

Greater Parramatta and Olympic Peninsula Water Cycle Management Project

Noise and Vibration Impact Assessment

05 Dec 2025
Greater Parramatta and Olympic Peninsula Water Cycle Management Project
Doc No. 60730301 RPNV 02_E

Greater Parramatta and Olympic Peninsula Water Cycle Management Project

Noise and Vibration Impact Assessment

Client: Sydney Water

ABN: 49 776 225 038

Prepared by

AECOM Australia Pty Ltd

Gadigal Country, Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia

T +61 1800 868 654 www.aecom.com

ABN 20 093 846 925

05-Dec-2025

Job No.: 60730301

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.

AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

Quality Information

Document Greater Parramatta and Olympic Peninsula Water Cycle Management Project
Ref 60730301
Date 05-Dec-2025
Originator Sarah Lu
Checker/s Geoff Lucas
Verifier/s Gayle Greer

Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
A	4-Apr-2025	Minor Updates	Gayle Greer Technical Director - Acoustics	
B	27-Jun-2025	Minor Updates	Gayle Greer Technical Director - Acoustics	
C	8-Oct-2025	Minor Updates	Gayle Greer Technical Director - Acoustics	
D	12-Nov-2025	Minor updates	Gayle Greer Technical Director - Acoustics	
E	5-Dec-2025	Minor Updates	Gayle Greer Technical Director - Acoustics	

Table of Contents

Glossary i

Executive Summary	iv
1.0 Introduction	1
1.1 Background information	1
1.2 Scope	1
1.3 Policies and guidelines	2
1.4 Planning Secretary's Environmental Assessment Requirements	2
1.5 Agency comments	5
2.0 Existing acoustic environment	6
2.1 Site description and program	6
2.2 Noise and vibration sensitive receivers	8
2.2.1 Residential receivers	8
2.2.2 Non-residential receivers	11
2.2.3 Heritage items	11
2.3 Noise measurement methodology	14
2.3.1 Unattended noise measurement methodology	14
2.3.2 Attended noise measurement methodology	15
2.4 Noise measurement results	15
2.4.1 Unattended noise measurement results	15
2.4.2 Attended noise measurements	16
2.4.3 Previous noise logging	16
2.5 Existing noise environment summary	17
3.0 Construction noise and vibration criteria	19
3.1 Construction activity noise criteria	19
3.1.1 Interim Construction Noise Guideline	19
3.1.2 Sleep disturbance criteria	22
3.2 Construction traffic noise criteria	23
3.3 Construction vibration criteria	25
3.3.1 Structural damage	25
3.3.2 Human comfort	26
4.0 Operational noise criteria	27
4.1 Noise Policy for Industry	27
4.1.1 Intrusive noise impacts	27
4.1.2 Protecting amenity	27
4.1.3 Summary	28
4.1.4 Maximum noise level assessment	29
4.2 Operational road traffic noise criteria	29
5.0 Construction noise assessment	30
5.1 Construction sources	30
5.2 Construction hours	33
5.3 Modelling conditions	33
5.4 Construction noise assessment	35
5.4.1 Residential receivers	35
5.4.2 Non-residential receivers	42
5.4.3 Discussion	43
5.5 Sleep disturbance assessment	44
5.6 Construction traffic assessment	46
5.6.1 WRRF Site	46
5.6.2 Wider Project area	49
5.7 Construction vibration assessment	49
5.8 Cumulative construction impacts	52
5.8.1 Construction fatigue	54
5.9 Construction mitigation measures	55
5.9.1 Effective measures from previous Sydney Water projects	55
5.9.2 Construction Environment Management Plan	55

	5.9.3	The effectiveness and implementation of mitigation measures	58
	5.9.4	Residual noise impacts	59
6.0	Operational noise		60
	6.1	Noise modelling	60
	6.1.1	Modelling parameters	60
	6.2	Noise sources	60
	6.2.1	Noise model sound pressure levels –noise sources	60
	6.3	Site operational noise	62
	6.3.1	Sleep disturbance results	63
	6.3.2	Discussion	65
	6.4	Operational traffic	66
7.0	Conclusion		67
Appendix A			
	Noise logging results		A
Appendix B			
	Construction noise contours		B
Appendix C			
	Construction noise sleep disturbance contours		C
Appendix D			
	Operational noise contours		D

List of Tables

Table 1-1	SEARs Requirements	2
Table 1-2	Other Agency comments Requirements	5
Table 2-1	Indicative program and construction staging	6
Table 2-2	Non-residential noise sensitive receivers	11
Table 2-3	Heritage items	11
Table 2-4	Noise monitoring details	14
Table 2-5	Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels	15
Table 2-6	Attended noise measurements	16
Table 2-7	Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels	17
Table 2-8	Existing noise environment	17
Table 3-1	<i>Interim Construction Noise Guideline</i> residential NMLs	20
Table 3-2	Construction NMLs – residential receivers	20
Table 3-3	Construction NMLs - other receivers	22
Table 3-4	Sleep disturbance criteria	22
Table 3-5	Roads used by construction traffic	23
Table 3-6	Standards/guidelines used for assessing construction vibration	25
Table 3-7	DIN 4150: structural damage safe limits for building vibration	25
Table 3-8	Preferred and maximum VDV for intermittent vibration	26
Table 4-1	Intrusive criteria	27
Table 4-2	Project amenity noise levels	28
Table 4-3	Summary of environmental noise emission criteria	28
Table 4-4	Night-time sleep disturbance screening levels	29
Table 5-1	Construction scenarios assessed	30
Table 5-2	Equipment sound power levels	32
Table 5-3	Summary of modelled scenarios	34
Table 5-4	Number of residential NML exceedances during standard hours work	35
Table 5-5	Number of residential NML exceedances during out-of-hours work (night-time)	38
Table 5-6	Summary of construction noise impacts	40
Table 5-7	Number of noise sensitive non-residential NML exceedances during hours of use	42
Table 5-8	Number of residential receivers where noise levels exceed the sleep disturbance and awakening reaction criteria	44

Table 5-9	Existing road traffic noise levels and predicted road traffic noise levels including construction traffic during standard hours	48
Table 5-10	Minimum working distances of vibration intensive equipment to be used during the Project	50
Table 5-11	Distance of heritage items to Project area	50
Table 5-12	Developments in close proximity to the Project	53
Table 5-13	Recommended construction mitigation measures	56
Table 5-14	Effectiveness of construction mitigation measures	58
Table 6-1	Existing and proposed equipment and sound power levels – CPS	60
Table 6-2	Proposed equipment and sound power levels –WRRF	60
Table 6-3	Existing operational noise levels due to the CPS	62
Table 6-4	Predicted operational noise levels due to the Project (WRRF and CPS)	63
Table 6-5	Predicted night-time L_{Amax} operational noise levels and sleep disturbance criteria	64
Table 6-6	Predicted night-time L_{Aeq} operational noise levels and sleep disturbance criteria	65

List of Figures

Figure 2-1	Site location	7
Figure 2-2	Project area and surrounding land uses	9
Figure 2-3	Noise logger locations and noise catchment areas	10
Figure 2-4	Heritage Items	13
Figure 5-1	Variation in $L_{Aeq(15min)}$ noise level as works progress	44
Figure 5-2	Construction vehicle arrival routes	47
Figure 5-3	Construction vehicle departure routes	48

Glossary

Term	Description
A Weighted decibels [dB(A)]	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1 kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.
Assessment background level	The overall background level for each day, evening and night period for each day of the noise monitoring.
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L_{90} sound pressure level is used to quantify background noise.
Construction footprint	The area needed to construct the Proposal, including for example construction ancillary facilities, access roads, haulage and water quality basins.
Day	Construction noise: The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays. Road traffic noise: The period from 0700 to 2200 h every day of the week.
Decibel [dB]	The measurement unit of sound.
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. Sound power levels refer to the total fixed sound energy emitted by a source (i.e. piece of construction equipment). This results in sound pressure levels which is what the human ear hears and is dependent on distance from the source. A 3 dB(A) increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB(A) increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows: 0 dB(A) Threshold of human hearing 30 dB(A) A quiet country park 40 dB(A) Whisper in a library 50 dB(A) Idling tracked excavator, at 10 metres 70 dB(A) Small excavator, at 10 metres 80 dB(A) Dump truck/concrete truck, at 10 metres 90 dB(A) Mulcher, at 7 metres 100 dB(A) Hydraulic hammer, at 10 metres 115 dB(A) Limit of sound permitted in industry.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
L_{eq} 15min	The equivalent continuous sound level over 15 minutes.
Evening	Construction noise: The period from 1800 to 2200 h Monday to Sunday and Public Holidays. Road traffic noise: Not applicable.

Term	Description
Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high-pitched sound and a low frequency a low-pitched low pitched sound.
L ₁₀	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period, it was louder than the L ₁₀ .
L ₉₀	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period, it was louder than the L ₉₀ .
L _{Aeq}	The A-weighted constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy. The A-weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds
L _{max}	The maximum sound pressure level measured over the measurement period.
L _{min}	The minimum sound pressure level measured over the measurement period.
Night	Construction noise: The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays. Road traffic noise: The period from 2200 to 0700 h every day of the week.
Noise management level	The level which represents the point above which there may be some community reaction to noise.
Proposal area	The area required for construction and operation of the Proposal.
Rating background level	The overall background level for each day, evening and night period for the entire length of noise monitoring.
Sound power level	The total sound emitted by a source.
Study area	Study area investigated for noise and vibration relative to the Proposal and construction footprint in terms of potential impacts.
Traffic noise	The total noise resulting from road traffic. The L _{eq} sound pressure level is used to quantify traffic noise.

Abbreviations/acronyms

Acronym	Definition
AVATG	Assessing Vibration: A Technical Guideline
ABL	Assessment Background Level
CEMP	Construction Environmental Management Plan
CNVG-R	Construction Noise and Vibration Guideline (Roads)
CNVMP	Construction Noise and Vibration Management Plan
CoRTN	Calculation of Road Traffic Noise
CPS	Camellia pumping station
CRM	Customer Relationship Management

Acronym	Definition
DCCEEW	NSW Department of Climate Change, Energy, Environment and Water
DEC	Former NSW Department of Environment and Conservation (now known as DCCEEW)
DECC	Former NSW Department of Environment and Climate Change (now known as DCCEEW)
DECCW	Former NSW Department of Environment, Climate Change, and Water (now known as DCCEEW)
EPA	NSW Environment Protection Authority
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
HDD	Horizontal Directional Drilling
ICNG	Interim Construction Noise Guideline
LEP	Local Environment Plan
LGA	Local Government Area
NATA	National Association of Testing Authorities
NCA	Noise Catchment Area
NML	Noise Management Level
NL	Noise Logger
NPfi	Noise Policy for Industry
NSOOS	Northern Suburbs Ocean Outfall Sewer
NSW	New South Wales
OOHW	Out-of-Hours Works
RBL	Rating Background Level
REF	Review of Environmental Factors
RNCG	Road Noise Criteria Guideline
RNP	Road Noise Policy
SWL	Sound Power Level
Transport	Transport for NSW
VDV	Vibration Dose Value
WRRF	Water Resource Recovery Facility

Executive Summary

A construction and operational Noise and Vibration Impact Assessment has been completed for the proposed construction and operation of a new Sydney Water water resource recovery facility (WRRF) at Camellia-Rosehill and associated infrastructure.

The proposed works would include construction of the new WRRF, upgrade of the existing pumping station at Camellia (Camellia pumping station (CPS)), and construction of three pipelines:

- A new WRRF at Camellia-Rosehill to treat wastewater to produce advanced treated water
- Upgrades to Camellia pumping station
- A new wastewater transfer pipeline from Camellia pumping station to the WRRF
- A new and repurposed brine pipeline to transfer brine from the WRRF to the Northern Suburbs Ocean Outfall Sewer (NSOOS)
- A new river release pipeline to transfer advanced treated water from the WRRF to a release structure in Parramatta River at Meadowbank.

Nearby noise and vibration sensitive receivers were identified. Attended and unattended noise measurements were completed to characterise the existing noise environment. The measured noise levels were used to establish construction noise management levels.

Construction impacts

The construction works are expected to be undertaken during standard working hours where reasonable and feasible, with some out-of-hours work potentially required for certain construction works, including delivery of oversized plant or structures, and construction of the pipelines where out-of-hours works are required to manage traffic or other impacts. The proposed construction equipment and plant have been developed in consultation with Sydney Water and detailed within this report. Construction noise impacts were assessed at all nearby residential and other non-residential noise sensitive receivers.

Construction noise

Seven worst-case construction scenarios were assessed for standard construction hours and three of these construction scenarios were also assessed for out-of-hours (night-time) works. The predicted construction noise levels are expected to exceed the construction noise management levels for all assessed scenarios except for Scenario 2 (Construction of the WRRF site) and Scenario 6 (Works at Camellia Pumping Station). The largest number of exceedances are predicted within Noise Catchment Area (NCA) 7 (Newington) during Scenario 1 (Construction compound operation) for standard hours and Scenario 3 (Pipeline construction – Open trenching) for night-time works.

During construction compound operation, residential receivers in Newington and Meadowbank will be impacted the most, particularly those located near the horizontal directional drilling (HDD) construction compounds which may operate 24 hours. Construction compound hoarding or noise shielding should be implemented where practicable. During night-time open trenching works, residential receivers in Silverwater and Newington are predicted to be the most affected due to the trenching along Carnarvon Street and microtunnelling.

A number of exceedances of the sleep disturbance criteria, particularly within NCA 7 (Newington), have been predicted due to night-time construction works. Exceedances of the awakening reaction criteria have also been predicted at receivers in NCAs 5 (Silverwater) and 6 (Silverwater and Newington).

Four non-residential noise sensitive receivers are predicted to experience noise management level exceedances greater than 20 dB(A) during their hours of use due to Project construction works, including West Ryde Netball Club, two buildings associated with Sydney Korean Catholic Church, and Western Sydney University Early Learning Parramatta.

Although exceedances of the noise management levels were predicted during the construction works for the Project, feasible and reasonable mitigation measures for noise and vibration were identified to

minimise the noise impacts. These mitigation measures would be detailed in a Construction Environment Management Plan (CEMP).

Construction traffic

Construction traffic noise is not expected to increase road traffic noise by more than 2 dB(A) at residential receivers on haulage routes proposed for Project construction, including James Ruse Drive and Parramatta Road, and at the horse stables on Unwin Street.

Construction vibration

Minimum working distances have been provided that allow for compliance with the construction vibration criteria. There are several heritage items that fall within the minimum working distances. If vibration intensive works are required within these minimum working distances, mitigation measures to control excessive vibration have been outlined.

There may also be vibration impacts from open trenching works at RØDE, located at 107 Carnarvon St Silverwater. It is recommended that consultation with RØDE is undertaken to determine when vibration intensive works can be carried out to minimise disruption to manufacturing activities.

Operational impacts

Site operational noise

Noise levels associated with the operation of the Project were assessed in accordance with the *Noise Policy for Industry*. The WRRF development was predicted to comply with the operational noise criteria at all noise sensitive receivers. The upgrades to Camellia pumping station will not change the noise levels at the existing pumping station, existing noise levels are predicted to exceed the criteria by up to 8 dB at the proposed new Town Centre. However, appropriate building design to control traffic noise within the proposed Camellia Town Centre residences would also sufficiently control noise from Camellia Pumping Station. As a result, no mitigation is considered to be required.

Operational road traffic noise

Vehicle movements generated by the Project are assessed to comply with the *Road Noise Policy*.

1.0 Introduction

1.1 Background information

AECOM Australia Pty Ltd (AECOM) has been commissioned by Sydney Water to undertake a Noise and Vibration Impact Assessment of the construction and operation of a new water resource recovery facility (WRRF) at Camellia-Rosehill. The WRRF is needed to provide additional wastewater capacity to support growth across the northern suburbs of Sydney, and in the Greater Parramatta and Olympic Peninsula (GPOP) growth corridor. The WRRF and its associated infrastructure together form the GPOP Water Cycle Management (WCM) project (the Project).

Main elements of the Project include:

- A new WRRF at Camellia-Rosehill to treat wastewater to produce advanced treated water
- Upgrades to the existing pumping station at Camellia
- A new wastewater transfer pipeline from Camellia pumping station (CPS) to the WRRF
- A new and repurposed brine pipeline to transfer brine from the WRRF to the Northern Suburbs Ocean Outfall Sewer (NSOOS)
- A new river release pipeline to transfer advanced treated water from the WRRF to a release structure in Parramatta River at Meadowbank.

Construction compounds will be required to house site sheds, construction equipment, amenities, parking and storage.

Subject to State Significant Infrastructure approvals (SSI 7428485) the works are expected to commence in 2028 with a duration of around 36 months. Operation is planned to commence in 2031.

1.2 Scope

This report has been prepared to support the Environmental Impact Statement (EIS) for the Project. This report provides a noise and vibration impact assessment (NVIA) of the construction and operation of the Project and addresses the Secretary's Environmental Assessment Requirements (SEARs) relating to noise and vibration for the Project SSI-74284585.

The scope of this Noise and Vibration Impact Assessment is to:

- establish the existing background noise levels in the vicinity of the Project
- establish operational project noise trigger levels, construction noise management levels and vibration limits that would apply to the Project
- predict construction noise and vibration levels at nearby residential and other sensitive receivers due to the Project
- review the potential impacts of construction noise and vibration in relation to identified sensitive receivers
- determine in principle mitigation measures if required, including silencing treatment of mechanical mobile plant, management of mechanical and mobile plant, community consultation and/or other noise mitigation and management measures
- predict operational noise levels at nearby noise sensitive receivers due to operation of the Project
- assess the operational noise impact in accordance with the established project noise trigger levels and provide indicative noise control measures where necessary
- assess road traffic noise arising from additional traffic generation as a result of construction and operation of the Project, and if necessary, recommend mitigation and management measures.

1.3 Policies and guidelines

In accordance with the SEARs, the relevant guidelines, specifications and policy documents relevant to this NVIA are listed below.

- *Assessing Vibration: A Technical Guideline* (AVATG), Department of Environment and Conservation, 2006
- *Interim Construction Noise Guideline* (ICNG), Department of Environment and Climate Change, 2009
- *Noise Policy for Industry* (NPfI), Environment Protection Authority, 2017
- *NSW Road Noise Policy* (RNP), Department of Environment, Climate Change and Water, 2011
- *Construction Noise and Vibration Guideline (Roads)* (CNVG-R), Transport for NSW, 2023
- Australian Standard AS 2436-2010, *Guide to noise and vibration control on construction, demolition and maintenance sites*, 2010
- Australian Standard AS IEC 61672.1 – 2019 *Electroacoustics – Sound level meters – Specifications*, 2019
- British Standard 5228: Part 1 2009 *Code of practice for noise and vibration control on construction and open sites*, Part 1: Noise, 2009 including Amendment 1, 2014
- British Standard 6472: Part 1 2008 *Evaluation of Human Exposure to Vibration in Buildings*, 2008
- British Standard 7385: Part 2 1993 *Evaluation and Measurement of Vibration in Buildings*, 1993
- DIN Standard 4150: Part 3 1999 *Structural Vibration in Buildings - Effects on Structures*, 1999
- Sydney Water Environmental mitigation measures, 2023.

1.4 Planning Secretary's Environmental Assessment Requirements

Section 11 of the Planning Secretary's Environmental Assessment Requirements (SEARs) for SSI-74258485 considers noise and vibration. The SEARs state the desired performance outcome is the following:

Table 1-1 below shows the SEARs which relate to noise and vibration and the section where each requirement is considered.

Table 1-1 SEARs Requirements

Key issue and designed performance outcome	Requirement	Section addressed
2. Environmental Impact Statement The project is described in sufficient detail to enable clear understanding that the project has been developed through an iterative process of impact identification and assessment and	1. The EIS must include, but not necessarily be limited to, the following:	-
	f. the community and agency engagement undertaken and to be undertaken for the project, including but not limited to: – EPA for noise and vibration, water quality, contamination, air quality, and waste...	1.5

Key issue and designed performance outcome	Requirement	Section addressed
10. Heritage – Environmental The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of environmental heritage. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage.	2. Where impacts to State or locally significant heritage items are identified, the assessment must: a. include a significance assessment, a statement of heritage impact (SOHI) for all heritage items and a historical archaeological assessment b. assess the consistency of the project against conservation policies of any relevant conservation management plan c. consider impacts to the item of significance caused by, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment, drainage infrastructure, contamination remediation and site compounds (as relevant)...	3.3, 5.7
11. Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity, and adverse impacts on the structural integrity of buildings and items including Aboriginal places and environmental heritage. Increases in noise emissions and vibration affecting nearby properties and other sensitive receivers during operation of the project are effectively managed to protect the amenity and well-being of the community. Increases in noise emissions and vibration affecting	3. The assessment of construction noise and vibration must:	-
	a. identify and justify all noise monitoring locations used to determine the construction Noise Management Levels and construction Rating Background Levels	2.0
	b. identify the relevant construction scenarios (both surface and below ground) for assessment considering, but not limited to, time of day, duration, annoying characteristics, and noise (both air and ground borne) and vibration levels	5.1
	c. identify noise (both air and ground borne) and vibration impacts resulting from work proposed to be undertaken outside of standard construction hours. The location, duration, type of activity and justification (consistent with ICNG requirements) must be provided	5.4, 5.7
	d. identify predicted noise (both air and ground borne) and vibration levels, and provide noise and vibration contour maps for potentially affected receivers	Appendix B
	e. assess and justify the potential noise (both air and ground borne) and vibration impacts	5.4, 5.7
	f. identify and assess the potential vibration impacts on Aboriginal places and environmental heritage (including heritage items)	5.7
	g. assess noise generated by construction traffic on public roads and entering and exiting fixed facilities and construction works zones, including noise	5.6

Key issue and designed performance outcome	Requirement	Section addressed
environmental heritage as defined in the Heritage Act during operation of the project are effectively managed.	generated by idling heavy vehicles and consideration of road geometry	
	h. identify and justify potential mitigation to be applied, including but not limited to learning(s) from previous projects, case studies and identification of good practice to manage noise and vibration impacts relevant to the proposed construction activities	5.9.1
	i. identify and assess the predicted effectiveness of mitigation measures including the effect on noise (both air and ground borne) and vibrations levels, time of day and duration	5.4.1, 5.9.3
	j. identify potential residual noise and vibration impacts following application of mitigation measures	5.4.1, 5.9.4
	k. demonstrate how community consultation has informed the development of noise and vibration mitigation measures including how out-of-hours works has been socialised with the affected community	5.8, 5.9.2
	l. consider cumulative noise and vibration impacts from the project, including concurrent and consecutive construction activities within the project boundary and the construction of other projects in the vicinity of the project	5.8
	m. consider construction fatigue and how this will be managed on during construction of the project, taking into account cumulative impacts particularly with other SSI projects such Sydney Metro West and Parramatta Light Rail Stage 2.	5.8.1
	4. The assessment of Operational noise and vibration must:	-
	a) define and justify all operational assessment scenarios and activities, including additional noise from new and upgraded pumping stations	6.2
	b) demonstrate and validate the performance of the noise or vibration model used	6.1
	c) include the selection criteria/methodology and justification for monitoring locations with specific reference to locations indicative of potential impacts	4.0
	d) identify all sensitive receivers that exceed the relevant operational triggers/criteria which may qualify for mitigation	6.3
	e) present predicted noise levels, and noise contour maps for all potentially affected receivers	6.3, Appendix D
	f) identify, assess and justify conceptual mitigation measures to be implemented	6.3
	g) identify all affected receivers with residual impacts after the implementation of the conceptual mitigation measures.	6.3

Key issue and designed performance outcome	Requirement	Section addressed
	5. The process for community engagement should be included or referenced in the noise and vibration assessment as part of the mitigation strategy and assessment.	5.9

1.5 Agency comments

Comments from other Agencies that consider noise and vibration are summarised in the table below.

Table 1-2 Other Agency comments Requirements

Requirement	Section
NSW EPA	
The EIS must assess the following noise and vibration aspects of the proposed development:	
Construction noise associated with the proposed development should be assessed using the <i>Interim Construction Noise Guideline</i> (DECC, 2009).	3.1, 5.4,
Operational and construction activities on the premises that may be considered vibration intensive should be assessed using the guidelines contained in the <i>Assessing Vibration: a technical guideline</i> (DEC, 2006)	3.3, 5.7
If blasting is required for any reason during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the guidelines contained in <i>Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration</i> (ANZEC, 1990).	N/A – no blasting required as part of the project.
Operational noise from noise intensive activities to be undertaken on the premises should be assessed using the guidelines contained in the <i>NSW Noise Policy for Industry</i> (EPA, 2017)	4.1, 6.3
If applicable, noise on public roads from increased road traffic generated by land use developments other than road projects should be assessed using the guidelines contained in the <i>NSW Road Noise Policy</i> (EPA, 2011) and associated application notes	4.2, 6.4
If applicable, noise on rail lines from increased rail traffic generated by land-use developments other than rail projects should be assessed using the guidelines contained in the <i>Rail Infrastructure Noise Guideline</i>	N/A – no rail noise generated by the project.
Sydney Metro	
A cumulative noise and vibration assessment that considers construction of other developments in the vicinity (including Sydney Metro - West) should be undertaken.	5.8

2.0 Existing acoustic environment

2.1 Site description and program

The WRRF site is located within the City of Parramatta Council area, in land zoned E5 Heavy Industrial under the *Parramatta Local Environment Plan* (LEP) 2023.

The proposed pipeline alignments are located mainly within the City of Parramatta Council area with a small section in the City of Ryde Council area.

The section of brine pipeline and wastewater transfer pipeline between the CPS and the WRRF are located within the suburb of Rosehill.

The section of the brine pipeline (relined section) between the pumping station and the NSOOS connection is located within the suburbs of Dundas, Rydalmere, Parramatta and Camellia.

The river release pipeline is located within the suburbs of Silverwater, Newington, Sydney Olympic Park, Wentworth Point and Meadowbank.

The Camellia-Rosehill town centre is proposed to be located in the northwestern section of the Camellia Precinct. The town centre is 40 hectares of the 320-hectare Camellia Precinct and is bound by Parramatta River to the north, Grand Avenue to the south and James Ruse Drive to the west. The town centre is planned to include residential and educational noise sensitive receivers and is located adjacent to the CPS and approximately 500 metres from the WRRF. The location of the Project is shown in Figure 2-1.

An indicative construction program is presented in Table 2-1.

Table 2-1 Indicative program and construction staging

Activity	Indicative timing
WRRF construction	Q3 2028 – Q4 2030
Upgrade of the Camellia pumping station	Q2 2028 – Q3 2030
Transfer pipeline construction	Q2 2028 – Q3 2030
Brine pipeline construction	Q2 2028 – Q3 2029
River release pipeline construction including works within Parramatta River	Q3 2028 – Q2 2030
Commissioning	Q4 2030 – Q4 2031
Start operation	Q4 2031

Additionally, indicative timeframes for specific components of the Project are as follows:

- Relining works would be undertaken for approximately 1-4 weeks at each pit
- HDD launch and receive pits for brine and transfer pipeline construction would take approximately 12 months at Meadowbank Park, and approximately 6-12 months at other locations
- Trenching works would likely progress at a rate of 10-25 metres per day
- River release structure construction would take approximately 12 months to complete.

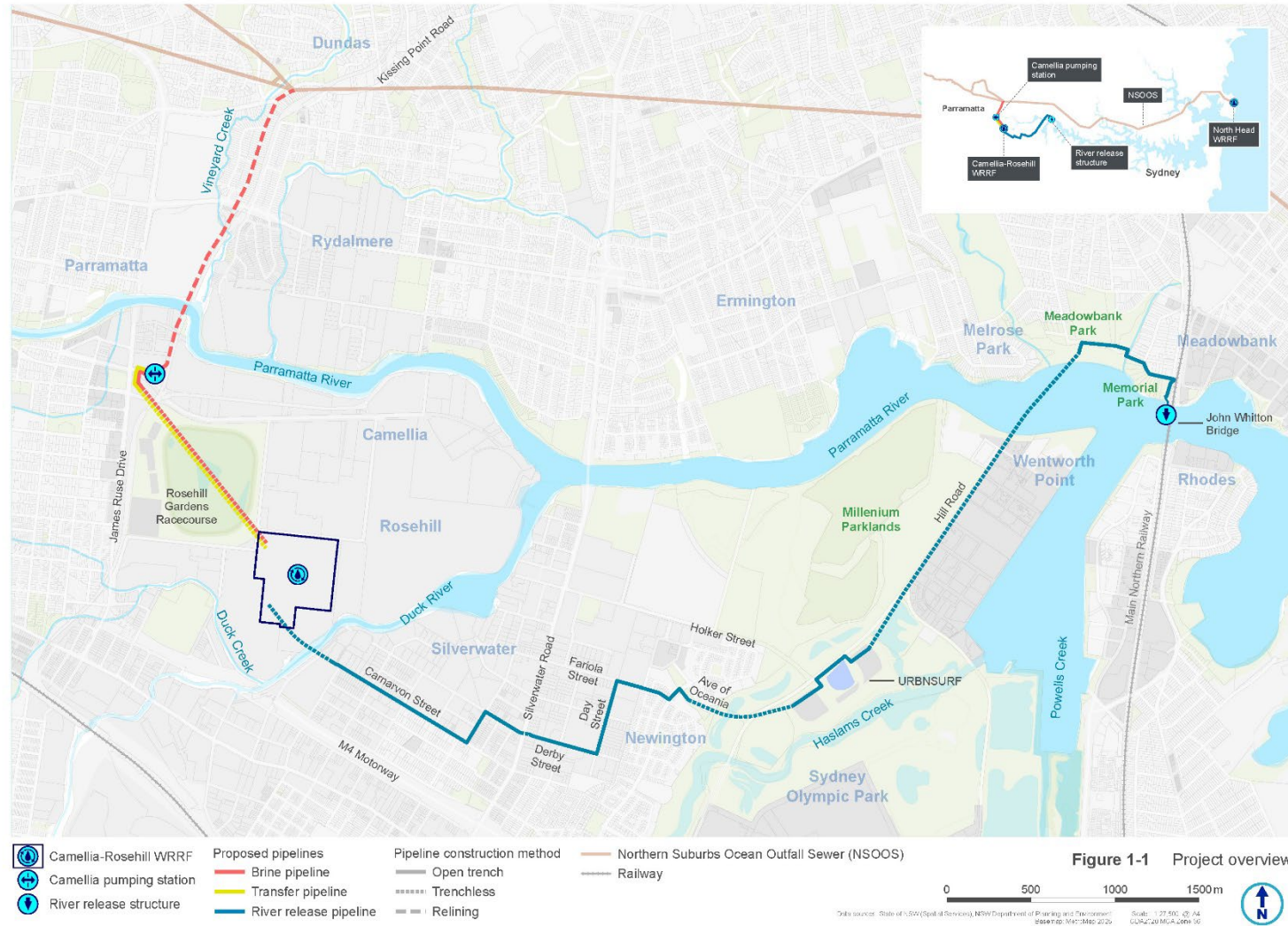


Figure 2-1 Site location

2.2 Noise and vibration sensitive receivers

Land uses adjacent to the WRRF are mainly industrial and commercial. Land uses surrounding the proposed pipeline are mainly urban/suburban residential or industrial/commercial.

The project area assessed is approximately 1,000 metres from the WRRF site or proposed pipeline alignments.

2.2.1 Residential receivers

The closest residential receivers to the WRRF site are located:

- to the south-east of the site, with the closest receivers approximately 460 metres from the site (Asquith Street, Silverwater)
- to the west and north-west of the site, with the closest receivers approximately 875 metres from the site (West of James Ruse Drive, Rosehill).

The closest residential receivers located near the proposed pipeline alignments are residential receivers in Dundas along the brine (relining section) pipeline, and in Silverwater and Newington along the river release pipeline, as shown in Figure 2-2.

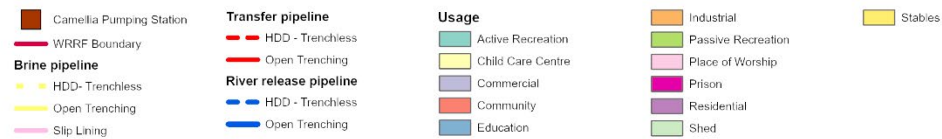
The Rosehill Racecourse residence is located in close proximity to the brine and transfer pipeline, and approximately 80 metres south of the Camellia pumping station.

The project area was divided into 12 noise catchment areas (NCAs), as shown on Figure 2-3. The NCAs were determined by reviewing existing land use and identifying groups of noise sensitive receivers which are likely to be exposed to a similar noise environment. For urban and suburban environments ambient noise levels in these areas are typically controlled by transport infrastructure and noise generating industry.

In addition, the Camellia-Rosehill Place Strategy (NSW Department of Planning and Environment, 2022) indicates that residential and educational building are planned within the suburbs of Camellia and Rosehill.



Project Location and Surrounding Land Uses



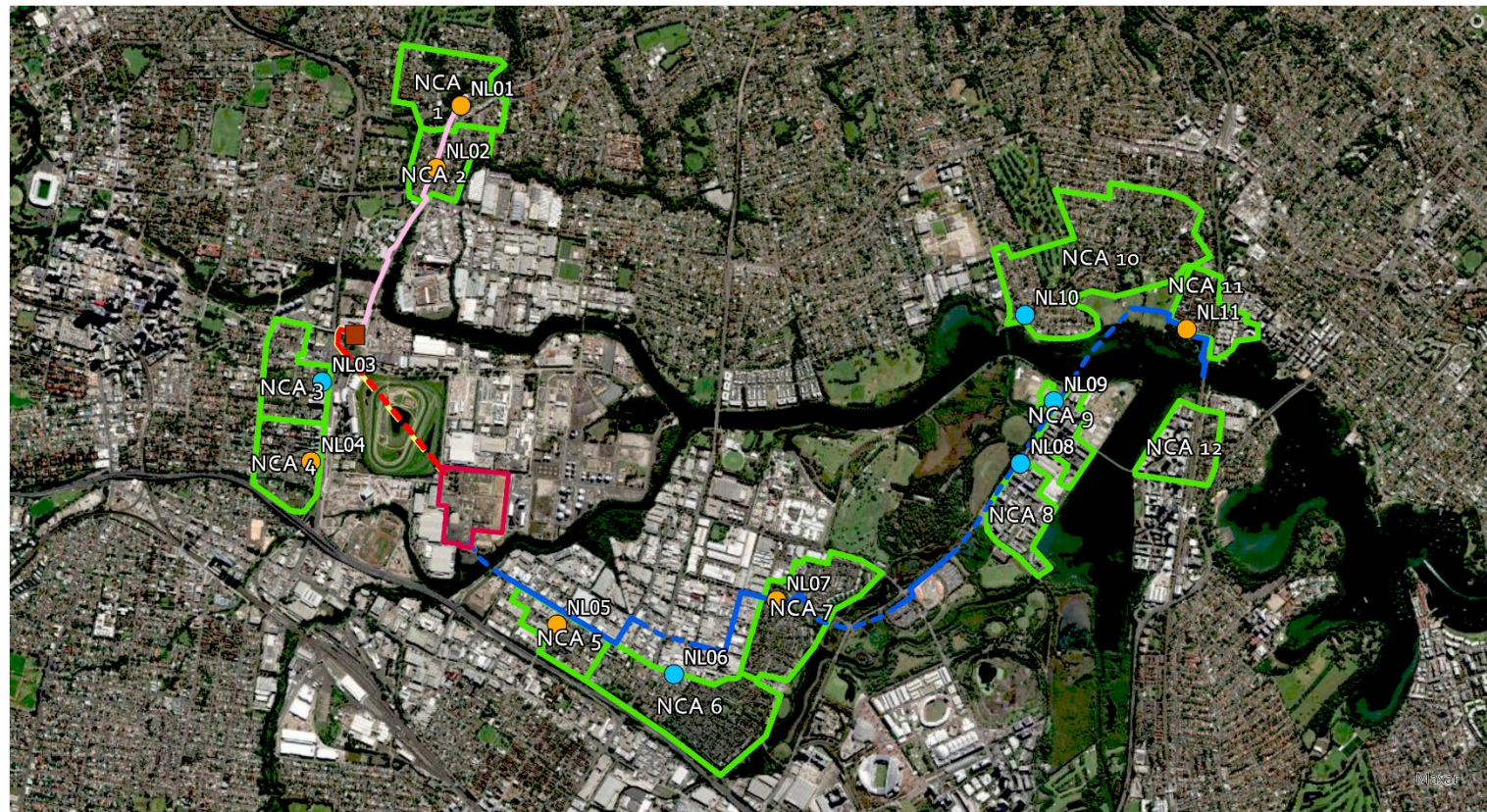
Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons Attribution 4.0 Australia license (Department of Customer Service 2020). (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/> (Creative Commons).

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content in accordance with section 5 of the Copyright Licensing Act 2011 has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nasa maps 2024

Figure 2-2 Project area and surrounding land uses



Noise Catchment Areas



Figure 2-3 Noise logger locations and noise catchment areas

2.2.2 Non-residential receivers

There is one non-residential noise sensitive receiver located within the vicinity of the WRRF. The Rosehill Gardens Racecourse horse stables are located about 620 metres to the west of the WRRF site.

Non-residential noise sensitive receivers are located close to the proposed pipelines. These are identified in Table 2-2 below.

Table 2-2 Non-residential noise sensitive receivers

Project element	Non sensitive receiver and approximate distance
Brine pipeline (relining section)	- Western Sydney University (WSU) Early Learning Paramatta - WSU Whitlam Library - Sir Ian and Nancy Turbott Auditorium
Brine and transfer pipeline	- Explore and Develop Paramatta - Rosehill Bowling Club
River release pipeline	- West Ryde Rovers Netball Club - Sydney Korean Catholic Church - RØDE - Sydney Baha'i Centre - Pierre de Coubertin Park - Eastwood Ryde Netball Association - Urbnsurf Sydney - Narawang Wetlands - Newington Nature Reserve Forest - Meadowbank Park - Meadowbank Dog Beach - Memorial Park - Duck River Nature Trail

2.2.3 Heritage items

There is one heritage-listed item under the Paramatta Local Environment Plan (LEP) 2023 located about 105 metres from the WRRF. This is the Capral Aluminium building (ID: I677) located at 3-11 Shirley Street, Rosehill.

In addition, there are nine heritage structures and three environmental heritage items within 200 metres of the pipeline alignment listed under the Parramatta LEP (2023), Ryde LEP (2014), State Heritage Register (SHR), the State Environmental Planning Policy (SEPP) and/or Section 170 Heritage and Conservation Register. These are stated in Table 2-3 and shown in Figure 2-4.

Table 2-3 Heritage items

Heritage item	Register (ID)
Dundas Railway Station Group	SHR (01133) Transport for NSW Section 170 Heritage and Conservation Register (4801051)
Rydalmere Hospital Precinct (former)	SHR (00749) Section 170 Department of Health Heritage and Conservation Register (5000658)
WSU Parramatta Campus (former Rydalmere Hospital and Female Orphan School)	Parramatta LEP (I661)
Clyde Carlingford Rail Bridge abutments	Parramatta LEP (I008/I695)
Camellia (Parramatta River) Underbridge Abutments	Transport for NSW Section 170 Heritage and Conservation Register (4800212)
Grave of Eliner Magee & child	Parramatta LEP (I007)

Heritage item	Register (ID)
Tram alignment	Parramatta LEP (I006)
Camelia Pumping Station (CPS)	Parramatta LEP (I009) Sydney Water Section 170 Heritage and Conservation Register (4571724)
Capral Aluminium	Parramatta LEP (I677)
Wetlands	Parramatta LEP (I011/I623)
Ernest Fleming Pty Ltd, machinery merchants	Parramatta LEP (I703)
Dwelling	Parramatta LEP (I704)
Explosives Store	SEPP (Precincts – Central River City) 2021 (Item 87) Parramatta LEP (I291) Sydney Olympic Park Section 170 Heritage and Conservation Register (I42)
Newington Armament Depot and Nature Reserve	SHR (01850)
Memorial Park (including obelisk) and remnants of former Meadowbank baths	Ryde LEP (I072)
Millennium Parklands Conservation Area	SEPP (Precincts – Central River City) 2021 (B)
Meadowbank rail bridge over Parramatta River	SHR (01189) Transport for NSW Section 170 Heritage and Conservation Register (4805744)

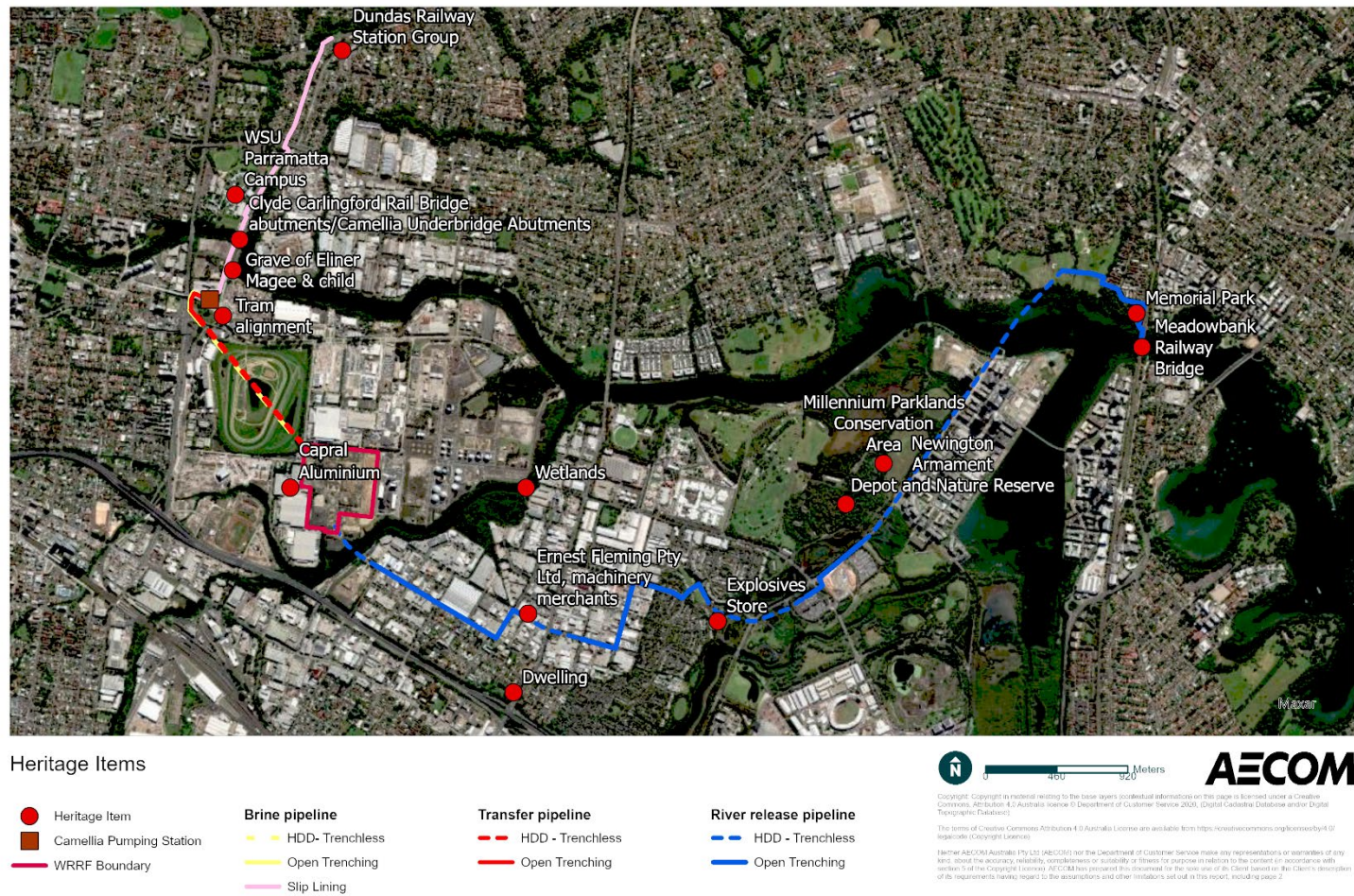


Figure 2-4 Heritage Items

2.3 Noise measurement methodology

Long term unattended and short term attended measurements were undertaken to establish the existing ambient and background noise environment at potentially affected receivers.

In addition to these noise measurements the results of noise surveys from other recent major projects in the area were also used. These are detailed in Section 2.4.3.

2.3.1 Unattended noise measurement methodology

Long term unattended noise monitoring was conducted at two locations between 15 May 2024 and 24 May 2024 and at four locations between 15 November 2024 and 28 November 2024. The noise loggers were calibrated prior to and after the monitoring period with a drift in calibration not exceeding ± 0.5 dB. The noise monitoring locations and logger details are presented in Table 2-4. Figure 2-3 also shows the noise logger locations relative to the Project site.

The noise monitoring locations were selected as representative of the various noise catchment areas and captured the existing ambient and background noise environments within each area. The locations selected span the area of the project components and include residential, commercial, industrial and recreational land use areas. Descriptions of the noise catchment area and the specific locations of each noise logger are provided in Section 2.5.

All acoustic instrumentation employed during the noise measurements comply with the requirements of AS IEC 61672.1 – 2019 *Electroacoustics – Sound level meters – Specifications* and were within their current National Association of Testing Authorities (NATA) Australia certified in-calibration period (i.e. calibrated in the last two years).

Table 2-4 Noise monitoring details

Logger	Location	Measurement period	Model	Serial number
NL01	45 Kissing Point Road, Dundas	16-27/11/2024	Rion NL52	164394
NL02	26 Rippon Avenue, Dundas	16-27/11/2024	Rion NL52	1043455
NL04	2 Eleanor Street, Rosehill	15-24/05/2024	01dB DUO	10391
NL05	63 Asquith Street, Silverwater	15-24/05/2024	01dB CUBE	12227
NL07	9 Comaneci Avenue, Newington	16-27/11/2024	Rion NL52	164396
NL11	13 Meadow Crescent, Meadowbank	16-27/11/2024	Rion NL52	175537

In accordance with the EPA's NSW *Noise Policy for Industry*, noise monitoring affected by adverse weather conditions or extraneous noise events was excluded from the monitoring data. The *Noise Policy for Industry* advises that data may be affected during adverse weather, such as wind speed higher than 5 m/s or rain. Weather data was acquired from the Bureau of Meteorology's Sydney Olympic Park weather station (station ID: 95765).

The loggers measured the noise levels over the sample period and then determined L_{A1} , L_{A10} , L_{A90} , and L_{Aeq} levels of the noise environment. The L_{A1} , L_{A10} and L_{A90} noise levels are the levels exceeded for 1%, 10% and 90% of the measurement period respectively. The L_{A90} is taken as the background level. The L_{A1} is indicative of the maximum noise levels due to individual noise events such as the pass-by of a heavy vehicle. The L_{Aeq} level is the equivalent continuous sound level and has the same sound energy over the sample period as the actual noise environment with fluctuating sound levels.

The L_{A90} noise levels were analysed to determine a single assessment background level (ABL) for each day, evening and night period in accordance with the *Noise Policy for Industry* for each monitoring location. The ABL is established by determining the lowest ten-percentile level of the L_{A90} noise data acquired over each period of interest. The background noise level or rating background level (RBL) representing the day, evening and night-time assessment periods is based on the median of individual ABLs determined over the entire monitoring period.

2.3.2 Attended noise measurement methodology

Attended noise measurements were conducted at the two unattended monitoring locations on 15 May 2024 and at four locations between 15 November 2024 and 28 November 2024 during the daytime. Each measurement was conducted over a 15 minute period. Weather conditions were fine and partly cloudy.

Attended noise measurements were conducted using a Brüel & Kjær Type 2250 sound level meter. The sound level meter used is designated as a Class 1 instrument and has accuracy suitable for laboratory and field use. The sound level meter was calibrated prior to and after the monitoring period with a drift in calibration not exceeding ± 0.5 dB.

All the acoustic instrumentation employed during the noise measurements comply with the requirements of AS IEC 61672.1 – 2019 and were within their current NATA Australia certified in-calibration period (i.e. calibrated in the last two years).

2.4 Noise measurement results

2.4.1 Unattended noise measurement results

Table 2-5 presents the existing overall representative L_{Aeq} ambient noise levels and the background L_{A90} noise levels for the day, evening and night-time periods, in accordance with the *Noise Policy for Industry*. The overall representative L_{Aeq} noise levels were determined by logarithmically averaging each assessment period for the entire monitoring period.

In total, 10 to 12 days of logging were completed, however some periods of noise logging were excluded due to adverse weather. The data was processed in accordance with Fact Sheet B of the *Noise Policy for Industry*.

The results for each day and the graphical noise logging results are presented in Appendix A.

Table 2-5 Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels

Logger number and location	L_{A90} background rating noise level, dB(A)			Log average noise (ambient) L_{Aeq} levels dB(A)		
	Day ¹	Evening ¹	Night ¹	Day ¹	Evening ¹	Night ¹
NL01 45 Kissing Point Road, Dundas	53	53 ²	34	68	67	63
NL02 26 Rippon Avenue, Dundas	39	39	36	53	51	48
NL04 2 Eleanor Street, Rosehill	52	50	42	58	57	54
NL05 63 Asquith Street, Silverwater	51	47	45	63	58	57
NL07 9 Comaneci Avenue, Newington	39	36	30 ³	55	51	47
NL11 13 Meadow Crescent, Meadowbank	41	37	30	56	53	48

Notes:

- Day is defined as 7:00 am to 6:00 pm, Monday to Saturday and 8:00 am to 6:00 pm Sundays & Public Holidays. Evening is defined as 6:00 pm to 10:00 pm, Monday to Sunday & Public Holidays. Night is defined as 10:00 pm to 7:00 am, Monday to Saturday and 10:00 pm to 8:00 am Sundays & Public Holidays.
- Set to daytime RBL in accordance with community expectations.

3. Set to 30 dB(A) in accordance with the Noise Policy for Industry minimum RBL for an evening or night-time period.

2.4.2 Attended noise measurements

The results of the attended noise monitoring are presented in Table 2-6. The measurements indicate that the dominant existing noise source affecting residential receivers is road traffic noise.

Table 2-6 Attended noise measurements

Logger number and location	Date	Time	L _{Aeq} dB(A)	L _{A90} dB(A)	Comments
NL01 45 Kissing Point Road, Dundas	15 Nov 2024	10:57 AM	70	59	Heavy traffic along Kissing Point Road. Car pass-by 74 dB(A). Truck pass-by 84 dB(A). Some minor lulls in traffic but mostly constant. Birds chirping during lulls. Overcast conditions.
NL02 26 Rippon Avenue, Dundas	15 Nov 2024	11:22 AM	53	41	Quiet street. Some car pass-bys, a very distant plane flyover. Car pass-by on Rippon Avenue 66 dB(A). Bird noise dominant during lulls. Distant hum from main road. Overcast conditions.
NL04 2 Eleanor Street, Rosehill	15 May 2024	2:42 PM	58	53	Cars and trucks passing by on James Ruse Drive; traffic noise generally between 55-57 dB(A). Some bird noise. Helicopter pass-by. Light wind conditions
NL05 63 Asquith Street, Silverwater	15 May 2024	4:08 PM	63	54	Cars passing along Stubbs Street, around 50-60 dB(A). Occasional aircraft noise. Light wind conditions
NL07 9 Comaneci Avenue, Newington	15 Nov 2024	10:15 AM	53	42	Some very distant hum from main road, but birds mostly dominant. Some local domestic noise sources, wheelie bins being moved around. A few car pass-bys along Comaneci Avenue. Car pass-by on Comaneci Avenue 63 dB(A). Conditions clear, no wind.
NL11 13 Meadow Crescent, Meadowbank	15 Nov 2024	12:03 PM	51	44	Car pass-by 59 dB(A), very few pass-bys. Some distant construction and traffic noise, reverse alarms, otherwise birds chirping and leaves rustling dominant. Overcast conditions.

2.4.3 Previous noise logging

The results of noise logging undertaken during the noise impact assessment of the Sydney Metro West (*Sydney Metro West Stage 1 Environmental Impact Statement Technical Paper 2 Noise and Vibration, September 2020*) and the Parramatta Light Rail Stage 2 (*Parramatta Light Rail Stage 2 Environmental Impact Statement, Technical Paper 3 Noise and Vibration October 2022*) were also used in this assessment. A summary of these noise logging results is provided in Table 2-7.

Table 2-7 Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels

Logger location	Date	L _{A90} background rating noise level, dB(A)			Log average noise (ambient) L _{Aeq} levels dB(A)		
		Day ¹	Evening ¹	Night ¹	Day ¹	Evening ¹	Night ¹
NL03 5 Hope Street, Rosehill	Dec 2021	51	49	40	61	60	57
NL06 10 Carnarvon Street, Silverwater	Aug 2019	46	44	41	60	57	55
NL08 286/33 Hill Road, Wentworth Point	Dec 2021	53	51	36	63	63	57
NL09 105/16 Hill Road, Wentworth Point	Dec 2021	48	47	38	59	57	51
NL10 78 Lancaster Avenue, Melrose Park	Dec 2021	37	37	32	55	50	45

Notes:

1. Day is defined as 7:00 am to 6:00 pm, Monday to Saturday and 8:00 am to 6:00 pm Sundays & Public Holidays. Evening is defined as 6:00 pm to 10:00 pm, Monday to Sunday & Public Holidays. Night is defined as 10:00 pm to 7:00 am, Monday to Saturday and 10:00 pm to 8:00 am Sundays & Public Holidays.

2.5 Existing noise environment summary

Noise catchment areas (NCAs) have been applied to the Project area, combining areas with a similar noise environment. The location of the NCAs is shown in Figure 2-3. A description of the noise environment for each NCA has been provided below in Table 2-8.

Table 2-8 Existing noise environment

NCA	Representative noise logger	Logger location description	NCA noise environment description
1	45 Kissing Point Road, Dundas	Logger located adjacent to Kissing Point Road, close to the proposed pipeline alignment	Dominated by traffic noise on Kissing Point Road.
2	28 Rippon Avenue, Dundas	Logger located adjacent to local residential street, close to the proposed pipeline alignment	Distant road traffic noise is constant. Local traffic and natural sounds such as birds are also audible.
3	5 Hope Street, Rosehill	Logger located close to James Ruse Drive, close to the proposed pipeline alignment	Dominated by traffic noise on James Ruse Drive. Also, local traffic noise from Hope Street.
4	2 Eleanor Street, Rosehill	Logger located one block back from James Ruse Drive	Local traffic noise audible. Bird noise is also audible.
5	63 Asquith Street, Silverwater	Logger located adjacent to local residential street	Dominated by local traffic noise. Occasional aircraft noise.
6	10 Carnarvon Street, Silverwater	Logger located adjacent to Carnarvon Road and a block back from Silverwater Road	Dominated by road traffic noise on Carnarvon Road and Silverwater Road to the south. Industrial noise also contributes to the noise levels.

NCA	Representative noise logger	Logger location description	NCA noise environment description
7	9 Comaneci Avenue, Newington	Logger located adjacent to Comaneci Avenue within a residential area, close to the proposed pipeline alignment	Very distant road traffic noise is audible. Local traffic and natural sounds such as birds are also audible.
8	286/33 Hill Road, Wentworth Point	Logger located adjacent to Hill Road, close to the proposed pipeline alignment	Dominated by traffic noise on Hill Road.
9	105/16 Hill Road, Wentworth Point	Logger located adjacent to Hill Road close to the Parramatta River, close to the proposed pipeline alignment	Dominated by traffic noise on Hill Road. Noise from boat horns and wharf area also audible.
10	78 Lancaster Avenue, Melrose Park	Logger located adjacent to Lancaster Avenue within a residential area, close to the Parramatta River	Dominated by distant road traffic noise along with natural sounds such as birds and distant aircraft and marine craft noise.
11 & 12	13 Meadow Crescent, Meadowbank	Logger located adjacent to Meadow Crescent within a residential area, close to the Parramatta River	Distant road traffic noise is audible. Occasional local traffic is also audible. Natural sounds such as birds are dominant.

3.0 Construction noise and vibration criteria

3.1 Construction activity noise criteria

3.1.1 Interim Construction Noise Guideline

The potential risk of adverse impact of construction noise on a receiver is determined by the extent of its emergence above the existing background noise level, the duration of the event and the characteristics of the noise.

The *Interim Construction Noise Guideline* is a NSW Government document that sets out ways to deal with the impacts of construction noise on residences and other sensitive land uses. It presents assessment approaches tailored to the scale of the construction project and identifies practices to minimise noise impacts. As the proposed works are expected to continue for a period of more than three weeks, a quantitative assessment, based on 'reasonable' worst case construction scenarios, has been carried out for these works.

Noise levels resulting from construction activities are predicted at nearby noise sensitive receivers (e.g. residences, schools, hospitals, places of worship, passive and active recreation areas) and compared to the levels provided in the *Interim Construction Noise Guideline*.

Where an exceedance of the management levels is predicted the *Interim Construction Noise Guideline* advises that receivers can be considered 'noise affected' and all feasible and reasonable work practices should be applied to minimise the noise impact.

Where construction noise levels at the receiver reach 75 dB(A), residential receivers are considered to be 'highly noise affected' and the proponent should, in consultation with the community, consider restrictions to the hours of construction to provide respite periods.

The *Interim Construction Noise Guideline* defines what is considered to be feasible and reasonable as follows:

“Feasible

A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements.

Reasonable

Selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure.”

The construction noise management levels (NMLs) for the residential and other sensitive land uses are detailed in Table 3-1, Table 3-2 and Table 3-3.

Table 3-1 *Interim Construction Noise Guideline residential NMLs*

Time of day	NML, $L_{Aeq,15min}$, dB(A) ¹	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. - Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. - The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. - Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: - 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 recommended standard hours	Noise affected RBL + 5 dB	- A strong justification would typically be required for works outside the recommended standard hours. - The proponent should apply all feasible and reasonable work practices to meet the noise affected level. - Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. - For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Notes:

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

Table 3-2 presents the NMLs applicable to residential receivers nearby to the proposed site.

Table 3-2 **Construction NMLs – residential receivers**

NCA	Logger location	Period	RBL, L_{A90} dB(A)	Standard hours NMLs, $L_{Aeq,15min}$, dB(A)	Out of hours NMLs, $L_{Aeq,15min}$, dB(A)
1	45 Kissing Point Road, Dundas	Day	53	63	58
		Evening	53	-	58
		Night	34	-	39

NCA	Logger location	Period	RBL, L _{A90} dB(A)	Standard hours NMLs, L _{Aeq,15min} , dB(A)	Out of hours NMLs, L _{Aeq,15min} , dB(A)
2	28 Rippon Avenue, Dundas	Day	39	49	44
		Evening	39	-	44
		Night	36	-	41
3	5 Hope Street, Rosehill	Day	51	61	56
		Evening	49	-	54
		Night	40	-	45
4	2 Eleanor Street, Rosehill	Day	52	62	57
		Evening	50	-	55
		Night	42	-	47
5	63 Asquith Street, Silverwater	Day	51	61	56
		Evening	47	-	52
		Night	45	-	50
6	10 Carnarvon Street, Silverwater	Day	46	56	51
		Evening	44	-	49
		Night	41	-	46
7	9 Comaneci Avenue, Newington	Day	39	49	44
		Evening	36	-	41
		Night	30	-	35
8	286/33 Hill Road, Wentworth Point	Day	53	63	58
		Evening	51	-	56
		Night	36	-	41
9	105/16 Hill Road, Wentworth Point	Day	48	58	53
		Evening	47	-	52
		Night	38	-	43
10	78 Lancaster Avenue, Melrose Park	Day	37	47	42
		Evening	37	-	42
		Night	32	-	37
11 & 12	13 Meadow Crescent, Meadowbank	Day	41	51	46
		Evening	37	-	42
		Night	30	-	35

Table 3-3 presents the NMLs applicable to other noise sensitive receivers, such as educational facilities and places of worship, as well as to commercial and industrial receivers.

Table 3-3 Construction NMLs - other receivers

Land use	NMLs, $L_{Aeq,15min}$ (applies when properties are in use)
Education (classrooms at schools and other educational institutions and childcare centres)	External noise level 55 dB(A) ¹
Places of worship	External noise level 55 dB(A) ¹
Active recreation	65 dB(A)
Passive recreation (including stables) ²	60 dB(A)
Commercial premises (including offices, retail outlets)	70 dB(A)
Industrial premises	75 dB(A)

Notes:

1. Based on an internal noise level of 45 dB outlined in the Interim Construction Noise Guideline, where a conservative estimate of 10 dB has been assumed between internal and external noise levels.
2. The NSW Government noise guidelines do not have specific construction noise management levels for equine stables. However, as part of the Sydney Metro West – Western Tunnelling Package, the Australian Turf Club (ATC) and an equine expert developed and implemented noise testing which resulted in the following report 'Report on the effects of noise and vibration in the behaviour of stabled racehorses in training at Rosehill Racecourse'. After release of this report the noise management level of 60 dB(A) for the racecourse stables continued to be used on the Sydney Metro West, therefore it is considered suitable for use for these works also.

3.1.2 Sleep disturbance criteria

The *Interim Construction Noise Guideline* requires a sleep disturbance analysis where construction works are planned to extend over more than two consecutive nights. The $L_{A1,1min}$ noise levels and number of expected $L_{A1,1min}$ noise events should be predicted in order to determine the likelihood of potential sleep disturbance.

The EPA recommends that to minimise the risk of sleep disturbance during the night-time period (10.00 pm to 7.00 am), the $L_{A1,1min}$ noise level outside a bedroom window should not exceed the $L_{A90,15min}$ background noise level by more than 15 dB. If this screening criterion is found to be exceeded, then a more detailed analysis must be undertaken. Analysis should include the extent that the maximum noise level exceeds the background noise level, and the number of times this is likely to happen during the night-time period.

Sleep disturbance research presented in the *Road Noise Policy* concludes that 'maximum internal noise levels below 50-55 dB(A) are unlikely to cause awakening reactions'. Therefore, given that an open window provides approximately 10 dB in noise attenuation from outside to inside, external noise levels of 60-65 dB(A) are unlikely to result in awakening reactions.

Based on the measured background noise levels during the night, the sleep disturbance criteria for the nearest noise sensitive residential receivers are presented in Table 3-4.

Table 3-4 Sleep disturbance criteria

NCA	Suburbs within NCA	Background noise level, L_{A90} , dB(A)	Sleep disturbance criteria, $L_{A1,1min}$, dB(A)	
			Screening level	Awakening reaction
1	Oatlands, Dundas	34	49	65
2	Dundas, Rydalmere	36	51	65
3	Parramatta, Rosehill	40	55	65
4	Rosehill, Granville	42	57	65
5	Silverwater	45	60	65

NCA	Suburbs within NCA	Background noise level, L_{A90} , dB(A)	Sleep disturbance criteria, $L_{A1,1min}$, dB(A)	
			Screening level	Awakening reaction
6	Silverwater, Newington	41	56	65
7	Newington	30	45	65
8	Wentworth Point	36	51	65
9	Wentworth Point	38	53	65
10	Melrose Park, West Ryde	32	47	65
11	Meadowbank	30	45	65
12	Rhodes	30	45	65

3.2 Construction traffic noise criteria

To assess noise impacts from construction traffic an initial screening test should be undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB(A), in line with the *Road Noise Policy*. Where the predicted noise increase is 2 dB(A) or less, then no further assessment is required. However, where the predicted noise level increase is greater than 2 dB(A), and the predicted road traffic noise level exceeds the criterion for that road, then noise mitigation should be considered for those receivers affected. The *Road Noise Policy* does not require assessment of noise impact to commercial or industrial receivers.

James Ruse Drive, Unwin Street, Grand Avenue and Colquhoun Street provide the main access roads to the WRRF site. James Ruse Drive is an arterial road while Unwin Street, Grand Avenue and Colquhoun Street are sub-arterial roads. The external noise criteria are applied one metre from the external façade of an affected receiver building.

Construction haulage trucks, machinery and vehicles may pass by the horse stables on Unwin Street to access the WRRF site.

Construction vehicles accessing the section of brine pipeline and wastewater transfer pipeline between the CPS and the WRRF will primarily use James Ruse Drive, Grand Avenue and Colquhoun Streets.

Construction vehicles accessing the brine pipeline between the pumping station and the NSOOS connection will primarily use Kissing Point Road, Rippon Avenue and Railway Street.

Construction vehicles accessing the river release pipeline will primarily use Silverwater Road, Carnarvon Street, Day Street, Derby Street, Holker Street, Avenue of Oceania, Comaneci Avenue, Hill Road, Meadow Crescent and Adelaide Street.

Table 3-5 presents roads used as construction routes and notes if there are residential receivers and horse stables along the route along with estimated annual average daily traffic (AADT) volumes.

Table 3-5 Roads used by construction traffic

Key roads for construction traffic	Type	Road adjacent to residential receivers	Road adjacent to stables	Estimated existing Annual Average Daily Traffic (AADT) ¹
James Ruse Drive, Rosehill	Arterial	Yes	Yes	56,200
Silverwater Road, Rydalmere	Arterial	Yes	No	67,000

Key roads for construction traffic	Type	Road adjacent to residential receivers	Road adjacent to stables	Estimated existing Annual Average Daily Traffic (AADT) ¹
Unwin Street, Rosehill	Sub-arterial	No	Yes	< 9,000
Grand Avenue, Camellia	Sub-arterial	No	No	< 20,000
Colquhoun Street, Rosehill	Sub-arterial	No	No	< 9,000 ²
Kissing Point Road, Dundas	Arterial	Yes	No	30,000
Rippon Avenue, Dundas	Sub-arterial	Yes	No	< 4,500 ³
Railway Street, Parramatta	Sub-arterial	Yes	No	< 4,500 ³
Carnarvon Street, Silverwater	Sub-arterial	Yes	No	< 4,500 ³
Derby Street, Silverwater	Sub-arterial	No	No	< 4,500 ³
Day Street, Silverwater	Sub-arterial	No	No	< 4,500 ³
Holker Street, Newington	Sub-arterial	Yes	No	< 9,000 ²
Comaneci Avenue, Newington	Sub-arterial	Yes	No	< 4,500 ³
Avenue of Oceania, Newington	Sub-arterial	Yes	No	< 4,500 ³
Hill Road, Sydney Olympic Park	Sub-arterial	No	No	< 9,000 ²
Meadow Crescent, Meadowbank	Sub-arterial	Yes	No	< 4,500 ³
Adelaide Street, West Ryde	Sub-arterial	Yes	No	< 4,500 ³

Notes:

1. Volumes estimated from data from Transport for NSW Traffic Volume Viewer, Camellia – Rosehill Place Strategy (2022), and Sydney Metro West – Stage 1 Technical Paper 1: Transport and Traffic (2020).
2. Volumes assumed to be similar to Unwin Street.
3. Estimated to be less than half of Unwin Street volumes.

3.3 Construction vibration criteria

The relevant standards/guidelines for the assessment of construction vibration are summarised in Table 3-6.

Table 3-6 Standards/guidelines used for assessing construction vibration

Item	Standard/guideline
Structural damage	German Standard DIN 4150 – Part 3 – Structural Vibration in Buildings – Effects on Structures
Human comfort (tactile vibration) ¹	Assessing Vibration: A Technical Guideline (AVATG)

Notes:

1. This document is based upon the guidelines contained in British Standard 6472:1992, "Evaluation of human exposure to vibration in buildings (1-80 Hz)". This British Standard was superseded in 2008 with BS 6472-1:2008 "Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting" and the 1992 version of the Standard was withdrawn. Although a new version of BS 6472 has been published, the EPA still requires vibration to be assessed in accordance with the 1992 version of the Standard at this point in time.

Vibration, at levels high enough, has the potential to cause damage to structures and disrupt human comfort. Vibration and its associated effects are usually classified as continuous, impulsive or intermittent as follows:

- continuous vibration continues uninterrupted for a defined period and includes sources such as machinery and continuous construction activities
- impulsive vibration is a rapid build up to a peak followed by a damped decay. It may consist of several cycles at around the same amplitude, with durations of typically less than two seconds and no more than three occurrences in an assessment period. This may include occasional dropping of heavy equipment or loading activities
- intermittent vibration occurs where there are interrupted periods of continuous vibration, repeated periods of impulsive vibration or continuous vibration that varies significantly in magnitude. This may include intermittent construction activity, impact pile driving, jack hammers.

The following sections set out vibration criteria to avoid structural damage and maintain human comfort. Transport for NSW's *Construction Noise and Vibration Guideline (Roads)* (CNVG-R) guidelines recommends minimum working distances to comply with these criteria and these have been discussed in Section 5.7.

3.3.1 Structural damage

At present, no Australian Standards exist for the assessment of building damage caused by vibration. The German Standard (DIN 4150) provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are presented in Table 3-7. DIN 4150 states that buildings exposed to higher levels of vibration than recommended limits would not necessarily result in damage.

Table 3-7 DIN 4150: structural damage safe limits for building vibration

Group	Type of structure	At foundation Less than 10 Hz	At foundation 10 Hz to 50 Hz	At foundation 50 Hz to 100 Hz ¹	Vibration at the horizontal plane of the highest floor for all frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20 mm/s	20 to 40 mm/s	40 to 50 mm/s	40 mm/s
2	Dwellings and buildings of similar design and/or use	5 mm/s	5 to 15 mm/s	15 to 20 mm/s	15 mm/s

Group	Type of structure	At foundation Less than 10 Hz	At foundation 10 Hz to 50 Hz	At foundation 50 Hz to 100 Hz ¹	Vibration at the horizontal plane of the highest floor for all frequencies
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order/heritage listed)	3 mm/s	3 to 8 mm/s	8 to 10 mm/s	8 mm/s

Notes:

1. At frequencies above 100 Hz, the values given in this column may be used as minimum values

3.3.2 Human comfort

The assessment of intermittent vibration outlined in the NSW EPA guideline *Assessing Vibration: A Technical Guideline* is based on vibration dose values (VDVs). The VDV accumulates the vibration energy received over the daytime and night-time periods.

Maximum and preferred VDVs for intermittent vibration arising from construction activities are listed in Table 3-8. The VDV criteria are based on the likelihood that a person would be annoyed by the level of vibration over the entire assessment period.

Table 3-8 Preferred and maximum VDVs for intermittent vibration

Location	Daytime ¹ (m/s ^{1.75})		Night time ¹ (m/s ^{1.75})	
	Preferred	Maximum	Preferred	Maximum
Critical areas	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes:

1. Day is defined as 7:00 am to 10:00 pm. Night is defined as 10:00 pm to 7:00 am

4.0 Operational noise criteria

4.1 Noise Policy for Industry

The NSW *Noise Policy for Industry* (NPfI) provides guidance in relation to acceptable noise limits for industrial noise emissions, which includes, but is not limited to, noise emissions from mechanical plant.

The assessment procedure in the *Noise Policy for Industry* has two components:

- controlling **intrusive** noise impacts in the short term for residences
- maintaining noise level **amenity** for residences and other land uses.

Both components are assessed at the boundary of the noise sensitive receiver site, or if the site boundary is more than 30 metres from the noise sensitive building, a distance of 30 metres from the noise sensitive building.

4.1.1 Intrusive noise impacts

The *Noise Policy for Industry* states that the noise from any single noise source should not be greatly above the prevailing background noise level. Industrial noise sources are generally considered acceptable if the A-weighted equivalent continuous sound pressure level of noise from the source, measured over a 15 minute period ($L_{Aeq,15min}$) does not exceed the rating background level (RBL) by more than 5 dB(A) for the period under consideration. This is termed the Intrusiveness Criterion.

The RBL is the background noise level to be used for assessment purposes and is determined by the methods given in the *Noise Policy for Industry*.

The RBL and the respective intrusive criteria for the day, evening and night periods are provided in Table 4-1. Only the NCAs directly adjacent to the CPS and WRRF have been included below, compliance within these NCAs implies compliance within NCAs which are located further from the WRRF.

Table 4-1 Intrusive criteria

Location	Period	RBL (L_{A90}), dB(A)	Intrusive criteria (RBL+5), dB(A)
NCA 3 – CPS	Day	51	56
	Evening	49	54
	Night	40	45
NCA 4 – WRRF	Day	52	57
	Evening	50	55
	Night	42	47
NCA 5 – WRRF	Day	51	56
	Evening	47	52
	Night	45	50

4.1.2 Protecting amenity

To limit continuing increase in noise levels, the maximum ambient noise level within an area from all industrial noise sources should not normally exceed the recommended amenity noise levels specified in Table 2.2 of the *Noise Policy for Industry*. The recommended amenity noise levels take into account the particular locality and land use.

Where there is existing industrial noise in an area the amenity level for a project is usually set to the recommended amenity level minus 5 dB. This correction ensures that industrial noise levels, from both existing and new sources, remain within the recommended noise levels for an area.

The 'minus 5 dB' correction has been applied to the amenity level for receivers in NCA 3, 4 and 5. The relevant project amenity noise levels are presented in Table 4-2. The project amenity levels for each period (day, evening and night-time) are then converted to project amenity levels for a 15 minute period by adding 3 dB(A). The 15 minute project amenity noise levels applicable to the Project are also provided in Table 4-2.

Table 4-2 Project amenity noise levels

Type of receiver	Indicative noise amenity area	Time of day	Project amenity noise level, dB(A)	
			L _{Aeq,period}	L _{Aeq,15min}
Residential receivers – NCA 3, 4 & 5	Urban	Day	55 ¹	58
		Evening	45 ¹	48
		Night	40 ¹	43
School classroom ²	All	Noisiest 1-hour period when in use	40 ^{1,2}	43
Childcare centre	All	Noisiest 1-hour period when in use	40 ^{1,3}	43
Place of worship	All	When in use	45 ¹	48
Commercial premises	All	When in use	60 ¹	63
Active recreation area	All	When in use	50 ¹	53

Notes:

1. Noise Policy for Industry amenity level minus 5 dB for an industrial development.
2. External noise levels are based upon a 10 dB reduction from outside to inside through an open window.
3. School classroom criteria have been used for childcare centres.
4. NCA 1,2,6-12 are not expected to be affected by operational noise from the Project.

4.1.3 Summary

A summary of the project noise trigger levels is presented in Table 4-3 below. These trigger levels apply to environmental noise emissions from activities undertaken or plant installed as part of the Project.

Table 4-3 Summary of environmental noise emission criteria

Location	Time of day	Project noise trigger levels ¹
		L _{Aeq,15min} dB(A)
NCA 3 - Rosehill	Day	56
	Evening	48
	Night	43
NCA 4 - Rosehill	Day	57
	Evening	48
	Night	43
NCA 5 - Silverwater	Day	56
	Evening	48
	Night	43
School classroom	Noisiest 1-hour period when in use	43
Place of Worship	When in use	48

Location	Time of day	Project noise trigger levels ¹ L _{Aeq} , dB(A)
Commercial premises	When in use	63
Active recreation area	When in use	53

Notes:

1. Project noise trigger levels represent the lower of the intrusive (Table 4-1) and amenity criteria (Table 4-2).

4.1.4 Maximum noise level assessment

The *Noise Policy for Industry* requires the potential for sleep disturbance to be assessed by considering maximum noise level events during the night-time period.

Where the subject development/premises night-time noise levels at a residential location exceed the following screening levels a detailed maximum noise level event assessment should be undertaken:

- L_{Aeq,15min} 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Based on the measured background noise levels during the night, the sleep disturbance criteria for the nearest noise sensitive residential receivers are presented in Table 4-4.

Table 4-4 Night-time sleep disturbance screening levels

Location	Measured night time RBL, L _{A90,15min} dB(A)	Sleep disturbance screening levels	
		L _{Aeq,15min} , dB(A)	L _{AFmax} , dB(A)
NCA 3 - Rosehill	40	45	55
NCA 4 - Rosehill	42	47	57
NCA 5 - Silverwater	45	50	60

4.2 Operational road traffic noise criteria

To assess noise impacts from increases in operational traffic, an initial screening test should be undertaken by evaluating whether existing road traffic noise levels will increase by more than 2 dB(A), in accordance with the *NSW Road Noise Policy*. Where the predicted noise increase is 2 dB(A) or less, then no further assessment is required. Where the predicted noise level increase is greater than 2 dB(A), and the predicted road traffic noise level exceeds the road category specific criterion then noise mitigation should be considered for those receivers affected. The *NSW Road Noise Policy* does not require assessment of noise impact to commercial or industrial receivers.

5.0 Construction noise assessment

5.1 Construction sources

In consultation with Sydney Water, the items of construction equipment and plant presented in Table 5-1 have been assumed for the Project. These would be confirmed by the construction contractor prior to construction commencing and further assessment would be undertaken if required.

Noise sources and their respective L_{Aeq} sound power levels (SWLs) are shown in Table 5-2. These SWLs are typical values taken from data provided in Australian Standard AS:2436-2010 *Guide to noise and vibration control on construction, demolition and maintenance sites*, British Standard 5228: Part 1 2009 *Code of practice for noise and vibration control on construction and open sites*, Part 1: Noise, 2009 including Amendment 1, 2014, and Transport for NSW's *Construction Noise and Vibration Guideline – Roads*, 2024.

The following construction scenarios, as shown in Table 5-1, have been considered in the construction noise assessment.

Table 5-1 Construction scenarios assessed

Scenario	Description	Anticipated significant noise and vibration emitting equipment
1	Construction compound operation	Backhoe Delivery truck Generator Light vehicle Spoil truck Water truck
2	Construction of the WRRF site (representative of phases 1 and 2)	Backhoe Chainsaw Compactor Concrete pump Concrete saw Concrete truck Delivery truck Dozer Dump truck Excavator (10T) Excavator (10T) with hammer attachment Franna crane Front end loader Generator Grader Hand tools Pavement profiler Paver Piling rig – bored Road truck Truck and dog Truck compressor Vibratory roller Water truck

Scenario	Description	Anticipated significant noise and vibration emitting equipment
3	Pipeline construction – Opening trenching	Backhoe Concrete truck Excavator (tracked) (35T) Franna crane Road truck Street sweeper Truck compressor Vibratory roller
4	Pipeline construction – Horizontal directional drilling (HDD)	Generator HDD machine Mud mixer and pump Road truck
5	Relining works	Excavator (10T) Generator Light vehicle Lighting tower Truck with Hiab
6	Works at Camellia Pumping Station	Backhoe Barge Chainsaw Compactor Compressor Concrete pump Concrete saw Concrete truck Concrete vibrator Delivery truck Excavator (10T) Excavator (10T) with hammer attachment Elevated work platform Generator Hand tools Jackhammer Light vehicle Spoil truck Vacuum truck Water pump Water truck
7	Construction of river release structure	Barge Crane Excavator (10T) Hand tools Light vehicle Truck and dog Tug

Table 5-2 Equipment sound power levels

Equipment	Scenario	SWL, dB(A)
Backhoe	1, 2, 3, 6	111
Barge	7	101 ²
Bobcat	6	110
Chainsaw	2, 6	117 ¹
Compactor	2, 6	95
Compressor	6	93
Concrete pump	2, 6	109
Concrete saw	2, 6	117 ¹
Concrete truck	2, 3, 6	106
Concrete vibrator	6	102 ¹
Crane	2, 6, 7	98
Delivery truck	1, 2, 6	108
Dozer	2	116
Dump truck	2	110
Excavator (tracked) (35T)	3	110
Excavator (10T)	2, 5, 6, 7	100
Excavator (10T) with hammer attachment	2, 6	116 ¹
Elevated work platform	6	95
Franna crane	2, 3	98
Front end loader	2	112
Generator	1, 2, 4, 5, 6	103
Grader	2	106
Hand tools	2, 6, 7	94
HDD machine	4	105
Jackhammer	6	116 ¹
Light vehicle	1, 5, 6, 7	103
Lighting tower	5	80
Mud mixer and pump	4	108
Pavement profiler	2	110
Paver	2	105
Piling rig – bored	2	112
Road truck	2, 3, 4	108
Spoil truck	1, 6	108

Equipment	Scenario	SWL, dB(A)
Street sweeper	3	104
Truck and dog	2, 7	107
Truck compressor	2, 3	75
Truck with Hiab	5	98
Tug	7	101 ²
Vacuum truck	6	109
Vibratory roller	2, 3	105
Water pump	6	96
Water truck	1, 2, 6	109

Notes:

1. Annoying characteristic penalty of +5dB added to SWL.
2. For a conservative approach, the barge has been assumed to be powered and have the same SWL as the tug.

5.2 Construction hours

When it is feasible and reasonable to do so, construction works will be carried out during standard working hours as defined by the *Interim Construction Noise Guideline*:

- Monday to Friday, 7 am to 6 pm
- Saturdays, 8 am to 1 pm
- Sundays and public holidays, no work.

However, due to the size and duration of the Project, some out-of-hours work may be required for certain construction works, including:

- Delivery of oversized plant or structures that police or other authorities determine to require special arrangements to transport along public roads
- Trenched pipeline construction along busy roads, such as along the section of the river release pipeline alignment within Carnarvon Street, to minimise traffic impacts
- Works that cannot be completed within the standard respite periods for engineering reasons, such as tunnelling for trenchless pipeline construction sections
- Relining works on Kissing Point Road, Dundas
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm;
 - Public infrastructure works that shorten the length of the Project construction and are supported by the affected community (Duration reduction assessment)
 - Works where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours
 - Works that cannot be completed within the standard respite periods for engineering justifications
- Construction of the River Release Structure – limited to works within the river, to minimise impacts to ferry operations and other users of the river.

5.3 Modelling conditions

In order to assess noise impacts from the site during construction, a noise model with the seven construction scenarios detailed in Section 5.1 was created to represent 'reasonable' worst case periods of construction works. For all scenarios except Scenario 4 (HDD construction), the scenarios were

modelled using the noisiest piece of equipment/plant for that scenario. For Scenario 4, point sources representing a generator, truck, mud mixer and pump, and HDD machine were modelled at each drilling site and HDD pit location.

A summary of the modelled construction scenarios and activity noise levels are presented in Table 5-3.

Table 5-3 Summary of modelled scenarios

Scenario ID	Scenario	Modelled equipment (worst case) ¹	SWL, dB(A)	Construction hours
1	Construction compound operation	Backhoe	111	Standard hours Out-of-hours (Likely for Compound 23)
2	Construction of the WRRF site	Piling rig – bored (standard hours)	112	Standard hours
		Truck and dog (out-of-hours)	102 ²	Out-of-hours (delivery, concrete pours)
3	Pipeline construction – open trenching	Concrete saw	112 ^{2,3}	Standard hours Out-of-hours (at Grand Avenue, Camellia, Carnarvon Street, Silverwater, and Hill Road, Sydney Olympic Park)
4	Pipeline construction – HDD	HDD machine	105	Standard hours
		Mud mixer and pump	108	Out-of-hours
		Road truck	108	
		Generator	103	
5	Relining works	Generator	103	Standard hours (entire relining works footprint) Out-of-hours (at Kissing Point Road, Dundas and Victoria Road, Rydalmere)
6	Works at CPS	Concrete saw	112 ^{2,3}	Standard hours
7	Construction of river release structure	Truck and dog	102 ²	Standard hours Out-of-hours (two 24-hour weekends)

Notes:

- For each scenario except Scenario 4, the worst-case 15-minute period of works has been modelled using the noisiest piece of equipment/plant.
- Equipment has been assumed to be in operation for 33% of the worst-case 15-minute period.
- An annoying characteristic penalty of 5 dB has been included

The noisiest piece of equipment/plant was modelled for each construction scenario as this approach is considered more representative of the actual construction noise levels, compared to the very conservative approach of modelling all the equipment for each scenario¹.

The construction of the Project was modelled in SoundPLAN Version 8.2. The following features were included in the noise model:

- ground topography
- ground absorption and reflection
- buildings (residential and non-residential)
- construction noise sources.

Noise emissions from the construction sites have been modelled using an implementation of the CONCAWE propagation algorithm with neutral meteorological conditions². The CONCAWE algorithm was developed in 1981 to assess the propagation of noise from petroleum and petrochemical complexes. The method is based upon experimental data taken in the vicinity of typical industrial plants and is widely used and accepted in industry to assess noise from industrial equipment.

It can be expected that there may be differences between predicted and measured noise levels due to variations in instantaneous operating conditions, plant in operation during measurement, and also the location of the plant equipment. The acoustic shielding calculated in the model due to fixed building structures would also vary as the construction equipment moves around the Site and along the construction footprint.

5.4 Construction noise assessment

Noise levels at the residential and non-residential receivers within the study area have been assessed against the daytime and night-time noise management levels.

During construction, and the noisiest piece of equipment/plant may not be operating for the entire duration of the worst-case period of construction works, which has been assumed for the model. This would result in reduced noise levels compared with those predicted and presented below. In addition, mitigation measures have been specified in Section 5.9 which may reduce the impact on receivers.

Construction noise contours calculated at 1.5 metres above ground level are presented in Appendix B.

5.4.1 Residential receivers

Table 5-4 and Table 5-5 present the construction noise modelling results for residential receivers during standard hours and out-of-hours respectively. The tables show the number of residential properties where the construction NMLs are likely to be exceeded during standard hours and out-of-hours (night-time) respectively. Table 5-4 also presents the number of receivers where noise levels are predicted to exceed the highly affected level, 75 dB(A).

Table 5-4 Number of residential NML exceedances during standard hours work

NCA	L _{Aeq,15min} NML dB(A)	Predicted number of noise affected residential properties			
		Level of exceedance of NMLs during standard construction hours			Highly affected
		1 10 dB(A)	10 20 dB(A)	>20 dB(A)	>75 dB(A)
Scenario 1: Construction compound operation					
NCA 1 (Oatlands and Dundas)	63	-	-	-	-

¹ A. Morris, M. Tabacchi and R. Zhafranata, "Comparison of predictions from web-based construction noise tool with operator-attended field measurements," *Journal of the Acoustical Society of America*, vol. 154, no. 4_supplement, 2023

² C. Manning, "The propagation of noise from petroleum and petrochemical complexes to neighbouring communities," 1981.

NCA	L _{Aeq,15min} NML dB(A)	Predicted number of noise affected residential properties			
		Level of exceedance of NMLs during standard construction hours			Highly affected
		1 10 dB(A)	10 20 dB(A)	>20 dB(A)	>75 dB(A)
NCA 2 (Dundas and Rydalmere)	49	-	-	-	-
NCA 3 (Parramatta and Rosehill)	61	-	1	-	1
NCA 4 (Rosehill and Granville)	62	-	-	-	-
NCA 5 (Silverwater)	61	-	-	-	-
NCA 6 (Silverwater and Newington)	56	71	41	10	18
NCA 7 (Newington)	49	125	122	55	24
NCA 8 (Wentworth Point)	63	-	-	-	-
NCA 9 (Wentworth Point)	58	-	-	-	-
NCA 10 (Melrose Park and West Ryde)	47	174	10	-	-
NCA 11 (Meadowbank)	51	27	16	8	6
NCA 12 (Rhodes)	51	6	-	-	-
Scenario 2: Construction of the WRRF site¹					
NCA 3 (Parramatta and Rosehill)	61	-	-	-	-
NCA 4 (Rosehill and Granville)	62	-	-	-	-
NCA 5 (Silverwater)	61	-	-	-	-
Scenario 3: Pipeline construction Open trenching					
NCA 1 (Oatlands and Dundas)	63	-	-	-	-
NCA 2 (Dundas and Rydalmere)	49	-	-	-	-
NCA 3 (Parramatta and Rosehill)	61	1	-	-	-
NCA 4 (Rosehill and Granville)	62	-	-	-	-
NCA 5 (Silverwater)	61	3	-	-	-
NCA 6 (Silverwater and Newington)	56	5	3	-	-
NCA 7 (Newington)	49	121	46	39	22

NCA	L _{Aeq,15min} NML dB(A)	Predicted number of noise affected residential properties			
		Level of exceedance of NMLs during standard construction hours			Highly affected
		1 10 dB(A)	10 20 dB(A)	>20 dB(A)	>75 dB(A)
NCA 8 (Wentworth Point)	63	-	-	-	-
NCA 9 (Wentworth Point)	58	-	-	-	-
NCA 10 (Melrose Park and West Ryde)	47	52	-	-	-
NCA 11 (Meadowbank)	51	34	11	10	10
NCA 12 (Rhodes)	51	5	-	-	-
Scenario 4: Pipeline construction HDD					
NCA 1 (Oatlands and Dundas)	63	-	-	-	-
NCA 2 (Dundas and Rydalmere)	49	-	-	-	-
NCA 3 (Parramatta and Rosehill)	61	1	-	-	-
NCA 4 (Rosehill and Granville)	62	-	-	-	-
NCA 5 (Silverwater)	61	-	-	-	-
NCA 6 (Silverwater and Newington)	56	-	-	-	-
NCA 7 (Newington)	49	18	6	1	-
NCA 8 (Wentworth Point)	63	-	-	-	-
NCA 9 (Wentworth Point)	58	-	-	-	-
NCA 10 (Melrose Park and West Ryde)	47	3	-	-	-
NCA 11 (Meadowbank)	51	-	-	-	-
NCA 12 (Rhodes)	51	-	-	-	-
Scenario 5: Relining works²					
NCA 1 (Oatlands and Dundas)	63	17	-	-	-
NCA 2 (Dundas and Rydalmere)	49	20	44	21	2
Scenario 6: Works at CPS³					
NCA 3 (Parramatta and Rosehill)	61	1	-	-	-

NCA	L _{Aeq,15min} NML dB(A)	Predicted number of noise affected residential properties			
		Level of exceedance of NMLs during standard construction hours			Highly affected
		1 10 dB(A)	10 20 dB(A)	>20 dB(A)	>75 dB(A)
Scenario 7: Construction of river release structure ⁴					
NCA 11 (Meadowbank)	51	9	-	-	-
NCA 12 (Rhodes)	51	-	-	-	-

Notes:

1. NCAs 3, 4 and 5 are the only NCAs in the vicinity of the construction of the WRRF works area; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.
2. NCA 1 and NCA 2 are the only NCAs impacted by the relining works; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.
3. NCA 3 is the only NCA in the vicinity of the works at CPS; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.
4. NCA 11 and NCA 12 are the only NCAs in the vicinity of the construction of the river release structure works area; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.

Table 5-5 Number of residential NML exceedances during out-of-hours work (night-time)

NCA	L _{Aeq,15min} NML dB(A)	Number of predicted noise affected residential properties			
		Level of exceedance of NMLs during out of hours construction hours (night time)			
		1 5 dB(A)	6 15 dB(A)	16 25 dB(A)	>25 dB(A)
Scenario 1: Construction compound operation (Compound C23 only) ¹					
NCA 5 (Silverwater)	50	4	-	-	-
NCA 6 (Silverwater and Newington)	46	53	98	30	14
NCA 7 (Newington)	35	21	12	-	-
Scenario 2: Construction of the WRRF site ¹					
NCA 3 (Parramatta and Rosehill)	61	-	-	-	-
NCA 4 (Rosehill and Granville)	62	-	-	-	-
NCA 5 (Silverwater)	61	-	-	-	-
Scenario 3: Pipeline construction Open trenching					
NCA 1 (Oatlands and Dundas)	39	-	-	-	-
NCA 2 (Dundas and Rydalmere)	41	-	-	-	-
NCA 3 (Parramatta and Rosehill)	45	71	23	1	-
NCA 4 (Rosehill and Granville)	47	-	-	-	-
NCA 5 (Silverwater)	50	42	48	9	21

NCA	L _{Aeq,15min} NML dB(A)	Number of predicted noise affected residential properties			
		Level of exceedance of NMLs during out of hours construction hours (night time)			
		1 5 dB(A)	6 15 dB(A)	16 25 dB(A)	>25 dB(A)
NCA 6 (Silverwater and Newington)	46	27	16	6	2
NCA 7 (Newington)	35	109	103	-	-
NCA 8 (Wentworth Point)	41	9	1	-	-
NCA 9 (Wentworth Point)	43	-	-	-	-
NCA 10 (Melrose Park and West Ryde)	37	-	-	-	-
NCA 11 (Meadowbank)	35	-	-	-	-
NCA 12 (Rhodes)	35	-	-	-	-
Scenario 4: Pipeline construction HDD					
NCA 1 (Oatlands and Dundas)	39	-	-	-	-
NCA 2 (Dundas and Rydalmere)	41	-	-	-	-
NCA 3 (Parramatta and Rosehill)	45	24	-	1	-
NCA 4 (Rosehill and Granville)	47	-	-	-	-
NCA 5 (Silverwater)	50	-	-	-	-
NCA 6 (Silverwater and Newington)	46	-	-	-	-
NCA 7 (Newington)	35	66	47	19	5
NCA 8 (Wentworth Point)	41	7	-	-	-
NCA 9 (Wentworth Point)	43	4	-	-	-
NCA 10 (Melrose Park and West Ryde)	37	93	47	-	-
NCA 11 (Meadowbank)	35	14	22	-	-
NCA 12 (Rhodes)	35	9	11	-	-
Scenario 5: Relining works²					
NCA 1 (Oatlands and Dundas)	39	3	6	-	-
NCA 2 (Dundas and Rydalmere)	41	4	3	1	1

NCA	L _{Aeq,15min} NML dB(A)	Number of predicted noise affected residential properties			
		Level of exceedance of NMLs during out of hours construction hours (night time)			
		1 5 dB(A)	6 15 dB(A)	16 25 dB(A)	>25 dB(A)
Scenario 7: Construction of river release structure ³					
NCA 11 (Meadowbank)	35	7	16	12	1
NCA 12 (Rhodes)	35	19	22	-	-

Notes:

1. NCAs 5, 6 and 7 are the only NCAs within the vicinity of compound C23, which may operate 24 hours; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.
2. NCA 1 and NCA 2 are the only NCAs within the vicinity of the relining works; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.
3. NCA 11 and NCA 12 are the only NCAs in the vicinity of the construction of the river release structure works area; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.

A qualitative summary of the construction noise impacts of each Project component is provided in Table 5-6 below.

Table 5-6 Summary of construction noise impacts

Project component	NCA areas	Summary of impact
Construction compounds	NCAs 3, 5 – 7, and 10 – 12	During compound operation in standard hours, residential receivers near the compounds in Pierre De Coubertin Park and Meadowbank Park are predicted to be impacted the most. Recreational users of these parks may also be impacted. During out-of-hours operation of compound C23, residential receivers in NCA 6 (Silverwater and Newington) will experience the highest number of NML exceedances. The Rosehill Racecourse residence may also be impacted. Construction compound hoarding or noise curtains should be implemented where practicable.
WRRF site construction	NCAs 3 – 5	There are no predicted impacts on residential receivers in the nearest NCAs (3, 4 and 5) as a result of construction works at the WRRF site during both standard hours and out-of-hours works.
Open trenching	NCAs 3, 5 – 8, and 10 – 12	During standard hours, NCAs 7 (Newington) and 11 (Meadowbank) are predicted to experience the highest number of NML exceedances at residential receivers when open trenching works are taking place. During out-of-hours works, residential receivers in Silverwater and Newington and the Rosehill Racecourse residence are predicted to be the most affected due to the night works trenching along Carnarvon Street and the 24 hour microtunneling.

Project component	NCA areas	Summary of impact
HDD	NCA 3 and 7 – 12	During standard hours, 25 residential receivers in NCA 7 (Newington), three residential receivers in NCA 10 (Melrose Park and West Ryde) and the Rosehill Racecourse residence are predicted to experience NML exceedances while HDD is taking place. Similarly, during out-of-hours HDD works, NCA 7 (Newington) and NCA 10 (Melrose Park and West Ryde) will be the most impacted due to the possible 24 hour HDD works. Recreational users at Pierre de Coubertin Park and Meadowbank Park may also be affected.
Brine relining works	NCA 1 and 2	Impacts are fairly minimal due to the short duration of the works. More residential receivers located in NCA 2 (Dundas and Rydalmere) are impacted by works than in NCA 1 (Oatlands and Dundas). There are 9 residential receivers in each NCA predicted to experience NML exceedances during night-time works.
CPS works	NCA 3	No residential receivers are likely to be impacted by the works at the CPS during standard construction hours. No night-time works are proposed.
Construction of river release structure	NCA 11 and 12	Residential receivers Meadowbank and Rhodes and recreational users of Memorial Park and the river near John Whitton Bridge have the potential to be impacted by the river release structure construction works. There are 9 residential receivers in NCA 11 (Meadowbank) predicted to experience NML exceedances during standard hours. During night-time works, 36 residential receivers in NCA 11 (Meadowbank) and 41 residential receivers in NCA 12 (Rhodes) are predicted to experience NML exceedances, however this will only be for a short duration (two 24-hour weekends of construction work).

The results show that construction noise levels are predicted to exceed the NMLs during both standard hours and out-of-hours night-time hours for all assessed construction scenarios except Scenario 2, Construction of the WRRF site and Scenario 6, Works at CPS. The largest number of total NML exceedances occurs within NCA 7 (Newington) during Scenario 1, Construction compound operation for standard hours, and Scenario 3, Pipeline construction – open trenching, for night-time works. NCA 7 (Newington) corresponds to the area which includes trenching through several residential streets and the presence of an HDD site in Pierre de Coubertin Park.

'Highly noise affected' (experiencing noise levels greater than 75 dB(A)) residential receivers were predicted for all construction scenarios except for Scenarios 2, 4, 6 and 7. The largest number of 'highly noise affected' residential receivers – 24 receivers – are predicted within NCA 7 (Newington) during construction compound operation. The *Interim Construction Noise Guideline* states additional consideration for mitigation should be afforded for 'highly noise affected' receivers. These receivers would receive additional consultation with regards to specific timing and impacts of construction works. Respite periods would also be considered for these receivers in accordance with the *Interim Construction Noise Guideline*.

The open trenching works (particularly use of the concrete saw) are expected to impact the largest number of receivers at night compared to the other construction scenarios, with receivers in NCAs 3 (Parramatta and Rosehill), 5 (Silverwater), 6 (Silverwater and Newington) and 7 (Newington) being the most impacted. However, as discussed in section 5.4.3.1, these receivers will only be affected as the work progresses past the property. The HDD drilling is also expected to impact a number of receivers, mainly in NCA 7 (Newington). Relining works and river release structure works are also expected to

impact receivers at night but also to a lesser extent than open trenching and HDD drilling. Generator noise and construction vehicle movements are expected to be the main sources of noise during these works.

Lastly, Compound 23 on the corner of Silverwater Road and Carnarvon Street may operate at night and therefore noise could impact neighbouring receivers. It is expected that deliveries and vehicle movements within the compound will be the main source of noise. Compound C23 has been selected as a worst-case compound to demonstrate night-time impacts. Alternative compounds may be used for out-of-hours work which would have similar or less impacts on residential receivers. HDD compounds may also operate 24 hours.

5.4.2 Non-residential receivers

Table 5-7 presents the construction noise modelling results for non-residential noise sensitive receivers across the Project area for each scenario and shows the number of properties where the NMLs are likely to be exceeded during the receivers' hours of use.

Table 5-7 Number of noise sensitive non-residential NML exceedances during hours of use

Scenario ID	Scenario	Number of non residential noise sensitive properties where noise levels may exceed NMLs across the Project area		
		Level of exceedance of NMLs during hours of use		
		1 10 dB(A)	10 20 dB(A)	>20 dB(A)
1	Construction compound operation	3	4	3
2	Construction of WRRF Site	-	-	-
3	Pipeline construction – Open trenching	7	2	-
4	Pipeline construction – HDD	-	-	-
5	Relining works	1	2	1
6	Works at CPS	-	-	-
7	Construction of river release structure	-	-	-

The results show that construction activities are expected to exceed the NMLs at a number of non-residential noise sensitive receivers for the assessed scenarios. Four non-residential noise sensitive receivers are predicted to experience NML exceedances greater than 20 dB(A), including West Ryde Rovers Netball Club and two buildings associated with Sydney Korean Catholic Church during construction compound operation, and Western Sydney University (WSU) Early Learning Paramatta during relining works. It is expected that deliveries and construction vehicle movements will be the main source of noise during construction compound operation and generators and excavators will be the main source during relining works.

Other non-residential noise sensitive receivers that may experience NML exceedances less than 20 dB(A) include Sydney Baha'i Centre, Explore and Develop Paramatta, Rosehill Bowling Club, Eastwood Ryde Netball Association, Urbnsurf Sydney, Meadowbank Park, WSU Whitlam Library and Sir Ian and Nancy Turbott Auditorium.



5.4.3 Discussion

Although exceedances of the NMLs are predicted during the construction works feasible and reasonable mitigation measures for noise and vibration have been included in Section 5.9.2 of this report to minimise the noise impact. These mitigation measures would also be detailed in a Construction Environment Management Plan (CEMP).

It is important to consider that this assessment is representative of the typical worst-case 15-minute period of construction works. The assessed scenarios do not represent the ongoing day-to-day noise impact at noise sensitive residential receivers for an extended period of time. In addition, it should be noted that the construction works would move progressively along the pipeline alignment and not all sensitive receivers would be impacted at the same time. This is discussed further in Section 5.4.3.1.

Particularly noisy activities, such as concrete sawing, are likely to persist for only a fraction of the overall construction period. Typical noise levels could be 5 to 10 dB(A) lower than the predicted noise levels depending on the location of equipment, site sheds or any temporary screening on site, as well as the intermittent nature of some works (e.g. works involving the use of noise intensive equipment such as concrete saws).

The construction compounds other than compound 23 are not expected to be used outside of standard hours (with the exception of deliveries of oversized plant and structures that would need to occur due to access limitations on public roads). The impact of the night-time deliveries is likely to be minimal and less than the number of predicted exceedances occurring during standard hours. If alternative compounds are used for out-of-hours work, these would have similar or less noise impacts on residential receivers than compound 23.

HDD compounds are likely to be under 24-hour operation, however the impact of the HDD compound operations is likely to be less than the number of predicted exceedances occurring during standard and out-of-hours works for HDD pipeline construction.

No barriers have been considered in the noise assessment. Temporary barriers and screens may provide 5 to 10 dB reduction to the predicted levels at the sensitive receivers when located close to the noise source or to a receiver.

5.4.3.1 Progressive works

The open trenching works are expected to progress at an average rate of around 10 metres per day. Receivers would generally be affected for around ten weeks. The predicted noise levels for this scenario are therefore worst case and represent the period where the works come closest to each receiver.

For the open trenching work a total of:

- 487 receivers may experience noise levels above the NMLs outside of standard hours; and
- 329 receivers may experience noise levels above the NMLs during standard hours, and
- 32 receivers may be 'highly noise affected'.

However, at any one receiver, construction noise levels would slowly increase as the works approach the receiver (around five weeks), would remain fairly constant while the works are directly in front of the receiver (around three to five days) and would then slowly decrease again as the works move away (around five weeks). Therefore, the number of receivers affected at any one point in time would be much lower. For example, at a receiver located along the road where trenching and excavation is taking place, noise levels are expected to:

- increase by about 30 dB over the NML over a period of up to five weeks
- remain above 75 dB(A) for about three to five days as the works are directly in front of the receiver
- decrease to the NML over a period of up to five weeks as the works move away.

An example of this change is shown diagrammatically in Figure 5-1.

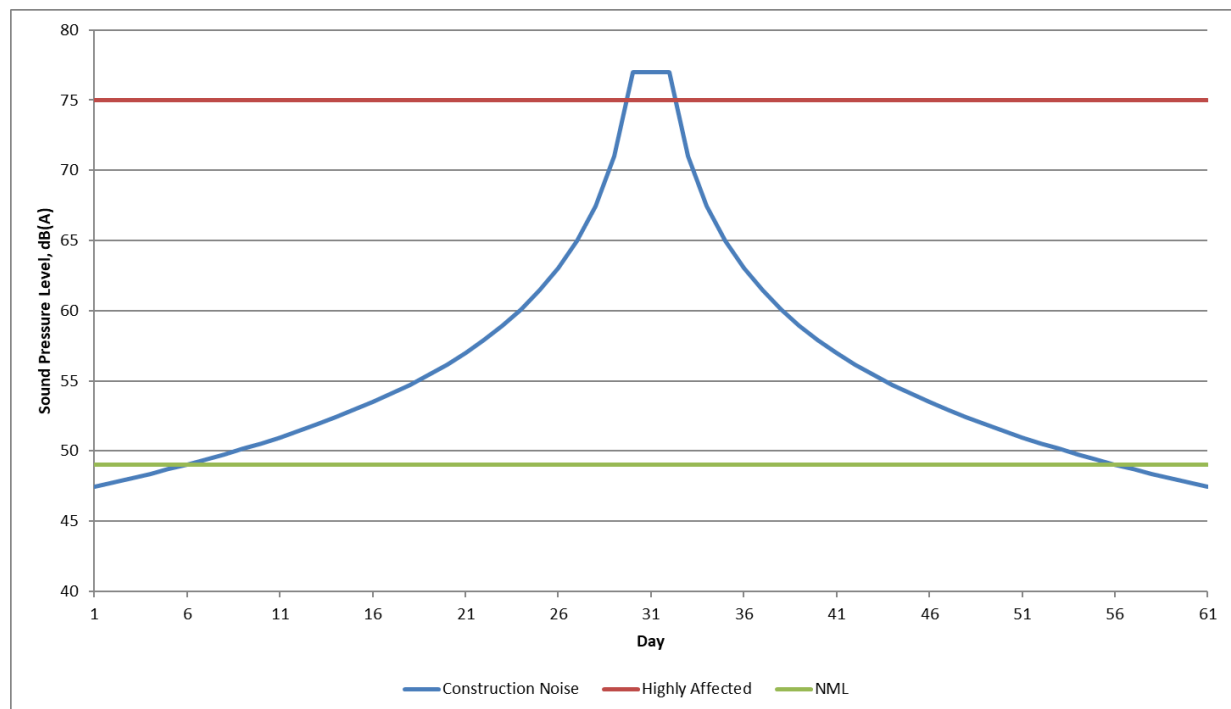


Figure 5-1 Variation in $L_{Aeq(15min)}$ noise level as works progress

Similarly, construction of the river release pipeline is predicted to take about 6 months, however works within the river involving laying of the grout mattress and pipes would likely be undertaken over several weekends only.

5.5 Sleep disturbance assessment

A sleep disturbance assessment was undertaken to assess the potential impact of night-time works on sleep disturbance. Table 5-8 below presents the number of residential properties where predicted noise levels exceed the sleep disturbance criteria and the sleep awakening reaction criteria. The most significant items of plant affecting the predicted noise levels is discussed in section 5.4.1. Construction noise contours for sleep disturbance are presented in Appendix C.

Table 5-8 Number of residential receivers where noise levels exceed the sleep disturbance and awakening reaction criteria

NCA	Sleep disturbance criteria, dB(A)	Awakening reaction criteria, dB(A)	Number of residential properties where predicted noise levels exceed	
			Sleep disturbance criteria	Awakening reaction criteria
Scenario 1: Construction compound operation (Compound C23 only) ¹				
NCA 5 (Silverwater)	60	65	-	-
NCA 6 (Silverwater and Newington)	56		175	65
NCA 7 (Newington)	45		23	-
Scenario 3: Pipeline construction Open trenching				
NCA 1 (Oatlands and Dundas)	49	65	-	-

NCA	Sleep disturbance criteria, dB(A)	Awakening reaction criteria, dB(A)	Number of residential properties where predicted noise levels exceed	
			Sleep disturbance criteria	Awakening reaction criteria
NCA 2 (Dundas and Rydalmere)	51		-	-
NCA 3 (Parramatta and Rosehill)	55		66	1
NCA 4 (Rosehill and Granville)	57		-	-
NCA 5 (Silverwater)	60		102	65
NCA 6 (Silverwater and Newington)	56		30	10
NCA 7 (Newington)	45		162	-
NCA 8 (Wentworth Point)	51		7	-
NCA 9 (Wentworth Point)	53		-	-
NCA 10 (Melrose Park and West Ryde)	47		-	-
NCA 11 (Meadowbank)	45		-	-
NCA 12 (Rhodes)	45		-	-
Scenario 4: Pipeline construction HDD				
NCA 1 (Oatlands and Dundas)	49	65	-	-
NCA 2 (Dundas and Rydalmere)	51		-	-
NCA 3 (Parramatta and Rosehill)	55		6	1
NCA 4 (Rosehill and Granville)	57		-	-
NCA 5 (Silverwater)	60		-	-
NCA 6 (Silverwater and Newington)	56		-	-
NCA 7 (Newington)	45		99	14
NCA 8 (Wentworth Point)	51		1	-
NCA 9 (Wentworth Point)	53		-	-
NCA 10 (Melrose Park and West Ryde)	47		109	-
NCA 11 (Meadowbank)	45		32	-

NCA	Sleep disturbance criteria, dB(A)	Awakening reaction criteria, dB(A)	Number of residential properties where predicted noise levels exceed	
			Sleep disturbance criteria	Awakening reaction criteria
NCA 12 (Rhodes)	45		15	-
Scenario 5: Relining works ²				
NCA 1 (Oatlands and Dundas)	49	65	7	-
NCA 2 (Dundas and Rydalmere)	51		7	2
Scenario 7: Construction of the river release structure ³				
NCA 11 (Meadowbank)	45	65	34	4
NCA 12 (Rhodes)	45		33	-

Notes:

1. NCAs 5, 6 and 7 are the only NCAs within the vicinity of compound C23, which may operate 24 hours; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.
2. NCA 1 and NCA 2 are the only NCAs within the vicinity of the relining works; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.
3. NCA 11 and NCA 12 are the only NCAs in the vicinity of the construction of the river release structure works area; all other NCAs do not have any predicted exceedances and have been omitted from the table for this scenario.

A number of exceedances of the sleep disturbance criteria, particularly in NCA 7 (Newington), have been predicted due to the night-time construction work associated with the Project. Exceedances of the awakening reaction criteria have also been predicted at several receivers in NCAs 5 (Silverwater) and 6 (Silverwater and Newington) and at the Rosehill Racecourse residence. These exceedances are attributed to the close proximity of the construction footprint to residences.

It is noted that the majority of construction activities, including particularly noisy activities, would be undertaken during the day where feasible.

Given the number of sleep disturbance exceedances, particularly due to open trenching works, an effective communication plan and noise management measures must be developed during detailed design to minimise the impacts upon affected residential receivers.

5.6 Construction traffic assessment

5.6.1 WRRF Site

The number of construction heavy vehicle movements for works at the WRRF Site has been estimated to be up to 15 heavy vehicles per hour during the daytime period, and no heavy vehicle movements during the night-time period. Vehicles would access the site via James Ruse Drive, Unwin Street, Grand Avenue, and Colquhoun Street. Construction vehicle arrival and departure routes are shown in Figure 5-2 and Figure 5-3 below.



Figure 5-2 Construction vehicle arrival routes



Figure 5-3 Construction vehicle departure routes

James Ruse Drive and Unwin Street have been considered in the construction traffic assessment as they are potential access routes to the WRRF with noise sensitive receivers (residential receivers and horse stables). The existing traffic flow on James Ruse Drive and Unwin Street is substantially greater than the proposed construction traffic numbers. Table 5-9 presents indicative noise levels at residential receivers on James Ruse Drive and at the Rosehill Gardens Racecourse stables due to existing road traffic and the predicted noise levels due to additional construction traffic.

Table 5-9 Existing road traffic noise levels and predicted road traffic noise levels including construction traffic during standard hours

Road	Existing noise level, dB(A)	Predicted noise level, dB(A)	Change in noise level, dB(A)	Change in noise level greater than 2 dB(A)?
Residential receivers on James Ruse Drive				
James Ruse Drive, Rosehill	72	72	0.0	No

Road	Existing noise level, dB(A)	Predicted noise level, dB(A)	Change in noise level, dB(A)	Change in noise level greater than 2 dB(A)?
Rosehill Gardens Racecourse stables				
James Ruse Drive, Rosehill	66	66	0.0	No
Unwin Street, Rosehill	68	68	0.1	No

As shown in Table 5-9, the additional construction traffic on James Ruse Drive and Unwin Street would have negligible impact on existing road traffic noise levels at residential receivers and the horse stables, where traffic noise levels are not expected to increase by more than 2 dB(A) during construction.

5.6.2 Wider Project area

For works associated with the influent, brine and river release pipelines across the wider Project area, the number of construction heavy vehicle movements has been estimated to be an average of 20 heavy vehicles across a 24-hour period.

For the wastewater transfer pipeline from the CPS to the WRRF vehicles would access the pipeline construction areas via Grand Avenue and James Ruse Drive. There are residential receivers along James Ruse Drive, however as this road is considered a major road with high existing traffic volumes, the additional construction traffic volumes are considered to have little to no impact (less than 2 dB(A) increase) on existing traffic noise levels at residential receivers.

For the brine pipeline from the WRRF to the NSOOS vehicles would access the pipeline construction areas via Kissing Point Road, Rippon Avenue and Railway Street. There are residential receivers along all three of these roads, however additional construction traffic volumes are unlikely to increase existing traffic noise levels at residential receivers by more than 2 dB(A).

For the river release pipeline from the WRRF to the Parramatta River vehicles would access the pipeline construction areas via Silverwater Road, Carnarvon Street, Derby Street, Day Street, Holker Street, Comaneci Avenue, Avenue of Oceania, Hill Road, Meadow Crescent and Adelaide Street. There are residential receivers along many of these roads, however additional construction traffic volumes are unlikely to increase existing traffic noise levels at residential receivers by more than 2 dB(A).

Truck drivers will be advised of designated vehicle routes, parking locations and acceptable delivery hours to minimise the use of engine brakes and avoid extended periods of engine idling (refer to section 5.9.2).

5.7 Construction vibration assessment

Vibration intensive works may include the use of vibratory rollers, small hydraulic hammers or bored piling rigs during construction of the Project. The minimum working distances of these items of equipment from off-site receivers are shown in Table 5-10, which is based on recommendations from the Transport for NSW *Construction Noise and Vibration Guideline (Roads)* (CNVG-R). If these minimum working distances are complied with, no adverse impacts from intensive works are likely in terms of cosmetic damage or human response. If works are undertaken within the minimum working distances measurements of vibration intensive plant may be required (as described below and in section 5.9.2). The minimum working distances from the CNVG-R have been determined as a practical guide to compliance with the vibration limits discussed in section 3.3. The use of minimum working distances was an effective vibration control measure for the Upper South Creek Advanced Water Recycling Centre and Pipelines project.

Table 5-10 Minimum working distances of vibration intensive equipment to be used during the Project

Plant	Rating/ description	Cosmetic damage		Human response
		Residential/ commercial	Heritage and other sensitive structures	
Vibratory roller	< 50 kN (typically 1-2t)	5 m	14 m	15 m
	< 100 kN (typically 2-4t)	6 m	16 m	20 m
	< 200 kN (typically 4-6t)	12 m	33 m	40 m
	< 300 kN (typically 7-13t)	15 m	41 m	100 m
	> 300 kN (typically 13-18t)	20 m	54 m	100 m
	> 300 kN (> 18 t)	25 m	68 m	100 m
Small hydraulic hammer	300 kg – 5 to 12T excavator	2 m	5 m	7 m
Pile boring and directional drilling	≤ 800 m	2 m (nominal)	40 m	4 m

The heritage items identified in Section 2.2.3 and their nearest distances to the Project area are presented below in Table 5-11. For further information please refer to the Non-indigenous Heritage report (Statement of Heritage Impact, Greater Parramatta Olympic Peninsula Water Cycle Management Project, EMM, 2025).

Table 5-11 Distance of heritage items to Project area

Heritage item	Register (ID)	Distance to Project area (m)	Comments	Likelihood of impact
Dundas Railway Station Group	Parramatta LEP (I054) SHR (01133)	60	Works in this area are to reline existing pipeline; minimal vibration is anticipated. Vibratory rollers sized 13t or lower are to be used in vicinity of this item.	Unlikely to be impacted.
WSU Parramatta Campus (formerly Rydalmere Hospital Precinct)	Parramatta LEP (I6661) SHR (00749)	0	While works intercept the curtilage, the heritage item is located further than 100 m from the Project area.	Unlikely to be impacted.

Heritage item	Register (ID)	Distance to Project area (m)	Comments	Likelihood of impact
Clyde Carlingford Rail Bridge abutments	Parramatta LEP (I008 and I695)	15	Works in this area are to reline existing pipeline; minimal vibration is anticipated. Vibratory rollers sized 1-2t are to be used in vicinity of this item.	Unlikely to be impacted.
Grave of Eliner Magee & child	Parramatta LEP (I007)	25	Works in this area are to reline existing pipeline; minimal vibration is anticipated. Vibratory rollers sized 4t or lower are to be used in vicinity of this item.	Unlikely to be impacted.
Sewage Pumping Station 67 (Camelia pumping station, part of the Project)	Parramatta LEP (I009) SHR (01643)	0	Part of the Project. Vibration associated with works are unlikely to impact heritage brick superstructure.	Unlikely to be impacted.
Capral Aluminium	Parramatta LEP (I677)	105	Outside area of vibration impact.	No impacts.
Lower Duck River Wetlands	Parramatta LEP (I702)	67	Outside area of vibration impact.	No impacts.
Wetlands	Parramatta LEP (I011)	0	Part of the Project. This section is to be trenchless and vibration is unlikely to impact the wetlands.	Unlikely to be impacted.
Ernest Fleming Pty Ltd, machinery merchants	Parramatta LEP (I703)	30	Vibratory rollers sized 4t or lower are to be used in vicinity of this item.	Unlikely to be impacted.
Explosives Store	Parramatta LEP (I291)	55	Trenchless works proposed in the vicinity of this item.	Unlikely to be impacted.
Newington Armament Depot and Nature Reserve	SHR (01850)	66	Vibratory rollers sized 18t or lower are to be used in vicinity of this item.	Unlikely to be impacted.
Memorial Park (including obelisk) and remnants of former Meadowbank baths	Parramatta LEP (I072)	0	While works are within the curtilage, the item of significance is located over 40 m from the Project area. Vibratory rollers sized 7t or lower are to be used in vicinity of this item.	Unlikely to be impacted.

Heritage item	Register (ID)	Distance to Project area (m)	Comments	Likelihood of impact
Meadowbank rail bridge over Parramatta River	Ryde LEP (I056) SHR (01189)	20	Works in this area are to sink the river release outlet, which requires minimal use of vibration generating equipment. Vibratory rollers sized 4t or lower are to be used in vicinity of this item.	Unlikely to be impacted.

All of the heritage items detailed in Section 2.2 except for the Capral Aluminium building may fall within the minimum working distances listed in Table 5-10 above, depending on the vibration intensive equipment. The CPS is part of the Project and vibration works are unlikely to affect the heritage structure. Where works are proposed to be undertaken within the minimum working distances, then the selection of smaller plant/equipment is recommended. Where the selection of small plant/equipment is not feasible or reasonable attended vibration monitoring to determine site-specific minimum working distances, would be completed. For any structures still within the site-specific minimum working distance the following is recommended:

- conditions surveys before and after vibration intensive works; and
- vibration monitoring during vibration intensive activities. The vibration monitor should notify the work supervisor when measured vibration levels are approaching or exceed the vibration criteria.

There may also be vibration impacts from open trenching works at RØDE, located at 107 Carnarvon Street, Silverwater. It is recommended consultation is undertaken to determine when vibration intensive works can be undertaken to minimise disruption to manufacturing activities.

5.8 Cumulative construction impacts

Simultaneous noise from construction works on other developments has the potential to increase noise levels at nearby sensitive receivers.

Details of projects in close proximity to the Project are shown in Table 5-12.

The projects likely to have the most significant impact on cumulative construction noise levels are:

- Sydney Metro West Stage 3 – Rail infrastructure, stations, precincts and operations
- Parramatta Light Rail Stage 2.

There is some overlap in the construction footprints between the Project and Sydney Metro West Stage 3 works near the WRRF site, between the Project and Parramatta Light Rail Stage 2 where the brine pipeline extends from the CPS to the NSOOS connection, and near the end of the river release pipeline at Wentworth Point. The pipeline construction works for the Project in Silverwater are considered to be the most impactful works on receivers. The footprint for these works is located outside of the construction footprints for Sydney Metro West and Parramatta Light Rail Stage 2 and construction noise from these concurrent developments are unlikely to increase noise levels at the most affected receivers near the pipeline construction works (receivers in NCAs 5-7). The receivers most impacted by construction noise from the Sydney Metro West works (Sydney Metro West Technical Paper 4 March 2022) are adjacent to James Ruse Drive south of Prospect Street. These receivers are in NCA4 (Rosehill and Granville) in section 5.4 of this report. The Project is not predicted to significantly affect receivers in NCA4 so cumulative impacts due to the Project and Sydney Metro West are expected to be minimal.

There may be some cumulative construction traffic noise impacts with the Sydney Metro West works. The Sydney Metro West Stage 1 construction works are using Wentworth Street and Unwin Street which will also be used by the Project. It is expected that the Sydney Metro West Stage 1 earthworks

and tunnelling works will be completed prior to the Project works starting. Peak construction of Sydney Metro West Stage 3 is likely to coincide with Project construction. As a result, there will likely be significant construction vehicle movements at Camellia-Rosehill from Stage 3. The predicted increase on Wentworth Street due to Stage 3 construction traffic is 3 dB during the day (Sydney Metro West Technical Paper 4 – Construction Noise and Vibration, SLR, 2022). As shown in Table 5-9, the predicted increase in traffic noise at the Rosehill Racecourse horse stables from the additional construction vehicles for this Project is 0.1 dB, which would have a negligible contribution to the construction traffic noise impacts from Sydney Metro West Stage 3 construction.

Table 5-12 Developments in close proximity to the Project

Name	Location	Distance from project	Construction timeframe	Construction hours	Noise impacts
Parramatta Light Rail Stage 2	Various lots – East of Rosehill Racecourse	Overlaps with the project	5 to 6 years commencing in 2025	Standard construction hours & Saturday afternoons. However, 24/7 work in Camellia	Potential for cumulative impacts.
Sydney Metro West – Rail infrastructure, stations, precincts and operations	Various lots including Clyde Stabling depot (Unwin Street)	<1km	8 years. Construction for this project was expected to commence in 2024	Underground work – 24 hours per day. Most above ground construction work would be undertaken during daytime hours.	Stage 3 of the Metro West works are most likely to overlap with the Project. Stage 3 works include Rail infrastructure, stations, precincts and operations. These works are less impactful than the bulk earthworks undertaken in earlier stages.
Duck River Nature Trail	Various lots	Overlaps with the project	March 2025 to 2028	Duck River Nature Trail	Most works on the Nature Trail are expected to be finished before the Project commences, and would occur away from residential receivers affected by the Project. Significant cumulative impacts are unlikely. When the Nature Trail is complete, users of the trail may become noise receivers

Name	Location	Distance from project	Construction timeframe	Construction hours	Noise impacts
					of the Project – this has been considered in the assessment.
Hill Road Upgrade Project	Hill Road from Wentworth Point to Lidcombe, between Burroway Road to Haslams Marker (John Ian Wing Parade)	Overlaps with the project	Q4 2026 to Q2 2028	TBC	TBC
Meadowbank Bridge Remediation	Meadowbank Bridge (John Whitton Bridge)	Overlaps with the project	Q2 2024 to Q4 2024	7am to 3pm (Monday to Friday)	No cumulative noise impacts are expected as remediation works will be complete prior to the commencement of the Project.
WSU Indigenous Centre of Excellence	171 Victoria Road, Parramatta	0.14 km (directly adjacent to compound access route)	Q1 2025 and completed by 2026	7am to 6pm (Monday to Friday)	Construction is expected to be complete by 2026. Significant cumulative impacts unlikely.

In the cases where noisy construction activities may occur at the same time in close proximity to each other, it is possible that predicted noise levels may increase by up to 3 dB(A). It should be noted that where a receiver is affected by noise from two concurrent projects, it is likely that noise levels from one would be dominant, and therefore overall noise levels would increase only slightly, if at all.

The implementation of noise management measures described in Section 5.9 would help ensure that the potential for adverse impacts at sensitive receivers is minimised.

5.8.1 Construction fatigue

Where several projects occur in the same area consecutively, there may be a combined effect due to the increased duration of impacts on nearby receivers. This effect is termed 'construction fatigue'.

There is potential for construction noise fatigue for receivers which will be affected by projects listed in Table 5-12 and the Project due to the increased duration of the construction period.

Receivers which are affected by the Sydney Metro West project would be potentially affected from 2025 until 2033. The Project is likely to be completed within this timeframe and therefore would not lead to an increased duration, in addition the Sydney Metro West project would affect largely different receivers to the Project.

A number of receivers near Meadowbank Park likely to be affected by the Project may also be affected by Parramatta Light Rail Stage 2 (PRL Stg 2) works. It should be noted however that the most noise intensive phase of works (bridge piling) which would affect common receivers, would occur for approximately 19 weeks during phase 1 of the PRL Stg 2 works. These works are likely to be complete before the Project commences, and therefore these receivers may have a period of respite.

Construction fatigue would predominantly be managed through discussions with the affected community and the establishment of a Fatigue Management Plan. Where practicable respite would be provided and the total duration of works would be minimised as far as practicable.

5.9 Construction mitigation measures

The following sections describe recommended noise and vibration mitigation measures.

5.9.1 Effective measures from previous Sydney Water projects

Mitigation measures which Sydney Water has found effective on previous similar projects (such as Upper South Creek Advanced Water Recycling Centre project and Sydney Metro West Stage 1) include the following:

- position noise-generating activities away from people nearby, where practicable
- ensure plant and equipment is in good working order and compliant with manufacturer's requirements
- use quieter and less noise/vibration emitting construction methods where feasible
- power down any equipment not in use
- induct workers on how to reduce noise and vibration impacts
- implement minimum working distances for vibration-intensive equipment
- monitor noise and vibration at key locations to quantify impacts and nominate where site-specific management measures are required
- provide the community with information of construction activities, potential impacts and mitigations
- coordinate with other projects nearby to reduce impacts.

5.9.2 Construction Environment Management Plan

The Construction Environment Management Plan (CEMP) should include all reasonable and feasible safeguards to manage the noise emissions from the site and any complaints which may occur due to construction noise. It is recommended that the CEMP incorporate the following:

- identification of nearby residences and other sensitive land uses
- description of approved hours of work
- description and identification of all construction activities, including nature of works, expected noise impacts, work areas, equipment, duration, complaints handling and contact details
- the location of temporary noise barriers where feasible and reasonable
- determine need for, and appropriate timing of respite periods (e.g. times identified by the community that are sensitive to noise such as early-morning or evening for works near residences)
- description of what work practices (generic and specific) would be applied to minimise noise and vibration
- a complaints handling process
- noise and vibration monitoring procedures, including for heritage structures
- overview of community consultation required for identified high impact works.

Consultation has been undertaken with:

- affected premises in Silverwater and Newington
- the City of Ryde Council regarding Meadowbank Park, and
- NSW Maritime regarding works in the river.

Feedback from this consultation has been included in the design and the construction methodology. Examples include general preference of businesses in Carnarvon Street in Silverwater for night-time works. However, further consultation will be undertaken prior to construction as the CEMP is developed.

Based on information gathered from best practice, previous projects, community consultation and Sydney Water Environmental Mitigation Measures. Table 5-13 presents the project specific mitigation measures which should be considered as part of the CEMP. The measures included in Table 5-13 are best practice and have been developed with regard to similar measures across other large infrastructure projects such as the Upper South Creek Advanced Water Recycling Centre and Sydney Metro West.

Table 5-13 Recommended construction mitigation measures

Action required	Safeguard details
Management measures	
Construction Noise and Vibration Management Plan	Prepare a Construction Noise and Vibration Management Plan (CNVMP) as part of the project's CEMP. This will include: • roles and responsibilities • noise sensitive receiver locations • standard working hours and out-of-hours work (OOHW) processes • reasonable and feasible management measures (including respite consideration) • monitoring methodology • community engagement.
Behavioural practices and use of plant	Regularly train workers and contractors (such as toolbox talks) to use equipment in ways to minimise noise, including: • site managers to periodically check the site and nearby residences for noise problems so that solutions can be quickly applied • avoid the overuse of radios or stereos outdoors. When in use outdoors, maintain at respectful volumes • avoid the overuse of public address systems • avoid shouting and minimise talking loudly and slamming vehicle doors • turn off all plant and equipment when not in use • maintain and monitor equipment to ensure proper and efficient operation • aligning with Sydney Water's Noise Management Code of Behaviour (SWEMS0056.01).
Source controls	
Equipment selection	Select equipment to minimise noise emissions. For example: • select equipment with lower noise emissions than alternative equipment • use electric/hydraulic equipment where possible • use the minimum size and power requirement to complete a task

Action required	Safeguard details
Placement of construction equipment	Arrange construction equipment to minimise noise to any nearby sensitive receivers. For example: • maximise the distance between noisy plant and any adjacent sensitive noisy receivers, including directing noise emitting plant away from sensitive receivers • Throttle down or shut down equipment when not in use • Where possible, shield or enclose stationary noise sources whilst maintaining worker safety • Where possible, place structures or hoarding/noise curtains at particularly noisy compounds to shield residential receivers where possible, e.g. compounds where trenchless works will be undertaken for particularly long durations.
Use of construction vehicle reverse beepers	Implement and use non-tonal reversing beepers (or an equivalent mechanism) on all construction vehicles and mobile plant, where possible. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
Path controls	
Shield stationary noise sources such as pumps, compressors, fans etc.	Stationary noise sources will be enclosed or shielded to the greatest extent possible whilst ensuring that the occupational health and safety of workers is maintained.
Construction compound hoarding	Structures will be used to shield residential receivers from noise such as use of hoarding/noise curtains, where practicable, at construction compounds, particularly at compounds where HDD and trenching works will be taking place for long durations, such as the compounds in Meadowbank Park and Pierre De Coubertin Park.
Community engagement	
Community engagement	Develop and implement a Community and Stakeholder Engagement Plan (CSEP) that will outline the following engagement activities: • ongoing consultation with landowners, stakeholders, local councils, businesses and other government agencies • notification of construction impacts to local areas and how these will be managed • project updates to nearby communities, including information on positive impacts and long-term project benefits • process for community complaints and response management system • a dedicated 1800 toll free number for enquiries • a dedicated email address and website for the project • resident notifications regarding: - start of construction - significant milestones - major detours, traffic disruptions and controls - after hours work • communication of key messages in a range of languages • vehicle management signs to communicate traffic changes to road users and communicate traffic management plans. For affected sensitive non-residential receivers (such as childcare centres, places of worship and businesses) specific community engagement should be undertaken to understand noise sensitive times to avoid high noise generating works during sensitive periods or inclusion of respite periods.

Action required	Safeguard details
OOHW	For works required outside of standard hours, undertake particularly noisy work at the start of the shift where possible. Provide appropriate respite to affected receivers in accordance with the <i>Interim Construction Noise Guideline</i> (ICNG).
Sleep disturbance of sensitive receivers from OOHW	Consult with residents that will be impacted by OOHW about measures to manage impacts in accordance with the ICNG.
Vibration	
Vibration generating equipment	Investigate opportunities for using alternatives to vibration generating equipment where vibration impacts have the potential to occur.
Condition survey	Complete dilapidation and condition surveys on infrastructure and structures at risk from being damaged by vibration during construction, including heritage items.
Vibration monitoring	Undertake in-situ vibration monitoring to confirm vibration levels and assess potential impacts where minimum vibration impact distances cannot be achieved. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional management measures will be identified and implemented to appropriately manage impacts.

5.9.3 The effectiveness and implementation of mitigation measures

The table below provides an indication of the effectiveness of the proposed noise mitigation measures.

Table 5-14 Effectiveness of construction mitigation measures

Mitigation measure	Nominal noise reduction
Screening, location of site sheds, construction compound boundary fencing	5-10 dB nominal noise reduction
Good site layouts/distance	About 6 dB per each doubling of distance
Construction scheduling	Provision of periods of respite
Selection of appropriate equipment and good maintenance Substitution of equipment e.g. rubber wheeled excavators	5-15 dB nominal noise reduction
Monitoring	Confirmation construction noise predictions, identification of unnecessarily noisy pieces of equipment or methodology and alternative/additional methods of mitigation.
Community consultation/notification	Construction would not occur unexpectedly. Residents can plan to minimise disruption. Residents would be aware of the complaint management process.

The community can expect Sydney Water and the Contractor to implement all feasible and reasonable noise mitigation measures for the duration of all stages of construction works and have ongoing consultation with the community as the proposal progresses. Community consultation will continue to be undertaken with affected receivers and the outcome of this will feed into the preparation of the CEMP.

Factors which may affect the implementation of generic mitigation measures include the following:

- Where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm
- Works that would need to be undertaken outside of normal and extended construction hours to ensure road safety, minimise disruption to regional and local traffic flows and/or for technical and timetabling reasons
- Outcomes of community consultation.

5.9.4 Residual noise impacts

Following the implementation of the mitigation measures detailed in Section 5.9.2 and considering Section 5.9.1 above, it is likely that residual noise levels may reduce by up to 10 dB than those presented in Section 5.4. This would have the impact of reducing the intrusiveness of construction noise for receivers. Specific community engagement may also help reduce noise impacts at certain receivers, including affected commercial receivers, schools, childcare centres and places of worship, by informing the scheduling of works outside of noise-sensitive times, such as exam periods, child rest times and worship services.

6.0 Operational noise

6.1 Noise modelling

In consultation with Sydney Water a noise model has been prepared for the WRRF using SoundPLAN Version 8.2. SoundPLAN is an industry accepted environmental noise modelling software. The model is based on the following information.

6.1.1 Modelling parameters

The operational noise model has been based upon the 1 metre Digital Elevation Model provided by the NSW Government – Spatial Services (Elevation and Depth - Foundation Spatial Data - Sydney 2019 Digital Elevation Models). Ground has been modelled with a ground absorption of 0.75.

Buildings have been incorporated into the model as follows:

- Existing buildings beyond the site boundaries including industrial, commercial and residential buildings (obtained from digital survey information and/or digitisation of aerial photography)
- Proposed buildings within the site boundary.

The modelling has considered the following meteorological conditions:

- Neutral weather conditions – 0.5 m/s winds and D class stability
- Adverse weather conditions – 3 m/s winds in the worst case direction and D class stability (night and evening only) or temperature inversion – 2 m/s winds and F class stability (night only).

Noise emissions from the operation of the WRRF have been modelled using an implementation of the CONCAWE propagation algorithm for the second phase.

6.2 Noise sources

The noise sources to be included in the noise model are discussed below.

6.2.1 Noise model sound pressure levels –noise sources

The equipment included in the CPS and WRRF are provided below in Table 6-1 and Table 6-2. Operation of the CPS and WRRF are assumed to be the same during the day and the night.

Table 6-1 Existing and proposed equipment and sound power levels – CPS

Description	Number of	Rated power, kW	Operational time	Sound power level, L_{Aeq} dB(A)
Pumps (5 existing pumps to be replaced)	3 Duty, 2 standby	400	Day and Night	91
Air blowers ¹	2	-	Day and Night	< 85
Variable Speed Drives	3 Duty, 2 standby	-	Day and Night	< 81

Notes:

- Air blowers are located within a concrete pit with a steel lid.

Table 6-2 Proposed equipment and sound power levels –WRRF

Description	Number of	Rated power, kW	Operational time	Sound power level, L_{Aeq} dB(A)
Primary sludge pump 3	1	11	Day and Night	79
Membrane Bioreactor 9-12 filtrate pumps	5	75	Day and Night	88
Membrane Bioreactor blower 5 & 6	2	150	Day and Night	97

Description	Number of	Rated power, kW	Operational time	Sound power level, L_{Aeq} dB(A)
Membrane Bioreactor backpulse pump 3	1	75	Day and Night	88
Bioreactor 3 waste-activated sludge pump 1	1	8.8	Day and Night	78
Bioreactor blower 4 & 5	2	315	Day and Night	97
Digester 3 sludge transfer pump 1	1	5.5	Day and Night	76
Digester 3 membrane air support fan 1	1	0.37	Day and Night	85
Biogas blower 3	1	1.8	Day and Night	87
Hot water pump 3	1	5.5	Day and Night	76
Digester 3 sludge mixing pump 1 (Stage 2)	1	150	Day and Night	93
PS RDT feed pump 3	1	15	Day and Night	81
Thickened waste-activated sludge pump 3	1	7.5	Day and Night	78
Thickened PS pump 3	1	7.5	Day and Night	78
Centrifuge feed pump 3	1	18.5	Day and Night	82
Dewatering centrifuge 3 (Stage 2)	1	N/A	Day and Night	100
Biosolids collection conveyor 2	1	7.5	Day and Night	93
Biosolids silo 1 slide frame	1	N/A	Day and Night	93
Digester 3 (Primary) sludge heating pump 1	1	18.5	Day and Night	82
Hot water heater 3 blower (Stage 2)	1	1.5	Day and Night	87
Biotrickling Filter 8-10 recirculation pump 1	3	7.5	Day and Night	78
Foul air fan 4	1	90	Day and Night	92
Scrubber 3 recirculation pump 1	1	55	Day and Night	86
River release pump 3	1	270	Day and Night	93
Purified recycled water pumping station building fan	3	3.7	Day and Night	90
Purified recycled water pump 1	1	1,150	Day and Night	95
River release pump 4 & 5	2	45	Day and Night	86
Reverse Osmosis LP pump 4	1	132	Day and Night	92
Reverse Osmosis train 6-8 HP pump	3	315	Day and Night	93
Ultra-filtration feed pump 4	1	185	Day and Night	93
Ultra-filtration CIP pump 1 & 3	2	22	Day and Night	82
Purified recycled water breakpoint chlorination tank fan	1	1.1	Day and Night	85
Purified recycled water chemical dosing mixing pump 1	1	7.5	Day and Night	78

6.3 Site operational noise

Based on the assumptions, modelling parameters and noise attenuation measures as set out in the previous sections, the typical operational noise levels were predicted at the receiver most likely to be affected. The operational noise levels were predicted under neutral and adverse meteorological conditions. The noise levels from the CPS are presented in Table 6-3. The results of the modelling of the proposed WRRF and upgraded pumping station are presented in Table 6-4. It is noted that while a single night-time operational scenario has been assessed it is representative of the likely worst case. No other areas of the Project would generate operational noise.

An assessment of the resultant noise levels at receivers for tonality and low frequency noise indicated that no corrections were required to be applied in accordance with the *Noise Policy for Industry*.

The results are presented at the worst affected receivers. Noise contour plots for normal operational scenarios are presented in Appendix D for the night-time periods for neutral and adverse weather conditions (wind 3 m/s source to receiver or an F class inversion).

Table 6-4 presents the predicted noise levels from the operation of the proposed WRRF and upgraded CPS in comparison with the *Noise Policy for Industry* criteria. It can be seen that during the night-time the L_{Aeq} levels do not exceed the trigger levels at the WRRF. At the proposed Camellia Town Centre to the north of the CPS, noise levels are predicted to exceed the criteria by up to 8 dB(A) under adverse weather conditions at the boundary between the proposed Camellia Town Centre and the CPS. This is not a discernible change from the existing operational noise levels at the CPS. At approximately 50 metres into the proposed Camellia Town Centre from the shared boundary, noise levels are expected to comply with the criteria. Noise levels also comply with the criteria at the residential property associated with Rosehill Racecourse.

At the time of writing the Camellia-Rosehill Place Strategy (NSW Department of Planning and Environment, 2022) has been finalised however the land has not yet been rezoned, and the layout of the proposed Camellia Town Centre is not known. Predicted noise levels from the CPS at the boundary of the pumping station and the proposed Camellia Town Centre are expected to be below the existing traffic noise from James Ruse Drive ($L_{Aeq,1hr}$ 55-57 dB(A)). In addition, noise levels at the pumping station are not predicted to increase above current operational noise levels. At this stage treatment to reduce noise from the CPS is not recommended, however if in the future treatment is required recommendations are provided in section 6.3.2.

Camellia-Rosehill Place Strategy - Noise and Vibration Implementation Report (NVIR) (July 2022) presents predicted noise levels from Industrial, Road and Rail sources from within the precinct. The NVIR predicts noise levels from all these sources combined of typically 60 dB(A) or higher at the most affected residential receivers and affected areas of the Proposed Camellia Town Centre. As shown in Table 6-3 and Table 6-4 noise levels from the Pumping Station and The Project are not predicted to exceed 51 dB(A). It is therefore unlikely that the Pumping Station or The Project will significantly contribute to overall noise levels at the nearest affected noise sensitive receivers.

Table 6-3 Existing operational noise levels due to the CPS

Location	Distance from CPS (m)	Sound pressure level, L _{Aeq} dB(A)		
		Existing	Criteria	Exceedance
Night time Neutral weather				
Proposed Camellia Town Centre – North of CPS	25	50	43	7
Proposed Camellia Town Centre – East of CPS	100	40	43	-
Rosehill Racecourse House	80	42	43	-
Night time Adverse weather				
Proposed Camellia Town Centre – North of CPS	25	51	43	8

Location	Distance from CPS (m)	Sound pressure level, L_{Aeq} dB(A)		
		Existing	Criteria	Exceedance
Proposed Camellia Town Centre – East of CPS	100	41	43	-
Rosehill Racecourse House	80	43	43	-

Table 6-4 Predicted operational noise levels due to the Project (WRRF and CPS)

Location	Distance from Project (m)	Sound pressure level, L _{Aeq} dB(A)		
		Future	Criteria	Exceedance
Night time Neutral weather				
51 Penelope Lucas Lane, Rosehill	860	36	43	-
105 Asquith Street, Silverwater	470	36	43	-
Proposed Camellia Entertainment and Residential	730	36	43	-
Proposed Camellia Town Centre – North of WRRF	650	33	43	-
Camellia Investigation Site for Educational Facilities	530	37	48	
Proposed Camellia Town Centre – North of CPS	25	50	43	7
Proposed Camellia Town Centre – East of CPS	100	40	43	-
Rosehill Racecourse House	80	42	43	-
Night time Adverse weather				
51 Penelope Lucas Lane, Rosehill	860	39	43	-
105 Asquith Street, Silverwater	470	39	43	-
Proposed Camellia Entertainment and Residential	730	39	43	-
Proposed Camellia Town Centre	650	36	43	-
Camellia Investigation Site for Educational Facilities	530	40	48	-
Proposed Camellia Town Centre – North of CPS	25	51	43	8
Proposed Camellia Town Centre – East of CPS	100	41	43	-
Rosehill Racecourse House	80	43	43	-

6.3.1 Sleep disturbance results

The sleep disturbance noise levels associated with the typical operation of the proposed WRRF and the upgraded CPS were predicted at nearby receivers under calm meteorological conditions and worst-case weather conditions. The results are presented in Table 6-5 and Table 6-6. It can be seen the L_{Amax} and L_{Aeq} levels from the operation of the facility comply with the project sleep disturbance criterion.

Table 6-5 Predicted night-time L_{Amax} operational noise levels and sleep disturbance criteria

Weather conditions	Distance from WRRF (m)	Sound pressure level, L _{Amax} dB(A)		
		Future	Criterion	Exceedance
Night time Neutral weather				
51 Penelope Lucas Lane, Rosehill	860	36	57	-
105 Asquith Street, Silverwater	470	36	60	-
Proposed Camellia Entertainment and Residential	730	36	57	-
Proposed Camellia Town Centre	650	33	55	-
Proposed Camellia Town Centre – North of CPS	25	50	55	-
Proposed Camellia Town Centre – East of CPS	100	40	55	-
Night time Adverse weather				
51 Penelope Lucas Lane, Rosehill	860	39	57	-
105 Asquith Street, Silverwater	470	39	60	-
Proposed Camellia Entertainment and Residential	730	39	57	-
Proposed Camellia Town Centre	650	36	55	-
Proposed Camellia Town Centre – North of CPS	25	50	55	-
Proposed Camellia Town Centre – East of CPS	100	40	55	-

Table 6-6 Predicted night-time L_{Aeq} operational noise levels and sleep disturbance criteria

Weather conditions	Distance from WRRF (m)	Sound pressure level, L _{Aeq} dB(A)		
		Future	Criterion	Exceedance
Night time Neutral weather				
51 Penelope Lucas Lane, Rosehill	860	36	47	-
105 Asquith Street, Silverwater	470	36	50	-
Proposed Camellia Entertainment and Residential	730	36	47	-
Proposed Camellia Town Centre	650	33	45	-
Proposed Camellia Town Centre – North of CPS	25	50	45	-
Proposed Camellia Town Centre – East of CPS	100	40	45	-
Night time Adverse weather				
51 Penelope Lucas Lane, Rosehill	860	39	47	-
105 Asquith Street, Silverwater	470	39	50	-
Proposed Camellia Entertainment and Residential	730	39	47	-
Proposed Camellia Town Centre	650	36	45	-
Proposed Camellia Town Centre – North of CPS	25	51	45	6
Proposed Camellia Town Centre – East of CPS	100	41	45	-

6.3.2 Discussion

Operational noise from the Project is not expected to exceed the project noise trigger levels at nearby sensitive receivers, and no significant exceedances of the sleep disturbance criteria are predicted as a result of the Project, with the exception of the proposed Camellia Town Centre to the north of the CPS.

It should be noted that the layout of the proposed Camelia Town Centre is not yet known however if the exceedance at the town centre is required to be reduced to zero the following noise control measures are recommended:

- Replacing the roller door on the western side of the CPS with an acoustic roller door. This door should have a minimum R_w of 18 dB
- Keep the windows on the western and northern sides of the CPS closed.

6.4 Operational traffic

Once operational the Project is expected to include light vehicle movements and truck movements for biosolids, screening and grit removal and deliveries. In total there will be up to 14 light vehicle movements and 10 truck movements per day at the WRRF. The existing traffic flow on Unwin and Colquhoun Streets is substantially greater than the proposed operational traffic numbers. Therefore, the traffic would have a minor impact on existing road traffic noise in these roads, where traffic noise levels are not expected to increase by more than 2 dB(A) during operation. Operational traffic to the CPS is expected to be minimal (less than 1 per day).

7.0 Conclusion

A construction and operation noise and vibration impact assessment has been completed for the proposed Sydney Water WRRF at Camellia-Rosehill and its associated infrastructure. Nearby noise and vibration sensitive receivers were identified. Attended and unattended noise measurements were completed to characterise the existing noise environment. The measured levels were used to establish construction noise management levels.

The construction works are expected to be undertaken during standard working hours where feasible and reasonable, with some out-of-hours work potentially required for certain construction works. Proposed construction equipment and plant have been identified in consultation with Sydney Water and detailed within this report. Construction noise impacts from seven worst-case construction scenarios were assessed at all nearby residential and other noise sensitive receivers.

The construction noise levels were predicted to exceed the construction noise management levels for all assessed scenarios except for Scenario 2, Construction of the WRRF and Scenario 6, Works at CPS. The largest number of exceedances were predicted within NCA 7 (Newington) during Scenario 1, Construction compound operation for standard hours and during Scenario 3, Pipeline construction – Open trenching for night-time works.

A number of exceedances of the sleep disturbance criteria, particularly within NCA 7 (Newington), were predicted due to night-time construction works. Exceedances of the awakening reaction criteria were also predicted at receivers in NCAs 5 (Silverwater) and 6 (Silverwater and Newington).

Four non-residential noise sensitive receivers were predicted to experience noise management level exceedances greater than 20 dB(A) during their hours of use due to Project construction works, including West Ryde Netball Club, two buildings associated with Sydney Korean Catholic Church, and Western Sydney University Early Learning Parramatta.

Despite the exceedances of the construction noise management levels, construction noise can be managed through careful implementation of standard mitigation and management measures.

Construction traffic noise was not predicted to increase road traffic noise by more than 2 dB(A) at residential receivers on haulage routes proposed for the construction of the Project, including James Ruse Drive and Parramatta Road, and at the horse stables on Unwin Street.

Minimum working distances have been provided that allow for compliance with the construction vibration criteria. Some works may potentially occur within the minimum working distances and mitigation measures to control excessive vibration were recommended.

Noise levels associated with the operation of the Project were assessed in accordance with the *Noise Policy for Industry*. The WRRF development and CPS upgrades were predicted to comply with the operational noise criteria at all noise sensitive receivers with the exception of a small section of the proposed Camellia Town Centre close to the CPS. Noise levels from the CPS would exceed the criteria by up to 8 dB(A) at the proposed Camellia Town Centre. However appropriate building design to control traffic noise within the Town Centre residences would sufficiently control noise from the CPS. In addition, noise levels at the pumping station are not predicted to increase above current operational noise levels. Noise from vehicle movements generated by the Project operation were also found to comply with the *Road Noise Policy*.

Appendix A

Noise logging results

Noise Logger Report

45 Kissing Point Road, Dundas

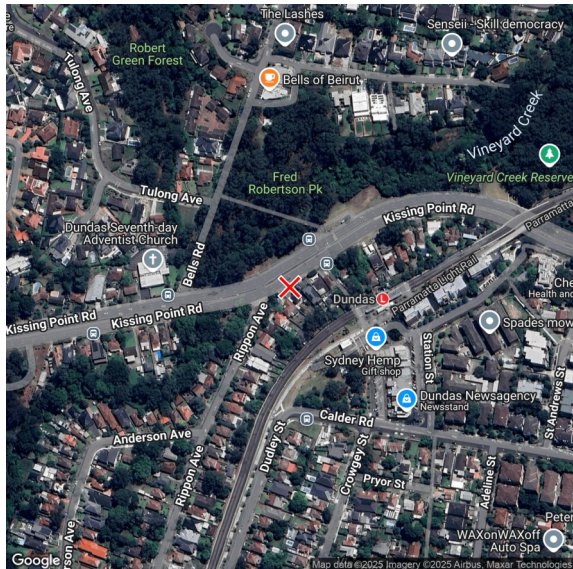


Item	Information
Logger Type	Rion NL52
Serial number	164394
Address	45 Kissing Point Road, Dundas
Location	Front Yard
Facade / Free Field	Free Field
Environment	Heavy traffic along Kissing Point Road. Car passby 74 dB(A). Truck passby 84 dB(A). Cloudy conditions. Some minor lulls in traffic but mostly constant. Birds chirping during lulls.

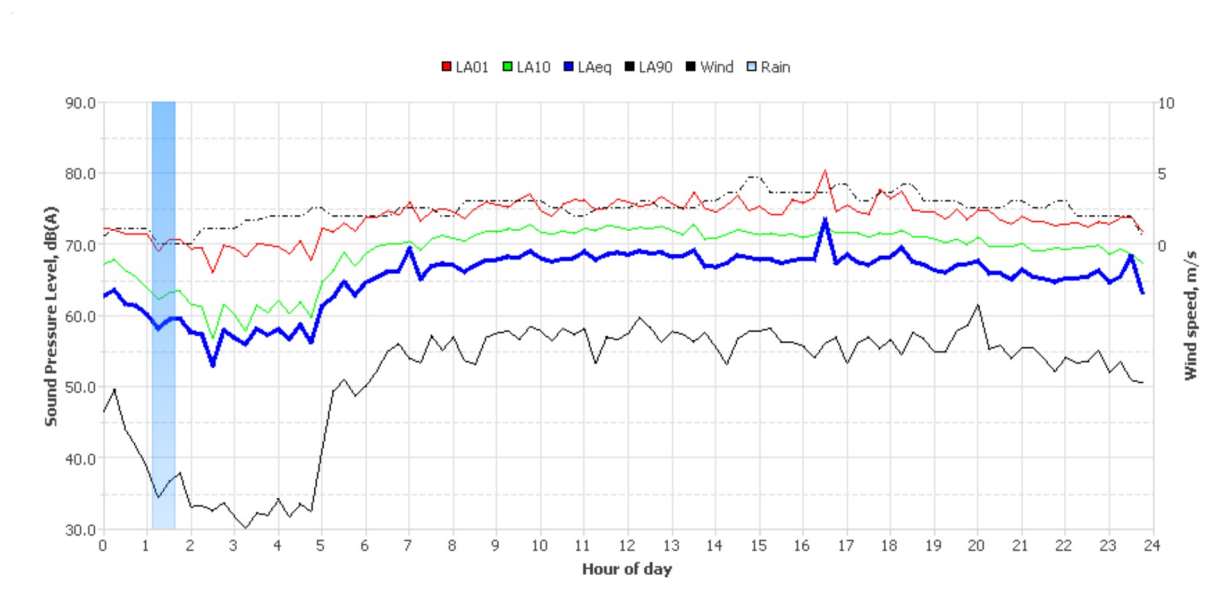
Measured noise levels

Logging Date	L _{Aeq,day} 7am 6pm	L _{Aeq,evening} 6pm 10pm	L _{Aeq,night} 10pm 7am	ABL Day 7am 6pm	ABL Eve 6pm 10pm	ABL Night 10pm 7am	L _{Aeq,15hr} 7am 10pm	L _{Aeq,9hr} 10pm 7am
Sat Nov 16 2024	68	67	63	53	54	32	68	63
Sun Nov 17 2024	68	67	62	51	-	30	68	62
Mon Nov 18 2024	69	65	66	-	-	-	69	66
Tue Nov 19 2024	68	67	63	-	53	31	68	63
Wed Nov 20 2024	68	67	63	-	53	35	68	63
Thu Nov 21 2024	68	68	63	53	54	33	68	63
Fri Nov 22 2024	68	68	63	53	54	37	68	63
Sat Nov 23 2024	69	68	63	54	54	34	68	63
Sun Nov 24 2024	66	66	61	52	51	38	66	61
Mon Nov 25 2024	68	66	63	52	50	33	68	63
Tue Nov 26 2024	68	67	63	53	53	35	67	63
Wed Nov 27 2024	70	68	63	-	55	36	69	63
Summary	68	67	63	53	54	34	68	63

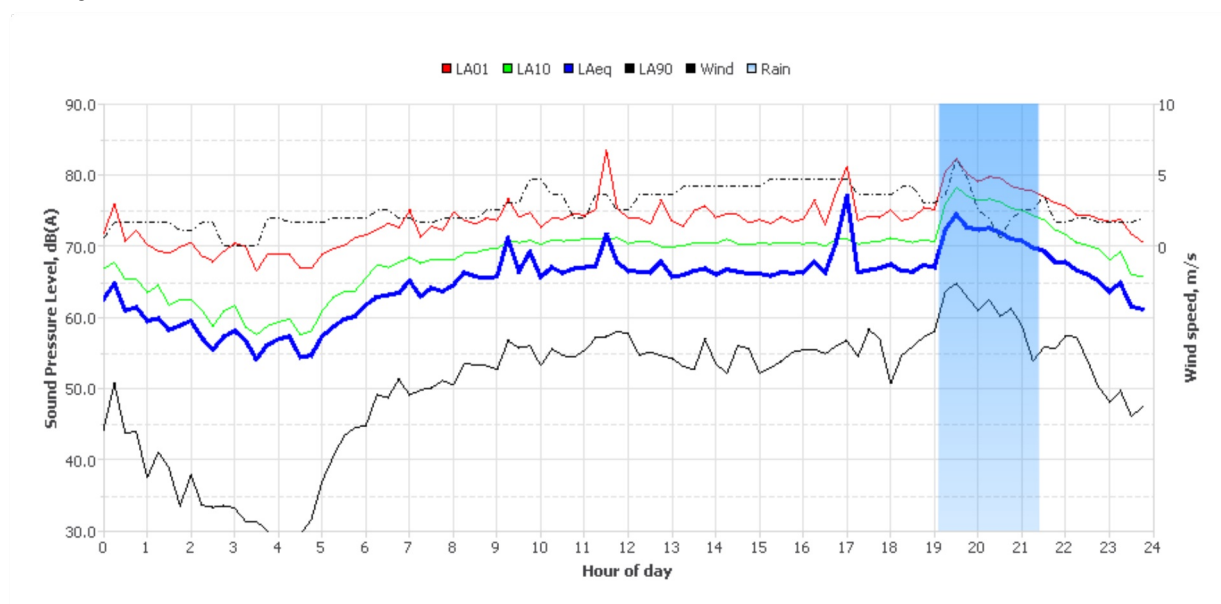
Note: Results denoted with '-' do not contain enough valid data for a value to be calculated. The data has been excluded either manually or automatically as a result of adverse weather conditions.

Logger Location	Logger Deployment Photo
 45 Kissing Point Road, Dundas	

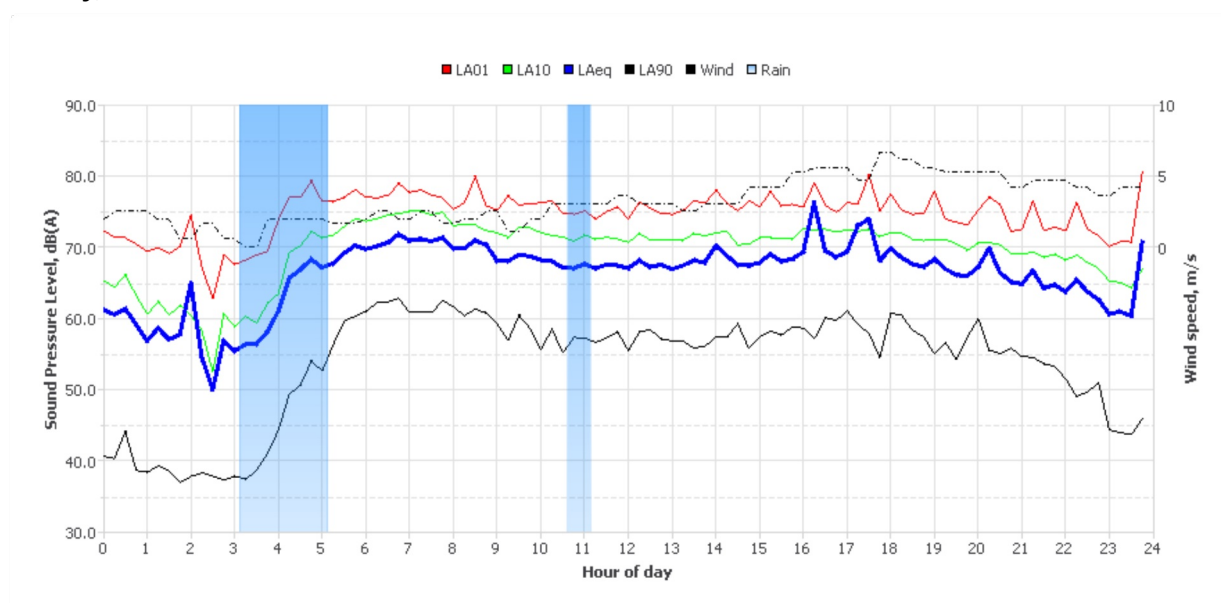
Saturday, 16 Nov 2024



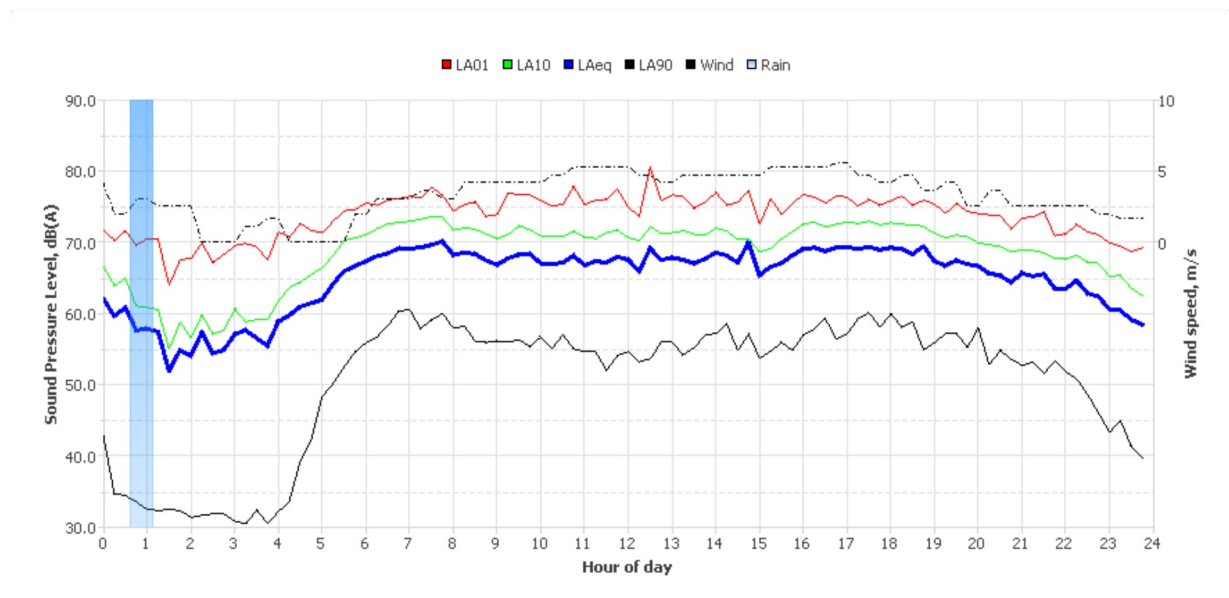
Sunday, 17 Nov 2024



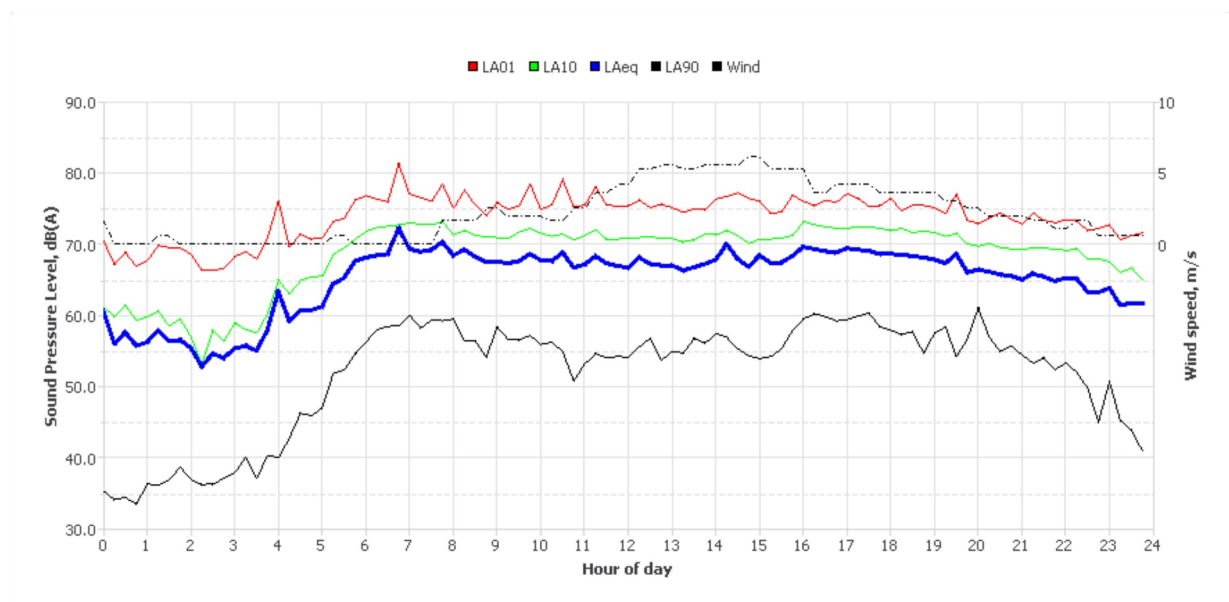
Monday, 18 Nov 2024



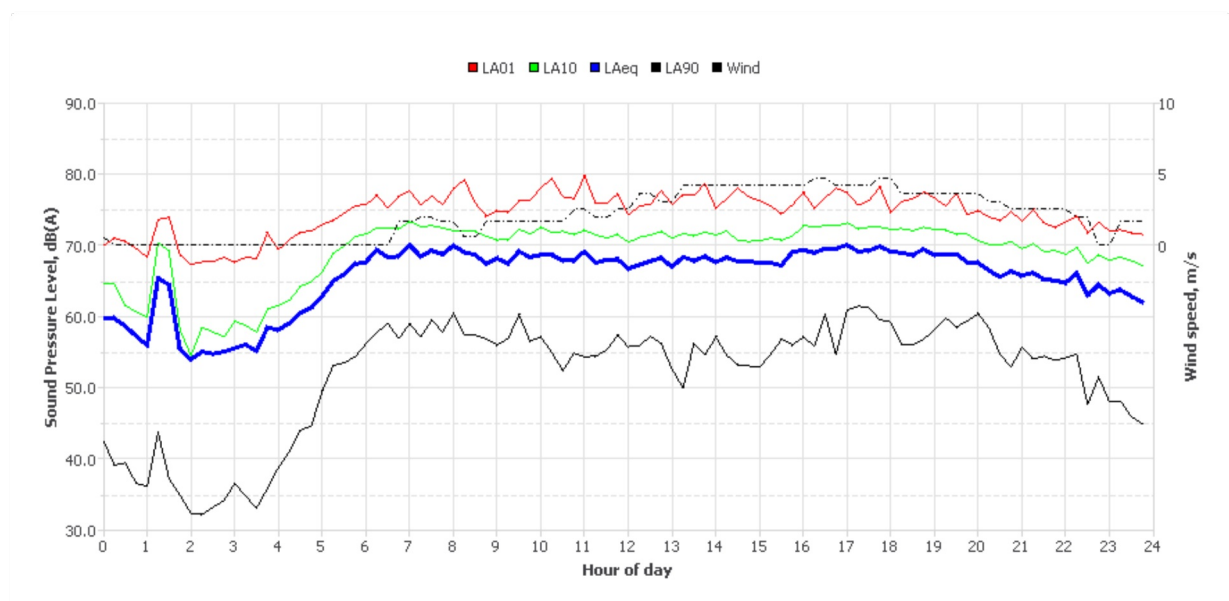
Tuesday, 19 Nov 2024



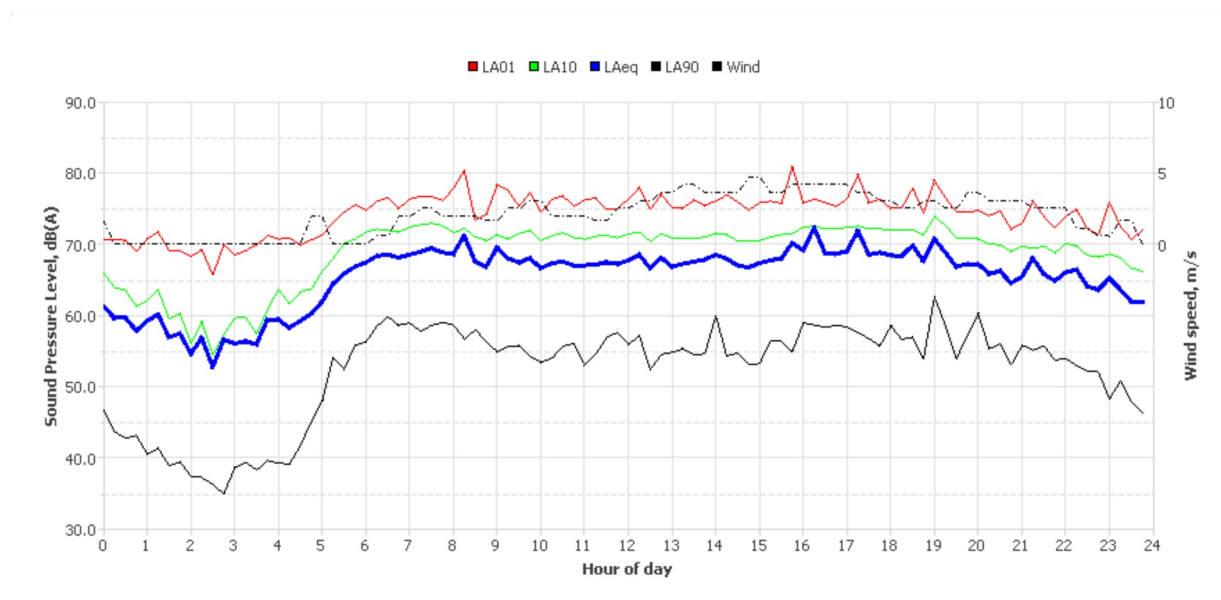
Wednesday, 20 Nov 2024



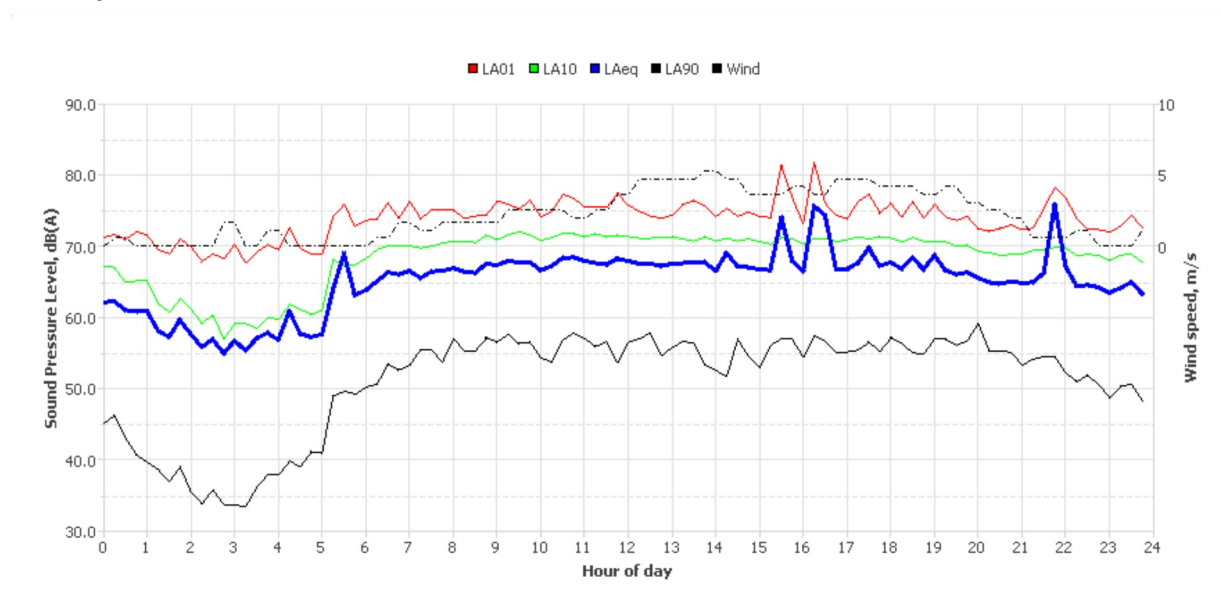
Thursday, 21 Nov 2024



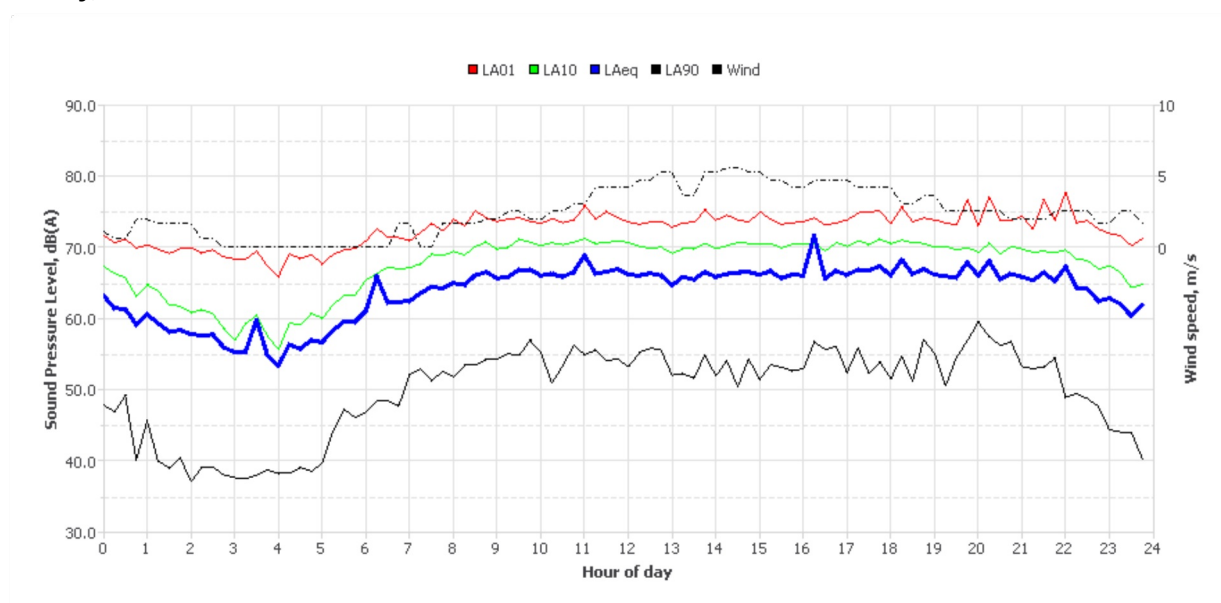
Friday, 22 Nov 2024



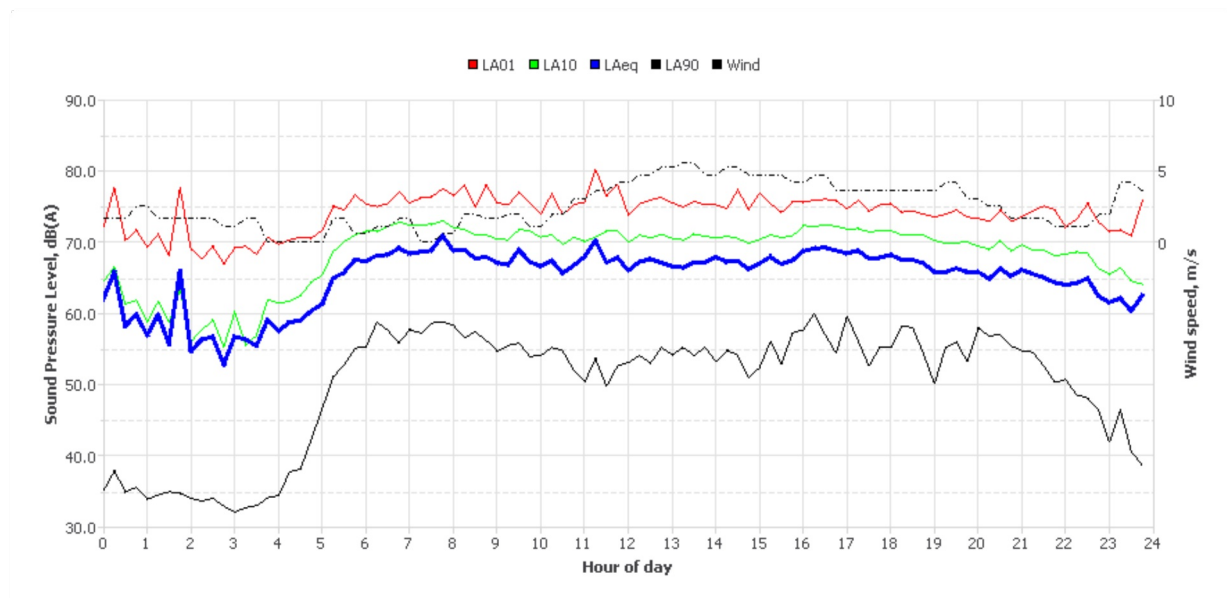
Saturday, 23 Nov 2024



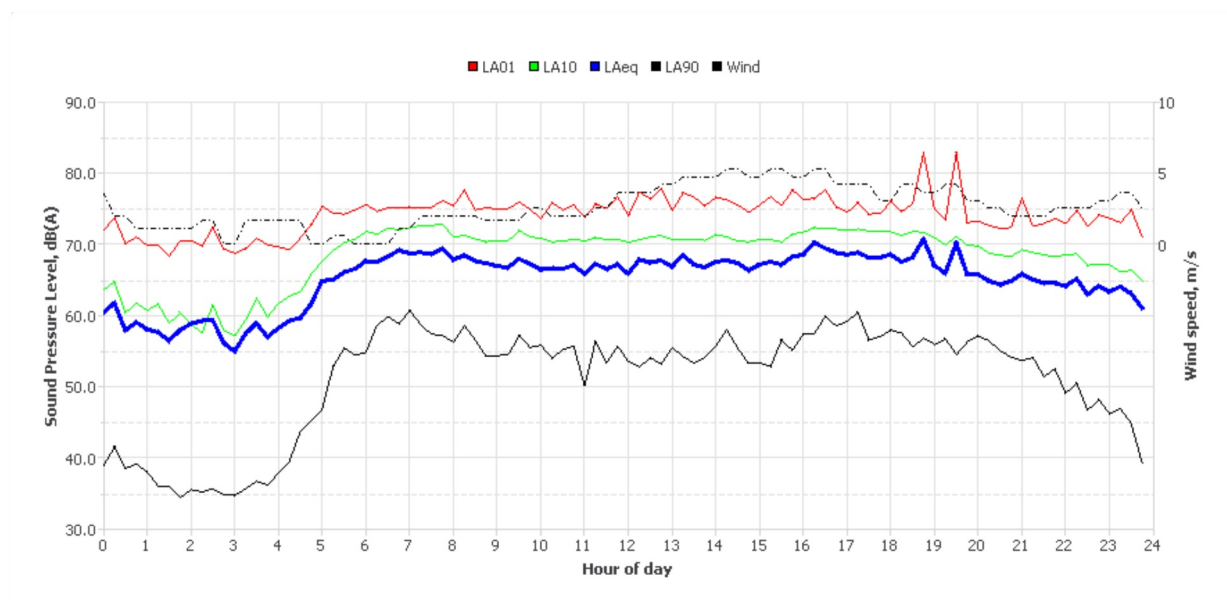
Sunday, 24 Nov 2024



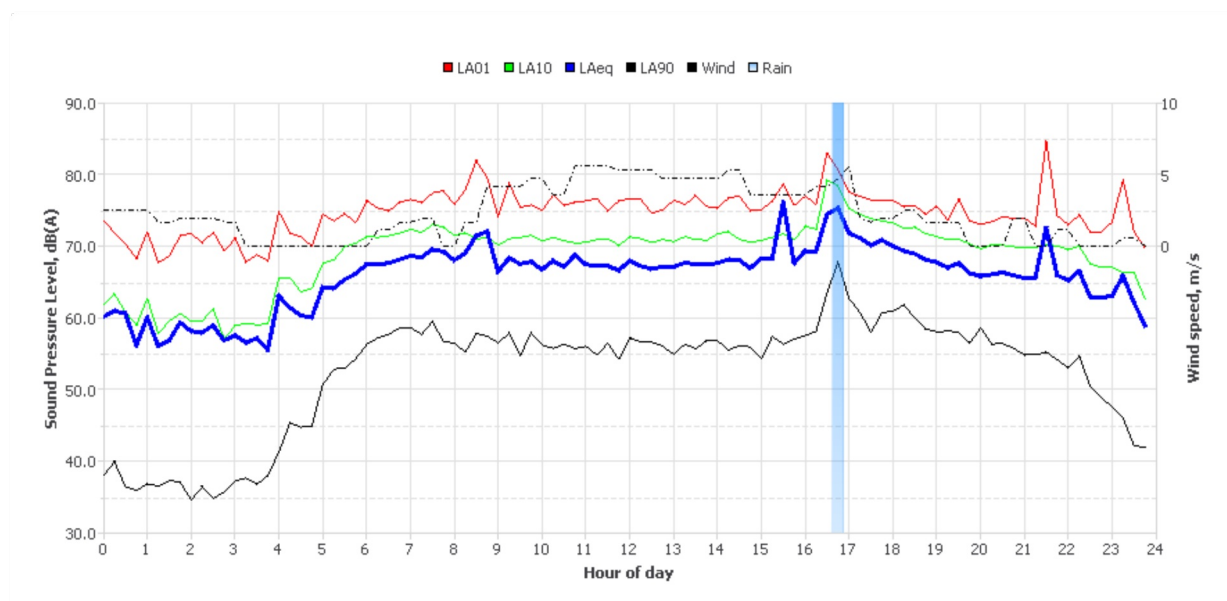
Monday, 25 Nov 2024



Tuesday, 26 Nov 2024



Wednesday, 27 Nov 2024



Noise Logger Report

26 Rippon Avenue, Dundas

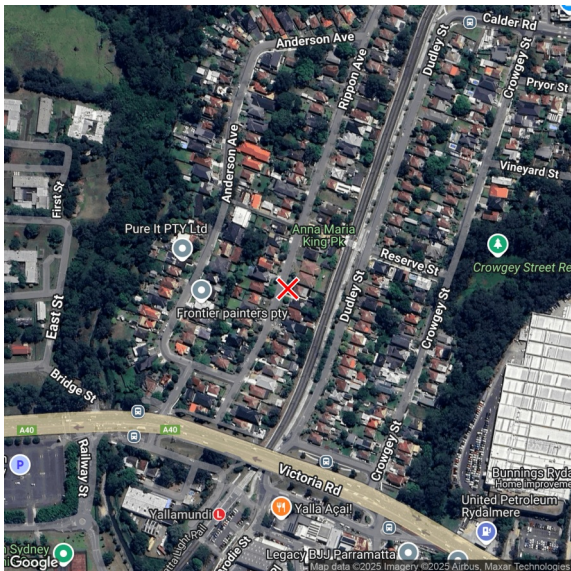


Item	Information
Logger Type	Rion NL52
Serial number	01043455
Address	26 Rippon Avenue, Dundas
Location	Front Yard
Facade / Free Field	Free Field
Environment	Quiet street. Some car passbys, a very distant plane flyover. Car passby on Rippon Ave 66 dB(A). Bird noise dominant during lulls. Distant hum from main road.

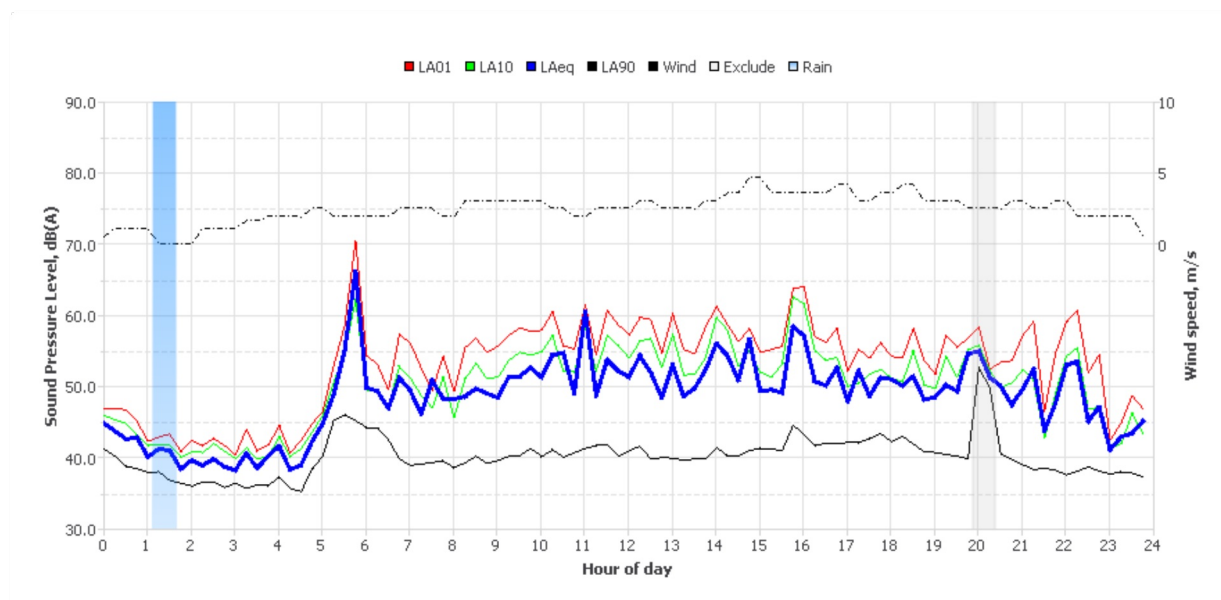
Measured noise levels

Logging Date	L _{Aeq,day} 7am 6pm	L _{Aeq,evening} 6pm 10pm	L _{Aeq,night} 10pm 7am	ABL Day 7am 6pm	ABL Eve 6pm 10pm	ABL Night 10pm 7am	L _{Aeq,15hr} 7am 10pm	L _{Aeq,9hr} 10pm 7am
Sat Nov 16 2024	53	50	52	39	38	36	52	52
Sun Nov 17 2024	52	50	45	38	-	31	52	45
Mon Nov 18 2024	53	51	49	-	-	-	52	49
Tue Nov 19 2024	53	51	46	-	37	30	52	46
Wed Nov 20 2024	52	51	48	-	40	37	52	48
Thu Nov 21 2024	53	54	48	40	38	36	53	48
Fri Nov 22 2024	52	49	49	39	39	40	52	49
Sat Nov 23 2024	52	50	47	39	40	38	52	47
Sun Nov 24 2024	51	51	47	-	39	39	51	47
Mon Nov 25 2024	51	52	48	-	38	35	51	48
Tue Nov 26 2024	51	51	47	39	41	34	51	47
Wed Nov 27 2024	56	54	48	-	44	39	56	48
Summary	53	51	48	39	39	36	52	48

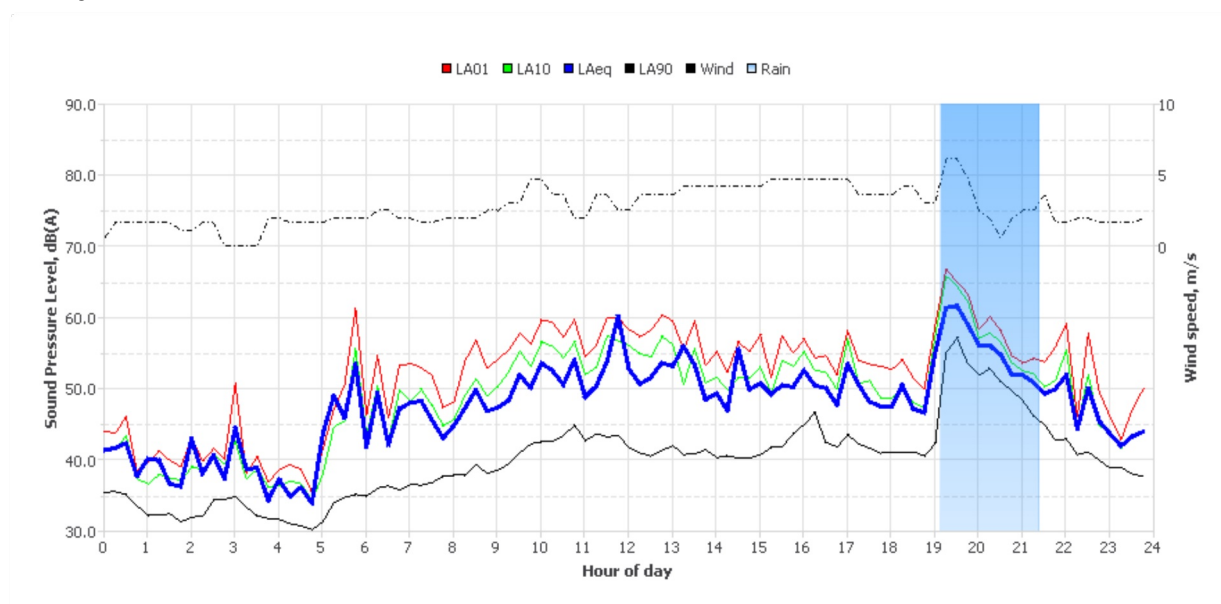
Note: Results denoted with '-' do not contain enough valid data for a value to be calculated. The data has been excluded either manually or automatically as a result of adverse weather conditions.

Logger Location	Logger Deployment Photo
 26 Rippon Avenue, Dundas	

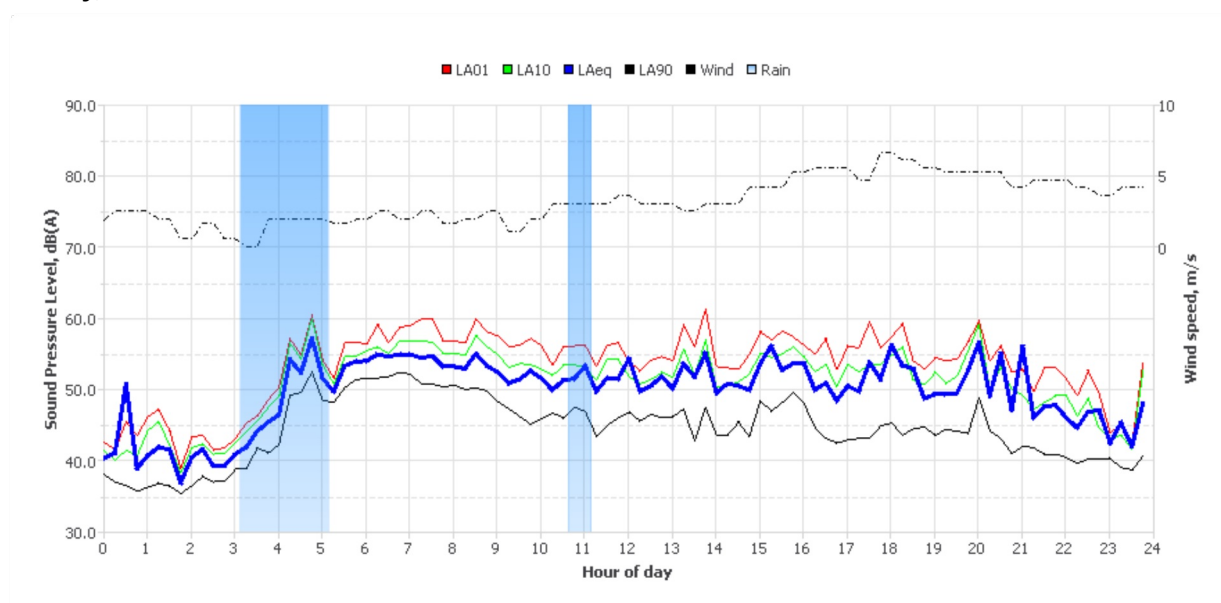
Saturday, 16 Nov 2024



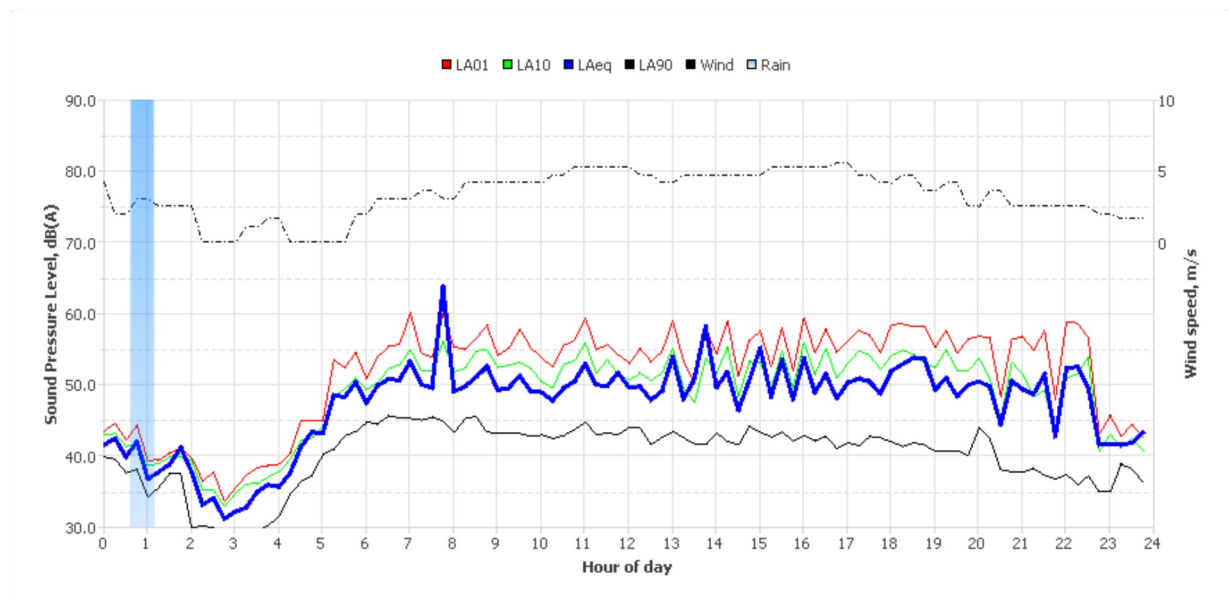
Sunday, 17 Nov 2024



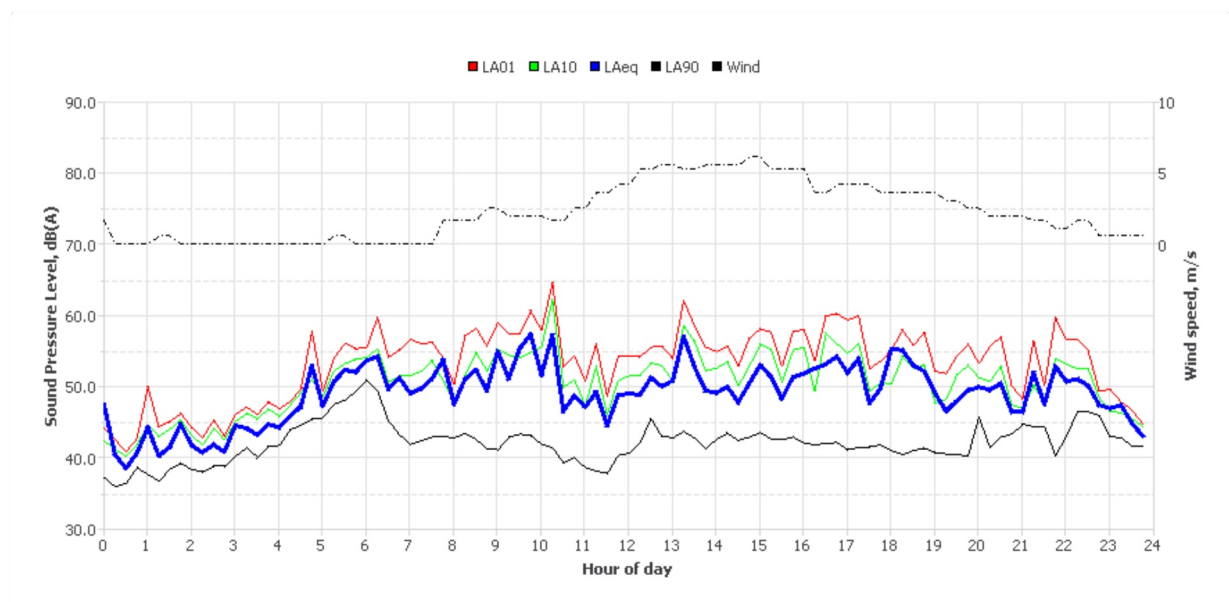
Monday, 18 Nov 2024



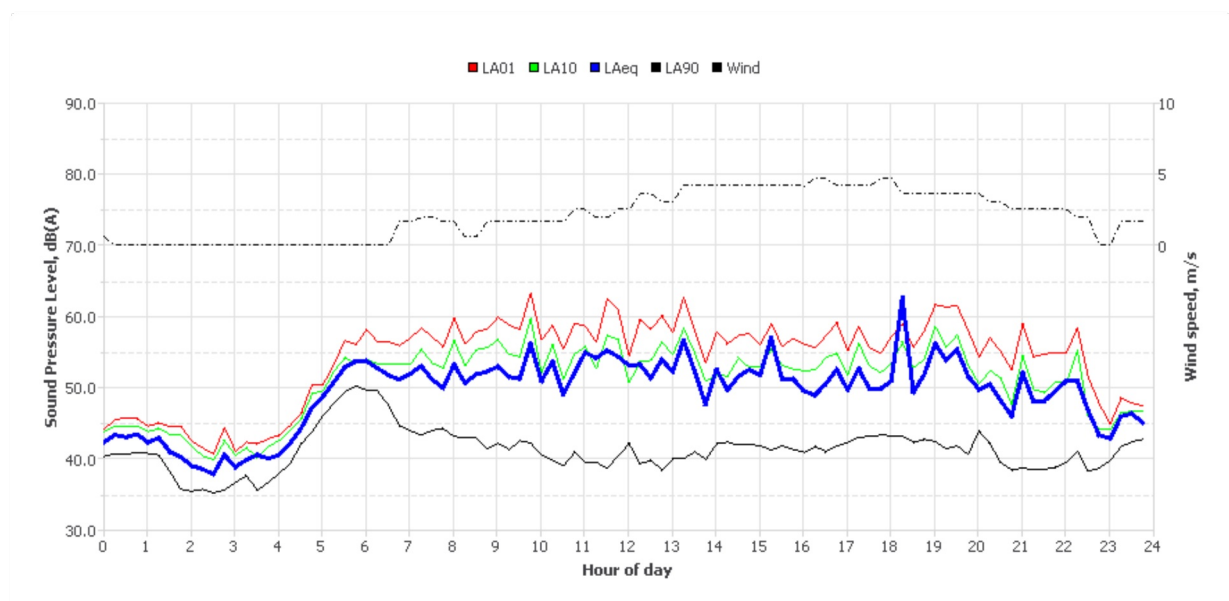
Tuesday, 19 Nov 2024



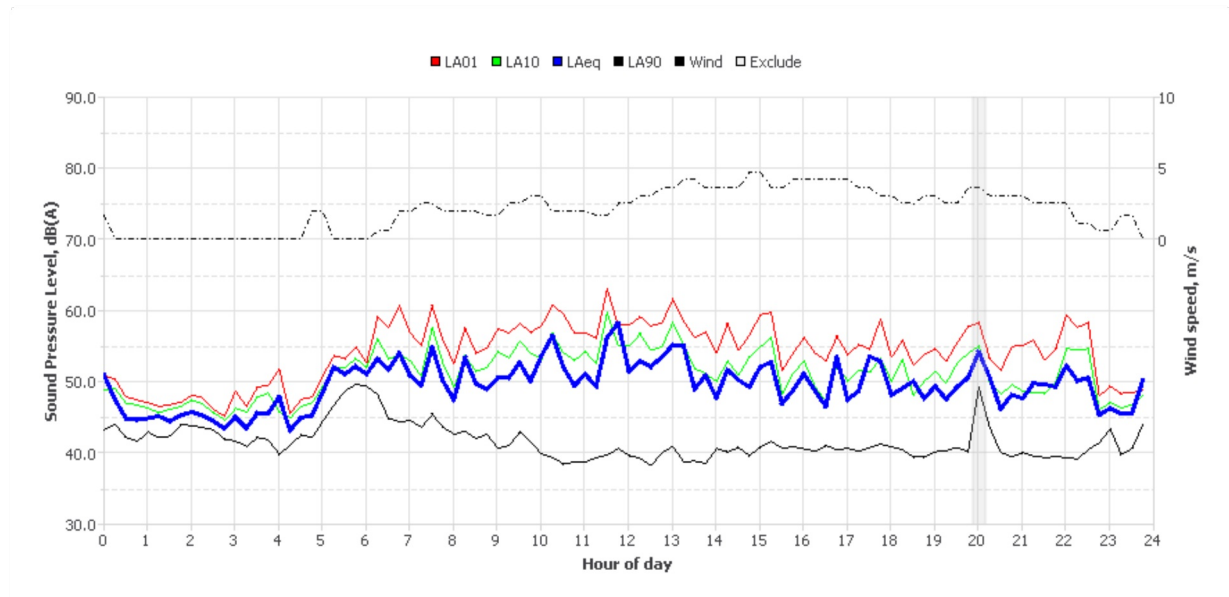
Wednesday, 20 Nov 2024



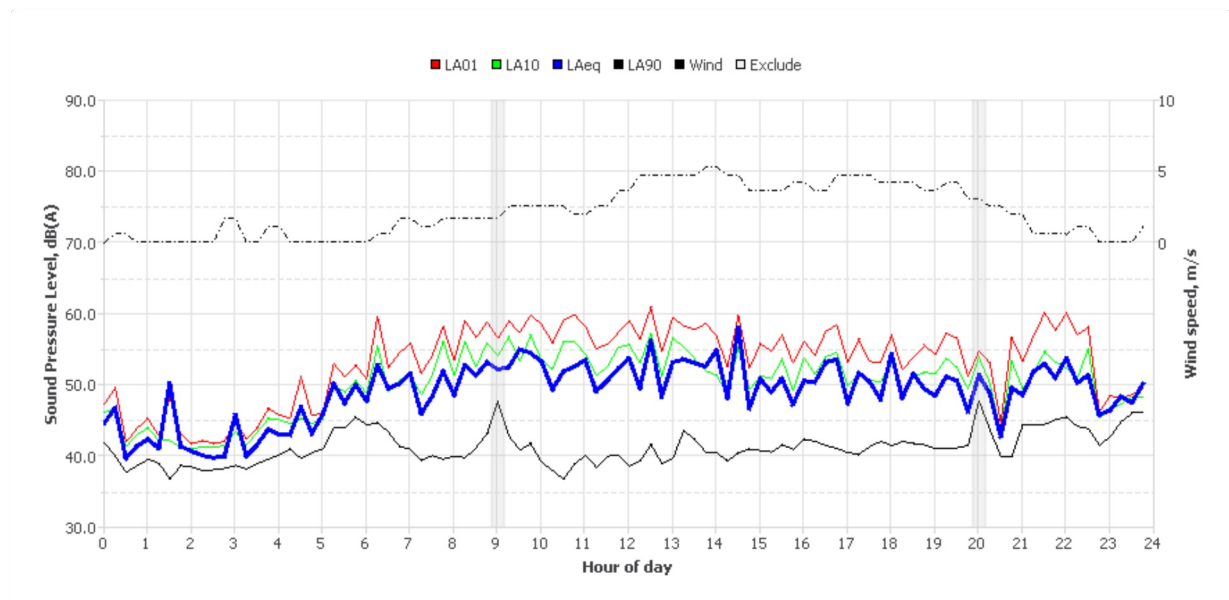
Thursday, 21 Nov 2024



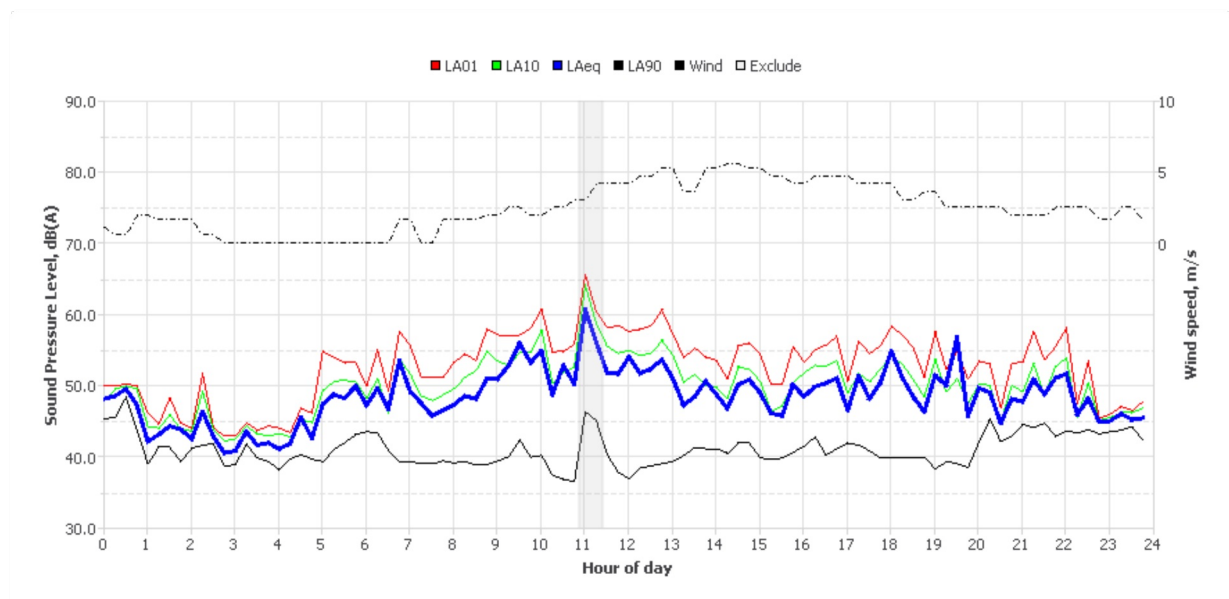
Friday, 22 Nov 2024



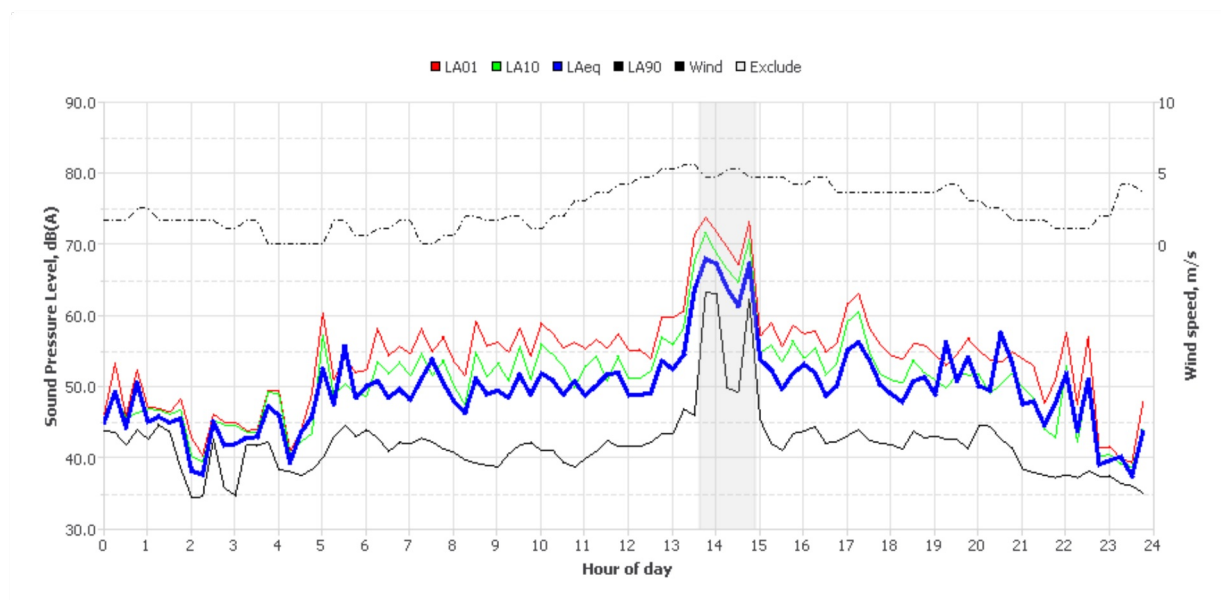
Saturday, 23 Nov 2024



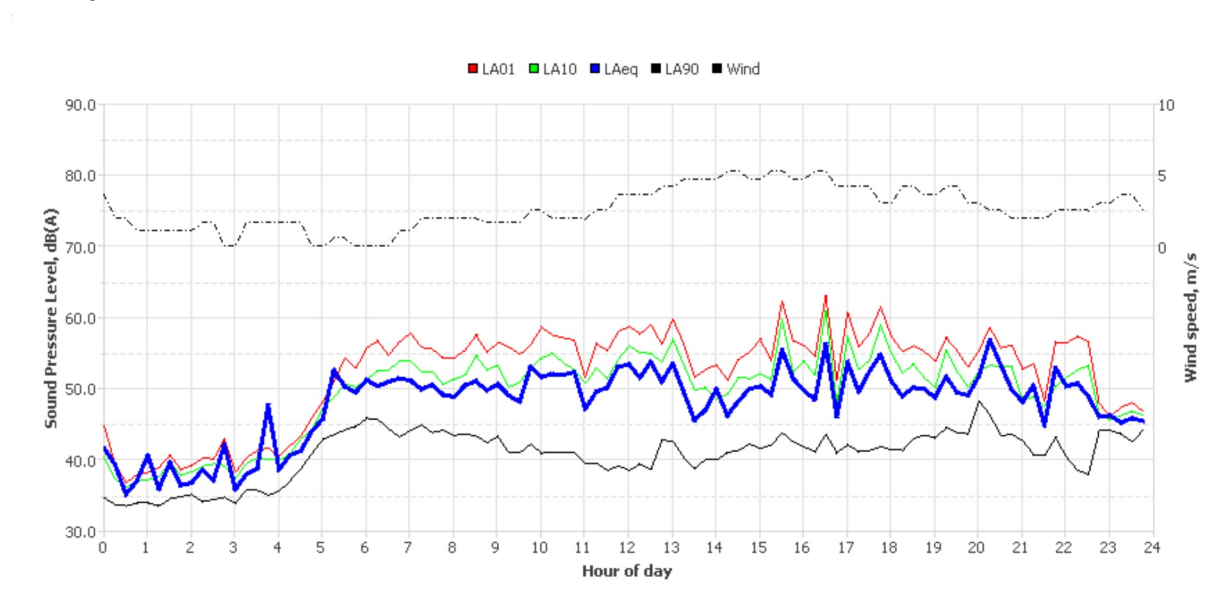
Sunday, 24 Nov 2024



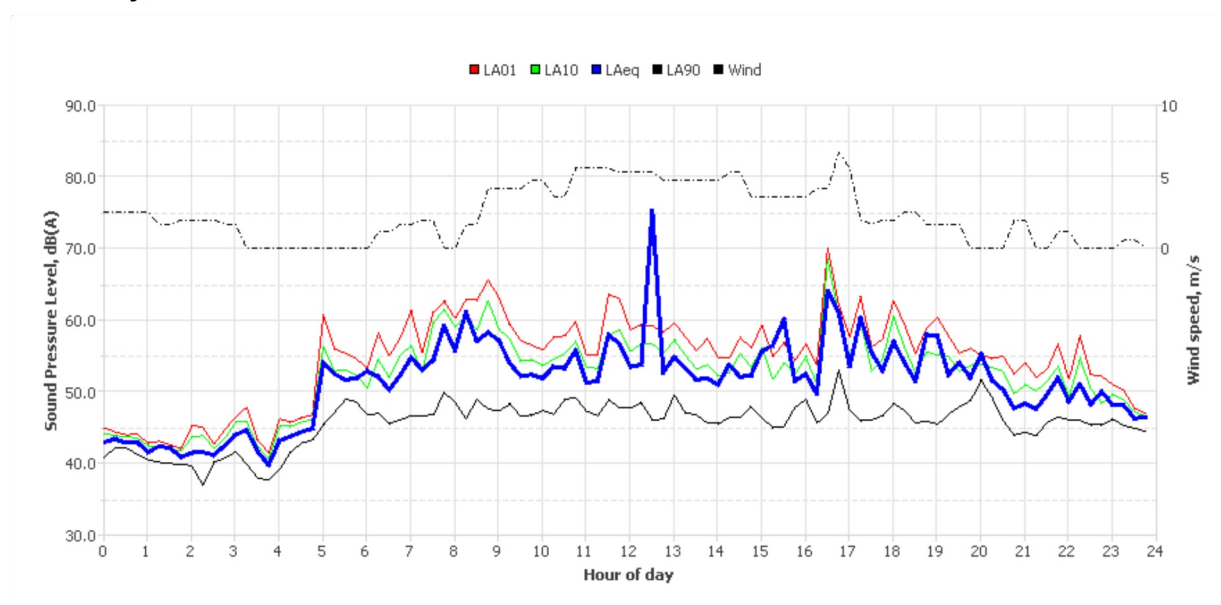
Monday, 25 Nov 2024



Tuesday, 26 Nov 2024



Wednesday, 27 Nov 2024



Noise Logger Report

2 Eleanor Street, Rosehill



Item	Information
Logger Type	01dB
Serial number	10391
Address	2 Eleanor Street, Rosehill
Location	Front Yard
Facade / Free Field	Free Field
Environment	Lots of cars and some trucks passing on James Ruse Drive, traffic noise generally between 55-57 dBA. Not many cars passing along Eleanor street itself. Light winds, some bird noise also Helicopter passing.

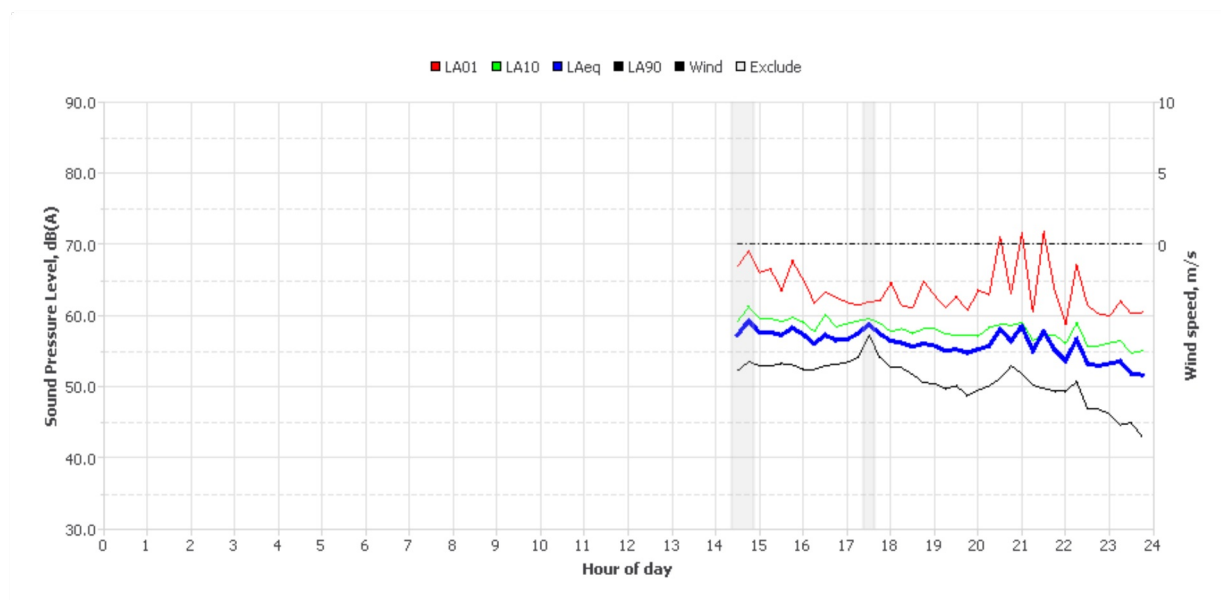
Measured noise levels

Logging Date	L _{Aeq,day} 7am 6pm	L _{Aeq,evening} 6pm 10pm	L _{Aeq,night} 10pm 7am	ABL Day 7am 6pm	ABL Eve 6pm 10pm	ABL Night 10pm 7am	L _{Aeq,15hr} 7am 10pm	L _{Aeq,9hr} 10pm 7am
Wed May 15 2024	57	56	54	-	49	-	57	54
Thu May 16 2024	58	57	54	52	49	42	58	54
Fri May 17 2024	59	58	54	52	52	41	59	54
Sat May 18 2024	59	58	55	-	52	-	58	55
Sun May 19 2024	57	57	53	51	52	43	57	53
Mon May 20 2024	59	58	54	54	49	41	58	54
Tue May 21 2024	59	56	54	53	49	43	58	54
Wed May 22 2024	58	57	55	52	50	42	58	55
Thu May 23 2024	58	59	55	52	52	44	59	55
Fri May 24 2024	58	-	55	-	-	-	58	55
Summary	58	57	54	52	50	42	58	54

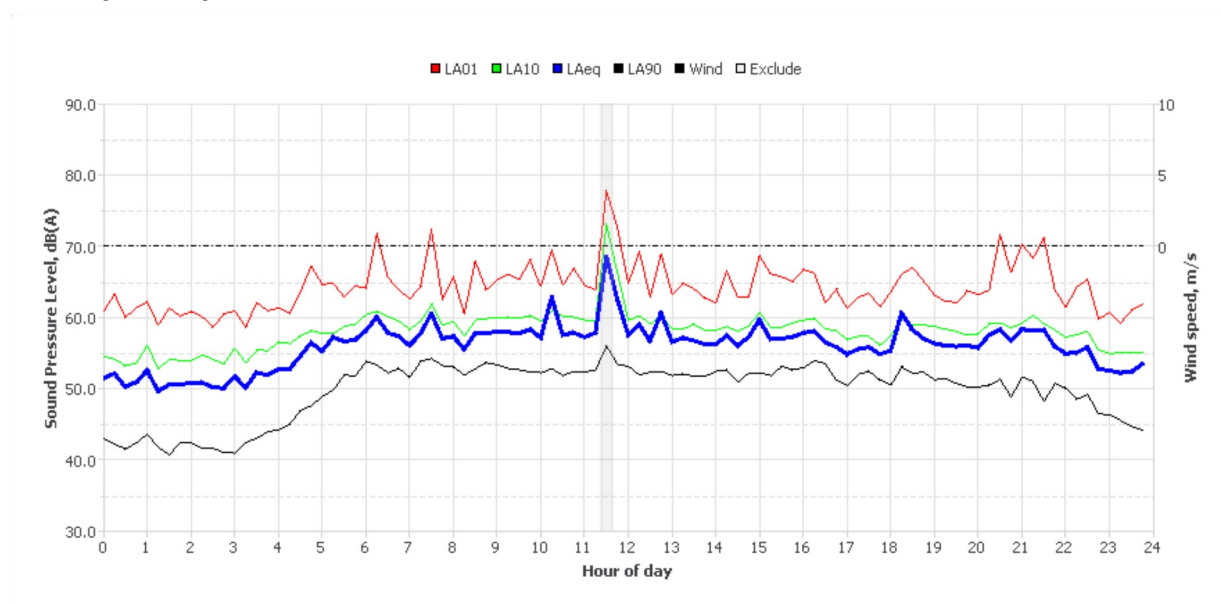
Note: Results denoted with '-' do not contain enough valid data for a value to be calculated. The data has been excluded either manually or automatically as a result of adverse weather conditions.

Logger Location	Logger Deployment Photo

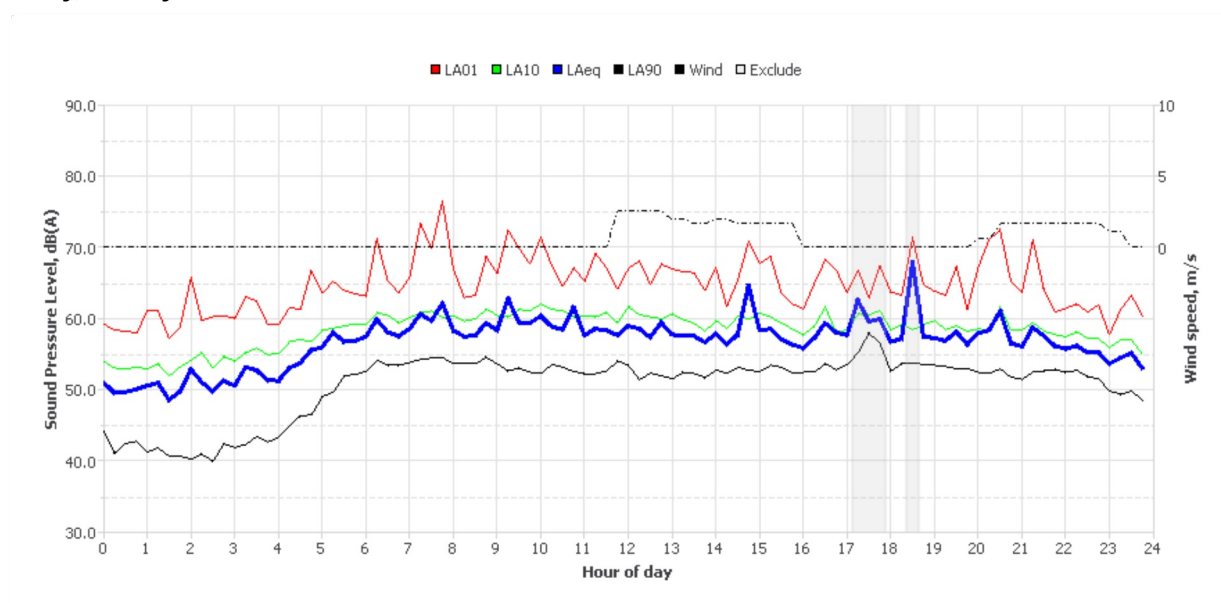
Wednesday, 15 May 2024



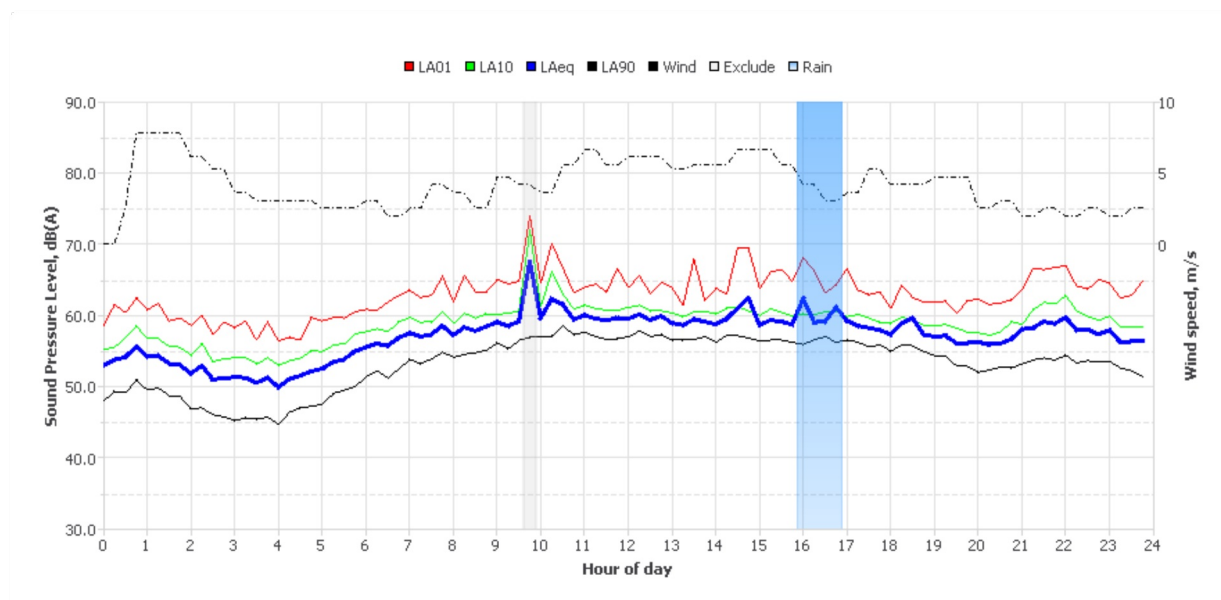
Thursday, 16 May 2024



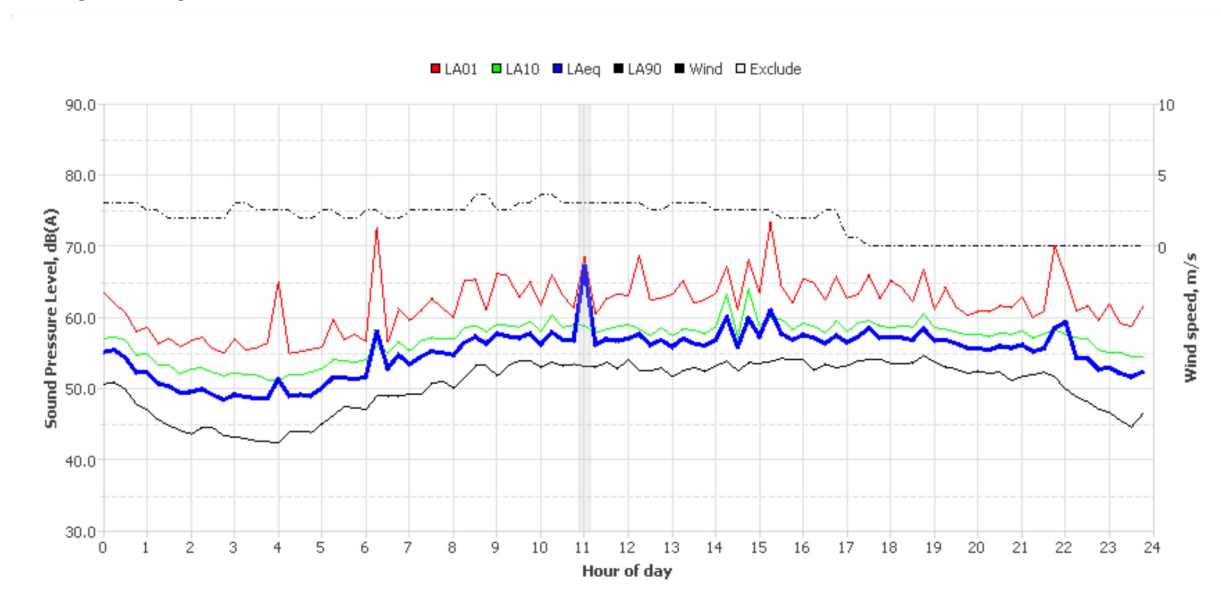
Friday, 17 May 2024



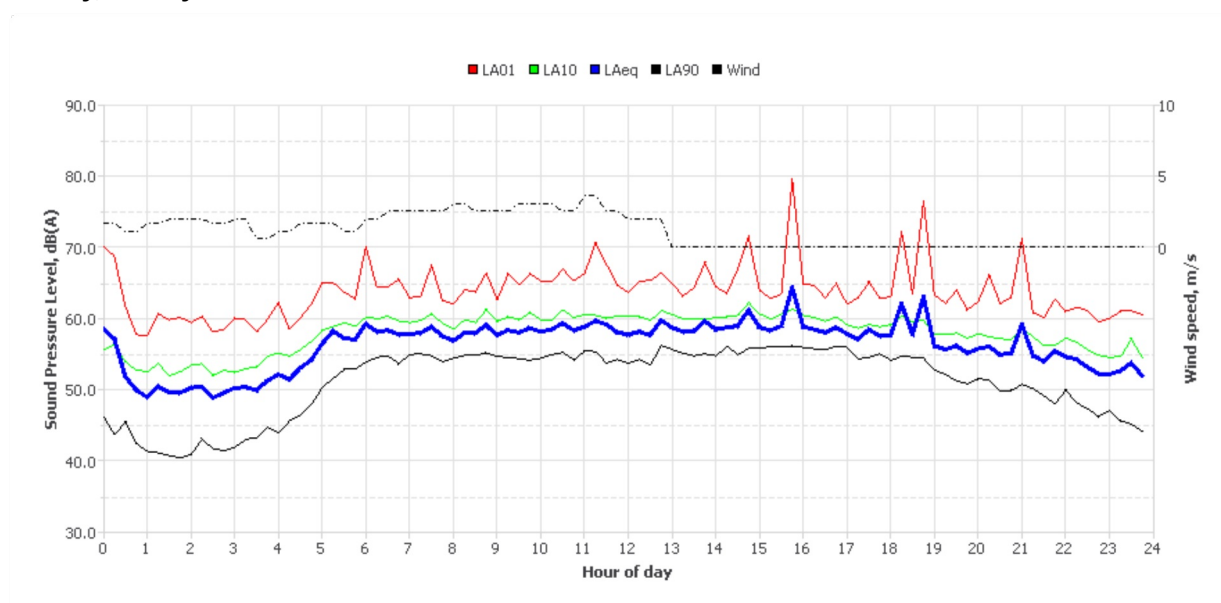
Saturday, 18 May 2024



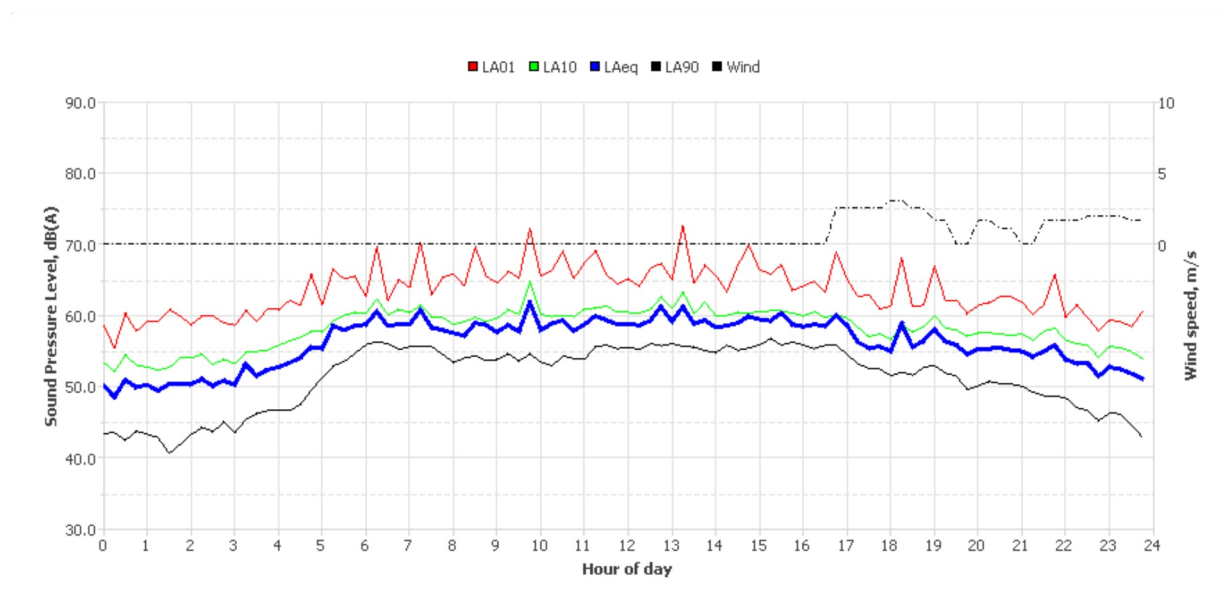
Sunday, 19 May 2024



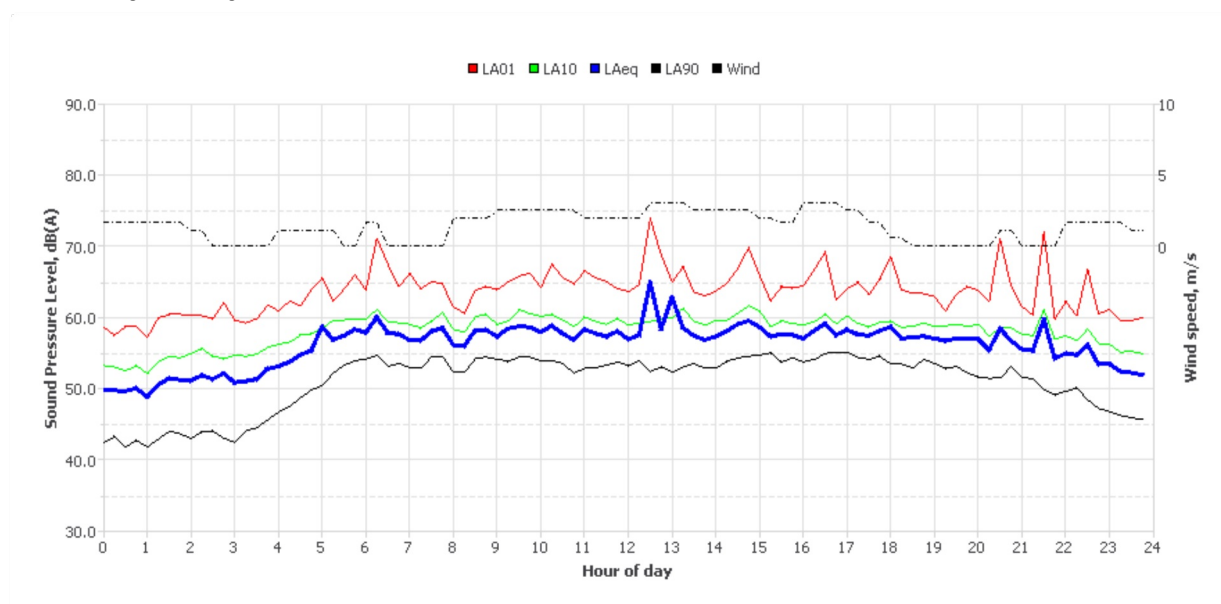
Monday, 20 May 2024



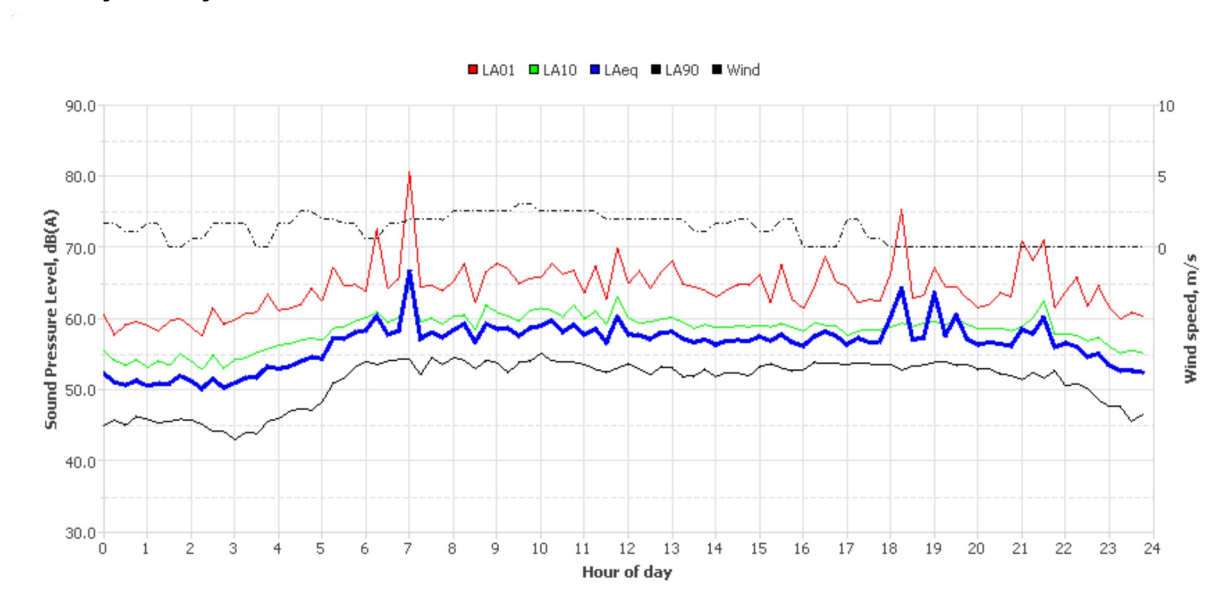
Tuesday, 21 May 2024

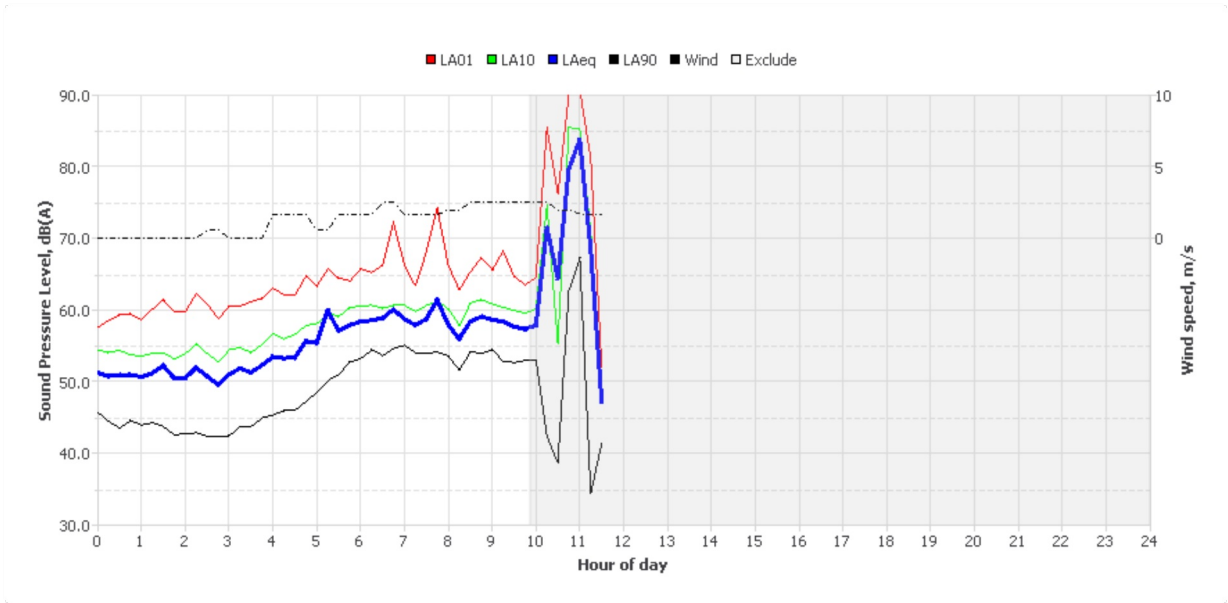


Wednesday, 22 May 2024



Thursday, 23 May 2024





Noise Logger Report

63 Asquith Street, Silverwater



Item	Information
Logger Type	01dB
Serial number	12227
Address	63 Asquith Street, Silverwater
Location	Front Yard
Facade / Free Field	Free Field
Environment	Ambient noise controlled by traffic noise. Cars passing along Stubbs street around 50-60 dBA. Occasional plane noise

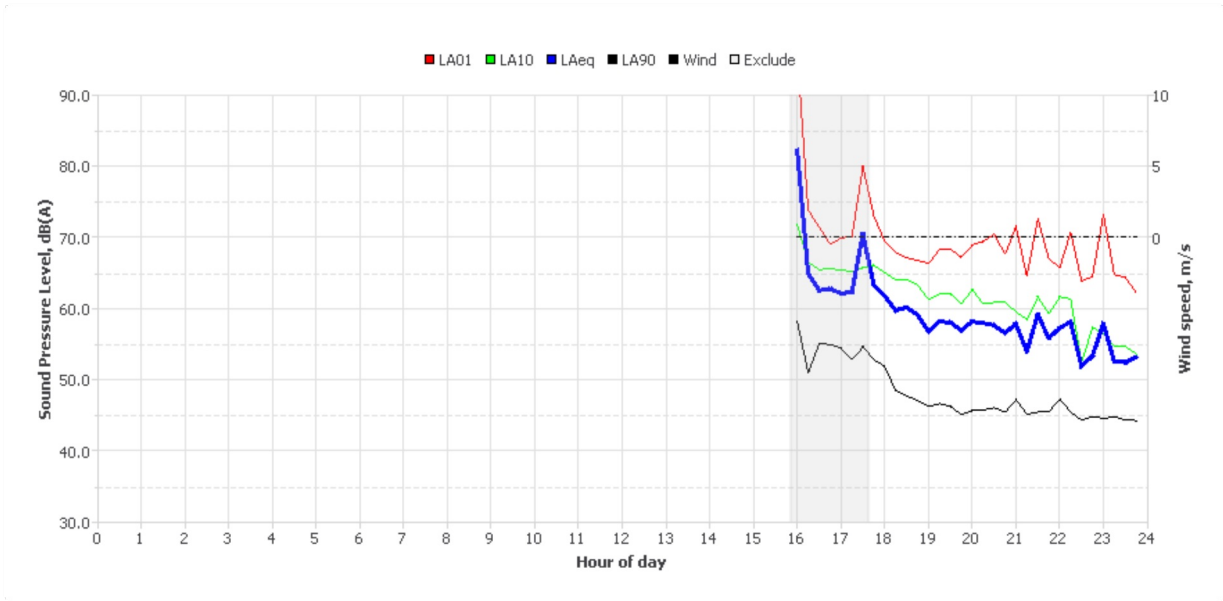
Measured noise levels

Logging Date	L _{Aeq,day} 7am 6pm	L _{Aeq,evening} 6pm 10pm	L _{Aeq,night} 10pm 7am	ABL Day 7am 6pm	ABL Eve 6pm 10pm	ABL Night 10pm 7am	L _{Aeq,15hr} 7am 10pm	L _{Aeq,9hr} 10pm 7am
Wed May 15 2024	63	58	55	-	45	-	59	55
Thu May 16 2024	64	59	58	51	46	44	63	58
Fri May 17 2024	64	59	58	51	48	45	63	58
Sat May 18 2024	61	57	55	-	49	-	59	55
Sun May 19 2024	59	56	52	48	48	45	59	52
Mon May 20 2024	63	58	57	53	47	46	62	57
Tue May 21 2024	64	58	58	52	47	45	63	58
Wed May 22 2024	63	59	58	52	47	46	63	58
Thu May 23 2024	63	60	58	50	48	45	63	58
Fri May 24 2024	64	-	58	-	-	-	64	58
Summary	63	58	57	51	47	45	62	57

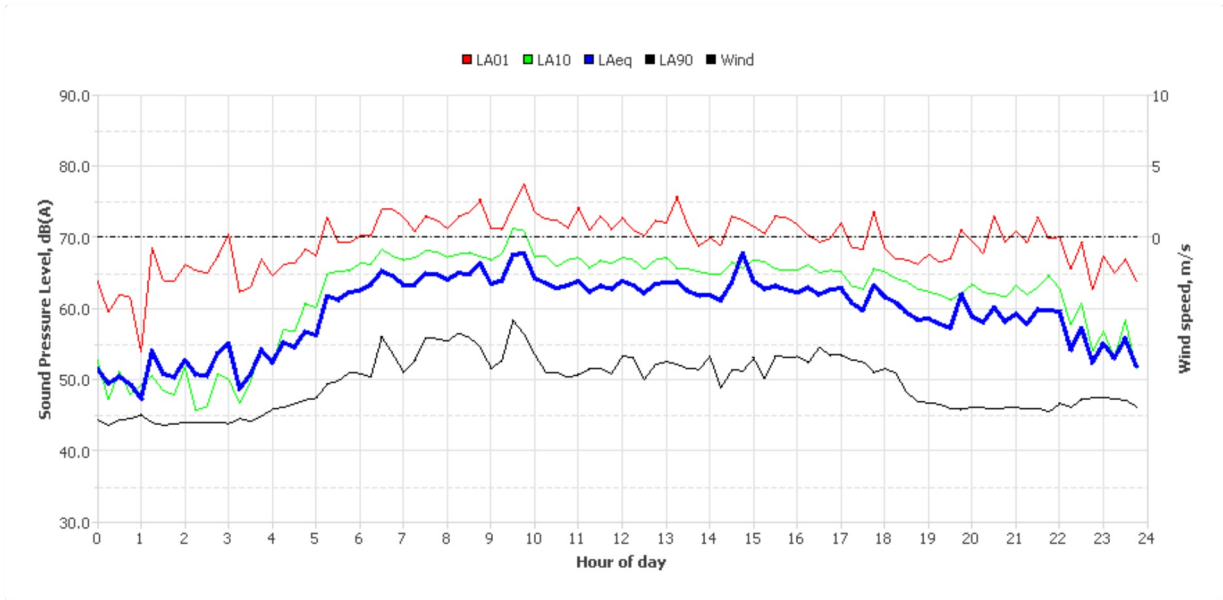
Note: Results denoted with '-' do not contain enough valid data for a value to be calculated. The data has been excluded either manually or automatically as a result of adverse weather conditions.

Logger Location	Logger Deployment Photo

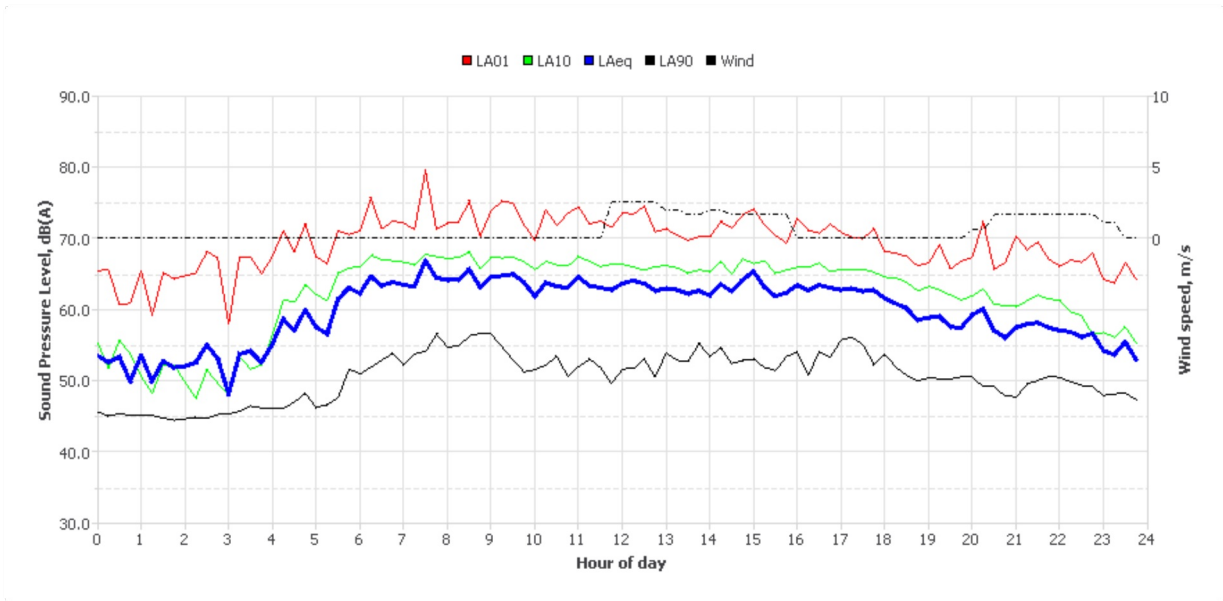
Wednesday, 15 May 2024



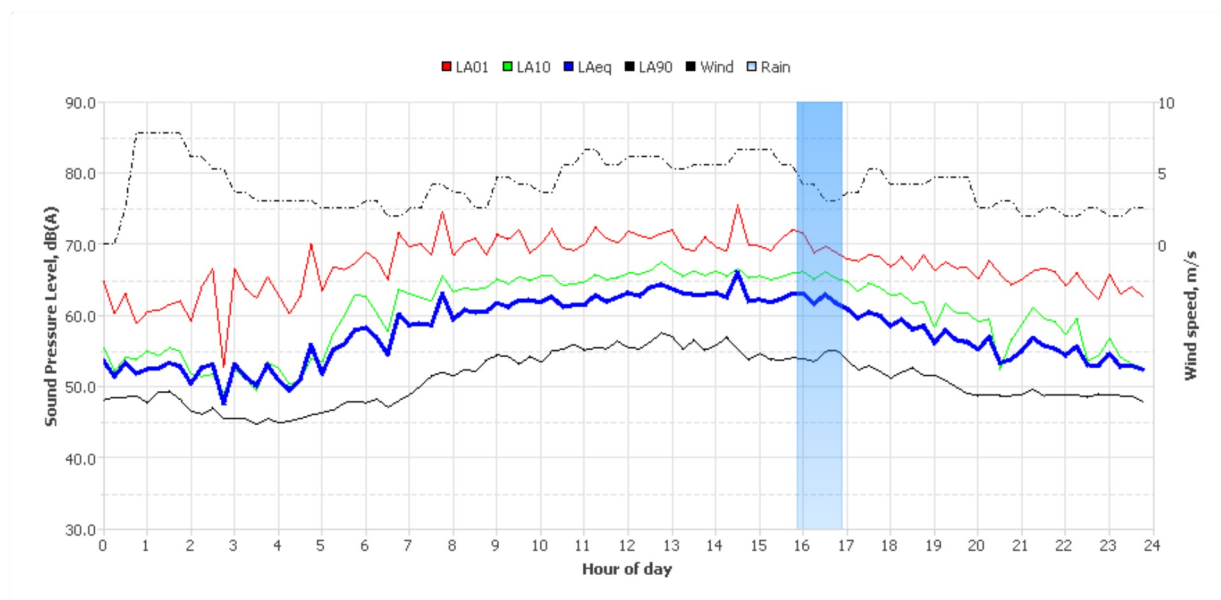
Thursday, 16 May 2024



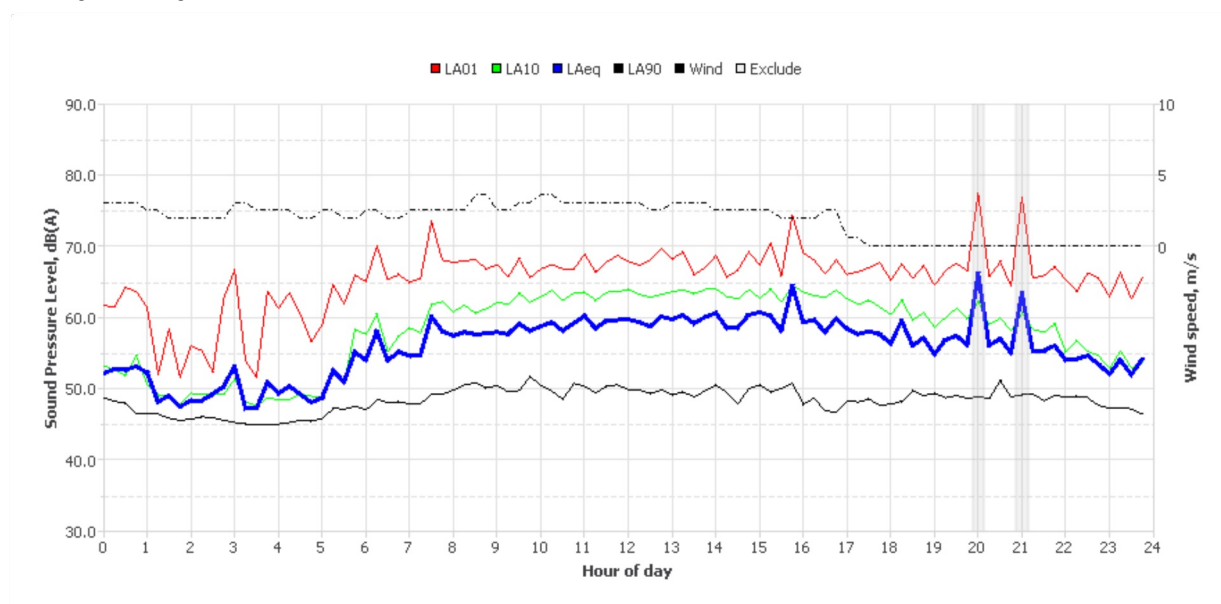
Friday, 17 May 2024



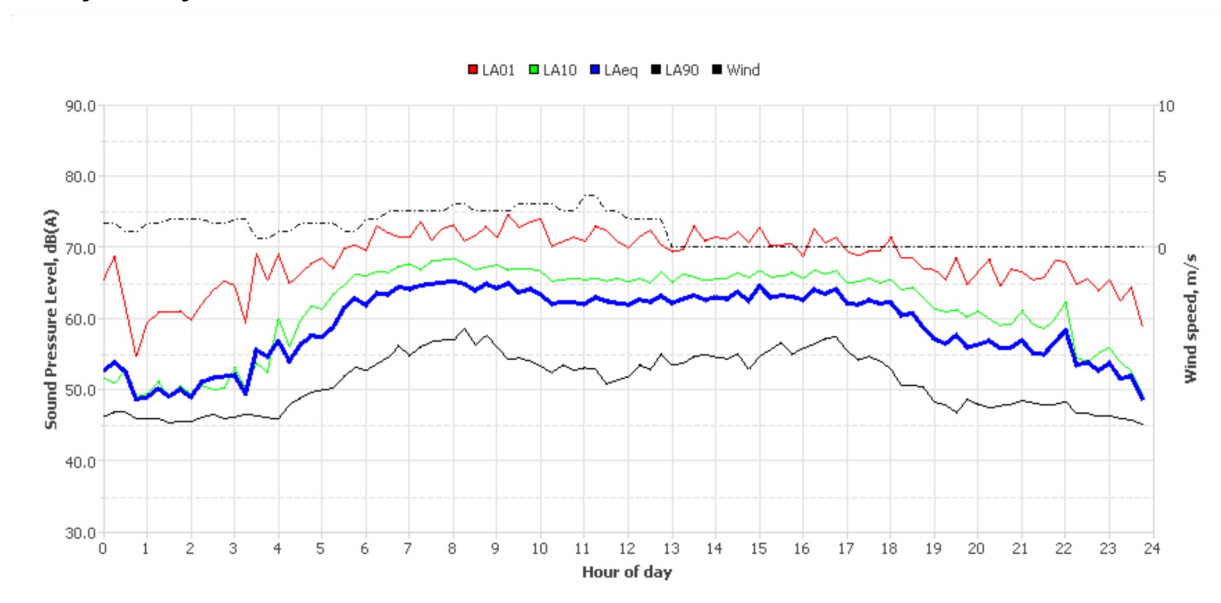
Saturday, 18 May 2024



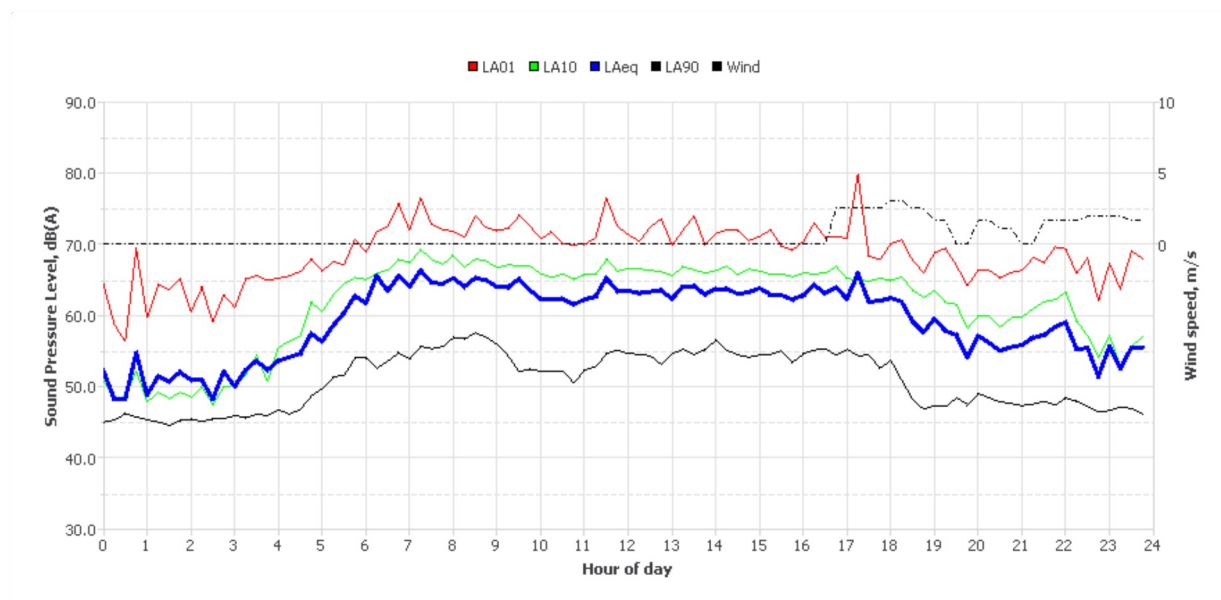
Sunday, 19 May 2024



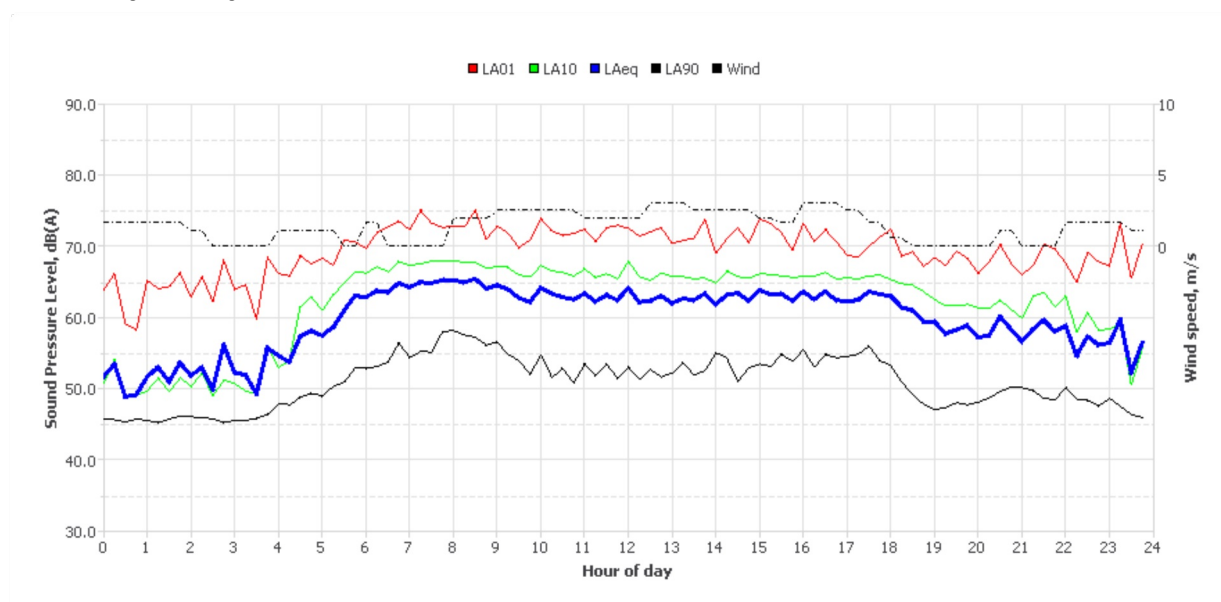
Monday, 20 May 2024



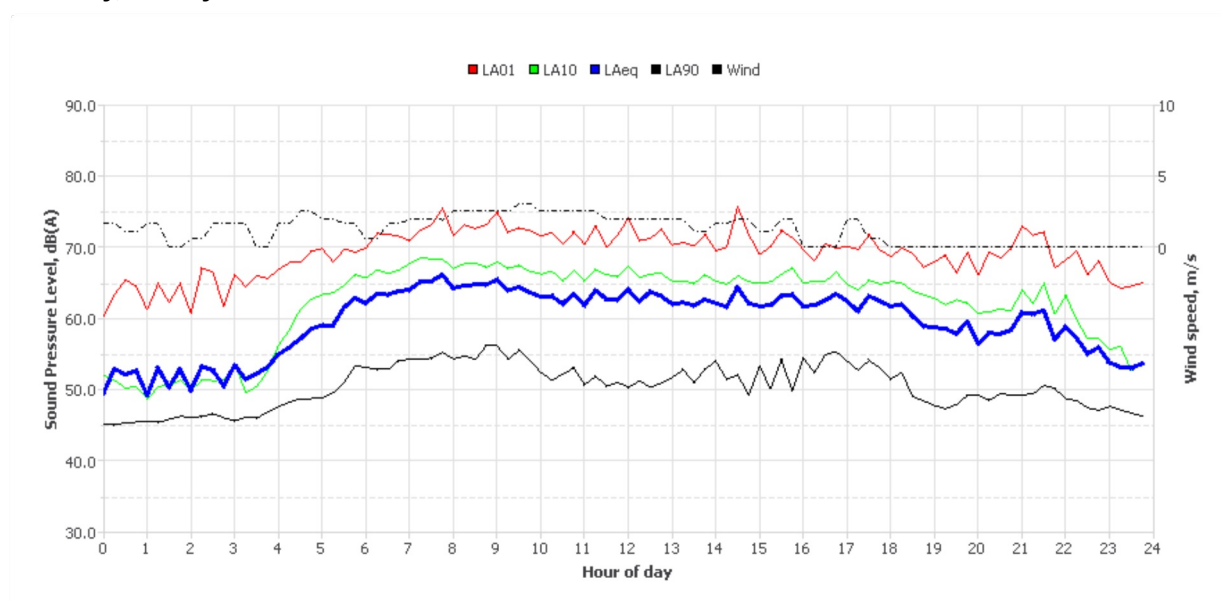
Tuesday, 21 May 2024



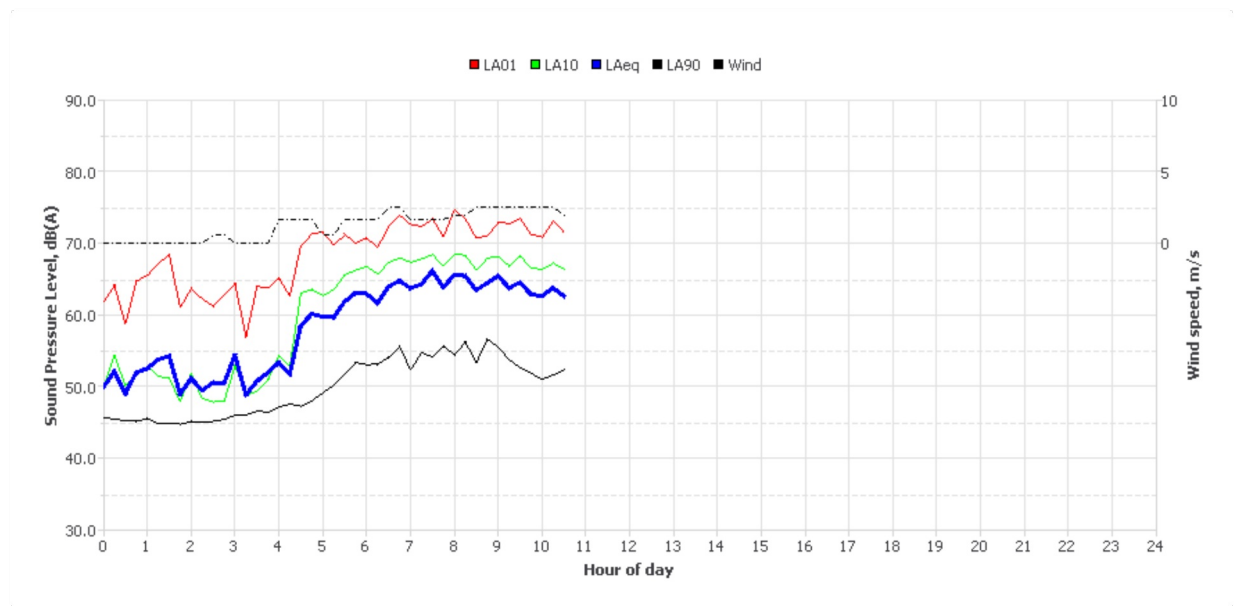
Wednesday, 22 May 2024



Thursday, 23 May 2024



Friday, 24 May 2024



Noise Logger Report

11 Comaneci Avenue, Newington

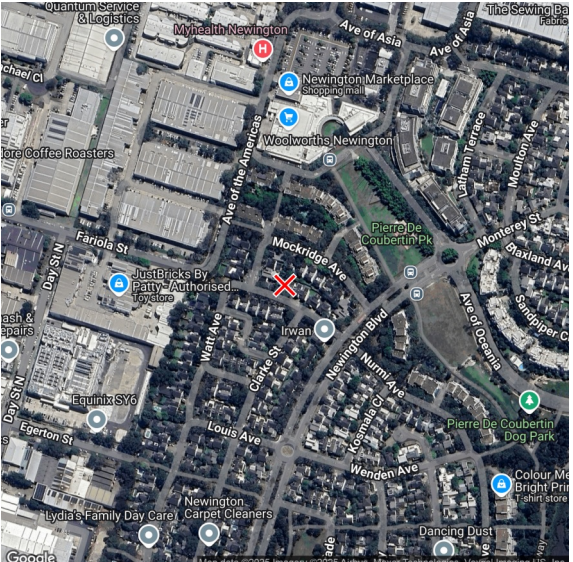


Item	Information
Logger Type	Rion NL52
Serial number	164396
Address	11 Comaneci Avenue, Newington
Location	Front Yard
Facade / Free Field	Free Field
Environment	Some very distant hum from main road, but birds mostly dominant. Some local domestic noise sources, wheelee bins being moved around. A few car passbys along Comaneci avenue. Car passbys on Comaneci 63 dB(A).

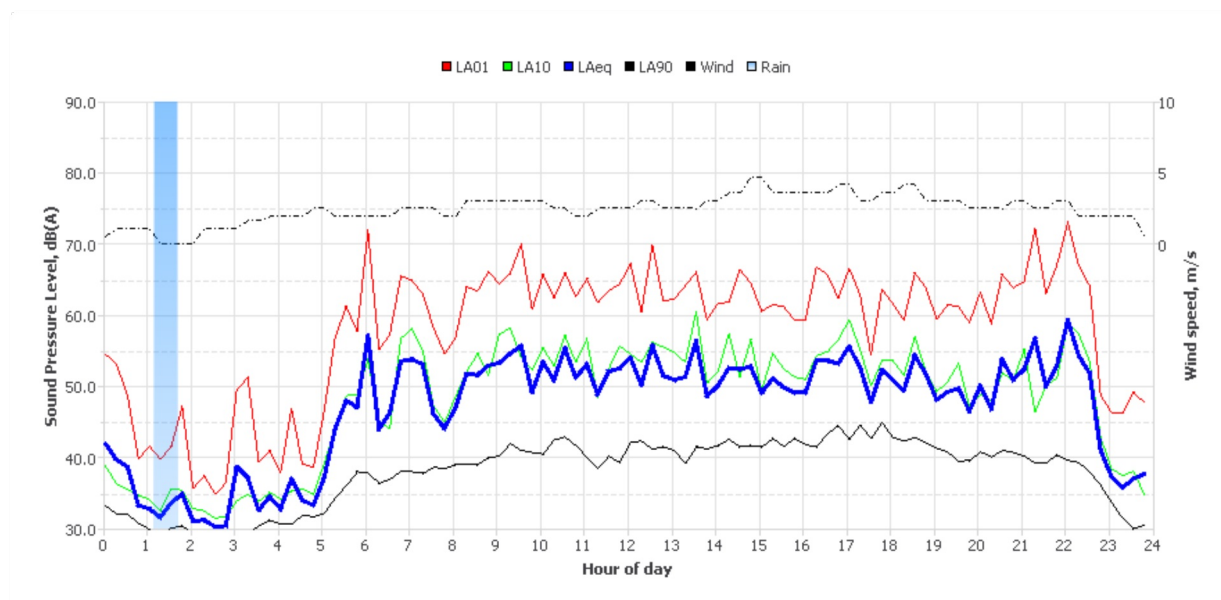
Measured noise levels

Logging Date	L _{Aeq,day} 7am 6pm	L _{Aeq,evening} 6pm 10pm	L _{Aeq,night} 10pm 7am	ABL Day 7am 6pm	ABL Eve 6pm 10pm	ABL Night 10pm 7am	L _{Aeq,15hr} 7am 10pm	L _{Aeq,9hr} 10pm 7am
Sat Nov 16 2024	52	52	48	39	39	29	52	48
Sun Nov 17 2024	53	52	45	37	-	27	53	45
Mon Nov 18 2024	51	45	48	-	-	-	51	48
Tue Nov 19 2024	51	50	49	-	35	29	51	49
Wed Nov 20 2024	55	53	48	-	34	27	54	48
Thu Nov 21 2024	54	54	50	39	39	26	54	50
Fri Nov 22 2024	54	52	46	39	38	30	54	46
Sat Nov 23 2024	58	51	47	36	37	30	57	47
Sun Nov 24 2024	52	51	46	36	34	31	52	46
Mon Nov 25 2024	60	51	46	39	34	27	58	46
Tue Nov 26 2024	53	50	47	39	36	29	53	47
Wed Nov 27 2024	54	49	45	-	37	33	53	45
Summary	55	51	47	39	36	29	54	47

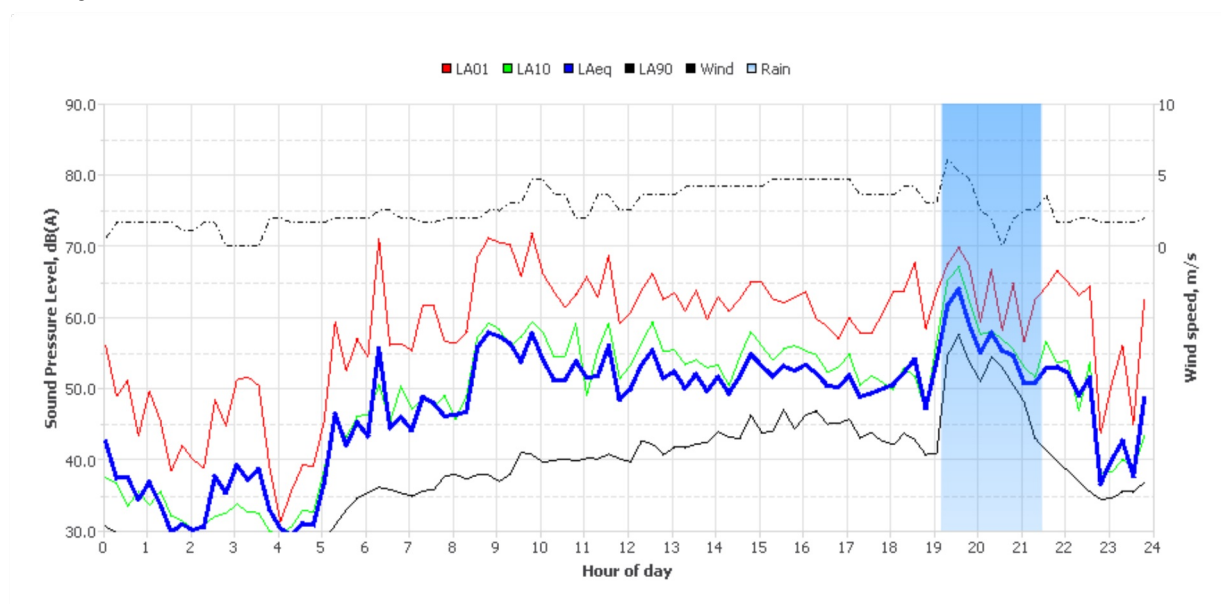
Note: Results denoted with '-' do not contain enough valid data for a value to be calculated. The data has been excluded either manually or automatically as a result of adverse weather conditions.

Logger Location	Logger Deployment Photo
 11 Comaneci Avenue, Newington	

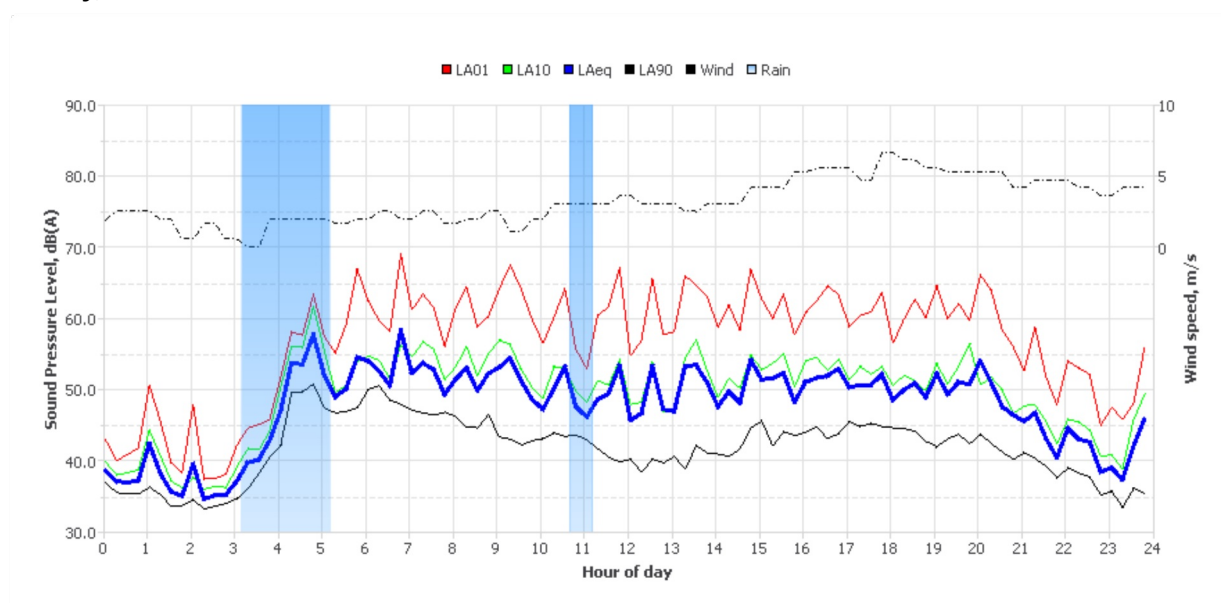
Saturday, 16 Nov 2024



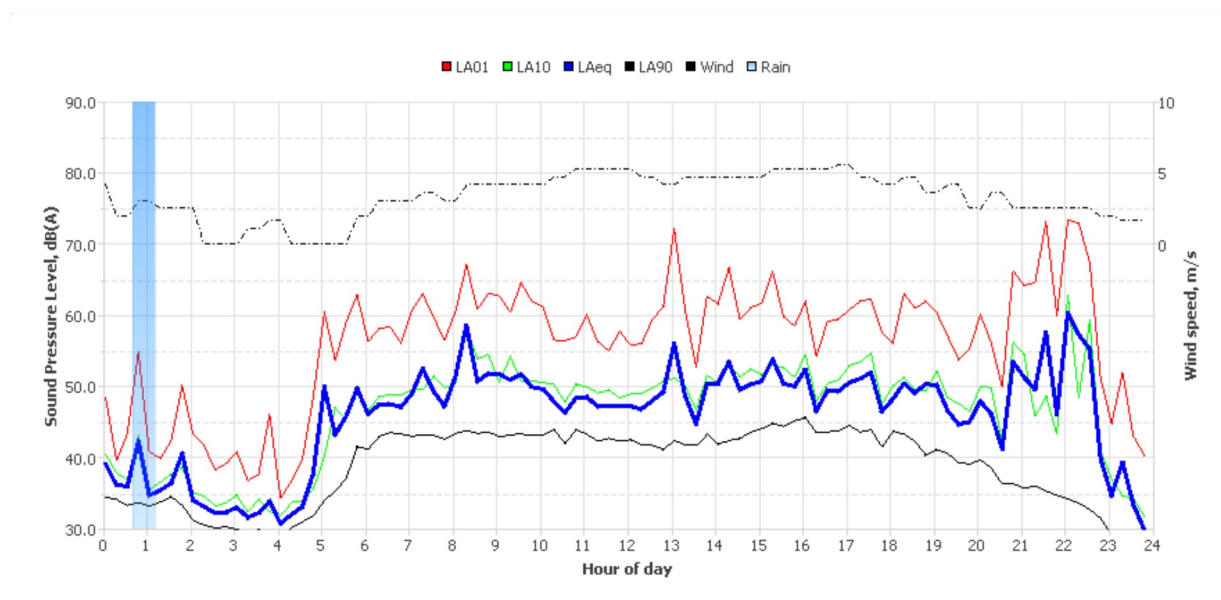
Sunday, 17 Nov 2024



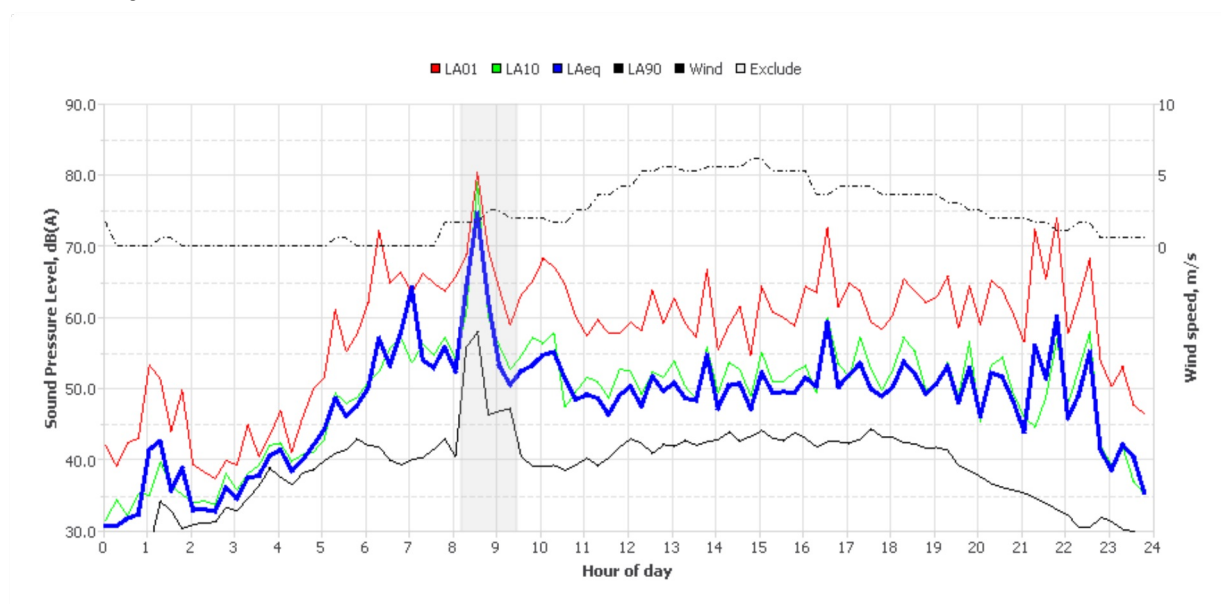
Monday, 18 Nov 2024



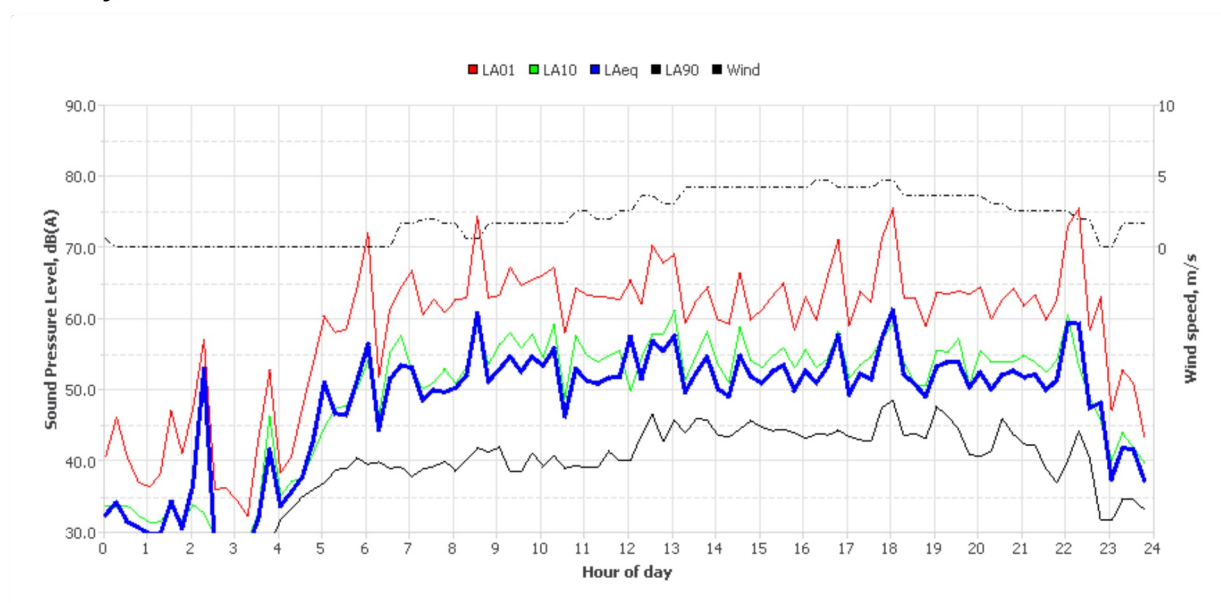
Tuesday, 19 Nov 2024



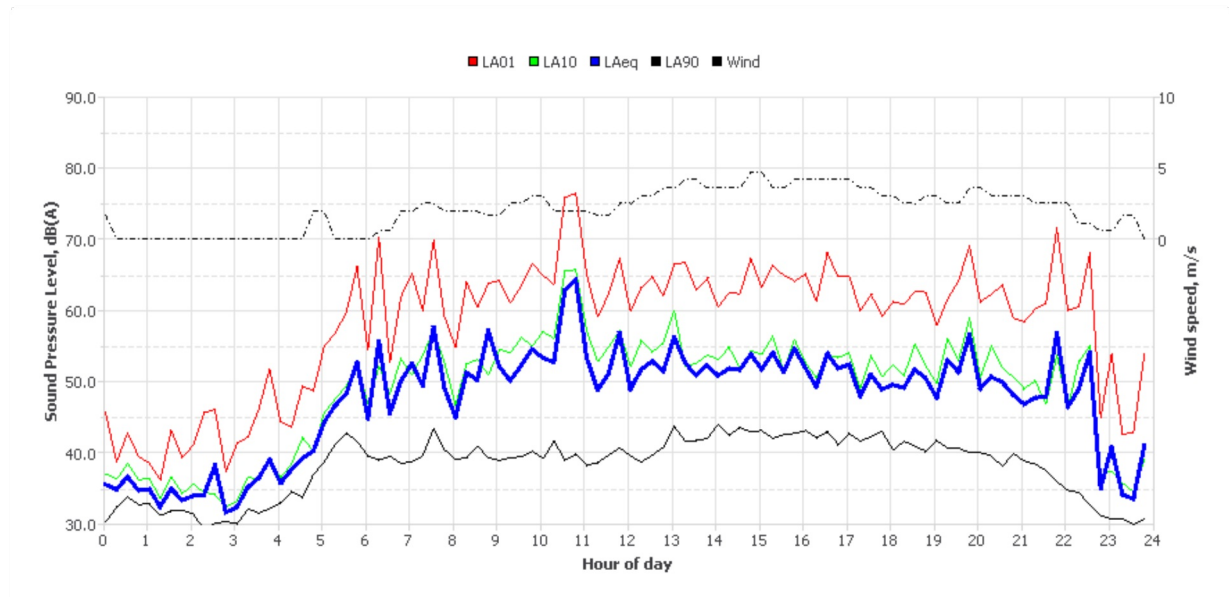
Wednesday, 20 Nov 2024



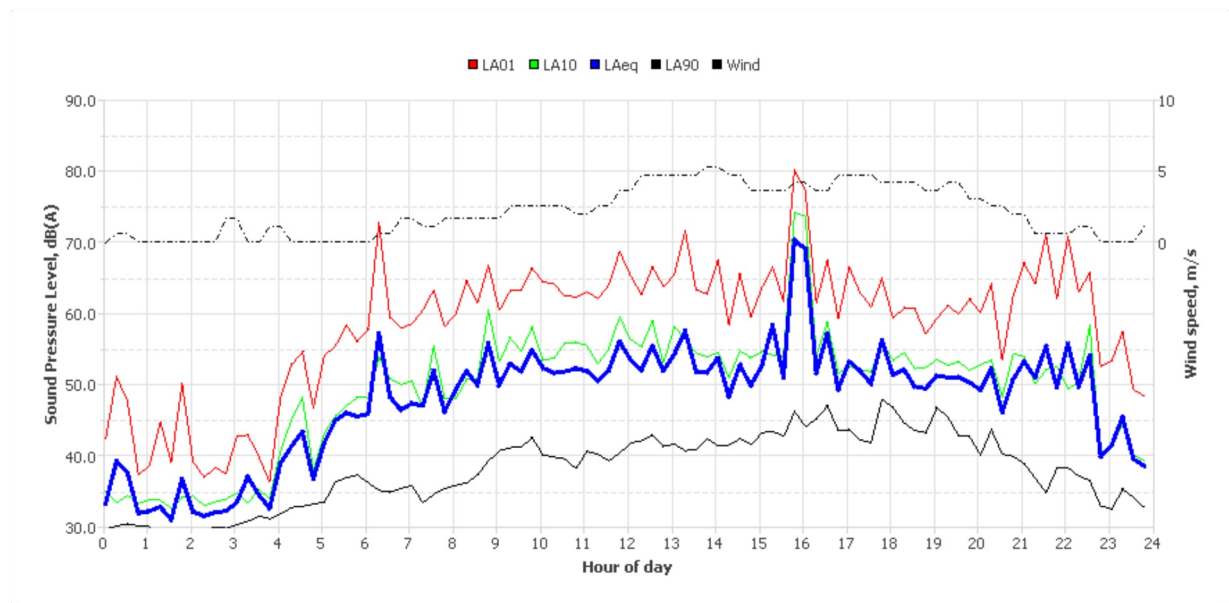
Thursday, 21 Nov 2024



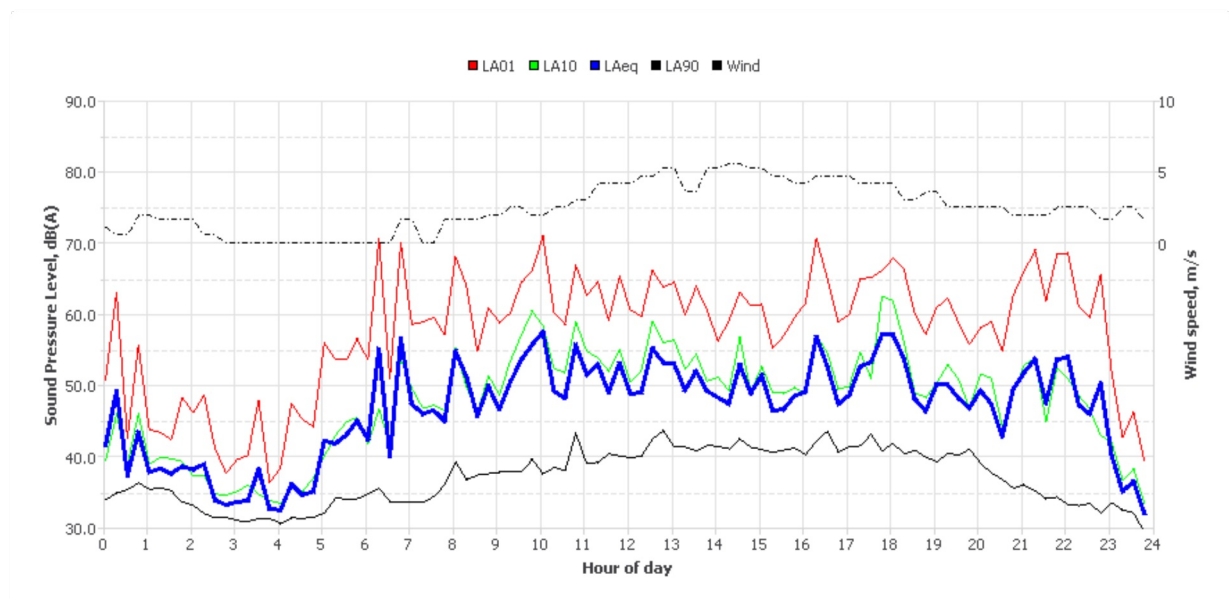
Friday, 22 Nov 2024



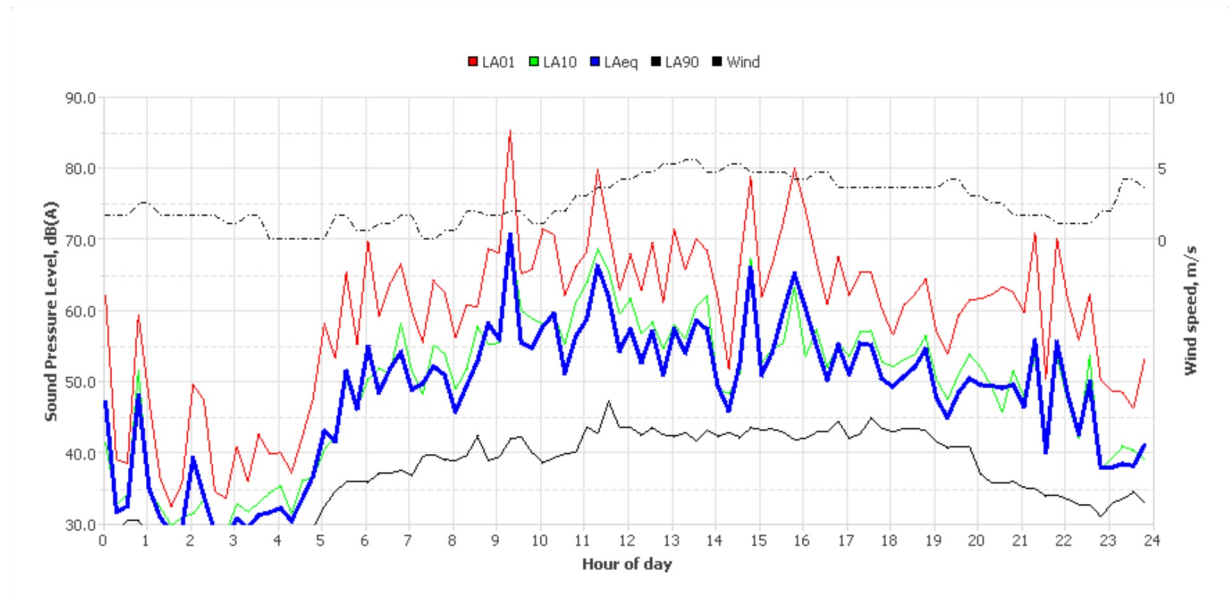
Saturday, 23 Nov 2024



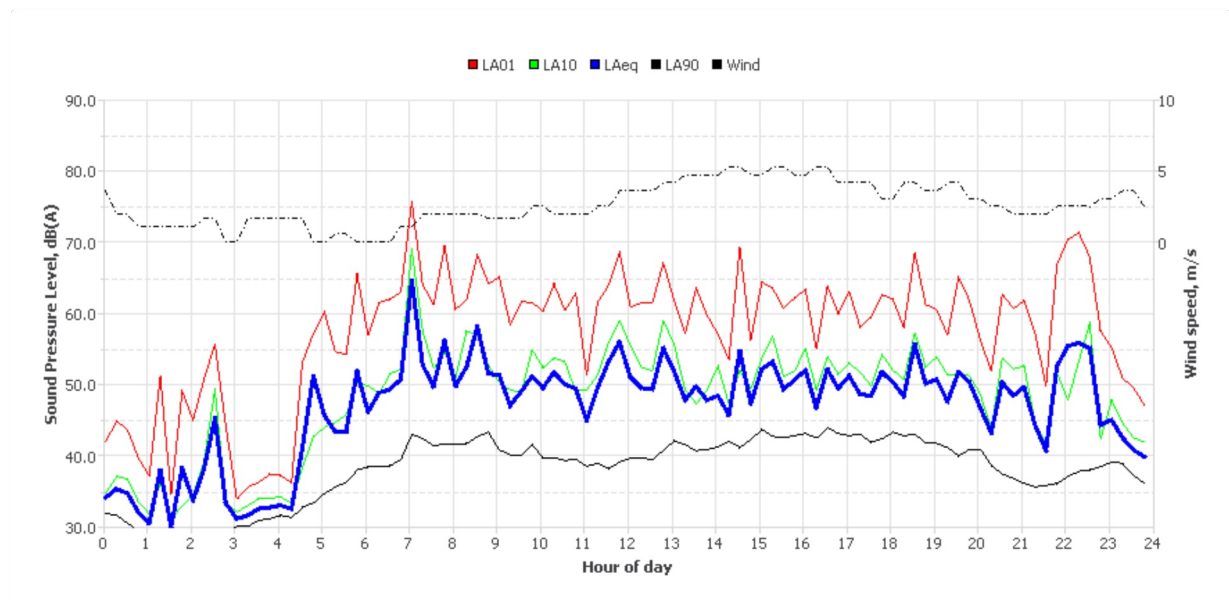
Sunday, 24 Nov 2024



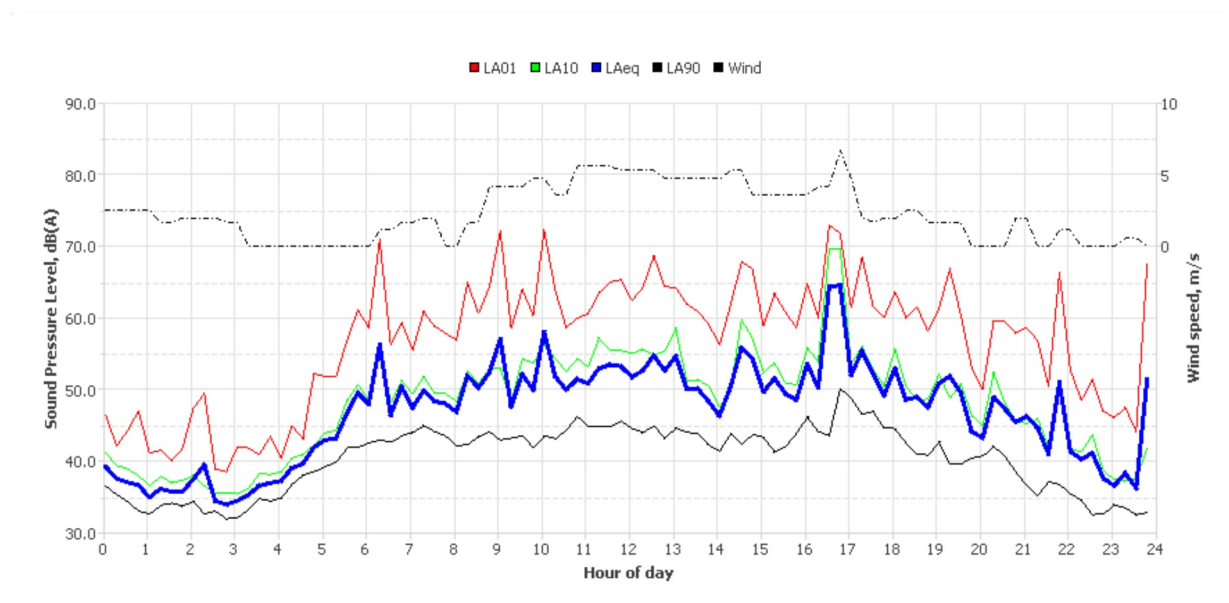
Monday, 25 Nov 2024



Tuesday, 26 Nov 2024



Wednesday, 27 Nov 2024



Noise Logger Report

13 Meadow Crescent, Meadowbank

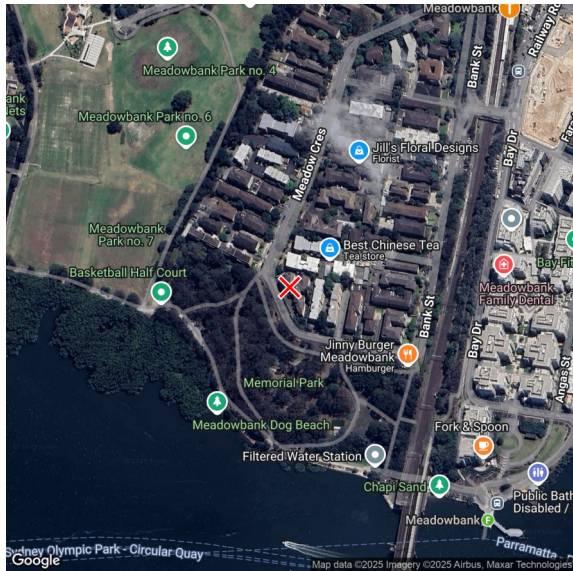


Item	Information
Logger Type	Rion NL52
Serial number	175537
Address	13 Meadow Crescent, Meadowbank
Location	Front Yard
Facade / Free Field	Free Field
Environment	Car pass-by 59 dB(A), very few passbys. Some distant construction and traffic noise, reverse alarms, otherwise birds chirping and leaves rustling dominant. Overcast conditions.

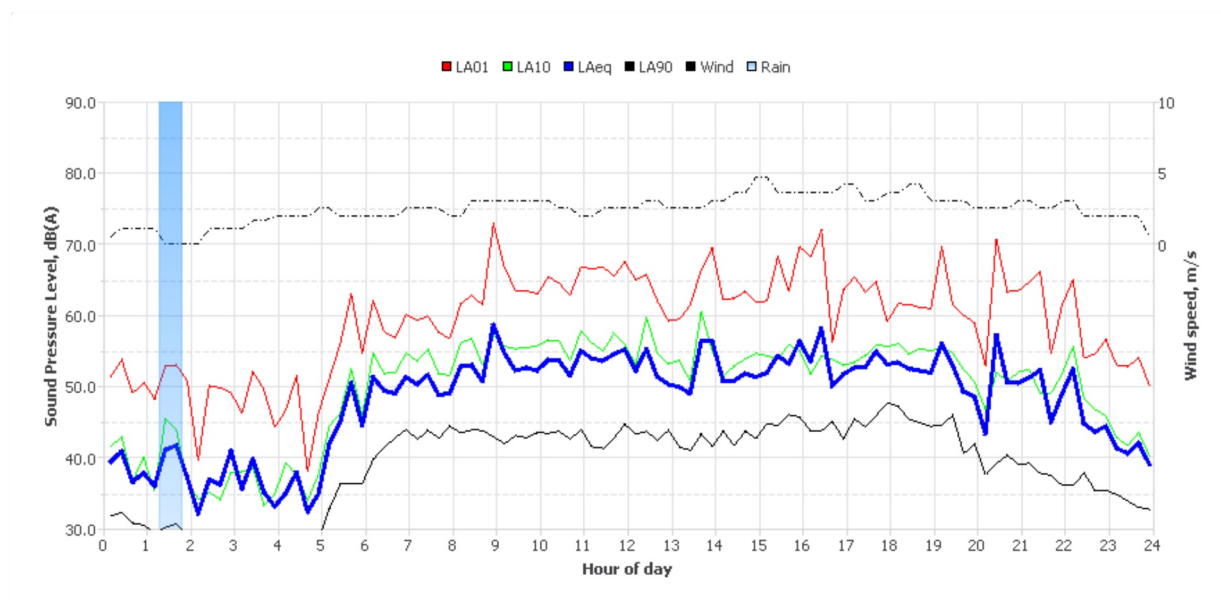
Measured noise levels

Logging Date	L _{Aeq,day} 7am 6pm	L _{Aeq,evening} 6pm 10pm	L _{Aeq,night} 10pm 7am	ABL Day 7am 6pm	ABL Eve 6pm 10pm	ABL Night 10pm 7am	L _{Aeq,15hr} 7am 10pm	L _{Aeq,9hr} 10pm 7am
Sat Nov 16 2024	53	52	45	42	38	28	53	45
Sun Nov 17 2024	54	53	49	41	-	28	54	49
Mon Nov 18 2024	63	47	49	-	-	-	63	49
Tue Nov 19 2024	54	50	47	-	36	29	53	47
Wed Nov 20 2024	52	52	46	-	37	30	52	46
Thu Nov 21 2024	55	55	48	41	37	29	55	48
Fri Nov 22 2024	54	53	47	42	40	30	54	47
Sat Nov 23 2024	54	54	47	41	38	33	54	47
Sun Nov 24 2024	53	54	51	41	37	34	53	51
Mon Nov 25 2024	53	52	48	-	37	31	53	48
Tue Nov 26 2024	52	52	48	42	39	34	52	48
Wed Nov 27 2024	52	54	46	-	37	36	53	46
Summary	56	53	48	41	37	30	56	48

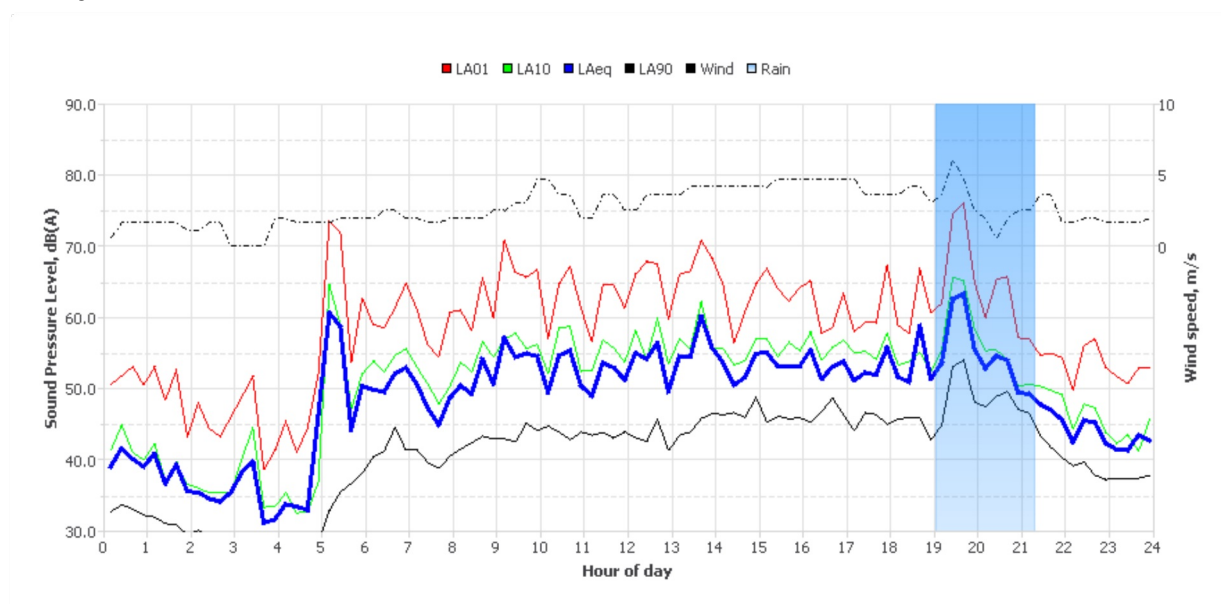
Note: Results denoted with '-' do not contain enough valid data for a value to be calculated. The data has been excluded either manually or automatically as a result of adverse weather conditions.

Logger Location	Logger Deployment Photo
 13 Meadow Crescent, Meadowbank	

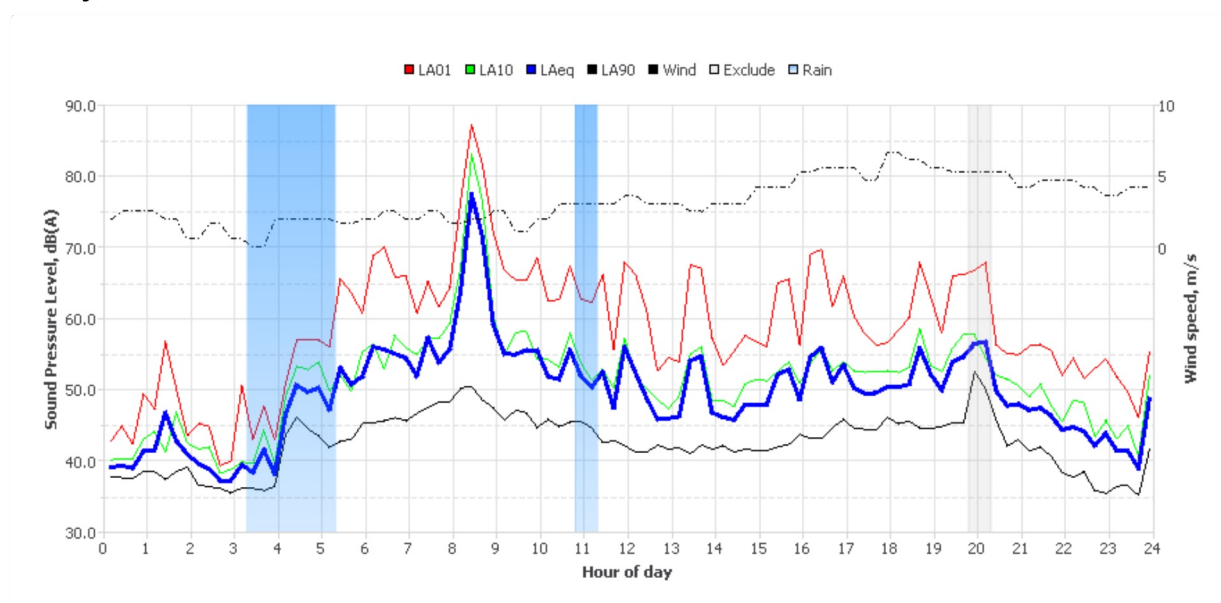
Saturday, 16 Nov 2024



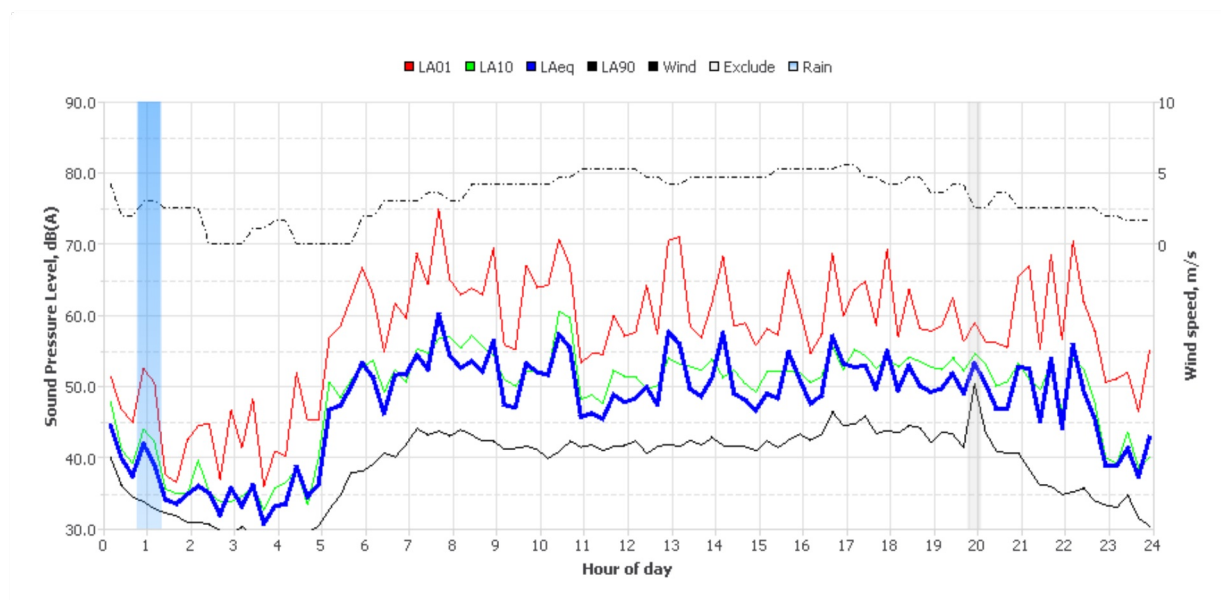
Sunday, 17 Nov 2024



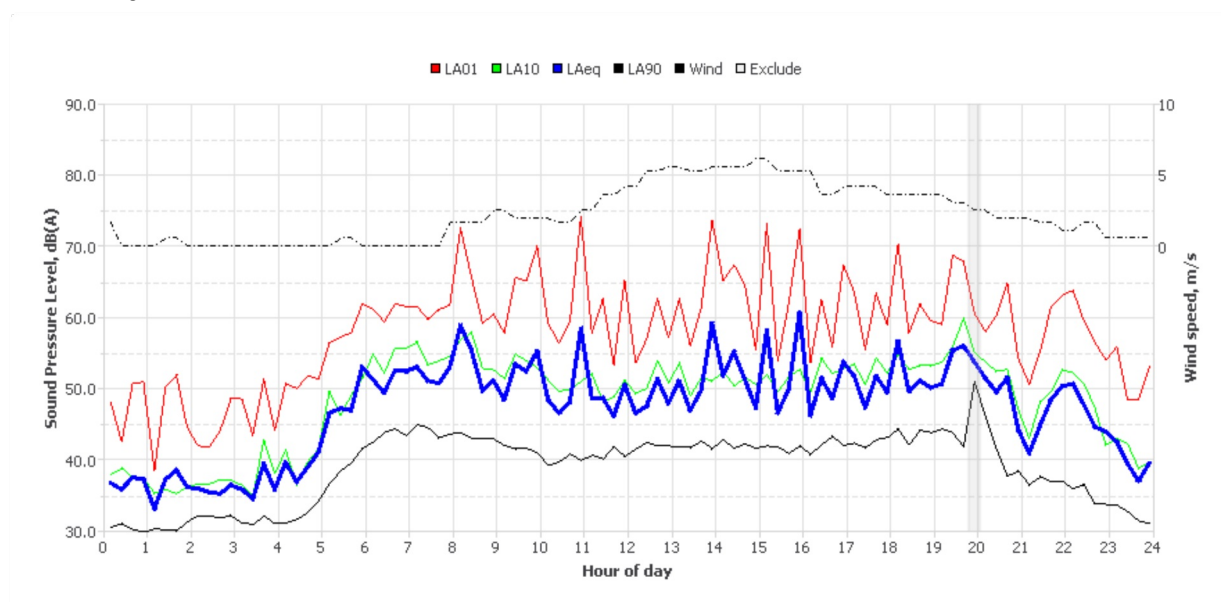
Monday, 18 Nov 2024



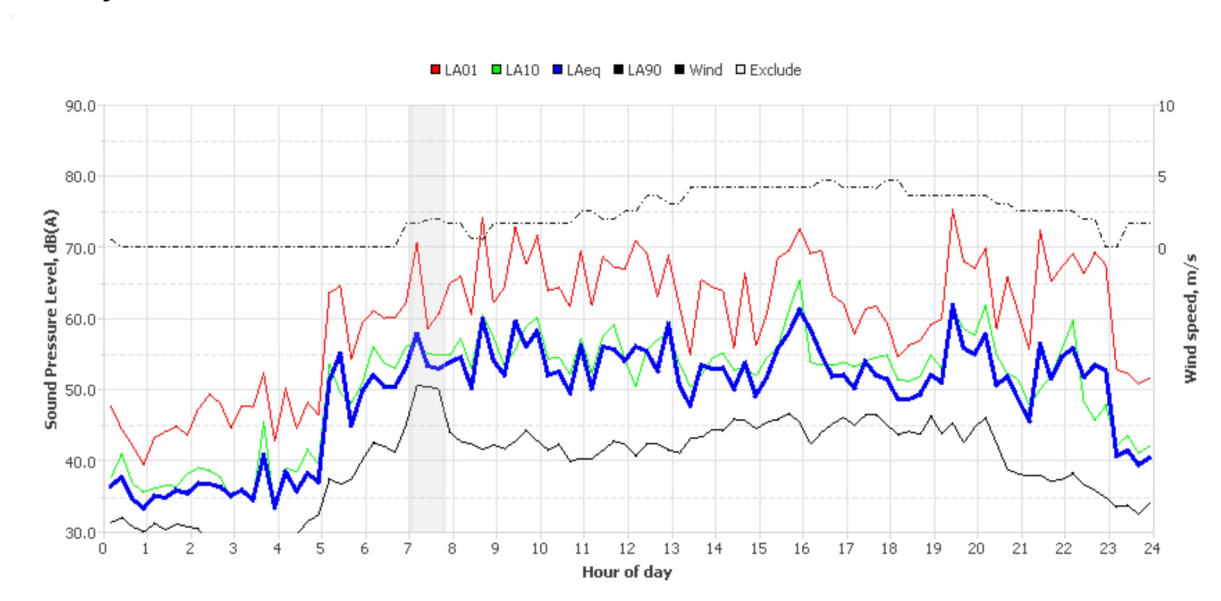
Tuesday, 19 Nov 2024



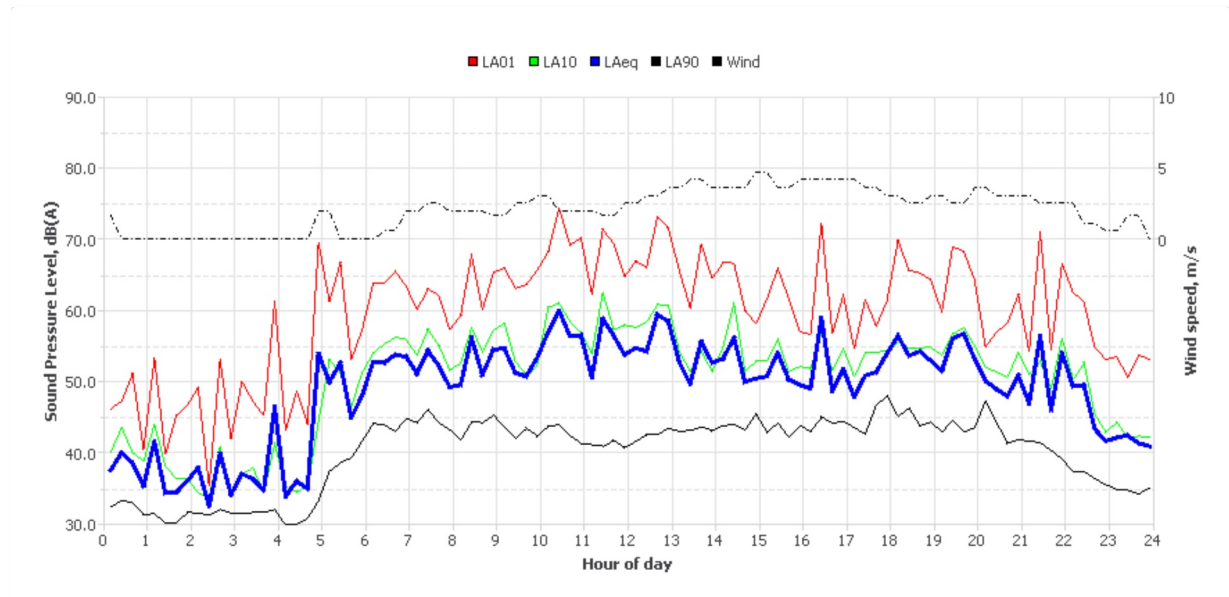
Wednesday, 20 Nov 2024



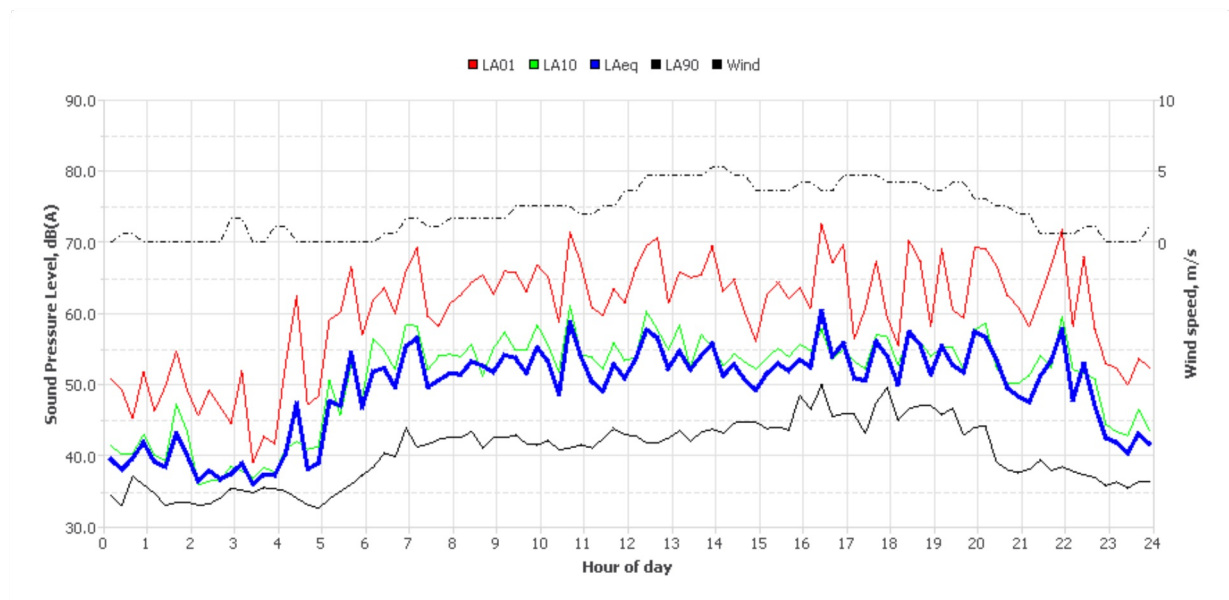
Thursday, 21 Nov 2024



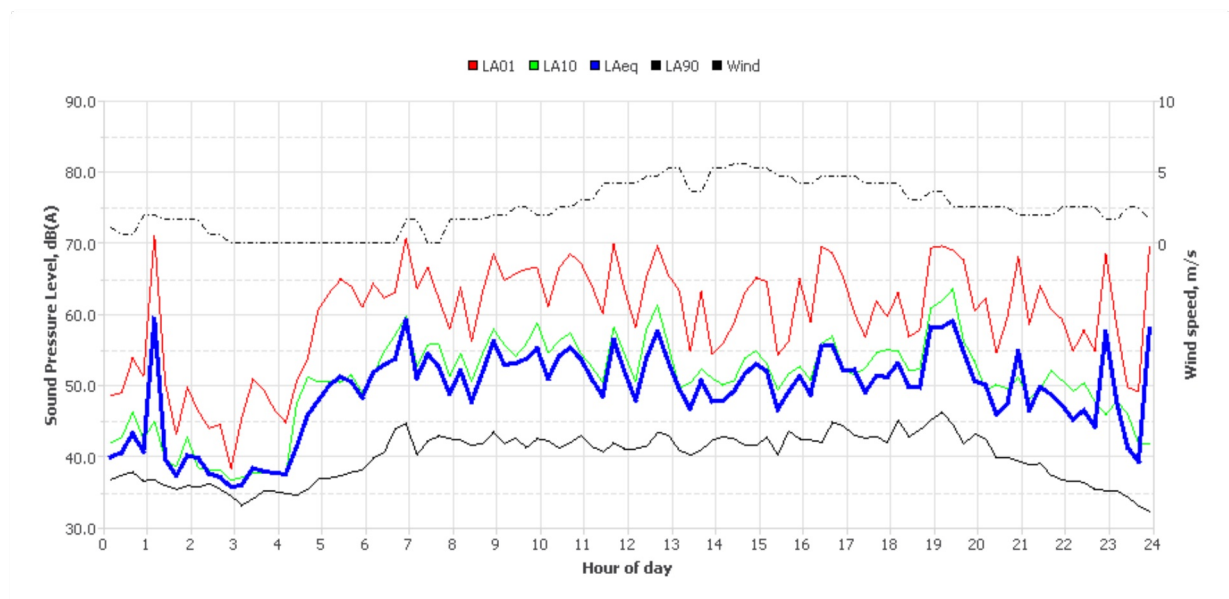
Friday, 22 Nov 2024



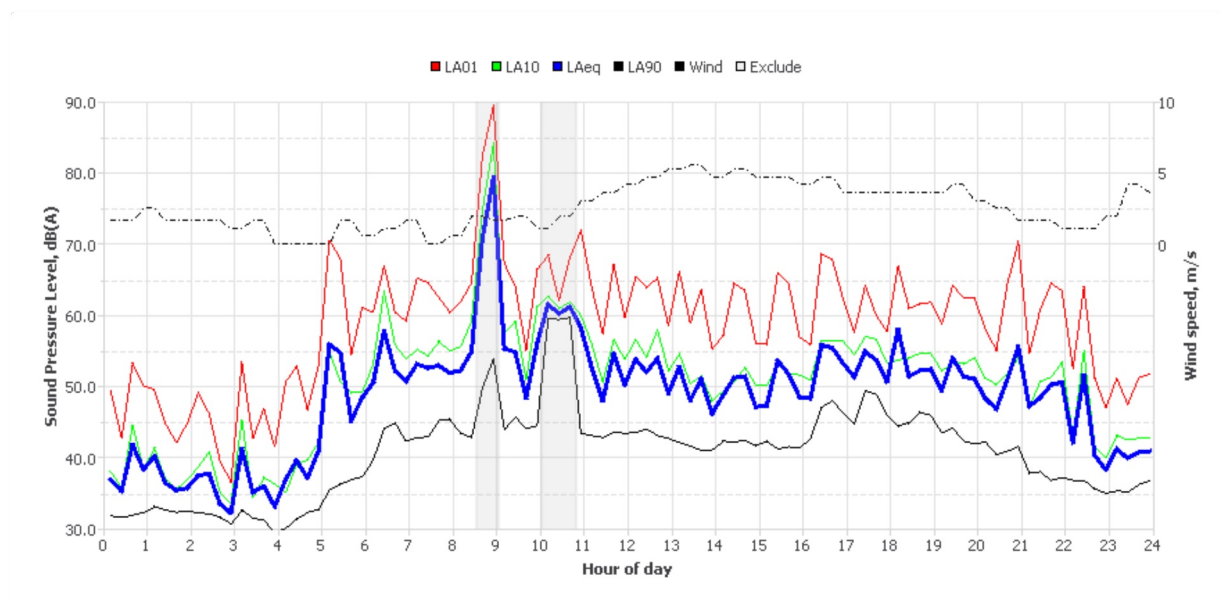
Saturday, 23 Nov 2024



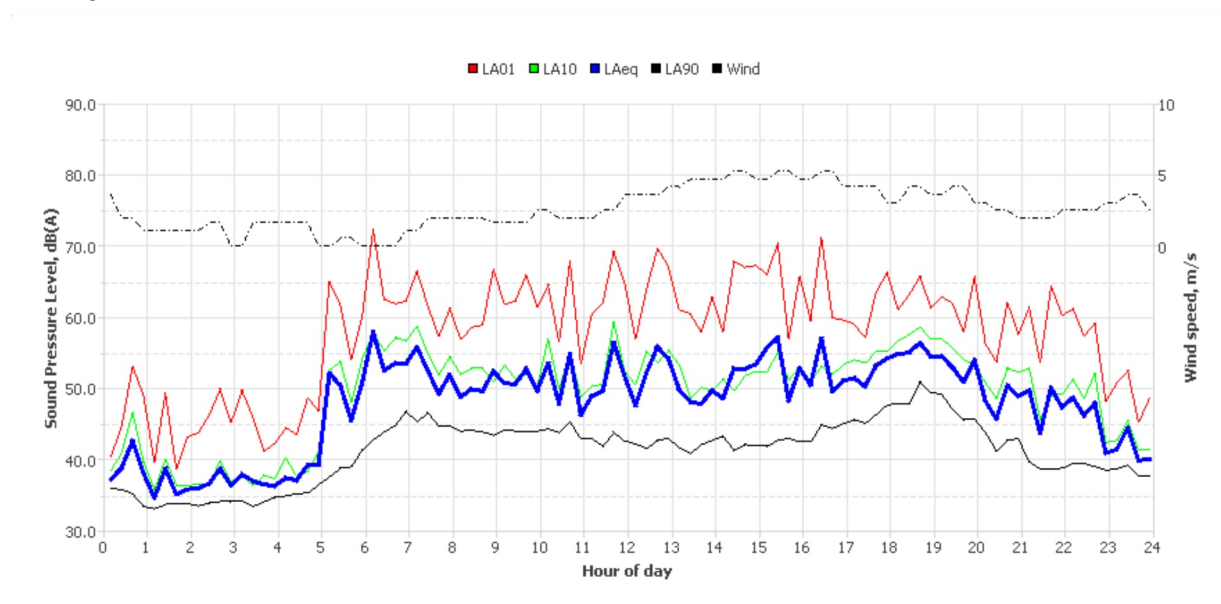
Sunday, 24 Nov 2024



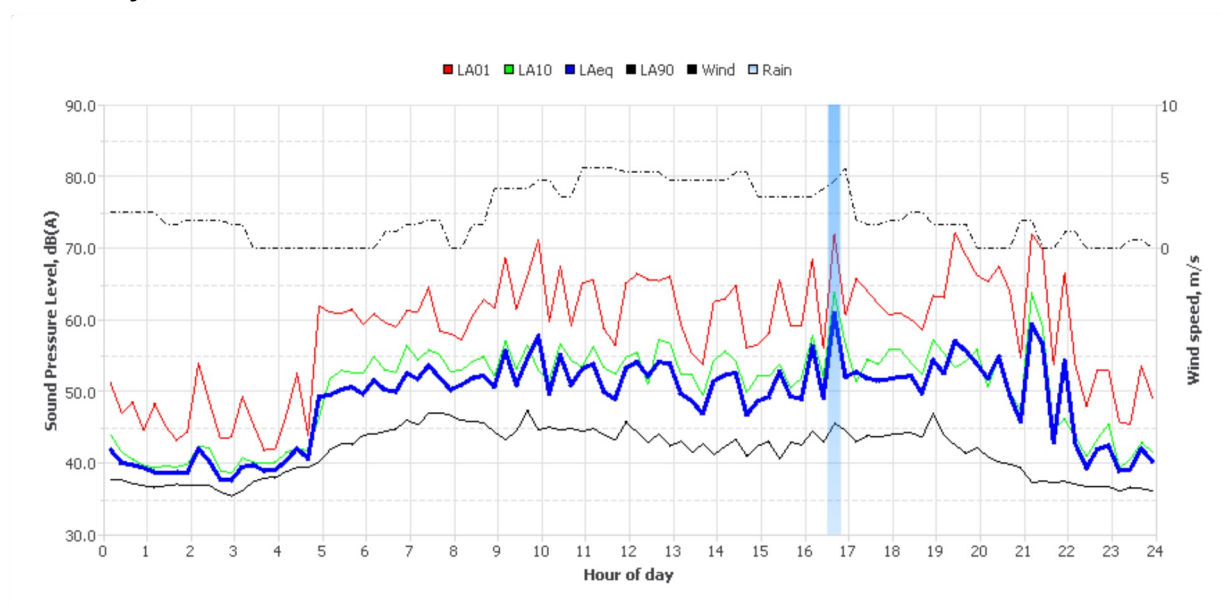
Monday, 25 Nov 2024



Tuesday, 26 Nov 2024



Wednesday, 27 Nov 2024



Appendix B

Construction noise contours



Construction Noise Contours Scenario 1: Construction compound operation (Day)

Noise contours are shown 1.5 meters above ground level



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

Scenario 1

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Education

Industrial

Passive Recreation

Place of Worship

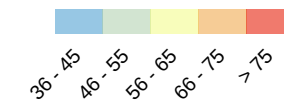
Prison

Residential

Shed

Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)



The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours Scenario 1: Construction compound operation (Night)

Noise contours are shown 1.5 meters above ground level

Scenario 1

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

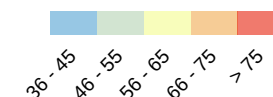
Prison

Residential

Shed

Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

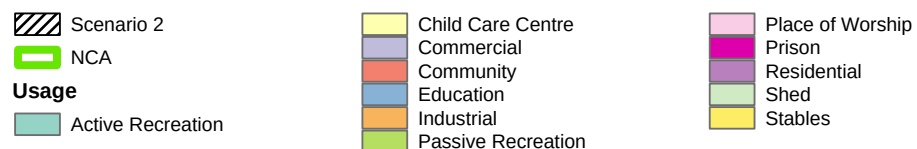
The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

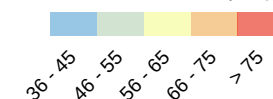


Construction Noise Contours Scenario 2: Construction of the WRRF site

Noise contours are shown 1.5 meters above ground level



Predicted noise level, $L_{Aeq,15min}$ dB(A)



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours Scenario 2: Construction of the WRRF site (Night)

Noise contours are shown 1.5 meters above ground level

Scenario 2

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

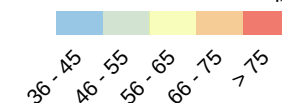
Prison

Residential

Shed

Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)

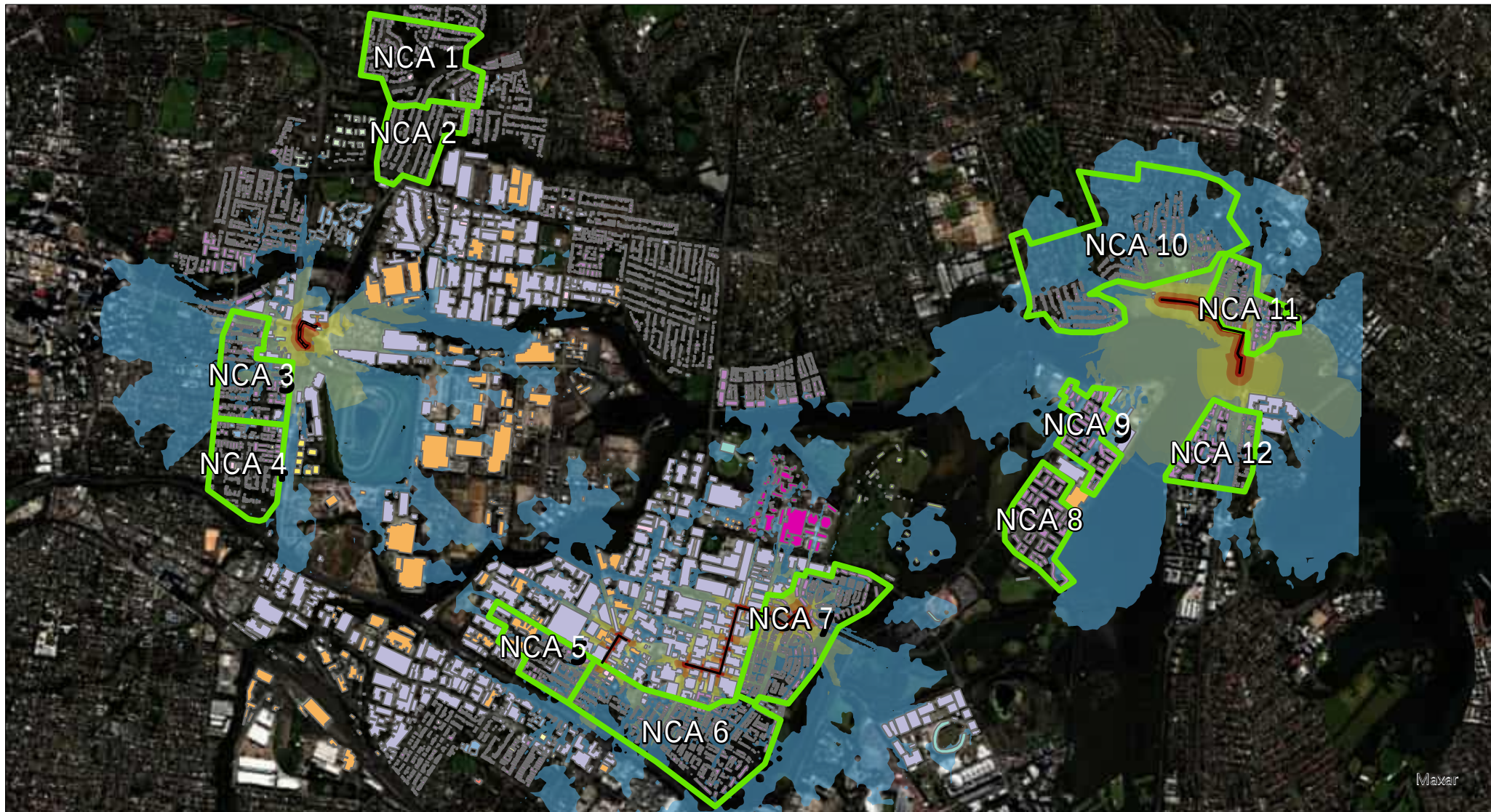


AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours Scenario 3: Pipeline construction - Open trenching (Day)

Noise contours are shown 1.5 meters above ground level

Scenario 3

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

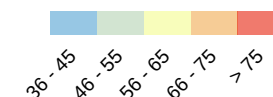
Prison

Residential

Shed

Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours Scenario 3: Pipeline construction - Open trenching (Night)

Noise contours are shown 1.5 meters above ground level

Scenario 3

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

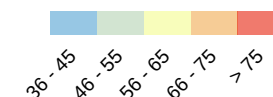
Prison

Residential

Shed

Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours

Scenario 4: Pipeline construction - Horizontal directional drilling

Noise contours are shown 1.5 meters above ground level



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

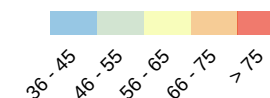
The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

- Scenario 4
- NCA
- Usage**
- Active Recreation

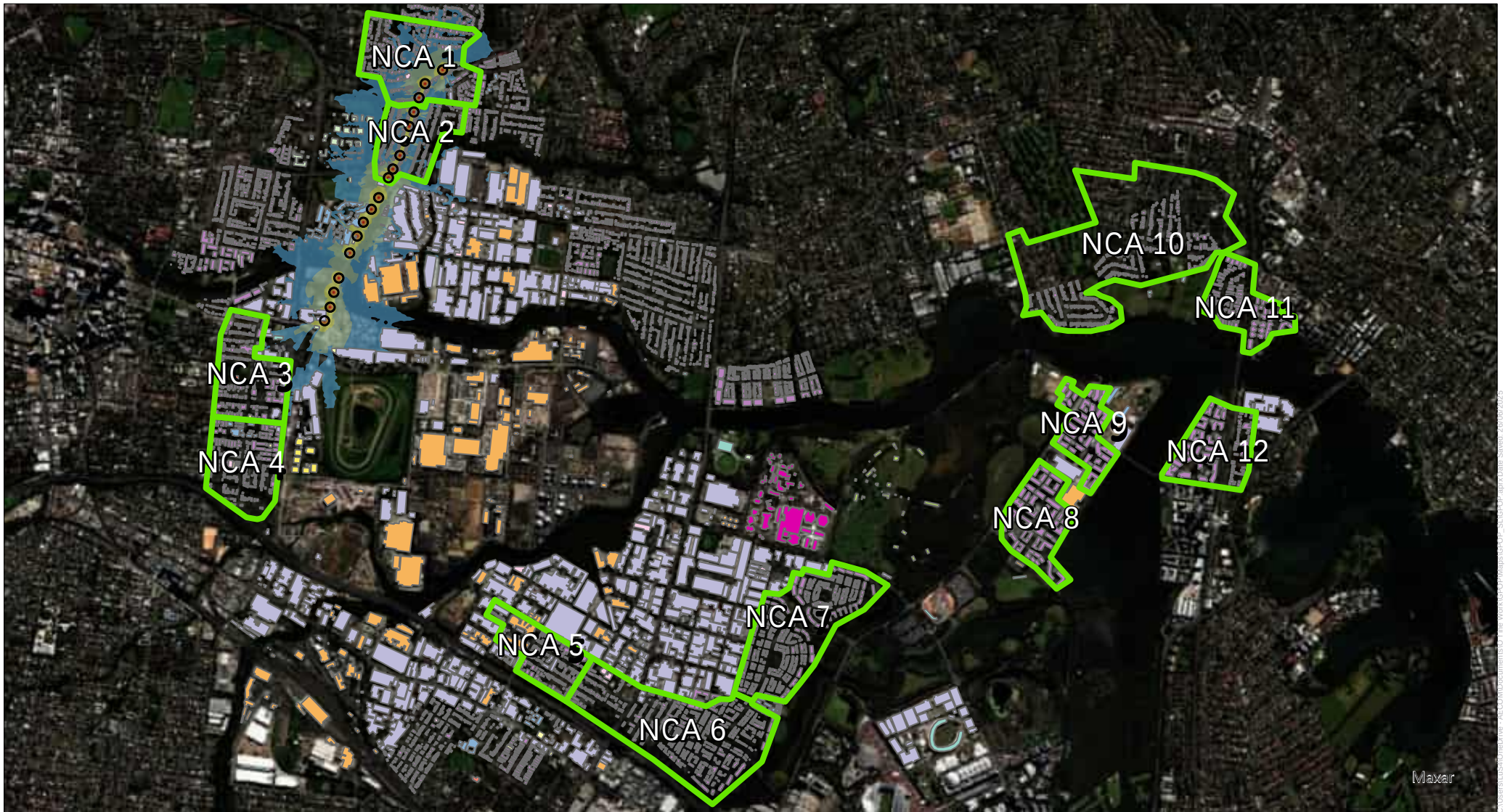
- Child Care Centre
- Commercial
- Community
- Education
- Industrial
- Passive Recreation

- Place of Worship
- Prison
- Residential
- Shed
- Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)



Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours Scenario 5: Slip lining works (Day)

Noise contours are shown 1.5 meters above ground level



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

○ Scenario 5

▬ NCA

Usage

▬ Active Recreation

▬ Child Care Centre

▬ Commercial

▬ Community

▬ Education

▬ Industrial

▬ Passive Recreation

▬ Place of Worship

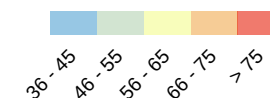
▬ Prison

▬ Residential

▬ Shed

▬ Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)



The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours Scenario 5: Slip lining works (Night)

Noise contours are shown 1.5 meters above ground level

○ Scenario 5
 NCA
Usage
 Active Recreation

Child Care Centre
 Commercial
 Community
 Education
 Industrial
 Passive Recreation

Place of Worship
 Prison
 Residential
 Shed
 Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)

36 - 45	46 - 55	56 - 65	66 - 75	> 75
---------	---------	---------	---------	------

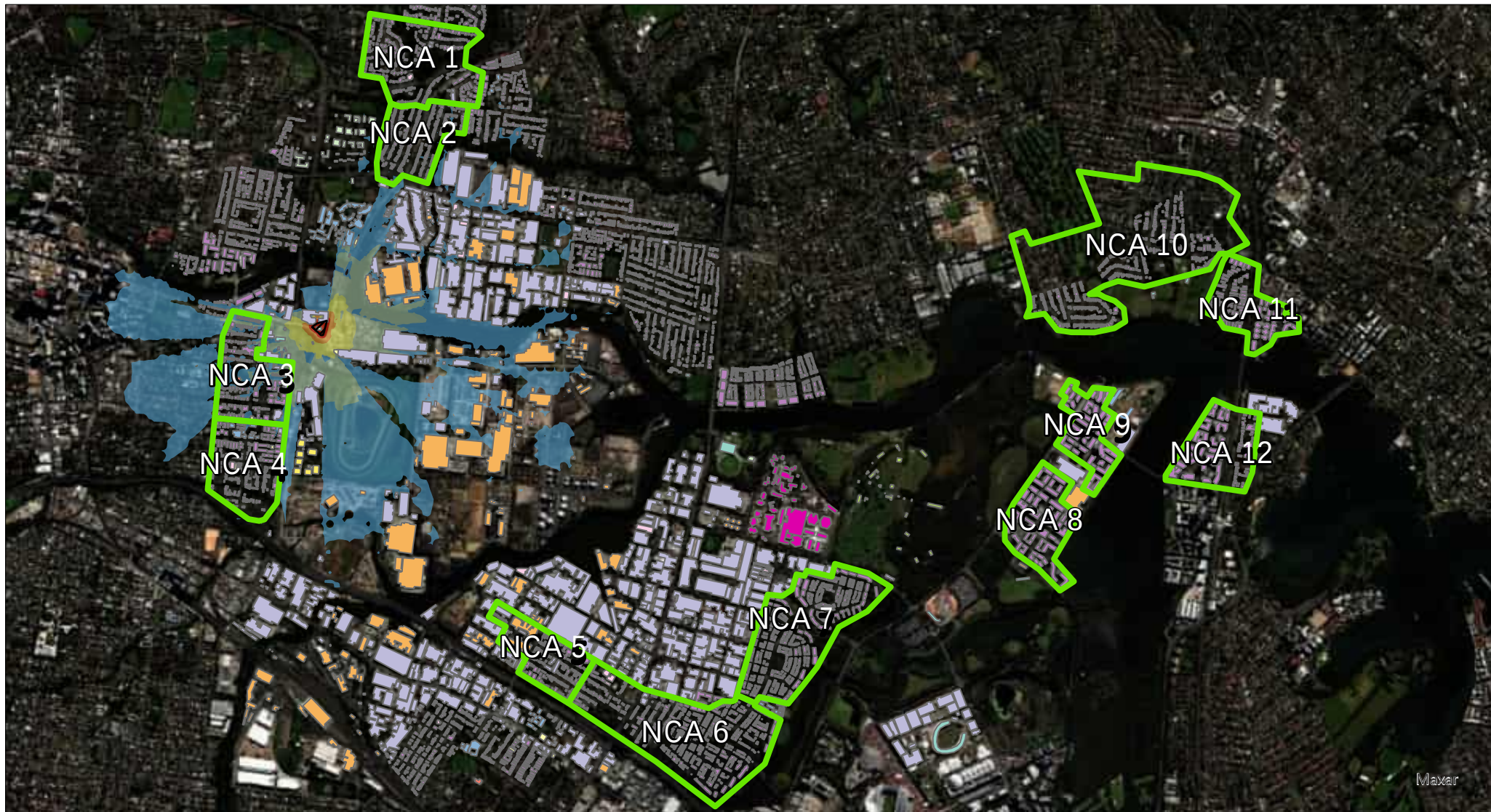


AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours Scenario 6: Works at SP0067

Noise contours are shown 1.5 meters above ground level

Scenario 6

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

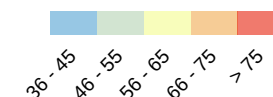
Prison

Residential

Shed

Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)

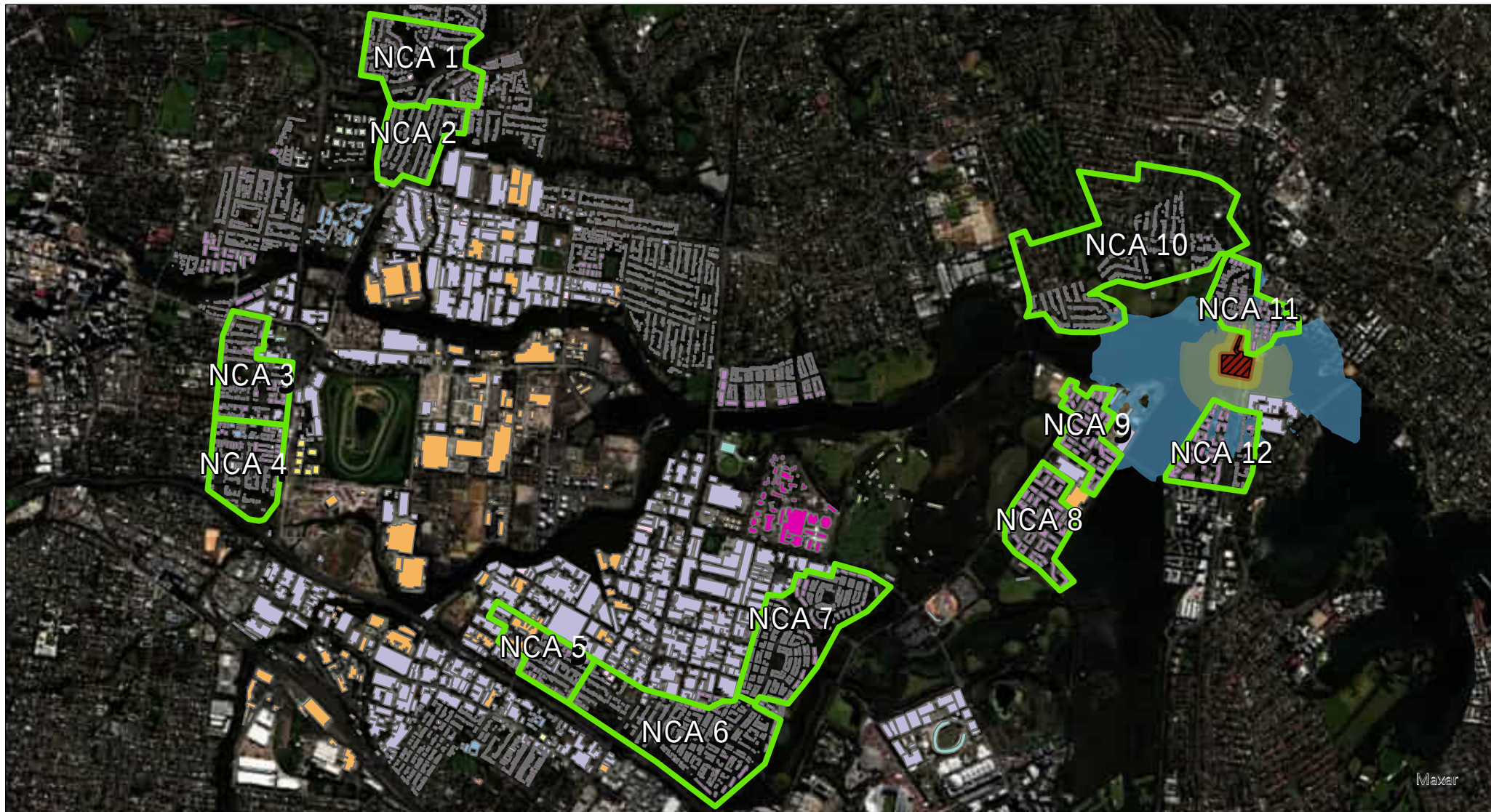


AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Contours Scenario 7: Construction of river release structure

Noise contours are shown 1.5 meters above ground level



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

Scenario 7

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

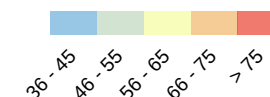
Prison

Residential

Shed

Stables

Predicted noise level, $L_{Aeq,15min}$ dB(A)



The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Appendix C

Construction noise sleep disturbance contours



Construction Noise Sleep Disturbance Contours Scenario 1: Construction compound operation

Noise contours are shown 1.5 meters above ground level



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

Scenario 1

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

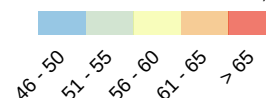
Prison

Residential

Shed

Stables

Predicted noise level, $L_{A1,1min}$ dB(A)



The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Sleep Disturbance Contours Scenario 2: Construction of the WRRF site

Noise contours are shown 1.5 meters above ground level



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

Scenario 2

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

Prison

Residential

Shed

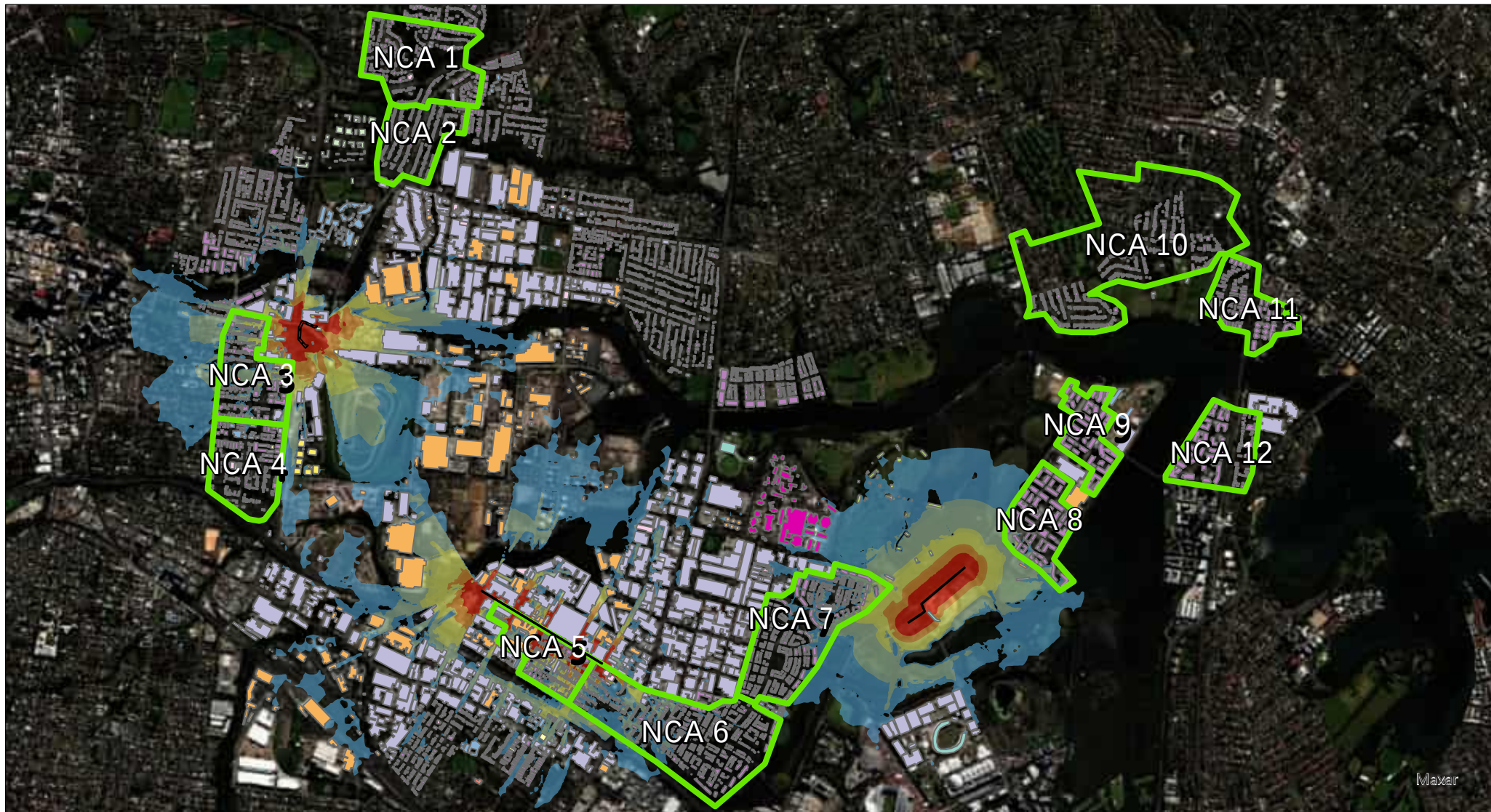
Stables

Predicted noise level, $L_{A1,1min}$ dB(A)



The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Sleep Disturbance Contours Scenario 3: Pipeline construction - Open trenching

Noise contours are shown 1.5 meters above ground level

Scenario 3

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

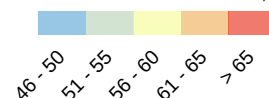
Prison

Residential

Shed

Stables

Predicted noise level, $L_{A1,1min}$ dB(A)



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Sleep Disturbance Contours Scenario 4: Pipeline construction - Horizontal directional drilling

Noise contours are shown 1.5 meters above ground level

○ Scenario 4
 NCA
Usage
 Active Recreation

Child Care Centre
 Commercial
 Community
 Education
 Industrial
 Passive Recreation

Place of Worship
 Prison
 Residential
 Shed
 Stables

Predicted noise level, $L_{A1,1min}$ dB(A)

46 - 50	51 - 55	56 - 60	61 - 65	> 65
---------	---------	---------	---------	------

0 510 1,020 Meters

AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Sleep Disturbance Contours Scenario 5: Slip lining works

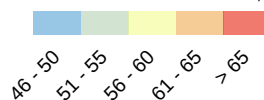
Noise contours are shown 1.5 meters above ground level

- Scenario 5
- NCA
- Usage**
- Active Recreation

- Child Care Centre
- Commercial
- Community
- Education
- Industrial
- Passive Recreation

- Place of Worship
- Prison
- Residential
- Shed
- Stables

Predicted noise level, $L_{A1,1min}$ dB(A)

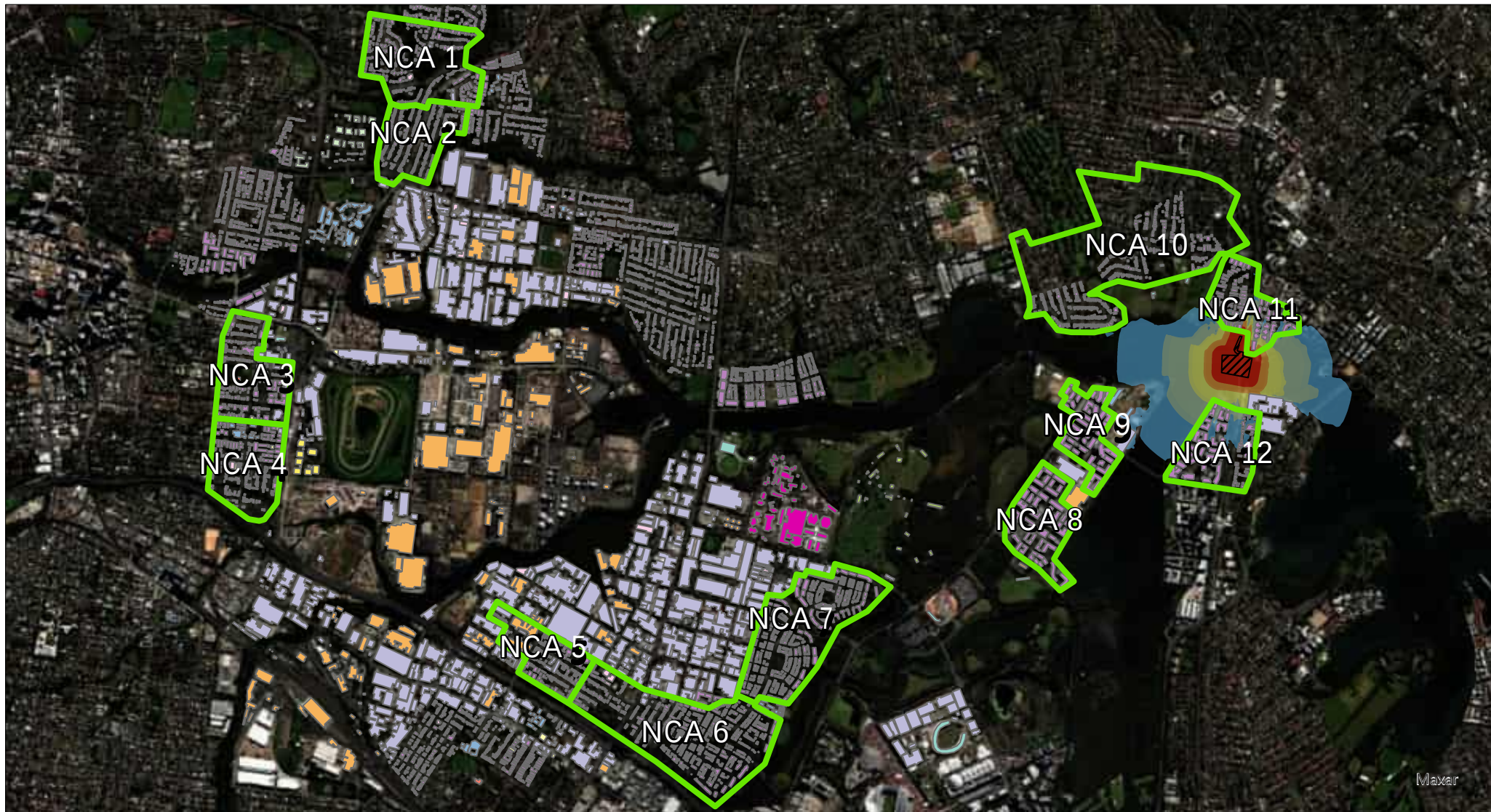


AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.



Construction Noise Sleep Disturbance Contours Scenario 7: Construction of river release structure

Noise contours are shown 1.5 meters above ground level

Scenario 7

NCA

Usage

Active Recreation

Child Care Centre

Commercial

Community

Education

Industrial

Passive Recreation

Place of Worship

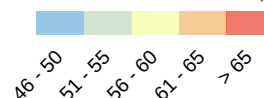
Prison

Residential

Shed

Stables

Predicted noise level, $L_{A1,1min}$ dB(A)



AECOM

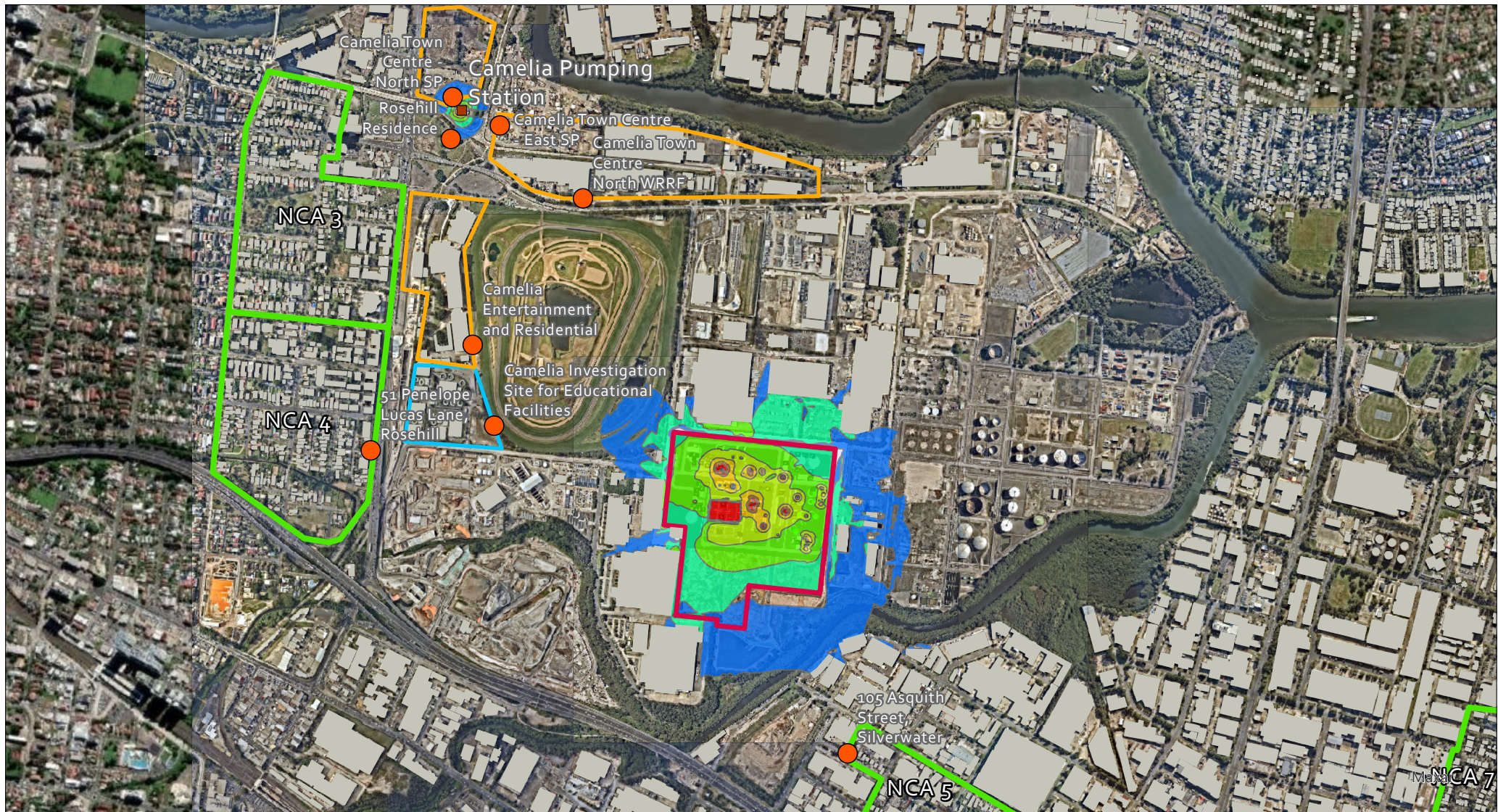
Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

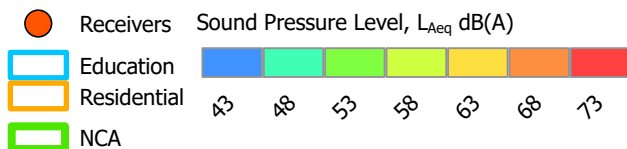
Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Appendix D

Operational noise contours



Camellia Water Resource Recovery Facility - Night-Time Noise Levels - Neutral Weather



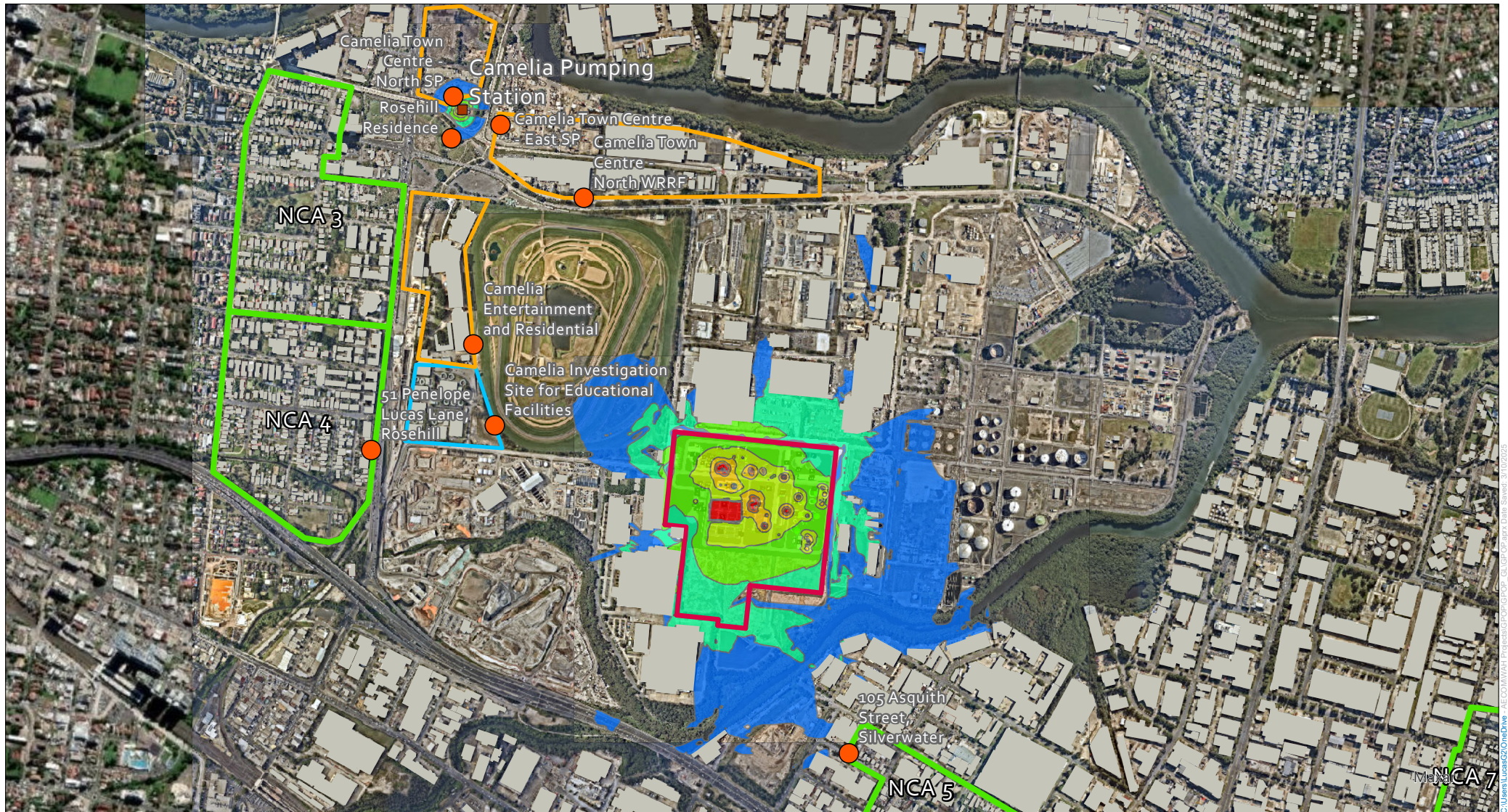
AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

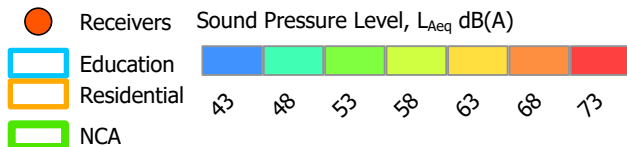
The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nearmap 2024



Camellia Water Resource Recovery Facility - Night-Time Noise Levels - Adverse Weather

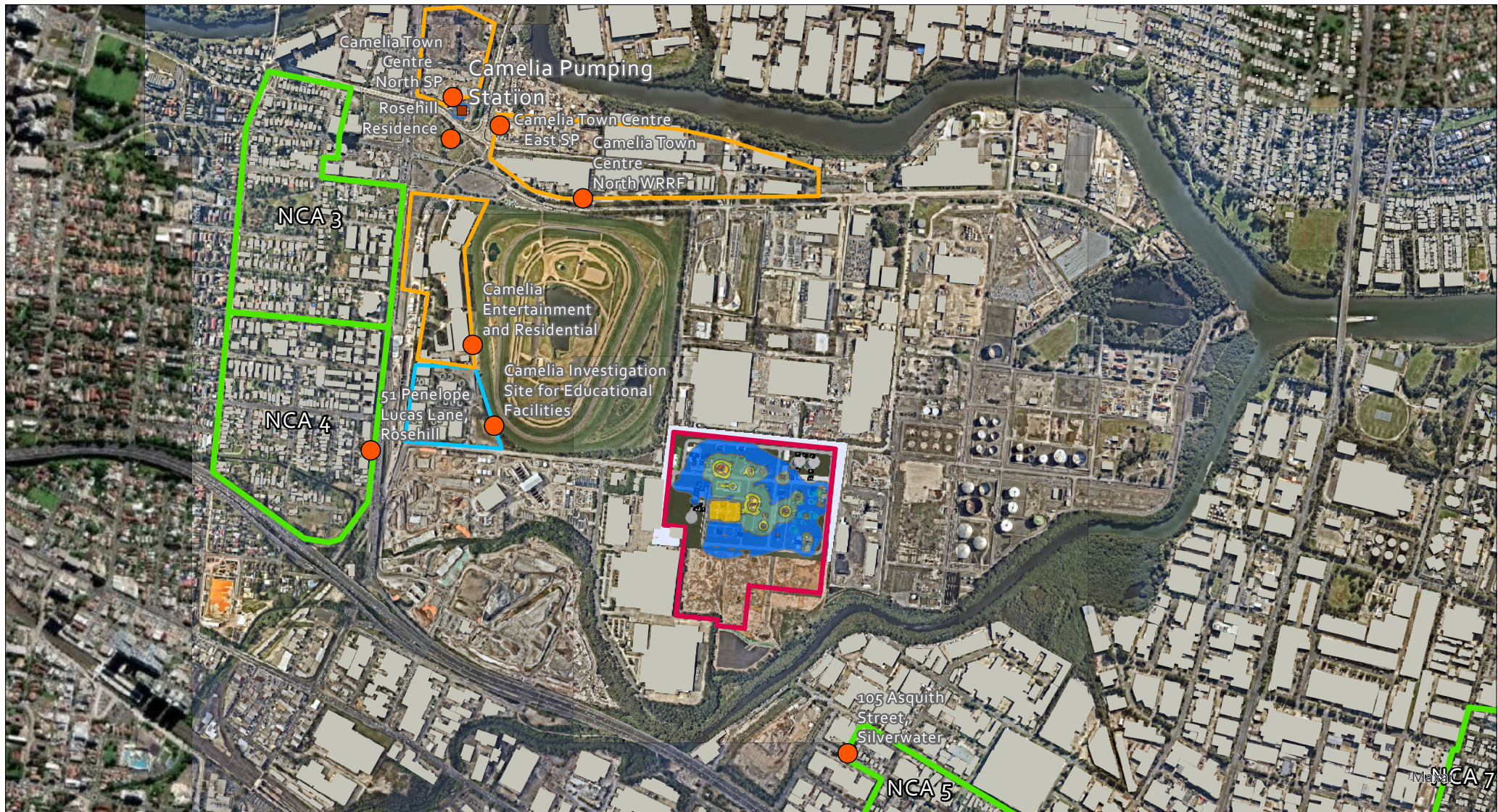


Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

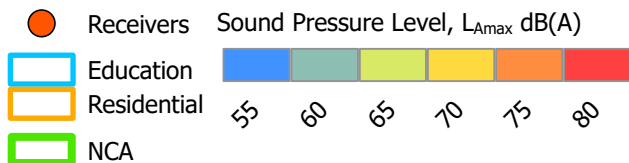
The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nearmap 2024



Camellia Water Resource Recovery Facility - Night-Time Noise Levels - Neutral Weather - Sleep Disturbance



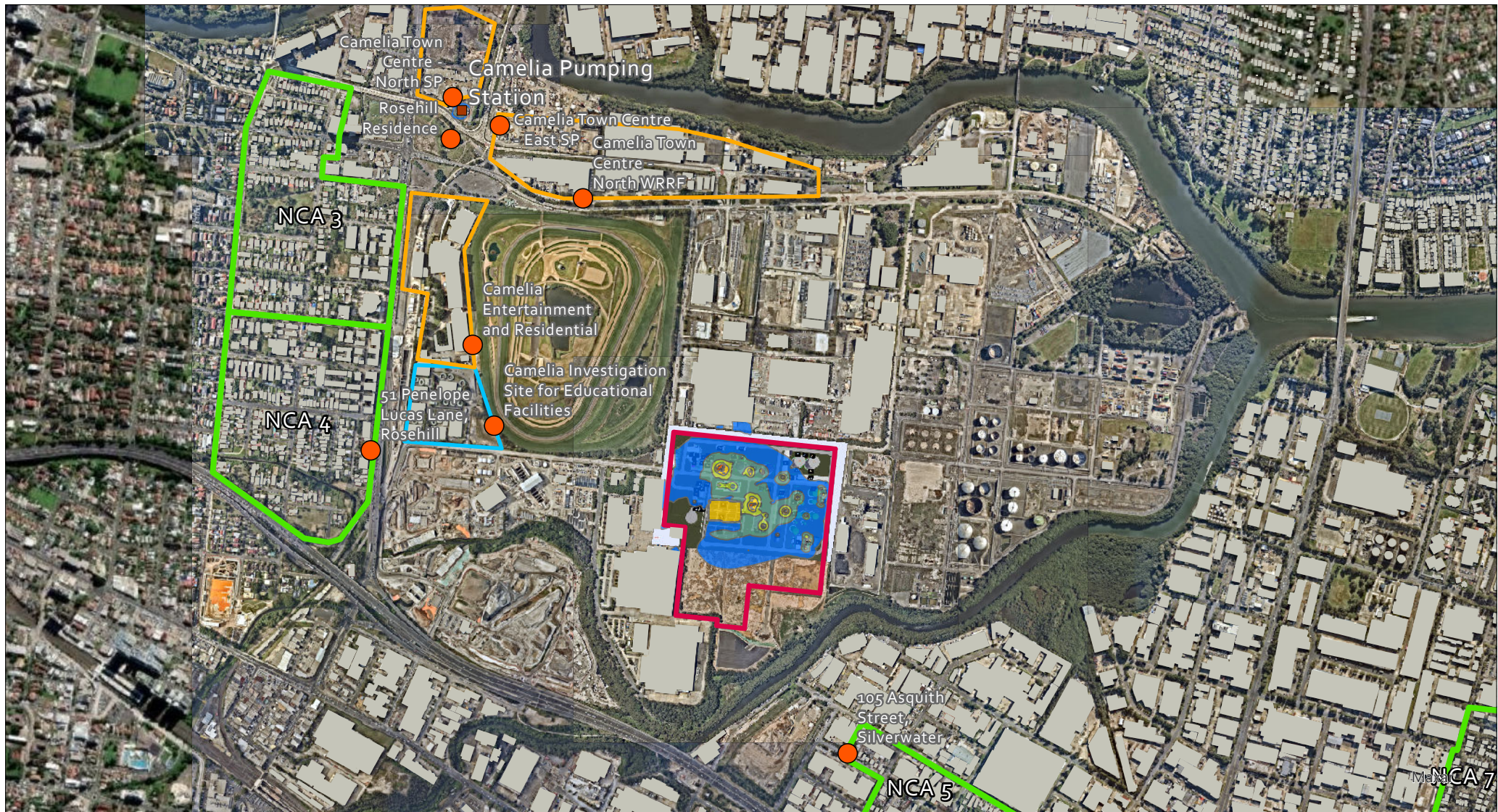
AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

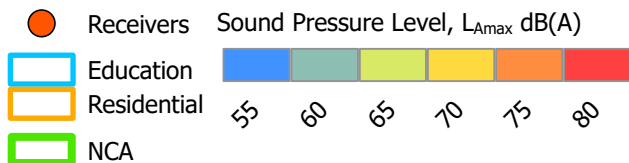
The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nearmap 2024



Camellia Water Resource Recovery Facility - Night-Time Noise Levels - Adverse Weather - Sleep Disturbance

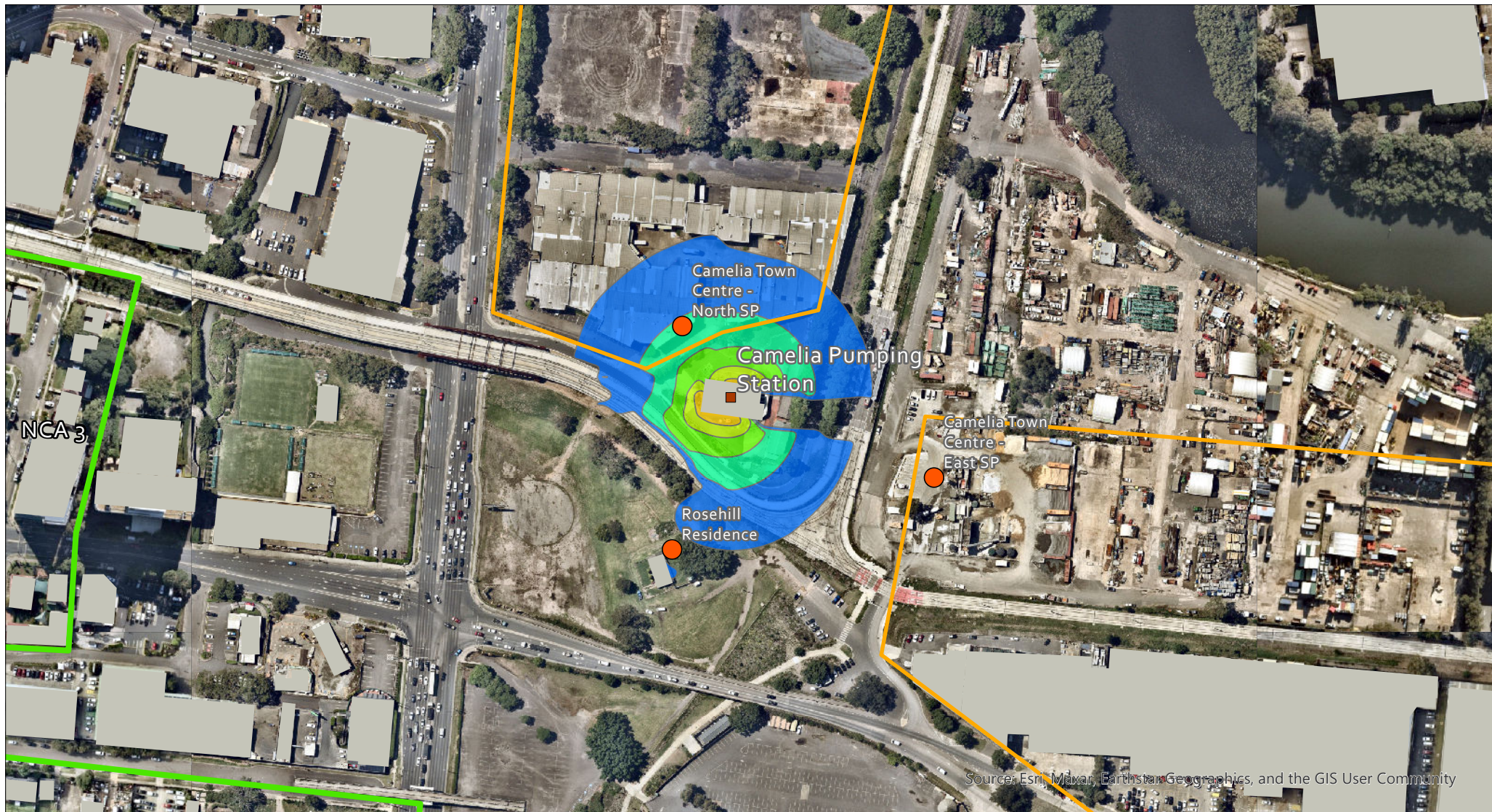


Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nearmap 2024



Camellia Water Resource Recovery Facility - Night-Time Noise Levels - Neutral Weather



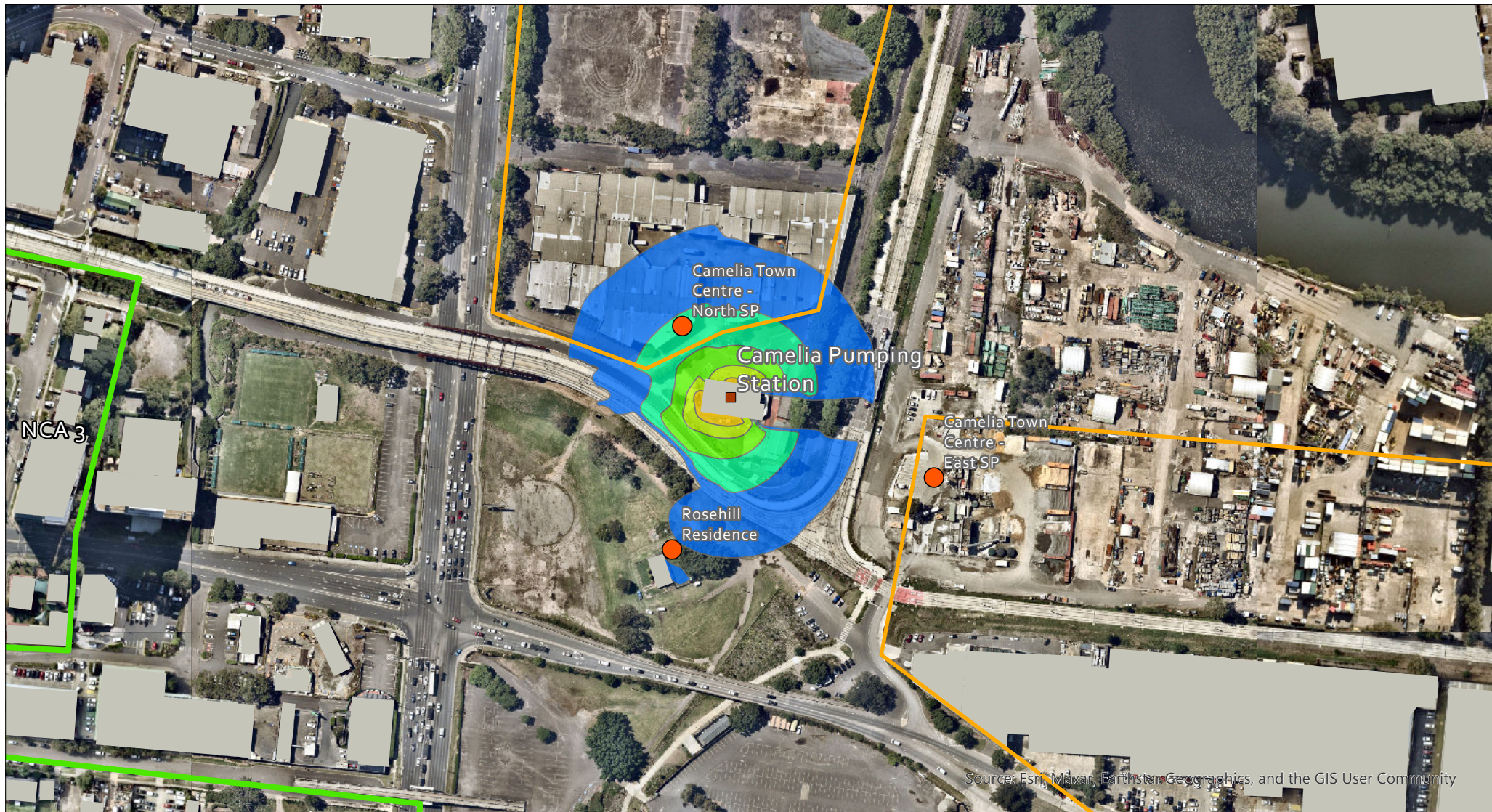
AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nearmap 2024



Camellia Water Resource Recovery Facility - Night-Time Noise Levels - Adverse Weather



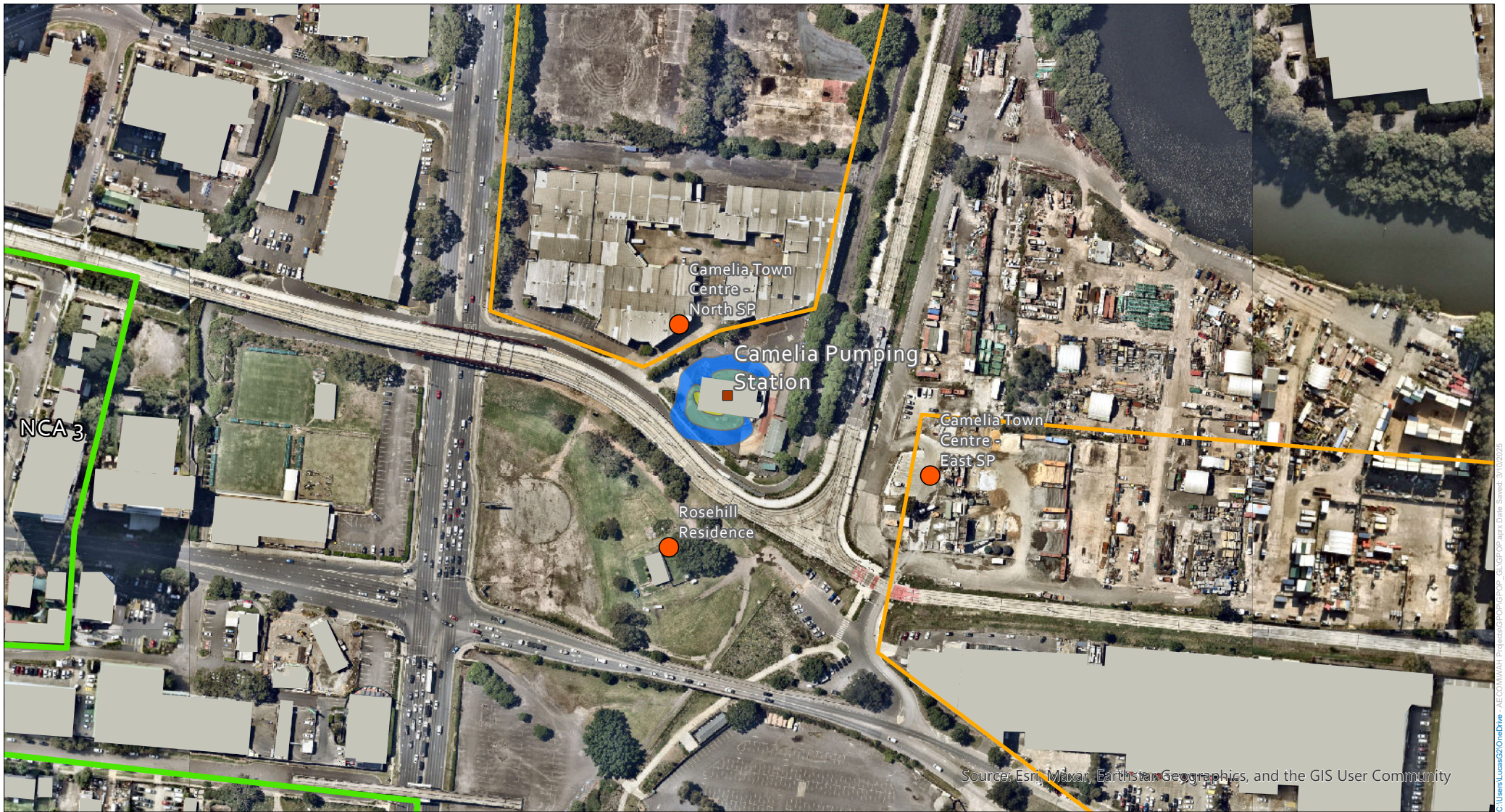
AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

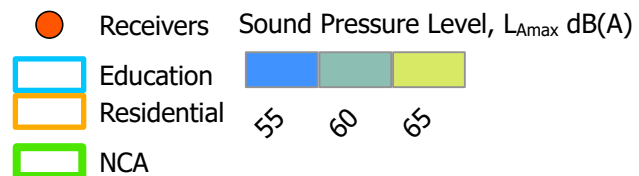
Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nearmap 2024



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Camellia Water Resource Recovery Facility - Night-Time Noise Levels - Neutral Weather - Sleep Disturbance



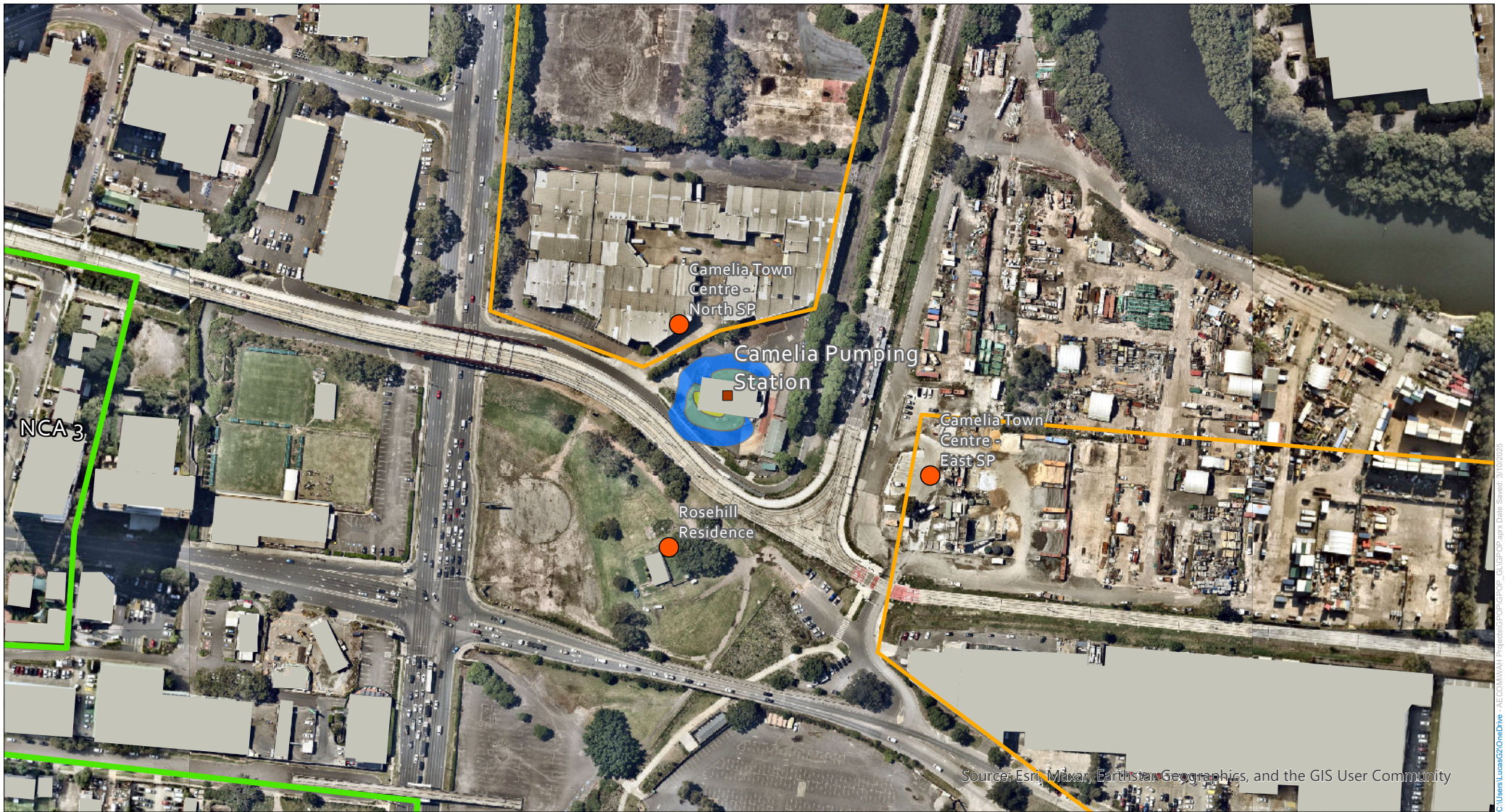
AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

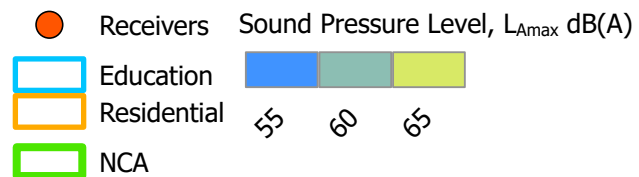
The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nearmap 2024



Camellia Water Resource Recovery Facility - Night-Time Noise Levels - Adverse Weather - Sleep Disturbance



AECOM

Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons, Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source: Nearmap 2024