



Project Pluto – 132 McCredie Road, Guildford West NSW 2161

SSD-69223466 Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Ltd

1-11 Hayes Road, Roseberry NSW 2018

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Basis of Report

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

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Table of Contents

Basis of Report	i
1.0 Introduction	6
1.1 The Site.....	8
1.2 Nearest Sensitive Receivers.....	14
2.0 Existing Noise Environment.....	16
2.1 Unattended Noise Monitoring	16
2.2 Attended Noise Monitoring	16
2.3 Justification of Monitoring Locations	17
3.0 Assessment Criteria.....	19
3.1 Construction Noise Criteria.....	19
3.1.1 Residential Receivers.....	19
3.1.2 Other Sensitive' Land Uses and Commercial Receivers.....	20
3.1.3 NML Summary	20
3.2 Construction Vibration Criteria.....	21
3.2.1 Human Comfort Vibration	21
3.2.2 Effects on Building Contents.....	21
3.2.3 Structural and Cosmetic Damage Vibration	21
3.2.4 Minimum Working Distances for Vibration-intensive Works	23
3.3 Operational Noise Criteria	24
3.3.1 Project Noise Trigger Levels.....	26
3.3.2 Cumulative Noise Impacts.....	27
3.3.3 Sleep Disturbance	28
3.3.4 Corrections for Annoying Noise Characteristics.....	28
3.3.5 Residual Impacts.....	30
3.3.6 Traffic on Surrounding Roads.....	31
4.0 Methodology	32
4.1 Construction Noise and Vibration Assessment	32
4.1.1 Construction Activities	32
4.1.2 Hours of Construction.....	33
4.2 Operational Noise Assessment	34
4.2.1 Operational Noise Sources.....	34
4.2.2 Operational Scenarios.....	40
4.2.3 Noise Source Inventory	42
4.2.4 Corrections for Annoying Noise Characteristics.....	45



4.2.5 Noise Sources with Potential for Sleep Disturbance	47
4.2.6 Off-site Road Traffic	47
4.2.7 Weather Conditions	48
5.0 Assessment of Impacts	49
5.1 Construction Noise	49
5.1.1 Stage 1.....	49
5.1.2 Stage 2.....	51
5.2 Construction Vibration	53
5.2.1 Stage 1.....	53
5.2.2 Stage 2.....	55
5.3 Operational Noise.....	57
5.3.1 Predicted Noise Levels – Ultimate Development (Stage 1 and Stage 2).....	57
5.3.2 Predicted Noise Levels – Stage 1 Development.....	58
5.3.3 Sleep Disturbance	59
5.3.4 Off-site Traffic Assessment	59
6.0 Cumulative Impacts	60
6.1 Construction Noise	60
6.2 Operational Noise.....	60
7.0 Mitigation and Management Measures	61
7.1 Construction Impacts.....	61
7.2 Operational Noise Impacts	61
8.0 Conclusion.....	64



Tables in Text

Table 1	Secretary’s Environmental Assessment Requirements	7
Table 2	Surrounding Sensitive Receivers	14
Table 3	Summary of Unattended Noise Monitoring Results	16
Table 4	Summary of Attended Noise Monitoring Results	17
Table 5	ICNG NMLs for Residential Receivers	19
Table 6	Construction NMLs for ICNG ‘Other Sensitive’ Receivers	20
Table 7	Project Specific Noise Management Levels	20
Table 8	Vibration Dose Values for Intermittent Vibration	21
Table 9	BS 7385 Transient Vibration Values for Minimal Risk of Damage	22
Table 10	DIN 4150 Guideline Values for Short-term Vibration on Structures	22
Table 11	Recommended Minimum Working Distances from Vibration-intensive Equipment	23
Table 12	Residential Receiver Amenity	24
Table 13	Residential Receiver Amenity Category Assessment	25
Table 14	Project Noise Trigger Levels	27
Table 15	Sleep Disturbance Screening Levels	28
Table 16	NPfl Modifying Factor Corrections	29
Table 17	NPfl Significance of Residual Noise Impacts	30
Table 18	NPfl Examples of Receiver-based Treatments to Mitigate Residual Noise Impacts	30
Table 19	RNP/NCG Criteria for Assessing Traffic on Public Roads	31
Table 20	Construction Equipment	33
Table 21	Vehicle Traffic Data – Worst-case 15-Minute Period	38
Table 22	Typical Hardstand and Loading Dock Noise Sources	38
Table 23	Mechanical Plant	39
Table 24	Indicative Substation Noise Sources	40
Table 25	Proposed Generator Maintenance Testing Regime	41
Table 26	Operational Assessment Scenarios	42
Table 27	Noise Source Inventory	43
Table 28	Adopted 1/3 Octave Spectrum – Cooling Towers	46
Table 29	Assessment of Annoying Noise Characteristics	46
Table 30	Sleep Disturbance Noise Events – LAmax Sound Power Levels	47
Table 31	Predicted Construction Noise Levels – Standard Daytime Construction Hours – Stage 1 Works	49
Table 32	Predicted Exceedance at Nearest Receivers – Standard Daytime Construction Hours – Stage 1 Works	50



Table 33	Predicted Construction Noise Levels – Standard Daytime Construction Hours – Stage 2 Works	51
Table 34	Predicted Exceedance at Nearest Receivers – Standard Daytime Construction Hours – Stage 2 Works.....	52
Table 35	Operational Noise Assessment – Ultimate Development	57
Table 36	Operational Noise Assessment – Stage 1 Development.....	58
Table 37	Sleep Disturbance Assessment	59
Table 38	Operational Noise Mitigation Options.....	62

Figures in Text

Figure 1	Site Aerial	9
Figure 2	Local Context.....	9
Figure 3	Proposed Development – Ground Floor Layout	10
Figure 4	Proposed Development – Floor 1 Layout.....	11
Figure 5	Proposed Development – Roof Layout	11
Figure 6	Proposed Development – Elevations	12
Figure 7	Proposed Development Staging	13
Figure 8	Site Plan	15
Figure 9	Modelled Noise Sources – Ground Level Sources	36
Figure 10	Modelled Noise Sources – Elevated Sources	37
Figure 11	Construction Vibration – Large Vibratory Roller – Stage 1 Works	54
Figure 12	Construction Vibration – Large Vibratory Roller – Stage 2 Works	56

Appendices

Appendix A	Acoustic Terminology
Appendix B	Noise Monitoring Data
Appendix C	Construction Noise Sources
Appendix D	Operational Noise Contours
Appendix E	CNVG Mitigation Measures
Appendix F	NPfl Mitigation Measures
Appendix G	Mechanical Plant Data Sheets



1.0 Introduction

A State Significant Development Application (SSDA) has been prepared in support of a proposed data centre at 132 McCredie Road, Guildford West NSW (Project Pluto). The site is zoned E4 General Industrial and has road frontage to McCredie Road. The developable site area is 71,710 m².

The proposed development comprises:

- Site preparation works including bulk excavation and removal of existing hard standing and structures on the site, tree and vegetation clearing, and bulk earthworks.
- Construction, fit out and operation of a data centre with an approximate building height of 25.77 m and total gross floor area of approximately 29,444 m² comprising:
 - At-grade parking for 53 car parking spaces and two accessible car parking spaces.
 - Two loading dock spaces.
 - Two levels of technical data hall floor space incorporating a total of nine data halls.
 - Ancillary office space.
- Provision of required utilities, including:
 - Fuel storage.
 - Two switch-rooms.
 - Four industrial water storage tanks.
- Vehicle entry and egress driveways located along McCredie Road.
- Internal access road.
- Associated landscaping and site servicing.
- Installation of services and drainage infrastructure.

Staging

The proposal seeks consent for the development to be constructed and operated in two phases to reflect the staged availability of power supply. The proposed stages involve the following:

Stage 1: Construction of the main data centre building as well as the car park, perimeter access road, site access/exit driveways and landscaping. Stage 1 will involve the fit-out and operation of five of the nine proposed data halls at levels 1 and 2 as well as the associated electrical rooms, generators, storage and office rooms.

Stage 2: Completion of the ultimate development scheme involving the extension of the building to the south with an additional four data halls, associated electrical rooms and generators, and associated landscaping and external works. The electrical substations will also be constructed in the north of the site during this phase.



The works are to be completed in four construction stages, as per below:

Stage 1:

- CC1 – Site Preparation works (including but not limited to vegetation removal, earthworks & piling, installation of footings, retaining walls)
- CC2 – Inground services installation, structural works
- CC3 – Facade construction, installation of services, fit out
- CC4 – Landscaping and external works

Stage 2:

- CC1 – Site Preparation works (earthworks & piling, installation of footings)
- CC2 – Inground services installation, structural works
- CC3 – Facade construction, installation of services, fit out
- CC4 – Landscaping and external works

This Noise and Vibration Impact Assessment report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) and accompanying cover letter issued for the Project Pluto Data Centre (SSD-69223466) dated 4 April 2024.

Specifically, this report has been prepared to respond to the SEARs requirements shown in **Table 1**.

Table 1 Secretary's Environmental Assessment Requirements

Item	Description of Requirement	Section Reference (this report)
12. Noise and Vibration	Provide a noise and vibration assessment prepared in accordance with the relevant EPA guidelines and Australian/International Standards. The assessment must detail construction and operational noise and vibration impacts (including testing of any back-up power system) on nearby sensitive receivers and structures, and outline the proposed mitigation, management and monitoring measures that would be implemented.	Construction: Section 3.1, 3.2, 4.1, 5.1 and 5.2 Operation: Section 3.3, 4.2 and 5.3 Mitigation: Section 7.0

SLR is suitably qualified and endorsed by the Planning Secretary to produce SSDA noise impact assessments. SLR staff are members of the Australian Acoustical Society (AAS) and SLR is a member firm of the Association of Australasian Acoustical Consultants (AAAC).

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.



1.1 The Site

The site is located on Gandangara Land and is in the Smithfield Industrial Area within the Cumberland Local Government Area (LGA). It is bounded by McCredie Road to the north.

The front part of the site adjoins the Guildford Transmission Substation, which is located immediately to the east and fronts onto McCredie Road. Other industrial uses are located further east, with residential properties beyond.

The Guildford West Sports Ground, which comprises several playing fields, is located to the south of the Guildford Transmission Substation. The playing fields bound the southern part of the site to the east. The playing fields / public recreation area also about the southern boundary of the site.

Prospect Creek is located to the south of the public recreation area and is zoned C2 Environmental Protection. The area to the south of Prospect Creek is predominately characterised by low density single storey residential housing.

The site is located in the south eastern corner of the Smithfield Industrial Estate and is around 500 m from Cumberland Highway (A28), 4.2 km from the M4 motorway and 9 km from the M7 motorway, which provide access to Sydney CBD, western Sydney and the south. The Smithfield Industrial Estate extends across the A28 to Gipps Road (approximately 3km west of the site). It forms part of the broader Smithfield Wetherill Park industrial area, which is one of the largest of its kind in the Southern Hemisphere and makes a significant contribution to the New South Wales and Australian economies.

The site has a net developable area of 71,710 m² and is currently vacant. It previously operated as a Castrol Lubricants facility. However, the majority of the site has now been cleared and subject to category 1 remediation works. A single storey office building is located on the northern portion of the site fronting McCredie Road. The building is vacant.

Approval was granted for a previous Development Application for 132 McCredie Road (DA2022/0759) by Cumberland City Council on 19 September 2023. DA2022/0759 includes the demolition of existing structures and construction of three warehouse buildings comprising ten warehouse units with ancillary offices for warehouse and distribution use to operate 24 hours a day 7 days a week with at-grade parking and loading areas, site access and associated works. A noise and vibration impact assessment was prepared in support of DA2022/0759 (*“Connect@Smithfield 132 McCredie Road, Smithfield, NSW - Noise and Vibration Impact Assessment”* prepared by RWDI, Report Reference RWDI#2205605 Version B, dated 12 December 2022, referred to as DA2022/0759 NVIA).

Site location and local context are shown in **Figure 1** and **Figure 2**. The proposed layout of the data centre is shown in **Figure 3** to **Figure 6**. The proposed development staging is shown in **Figure 7**.

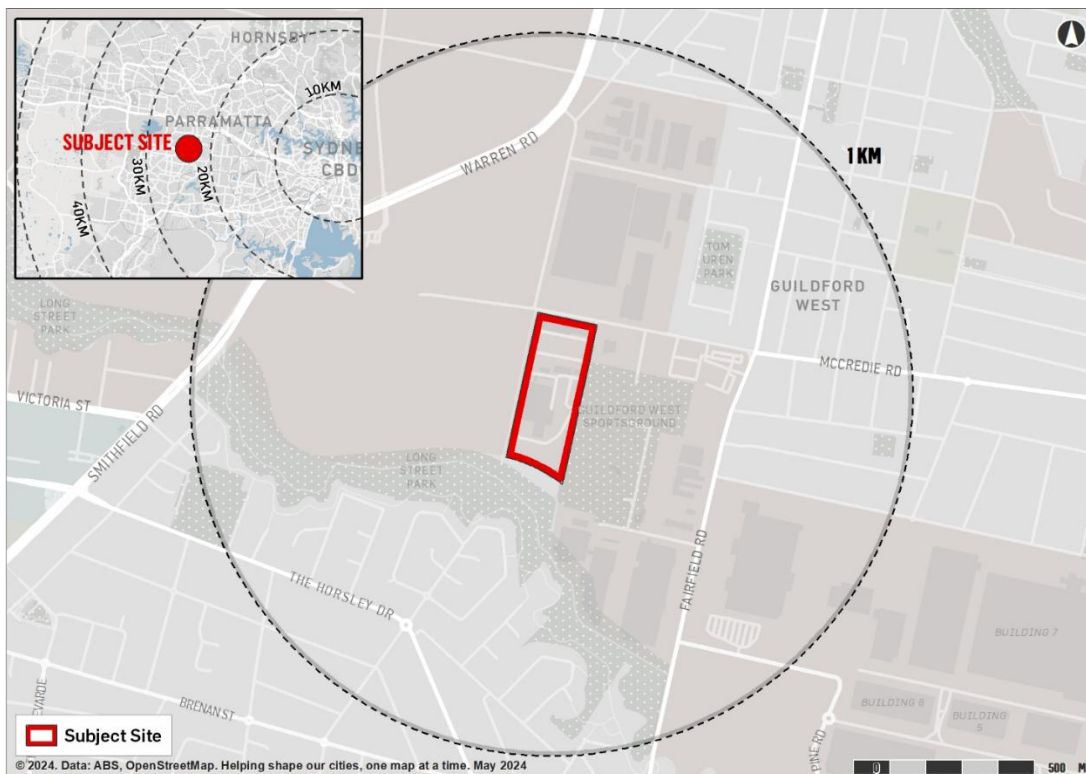


Figure 1 Site Aerial



Source: Urbis, 2024

Figure 2 Local Context



Source: Urbis, 2024



Figure 3 Proposed Development – Ground Floor Layout

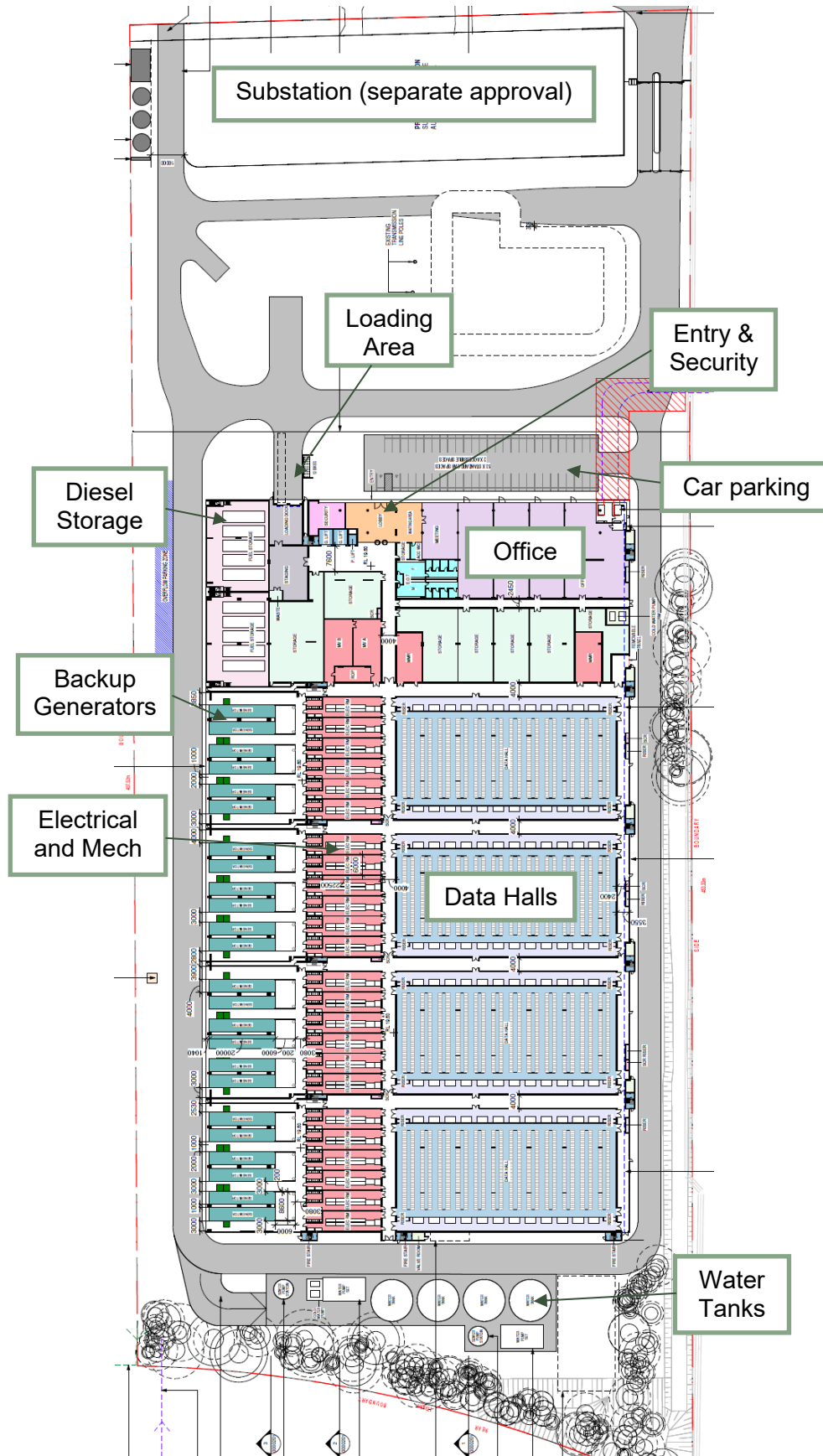


Figure 4 Proposed Development – Floor 1 Layout

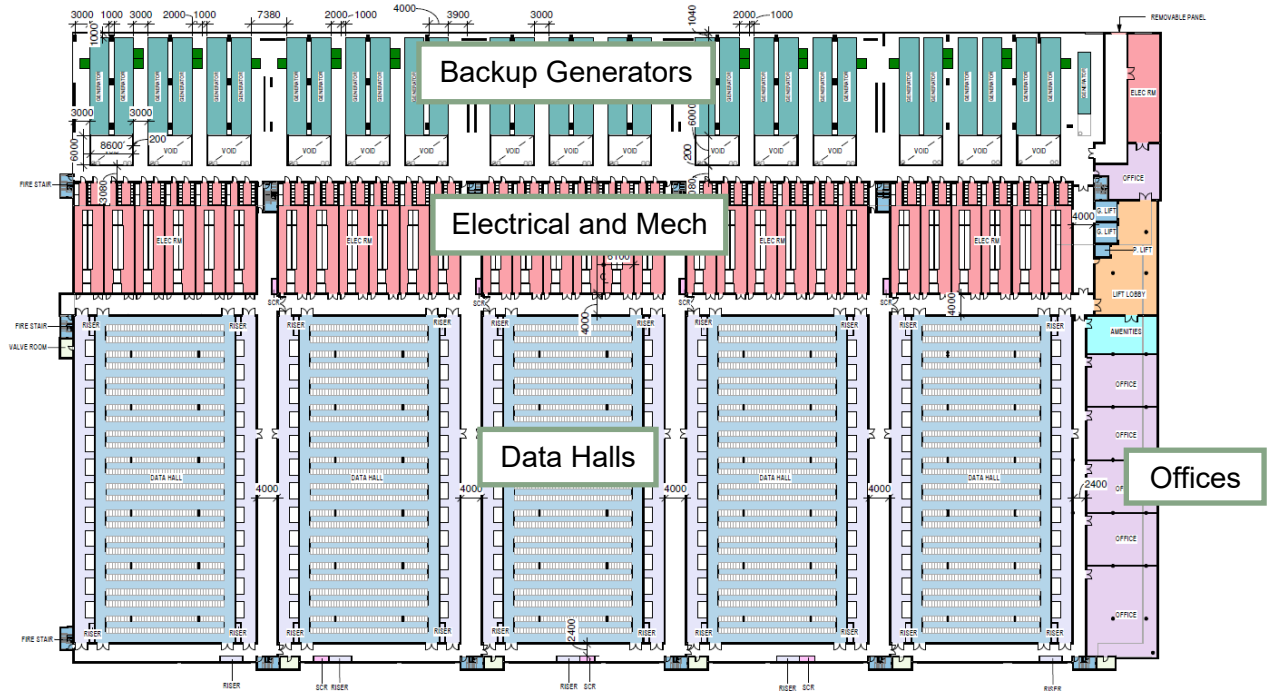


Figure 5 Proposed Development – Roof Layout

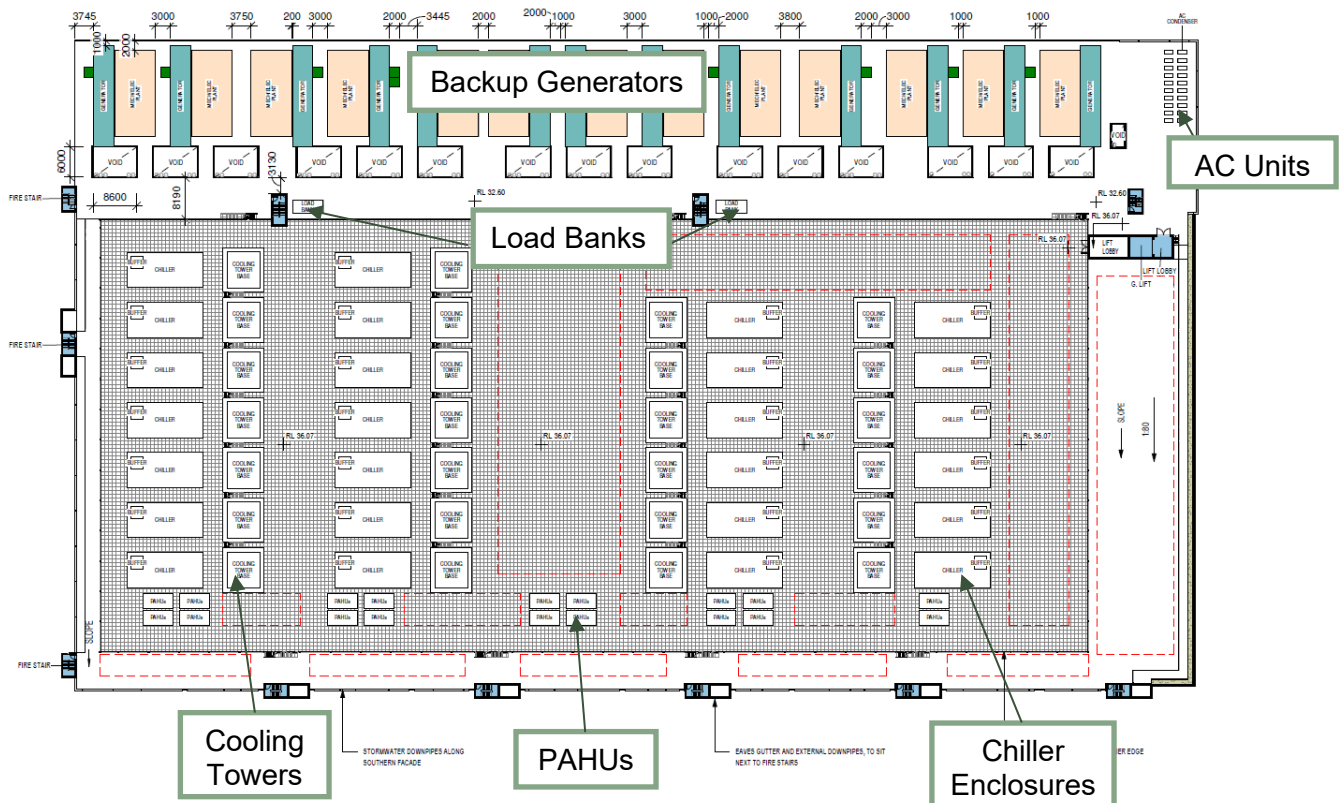


Figure 6 Proposed Development – Elevations

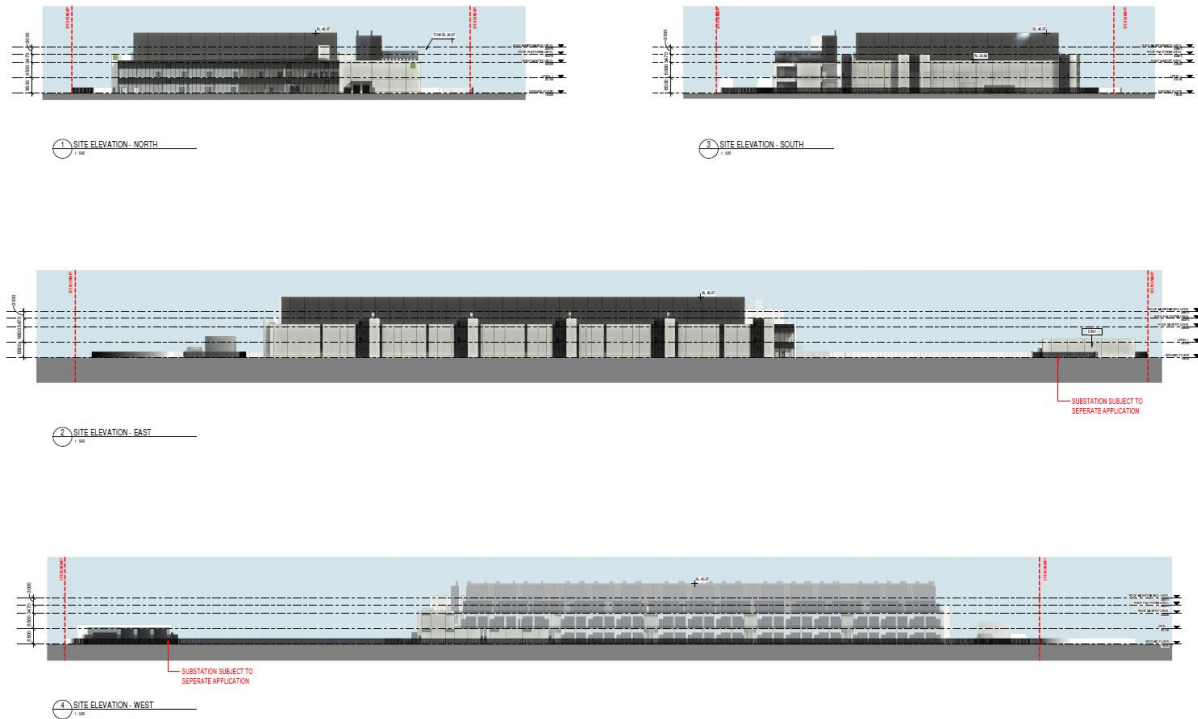


Figure 7 Proposed Development Staging



1.2 Nearest Sensitive Receivers

Residential areas are located to the northeast/east and south/southwest of the site. An active recreation area (the Guildford West Sports Ground) is located adjacent to eastern site boundary. Industrial uses are located to the west, north and east of the site.

The nearest receivers are shown in **Figure 8** and detailed in **Table 2**.

Table 2 Surrounding Sensitive Receivers

ID	Receiver Area	Type	Distance (m)	Direction
NCA01	Suburban residential area to the north of McCredie Road and to the east of Fairfield Road	Residential	200 m	North east, East
NCA02	Suburban residential area to the south of Prospect Creek	Residential	150 m	South, South west
NCA03	Guildford West Sports Ground	Active recreation	20 m	East
NCA04	Industrial areas around McCredie Road and Fairfield Road	Industrial	20 m	West, North, East



Figure 8 Site Plan



2.0 Existing Noise Environment

The existing noise environment in the area is typically dominated by industrial noise from the Smithfield Industrial Estate and road traffic noise from the surrounding major road network including McCredie Road, The Horsley Drive, Fairfield Road and Cumberland Highway.

2.1 Unattended Noise Monitoring

Unattended noise monitoring was undertaken at the adjacent residential receivers (refer to **Table 3**) in August and September 2022 as part of a previous Development Application for 132 McCredie Road (DA2022/0759). The noise monitoring is detailed in “*Connect@ Smithfield 132 McCredie Road, Smithfield, NSW - Noise and Vibration Impact Assessment*” prepared by RWDI, Report Reference RWDI#2205605 Version B, dated 12 December 2022 (DA2022/0759 NVIA).

Additional unattended noise monitoring in NCA02 to the south of the development was undertaken in July and August 2018 as part of a Development Application for 149 McCredie Road (DA2018/347/1). The noise monitoring is detailed in “*Smithfield Distribution Centre 149 McCredie Road, Smithfield – DA Noise Impact Assessment*” prepared by SLR, Report Reference 610.18295-R01-v2.1, dated 14 June 2019 (DA2018/347/1 NIA).

The noise monitoring locations are shown in **Figure 8** and the results are summarised in **Table 3**. Details of the monitoring location together with graphs of the measured daily noise levels are provided in **Appendix B**.

All unattended noise monitoring was captured and processed in accordance with the NSW EPA *Noise Policy for Industry* (NPfI), including Fact Sheets A and B of the NPfI.

Table 3 Summary of Unattended Noise Monitoring Results

ID	Address	Measured Noise Levels (dBA) ¹		
		Background Noise (RBL)		
		Day	Evening	Night
NL01	111-123 McCredie Road, Smithfield ²	45	41	38
NL02	Behind 55 Hemingway Crescent, Fairfield ²	44	44 ⁴ (46 actual)	44 ⁴ (47 actual)
NL03	38 Hemingway Crescent, Fairfield ³	45	45 ⁴ (46 actual)	45 ⁴ (48 actual)

Note 1: The assessment periods are the daytime which is 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sundays and public holidays, the evening which is 6 pm to 10 pm, and the night-time which is 10 pm to 7 am on Monday to Saturday and 10 pm to 8 am on Sunday and public holidays. See the NSW EPA *Noise Policy for Industry*.

Note 2: Noise monitoring data at this location sourced from DA2022/0759 NVIA (RWDI, 2022).

Note 3: Noise monitoring data at this location sources from DA2018/347/1 NIA (SLR, 2019).

Note 4: Where the evening or night RBL is higher than the day RBL, it has been reduced to be equal to the day RBL, as detailed in Section 2.3 of the NPfI.

2.2 Attended Noise Monitoring

Attended noise monitoring was undertaken on 8 April 2025 at the three monitoring locations. Attended monitoring results are provided in **Appendix B** and summarised in **Table 4**. The attended monitoring showed results that were generally consistent with the unattended monitoring.

The LA_{90(15minute)} (background noise) and LA_{eq} (average noise) at NL01 in NCA01 was dominated by road traffic noise from McCredie Road during the day and evening



measurements. Night measurements were not able to be undertaken at this location due to adverse weather.

The LA₉₀(15minute) at NL02 and NL03 in NCA02 during the day measurements was generally dominated by traffic noise from distant roads, including McCredie Road to the north, Fairfield Road to the east, The Horsley Drive to the south and south west, and Cumberland Highway to the west and north west. Industrial noise such as heavy vehicle movements and unloading activities contributed to the LA_{eq}(15minute).

The LA₉₀(15minute) and LA_{eq}(15minute) at NL02 and NL03 during the evening and night measurements was dominated by industrial noise from the north, and was generally measured to be higher than the daytime LA₉₀(15minute), consistent with the RBLs in the unattended monitoring results. The industrial noise was a combination of steady sources indicative of mechanical plant, with some variance in other industrial sources, not clearly identifiable but likely to be manufacturing or process noise.

All attended noise monitoring was captured and processed in accordance with the NSW EPA *Noise Policy for Industry* (NPfI), including Fact Sheets A and B of the NPfI.

Table 4 Summary of Attended Noise Monitoring Results

ID	Address	Measured Noise Levels (dBA) ¹						Notes
		Background Noise (LA90)			Average Noise (LAeq)			
		Day	Evening	Night	Day	Evening	Night	
NL01	111-123 McCredie Road, Smithfield	58	56	- ²	72	71	- ²	LA90 and LAeq dominated by road traffic noise from McCredie Road.
NL02	Behind 55 Hemingway Crescent, Fairfield	42	44	- ²	45	46	- ²	LA90 dominated by distant traffic noise during the day and industrial noise (mechanical plant / manufacturing) to the north during the evening. LAeq influenced by industrial noise (trucks & unloading) and environmental noise (birds etc).
NL03	38 Hemingway Crescent, Fairfield	44	47	44	50	48	46	LA90 dominated by distant traffic noise during the day and industrial noise (mechanical plant / manufacturing) to the north during the evening and night. LAeq influenced by industrial noise (trucks & unloading) and environmental noise (birds etc).

Note 1: The assessment periods are the daytime which is 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sundays and public holidays, the evening which is 6 pm to 10 pm, and the night-time which is 10 pm to 7 am on Monday to Saturday and 10 pm to 8 am on Sunday and public holidays. See the NSW EPA *Noise Policy for Industry*.

Note 2: Night measurement at this location was not able to be undertaken due to adverse weather.

2.3 Justification of Monitoring Locations

The monitoring locations for both the 2022 survey and 2018 survey were chosen with respect to the potentially most-affected receivers from development impacts, their proximity to the site, consideration of influences to the ambient noise levels including industrial noise and traffic noise, along with access permission and safety requirements. The unattended monitoring locations are considered to be representative of the potentially most-affected



residential receivers and the data is adequate for determining the construction and operational noise criteria that is derived in **Sections 3.1** and **3.3** of this report.

Noise levels collected in free field at ground level are applicable to two-storey dwellings, as per Section 2.6 of the NPfI. Attended monitoring in NCA02 (to the south), along with the trends shown in the unattended monitoring, show that the RBL is dominated by distant traffic noise during the day, and industrial noise during the evening and night. Two-storey dwellings would be more exposed to both of these sources, hence monitoring results from the ground level locations would be slightly conservative. Other residential receivers in NCA02 to the west and south east of the monitoring locations have similar exposure to both industrial noise and traffic noise to those at the monitoring locations.

Results from the quieter of the two monitoring locations to the south of the site (NL02) have conservatively been used to determine the noise criteria for NCA02. The monitoring results at the two locations and the noise levels trends on the graphs of the daily noise levels are generally consistent. The consistency in the measured levels at these locations, along with the observations during the attended measurements confirm that evening and night-time RBLs in NCA02 are generally higher than during the daytime. Where the evening or night RBL is higher than the day RBL, it has been reduced to be equal to the day RBL, as detailed in Section 2.3 of the NPfI.

All noise monitoring was captured and processed in accordance with the NSW EPA *Noise Policy for Industry* (NPfI), including Fact Sheets A and B of the NPfI.



3.0 Assessment Criteria

3.1 Construction Noise Criteria

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

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

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

3.1.1 Residential Receivers

The ICNG approach for determining NMLs at residential receivers is shown in **Table 5**.

Table 5 ICNG NMLs for Residential Receivers

Time of Day	NML LAeq(15minute)	How to Apply
Standard Construction Hours Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or public holidays	Noise affected RBL ¹ + 10 dB	- The noise affected level represents the point above which there may be some community reaction to noise - Where the predicted or measured LAeq(15minute) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level - The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75 dBA	- The Highly Noise Affected (HNA) level represents the point above which there may be strong community reaction to noise - Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restructuring the hours that the very noisy activities can occur, taking into account: - Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools or mid-morning or mid-afternoon for works near residences) - If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside Standard Construction Hours	Noise affected RBL + 5 dB	- A strong justification would typically be required for works outside the recommended standard hours - The proponent should apply all feasible and reasonable work practices to meet the noise affected level - Where all feasible and reasonable practises have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.

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



3.1.2 Other Sensitive' Land Uses and Commercial Receivers

Non-residential land uses have been identified in the study area. The NMLs for 'other sensitive' receivers are shown in **Table 6**.

Table 6 Construction NMLs for ICNG 'Other Sensitive' Receivers

Land Use	Noise management level L _{Aeq} (15minute) (dBA) (applied when the property is in use)	
	Internal	External
ICNG 'other sensitive' receivers		
Industrial	-	75
Active recreation areas	-	65

3.1.3 NML Summary

The construction NMLs for the proposal have been determined using the results from the unattended noise monitoring and are shown in **Table 7**.

Out of hours NMLs would be applicable should works be required to be undertaken outside ICNG standard construction hours.

Table 7 Project Specific Noise Management Levels

Receiver Area / Type	Monitoring Location	Noise Management Level (L _{Aeq} (15minute) – dBA)			
		Standard Construction (RBL +10 dB) ¹	Out of Hours (RBL +5 dB)		
		Daytime	Daytime ²	Evening	Night-time
NCA01 Residential	NL01	55	50	46	43
NCA02 Residential	NL02	54	49	49	49
NCA03 Active recreation	n/a	65	65	65	-
NCA04 Industrial	n/a	75	75	-	-

Note 1: RBL = Rating Background Level.

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

In addition to the above NMLs, residential receivers are considered to be 'highly noise affected' if the predicted level exceeds 75 dBA L_{Aeq}(15minute).



3.2 Construction Vibration Criteria

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

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

3.2.1 Human Comfort Vibration

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

Vibration from construction works tends to be intermittent in nature and the EPA's *Assessing Vibration: a technical guideline* (2006) provides criteria for intermittent vibration based on the Vibration Dose Value (VDV). The 'preferred' and 'maximum' VDV's for human comfort impacts are shown in **Table 8**.

Table 8 Vibration Dose Values for Intermittent Vibration

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

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

3.2.2 Effects on Building Contents

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

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

3.2.3 Structural and Cosmetic Damage Vibration

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



Examples of damage that can occur includes cracks or loosening of drywall surfaces, cracks in supporting columns and loosening of joints. Structural damage vibration limits are contained in British Standard BS 7385 and German Standard DIN 4150.

BS 7385

British Standard BS 7385 recommends vibration limits for transient vibration judged to give a minimal risk of vibration induced damage to affected buildings. The limits for residential and industrial buildings are shown in **Table 9**.

Table 9 BS 7385 Transient Vibration Values for Minimal Risk of Damage

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

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

DIN 4150

German Standard DIN 4150 also provides guideline vibration limits for different buildings. Damage is not expected to occur where the values are complied with and the values are generally recognised to be conservative. The DIN 4150 values for buildings and structures are shown in **Table 10**.

Table 10 DIN 4150 Guideline Values for Short-term Vibration on Structures

Group	Type of Structure	Guideline Values Vibration Velocity (mm/s)				
		Foundation, All Directions at a Frequency of			Topmost Floor, Horizontal	Floor Slabs, Vertical
		1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified as Group 1 or 2 and are of great intrinsic value (eg heritage listed buildings)	3	3 to 8	8 to 10	8	20 ¹

Note 1: It may be necessary to lower the relevant guideline value markedly to prevent minor damage.



3.2.4 Minimum Working Distances for Vibration-intensive Works

Minimum working distances for typical vibration-intensive construction equipment are provided in the Transport for NSW (TfNSW) *Construction Noise and Vibration Guideline* (CNVG) and are shown in **Table 11**. The minimum working distances are for both cosmetic damage (from BS 7385 and DIN 4150) and human comfort (from the NSW EPA Vibration Guideline). They are based on empirical data which suggests that where works are further from receivers than the quoted minimum distances then impacts are not considered likely.

Table 11 Recommended Minimum Working Distances from Vibration-intensive Equipment

Plant Item	Rating/Description	Minimum Distance		
		Cosmetic Damage		Human Response (NSW EPA Guideline)
		Residential and Light Commercial (BS 7385)	Heritage Items (DIN 4150, Group 3)	
Vibratory Roller	<50 kN (1–2 tonne)	5 m	11 m	15 m to 20 m
	<100 kN (2–4 tonne)	6 m	13 m	20 m
	<200 kN (4–6 tonne)	12 m	25 m	40 m
	<300 kN (7–13 tonne)	15 m	31 m	100 m
	>300 kN (13–18 tonne)	20 m	40 m	100 m
	>300 kN (>18 tonne)	25 m	50 m	100 m
Small Hydraulic Hammer	300 kg (5 to 12 t excavator)	2 m	5 m	7 m
Medium Hydraulic Hammer	900 kg (12 to 18 t excavator)	7 m	15 m	23 m
Large Hydraulic Hammer	1,600 kg (18 to 34 t excavator)	22 m	44 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	5 m to 40 m	20 m
Piling Rig – Bored	≤ 800 mm	2 m (nominal)	5 m	4 m
Jackhammer	Hand held	1 m (nominal)	3 m	2 m

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



3.3 Operational Noise Criteria

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

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

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

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

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

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

Table 12 Residential Receiver Amenity

Receiver Category	Typical Planning Land Use Zoning	Typical Existing Background Noise Levels (RBL)	Description
Rural	RU1 – primary production RU2 – rural landscape RU4 – primary production small lots R5 – large lot residential E4 – environmental living	Daytime <40 dBA Evening <35 dBA Night <30 dBA	Rural – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse. Note: Where background noise levels are higher than those presented due to existing industry or intensive agricultural activities, the selection of a higher noise amenity area should be considered.



Receiver Category	Typical Planning Land Use Zoning	Typical Existing Background Noise Levels (RBL)	Description
Suburban residential	RU5 – village RU6 – transition R2 – low density residential R3 – medium density residential E2 – environmental conservation E3 – environmental management	Daytime <45 dBA Evening <40 dBA Night <35dBA	Suburban – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.
Urban residential	R1 – general residential R4 – high density residential B1 – neighbourhood centre (boarding houses and shop-top housing) B2 – local centre (boarding houses) B4 – mixed use	Daytime >45 dBA Evening >40 dBA Night >35 dBA	Urban – an area with an acoustical environment that: • Is dominated by ‘urban hum’ or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources • Has through-traffic with characteristically heavy and continuous traffic flows during peak periods • Is near commercial districts or industrial districts • Has any combination of the above.

Amenity noise categories for the surrounding receivers have been determined with reference to the NPfl. The assessment is shown in **Table 13**.

Table 13 Residential Receiver Amenity Category Assessment

Area	Land Use Zoning	Existing Background Noise Levels RBL (dBA)			Resulting Amenity Classification	Discussion
		Day	Eve	Night		
NCA01	R2 low density residential R3 medium density residential	45	41	38	Suburban	The residences in NCA01 are mostly zoned as R2 low density residential, with a small area of R3 medium density residential. Residences are typically one to two-storey single dwellings, townhouses and low-level apartment buildings. Existing noise levels are typical of residential areas near industrial areas and major roads. Residences have, therefore, been classified as suburban.



Area	Land Use Zoning	Existing Background Noise Levels RBL (dBA)			Resulting Amenity Classification	Discussion
		Day	Eve	Night		
NCA02	R2 low density residential	44	44	44	Suburban	The residences in NCA02 are zoned as R2 low density residential. Residences are typically one to two-storey single dwellings. Existing noise levels are typical of residential areas near industrial areas and major roads. Residences have, therefore, been classified as suburban.

The existing noise sources, noise levels and characteristics at the receivers are indicative of urban/industrial interface classification, however, suburban classification has conservatively been adopted based on the land use zoning.

3.3.1 Project Noise Trigger Levels

The trigger levels for industrial noise from the proposal are summarised in **Table 14**. They are based on the previously measured background noise levels, where appropriate. The Project Noise Trigger Levels (PNTL) are the most stringent of the intrusiveness and amenity trigger level for each period and are highlighted below.

The NPfI states that when converting the project amenity level from $L_{Aeq(period)}$ to $L_{Aeq(15minute)}$, the $L_{Aeq(15minute)}$ is equal to the $L_{Aeq(period)}$ plus 3 dB, unless robust evidence is provided for an alternative approach (refer to Section 2.2 of the NPfI). While the main source of operational noise from data centres is typically mechanical plant which would generally operate continuously, the dominant items of plant at the development (ie the cooling towers) are expected to vary in noise emissions depending on the number of units in use, their load, and the current ambient temperature. It is noted that the noise modelling of mechanical plant at the development assumes all mechanical plant items conservatively operate at representative worst-case loads at all times (see **Section 4.2.1** for further information). As such, it is considered appropriate to apply the standard NPfI assumption of $L_{Aeq(15minute)}$ equal to the $L_{Aeq(period)}$ plus 3 dB for this project.

The PNTLs detailed in **Table 14** are consistent with those in the DA2022/0759 NVIA for the approved warehouse development on the site.



Table 14 Project Noise Trigger Levels

Receiver Area / Type	Period	Amenity Noise Level LAeq (dBA)	Measured Noise Level (dBA)	Project Noise Trigger Levels LAeq(15minute) (dBA)	
			RBL ¹	Intrusiveness	Amenity ^{2,3}
NCA01 Residential	Day	55	45	50	53
	Evening	45	41	46	43
	Night	40	38	43	38
NCA02 Residential	Day	55	44	49	53
	Evening	45	44	49	43
	Night	40	44	49	38
NCA03 Active recreation	When in use	55	-	-	53
NCA04 Industrial	When in use	70	-	-	68

Note 1: RBL = Rating Background Level.

Note 2: The recommended amenity noise levels have been reduced by 5 dB, where appropriate, to give the project amenity noise levels due to other sources of industrial noise being present in the area, as outlined in the NPfl.

Note 3: The project amenity noise levels have been converted to a 15-minute level by adding 3 dB, as outlined in the NPfl.

3.3.2 Cumulative Noise Impacts

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

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

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

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

The potential cumulative impacts from the development and other sources of industrial noise in the area are therefore accounted for in the proposal-specific PNTLs (see **Table 14**).



3.3.3 Sleep Disturbance

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

The NPfI defines the sleep disturbance screening level as 52 dBA LAF_{max} or the prevailing background level plus 15 dB, whichever is greater.

The sleep disturbance screening levels for the proposal are shown in **Table 15**.

Table 15 Sleep Disturbance Screening Levels

Location	Noise Level (dBA)	
	Measured Prevailing Night-time Background Level	Sleep Disturbance Screening Level ¹
NCA01 Residential	38	53
NCA02 Residential	44	59

Note 1: The sleep disturbance screening level as 52 dBA LAF_{max} or the prevailing background level plus 15 dB, whichever is greater

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

The NPfI refers to the *Road Noise Policy* (RNP) for additional information regarding sleep disturbance. enHealth Council studies are referenced which indicate that for short-term or transient noise events, for good sleep over eight hours the indoor LAF_{max} sound pressure level should ideally not exceed around 45 dBA more than 10 or 15 times per night.

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

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to awaken people from sleep
- One or two events per night with maximum internal noise levels of 65-70 dBA are not likely to affect health and wellbeing significantly.

3.3.4 Corrections for Annoying Noise Characteristics

Sources of industrial noise can cause greater annoyance where they contain certain characteristics, such as tonality, intermittency or dominant low-frequency content. The NPfI specifies the following modifying factor corrections, shown in **Table 16**, which are to be applied where annoying characteristics are present. The corrections are to be added to the noise level at the receiver before comparison with the Project Noise Trigger Levels.



Table 16 NPfl Modifying Factor Corrections

Factor	Assessment/ Measurement	When to Apply	Correction ¹
Tonal noise	One-third octave or narrow band analysis	Level of one-third octave band exceeds the level of the adjacent bands on both sides by the levels defined in the NPfl.	5 dB ²
Low-frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements	Measure/assess source contribution C and A weighted Leq,t levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and the level to which the thresholds defined in the NPfl are exceeded.	2 or 5 dB ²
Intermittent noise	Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level	The source noise heard at the receiver varies by more than 5 dB and the intermittent nature of the noise is clearly audible. The NPfl further defines intermittent noise as noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB, for example, equipment cycling on and off. The EPA has confirmed⁴ that the intermittent correction does not apply to short-term events that emerge above the general industrial noise level and is therefore not applicable to industrial or commercial sites that have vehicle or plant movements at night, including audible reversing alarms. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.	5 dB ³
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated.	Maximum correction of 10 dB ² (excluding duration correction)

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

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

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

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

Details of the modifying factor corrections applied in the assessment are provided in **Section 4.2.4**.



3.3.5 Residual Impacts

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

The significance of residual noise impacts, as defined in the NPfI, is shown in **Table 17**. Examples of receiver-based treatments that can be used to mitigate residual impacts are shown in **Table 18**.

Table 17 NPfI Significance of Residual Noise Impacts

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

Table 18 NPfI Examples of Receiver-based Treatments to Mitigate Residual Noise Impacts

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



3.3.6 Traffic on Surrounding Roads

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

An initial screening test is first applied to evaluate if existing road traffic noise levels are expected to increase by more than 2.0 dB. Where this is considered likely, further assessment is required using the RNP criteria shown in **Table 19**.

Table 19 RNP/NCG Criteria for Assessing Traffic on Public Roads

Road Category	Type of Project/Land Use	Assessment Criteria (dBA)	
		Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)
Freeway/ arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq(15hour) 60 (external)	LAeq(9hour) 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq(1hour) 55 (external)	LAeq(1hour) 50 (external)



4.0 Methodology

4.1 Construction Noise and Vibration Assessment

A noise model of the study area has been used to predict noise levels from the proposed construction work to all surrounding receivers. The model uses ISO 9613-2 algorithms in SoundPLAN software.

Local terrain, receiver buildings and structures were digitised in the noise model to develop a three-dimensional representation of the construction site and surrounding areas.

4.1.1 Construction Activities

The proposal would be constructed in two stages, as shown below (refer to **Section 1.0** for further details regarding staging):

Stage 1

- CC1 – Site preparation works (including but not limited to vegetation removal, earthworks and piling, installation of footings, retaining walls)
- CC2 – Inground services installation, structural works
- CC3 – Facade construction, installation of services, fit out
- CC4 – Landscaping and external works

Stage 2

- CC1 – Site preparation works (earthworks and piling, installation of footings)
- CC2 – Inground services installation, structural works
- CC3 – Facade construction, installation of services, fit out
- CC4 – Landscaping and external works

Representative scenarios have been developed to assess the likely impacts from the various construction phases of the proposal. These scenarios are shown in **Table 20**.

The assessment uses 'realistic worst-case' scenarios to determine the impacts from the noisiest 15-minute period that are likely to occur for each work scenario, as required by the ICNG. The impacts represent construction noise levels without mitigation applied.

The sound power levels for the construction equipment used in each scenario are presented in **Appendix C**.



Table 20 Construction Equipment

Scenario	Works Activity	Equipment	CC & Likely Duration	
			Stage 1	Stage 2
W.01	Vegetation clearing	Chainsaw, chipper, excavator, front end loader, dump truck, water truck	CC1 – 1 month	n/a
W.02	Earthworks	Dozer, excavator, front end loader, vibratory roller, dump truck, water truck	CC1, CC2 – 5 months	CC1, CC2 – 5 months
W.03	Excavation of hard rock	Rockbreaker, dozer, excavator, front end loader, dump truck, water truck	CC1, CC2 – 1 month	CC1, CC2 – 1 month
W.04	Construction of pads and hardstands	Concrete pump, concrete truck/agitator, concrete vibrator	CC1, CC2 – 3 months	CC1, CC2 – 3 months
W.05	Construction of structures and equipment installation	Elevated working platform, flatbed truck, hand tools, mobile crane	CC3, CC4 – 18 months	CC3, CC4 – 18 months

4.1.2 Hours of Construction

Construction activities for the proposal would only be undertaken during the following hours:

- 7:00 am to 6:00 pm, Mondays to Fridays
- 8:00 am to 1:00 pm on Saturdays
- At no time on Sundays or Public Holidays.



4.2 Operational Noise Assessment

The potential operational noise levels from the proposal have been predicted to the surrounding receivers using the ISO 9613-2 algorithm in SoundPLAN V8.2, implemented in accordance with ISO 17534.

ISO 9613-2 is an industry standard algorithm that is considered suitable for use in the prediction of noise from industrial sources where intervening objects provide acoustic shielding, such as at the subject site and surrounding area.

The ISO 9613-2 algorithm predicts continuous A-weighted sound pressure levels under noise-enhancing meteorological conditions favourable to downwind propagation, or equivalently, propagation under a well-developed, moderate, ground-based temperature inversion, such as commonly occurs on clear calm nights.

Downwind propagation conditions include wind from source to receiver, with wind speeds of around 1 to 5 m/s, measured at a height of 3 to 11 m above the ground. These propagation conditions are considered consistent with the noise-enhancing weather conditions specified in *Fact Sheet D: Accounting for noise-enhancing weather conditions* of the NPfI.

ISO 9613-2 has been used extensively on industrial projects in Australia over several decades and has been accepted previously by NSW DPE (now DPHI) in numerous environmental noise assessments.

The noise model includes ground topography, ground type (ground absorption modelled at 0.0 (hard ground) in the industrial area (NCA04 and the project site) and 0.5 (mixed ground) in the rest of the noise model outside the industrial area), buildings and representative noise sources from the proposal.

The potential impacts have been determined by comparing the predicted noise levels to the NPfI PNTLs in a 15-minute assessment period.

Noise levels have been assessed at the identified sensitive receivers with reference to the requirements of 'Section 2.6 – Assessment Locations' of the NPfI. This includes assessment of impacts at all floors of the identified multi-storey buildings.

4.2.1 Operational Noise Sources

The proposal is a speculative development with no tenants committed. The facility has been designed to accommodate typical data centre users.

Several assumptions have been made regarding the future tenants and likely sources of noise. These assumptions have been used to develop representative noise modelling scenarios that reflect the expected highest noise emissions that the development would likely emit.

The development comprises a multi-storey data centre building with associated data halls, plant rooms, backup generators, ancillary office area, vehicle access, loading dock, carparking, security hut and fencing with secure access. Design plans of the development are shown in **Figure 3** to **Figure 6**.

Light vehicle and heavy vehicles access would be from McCredie Road. The site would be in use 24 hours a day. It is anticipated that deliveries and loading dock access would typically be via medium rigid trucks.



The main sources of operational noise at the development are expected to include:

- Rooftop cooling towers and other externally located items of mechanical plant
- Testing of backup generators (see **Section 4.2.2.1** for more details)
- Internally located mechanical plant, such as items within electrical plant rooms and other mechanical services areas
- On-site light and heavy vehicle movements
- Loading dock activities
- Off-site vehicle movements.

A summary of the expected noise sources and representative assessment scenarios associated with the operation of the development is provided below. The noise model includes the operations of the ultimate development (inclusive of both Stage 1 and Stage 2). The location of the modelled noise sources is shown in **Figure 9** and **Figure 10**.



Figure 9 Modelled Noise Sources – Ground Level Sources

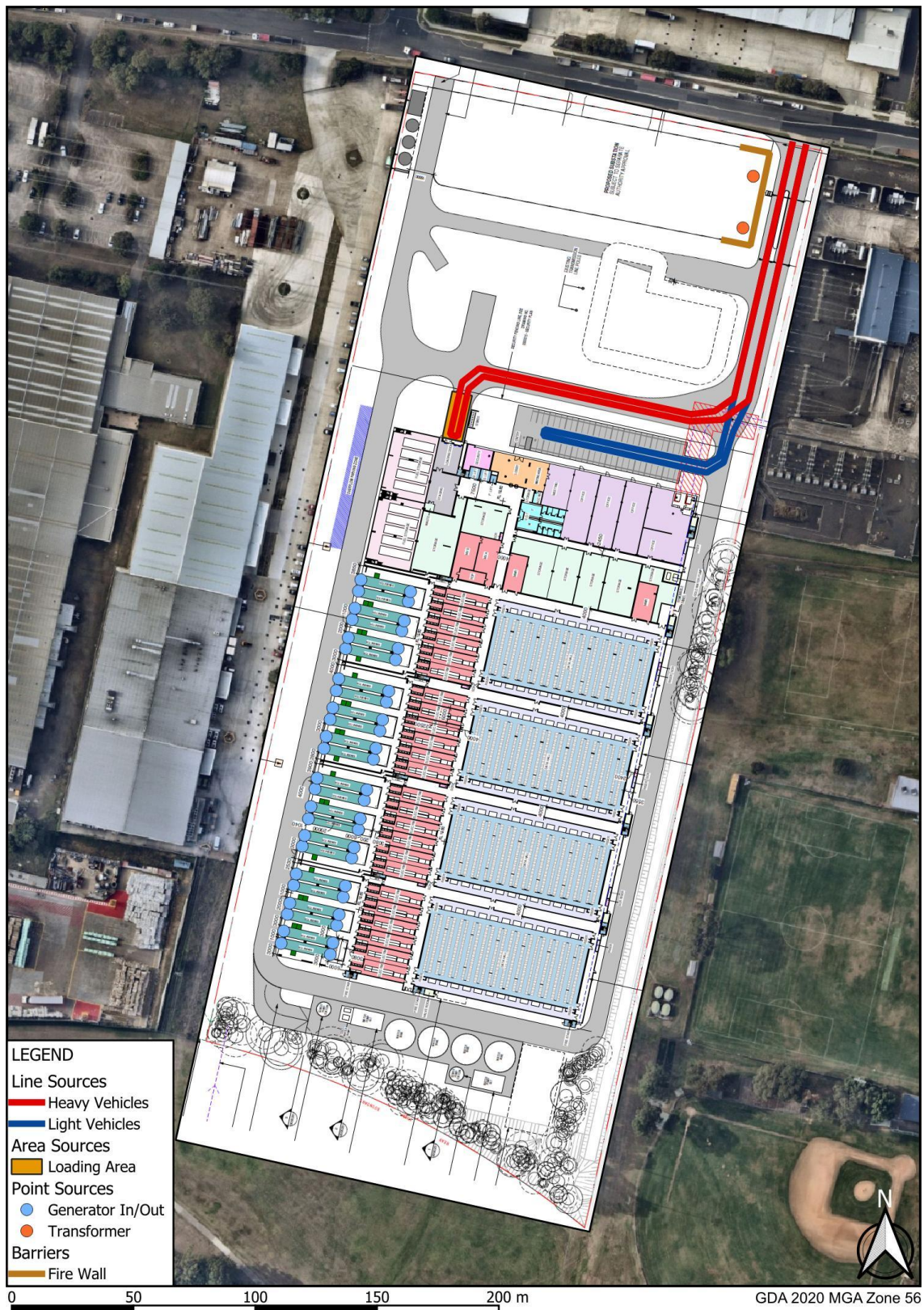
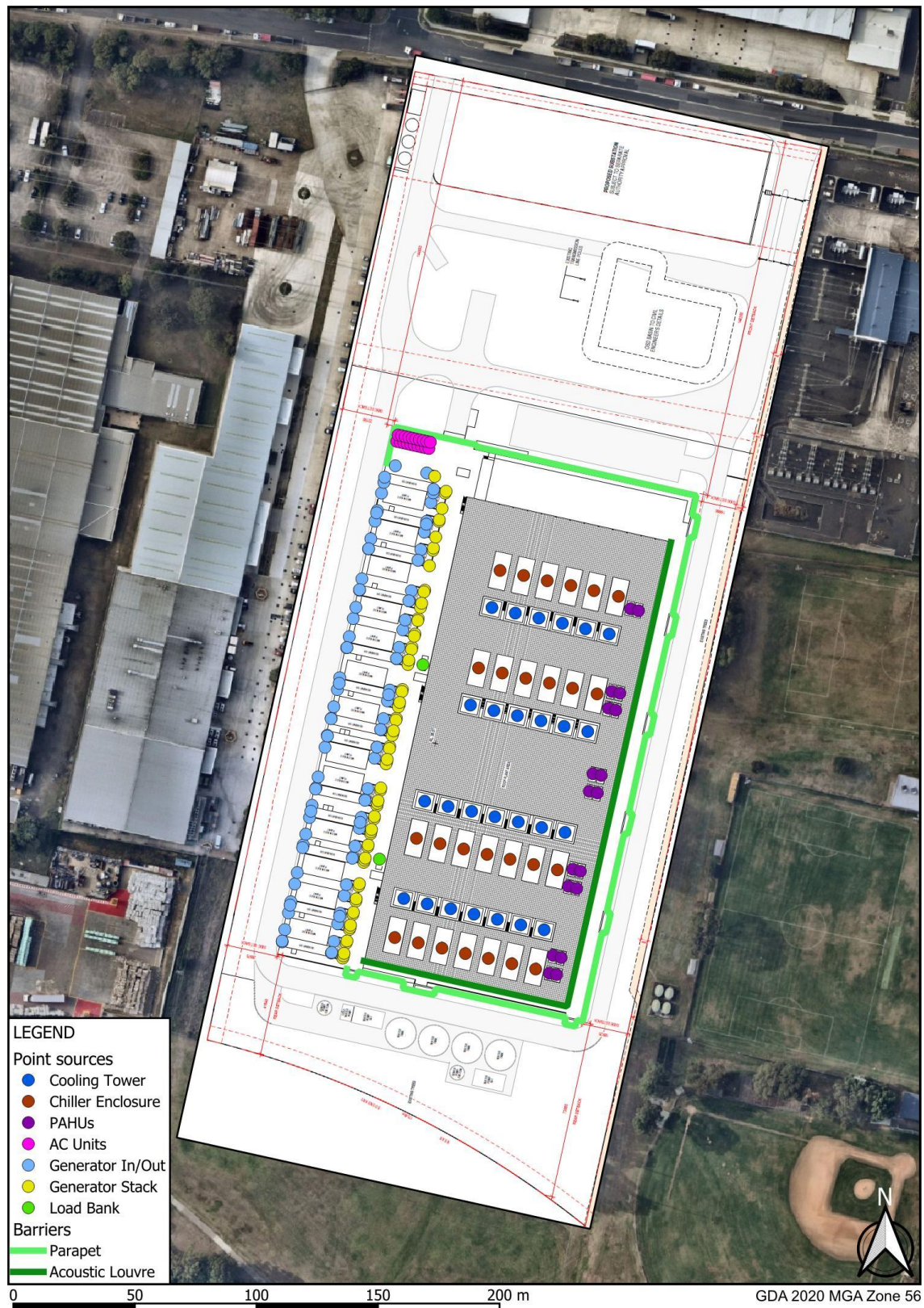


Figure 10 Modelled Noise Sources – Elevated Sources



4.2.1.1 Roof Layout

The proposed roof layout incorporates the following features (shown in **Figure 10**):

- Solid parapet walls to a height of around RL 33.60 m around the north, east and south edges of the data centre roof
- Mechanical plant platform on the data centre roof at a height of around RL 36.07 m
- Louvre screens to a height of around RL 45.07 m around the edges of the mechanical plant platform (down to roof level). The eastern and southern louvre screens are indicatively proposed to use acoustic louvres.

4.2.1.2 On-Site Traffic

On-site vehicles have been modelled using the data provided by the project's traffic consultant in **Table 21**. The volumes are representative of the expected worst-case 15-minute period for the daytime, evening and night-time. The volumes conservatively assume that light and heavy vehicles access the site concurrently during the worst-case 15-minute assessment period. In reality, vehicle access would be unlikely to occur concurrently, particularly during the night-time.

Heavy vehicle deliveries would typically be via medium rigid trucks.

Table 21 Vehicle Traffic Data – Worst-case 15-Minute Period

Vehicle Type	Location	Sound Power Level (dBA)	Vehicle Speed (km/h)	Number of Vehicles in Worst-case 15-Minute Period ¹		
				Daytime (7am to 6pm)	Evening (6pm to 10pm)	Night-time (10pm to 7am)
Medium trucks	Vehicle entry and hardstand	95 ²	5	1	0	0
Light vehicles	Vehicle entry and carpark	90 ²	5	8	3	6

Note 1: Total vehicles, includes both inbound and outbound vehicles. Volumes are rounded up to whole numbers for display purposes.

Note 2: Sound power level based on SLR measurement data.

4.2.1.3 Loading Docks

Details of the loading dock noise sources are shown in **Table 22**. The various sources have been modelled in the loading dock area based on the corresponding number of heavy vehicle movements in the worst-case 15-minute periods (see **Table 21**).

Table 22 Typical Hardstand and Loading Dock Noise Sources

Noise Source	Sound Power Level (dBA) ¹	Typical Duration of Use in Worst-case 15-minute Period
Truck reversing alarm	107 ^{2,3}	30 seconds
Forklift reversing alarm	102 ^{2,3}	90 seconds
Air brakes	118	1 second
Roller door	94	15 seconds
Electric forklift	84	900 seconds



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

Note 2: SWL based on recommendation to use broadband reversing alarms, see **Section 7.2**.

Note 3: SWL includes a -3 dB reduction due to alarms being discrete events.

4.2.1.4 Mechanical Plant

The main sources of externally located mechanical plant noise at the development would be the rooftop cooling towers, chiller enclosures, pressurisation air handling units (PAHUs), air conditioning units, and maintenance testing of the backup generators.

The mechanical plant used in the assessment, together with corresponding sound power levels and number of units and locations, are detailed in **Table 23**.

Table 23 Mechanical Plant

Noise Source	Example Unit	Sound Power Level (dBA)	Locations and Operations
Cooling towers	BAC XES3E-1222-07M ENDURA/H	84 dBA ¹	26 cooling towers on gantry on roof of data centre (see Figure 10). Assumed to operate 24 hours a day.
Chillers	York YZ_MA04 1AN037P078HA	77 dBA ventilation fan (breakout from chiller enclosure assumed to be negligible compared to fan)	26 chiller enclosures on gantry on roof of data centre (see Figure 10). Assumed to operate 24 hours a day.
PAHUs	Airchange PCU-N-D 40	52 dBA	18 PAHUs on gantry on roof of data centre (see Figure 10). Assumed to operate 24 hours a day.
AC Units	Mitsubishi PURY-M500YNW-A1	64 dBA	20 AC units on roof of data centre (see Figure 10). Assumed to operate 24 hours a day.
Backup generators	MTU 20V4000 DS3100	Intake design SWL 93 dBA ²	68 backup generators located in three levels in the west area of the site. The exhaust stacks for all generators terminate around RL 46.07 m. The backup generators would be tested during daytime hours (see Section 4.2.2.1 for more details).
		Outtake design SWL 93 dBA ²	
		Exhaust stack design SWL 93 dBA ²	
Load bank	Sephco WAR20CL2500	99 dBA	2 load banks located on gantry on roof of data centre will be used during testing of backup generators. (see Figure 10).

Note 1: Sound power level based on unit operating at typical peak speed based on advice from the manufacturer.

Note 2: Generator enclosures are custom built with design sound power levels for the generator enclosure intakes and outtakes, and generator exhaust gas stacks.

Mechanical plant manufacturer data sheets have been provided in **Appendix G**, where appropriate. Selection of mechanical plant was undertaken by the project's mechanical consultant. This selection took into account the worst-case operating conditions based on analysis of weather data for the area. The mechanical consultant's cooling analysis memorandum is also provided in **Appendix G**.



Various items of mechanical plant would also be located internally within the data centre. This includes items within the various data halls, electrical plant rooms and mechanical services areas. Details regarding these internal items of equipment are not currently available, however, breakout noise from these items is expected to be relatively minor compared to noise from externally located mechanical plant and testing of backup generators) given the internal plant areas are generally separated from the external facades by service corridors (see **Figure 3** to **Figure 6**).

The exact requirements for all items of mechanical plant would be determined as the project progresses when specifics are known about tenant requirements. Further noise modelling of all items of mechanical plant would be completed during the production of later noise assessments when the selected mechanical plant is known.

4.2.1.5 Substation

A substation is proposed to be built in the northern area of the site (see **Figure 3**). This substation would be subject to a separate authority approval, and is proposed to be built during construction of Stage 2 of the development.

Indicative noise emissions from the substation transformers have been included in the assessment to estimate cumulative impacts of the data centre and the substation operating concurrently.

Table 24 Indicative Substation Noise Sources

Noise Source	Reference	Sound Power Level (dBA)	Locations and Operations
Substation transformers	IEC60076-10 100 MVA (standard limit)	94 dBA	2 substation transformers indicatively modelled in the substation area with 8 m fire walls (see Figure 9). Assumed to operate 24 hours a day.

4.2.2 Operational Scenarios

4.2.2.1 Maintenance Testing of Backup Generators

The backup generators would require scheduled maintenance and would be tested during daytime business hours (ie 7 am to 6 pm Monday to Saturday and 8 am to 6 pm Sundays and public holidays). The maintenance testing schedule would include quarterly and annual testing, with a maximum of two generators being tested at full 100% load at a time, accompanied by two load banks, and up to two generators idling at 0% load.

The generators will operate as a standby power supply in the event of mains failure. Major power interruptions requiring the simultaneous operation of all standby generators would only occur infrequently and for a limited time.

Details regarding the backup generator testing are shown in **Table 25**.



Table 25 Proposed Generator Maintenance Testing Regime

Parameter	Values	
Test frequency per generator	Quarterly maintenance*	Annually operational run
No of generators	68	68
No of tests each year per generator	3	1
Run time per test	70 minutes (including 5 minute cooldown)	95 minutes (including 5 minute cooldown)
No of generators at full load (100%) per test	2	2
No of generators at no load (0%) per test	2	2
No of load banks per test	2	2
Total testing time for all generators	192.83 hours	
Testing schedule	7:00 am to 6:00 pm Monday to Saturday, and 8:00 am to 6:00 pm Sundays & public holidays	
Note: Generator tested under low load is to be undertaken such that the emissions do not exceed the POEO (Clean Air) Standard of Concentration for non-scheduled premises.		
* Quarterly maintenance occurs in three quarters of the year, annual testing occurs in the 4th quarter.		
Source: Data provided by ARUP 2025		

An additional operational scenario has been modelled which includes generator testing, see **Table 26** for more details.

4.2.2.2 Emergency Power Failure

Operation of backup generators (outside of maintenance/testing) is only expected to occur during an emergency where mains power to the development is lost. It is not considered reasonable for the development to be required to meet the operational noise criteria during this infrequent emergency scenario and it has not been assessed further.

4.2.2.3 Representative Operational Scenarios

Representative scenarios have been developed to assess the likely impacts from the operation of the proposal. These scenarios are shown in **Table 26**.



Table 26 Operational Assessment Scenarios

Scenario	Name	Description
OP.01	Normal Operations	- All equipment operating at typical peak capacity, except for backup generators. - Includes indicative noise emissions from the substation in the northern area of the site (substation subject to separate approval). - Assessed during daytime, evening and night-time periods.
OP.02	Maintenance/Testing Operations	- All equipment operating at typical peak capacity, including concurrent maintenance / testing of four backup generators (two at 100% load, up to two at 0% load) with two load banks. - The assessment conservatively uses the same sound power level for generators idling at 0% load and being tested at 100% load, based on information from the manufacturers indicating minimal reduction when idling. - All generator locations were modelled, with the worst-case generators for each receiver included in the predicted noise levels for that receiver. - Includes indicative noise emissions from the substation in the northern area of the site (substation subject to separate approval). - Assessed during daytime only.

Operational scenarios for the interim Stage 1 development are generally consistent with the ultimate development noise sources and scenarios detailed above, with the following changes:

- 12 cooling towers instead of 24
- 12 chiller enclosures instead of 24
- 10 PAHUs instead of 18
- 39 generators instead of 68
- Quantities of AC units and load banks do not change
- Vehicles movements and loading activities do not change
- Sound power levels of all equipment do not change
- Generator testing scenarios do not change
- While the substation is indicatively planned to be built during construction of the Stage 2 development, it has conservatively been included in the Stage 1 noise model.
- An interim acoustic louvre screen is proposed along the southern edge of the Stage 1 equipment platform, along with the permanent screen along the eastern edge.

4.2.3 Noise Source Inventory

A noise source inventory which includes the details of the various operational noise sources at the development is shown in **Table 27**. The noise model includes the operations of the ultimate development (inclusive of both Stage 1 and Stage 2) as per the inputs shown in



Table 27. Changes specific to the Stage 1 development operational scenario are detailed above in **Section 4.2.2.3**.

Table 27 Noise Source Inventory

Category	Noise Source	Usage	Reference for Noise Data
On-site traffic	Light vehicles	Light vehicles would access the development and park in the car park. Modelled in the location shown in Figure 9 using vehicle volumes in Table 21 .	Sound power level taken from measurement data of various light vehicle types and models at speeds of up to around 40 km/h, including vehicle acceleration.
	Medium trucks	Deliveries to the development would be via heavy vehicles. Heavy vehicle deliveries would be typically be via medium rigid trucks. Heavy vehicles would access the development via McCredie Road and travel to the loading docks. Modelled on the heavy vehicle route shown in Figure 9 using vehicle volumes in Table 21 .	Sound power level taken from historical measurement data of various medium rigid truck types and models in approximate 5 to 15 tonne range.
Loading docks	Reversing alarms, air brakes, forklifts, roller doors	Heavy vehicle deliveries would be unloaded via the loading docks. Modelled in the loading docks shown in Figure 9 using vehicle volumes in Table 21 .	Sound power level taken from historical measurement data of typical loading dock activities at various warehousing and distribution facilities.
Internal activities	Typical data centre activities	Internal noise-generating activities would be associated with typical data centre activities, including mechanical plant in the various data halls, electrical plant rooms and mechanical services areas.	Details regarding these internal items of equipment are not currently available, however, breakout noise from these items is expected to be relatively minor (compared to noise from externally located mechanical plant and testing of backup generators) given the internal plant areas are generally separated from the external facades by service corridors.
Mechanical plant	Cooling towers	Cooling towers would be used to expel heat from the data centre operations. Indicative cooling tower requirements are 26 units. These units would operate 24 hours a day and have been modelled on the data centre roof shown in Figure 10 using the details in Table 23 .	Sound power level taken from manufacturers specifications for the indicative units, supplied by the project team.



Category	Noise Source	Usage	Reference for Noise Data
	Chillers	Chillers would be used as a heat exchange for various data centre operations. Indicative chiller requirements are 26 units in chiller enclosures on the roof of the data. These units would operate 24 hours a day and have been modelled on the data centre roof shown in Figure 10 using the details in Table 23 .	Sound power level taken from manufacturers specifications for the indicative units, supplied by the project team.
	Pressurisation air handling units	PAHUs would be used to cool and pressurise internal spaces within the data centre. Indicative PAHU requirements are 18 units. These units would operate 24 hours a day and have been modelled on the data centre roof shown in Figure 10 using the details in Table 23 .	Sound power level taken from manufacturers specifications for the indicative units, supplied by the project team.
	Air conditioning units	AC units would be used to cool internal spaces within the data centre office areas. Indicative AC requirements are 20 units. These units would operate 24 hours a day and have been modelled on the data centre roof shown in Figure 10 using the details in Table 23 .	Sound power level taken from manufacturers specifications for the indicative units, supplied by the project team.
	Backup generators	Backup generators would be used to provide power to the data centre in the event of loss of mains power. 68 backup generators have been modelled in three levels in the west area of the site shown in Figure 9 and Figure 10 using the details in Table 23 . Backup generators would be operated as detailed in Section 4.2.2 .	The generators would be housed in custom built containers with exhaust stacks that terminate above roof level. Design sound power levels were supplied by the project team based on manufacturers specifications and indicative attenuator and silencer designs to meet the design sound power levels.
	Load bank	2 load banks will be used during testing of backup generators. The load banks are indicatively located on the roof between the generators and the equipment platform, shown in Figure 10 using the details in Table 23 . The load banks would be operated only during testing of backup generators as detailed in Section 4.2.2 .	Sound power level taken from manufacturers specifications for the indicative load bank unit, supplied by the project team.



Category	Noise Source	Usage	Reference for Noise Data
Substation	Substation transformers	A substation is proposed to be built in the northern area of the site during construction of Stage 2 of the development (subject to separate authority approval). 2 substation transformers have indicatively been modelled in the substation area with 8 m fire walls shown in Figure 9 using the details in Table 24. The substation has been included to estimate cumulative impacts with the data centre.	Indicative sound power level supplied by the project team.

4.2.4 Corrections for Annoying Noise Characteristics

The potential annoying noise characteristics and modifying factor corrections relevant to the proposal are tonality, low-frequency noise and intermittent noise. The assessment of tonality and low-frequency noise is typically limited by the available data for the applicable noise sources, with manufacturer sound power level data for mechanical plant typically being supplied as either a single overall level, or limited octave band levels (typically 63 Hz to 8 kHz), rather than 1/3 octave levels required for NPfI assessment of tonality and low-frequency noise. Additionally, all mechanical plant is indicative and will be reviewed during detailed design once tenant requirements are confirmed.

Cooling towers are the dominant item of equipment for normal operations. The proposed data centre at 1-5 Khartoum Road, Macquarie Park, proposes to use the same model cooling towers as this assessment (ie, BAC XES3E-1222-07M ENDURA/H) (refer to Arup report “MPark Talavera Road Data Centre Noise and Vibration Impact Assessment”, reference 304093-AC05 v5 SSDA NVIA, dated December 2024) (1-5 Khartoum Rd NVIA). The SSD-63235720 1-5 Khartoum Rd NVIA was sourced from the NSW Major Projects Planning Portal.

As low frequency 1/3 octave spectrum noise levels for the cooling towers are not provided on the manufacturer data sheets for the units, the 1/3 octave spectrum below 63 Hz for cooling towers has been conservatively estimated based on the data from the 1-5 Khartoum Rd NVIA, adjusted for the cooling tower unit sound power level in this assessment.

The adopted 1/3 octave spectrum for the cooling towers is shown in **Table 28**.



Table 28 Adopted 1/3 Octave Spectrum – Cooling Towers

Source	Unweighted 1/3 Octave Frequency (Hz) Sound Power Level (dBZ)					Total A-Weighted Sound Power Level (dBA)
	10	50	200	800	3,150	
	12.5	63	250	1,000	4,000	
	16	80	315	1,250	5,000	
	20	100	400	1,600	6,300	
	25	125	500	2,000	8,000	
	31.5	160	630	2,500	10,000	
	40					
Cooling Towers	87	87	82	75	70	84
	87	85	80	74	69	
	90	85	79	74	66	
	92	85	77	73	63	
	88	84	75	72	60	
	88	83	75	71	60	
	88					

An example of the tonality and low-frequency assessment results is shown in **Table 29** based on the predicted operational noise levels at the most-affected residential receiver. The below assessment has been undertaken for all applicable receivers to determine the applicable corrections for annoying noise characteristics.

Table 29 Assessment of Annoying Noise Characteristics

Most-Affected Receiver	Predicted Leq(15minute) Noise Levels – OP.01 Night						Tonal Trigger	Low Frequency Trigger
	Unweighted 1/3 Octave Frequency (Hz) (dBZ)					Total Noise Level (dB)		
	10	50	200	800	3,150			
	12.5	63	250	1,000	4,000			
	16	80	315	1,250	5,000			
	20	100	400	1,600	6,300			
	25	125	500	2,000	8,000			
	31.5	160	630	2,500	10,000			
40								
All NCA's	47	45	37	27	14	38 dBA	No	No
	46	44	36	28	12	58 dBZ		
	50	42	33	25	10	54 dBC		
	51	40	30	23	8			
	47	43	31	24	5			
	47	39	27	18	2			
	47							



The above assessment has been undertaken for all applicable receivers to determine the applicable corrections for annoying noise characteristics, detailed as follows:

- **Tonality** – the only source identified with potential tonal characteristics is truck and forklift reversing alarms. However, when considering broadband reversing alarms have been recommended as a noise mitigation measure (see **Section 7.2**), it is unlikely that this noise source would result in tonal noise impacts at the receivers and no corrections have been applied.
- **Low frequency noise** – noise levels at residential receivers from development-related mechanical plant were analysed as per the requirements of the NPfl and are not expected to result in low frequency noise impacts. No corrections have been applied.
- **Intermittent noise** – the NPfl defines intermittent noise as noise heard at the receiver where the level suddenly drops or increases several times during the assessment period, with a noticeable change of at least 5 dB. The intermittent correction does not apply to short-term events that emerge above the general industrial noise level and is therefore not applicable to industrial or commercial sites that have vehicle or plant movements at night, including audible reversing alarms. While testing of the backup generators may be intermittent, the testing is only undertaken during the daytime when no correction is applicable. No other sources have been identified with potential intermittent characteristics.

The above corrections for annoying noise characteristics will be reviewed during the detailed design stage of the project when tenant requirements for specific mechanical plant are known.

4.2.5 Noise Sources with Potential for Sleep Disturbance

As the development is proposed to operate 24-hours a day, noise emissions during the night-time require assessment for potential sleep disturbance at the nearest residential receivers. The details of typical activities with the potential to cause sleep disturbance are shown in **Table 30**.

The various sources have been modelled in the car parking area and light vehicle access (see **Figure 9**). It is noted that truck movements and loading dock operations are not proposed during the night-time period.

Table 30 Sleep Disturbance Noise Events – L_{Amax} Sound Power Levels

Noise Source	Sound Power Level L _{Amax} (dBA)
Light vehicle movement and parking	100

4.2.6 Off-site Road Traffic

Access to/from the site would be via McCredie Road and Sturt Street to the Cumberland Highway. There are no residential receivers between the site and Cumberland Highway. Daytime and night-time vehicle movements from the proposed development have been provided by the projects traffic consultant. Vehicle movements for the ultimate development (Stage 1 and Stage 2) are proposed to be around 199 vehicles during the daytime (7am to 10pm) and 32 vehicles during the night-time, with around 6% heavy vehicles during the day, and no heavy vehicles during the night.

At this stage of the project existing 24-hour traffic volumes are not available for the access route to the development. AM and PM peak volumes are available for McCredie Road, Sturt



Street and Cumberland Highway. Peak vehicle volumes on McCredie Road and Sturt Street are around 630 to 1,140 vehicles during the AM and PM peak 1-hour periods, with around 23% to 36% heavy vehicles. Peak vehicle volumes on Cumberland Highway are around 3,700 to 4,700 vehicles during the AM and PM peak 1-hour periods, with around 8% to 11% heavy vehicles.

The potential noise impacts from additional traffic have been assessed based on the above traffic data.

4.2.7 Weather Conditions

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

The nearest sensitive receivers are within 400 m of the proposal site and the effects of weather on noise levels are expected to be minimal due to the minimal source to receiver distance. Notwithstanding, the noise prediction modelling uses ISO 9613-2 algorithms which include noise-enhancing weather conditions including downwind propagation, or equivalently, propagation under a well-developed moderate ground-based temperature inversion.

As such, the assessment has conservatively applied noise-enhancing weather conditions for all periods as per Option 1 of Fact Sheet D of the NPfl.



5.0 Assessment of Impacts

5.1 Construction Noise

5.1.1 Stage 1

The predicted noise levels during Stage 1 construction works at the most-affected sensitive receivers surrounding the site are shown in **Table 31** and exceedances of the NMLs are shown in **Table 32**.

The predictions represent a realistic worst-case scenario where the equipment in each scenario is working concurrently at the nearest location to each receiver. It is expected that noise levels would frequently be lower than the worst-case levels presented.

Construction of the facility will be during the recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays. Construction outside recommended standard hours will be managed in accordance with the out-of-hours works protocol in a Construction Noise and Vibration Management Plan (CNVMP) prepared prior to commencement of construction.

Table 31 Predicted Construction Noise Levels – Standard Daytime Construction Hours – Stage 1 Works

NCA	Receiver Type	NML	Predicted Noise Level – LAeq(15minute) (dBA)				
			W.01 Vegetation clearing	W.02 Earthworks	W.03 Excavation of hard rock	W.04 Construction of pads & hardstands	W.05 Construction of structures & equipment installation
NCA01	Residential	55	63	60	67	54	55
NCA02	Residential	54	67	64	71	58	59
NCA03	Active recreation	65	73	70	77	64	65
NCA04	Industrial	75	81	78	85	72	73

Note 1: **Bold red** indicates an exceedance of the Highly Noise Affected NML.



Table 32 Predicted Exceedance at Nearest Receivers – Standard Daytime Construction Hours – Stage 1 Works

NCA	Receiver Type	NML	Predicted Exceedance – LAeq(15minute) (dBA)				
			W.01 Vegetation clearing	W.02 Earthworks	W.03 Excavation of hard rock	W.04 Construction of pads & hardstands	W.05 Construction of structures & equipment installation
NCA01	Residential	55	8	5	12	-	-
NCA02	Residential	54	13	10	17	4	5
NCA03	Active recreation	65	8	5	12	-	-
NCA04	Industrial	75	6	3	10	-	-
Legend (NML exceedances)			= Minor to marginal (1 to 10 dB)		= Moderate (11 to 20 dB)		= High (>20 dB)

The above worst-case predictions show the following:

- Construction noise levels during W.01 (vegetation clearing) are predicted to result in minor exceedances of the NMLs at the nearest receivers in NCA01, NCA03 and NCA04, and minor to moderate exceedances at the nearest receivers in NCA02.
- Construction noise levels during W.02 (earthworks) are predicted to result in minor exceedances of the NMLs at the nearest receivers in NCA01, NCA02, NCA03 and NCA04.
- Construction noise levels during W.03 (excavation of hard rock) are predicted to result in minor to moderate exceedances of the NMLs at the nearest receivers in NCA01, NCA02 and NCA03, and minor exceedances at the nearest receivers in NCA04.
- Construction noise levels during W.04 (construction of pads and hardstands) and W.05 (construction of structures and equipment installation) are predicted to result in minor exceedances of the NMLs in NCA02, and be below the NMLs at the nearest receivers in NCA01, NCA03 and NCA04.
- The highest impacts are predicted during 'vegetation clearing' when a chainsaw/chipper is in use close to receivers, and during 'excavation of hard rock' when a rockbreaker is in use close to receivers.
- Noise levels at residential receivers are not predicted to exceed the Highly Noise Affected NML during the assessed works.
- Works would only occur during Standard Daytime Construction Hours. There is no expectation that evening or night-time work would be required.

The presented impacts would only be expected to occur when noisy work is being completed close to the site boundaries, relative to each receiver. When work is further from the receiver, or when less noise-intensive equipment is being used, the noise levels and potential impacts would be lower.



Feasible and reasonable construction noise mitigation measures should be applied where exceedances of the NMLs are predicted. Construction noise mitigation and management measures are discussed in **Section 7.1**.

5.1.2 Stage 2

Stage 2 construction works would be confined to the southern area of the site after the Stage 1 data centre has been constructed. W.01 (vegetation clearing) is not applicable to the Stage 2 works. The predicted noise levels during Stage 2 construction works at the most-affected sensitive receivers surrounding the site are shown in **Table 33** and exceedances of the NMLs are shown in **Table 34**.

The predictions represent a realistic worst-case scenario where the equipment in each scenario is working concurrently at the nearest location to each receiver. It is expected that noise levels would frequently be lower than the worst-case levels presented.

Construction of the facility will be during the recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays. Construction outside recommended standard hours will be managed in accordance with the out-of-hours works protocol in a Construction Noise and Vibration Management Plan (CNVMP) prepared prior to commencement of construction.

Table 33 Predicted Construction Noise Levels – Standard Daytime Construction Hours – Stage 2 Works

NCA	Receiver Type	NML	Predicted Noise Level – LAeq(15minute) (dBA)			
			W.02 Earthworks	W.03 Excavation of hard rock	W.04 Construction of pads & hardstands	W.05 Construction of structures & equipment installation
NCA01	Residential	55	54	61	48	49
NCA02	Residential	54	64	71	58	59
NCA03	Active recreation	65	69	76	63	64
NCA04	Industrial	75	78	85	72	73

Note 1: **Bold red** indicates an exceedance of the Highly Noise Affected NML.



Table 34 Predicted Exceedance at Nearest Receivers – Standard Daytime Construction Hours – Stage 2 Works

NCA	Receiver Type	NML	Predicted Exceedance – LAeq(15minute) (dBA)			
			W.02 Earthworks	W.03 Excavation of hard rock	W.04 Construction of pads & hardstands	W.05 Construction of structures & equipment installation
NCA01	Residential	55	-	6	-	-
NCA02	Residential	54	10	17	4	5
NCA03	Active recreation	65	4	11	-	-
NCA04	Industrial	75	3	10	-	-
Legend (NML exceedances)			= Minor to marginal (1 to 10 dB)		= Moderate (11 to 20 dB)	
					= High (>20 dB)	

The above worst-case predictions show the following:

- Construction noise levels during W.02 (earthworks) are predicted to result in minor exceedances of the NMLs at the nearest receivers in NCA02, NCA03 and NCA04.
- Construction noise levels during W.03 (excavation of hard rock) are predicted to result in minor to moderate exceedances of the NMLs at the nearest receivers in NCA02 and NCA03, and minor exceedances at the nearest receivers in NCA01 and NCA04.
- Construction noise levels during W.04 (construction of pads and hardstands) and W.05 (construction of structures and equipment installation) are predicted to result in minor exceedances of the NMLs in NCA02, and be below the NMLs at the nearest receivers in NCA01, NCA03 and NCA04.
- The highest impacts are predicted during 'excavation of hard rock' when a rockbreaker is in use close to receivers.
- Noise levels at residential receivers are not predicted to exceed the Highly Noise Affected NML during the assessed works.
- Works would only occur during Standard Daytime Construction Hours. There is no expectation that evening or night-time work would be required.

The presented impacts would only be expected to occur when noisy work is being completed close to the site boundaries, relative to each receiver. When work is further from the receiver, or when less noise-intensive equipment is being used, the noise levels and potential impacts would be lower.

Feasible and reasonable construction noise mitigation measures should be applied where exceedances of the NMLs are predicted. Construction noise mitigation and management measures are discussed in **Section 7.1**.



5.2 Construction Vibration

5.2.1 Stage 1

The major potential sources of vibration from the proposed construction activities for Stage 1 would likely be during:

- 'Earthworks' when vibratory rollers are being used
- 'Excavation of hard rock' when rockbreakers are being used.

Vibration offset distances have been determined from the CNVG minimum working distances for cosmetic damage and human comfort (see **Table 11**) and the assessment is summarised in **Figure 11** for the potential worst-case scenario, which is during the use of a large vibratory roller. Buildings within the minimum working distances are highlighted in the figure.

Cosmetic Damage Assessment

Figure 11 indicates that the nearest industrial buildings to the west, north and east are potentially within the minimum working distance when vibratory rollers are in use at the boundaries of the construction site. Additionally, any structures within the easement in the northern area of the site are likely within the minimum working distance when vibration intensive plant is used nearby.

Some ancillary structures at the Guildford West Sports Ground to the east may also be within the minimum working distance when vibratory rollers are in use at the boundaries of the construction site.

All residential buildings are sufficiently distant from the site to be outside the minimum working distance and cosmetic damage impacts at these receivers are unlikely.

Feasible and reasonable construction vibration mitigation measures should be applied where vibration-intensive works are required within the minimum working distances. Construction mitigation and management measures are discussed further in **Section 7.1**.

Human Comfort Vibration Assessment

Figure 11 indicates that the nearest industrial receivers surrounding the site are within the human comfort minimum working distance and occupants of these buildings may be able to perceive vibration impacts at times when vibratory rollers or rockbreakers are in use nearby. Where impacts are perceptible, they would likely only be apparent for relatively short durations when vibration-intensive equipment is in use.

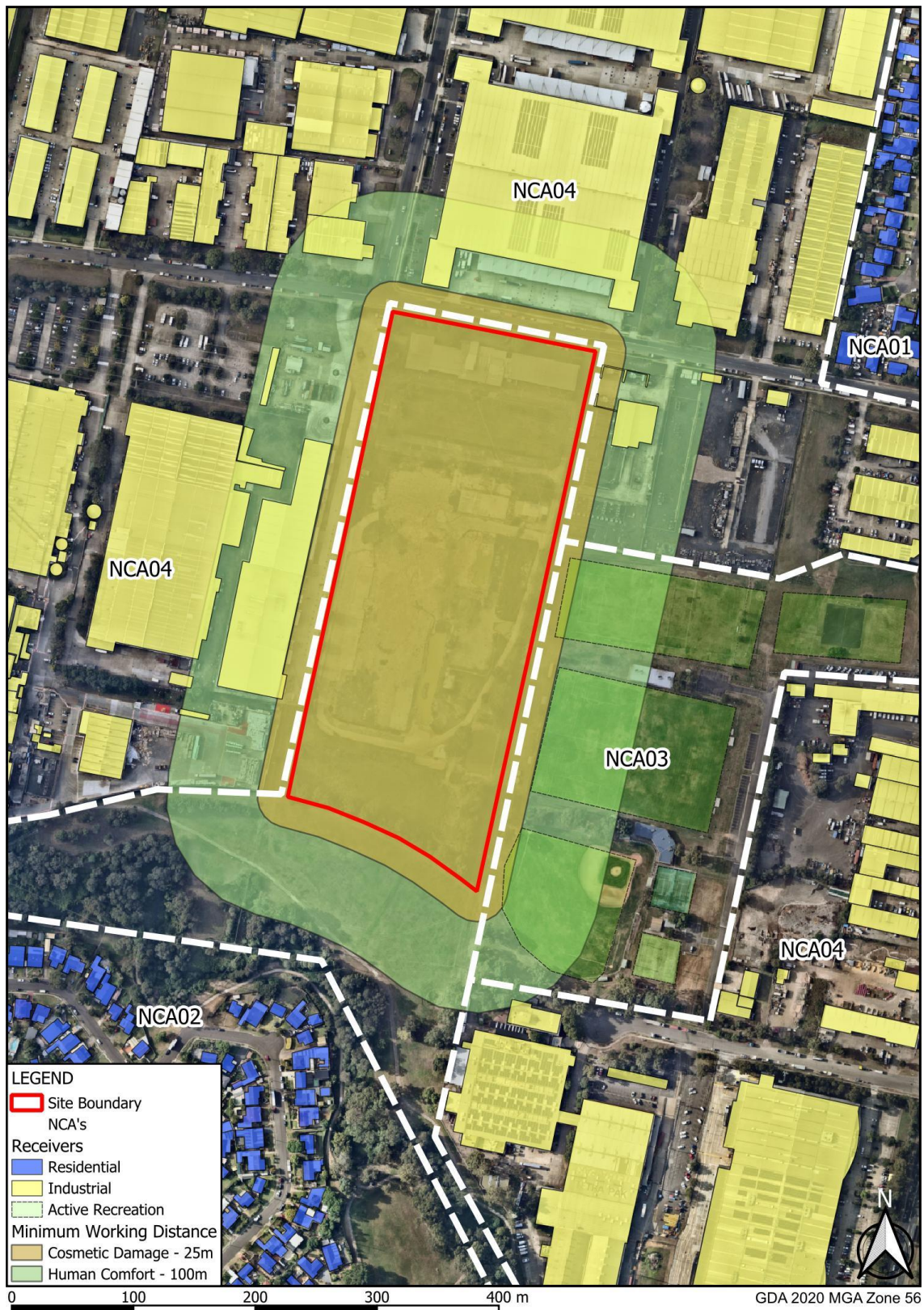
Areas of the Guildford West Sports Ground to the east are likely within the minimum working distance when vibratory rollers are in use at the boundaries of the construction site.

All residential buildings are sufficiently distant from the site to be outside the minimum working distance and human comfort impacts at these receivers are unlikely.

Feasible and reasonable construction vibration mitigation measures should be applied where vibration-intensive works are required within the minimum working distances. Construction mitigation and management measures are discussed further in **Section 7.1**.



Figure 11 Construction Vibration – Large Vibratory Roller – Stage 1 Works



5.2.2 Stage 2

The major potential sources of vibration from the proposed construction activities for Stage 2 would likely be during:

- 'Earthworks' when vibratory rollers are being used
- 'Excavation of hard rock' when rockbreakers are being used.

Vibration offset distances have been determined from the CNVG minimum working distances for cosmetic damage and human comfort (see **Table 11**) and the assessment is summarised in **Figure 12** for the potential worst-case scenario, which is during the use of a large vibratory roller. Buildings within the minimum working distances are highlighted in the figure.

Cosmetic Damage Assessment

Figure 12 indicates that the nearest industrial buildings to the west are potentially within the minimum working distance when vibratory rollers are in use at the boundaries of the construction site. Additionally, the Stage 1 development is likely within the minimum working distance when vibration intensive plant is used nearby.

Some ancillary structures at the Guildford West Sports Ground to the east may also be within the minimum working distance when vibratory rollers are in use at the boundaries of the construction site.

All residential buildings are sufficiently distant from the site to be outside the minimum working distance and cosmetic damage impacts at these receivers are unlikely.

Feasible and reasonable construction vibration mitigation measures should be applied where vibration-intensive works are required within the minimum working distances. Construction mitigation and management measures are discussed further in **Section 7.1**.

Human Comfort Vibration Assessment

Figure 12 indicates that the nearest industrial receivers to the west, along with the Stage 1 development, are within the human comfort minimum working distance and occupants of these buildings may be able to perceive vibration impacts at times when vibratory rollers or rockbreakers are in use nearby. Where impacts are perceptible, they would likely only be apparent for relatively short durations when vibration-intensive equipment is in use.

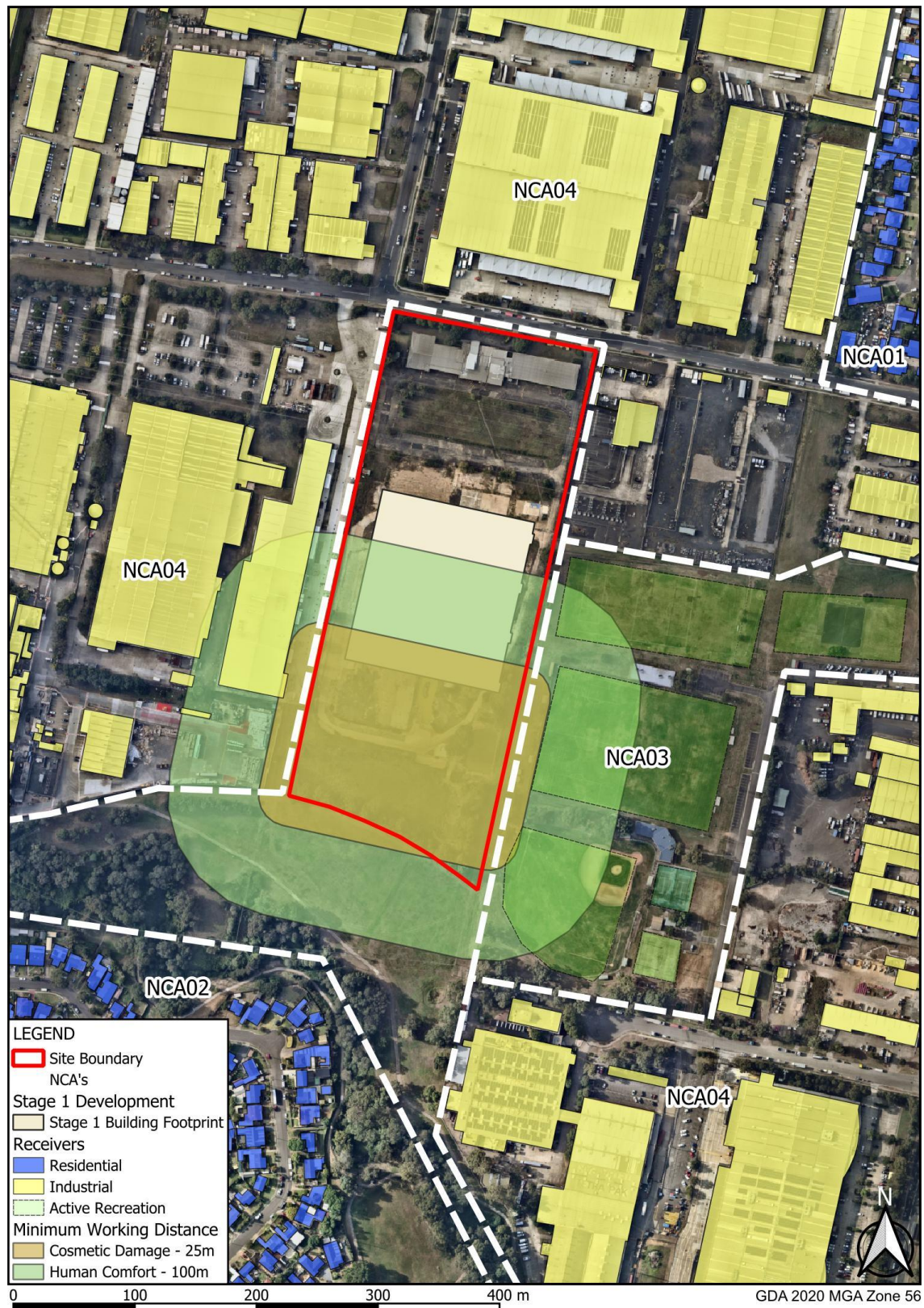
Areas of the Guildford West Sports Ground to the east are likely within the minimum working distance when vibratory rollers are in use at the boundaries of the construction site.

All residential buildings are sufficiently distant from the site to be outside the minimum working distance and human comfort impacts at these receivers are unlikely.

Feasible and reasonable construction vibration mitigation measures should be applied where vibration-intensive works are required within the minimum working distances. Construction mitigation and management measures are discussed further in **Section 7.1**.



Figure 12 Construction Vibration – Large Vibratory Roller – Stage 2 Works



5.3 Operational Noise

5.3.1 Predicted Noise Levels – Ultimate Development (Stage 1 and Stage 2)

A summary of the operational noise assessment from the ultimate development (Stage 1 and Stage 2) at the receivers surrounding the proposal is shown in **Table 35**. Impacts have been predicted at all floors of the receivers.

The predicted levels are compared to the Project Noise Trigger Levels to determine the potential impact from the proposal.

Table 35 Operational Noise Assessment – Ultimate Development

NCA	Receiver Type	Period	Predicted Noise Level LAeq(15minute) (dBA) ³			Compliance
			Noise Criteria	OP.01 ¹	OP.02 ²	
NCA01	Residential	Day	50	40	46	Yes
		Evening	43	38	-	Yes
		Night	38	38	-	Yes
NCA02	Residential	Day	49	37	49	Yes
		Evening	43	37	-	Yes
		Night	38	37	-	Yes
NCA03	Active recreation	When in use	53	46	48	Yes
NCA04	Industrial	When in use	68	57	67	Yes

Note 1: OP.01 – Normal Operations.

Note 2: OP.02 – Maintenance/Testing Operations.

Note 3: A 3 dB safety factor has been added to the predicted noise levels. This safety factor represents an allowance for potential uncertainty and increased noise emissions from the proposal that may occur due to selection of different mechanical plant units, increases to cooling tower noise due to variable frequency drives, additional minor external mechanical plant that is not known at this stage, or other minor modifications to noise sources utilised on the site.

The above assessment indicates that noise from the proposal is predicted to comply with the PNTLs during both OP.01 (typical operations) and OP.02 (testing of backup generators).

The details of the mechanical plant used in this assessment are indicative, including the unit types, sound power levels, number of units and locations of equipment. All mechanical plant items should be reviewed during later acoustic assessments during the detailed design stage of the project to confirm compliance with the PNTLs. It is expected that compliance is achievable through a combination of appropriate mechanical plant selection, orientation, position and screening, where appropriate.

A detailed investigation of all potential feasible and reasonable mitigation measures is provided in **Section 7.2**.

Noise contours of the predicted operational noise impacts are in **Appendix D**.



5.3.2 Predicted Noise Levels – Stage 1 Development

A summary of the operational noise assessment for the interim Stage 1 development at the receivers surrounding the proposal is shown in **Table 36**. Impacts have been predicted at all floors of the receivers.

The predicted levels are compared to the Project Noise Trigger Levels to determine the potential impact from the proposal.

Table 36 Operational Noise Assessment – Stage 1 Development

NCA	Receiver Type	Period	Predicted Noise Level LAeq(15minute) (dBA) ³			Compliance
			Noise Criteria	OP.01 ¹	OP.02 ²	
NCA01	Residential	Day	50	39	45	Yes
		Evening	43	38	-	Yes
		Night	38	38	-	Yes
NCA02	Residential	Day	49	34	48	Yes
		Evening	43	34	-	Yes
		Night	38	34	-	Yes
NCA03	Active recreation	When in use	53	46	48	Yes
NCA04	Industrial	When in use	68	57	67	Yes

Note 1: OP.01 – Normal Operations.

Note 2: OP.02 – Maintenance/Testing Operations.

Note 3: A 3 dB safety factor has been added to the predicted noise levels. This safety factor represents an allowance for potential uncertainty and increased noise emissions from the proposal that may occur due to selection of different mechanical plant units, increases to cooling tower noise due to variable frequency drives, additional minor external mechanical plant that is not known at this stage, or other minor modifications to noise sources utilised on the site.

The above assessment indicates that noise from the proposal is predicted to comply with the PNTLs during both OP.01 (typical operations) and OP.02 (testing of backup generators).

The details of the mechanical plant used in this assessment are indicative, including the unit types, sound power levels, number of units and locations of equipment. All mechanical plant items should be reviewed during later acoustic assessments during the detailed design stage of the project to confirm compliance with the PNTLs. It is expected that compliance is achievable through a combination of appropriate mechanical plant selection, orientation, position and screening, where appropriate.

A detailed investigation of all potential feasible and reasonable mitigation measures is provided in **Section 7.2**.

Noise contours of the predicted operational noise impacts are in **Appendix D**.



5.3.3 Sleep Disturbance

The predicted night-time maximum noise levels at the nearest residential receivers are shown in **Table 37**. These include the mitigation measures specified in **Section 7.2**.

The predictions include noise-enhancing weather conditions as discussed in **Section 4.2.7**.

Table 37 Sleep Disturbance Assessment

NCA	Receiver Type	Source	Maximum Noise Level L _{Amax} (dBA) ¹			Below Screening Level
			Sleep Dist. Screening Level	Predicted	Exceedance	
NCA01	Residential	Light vehicle movements and parking	53	49	-	Yes
NCA02	Residential	Light vehicle movements and parking	59	28	-	Yes

Note 1: Higher of Stage 1 or Stage 2 development impacts shown.

The above shows that maximum noise levels are predicted to comply with the sleep disturbance screening level at the nearest residential receivers. As such, maximum noise levels from the development are unlikely to result in sleep disturbance at these receivers and a detailed maximum noise level assessment is not required.

5.3.4 Off-site Traffic Assessment

As noted in **Section 4.2.6**, there are no residential receivers along the access route between the site on McCredie Road and the Cumberland Highway.

Comparison of the proposed development traffic to the available existing traffic on the access route shows minimal increase in traffic volumes. As such, the predicted change in road noise levels from development-related vehicles is expected to be below 2.0 dB. Increases of less than 2.0 dB are considered minor and not perceptible to the average person.

The potential impacts from development-related traffic on the surrounding roads are expected to be negligible and no consideration of mitigation is required.



6.0 Cumulative Impacts

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

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

6.1 Construction Noise

Cumulative construction noise impacts can occur where multiple work activities are being completed near to a particular receiver at the same time.

The construction work associated with the proposal has the possibility of interacting with the construction activities of other nearby projects.

Should other projects be approved in the area there is potential for cumulative construction impacts if they are constructed at the same time as the proposal, however this would be addressed in their respective Construction Noise and Vibration Management Plans.

Since construction scenarios and equipment for projects in the area would generally require similar items of equipment to the proposal, concurrent construction work could theoretically increase the worst-case noise levels in this report by around 3 dB (ie a logarithmic adding of two sources of noise at the same level). The likelihood of worst-case noise levels at any individual receiver being generated by works on different projects at the same time is, however, considered low.

As such, cumulative construction impacts are not likely to significantly alter the predictions in this report and no specific mitigation is expected to be required.

The potential cumulative impacts from the proposal and other projects would continue to be considered as the project progresses when detailed construction planning is developed.

6.2 Operational Noise

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

The policy accounts for potential cumulative impacts by lowering the criteria for each individual development to ensure that the ambient noise level within an area from all industrial noise sources combined remains below the recommended amenity noise levels, where feasible and reasonable. As such (as discussed in **Section 3.3.2**), the potential cumulative impacts from the proposal and other potential sources of industrial noise in the area are accounted for in the proposal-specific PNTLs and, therefore, do not require further consideration.



7.0 Mitigation and Management Measures

7.1 Construction Impacts

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

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

Construction impacts are expected to remain during certain work activities at the nearest sensitive receivers even with the implementation of all feasible and reasonable mitigation measures.

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

7.2 Operational Noise Impacts

Where operational noise impacts from the development are predicted to exceed the relevant noise criteria, feasible and reasonable operational noise mitigation and management measures should be considered, with the aim of reducing noise emissions to the relevant criteria.

The typical hierarchy for mitigation and management of industrial noise sources is as follows:

- Reducing noise emissions at the source (ie noise source control)
- Reducing noise in transmission to the receiver (ie noise path control)
- Reducing noise at the receiver (ie at-receiver control).

A detailed assessment of potential feasible and reasonable mitigation measures that can be applied to the development to minimise the operational noise impacts has been completed and is summarised in **Table 38**. The applicable measures have been included in the noise model and the assessment results in this report.

The measures should be regarded as indicative and would be further refined during detailed design and in an Operational Noise Management Plan when the specific tenants operations are known.



Table 38 Operational Noise Mitigation Options

Ref.	Mitigation Option	Noise Impact/Benefit	Feasible and Reasonable to Apply
Source Control			
S1	Optimised site layout to minimise noise emissions from the site	Where possible, the site layout has been designed so that the buildings screen the noisier areas of the development from the nearest receivers, such as locating the loading dock on the northern side of the building so it doesn't face receivers to the south, and locating the generators on the western side so they don't face the playing fields.	Yes – applied during design of the concept.
S2	Limit vehicle movements	A reduction in concurrent vehicle movements across the site by staggering delivery/pickup times and/or employee shift change times could reduce noise emissions. In practice, this would occur naturally due to operational requirements.	No – vehicle volumes used in this assessment are likely needed to meet tenant's requirements. Additionally, vehicle movements are not a dominant contributor to noise emissions from the site.
S3	Use broadband and/or ambient sensing alarms on heavy vehicles where they are required to reverse during the night-time.	Reduce potential for annoying noise emissions during the night-time.	Yes – encourage use of broadband and/or ambient sensing alarms on heavy vehicles and forklifts where they are required to reverse during the night-time.
S4	Appropriate specification and location of mechanical plant during detailed design.	Reduce potential for noise impacts from mechanical plant, particularly during the night-time.	Yes – the indicative mechanical plant units have been selected to minimise noise impacts from mechanical plant. The noise impacts from all items of mechanical plant would be reviewed during detailed design stage to confirm unit selections and any mitigation requirements.
S5	Roller doors kept closed when loading/unloading is not occurring.	Reduce potential for noise breakout from internal activity.	Yes – roller doors should be kept closed when not in use for loading/unloading.



Ref.	Mitigation Option	Noise Impact/Benefit	Feasible and Reasonable to Apply
S6	Production of an Operational Noise Management Plan.	This would detail the measures that could be used by the various tenants to minimise general noise emissions from the site. Reference can be made to the Best Management Practice (BMP) measures listed in the NPfl (see Appendix F).	Yes – the ONMP would detail any operational requirements for the development.
Path Control			
P1	Acoustic Screening	Construction of acoustic screening has been incorporated into the design of the roof layout (see Section 4.2.1.1) to mitigate noise from the rooftop mechanical plant.	Yes – an indicative combination of solid screening and acoustics louvres on the rooftop has been incorporated into the building design. Any acoustic louvred areas would indicatively use IAC Acoustics Noishield Model LP acoustic louvres or similar (manufacturer data sheet supplied by the project team). Note that not all louvres are specified as acoustic louvres. The design, extent, model and requirements for acoustic screening would be confirmed during the detailed design stage of the project.
Receiver Control			
R1	Not considered required	n/a	n/a

The proposal does not have tenants committed and the exact operational procedures of the site are not known at the time of this assessment. Several assumptions have been made regarding the likely future uses and sources of noise. The noise predictions in this report represent the expected peak operational noise emissions based on currently available information for planning purposes and will be reviewed at a later stage when detailed information is available.



8.0 Conclusion

SLR has been engaged to assess the potential construction and operational noise emissions from the proposed development at 132 McCredie Road, Guildford West. The proposal includes the operation of a multi-storey data centre, which would be in use 24/7.

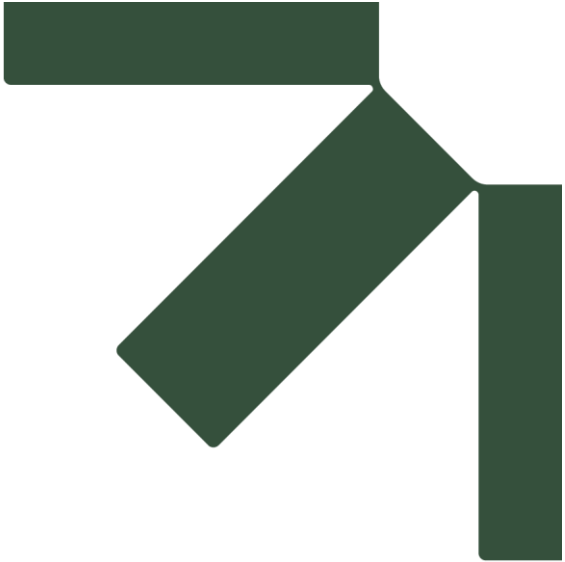
The potential impacts from the proposal have been assessed against the noise and vibration specific Secretary's Environmental Assessment Requirements.

Minor to moderate exceedances of the construction noise management levels are predicted at the nearest sensitive receivers during some of the noisier scenarios, particularly when noise-intensive items of equipment, such as rockbreakers, are in use. No residential receivers are predicted to be highly noise affected during construction works. Construction noise levels are generally expected to comply with the management levels when noisy equipment is not in use and at receivers further back from the first row (ie receivers without direct line of sight to the works). Mitigation measures have been recommended to address the potential construction impacts.

The operational noise assessment indicates that with the inclusion of the proposed mitigation outlined in this report, operational noise levels are expected to comply with the trigger levels at the nearest receivers. The potential operational impacts and requirements for mitigation would be confirmed during further acoustic assessments completed during detailed design when tenant requirements are known.

Based on the predicted levels and indicative mitigation measures, the proposal is considered appropriate from an acoustic standpoint.





Appendix A Acoustic Terminology

**Project Pluto – 132 McCredie Road, Guildford West NSW
2161**

SSD-69223466 Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Ltd

SLR Project No.: 610.31859.00002

25 July 2025

1. Sound Level or Noise Level

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

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

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

2. 'A' Weighted Sound Pressure Level

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

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

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

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

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

3. Sound Power Level

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

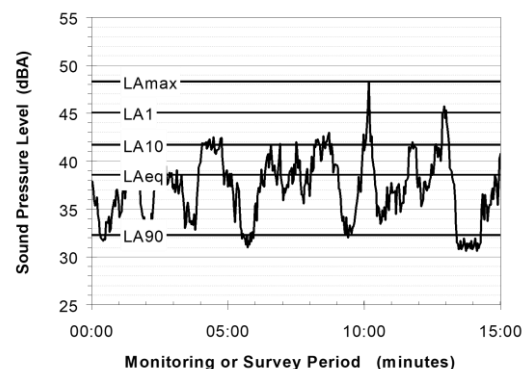
or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

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

4. Statistical Noise Levels

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

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



Of particular relevance, are:

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

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

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

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

5. Frequency Analysis

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

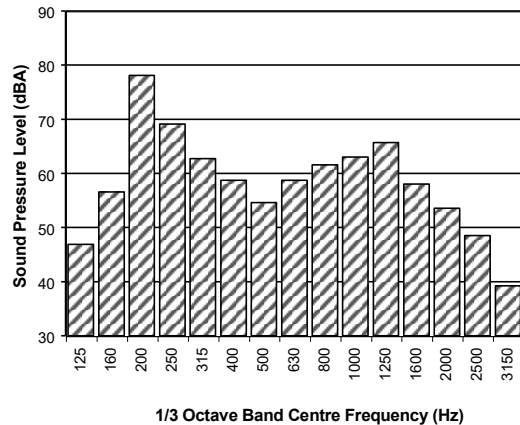
The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

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



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



6. Annoying Noise (Special Audible Characteristics)

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

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

7. Vibration

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

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

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

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

8. Human Perception of Vibration

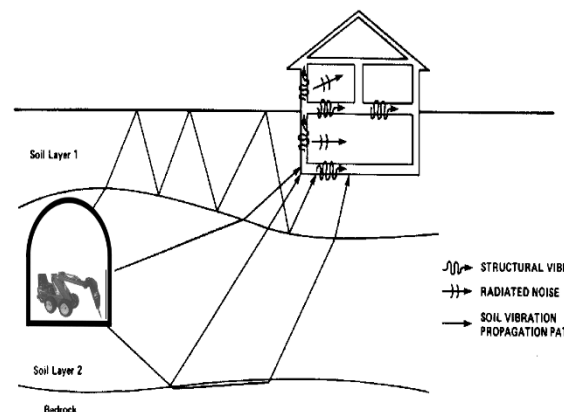
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience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

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

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

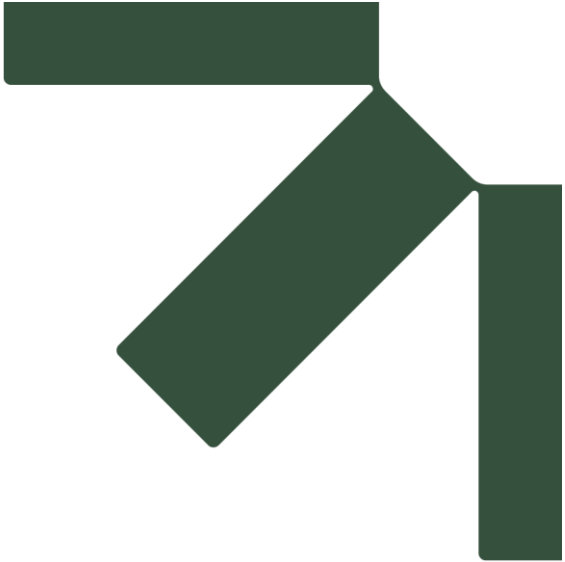
Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

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



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





Appendix B Noise Monitoring Data

**Project Pluto – 132 McCredie Road, Guildford West NSW
2161**

SSD-69223466 Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Ltd

SLR Project No.: 610.31859.00002

25 July 2025

Unattended Noise Monitoring Data – NL01

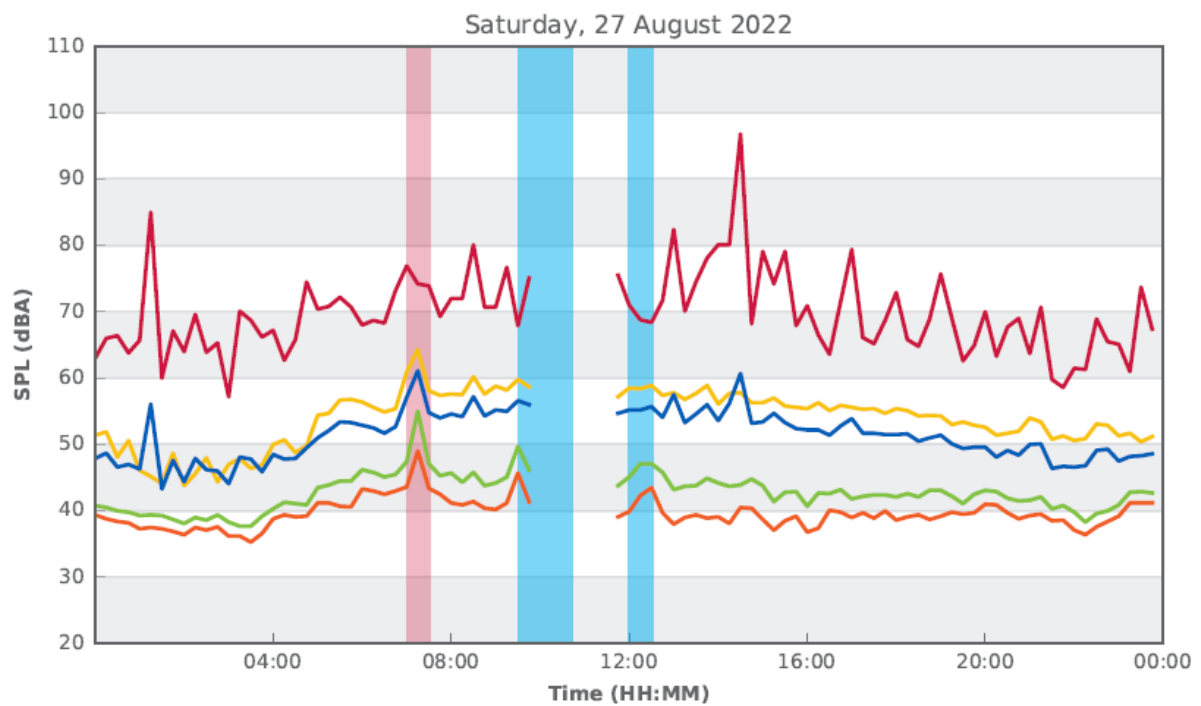
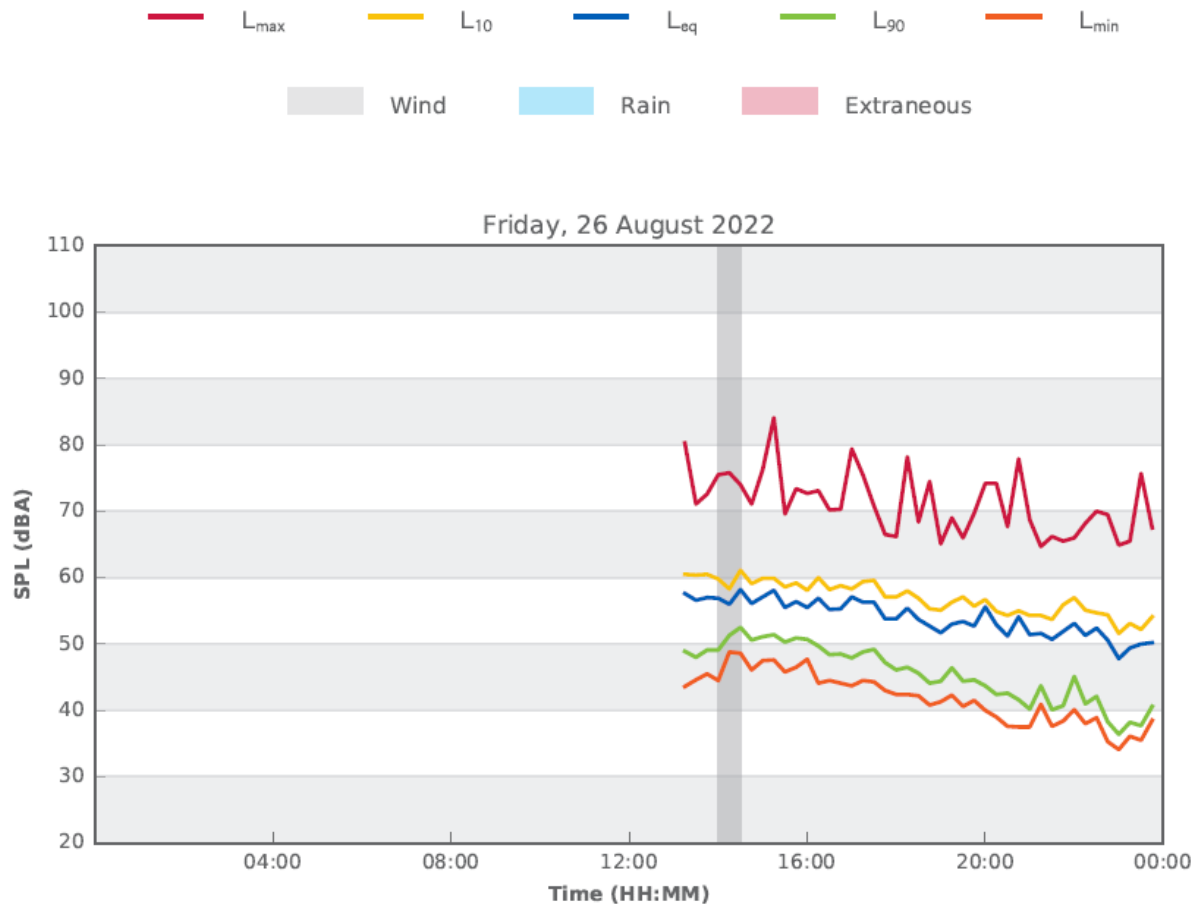
Noise Monitoring Location	NL01			
Noise Monitoring Address	111-123 McCredie Road, Smithfield			
Source Report	“Connect@ Smithfield 132 McCredie Road, Smithfield, NSW - Noise and Vibration Impact Assessment” prepared by RWDI, Report Reference RWDI#2205605 Version B, dated 12 December 2022 (DA2022/0759 NVIA)			
Logger Device Type: RION NL-52EX, Logger Serial No: n/a ¹ Unattended Noise Monitoring Date: 26/08/2022 - 7/09/2022 Ambient noise logger deployed at residential address 111-123 McCredie Road, Smithfield. Logger located in open space on the western side of the dwelling. Attended noise measurements were not supplied in the source report.				
Ambient Noise Logging Results – ICNG Defined Time Periods				
Monitoring Period	Noise Level (dBA)			
	RBL	LAeq	L10	L1
Daytime	45	n/a ¹	n/a ¹	n/a ¹
Evening	41	n/a ¹	n/a ¹	n/a ¹
Night-time	38	n/a ¹	n/a ¹	n/a ¹
Attended Noise Measurement Results				
Date	Start Time	Measured Noise Level (dBA)		
		LA90	LAeq	LAmix
n/a ¹	n/a ¹	n/a ¹	n/a ¹	n/a ¹

Note 1: This data is not supplied in the source report for this location.

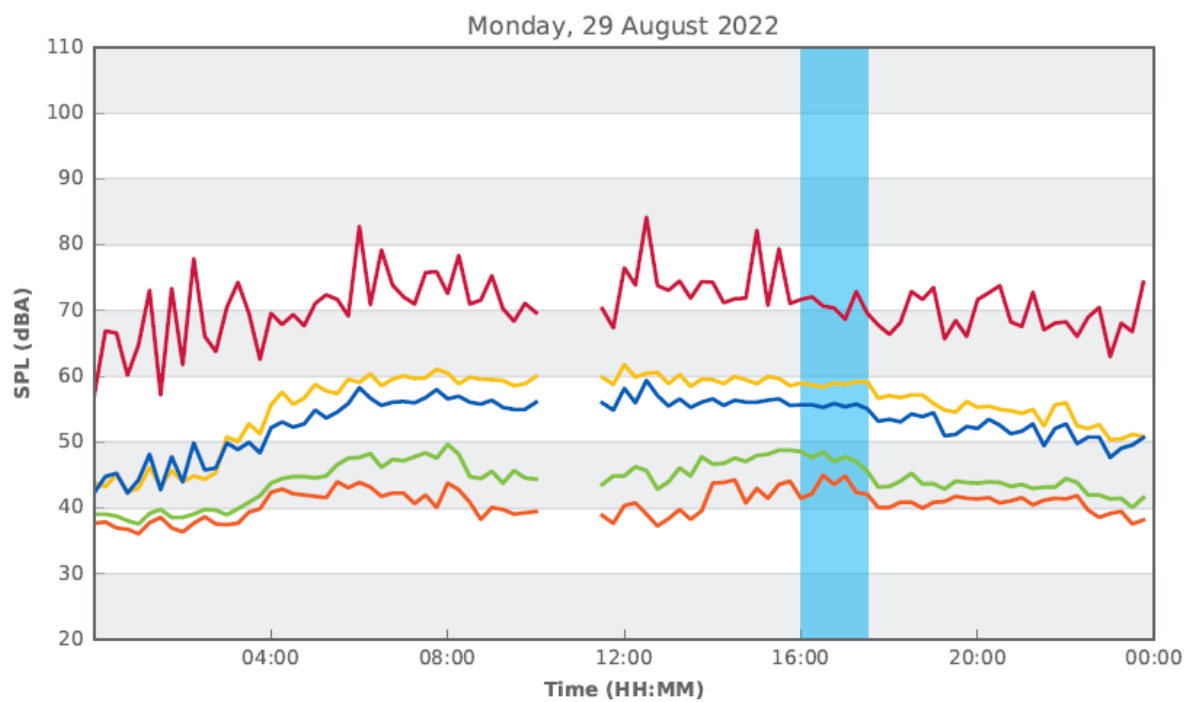
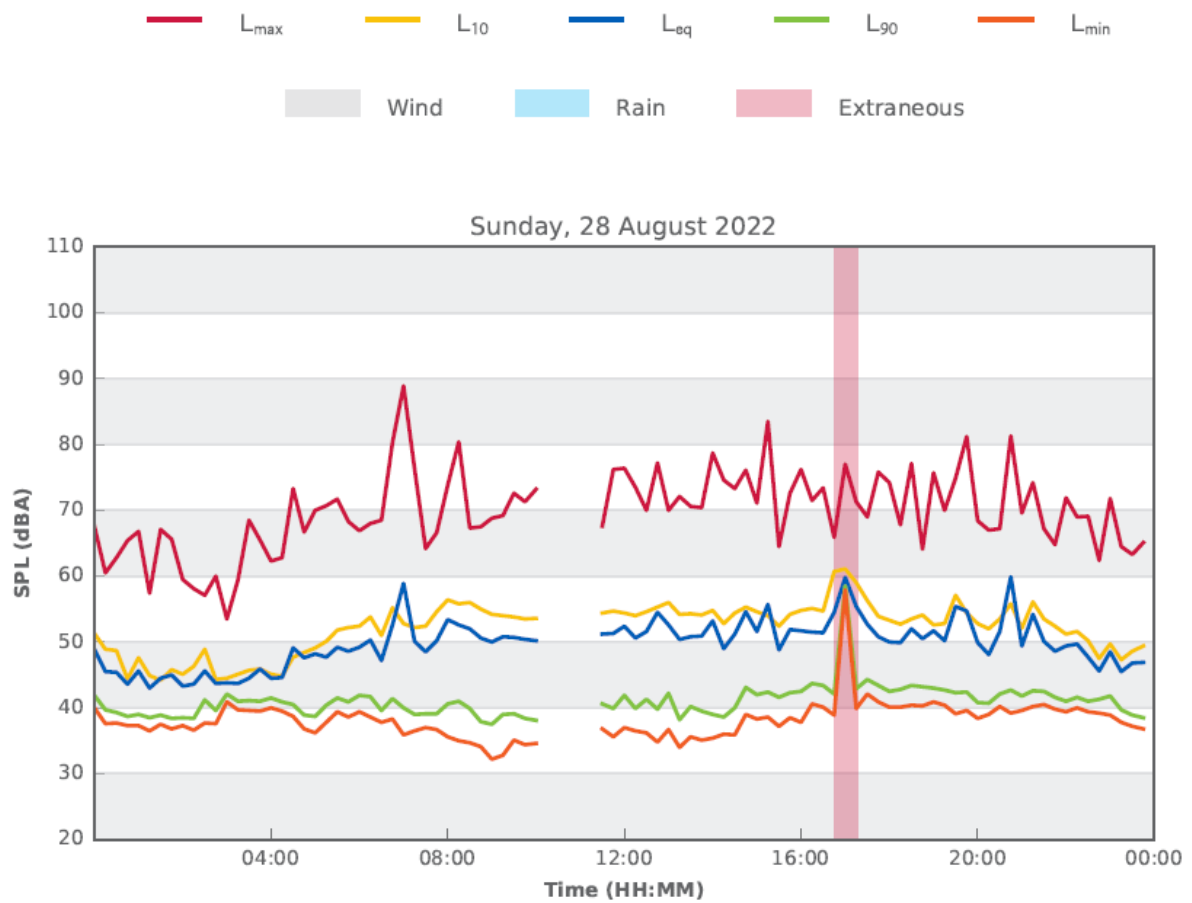
Note 2: All noise monitoring was captured and processed in accordance with the NSW EPA Noise Policy for Industry (NPfI), including Fact Sheets A and B of the NPfI.



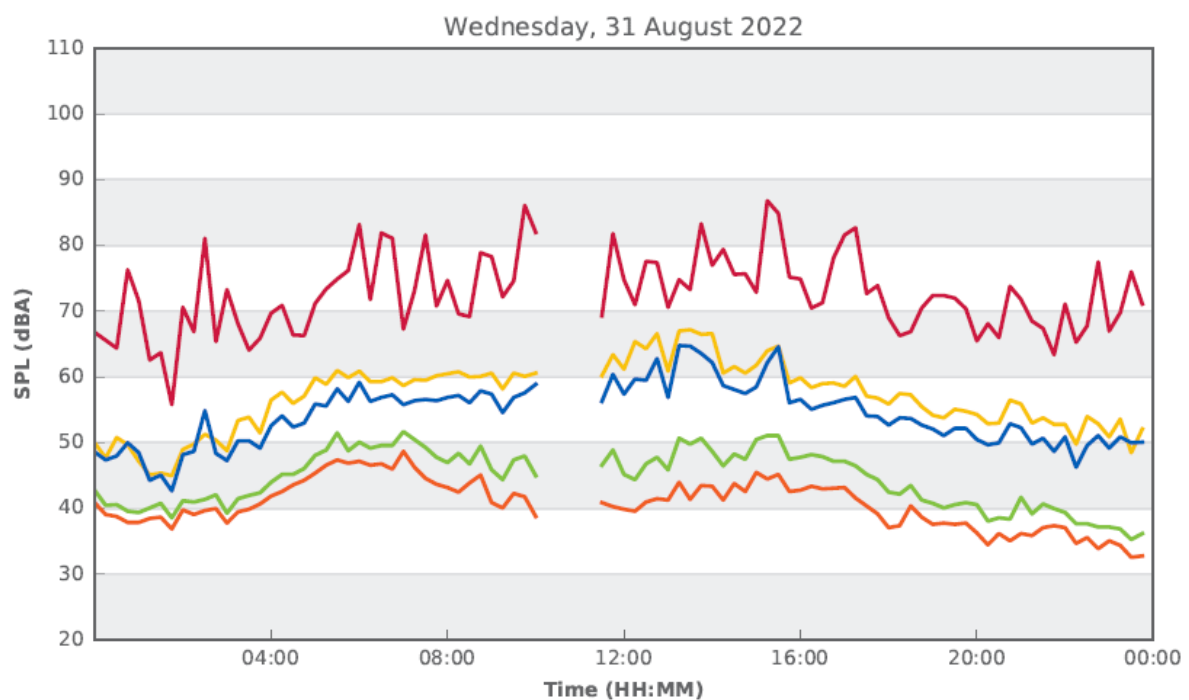
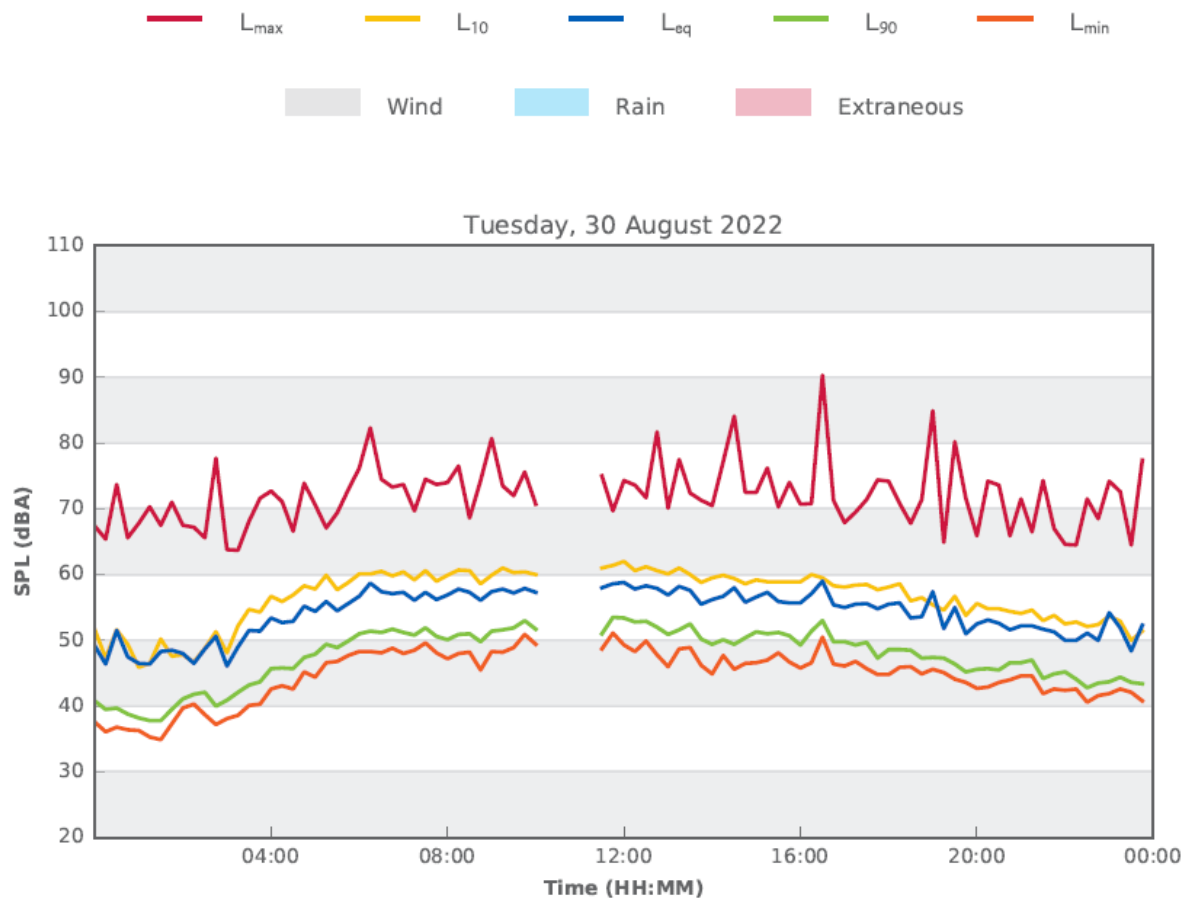
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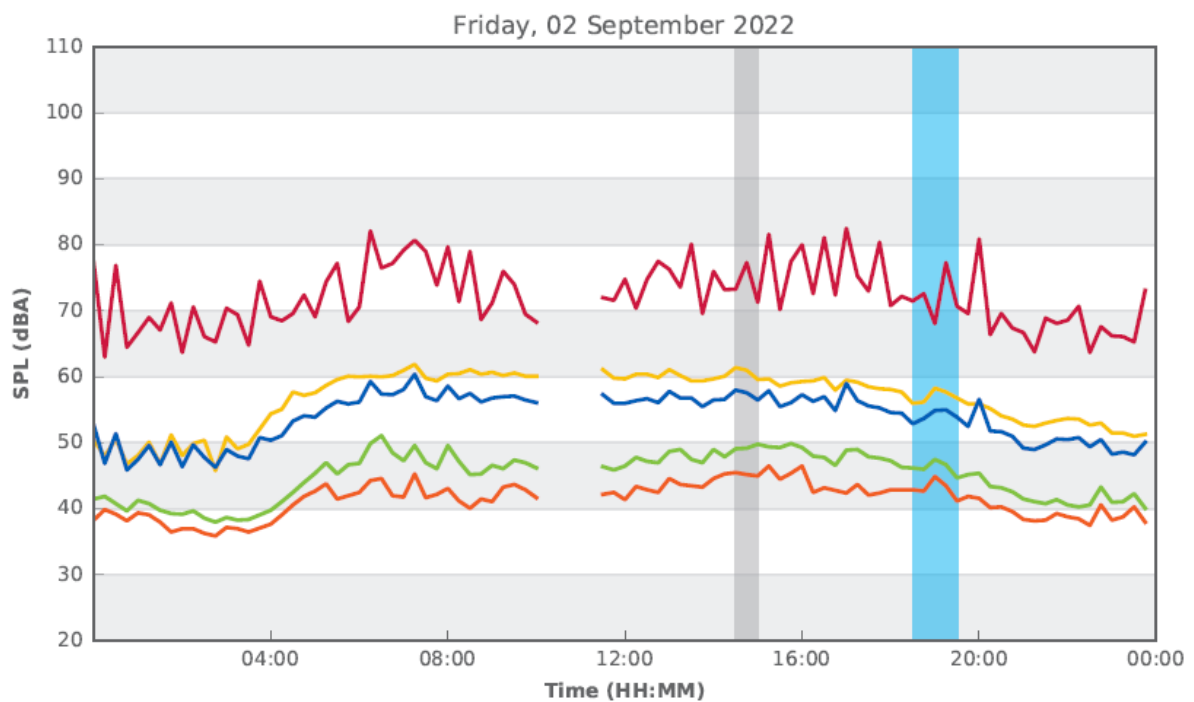
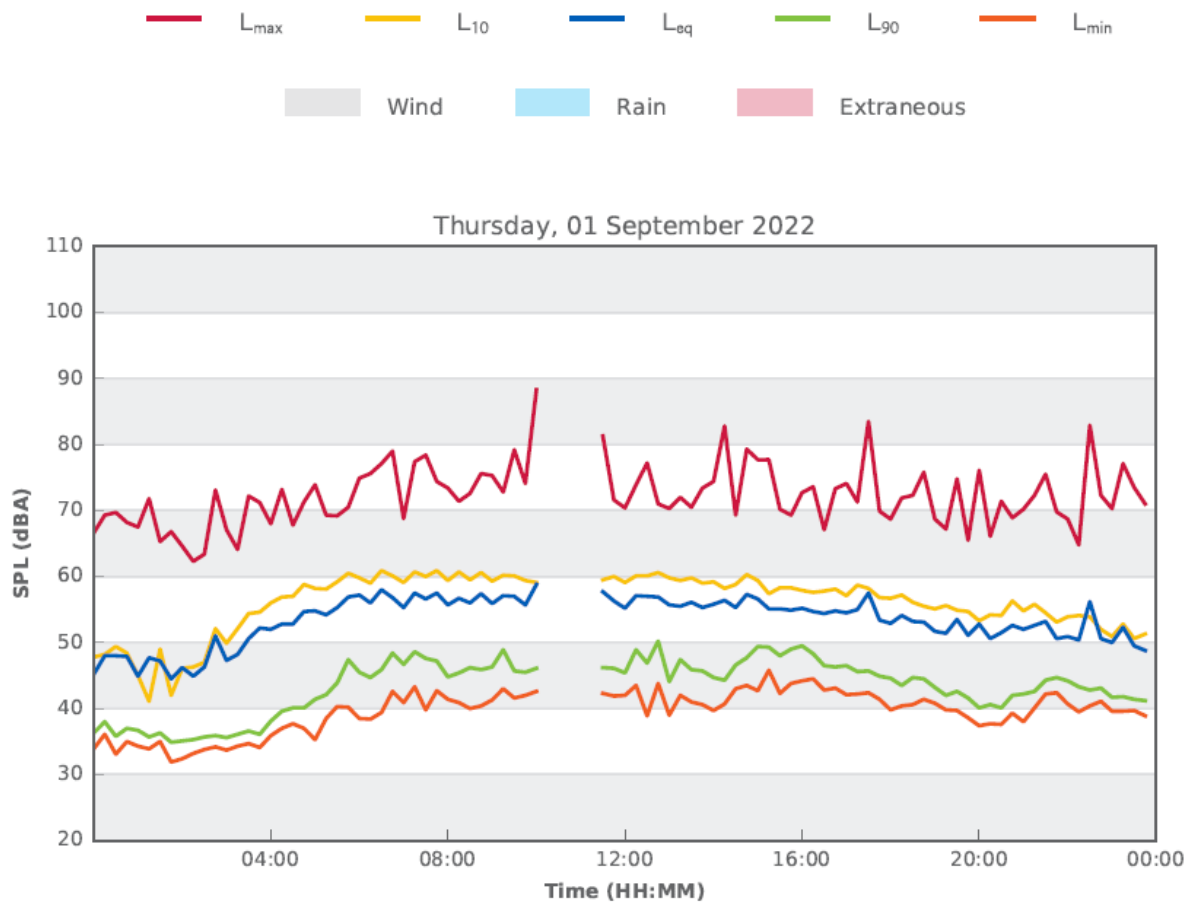
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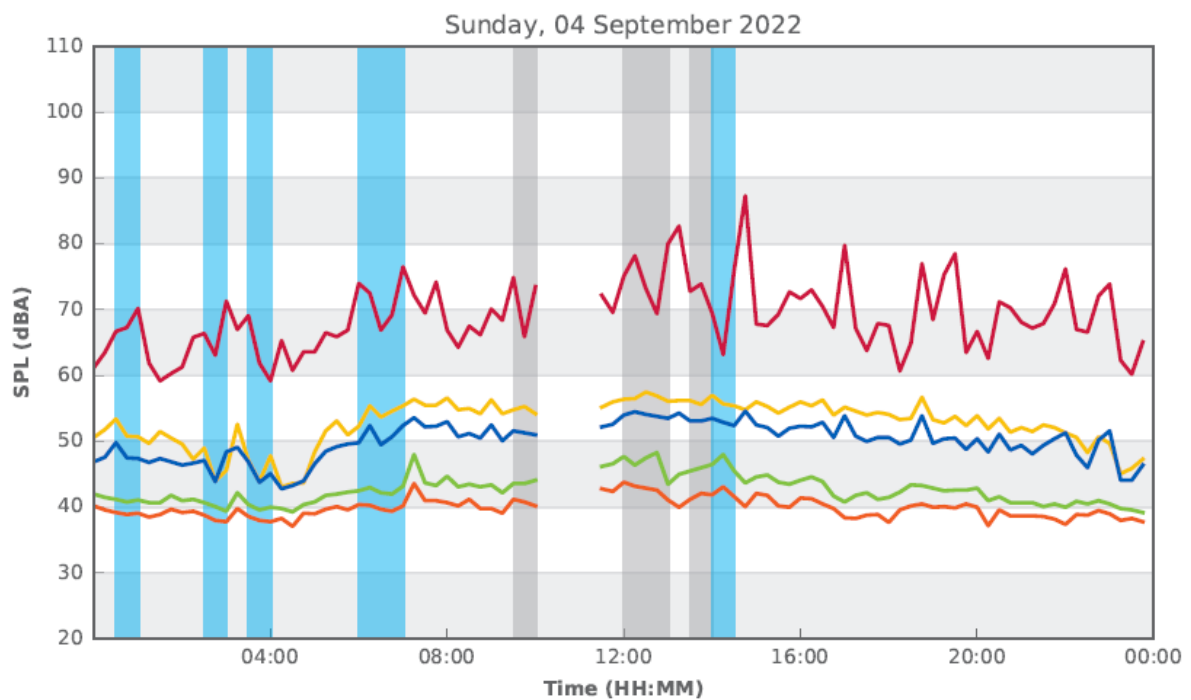
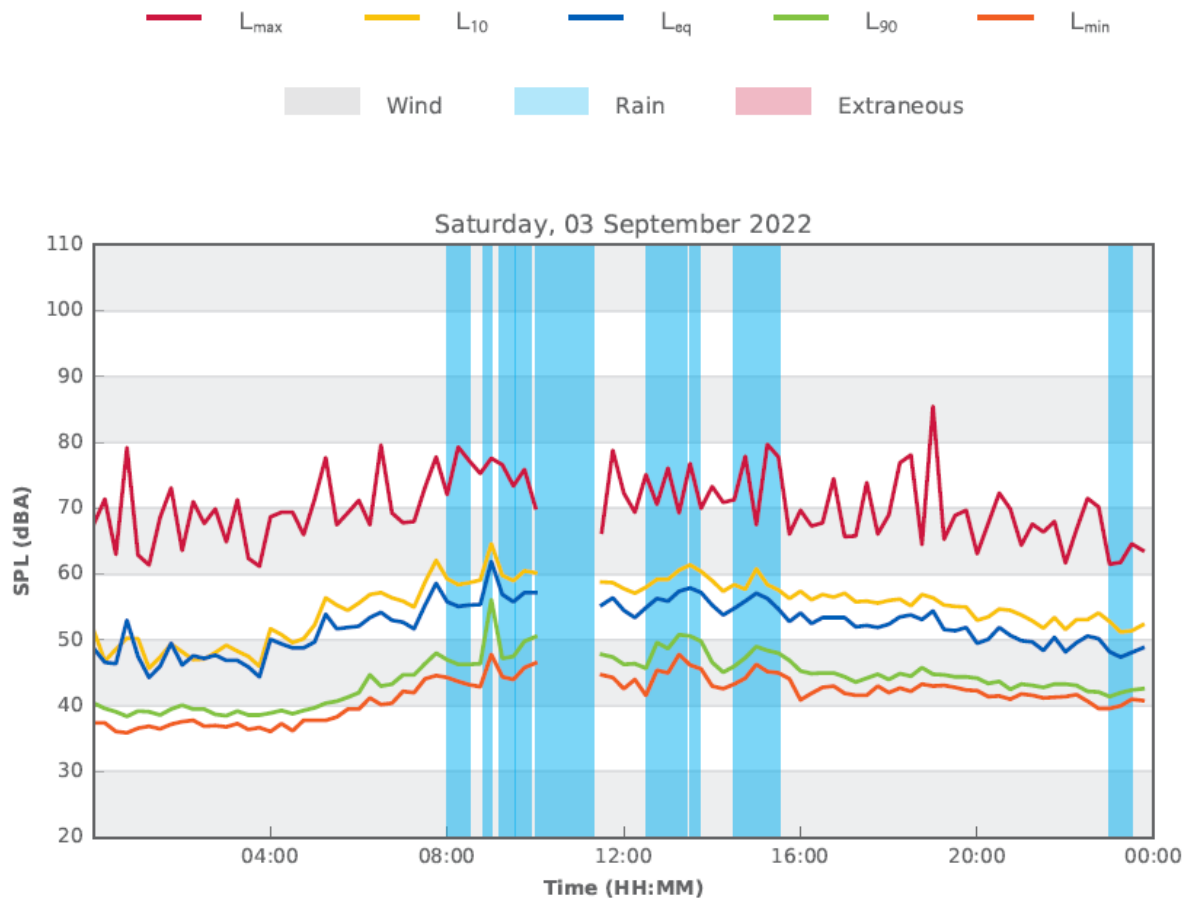
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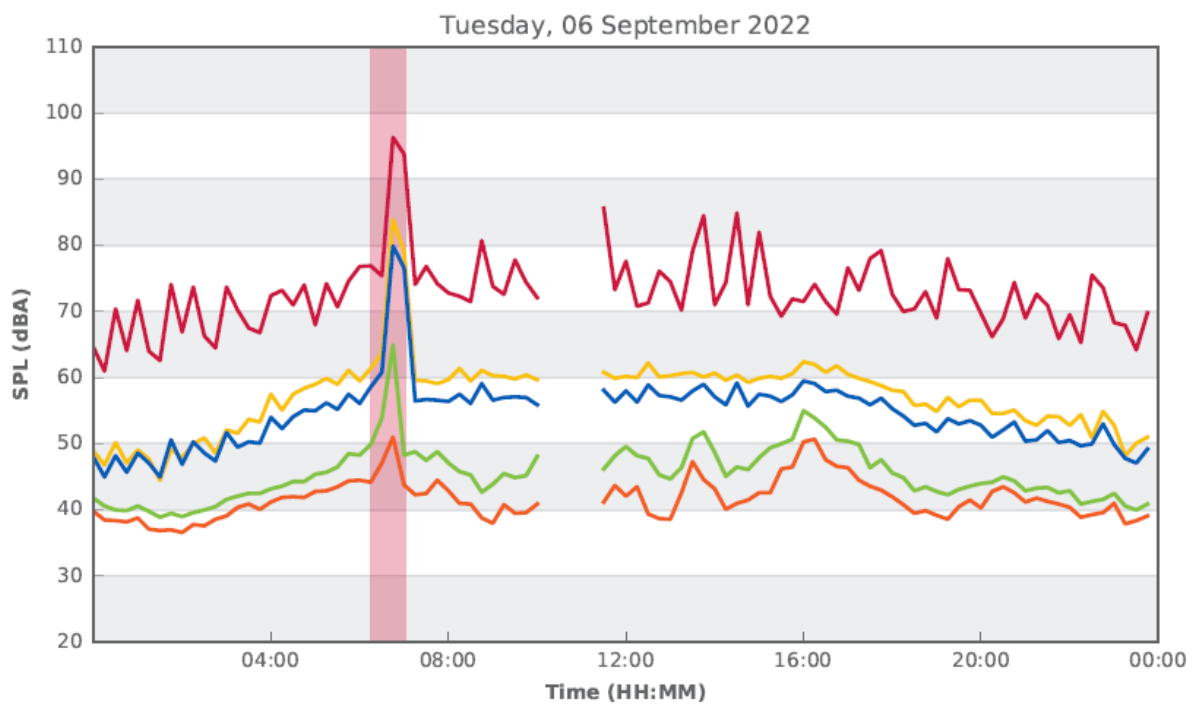
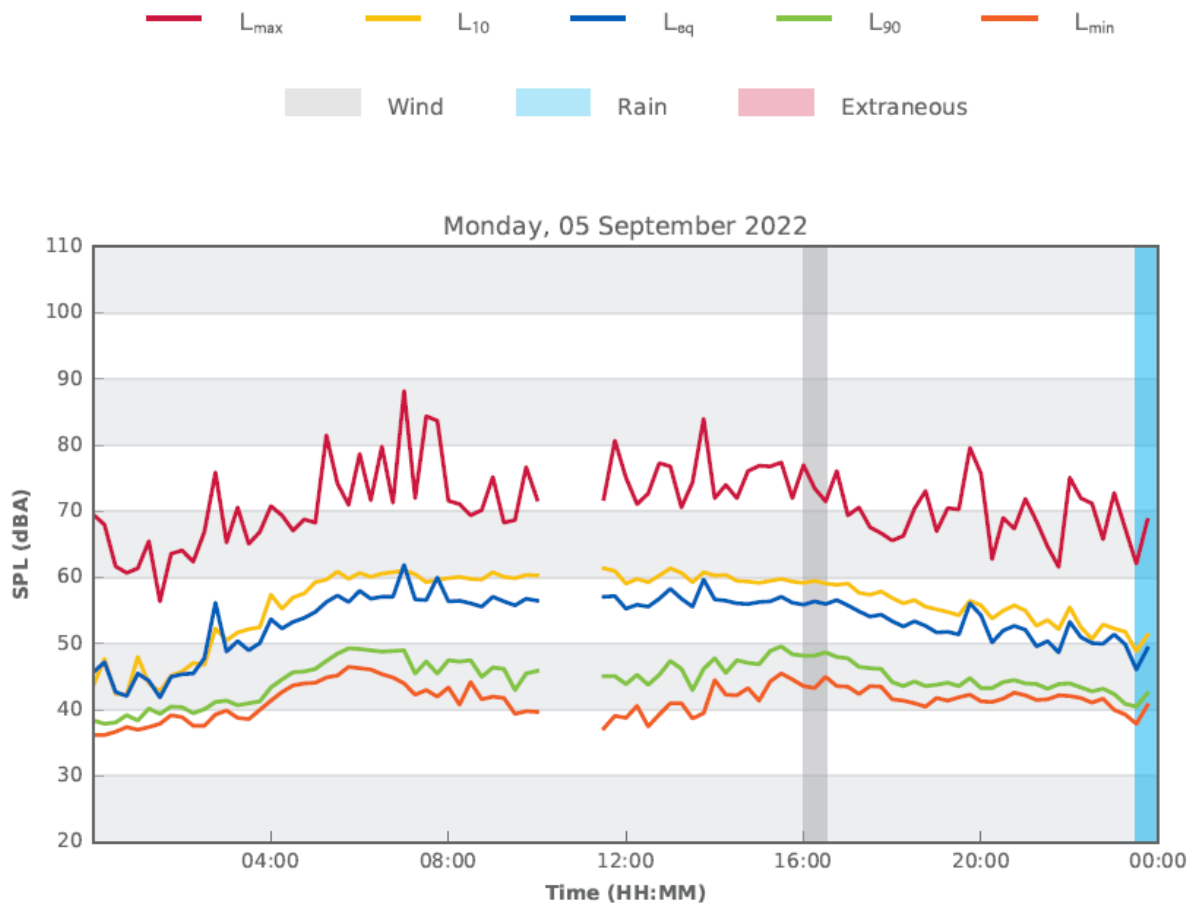
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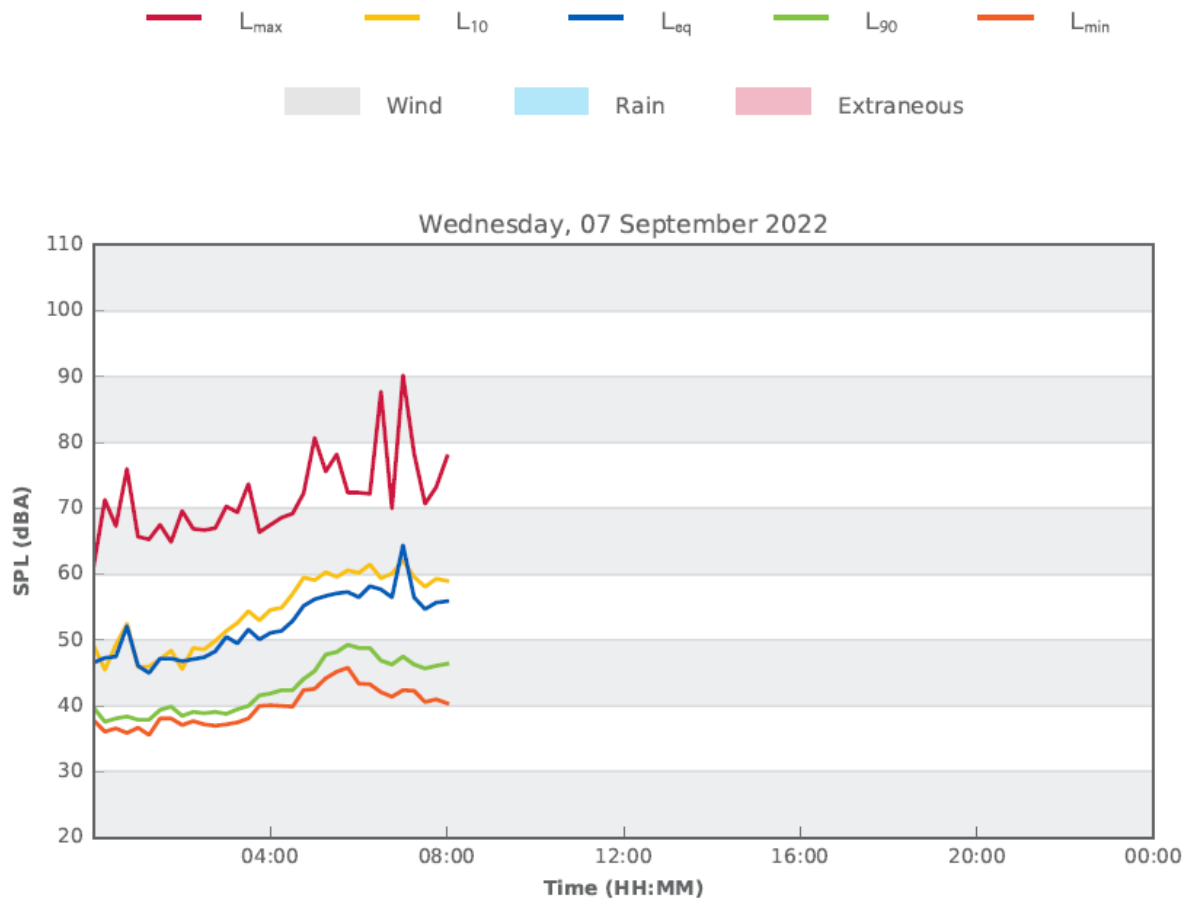
NL01 – 111-123 McCredie Road, Smithfield



NL01 – 111-123 McCredie Road, Smithfield



NL01 – 111-123 McCredie Road, Smithfield



Unattended Noise Monitoring Data – NL02

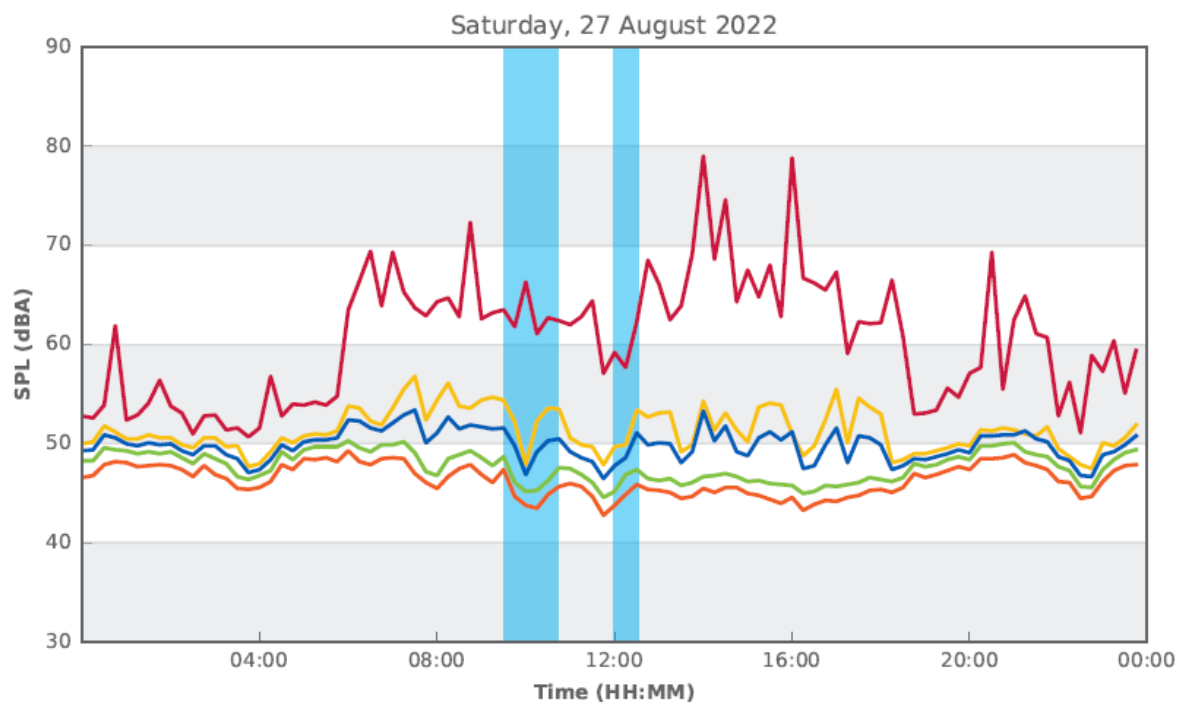
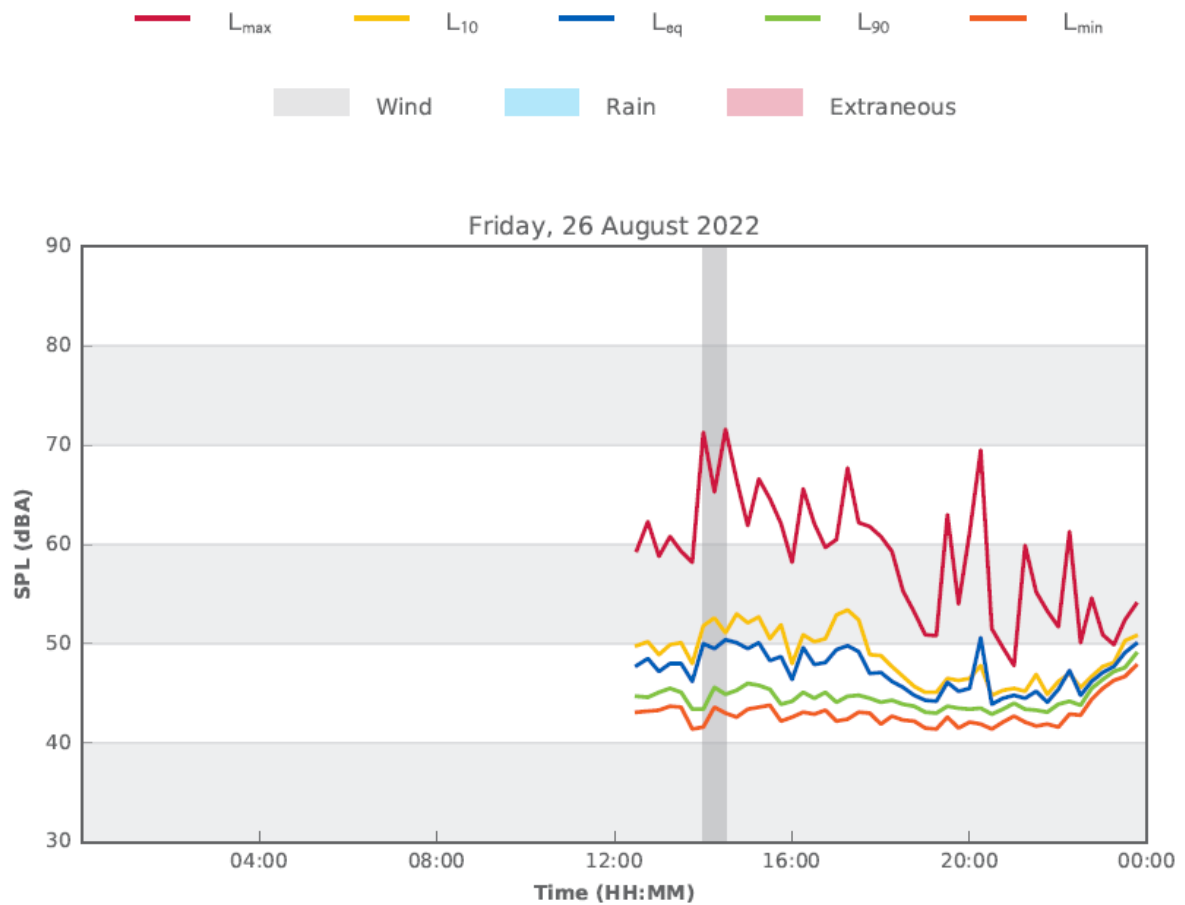
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Noise Monitoring Address	55 Hemingway Crescent, Fairfield			
Source Report	“Connect@ Smithfield 132 McCredie Road, Smithfield, NSW - Noise and Vibration Impact Assessment” prepared by RWDI, Report Reference RWDI#2205605 Version B, dated 12 December 2022 (DA2022/0759 NVIA)			
Logger Device Type: RION NL-52EX, Logger Serial No: n/a ¹ Unattended Noise Monitoring Date: 26/08/2022 - 7/09/2022 Ambient noise logger deployed at residential address 55 Hemingway Crescent, Smithfield. Logger located in clearing behind the property. Attended noise measurements were not supplied in the source report.				
Ambient Noise Logging Results – ICNG Defined Time Periods				
Monitoring Period	Noise Level (dBA)			
	RBL	LAeq	L10	L1
Daytime	45	n/a ¹	n/a ¹	n/a ¹
Evening	46	n/a ¹	n/a ¹	n/a ¹
Night-time	48	n/a ¹	n/a ¹	n/a ¹
Attended Noise Measurement Results				
Date	Start Time	Measured Noise Level (dBA)		
		LA90	LAeq	LAmix
n/a ¹	n/a ¹	n/a ¹	n/a ¹	n/a ¹

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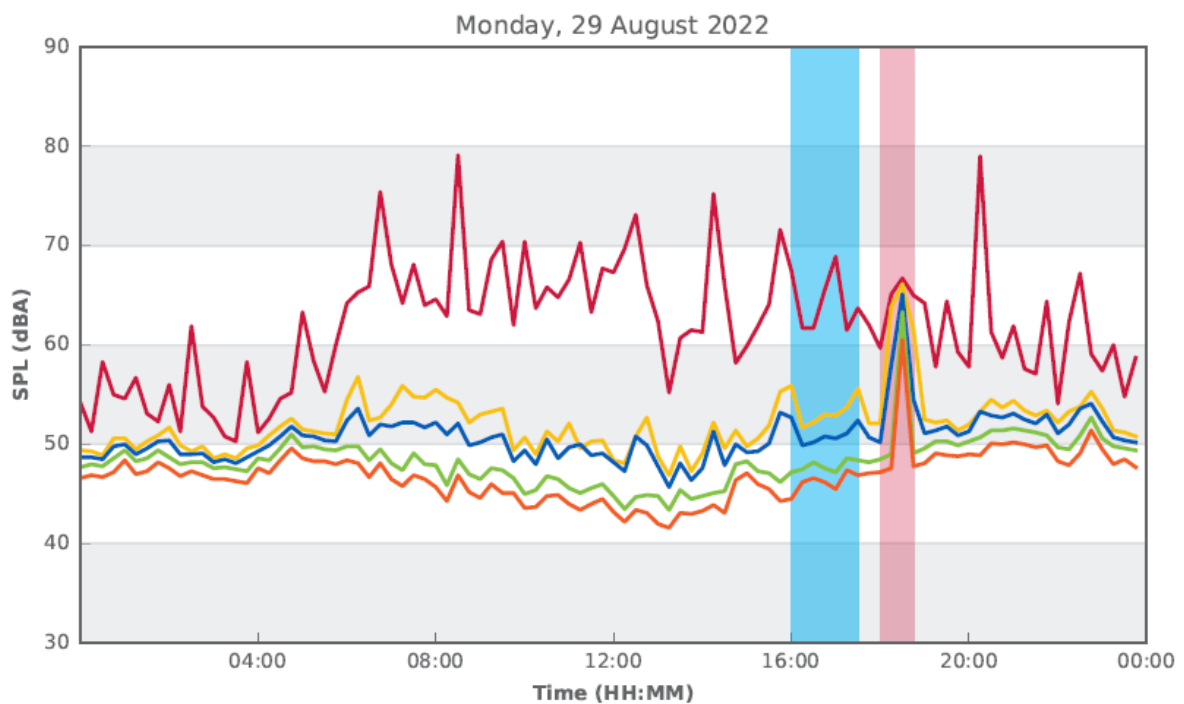
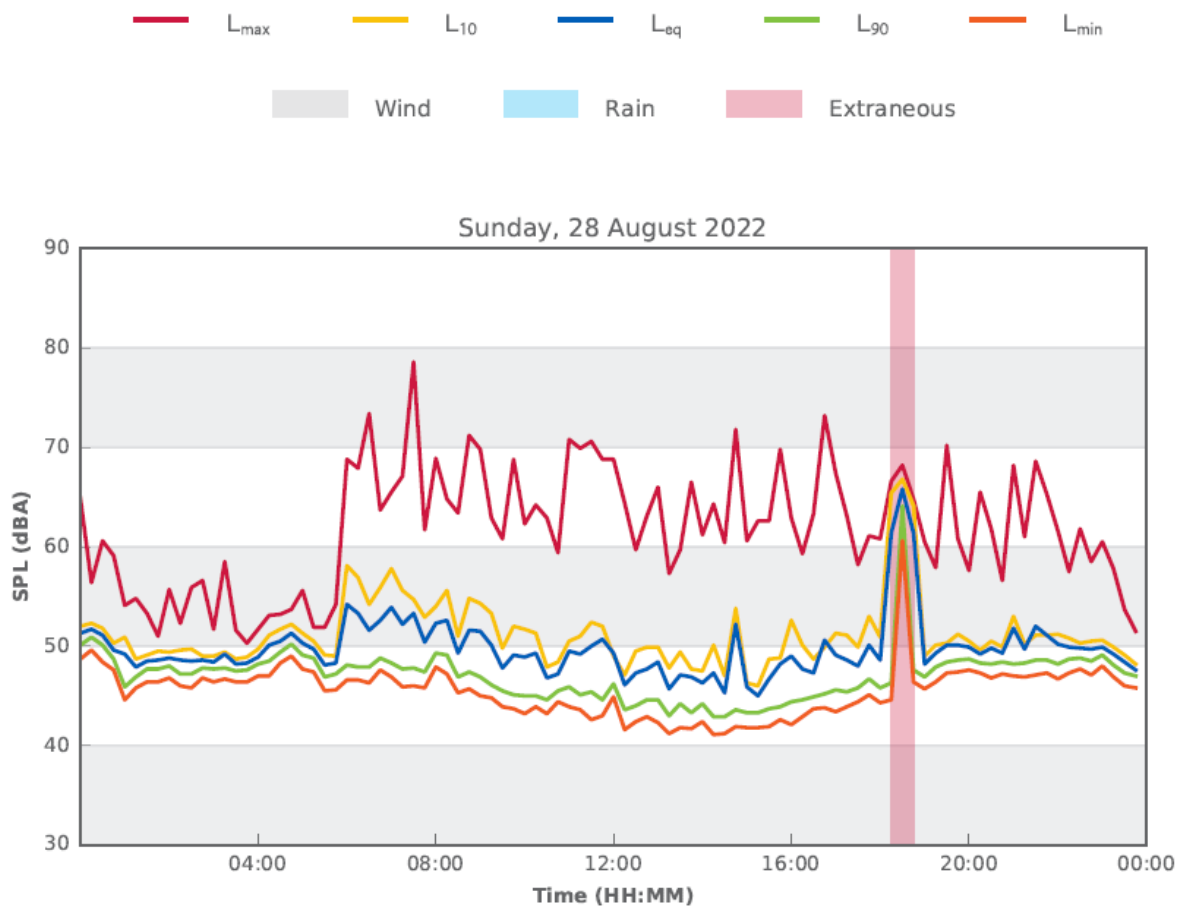
Note 2: All noise monitoring was captured and processed in accordance with the NSW EPA Noise Policy for Industry (NPfI), including Fact Sheets A and B of the NPfI.



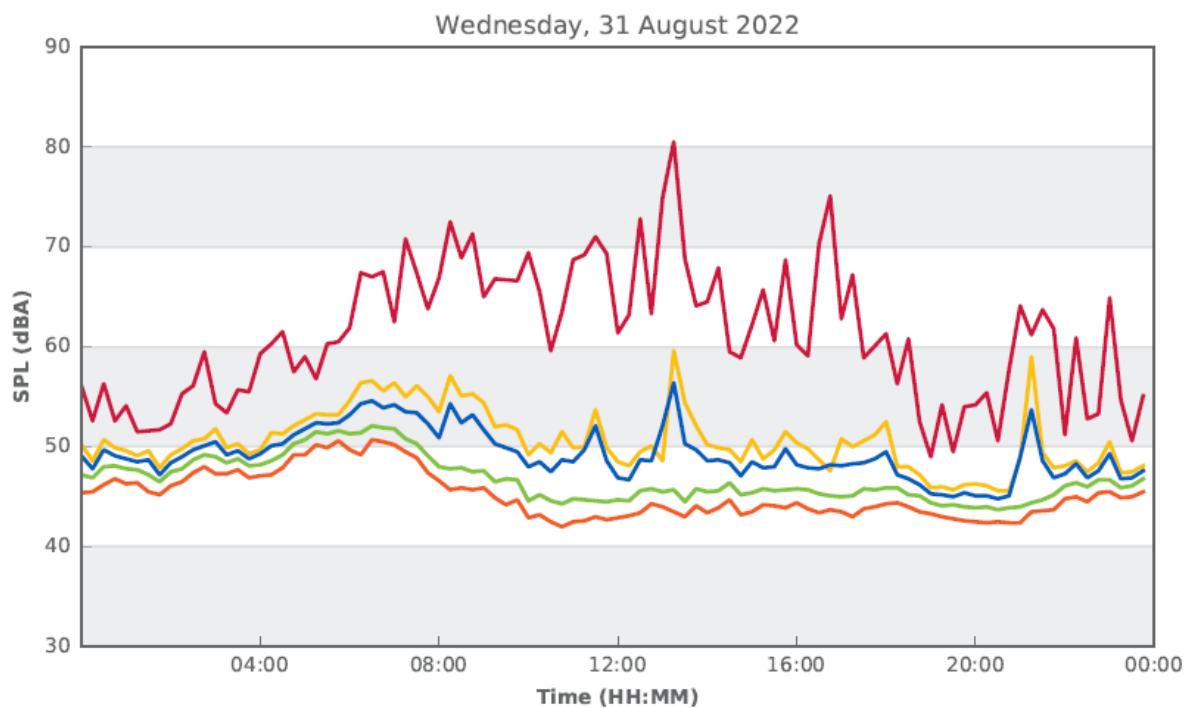
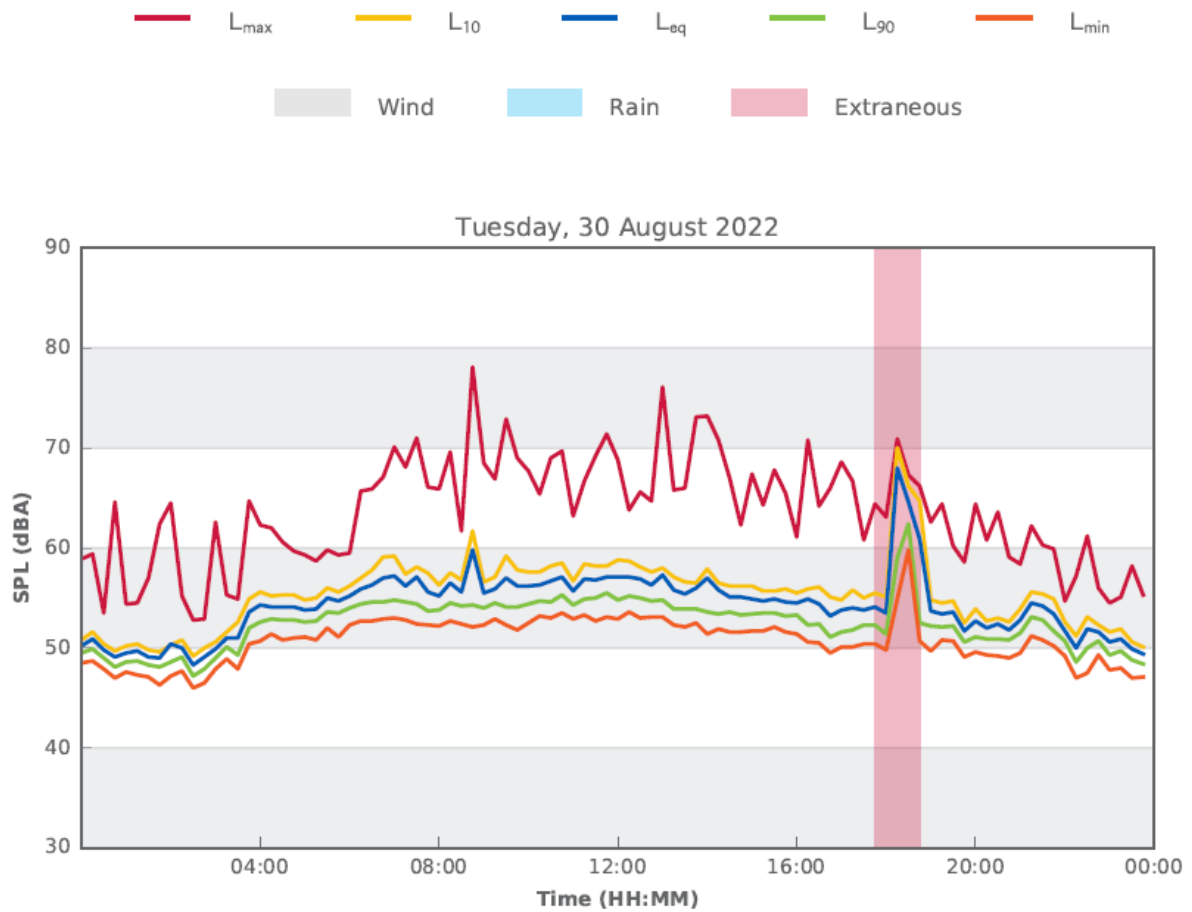
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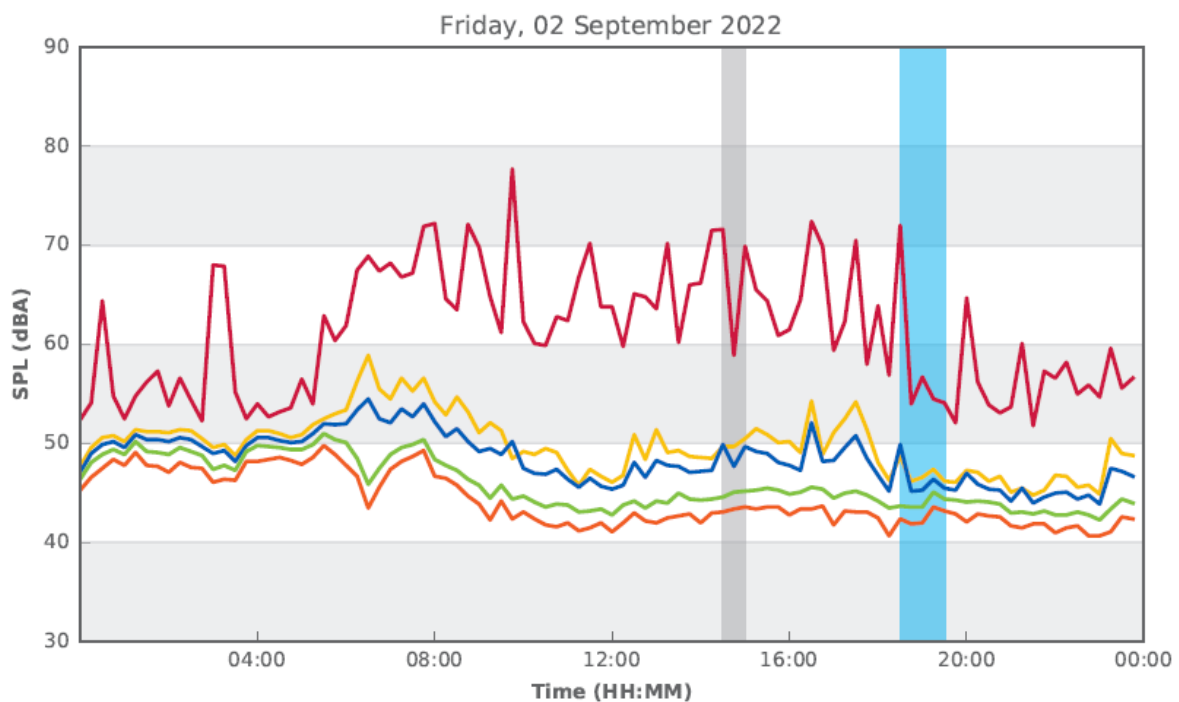
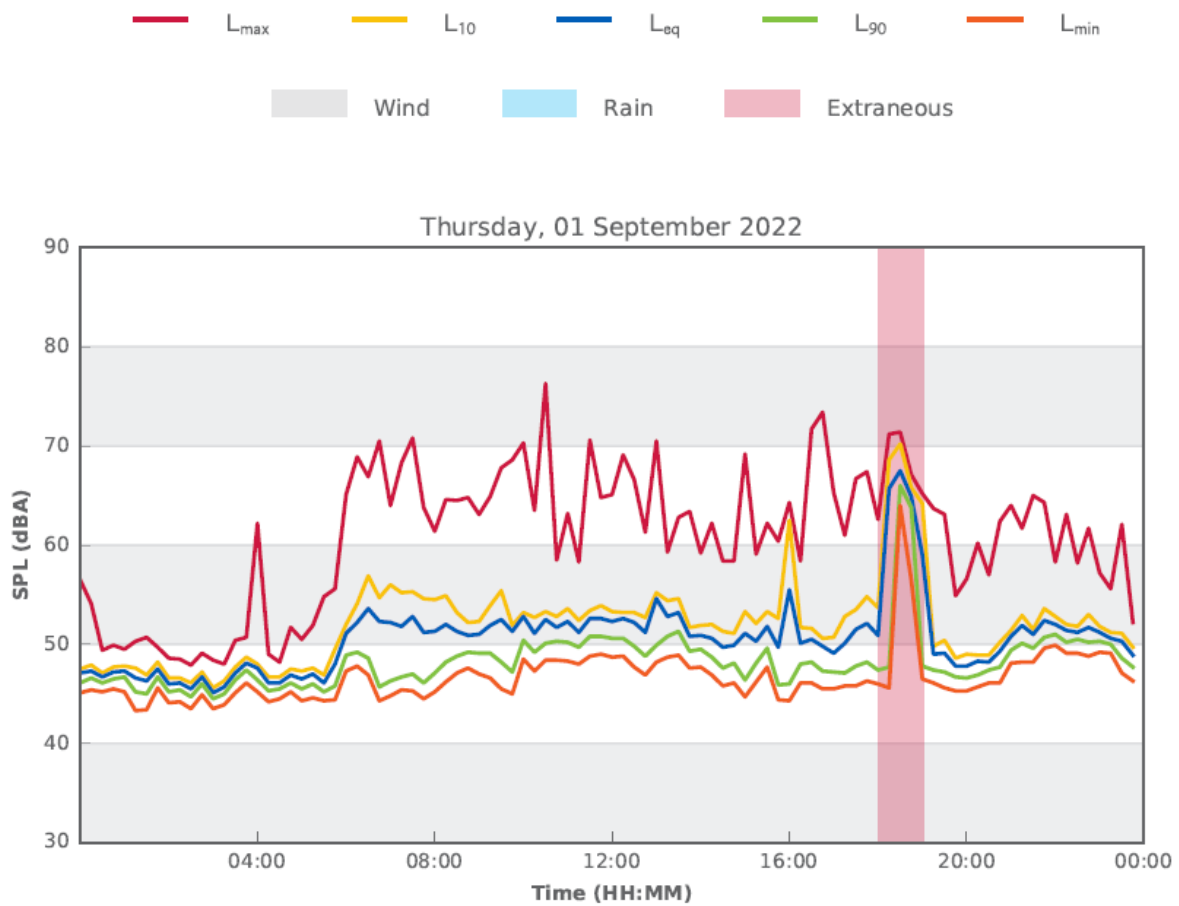
NL02 – 55 Hemingway Crescent, Fairfield



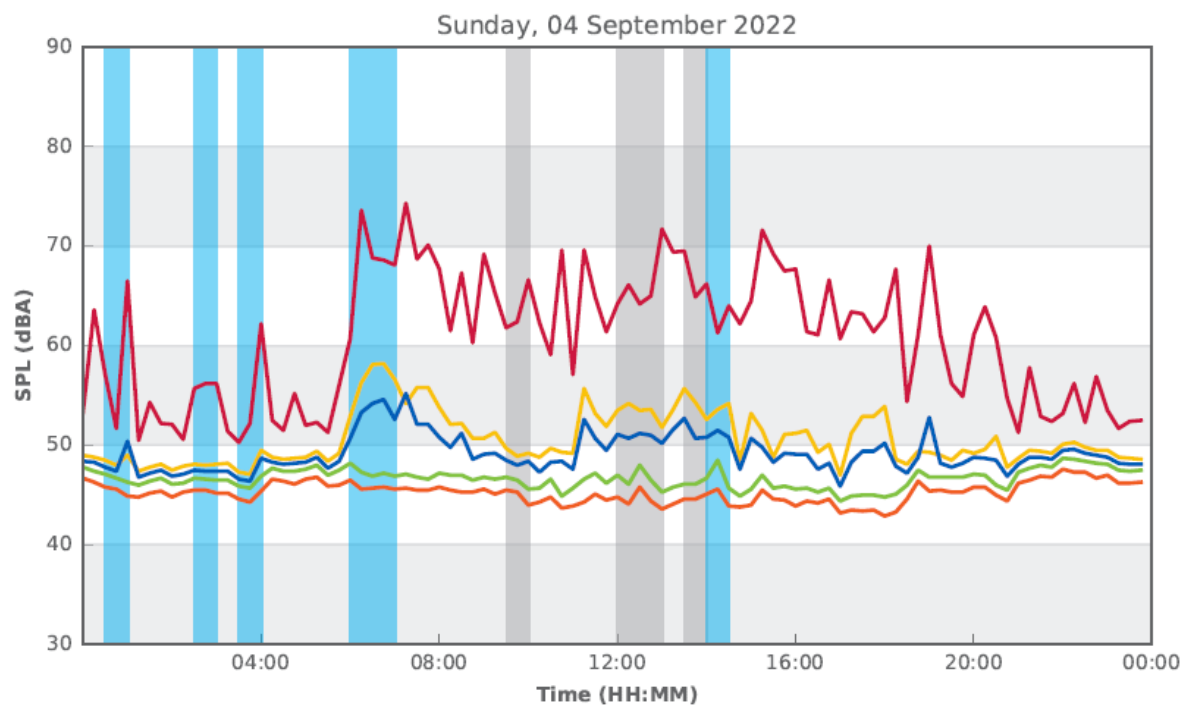
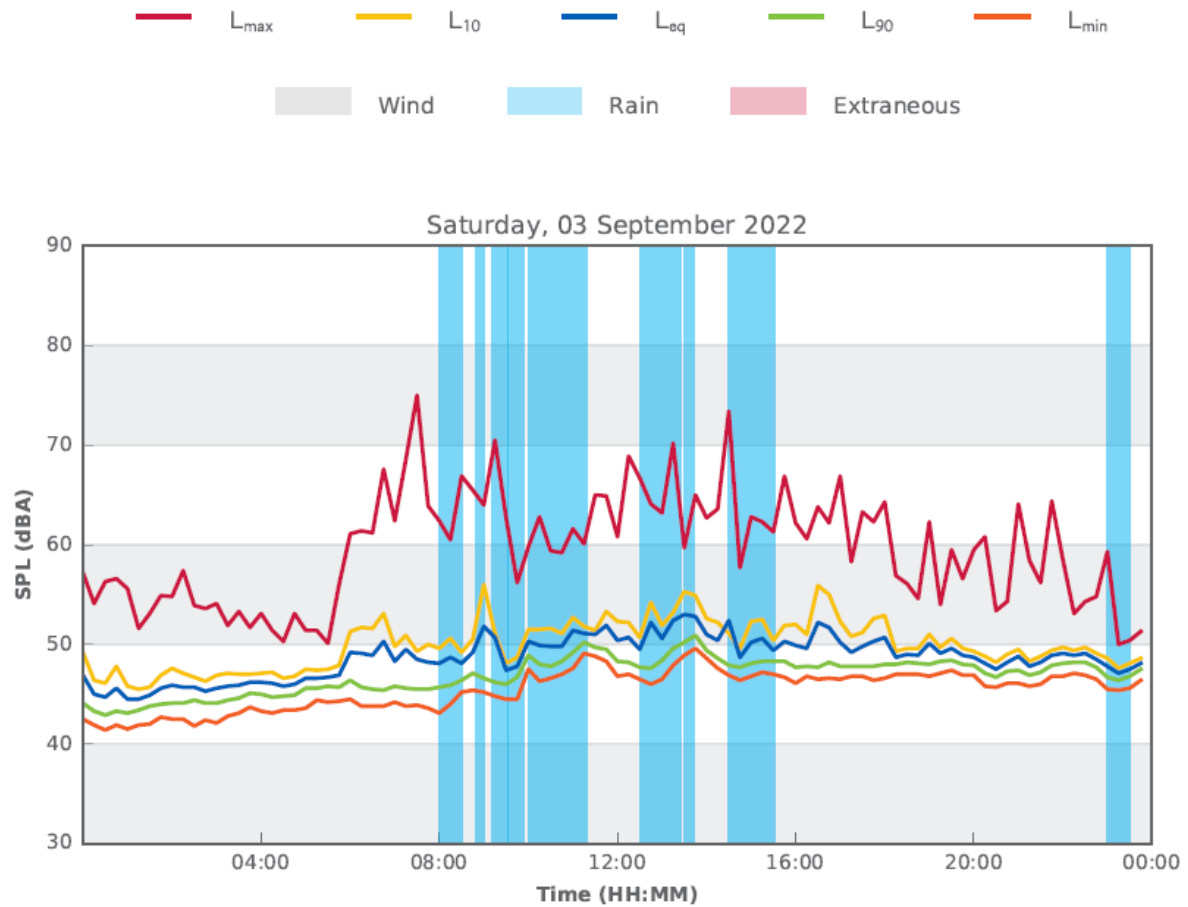
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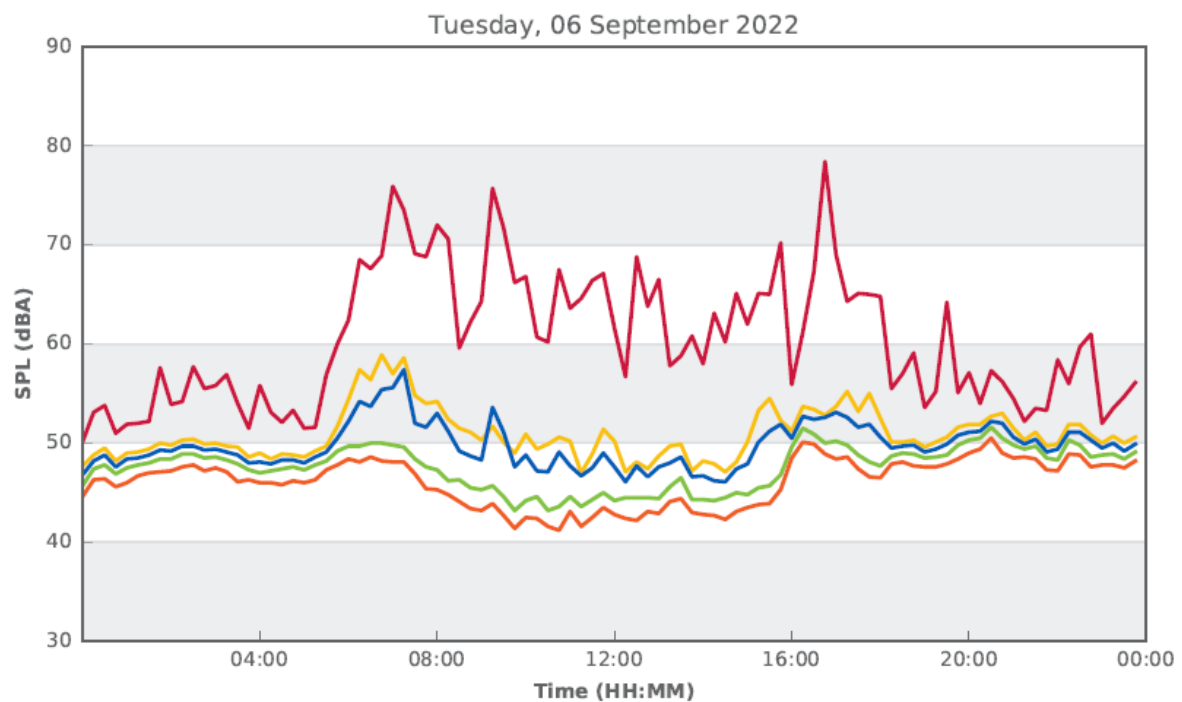
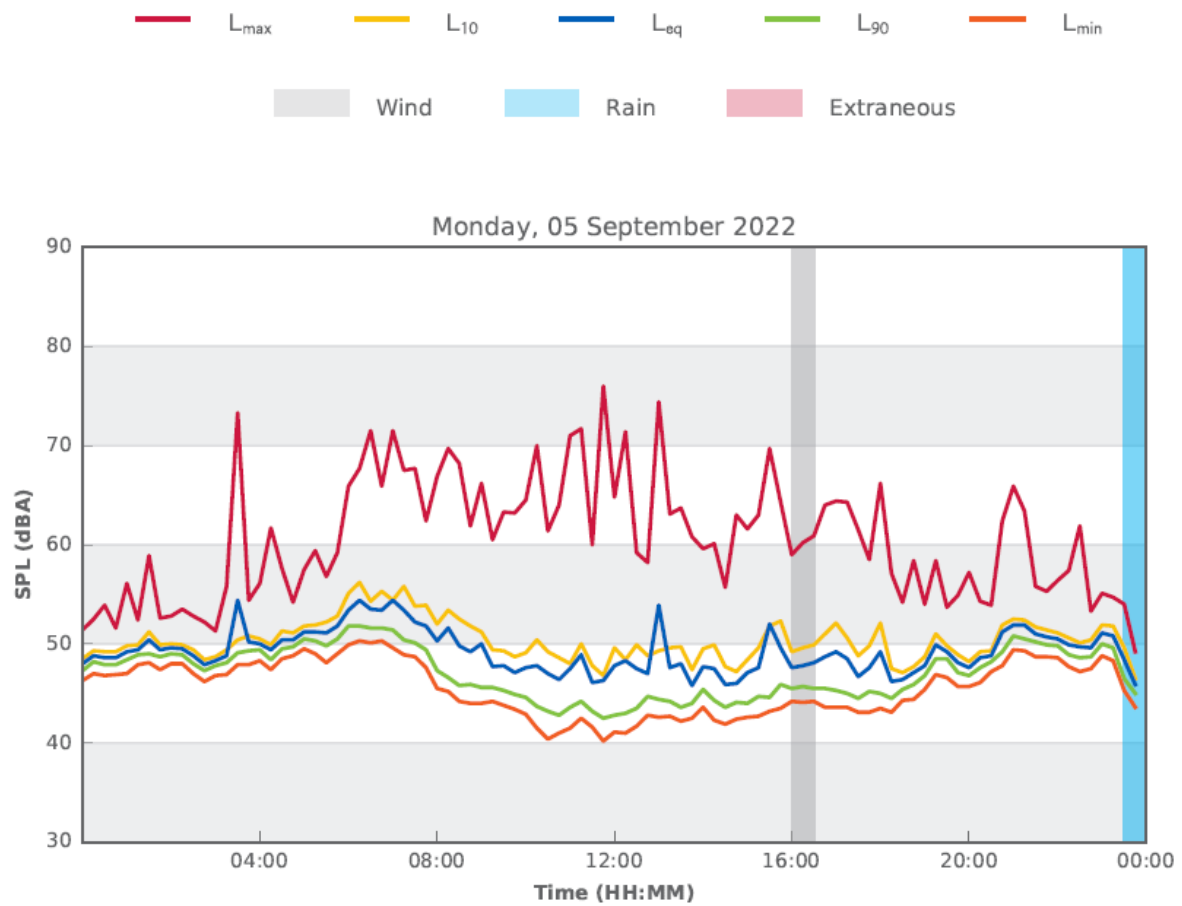
NL02 – 55 Hemingway Crescent, Fairfield



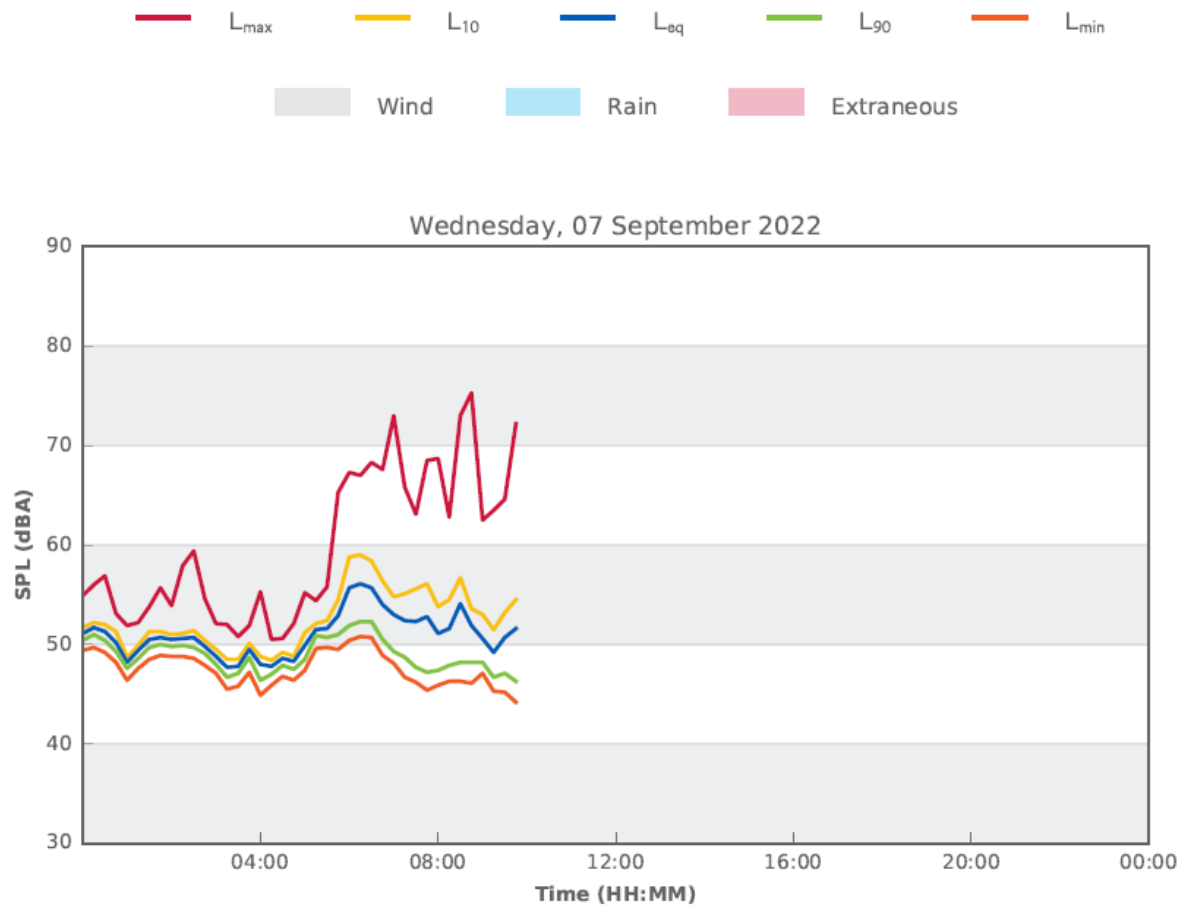
NL02 – 55 Hemingway Crescent, Fairfield



NL02 – 55 Hemingway Crescent, Fairfield



NL02 – 55 Hemingway Crescent, Fairfield



Unattended Noise Monitoring Data – NL03

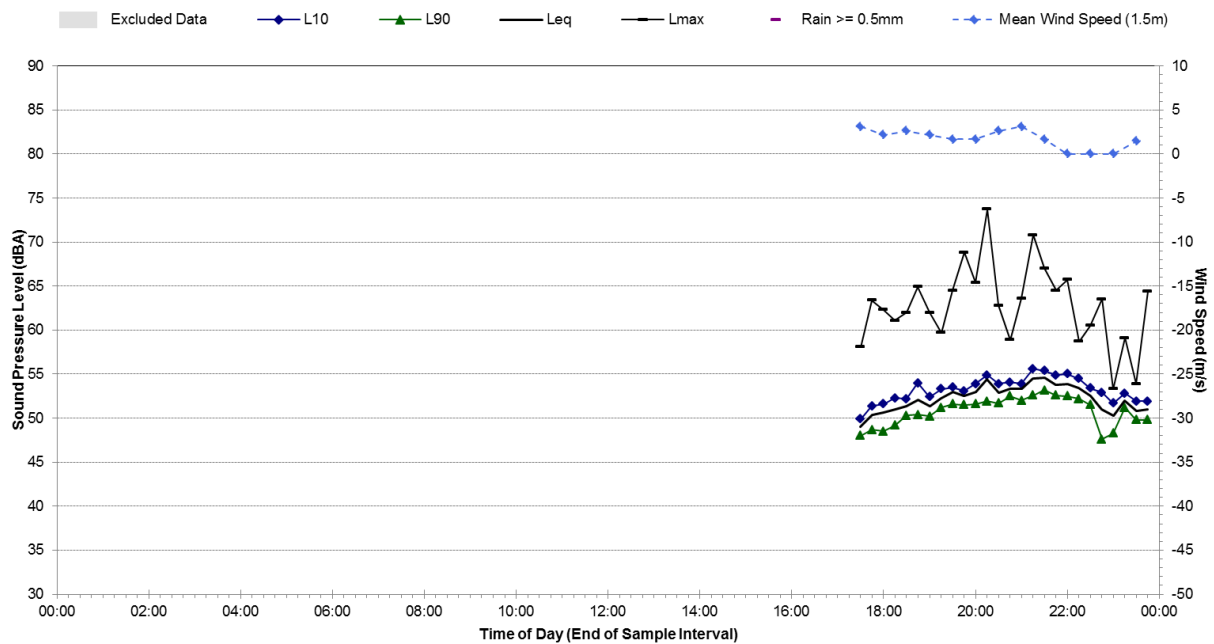
Noise Monitoring Location	NL03			
Noise Monitoring Address	38 Hemingway Crescent, Fairfield			
Source Report	“Smithfield Distribution Centre 149 McCredie Road, Smithfield – DA Noise Impact Assessment” prepared by SLR, Report Reference 610.18295-R01-v2.1, dated 14 June 2019 (DA2018/347/1 NIA)			
Logger Device Type: ARL 316, Logger Serial No: 16-306-040 Sound Level Meter Device Type: Brüel & Kjær Type 2260, Sound Level Meter Serial No: 2487418 Unattended Noise Monitoring Date: 25/07/2018 - 5/08/2018 Ambient noise logger deployed at residential address 38 Hemingway Crescent, Fairfield. Logger located in open space on the north eastern side of the dwelling. Attended noise measurements indicate the ambient noise environment at this location is dominated industrial noise emanating from the northwest. Measured Typical LAmax: Industrial noise: 48-50 dBA, Light vehicle traffic on Hemingway Crescent: up to 60 dBA, Dog barking: 79 dBA.				
Ambient Noise Logging Results – ICNG Defined Time Periods				
Monitoring Period	Noise Level (dBA)			
	RBL	LAeq	L10	L1
Daytime	45	52	53	59
Evening	46	51	52	56
Night-time	48	52	52	54
Attended Noise Measurement Results				
Date	Start Time	Measured Noise Level (dBA)		
		LA90	LAeq	LAmix
25/08/2018	16:52	48	51	79

Note 1: All noise monitoring was captured and processed in accordance with the NSW EPA Noise Policy for Industry (NPfI), including Fact Sheets A and B of the NPfI.



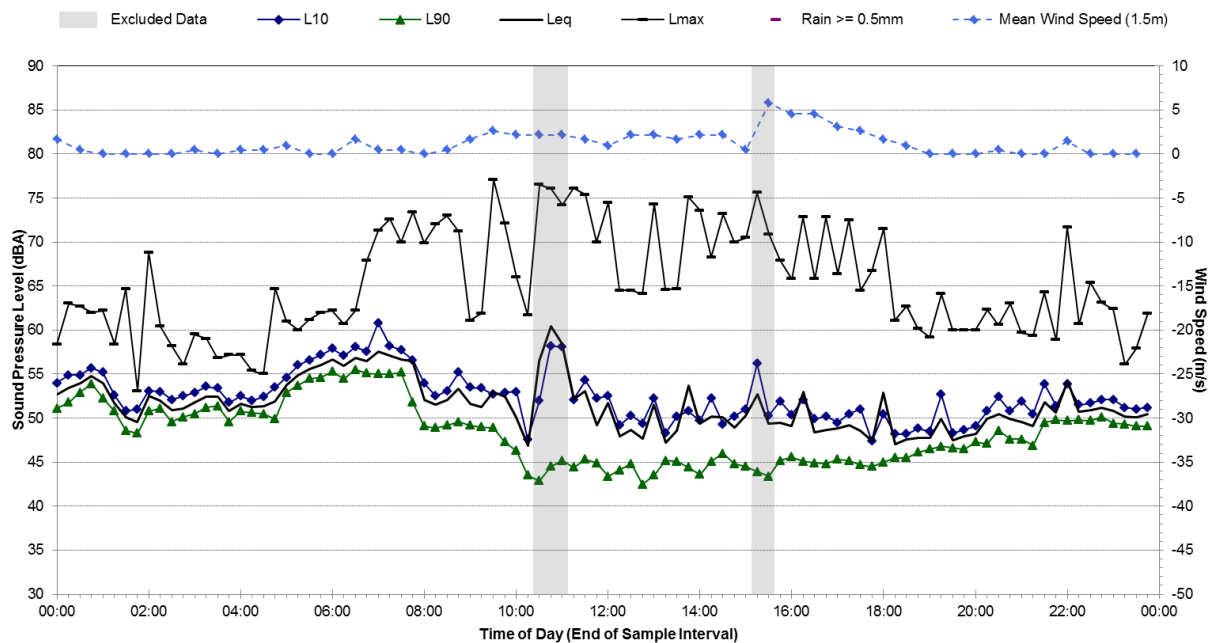
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Wednesday, 25 July 2018



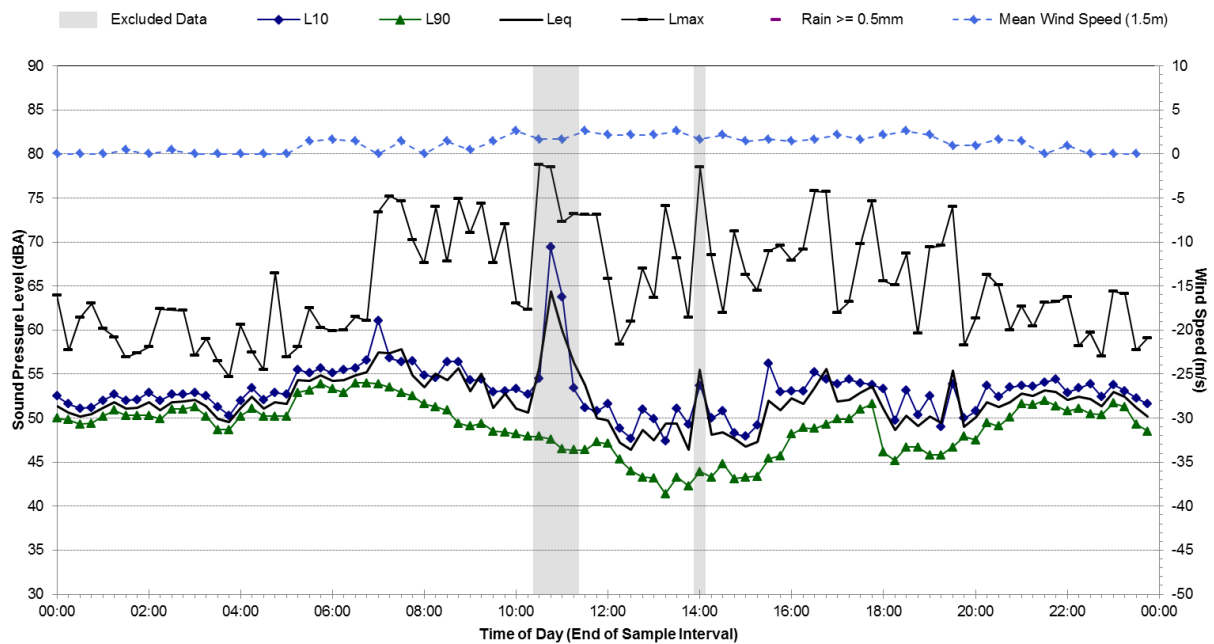
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Thursday, 26 July 2018



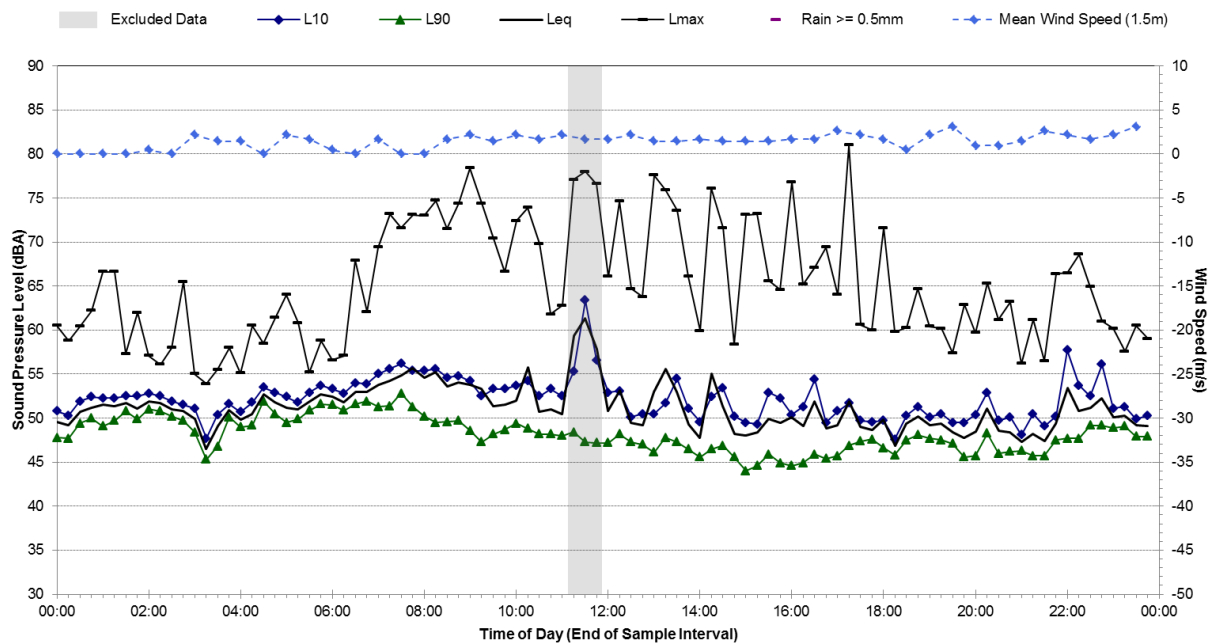
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Friday, 27 July 2018



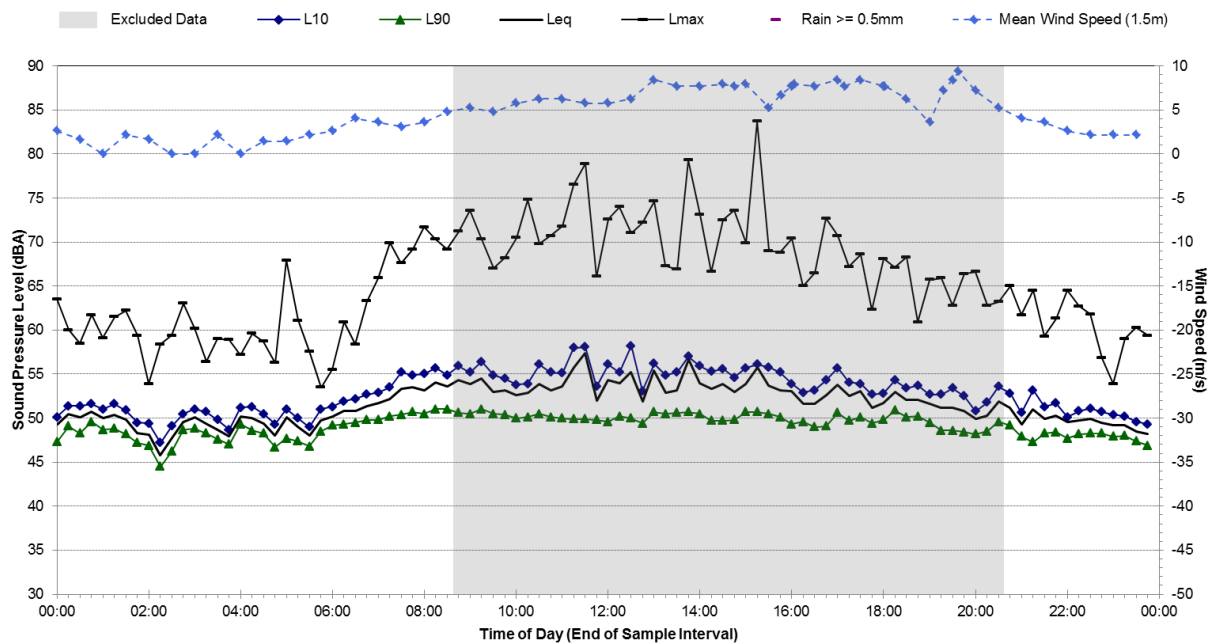
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Saturday, 28 July 2018



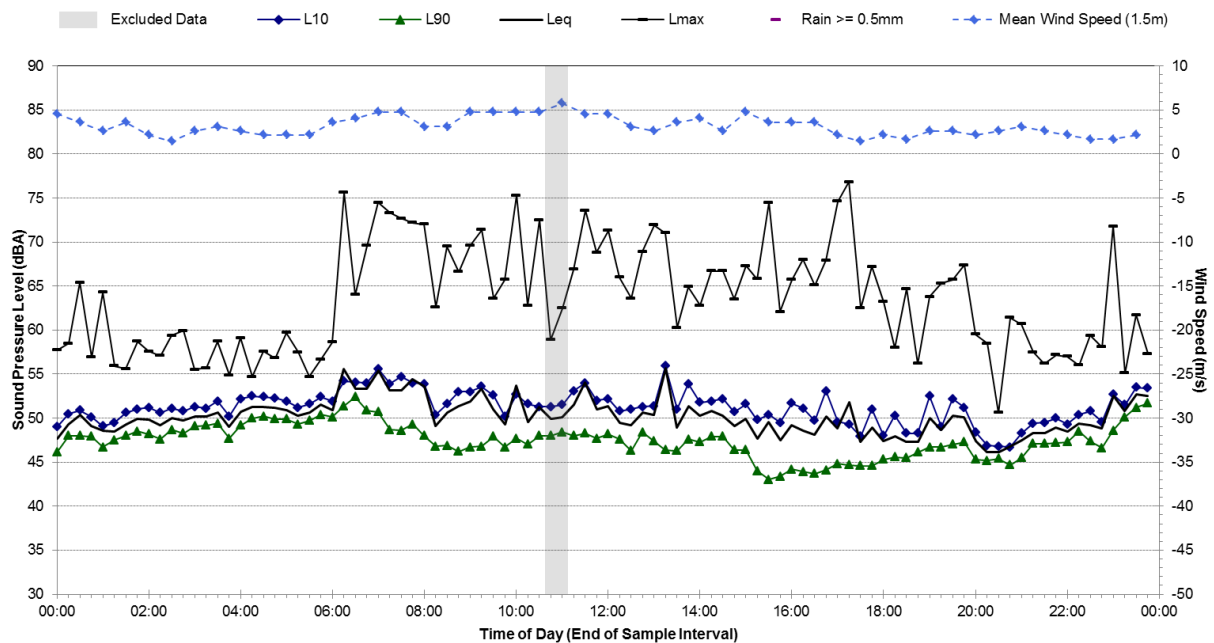
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Sunday, 29 July 2018



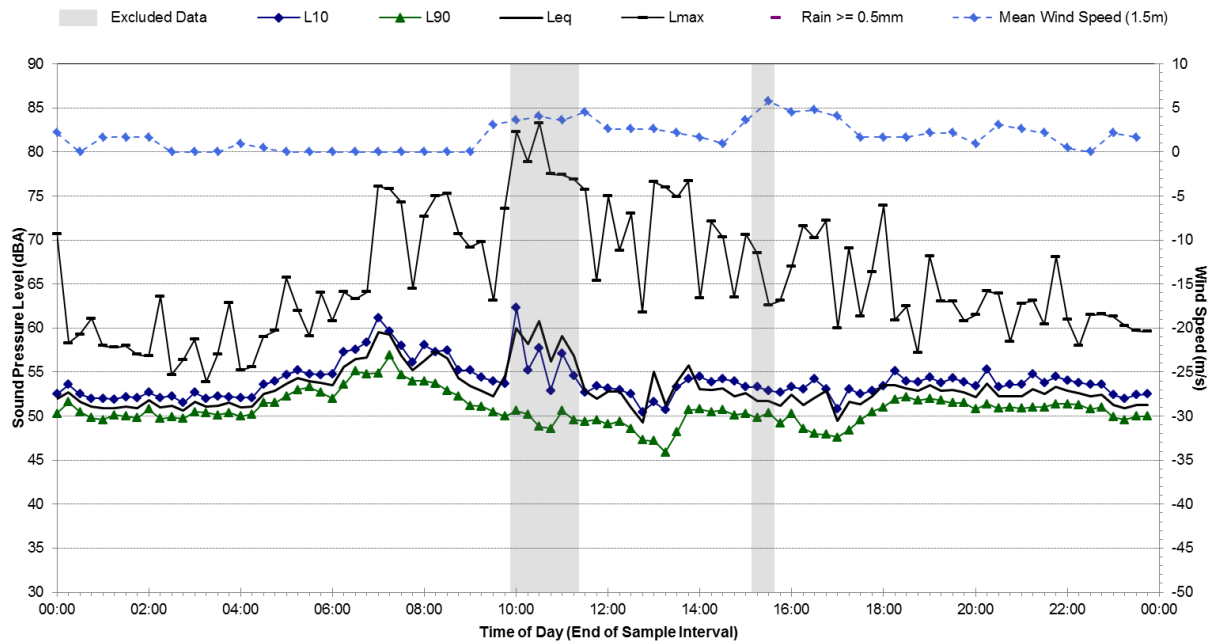
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Monday, 30 July 2018



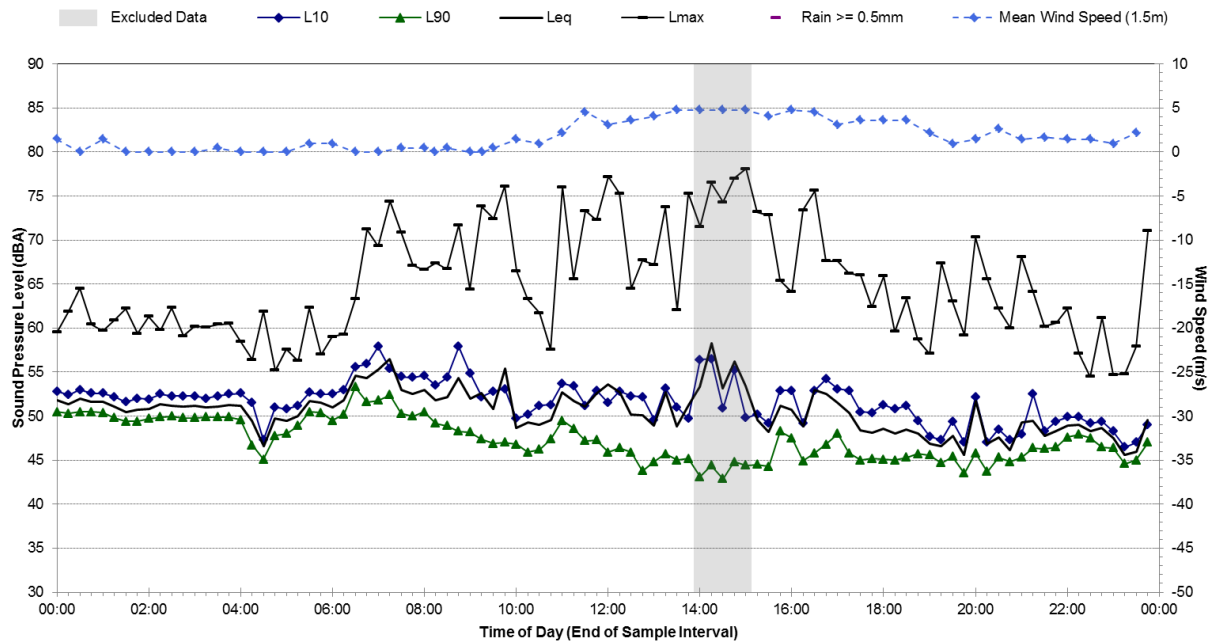
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Tuesday, 31 July 2018



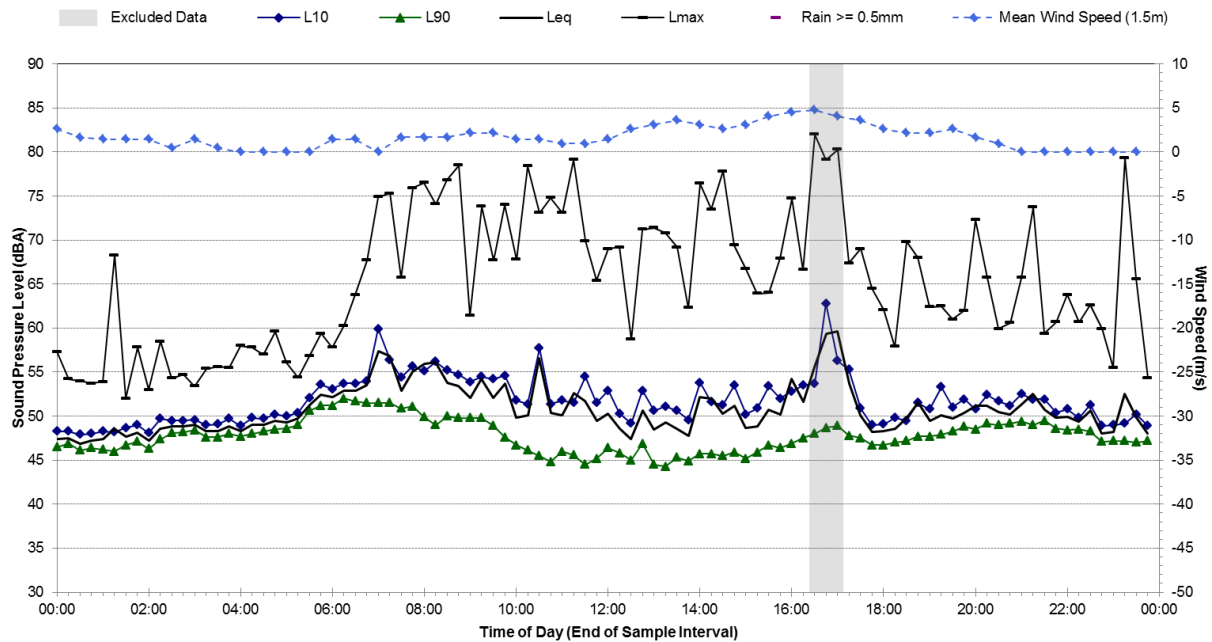
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Wednesday, 1 August 2018



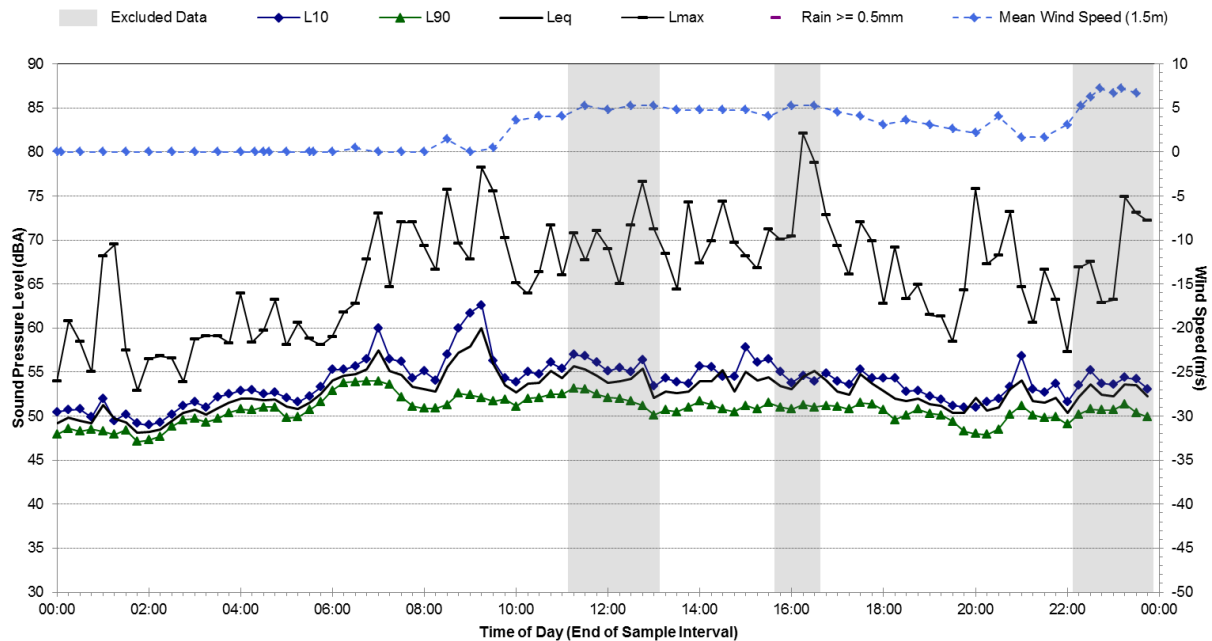
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Thursday, 2 August 2018



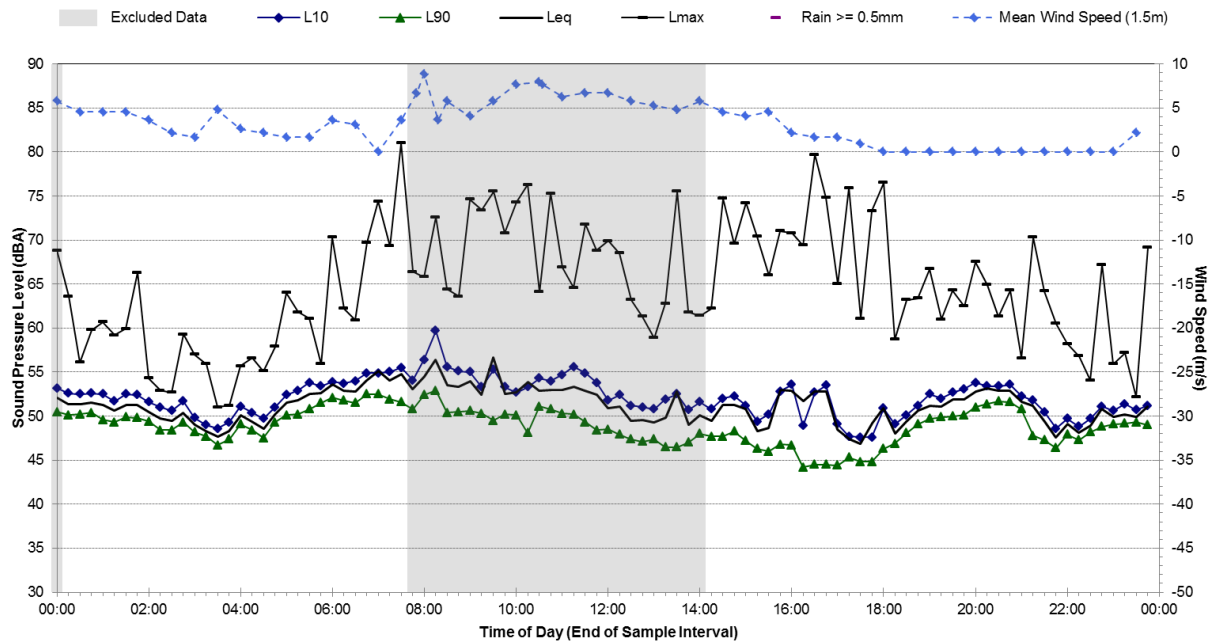
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Friday, 3 August 2018



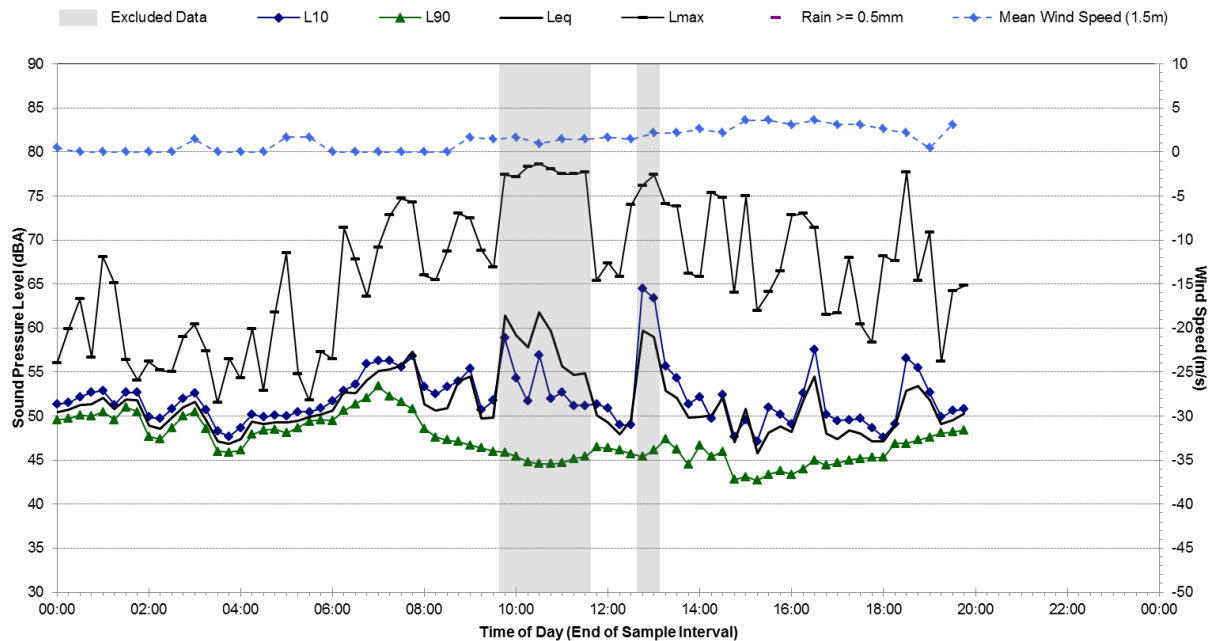
Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Saturday, 4 August 2018



Statistical Ambient Noise Levels

NL03 - 38 Hemingway Crescent, Fairfield - Sunday, 5 August 2018



Attended Noise Monitoring Data – 8 April 2025

Noise Monitoring Location			NL01		
Noise Monitoring Address			111-123 McCredie Road, Smithfield		
Sound Level Meter Device Type: Brüel & Kjær Type 2250, Sound Level Meter Serial No: 3004635					
Attended noise measurements undertaken on footpath adjacent to front yard of residence at 111-123 McCredie Road, Smithfield. This location was closer to McCredie Road than the location of the unattended noise monitoring in 2022 due to access restrictions.					
Daytime Attended Measurement					
Attended noise measurements indicate the ambient noise environment at this location is dominated by road traffic noise from McCredie Road during the daytime. During the measurement there was generally a steady flow of light vehicles, with intermittent heavy vehicles.					
Measured Typical L _{Amax} : Light vehicle traffic on McCredie Road: 51-80 dBA, Heavy vehicle traffic on McCredie Road: 60-86 dBA, Birds audible at times, Aircraft audible, Industrial noise was generally inaudible.					
Evening Attended Measurement					
Attended noise measurements indicate the ambient noise environment at this location is dominated by road traffic noise from McCredie Road during the evening. During the measurement there was a steady flow of light vehicles, though slightly less than the daytime measurement, with intermittent heavy vehicles.					
Measured Typical L _{Amax} : Light vehicle traffic on McCredie Road: 48-78 dBA, Heavy vehicle traffic on McCredie Road: 60-88 dBA, Birds audible at times, Aircraft audible, Industrial noise was generally inaudible.					
Night-time Attended Measurement					
Attended noise measurement was not able to be undertaken at this location due to adverse weather during the night-time.					
Attended Noise Measurement Results					
Date	Period	Start Time	Measured Noise Level (dBA)		
			L _{A90}	L _{Aeq}	L _{Amax}
8/04/2025	Daytime	17:38	58	72	86
8/04/2025	Evening	18:00	56	71	88
8/04/2025	Night-time	n/a ¹	n/a ¹	n/a ¹	n/a ¹

Note 1: Night-time measurement at this location was not able to be undertaken due to adverse weather.

Note 2: All noise monitoring was captured and processed in accordance with the NSW EPA Noise Policy for Industry (NPfI), including Fact Sheets A and B of the NPfI.



Noise Monitoring Location			NL02		
Noise Monitoring Address			55 Hemingway Crescent, Fairfield		
Sound Level Meter Device Type: Brüel & Kjær Type 2250, Sound Level Meter Serial No: 3004635					
Attended noise measurements undertaken in clearing behind 55 Hemingway Crescent, Fairfield, near the location of the unattended noise monitoring in 2022.					
Daytime Attended Measurement Attended noise measurements indicate the ambient noise environment at this location is dominated by distant road traffic noise during the daytime, including McCredie Road to the north, Fairfield Road to the east, The Horsley Drive to the south and south west, and Cumberland Highway to the west and north west. Industrial noise such as heavy vehicle movements and unloading activities contributed to the LAeq.					
Measured Typical LMax: Distant traffic noise (multiple directions): 40-44 dBA, Intermittent heavy vehicle and unloading noise from industrial sites to the north and east: up to 50 dBA, Aircraft: 58 dBA, Helicopter: 51 dBA, Birds and insects: up to 55 dBA, Residential noise audible at times.					
Evening Attended Measurement Attended noise measurements indicate the ambient noise environment at this location is dominated by industrial noise during the evening, mostly from the north. The industrial noise was generally a steady, low frequency rumble/hum, indicative of mechanical plant, with some variance in manufacturing noise.					
Measured Typical LMax: Steady industrial noise/mechanical plant to the north: 43-45 dBA, Manufacturing noise to the north: 44-50 dBA, Intermittent heavy vehicle and unloading noise from industrial sites to the north and east: up to 50 dBA, Aircraft: 55 dBA, Birds and insects audible, Distant traffic was not audible over the industrial noise.					
Night-time Attended Measurement Attended noise measurement was not able to be undertaken at this location due to adverse weather during the night-time.					
Attended Noise Measurement Results					
Date	Period	Start Time	Measured Noise Level (dBA)		
			LA90	LAeq	LMax
8/04/2025	Daytime	17:12	42	45	58
8/04/2025	Evening	21:05	44	46	55
8/04/2025	Night-time	n/a ¹	n/a ¹	n/a ¹	n/a ¹

Note 1: Night-time measurement at this location was not able to be undertaken due to adverse weather.

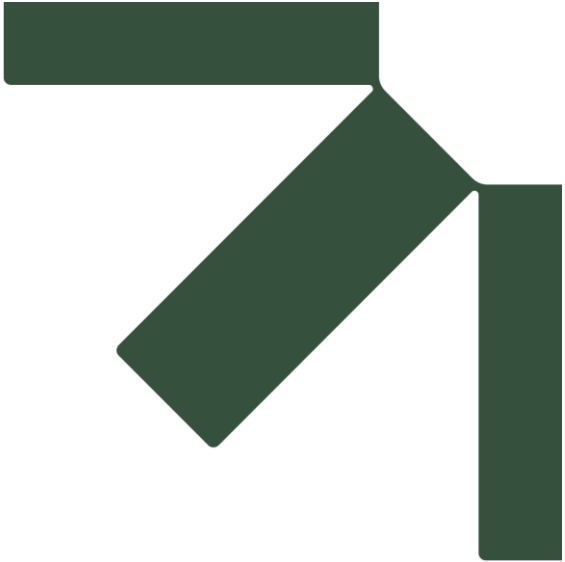
Note 2: All noise monitoring was captured and processed in accordance with the NSW EPA Noise Policy for Industry (NPfI), including Fact Sheets A and B of the NPfI.



Noise Monitoring Location			NL03		
Noise Monitoring Address			38 Hemingway Crescent, Fairfield		
Sound Level Meter Device Type: Brüel & Kjær Type 2250, Sound Level Meter Serial No: 3004635					
Attended noise measurements undertaken on footpath adjacent to front yard of residence at 38 Hemingway Crescent, Fairfield, near the location of the unattended noise monitoring in 2018.					
Daytime Attended Measurement					
Attended noise measurements indicate the ambient noise environment at this location is dominated by distant road traffic noise during the daytime, including McCredie Road to the north, Fairfield Road to the east, The Horsley Drive to the south and south west, and Cumberland Highway to the west and north west. Traffic noise was slightly higher at NL03 than at NL02. Industrial noise such as heavy vehicle movements and unloading activities contributed to the LAeq.					
Measured Typical L _{Amax} : Distant traffic noise (multiple directions): 41-45 dBA, Intermittent heavy vehicle and unloading noise from industrial sites to the north and east: 50-55 dBA, Occasional light vehicle passby on Hemingway Crescent: up to 67 dBA, Aircraft: up to 61 dBA, Birds and insects audible, Residential noise audible at times.					
Evening Attended Measurement					
Attended noise measurements indicate the ambient noise environment at this location is dominated by industrial noise during the evening, mostly from the north. The industrial noise was generally a steady, low frequency rumble/hum, indicative of mechanical plant, with some variance in manufacturing noise. The industrial noise was higher at NL03 than at NL02.					
Measured Typical L _{Amax} : Steady industrial noise/mechanical plant to the north: 46-48 dBA, Manufacturing noise to the north: 47-52 dBA, Intermittent high frequency whirring from industrial plant audible, Intermittent heavy vehicle and unloading noise from industrial sites to the north and east: up to 50 dBA, Aircraft: 54 dBA, Birds and insects audible, No vehicle passbys on Hemingway Crescent during the measurement, Distant traffic was not audible over the industrial noise.					
Night-time Attended Measurement					
Attended noise measurements indicate the ambient noise environment at this location is dominated by industrial noise during the night-time, mostly from the north. The industrial noise was generally a steady, low frequency rumble/hum, indicative of mechanical plant, with some variance in manufacturing noise. Some manufacturing noise ceased part-way through the measurement, and the steady rumble/hum reduced slightly.					
Measured Typical L _{Amax} : Steady industrial noise/mechanical plant to the north (reduced slightly part-way through measurement): 43-48 dBA, Manufacturing noise to the north (ceased part-way through measurement): 47-52 dBA, Intermittent high frequency whirring from industrial plant audible, Intermittent heavy vehicle and unloading noise from industrial sites to the north and east: up to 49 dBA, Dog barking: 47 dBA, Birds and insects audible, Light vehicle passby on Hemingway Crescent: 60 dBA, Distant traffic was audible at times after the industrial noise reduced slightly.					
Attended Noise Measurement Results					
Date	Period	Start Time	Measured Noise Level (dBA)		
			LA90	LAeq	L _{Amax}
8/04/2025	Daytime	16:54	44	50	67
8/04/2025	Evening	21:23	47	48	54
8/04/2025	Night-time	22:00	44	46	60

Note 1: All noise monitoring was captured and processed in accordance with the NSW EPA Noise Policy for Industry (NPfI), including Fact Sheets A and B of the NPfI.





Appendix C Construction Noise Sources

**Project Pluto – 132 McCredie Road, Guildford West NSW
2161**

SSD-69223466 Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Ltd

SLR Project No.: 610.31859.00002

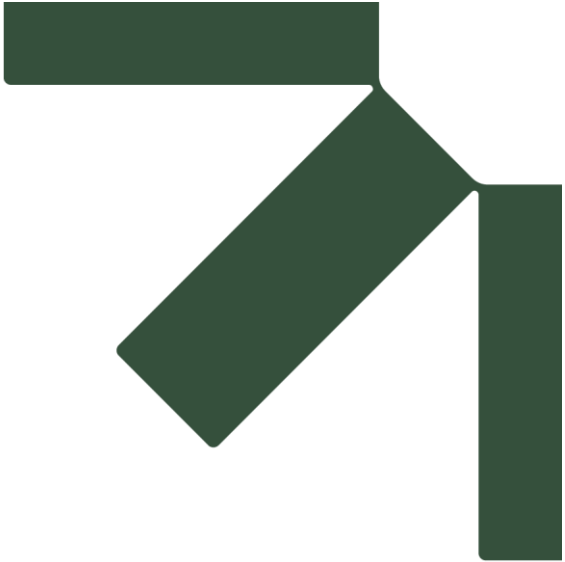
25 July 2025

Equipment	Total SWL	Chainsaw ¹	Chipper	Concrete Pump	Concrete Truck	Concrete Vibrator	Crane - Mobile (100t)	Dozer	Elevated Working Platform	Excavator (20t)	Excavator (30t) + Hydraulic Hammer ¹	Front End Loader	Hand Tools	Roller - Vibratory ¹	Truck - Dump	Truck - Flatbed	Water Truck
Sound Power Level²		119	120	109	109	113	113	116	97	105	127	112	104	114	110	103	107
Estimated on-time in any 15 minutes		5	15	10	15	5	15	10	15	10	5	10	15	15	10	10	10
<u>Scenario</u>																	
W.01 Vegetation clearing	122	X	X							X		X			X		X
W.02 Earthworks	119							X		X		X		X	X		X
W.03 Excavation of hard rock	126							X		X	X	X			X		X
W.04 Construction of pads, hardstands & ramps	113			X	X	X											
W.05 Construction of structures & equip. installation	114						X		X				X			X	

Note 1: Equipment classed as 'annoying' in the ICNG and requires a 5 dB correction.

Note 2: Sound power level data is taken from the DEFRA Noise Database, TfNSW *Construction and Vibration Guideline* and TfNSW *Construction Noise and Vibration Strategy*.





Appendix D Operational Noise Contours

**Project Pluto – 132 McCredie Road, Guildford West NSW
2161**

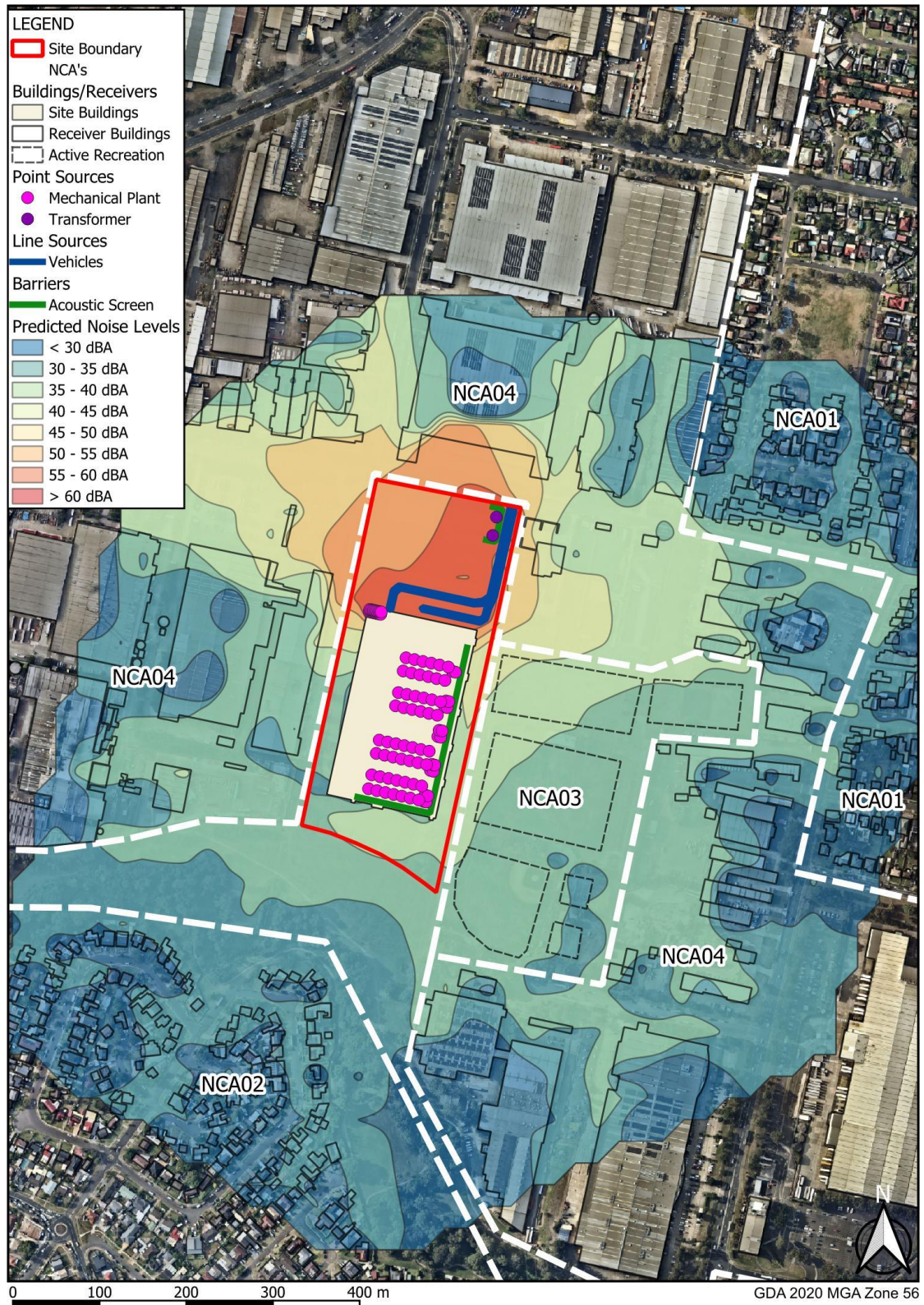
SSD-69223466 Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Ltd

SLR Project No.: 610.31859.00002

25 July 2025

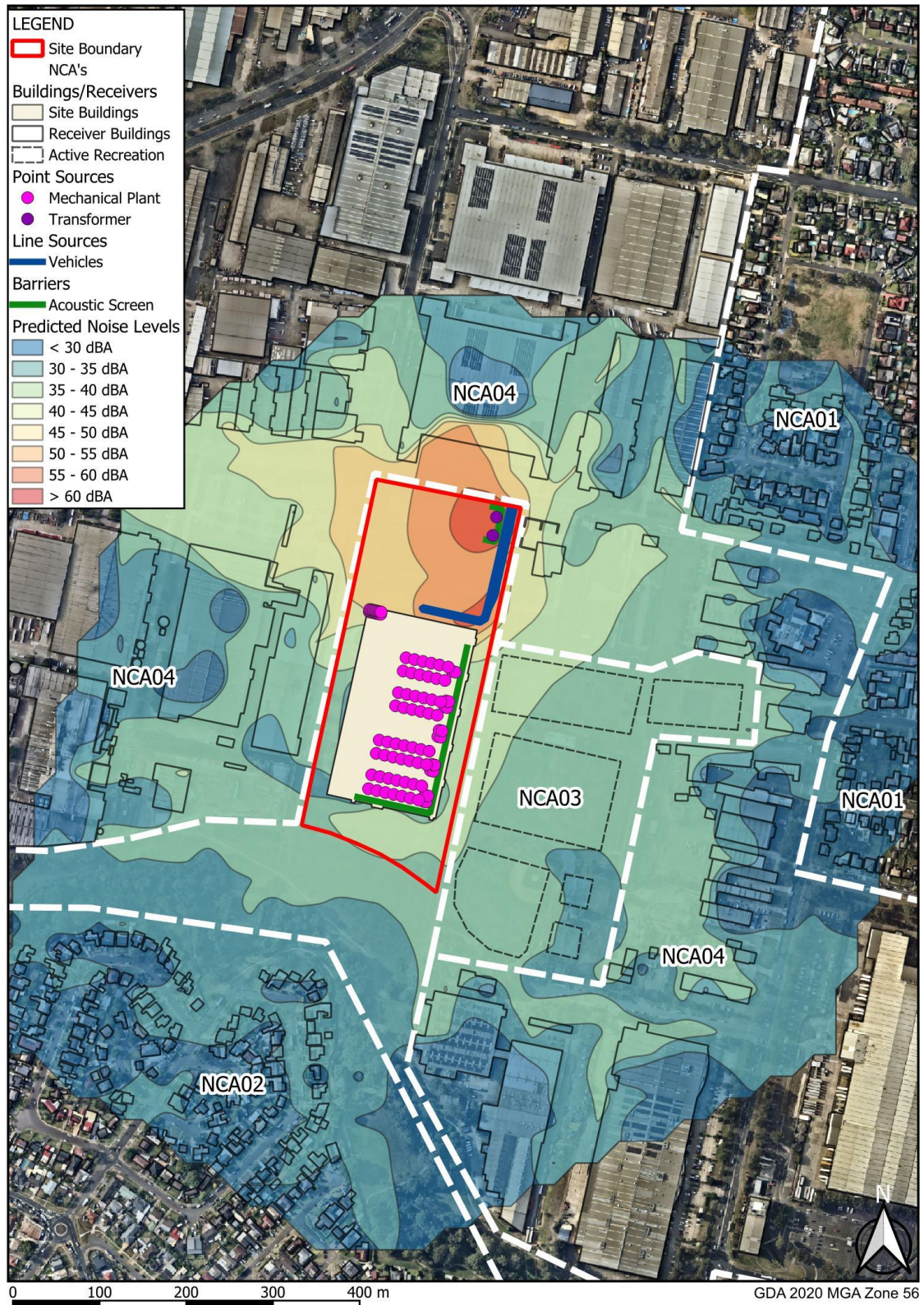
Predicted Operational Noise Contours – OP.01: Day – Ultimate Development – 1.5 m Height



Note 1: Noise contours calculated at 1.5 m above ground level.



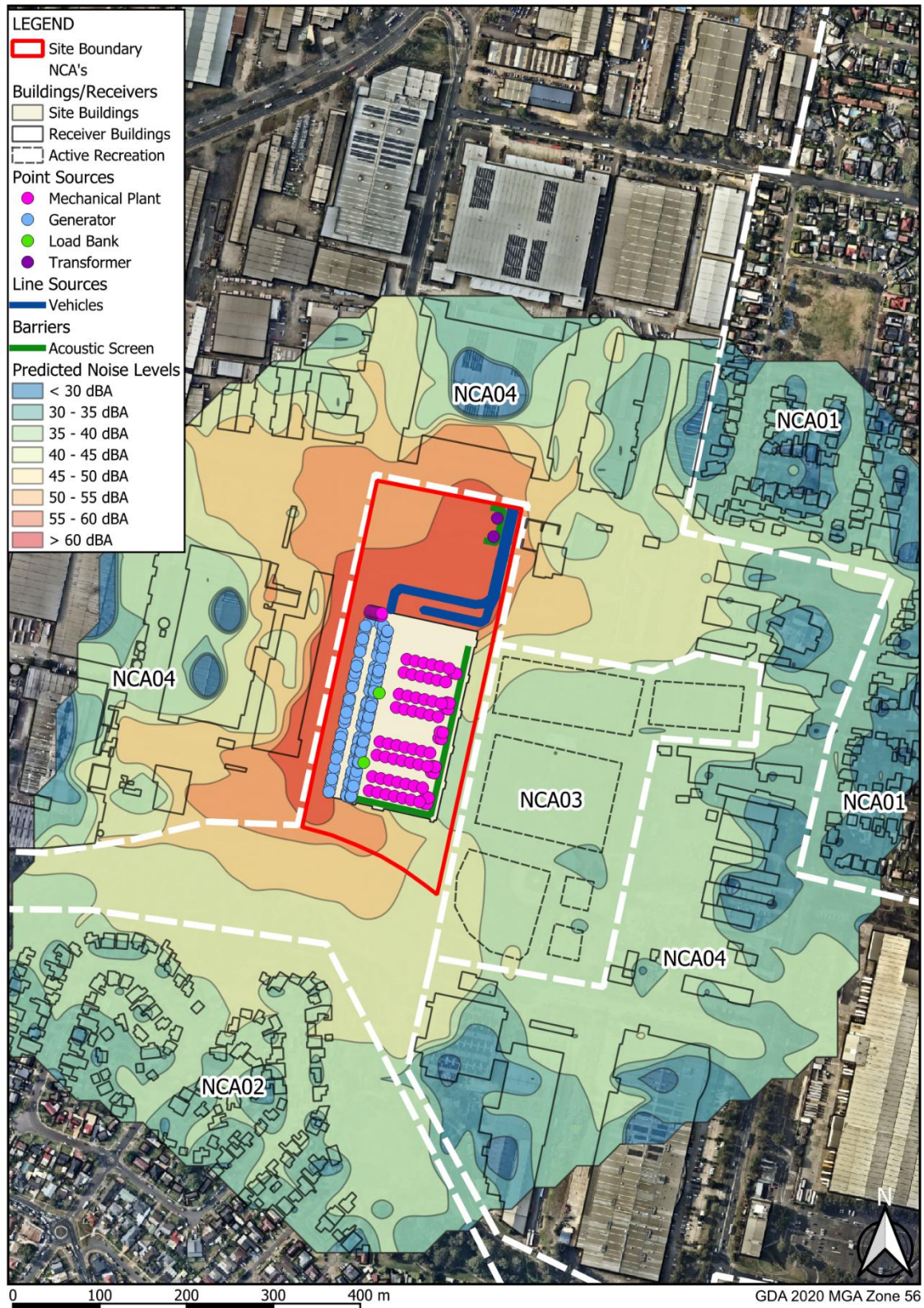
Predicted Operational Noise Contours – OP.01: Night – Ultimate Development – 1.5 m Height



Note 1: Noise contours calculated at 1.5 m above ground level.



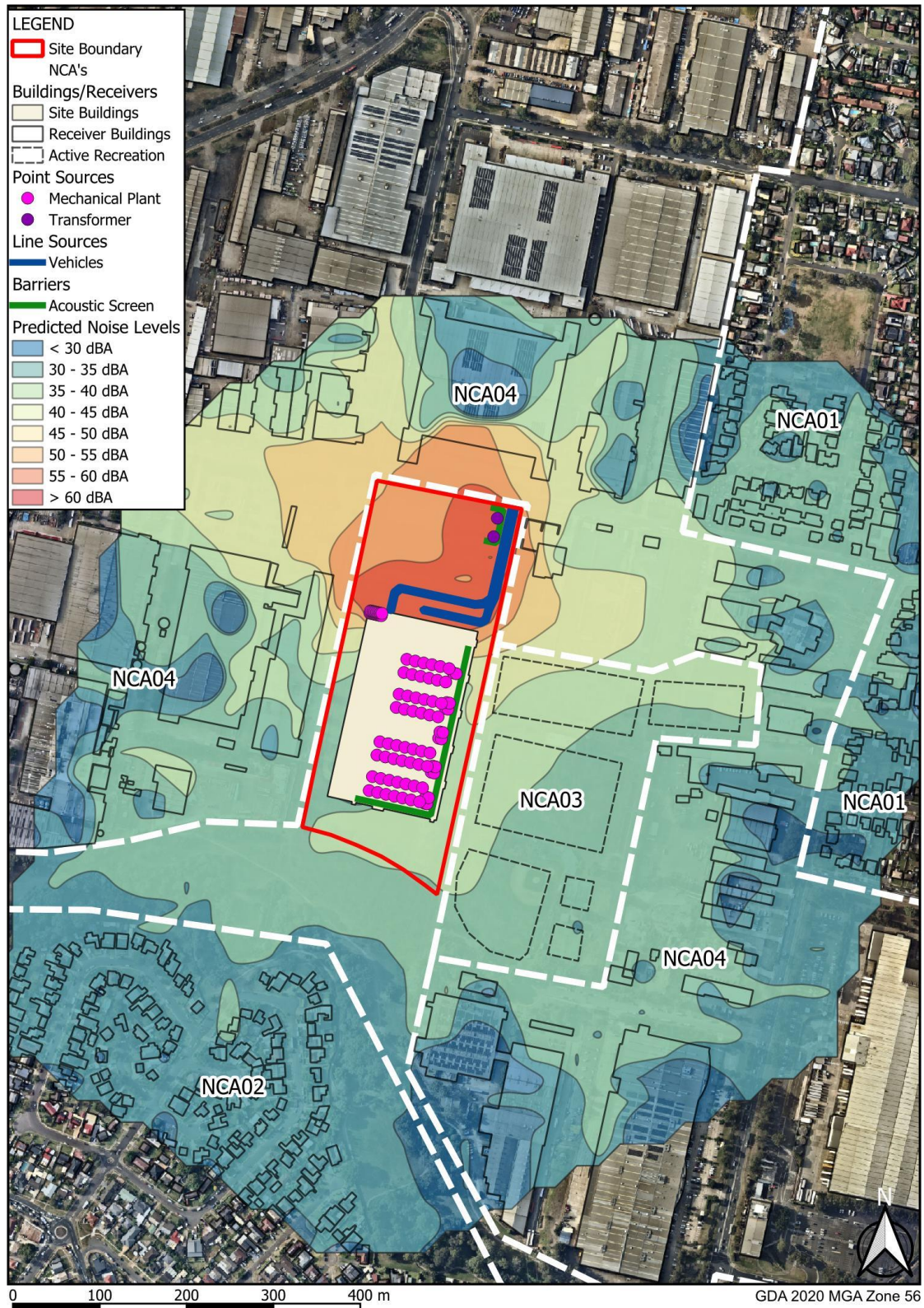
Predicted Operational Noise Contours – OP.02: Day + Generator Testing – Ultimate Development – 1.5 m Height



Note 1: Noise contours calculated at 1.5 m above ground level.



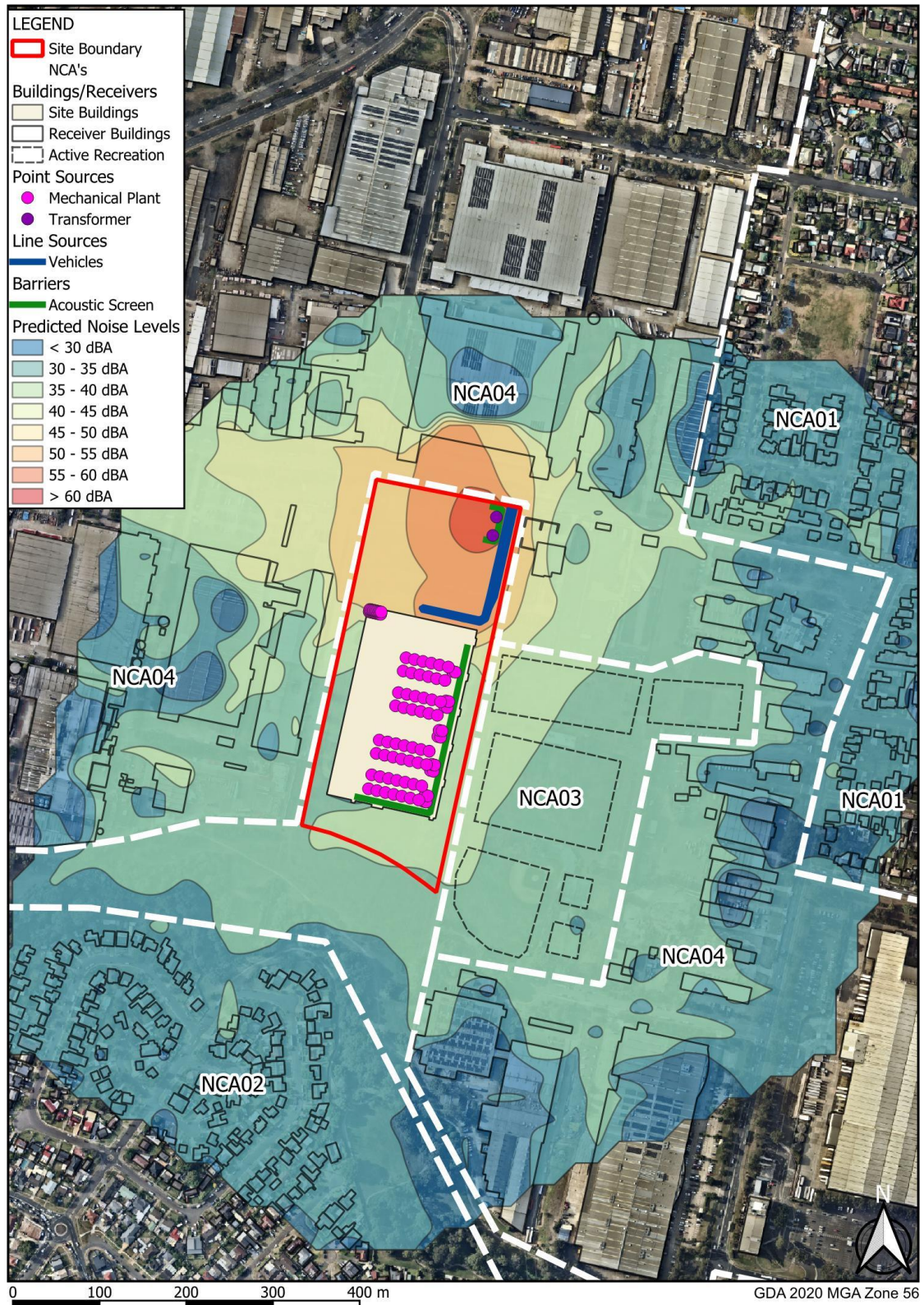
Predicted Operational Noise Contours – OP.01: Day – Ultimate Development – 4.5 m Height



Note 1: Noise contours calculated at 4.5 m above ground level.



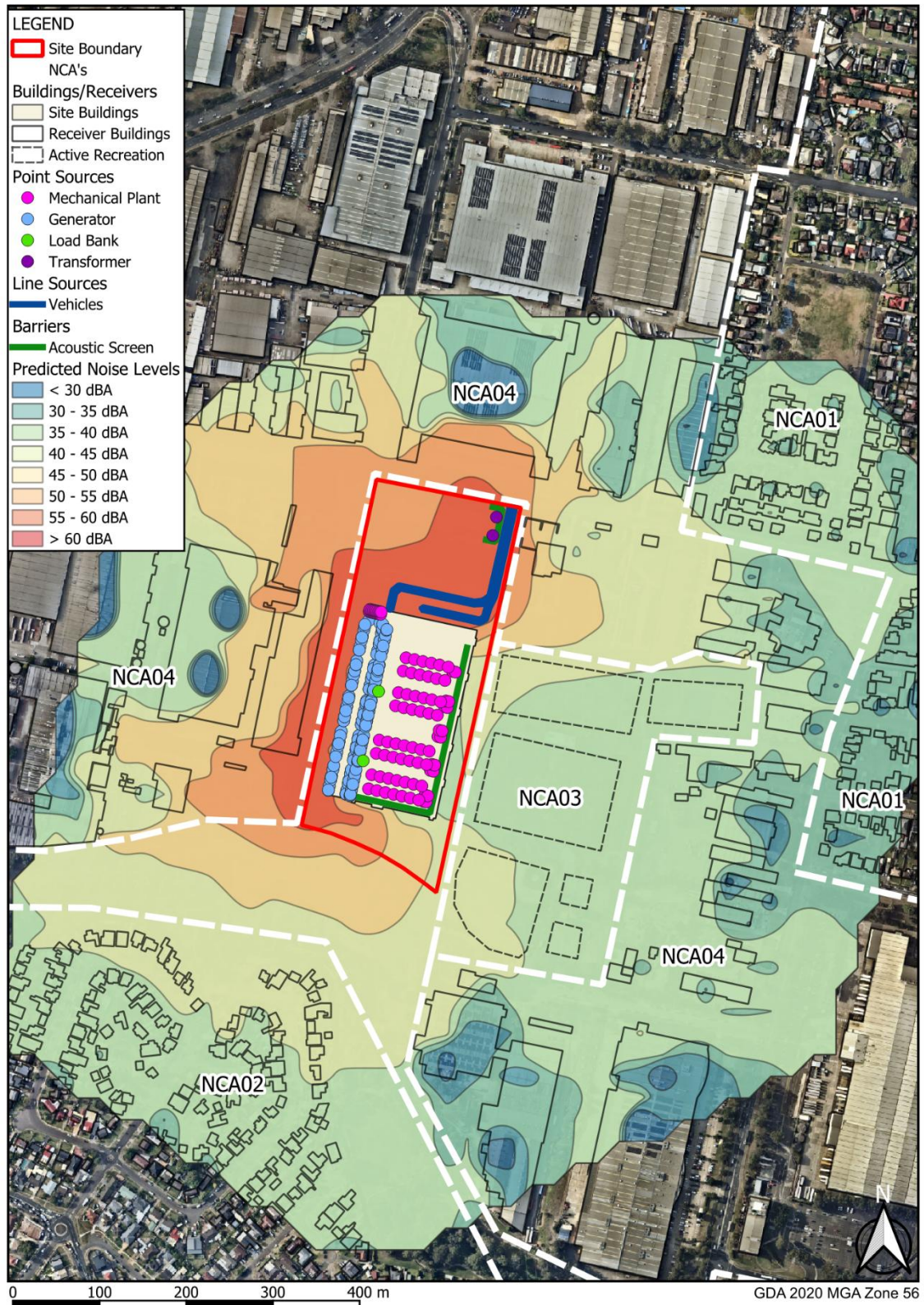
Predicted Operational Noise Contours – OP.01: Night – Ultimate Development – 4.5 m Height



Note 1: Noise contours calculated at 4.5 m above ground level.



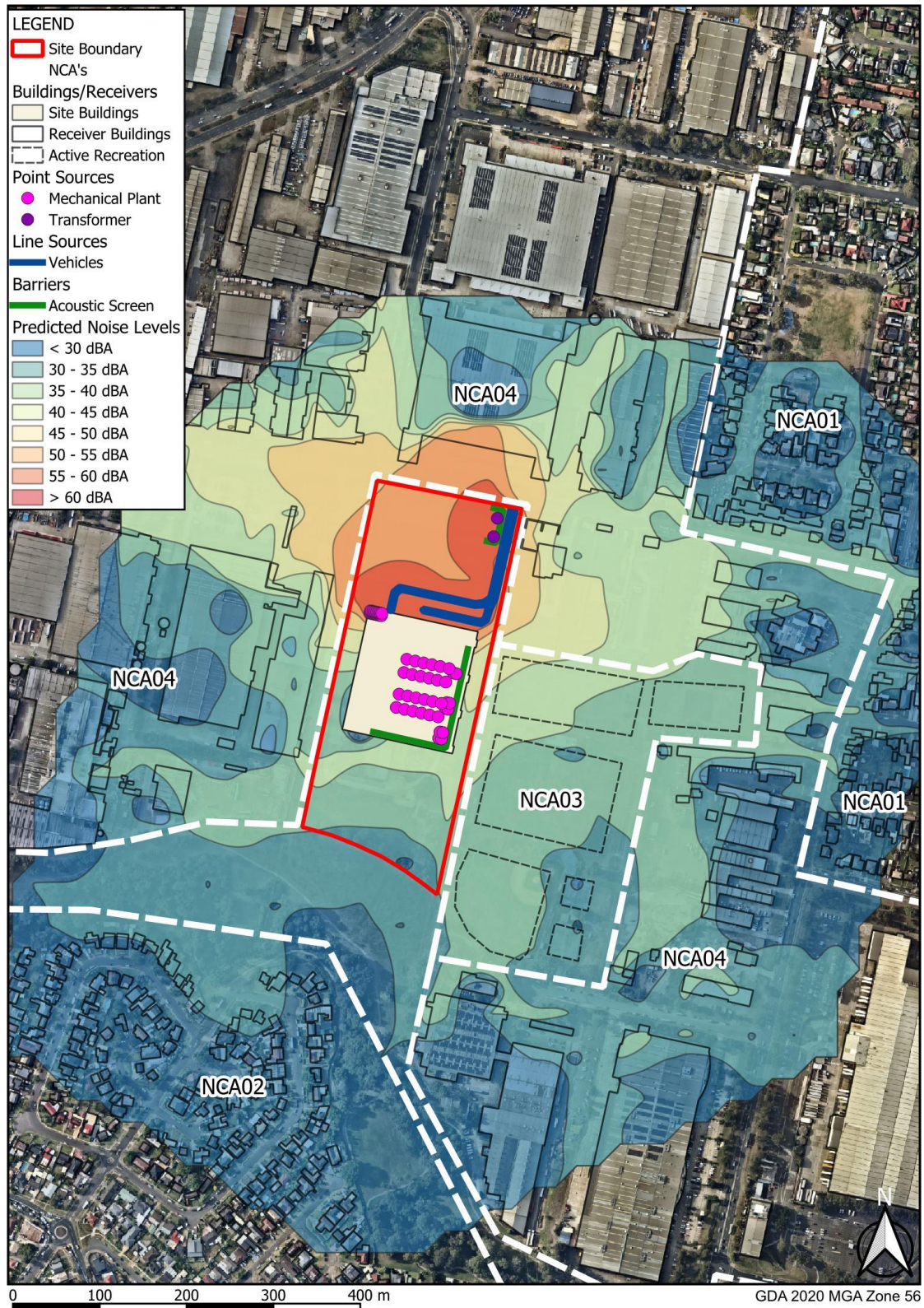
Predicted Operational Noise Contours – OP.02: Day + Generator Testing – Ultimate Development – 4.5 m Height



Note 1: Noise contours calculated at 4.5 m above ground level.



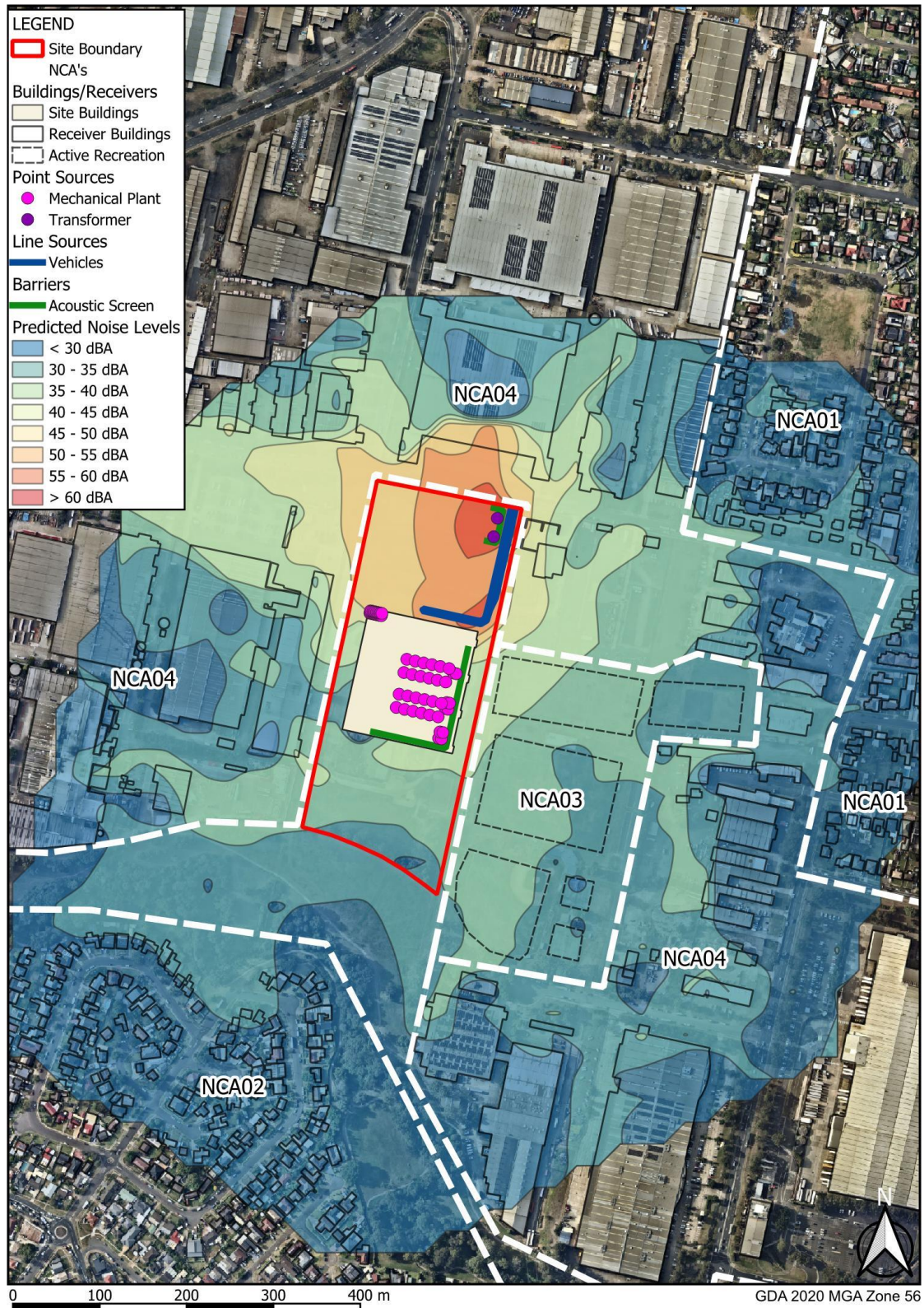
Predicted Operational Noise Contours – OP.01: Day – Stage 1 Development – 1.5 m Height



Note 1: Noise contours calculated at 1.5 m above ground level.



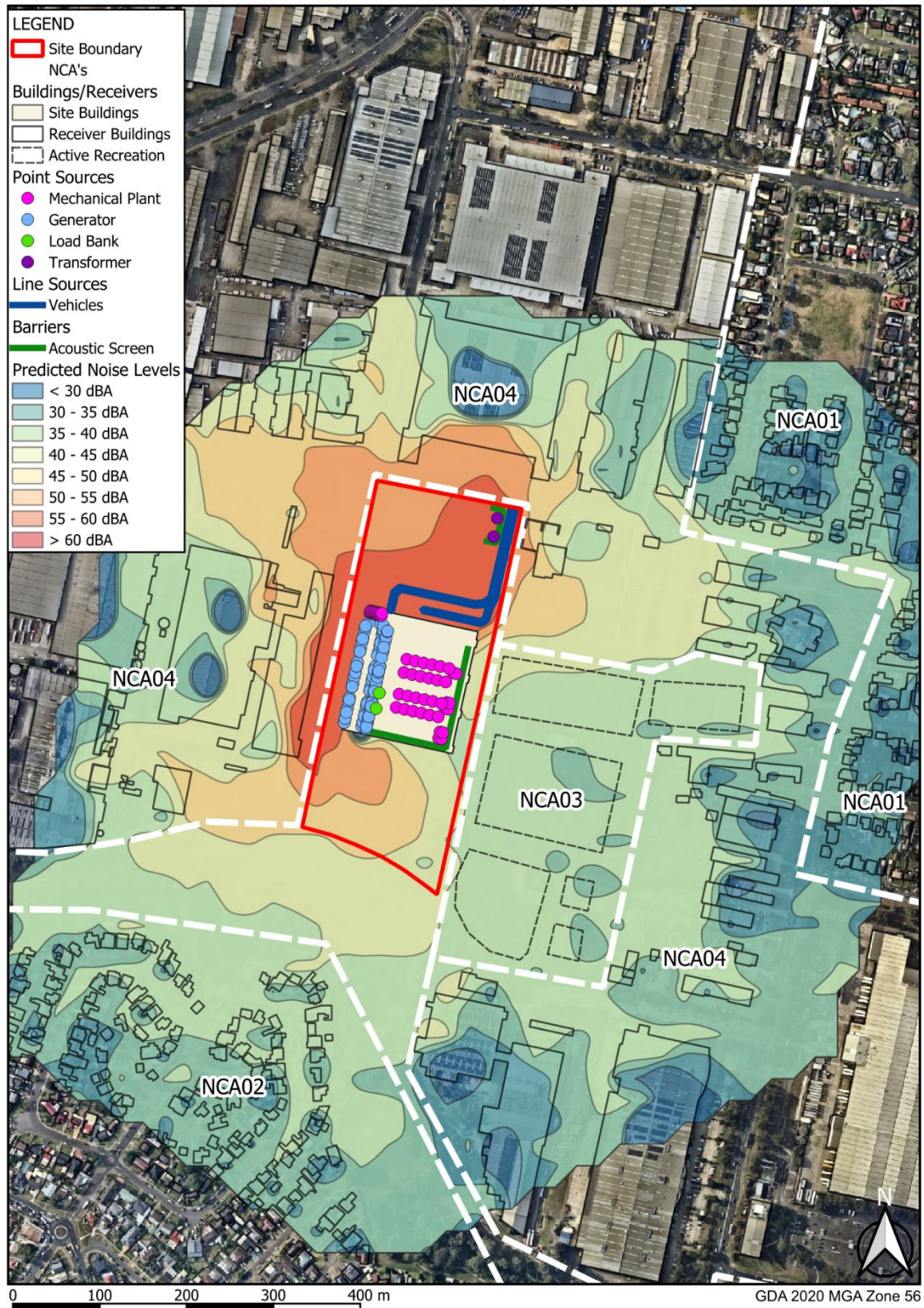
Predicted Operational Noise Contours – OP.01: Night – Stage 1 Development – 1.5 m Height



Note 1: Noise contours calculated at 1.5 m above ground level.



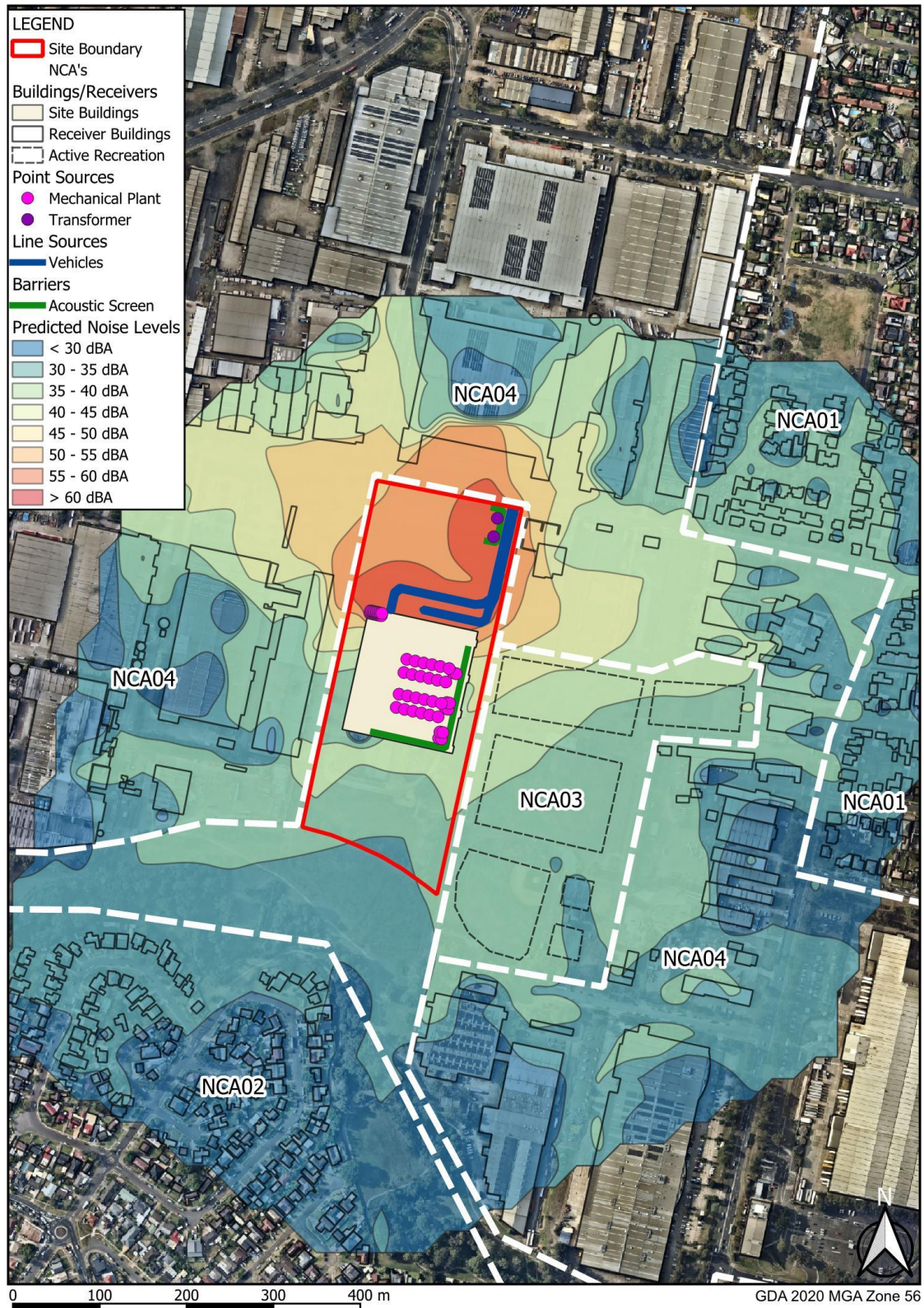
Predicted Operational Noise Contours – OP.02: Day + Generator Testing – Stage 1 Development – 1.5 m Height



Note 1: Noise contours calculated at 1.5 m above ground level.



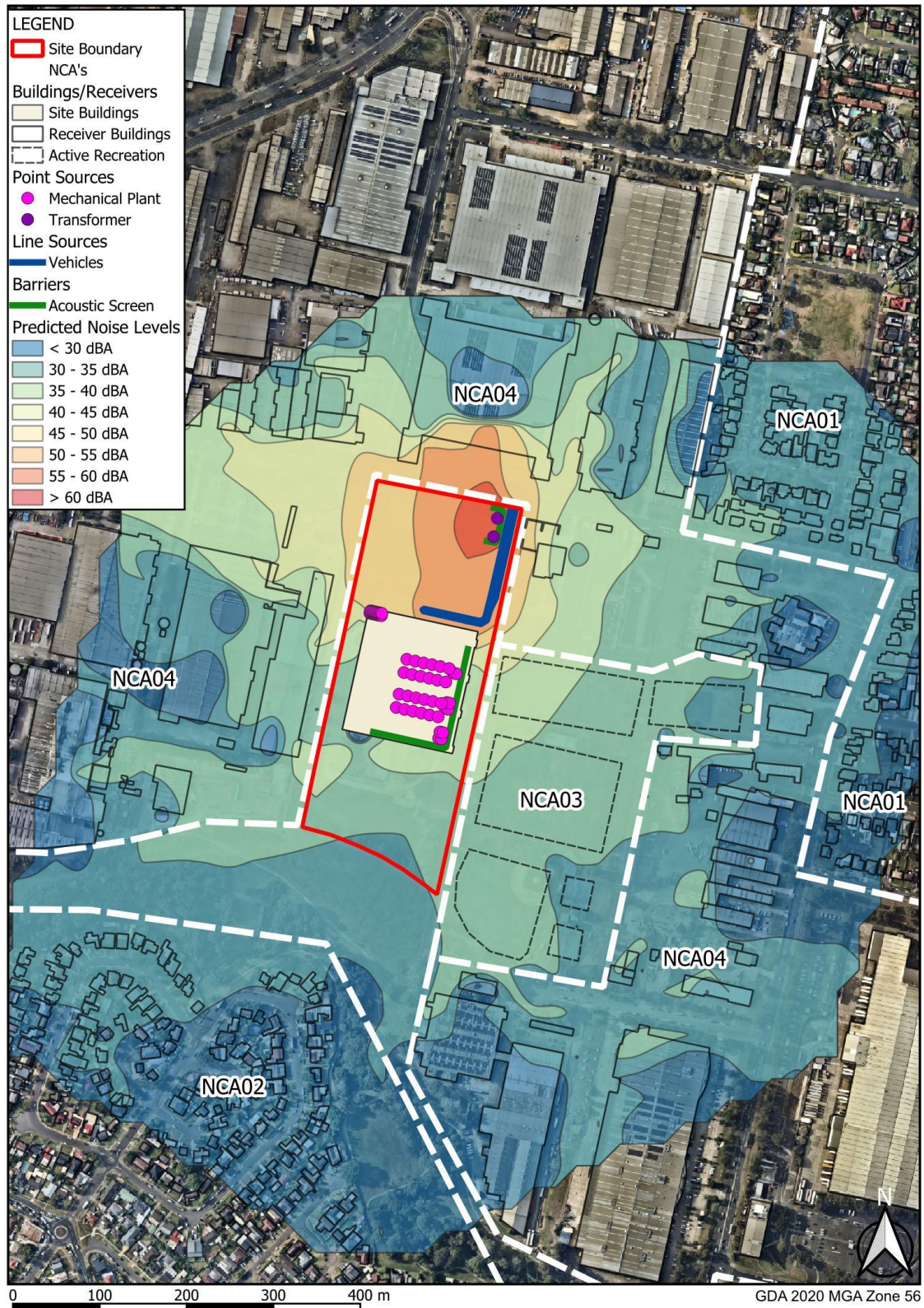
Predicted Operational Noise Contours – OP.01: Day – Stage 1 Development – 4.5 m Height



Note 1: Noise contours calculated at 4.5 m above ground level.



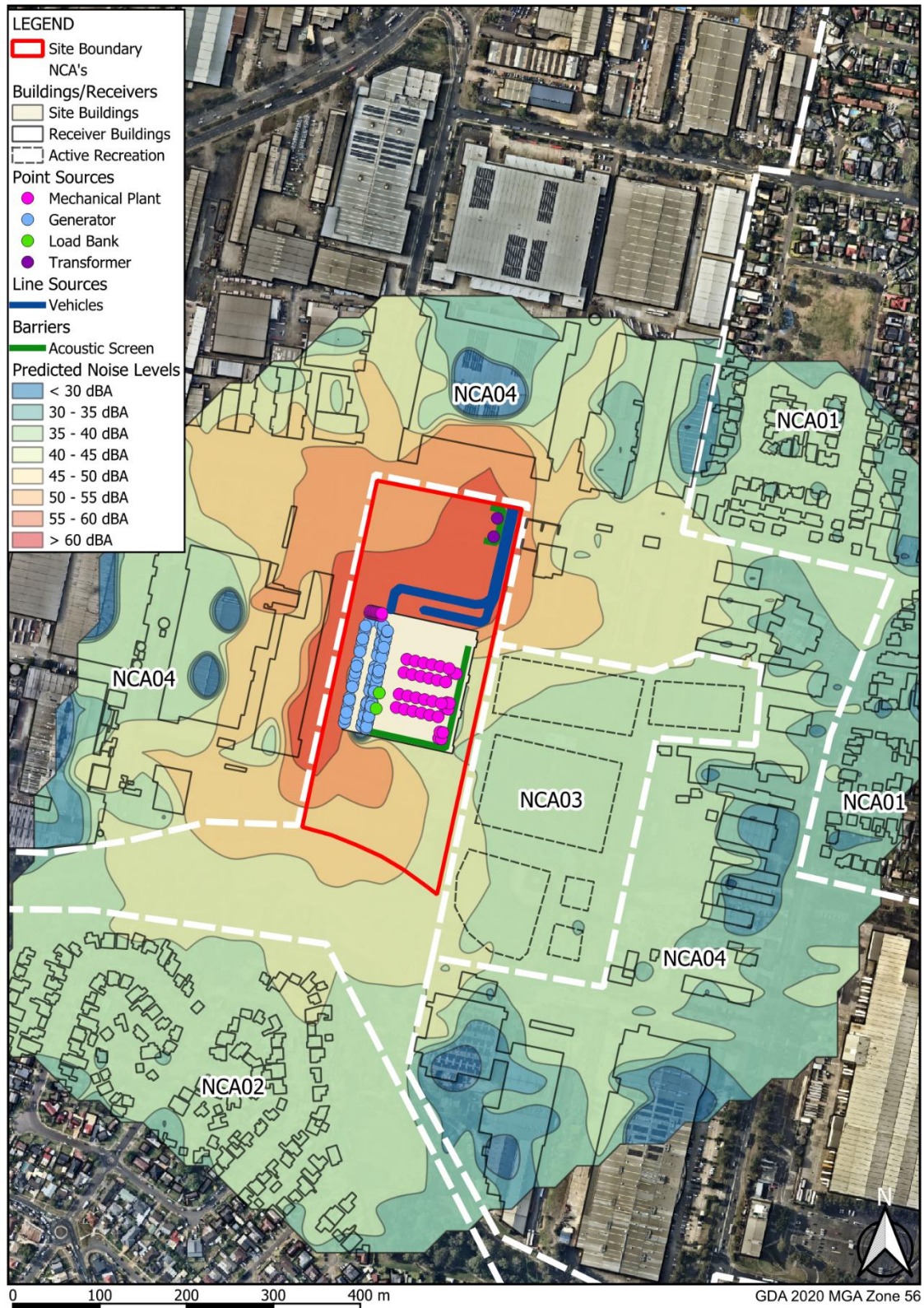
Predicted Operational Noise Contours – OP.01: Night – Stage 1 Development – 4.5 m Height



Note 1: Noise contours calculated at 4.5 m above ground level.

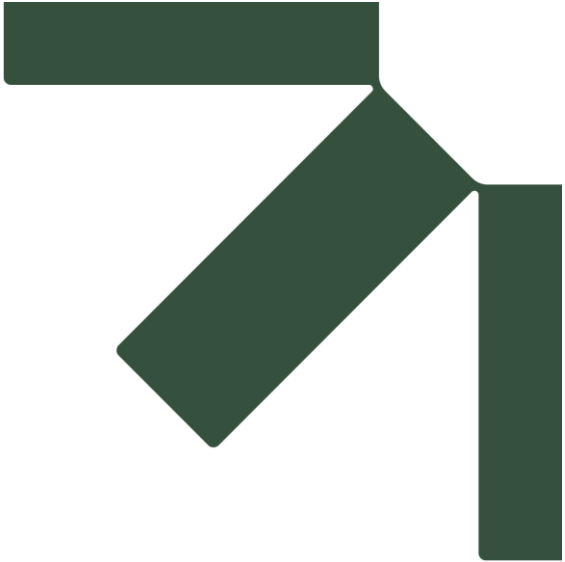


Predicted Operational Noise Contours – OP.02: Day + Generator Testing – Stage 1 Development – 4.5 m Height



Note 1: Noise contours calculated at 4.5 m above ground level.





Appendix E CNVG Mitigation Measures

**Project Pluto – 132 McCredie Road, Guildford West NSW
2161**

SSD-69223466 Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Ltd

SLR Project No.: 610.31859.00002

25 July 2025

CNVG Standard Mitigation and Management Measures

Action Required	Applies To	Details
Management measures		
Implementation of any project specific mitigation measures required.	Airborne noise	Implementation of any project specific mitigation measures required.
Implement community consultation or notification measures.	Airborne noise Ground-borne noise & vibration	Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night-time period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required. Please contact Transport Communication and Stakeholder Engagement for guidance. Website (If required) Contact telephone number for community Email distribution list (if required) Community drop-in session (if required by approval conditions).
Site inductions	Airborne noise Ground-borne noise & vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: - all project specific and relevant standard noise and vibration mitigation measures - relevant licence and approval conditions - permissible hours of work - any limitations on high noise generating activities - location of nearest sensitive receivers - construction employee parking areas - designated loading/unloading areas and procedures - site opening/closing times (including deliveries) - environmental incident procedures.
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Verification	Airborne noise Ground-borne noise & vibration	Where specified under Appendix C of the CNVG a noise verification program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.



Action Required	Applies To	Details
Update Construction Environmental Management Plans	Airborne noise Ground-borne noise & vibration	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys	Vibration Blasting	Undertake building dilapidation surveys on all buildings located within the buffer zone prior to commencement of activities with the potential to cause property damage
Source controls		
Construction hours and scheduling	Airborne noise Ground-borne noise & vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.
Construction respite period during normal hours and out-of-hours work	Ground-borne noise & vibration Airborne noise	See Appendix C of the CNVG for more details on the following respite measures: • Respite Offers (RO) • Respite Period 1 (R1) • Respite Period 2 (R2) • Duration Respite (DR)
Equipment selection.	Airborne noise Ground-borne noise & vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits. Ensure plant including the silencer is well maintained.
Plant noise levels.	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix H of the CNVG. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturers specifications or Appendix H of the CNVG.
Rental plant and equipment.	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 2 of the CNVG.
Use and siting of plant.	Airborne-noise	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers. Only have necessary equipment on site.
Plan worksites and activities to minimise noise and vibration.	Airborne noise Ground-borne vibration	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.



Action Required	Applies To	Details
		Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm. Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters. If programmed night work is postponed the work should be re-programmed and the approaches in this guideline apply again.
Reduced equipment power	Airborne noise Ground-borne vibration	Use only the necessary size and power.
Non-tonal and ambient sensitive reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
Minimise disturbance arising from delivery of goods to construction sites.	Airborne noise	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. Avoid or minimise these out of hours movements where possible.
Engine compression brakes	Construction vehicles	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.
Path controls		
Shield stationary noise sources such as pumps, compressors, fans etc.	Airborne noise	Stationary noise sources should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities.	Airborne noise	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when siting plant.



Action Required	Applies To	Details
Receptor control		
Structural surveys and vibration monitoring	Ground-borne vibration	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted. At locations where there are high-risk receptors, vibration monitoring should be conducted during the activities causing vibration.
See Appendix C of the CNVG for additional measures	Airborne noise Ground-borne vibration	In some instances, additional mitigation measures may be required.





Appendix F NPfl Mitigation Measures

**Project Pluto – 132 McCredie Road, Guildford West NSW
2161**

SSD-69223466 Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Ltd

SLR Project No.: 610.31859.00002

25 July 2025

Best Management Practice (BMP)

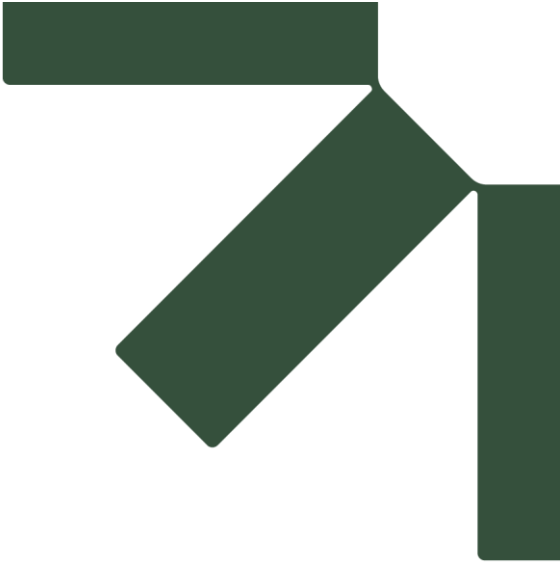
Best management practice (BMP) is the application of particular operational procedures that minimise noise while retaining productive efficiency.

Where applied, these measures and practices are often documented in a noise management plan so that operational practices and undertakings are clearly understood and applied at all levels of an industrial operation. Application of BMP can include the following types of practice:

- Using the quietest plant that can do the job
- Scheduling the use of noisy equipment at the least-sensitive time of day
- Not operating, or reducing operations at night
- Siting 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
- Where there are several noisy pieces of equipment, scheduling operations so they are used separately rather than concurrently
- Keeping equipment well-maintained and operating it in a proper and efficient manner
- Using 'quiet' practices when operating equipment, for example, positioning idling trucks in appropriate areas
- Running staff-education programs and regular tool box talks on the effects of noise and the use of quiet work practices.

For many industries there are a wide range of factors that can restrict the feasibility and reasonableness of applying BMP measures on a particular site. Work health and safety considerations must also be taken into account as well as any other regulatory and process requirements.





Appendix G Mechanical Plant Data Sheets

Project Pluto – 132 McCredie Road, Guildford West NSW 2161

SSD-69223466 Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Ltd

SLR Project No.: 610.31859.00002

25 July 2025



Baltimore Aircoil Company Cooling Tower Selection Report

Version: 8.11.19 ANZ
Product data correct as of: December 07, 2021

Project Name: Project Pluto
Selection Name: 4100kW
Project State/Province: NSW
Project Country/Region: Australia
Date: December 10, 2024

Model Information

Product Line: Series 3000 (2021 WQF)
Model: XES3E-1222-07M ENDURA/H

Number of Units: 2

Intake Option: None
Internal Option: None
Discharge Option: None

This model includes the ENDURADRIVE® Fan System.

Fan Type: Whisper Quiet Fan (2021)

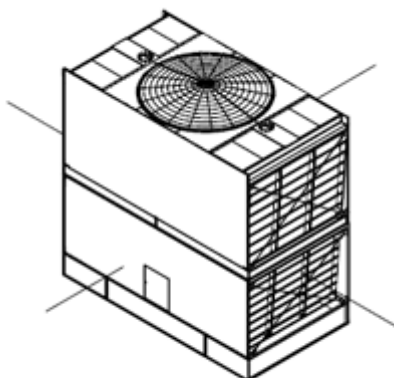
Fan Motor: (1) 14.92 = 14.92 kW/Unit

Total Standard Fan Power: 75.97% of Full Speed, 6.54 BkW/Unit

Octave band and A-weighted sound pressure levels (Lp) are expressed in decibels (dB) reference 0.0002 microbar. Sound power levels (Lw) are expressed in decibels (dB) reference one picowatt. Octave band 1 has a center frequency of 63 Hertz.

Top Sound Pressure (dB)		
Octave Band	Distance	
	1.5 m	15 m
1	65	57
2	64	57
3	59	53
4	56	48
5	55	47
6	52	45
7	48	42
8	42	33
A-wgtd	60	53

Air Inlet Sound Pressure (dB)		
Octave Band	Distance	
	1.5 m	15 m
1	68	59
2	66	55
3	59	48
4	57	46
5	55	45
6	42	37
7	38	26
8	42	32
A-wgtd	59	49



End Sound Pressure (dB)		
Octave Band	Distance	
	1.5 m	15 m
1	60	58
2	59	50
3	54	44
4	50	38
5	46	36
6	39	32
7	36	24
8	30	17
A-wgtd	52	42

End Sound Pressure (dB)		
Octave Band	Distance	
	1.5 m	15 m
1	60	58
2	59	50
3	54	44
4	50	38
5	46	36
6	39	32
7	36	24
8	30	17
A-wgtd	52	42

Total Sound Power (dB)		
Octave Band	Center Frequency (Hertz)	Lw
1	63	90
2	125	89
3	250	85
4	500	80
5	1000	79
6	2000	77
7	4000	74
8	8000	65
A-wgtd		84

Air Inlet Sound Pressure (dB)		
Octave Band	Distance	
	1.5 m	15 m
1	68	59
2	66	55
3	59	48
4	57	46
5	55	45
6	42	37
7	38	26
8	42	32
A-wgtd	59	49

Note: The use of frequency inverters (variable frequency drives) can increase sound levels.

Extra Notes: Sound data provided by CTI ATC-128 sound test code revision 2019

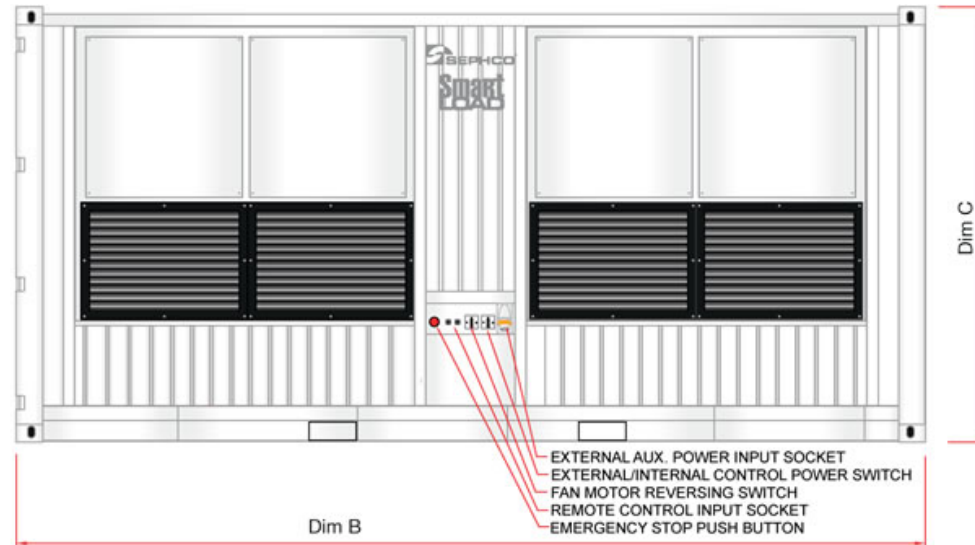
SEPHCO WAR-CL SERIES LOAD BANK DIMENSIONS

Off the Shelf load bank with 91dbA @1 m

WAR20CL, WAR40CL SERIES 2000kVa To 6500kVa



FRONT ELEVATION



SIDE ELEVATION

CONTROL PANEL

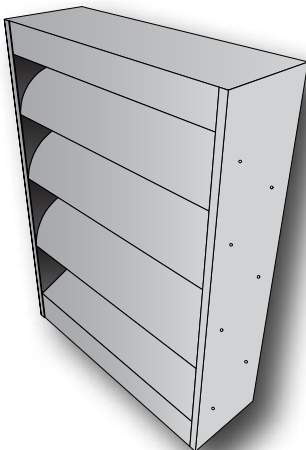
LC12D remote control type



MODEL NO	RATING	LOAD STEPS	DIM.A	DIM.B	DIM.C	WEIGHT	NOISE LEVEL
WAR40CL650C	6500KVA	6.25KVA	2440	12100	2595	20000KG	92dBa @ 1M
WAR40CL4500	4500KVA	6.25KVA	2440	12100	2595	16400KG	92dBa @ 1M
WAR40CL400C	4000KVA	6.25KVA	2440	6058	2595	13500KG	91dBa @ 1M
WAR20CL3300	3300KVA	6.25KVA	2440	6058	2595	12800KG	91dBa @ 1M
WAR20CL300C	3000KW	6.25KVA	2440	6058	2595	12000KG	91dBa @ 1M
WAR20CL2800	2800KVA	6.25KVA	2440	6058	2595	11200KG	91dBa @ 1M
WAR20CL2500	2500KVA	6.25KVA	2440	6058	2595	10600KG	91dBa @ 1M
WAR20CL200C	2000KVA	6.25KVA	2440	6058	2595	10000KG	91dBa @ 1M

Model LP

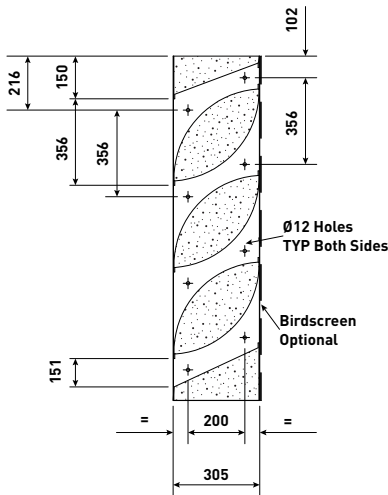
Noishield™ Acoustic Louvres



Weight
35kg/m²

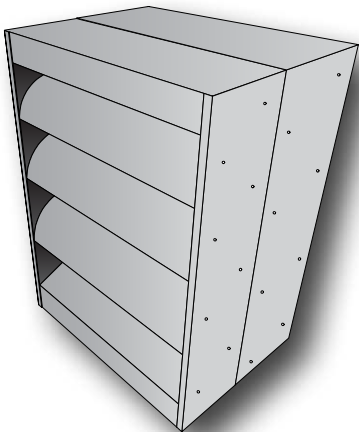
Module Width
300 - 1219mm

Standard Module Height
305 - 3660mm (in 305mm increments)
Intermediate heights are available



Model 2LP

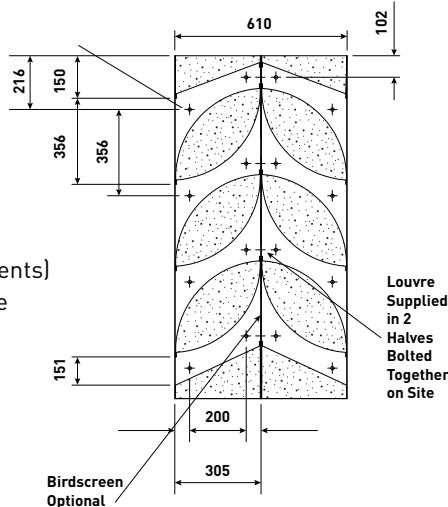
Noishield™ Acoustic Louvres



Weight
70kg/m²

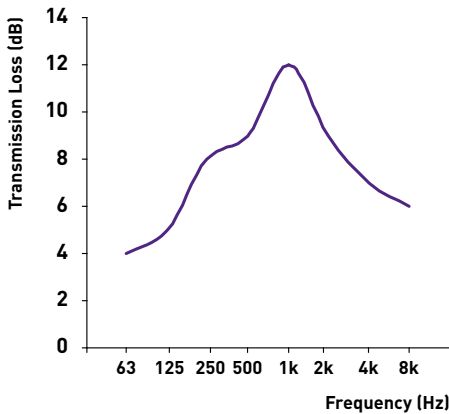
Module Width
300 - 1219mm

Standard Module Height
305 - 3660mm (in 305mm increments)
Intermediate heights are available



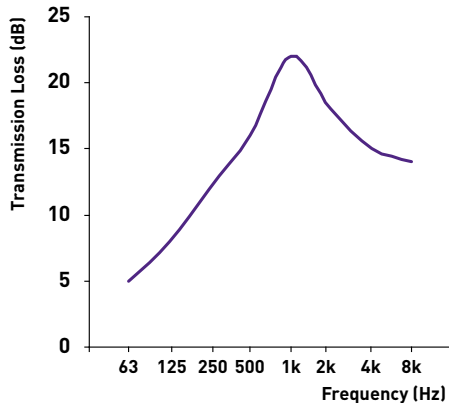
Acoustic Performance

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Transmission Loss (dB)	4	5	8	9	12	9	7	6
Acoustic Rating	R _w 11dB / D _{new} 18dB							



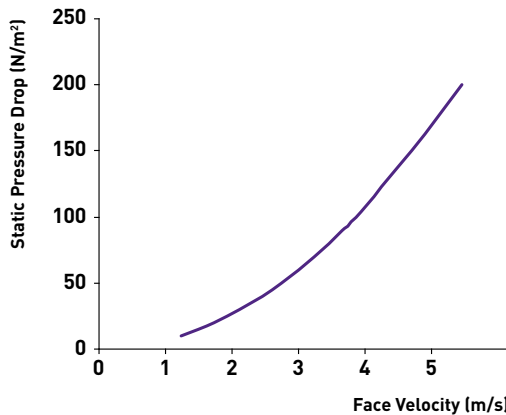
Acoustic Performance

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Transmission Loss (dB)	5	8	12	16	22	18	15	14
Acoustic Rating	R _w 19dB / D _{new} 25dB							



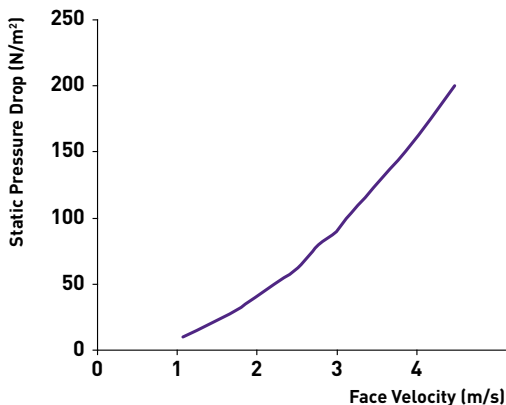
Aerodynamic Performance

Static Pressure Drop (N/m ²)	10	20	30	40	50	60	70	80	90	100
Face Velocity (m/s)	1.23	1.73	2.11	2.46	2.74	3.00	3.24	3.46	3.65	3.86
Nominal Free Area	52%* * Average over louver depth									
Aerodynamic Coefficient	11.10k									



Aerodynamic Performance

Static Pressure Drop (N/m ²)	10	20	30	40	50	60	70	80	90	100
Face Velocity (m/s)	1.07	1.41	1.73	1.98	2.21	2.46	2.62	2.77	2.99	3.12
Nominal Free Area	52%* * Average over louver depth									
Aerodynamic Coefficient	17.06k									



Acoustic Louvred Doors

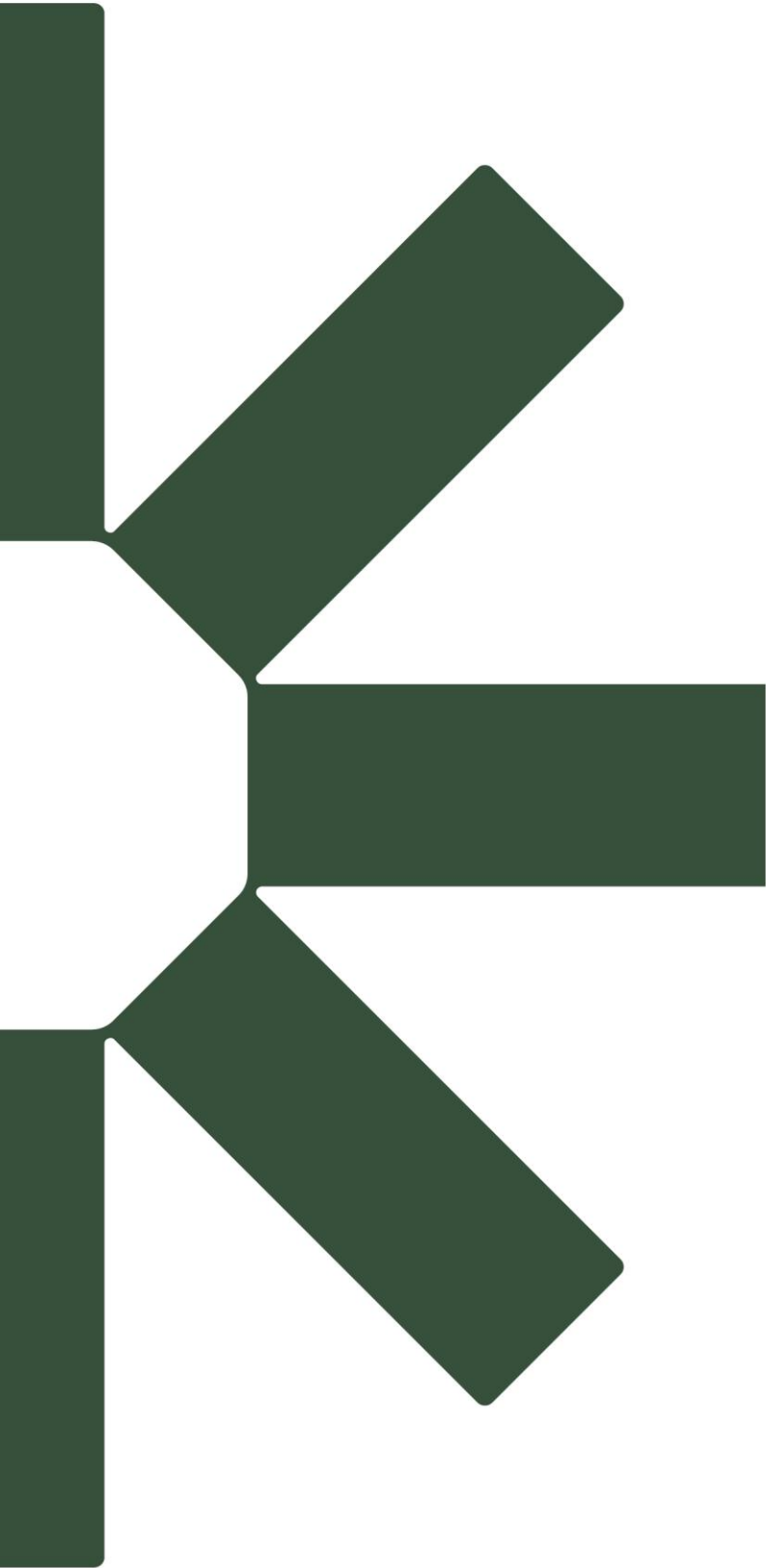
- Single and double doors are available in the LP louver range.
- See page 22 for further details

Arup's Cooling Memo

Annexure A - Weather Data

2021 ASHRAE Handbook - Fundamentals (SI)																		
SYDNEY BANKSTOWN, AUSTRALIA (WMO: 947650)																		
Lat:33.9181S			Long:150.9864E			Elev:8		StdP: 101.23		Time zone:10.00 (AUS)		Period:94-19		WBAN:99999				
Annual Heating, Humidification, and Ventilation Design Conditions																		
Coldest Month	Heating DB		Humidification DP/MCDB and HR							Coldest month WS/MCDB				MCWS/PCWD to 99.6% DB		WSF		
			99.6%			99%				0.4%		1%		MCWS	PCWD			
	99.6%	99%	DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB						
7	3.3	4.4	-3.3	2.9	17.0	-1.5	3.3	15.0	10.3	15.4	9.4	16.2	1.0	340	0.417			
Annual Cooling, Dehumidification, and Enthalpy Design Conditions																		
Hottest Month	Hottest Month DB Range	Cooling DB/MCWB							Evaporation WB/MCDB					MCWS/PCWD to 0.4% DB				
		0.4%		1%		2%			0.4%		1%		2%					
		DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB	MCWS	PCWD			
1	9.2	34.4	20.4	32.0	20.5	30.0	20.1	23.3	29.5	22.5	28.0	21.8	26.8	5.4	340			
Dehumidification DP/MCDB and HR																		
0.4%			1%			2%			0.4%			1%			2%			Extreme Max WB
DP	HR	MCDB	DP	HR	MCDB	DP	HR	MCDB	Enth	MCDB	Enth	MCDB	Enth	MCDB				
21.6	16.2	25.4	20.9	15.6	24.6	20.2	14.9	24.1	69.4	29.6	66.3	28.0	63.8	26.9	26.8			
Extreme Annual Design Conditions																		
Extreme Annual WS			Extreme Annual Temperature						n-Year Return Period Values of Extreme Temperature									
			Mean		Standard deviation		n=5 years		n=10 years		n=20 years		n=50 years					
1%	2.5%	5%	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
9.7	8.5	7.6	DB	0.8	40.4	0.9	2.9	0.1	42.4	-0.4	44.1	-0.9	45.7	-1.6	47.8			
			WB	0.2	24.7	0.9	0.9	-0.4	25.3	-0.9	25.8	-1.4	26.3	-2.1	27.0			
Monthly Climatic Design Conditions																		
		Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Temperatures, Degree-Days and Degree-Hours	DBAvg	17.6	23.2	22.8	21.2	18.1	14.9	12.4	11.4	12.6	15.3	17.8	19.9	21.8				
	DBStd	4.78	2.91	2.67	2.40	2.33	2.14	1.89	1.75	2.17	2.63	2.99	3.25	3.04				
	HDD10.0	9	0	0	0	0	0	2	5	2	0	0	0	0				
	HDD18.3	880	1	1	3	31	108	178	213	178	97	47	19	4				
	CDD10.0	2779	408	358	347	242	152	74	50	83	160	242	296	366				
	CDD18.3	608	151	125	92	23	2	0	0	1	7	31	64	113				
	CDH23.3	4378	1103	824	484	150	16	0	1	14	113	329	516	826				
	CDH26.7	1504	421	267	121	31	1	0	0	2	29	114	204	315				
Wind	WSAvg	3.1	3.7	3.5	3.1	2.5	2.5	2.5	2.6	3.0	3.2	3.4	3.7	3.7				
Precipitation	PrecAvg	911	94	107	118	94	67	81	45	37	43	64	81	69				
	PrecMax	1398	233	440	334	416	172	325	150	194	162	190	213	261				
	PrecMin	493	4	16	13	4	3	7	0	2	1	1	12	8				
	PrecStd	269	68	99	84	102	50	76	43	49	39	61	52	58				
Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures	0.4%	DB	38.3	36.7	32.7	30.2	25.3	21.1	22.3	25.2	30.1	33.3	36.0	36.7				
		MCWB	21.5	21.4	20.8	18.2	16.1	14.2	13.2	14.2	15.9	16.9	18.5	20.6				
	2%	DB	33.6	32.2	29.5	26.7	23.0	19.2	19.3	22.1	26.5	29.8	31.9	32.9				
		MCWB	21.6	22.0	20.5	17.9	15.7	13.5	11.9	13.0	14.9	16.8	19.5	20.3				
	5%	DB	31.0	29.6	27.7	24.8	21.3	18.1	17.8	20.1	23.9	27.0	28.5	30.1				
		MCWB	21.5	21.4	20.1	17.6	14.9	12.9	11.6	12.5	14.5	16.6	18.8	19.8				
	10%	DB	28.7	27.7	25.9	23.2	19.9	17.0	16.5	18.4	21.7	24.3	25.9	27.6				
		MCWB	20.8	20.8	19.5	17.2	14.5	12.3	11.0	11.7	13.9	16.1	18.2	19.6				
Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures	0.4%	WB	24.4	24.5	23.2	20.7	18.6	16.3	15.5	16.2	18.0	20.1	22.1	23.4				
		MCDB	32.3	31.1	28.0	25.5	21.1	18.6	18.8	21.6	24.0	26.0	29.6	30.4				
	2%	WB	23.2	23.4	21.9	19.6	17.6	15.1	13.7	14.7	17.0	18.9	21.0	22.1				
		MCDB	30.1	28.8	26.4	24.1	20.1	17.4	16.5	19.3	22.4	24.9	27.2	28.6				
	5%	WB	22.4	22.5	21.2	18.8	16.5	14.2	12.8	13.7	16.0	18.0	20.1	21.3				
		MCDB	28.3	27.2	25.3	22.6	19.4	16.6	15.8	18.1	21.2	23.4	25.7	27.1				
	10%	WB	21.7	21.7	20.5	18.1	15.5	13.4	11.9	12.7	15.1	17.2	19.1	20.5				
		MCDB	26.7	26.0	24.4	21.8	18.8	15.9	15.2	16.9	20.0	22.3	24.2	25.8				
Mean Daily Temperature Range	5% DB	MDBR	9.2	8.7	8.9	10.0	10.5	9.8	11.1	12.0	11.9	11.1	9.9	9.6				
		MCDBR	14.4	12.6	12.3	13.0	12.7	11.5	13.5	15.1	16.7	16.9	15.7	14.8				
		MCWBR	4.6	4.2	4.6	5.5	6.1	6.4	7.3	7.3	6.8	6.1	5.3	4.8				
	5% WB	MCDBR	11.5	10.2	9.9	10.6	9.5	8.7	10.4	12.7	12.9	12.4	12.3	12.0				
	MCWBR	4.3	4.0	4.2	5.0	5.2	5.5	6.4	6.9	6.8	6.1	5.3	4.8					
Clear Sky Solar Irradiance	taub	0.398	0.396	0.363	0.336	0.319	0.311	0.301	0.309	0.343	0.362	0.387	0.399					
	taud	2.442	2.467	2.541	2.593	2.587	2.608	2.617	2.586	2.492	2.467	2.438	2.416					
	Ebn at noon	940	921	916	889	850	833	864	905	922	943	944	943					
	Edn at noon	121	114	99	83	74	68	71	82	102	112	121	125					
All-Sky Solar Radiation	RadAvg	6.47	5.54	4.73	3.82	3.01	2.38	2.79	3.69	4.91	5.70	6.08	6.63					
	RadStd	0.48	0.49	0.41	0.33	0.20	0.22	0.22	0.21	0.28	0.50	0.55	0.56					
Historical Trends																		
		DBAvg	Heating		Cooling			Degree-Days										
			99% DB	99% DP	1% DB	1% WB	1% DP	HDD10.0	HDD18.3	CDD10.0	CDD18.3							
Station Only		+0.52	N/A	N/A	N/A	N/A	N/A	-5	-102	+211	+112							
Regional (0 neighbors)		+0.43	N/A	N/A	N/A	N/A	N/A	-2	-85	+184	+98							
CDDn	Cooling degree-days base n°C, °C-day				Lat	Latitude, °				Period	Years used to calculate the design conditions							
CDHn	Cooling degree-hours base n°C, °C-hour				Long	Longitude, °				Sd	Standard deviation of daily average temperature, °C							
DB	Dry bulb temperature, °C				MCDB	Mean coincident dry bulb temperature, °C				StdP	Standard pressure at station elevation, kPa							

DP	Dew point temperature, °C	MCDBR	Mean coincident dry bulb temp. range, °C	taub	Clear sky optical depth for beam irradiance
Ebn,noon	Clear sky beam normal and diffuse horizontal irradiances at solar noon, W/m2	MCDP	Mean coincident dew point temperature, °C	taud	Clear sky optical depth for diffuse irradiance
Edh,noon		MCWB	Mean coincident wet bulb temperature, °C	Tavg	Average temperature, °C
Elev	Elevation, m	MCWBR	Mean coincident wet bulb temp. range, °C	Time Zone	Hours ahead or behind UTC
Enth	Enthalpy, kJ/kg	MCWS	Mean coincident wind speed, m/s	WB	Wet bulb temperature, °C
HDDn	Heating degree-days base n°C, °C-day	MDBR	Mean dry bulb temp. range, °C	Hours 8/4 & 12.8/20.6	Number of hours between 8 a.m. and 4 p.m with DB between 12.8 and 20.6 °C
PCWD	Prevailing coincident wind direction, °, 0 = North, 90 = East	WS	Wind speed, m/s	HR	Humidity ratio, g of moisture per kg of dry air



Making Sustainability Happen