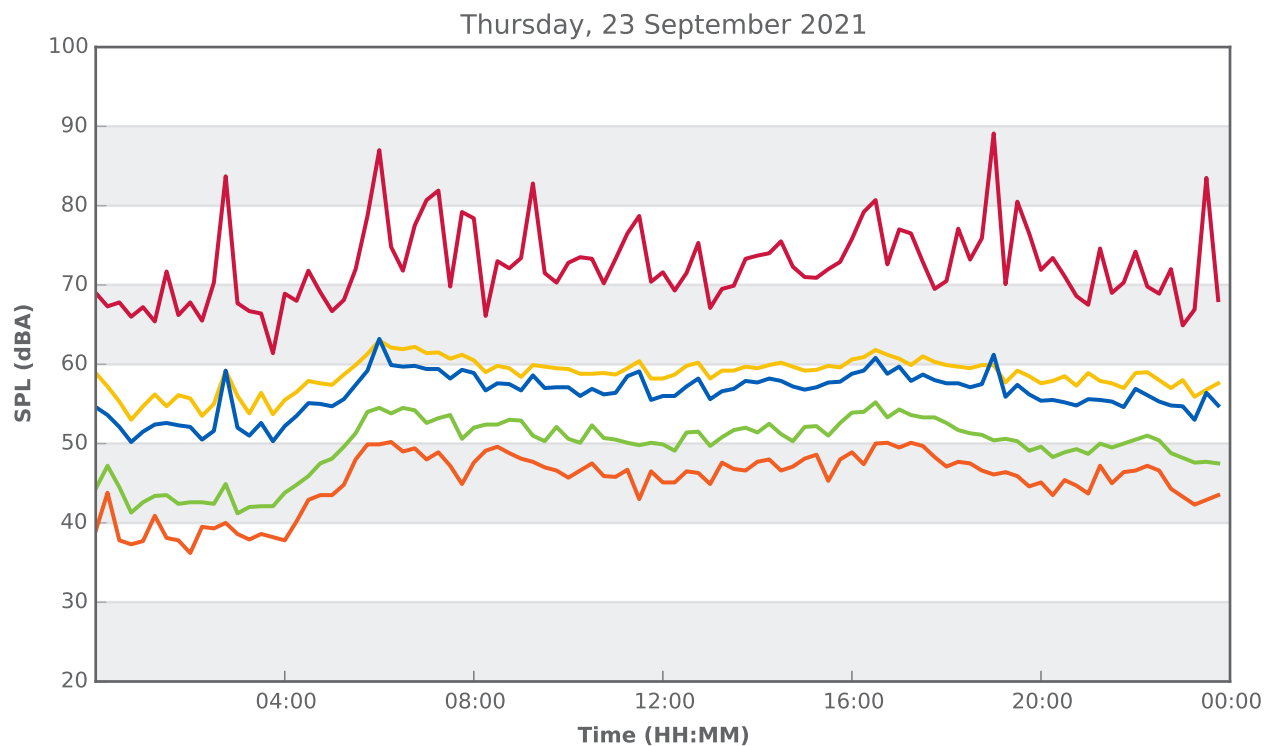
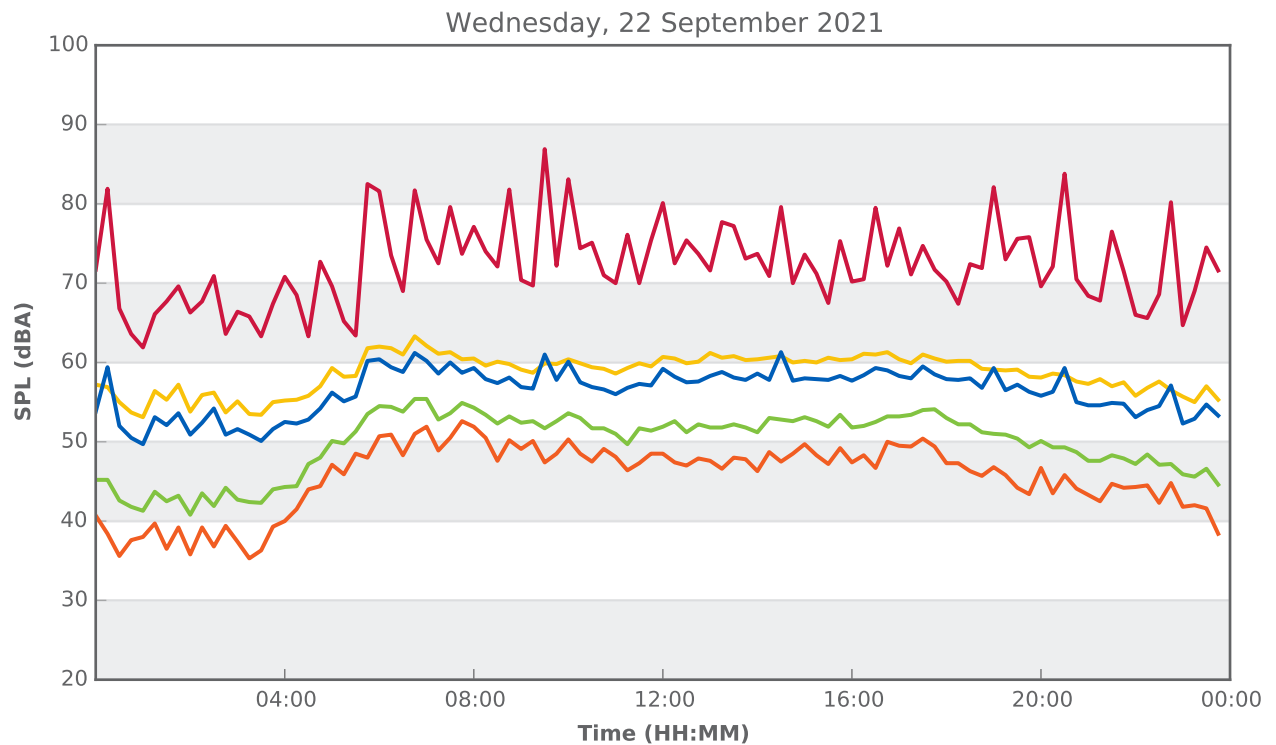
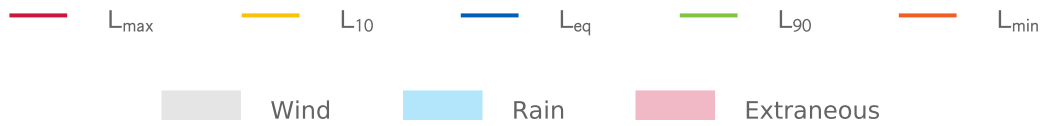
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