



# Noise and Vibration Construction Monitoring Report August 2024 to January 2025

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Parklife Metro D&C

## Document Approval

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## Glossary/Abbreviations

Abbreviation	Expanded Text
<b>BRD</b>	Bradfield Station, (formally named Aerotropolis Core Station(AEC))
<b>CEMF</b>	Construction Environmental Management Framework
<b>CNVS</b>	Sydney Metro Construction Noise and Vibration Standard
<b>Condition</b>	Planning Minister's Condition of Approval
<b>Construction</b>	Includes all work required to construct the CSSI as described in the documents listed in Conditions A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work.
<b>dB(A)</b>	A-weighted decibels is an expression of the relative loudness of sounds in the air as perceived by the human ear.
<b>DNVIS</b>	Detailed Noise and Vibration Impact Statement
<b>EPA</b>	NSW Environmental Protection Authority – The Appropriate Regulatory Authority for project activities on NSW land (off-airport land), as defined in Section 6(2)(c) of the POEO Act 1997
<b>EPL</b>	Environmental Protection Licence
<b>LA<sub>eq</sub></b>	Equivalent Continuous Sound Level
<b>LDN</b>	Luddenham Station
<b>LP or SPL</b>	Sound Pressure Level
<b>LW or SWL</b>	Sound Power Level
<b>LWD</b>	Linewide
<b>NCA</b>	Noise Catchment Area
<b>NML</b>	Noise Management Level
<b>NVCMR</b>	Noise and Vibration Construction Monitoring Report
<b>NVMP</b>	Noise and Vibration Monitoring Program
<b>OHE</b>	Orchard Hills Station
<b>OOHW</b>	Out of Hours Works
<b>Parklife Metro (PLM)</b>	Consortium comprising entities of Plenary, Siemens, RATP Dev and Webuild as the Applicant for the Sydney Metro Western Sydney Airport SSTOM Package.
<b>Parklife Metro D&amp;C</b>	Parklife Metro Design and Construct. Consists of Webuild S.P.A, Siemens Mobility Pty Ltd and Richard Crookes Constructions Pty Ltd. Responsible for the construction of SSTOM Works
<b>RBL</b>	Rating Background Noise Level
<b>SMF</b>	Stabling and maintenance facility
<b>SMWSA</b>	Sydney Metro Western Sydney Airport
<b>SPL</b>	Sound Pressure Level
<b>SSTOM</b>	Stations, Systems, Trains, Operations and Maintenance
<b>STM</b>	St Marys Station
<b>SWL</b>	Sound Power Level
<b>the Project</b>	Sydney Metro Western Sydney Airport

# 1 Introduction

## 1.1 Background

Sydney Metro is Australia's biggest public transport program comprising four main packages of work including Metro North-West Line, Sydney Metro City and Southwest, Sydney Metro West, and Sydney Metro Western Sydney Airport (SMWSA, the Project). The SMWSA will become the transport spine for Greater Western Sydney, connecting communities and travellers with the new Western Sydney International (Nancy-Bird Walton) Airport and the growing region.

The Project involves the construction and operation of a new metro railway line around 23km in length to connect Western Sydney suburbs from Bradfield in the south with St Marys in the north. The alignment includes a combination of tunnel, surface, bridges and viaduct sections, and comprises of six new metro stations between St Marys and Bradfield Station (formally named Aerotropolis Core Station), as well as a stabling and maintenance facility and operational control centre to support the operation of the new metro railway line (see Figure 1).

Parklife Metro D&C (PLM) has been engaged to deliver the Stations, Systems, Trains, Operations and Maintenance (SSTOM) works. The scope of the SSTOM package comprises:

- construction of six new stations
- installation of tracks, signalling, mechanical and electrical systems
- supplying new driverless trains
- construction of stabling and maintenance facility at Orchard Hills
- operation and maintenance of the line and its assets, and
- handback of operations and maintenance at the end of term.



FIGURE 1 OVERVIEW OF SMWSA PROJECT

## 1.1.1 Scope of report

This Noise and Vibration Construction Monitoring Report (NVCMR) has been prepared for works approved under the Infrastructure Approval SSI-10051 associated with the delivery of the off-airport portion of the SMWSA SSTOM Works. This report provides the results of noise and vibration monitoring undertaken as part of the Noise and Vibration Monitoring Program (NVMP) during the reporting period from the start of August 2024 to the end of January 2025. This noise and vibration construction monitoring report is the third issue since PLM construction works commenced in 2023.

The result of the monitoring is readily available in this report to the construction team, the proponent and ER and is provided to the Planning Secretary and EPA upon request as per Condition C15 of CSSI 10051.

TABLE 1 REQUIREMENTS RELEVANT TO NOISE AND VIBRATION MONITORING REPORT

Condition	Requirement
C14	<p>Each Construction Monitoring Program must provide:</p> <ul style="list-style-type: none"> <li>(a) details of baseline data available including the period of baseline monitoring;</li> <li>(b) details of baseline data to be obtained and when;</li> <li>(c) details of all monitoring of the project to be undertaken;</li> <li>(d) the parameters of the project to be monitored;</li> <li>(e) the frequency of monitoring to be undertaken;</li> <li>(f) the location of monitoring;</li> <li>(g) the reporting of monitoring results and analysis results against relevant criteria;</li> <li>(h) details of the methods that will be used to analyse the monitoring data;</li> <li>(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;</li> <li>(j) a consideration of SMART principles;</li> <li>(k) any consultation to be undertaken in relation to the monitoring programs; and</li> <li>(l) any specific requirements as required by Conditions C15 to C16.</li> </ul>
C15	<p>The Noise and Vibration Construction Monitoring Program must include:</p> <ul style="list-style-type: none"> <li>(a) noise and vibration monitoring at representative residential and other locations (including at the worst- affected residences), subject to property owner approval, to confirm construction noise and vibration levels;</li> <li>(b) monitoring undertaken during the day, evening and night-time periods throughout the construction period and cover the range of activities being undertaken;</li> <li>(c) method and frequency for reporting monitoring results; and</li> <li>(d) a process to undertake real time noise and vibration monitoring.</li> </ul> <p>The results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request.</p>
C22	<p>The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.</p>
E38	<p>Work must only be undertaken during the following hours:</p> <ul style="list-style-type: none"> <li>(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;</li> <li>(b) 8:00am to 1:00pm Saturdays; and (c) at no time on Sundays or public holidays.</li> <li>(c) at no time on Sundays or public holidays.</li> </ul>

E43	<p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:</p> <p>(a) construction ‘Noise affected’ noise management levels established using the Interim Construction Noise Guideline (DECC, 2009);</p> <p>(b) preferred vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure);</p> <p>(c) Australian Standard AS 2187.2 - 2006 “Explosives - Storage and Use - Use of Explosives” (for human exposure);</p> <p>(d) BS 7385 Part 2-1993 “Evaluation and measurement for vibration in buildings Part 2” as they are “applicable to Australian conditions”; and</p> <p>(e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage).</p> <p>Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan.</p>
E44	<p>All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:</p> <p>(a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and</p> <p>(b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).</p> <p>The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition E42.</p>
E47	<p>Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.</p>
CEMF 3.16a	<p>Issue specific environmental monitoring will be undertaken as required or as additionally required by any approval, permit or licence conditions.</p>
CNVS 6.1	<p>Measurements of sound power level.</p>
CNVS 6.2	<p>Monitoring to be undertaken where a DNVIS predicts NMLs will be exceeded.</p>
CNVS 5.1	<p>Where it has been identified that specific construction activities are likely to exceed the relevant noise or vibration goals, noise or vibration monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented.</p>
<b>EPL - 21807</b>	
L3.1	<p>The licensee must minimise noise and vibration impacts at residences and other sensitive land uses. To meet the requirements of this condition the licensee must:</p> <p>a) implement the guidance in the Interim Construction Noise Guideline (DEC, 2009) and the Assessing Vibration: a technical guideline (DEC, 2006);</p> <p>b) implement all reasonable and feasible measures to minimise noise impacts in accordance with the Interim Construction Noise Guideline (DEC, 2009); and</p> <p>c) implement vibration mitigation in accordance with the Assessing Vibration: a Technical Guideline (DEC, 2006).</p> <p>In this condition, ‘reasonable’ and ‘feasible’, in relation to noise management, have the same meaning as defined in the Interim Construction Noise Guideline (DEC, 2009).</p>

L5.4	<p>Works outside of standard construction hours - Notification</p> <p>The licensee must notify potentially affected Noise Sensitive Receivers of works outside of standard construction hours unless notification under this condition is not required as specified in another condition of this licence.</p> <p>a) The notification must:</p> <ol style="list-style-type: none"> <li>i. be given not less than 5 calendar days and not more than 14 calendar days before those works are to be undertaken, unless otherwise agreed with the affected community and notified to the EPA;</li> <li>ii. be undertaken by letterbox drop, email, text message or other targeted and equivalent method; and</li> <li>iii. be detailed on the project website or other relevant website notified to the EPA.</li> </ol> <p>b) The notification required by this Condition must:</p> <ol style="list-style-type: none"> <li>i. clearly outline the reason that the work is required to be undertaken outside the hours specified in condition L5.1;</li> <li>ii. include a diagram that clearly identifies the location of the proposed works in relation to nearby cross streets and local landmarks;</li> <li>iii. include details of the date, timing and relevant time restrictions that apply to the proposed works;</li> <li>iv. clearly outline in plain English, the location, nature, scope and duration of the proposed works;</li> <li>v. detail the expected noise impact of the works on Noise Sensitive Receivers;</li> <li>vi. clearly state how complaints may be made and additional information obtained;</li> <li>vii. include the number of the telephone complaints line required by condition M5.1, an after hours contact phone number specific to the works undertaken outside the hours specified in condition L5.1, and the project website address; and</li> <li>viii. include consideration of culturally and linguistically diverse Noise Sensitive Receivers where required.</li> </ol>
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## 2 Monitoring

This section provides a summary of the monitoring completed in the six-month reporting period from start of August 2024 to the end of January 2025.

PLM construction activities subject to noise monitoring within the reporting period was predominantly for concrete works at the station box sites. Other construction activities monitored included deliveries, earth works, generator operation and crane operations. Construction activities undertaken during the reporting period are summarised in Table 2.

Detailed monitoring results for each program are presented in the Appendix A.

TABLE 2 CONSTRUCTION ACTIVITIES DURING THIS REPORTING PERIOD

Site	Construction Activities
St Marys Station	<ul style="list-style-type: none"> <li>• General operation of ancillary facility</li> <li>• Site establishment of office sheds, laydown areas and temporary stockpile areas</li> <li>• Piling works</li> <li>• Tower crane construction</li> <li>• Station Box – form reo pour (FRP)</li> </ul>
Orchard Hills Station	<ul style="list-style-type: none"> <li>• General operation of ancillary facility</li> <li>• Site establishment (north)</li> <li>• Station Box – FRP</li> <li>• Batch plant operation</li> </ul>

Stabling Maintenance Facility	<ul style="list-style-type: none"> <li>• General operation of ancillary facility</li> <li>• Bulk earthworks</li> <li>• Drainage and trunk services</li> <li>• Power supply installation</li> <li>• In-ground utility installation</li> <li>• Substation FRP, water proofing, construction and fit out</li> <li>• Detailed excavation, inground service trenches, FRP and tank installation for maintenance and admin, and operational control centre buildings</li> </ul>
Luddenham Station	<ul style="list-style-type: none"> <li>• General operation of ancillary facility</li> <li>• Bulk Earthworks</li> <li>• In-ground utility installation</li> <li>• Station structures FRP</li> </ul>
Bradfield Station	<ul style="list-style-type: none"> <li>• General operation of ancillary facility</li> <li>• Station Box – Waterproofing</li> <li>• Station Box – FRP</li> <li>• Delivery of Equipment</li> <li>• Precast beam delivery and installation</li> </ul>
Linewide	<ul style="list-style-type: none"> <li>• Site establishment</li> <li>• In-ground utility installation</li> <li>• Galvanised steel trough (GST) installation</li> <li>• FRP works</li> <li>• Rail activities</li> </ul>

## 2.1 Attended Noise Monitoring

Attended noise monitoring is required to validate noise predictions, including NML compliant works, as well as measure the effectiveness of mitigation measures outlined in the management plans and detailed noise and vibration impact statement (DNVIS). Noise monitoring may also be conducted in response to complaints. No noise or vibration complaints were received for the project during the reporting period.

All noise monitoring both during standard construction hours and out of hours (OOH), demonstrated compliance within the reporting period.

Summary results of all attended noise monitoring conducted by PLM in the reporting period are provided in Appendix A (Attended activity-specific noise monitoring).

All monitoring locations are presented in Appendix B and NATA accredited noise calibration certificates are provided in Appendix C.

## 2.2 Unattended noise monitoring

Unattended noise monitoring is used to target sites with higher risk noise impacts throughout construction. Within the reporting period, PLM set up unattended noise monitors at the Stabling and Maintenance Facility, Luddenham Station and Bradfield based on these sites undertaking the most work outside of standard construction hours. Whilst data can be used for targeted unattended noise monitoring, PLM conducted all targeted monitoring via attended measurements.

Unattended noise monitoring can also provide a summary of noise trends throughout the reporting period, a summary of which is provided in Appendix A (Unattended site monitoring data).

Where noise levels were observed to exceed the predicted worst-case levels by more than 2dB, an investigation into the source was undertaken. In all instances, extraneous sources were responsible for the exceedances.

## 2.3 Plant/Equipment Verification

Sound power level checks for construction equipment is checked as per the NVMP. These checks are conducted on significant noise generating items of plant and would be monitored at first opportunity. Spot checks are performed for noise intensive plants where it is required to check noise emission against the manufacturer's specifications. Summary of sound power level (SWL) checks for plant and equipment are listed in Table 3.

During this reporting period, sound power level checks indicated no exceedance of maximum allowable LAeq for the equipment listed in Table 3.

TABLE 3 SUMMARY OF PLANT/EQUIPMENT NOISE VERIFICATION.

Date	Machinery	Activity location	Recorded SWL (dBA)	Maximum SWL (dBA) <sup>1</sup>	Exceedance of Predicted (dBA)	Comments
10/09/2024	Batch plant	Orchard Hills	103	108	No	One measurement was taken on each side at 10m. Three measurements in total
10/09/2024	Concrete truck	Orchard Hills	106	109	No	One measurement was taken on each side at 10m. Three measurements in total
10/09/2024	Front End Loader	Orchard Hills	102	112	No	One measurement was taken on each side at 10m. Two measurements in total
22/10/2024	500T Mobile Crane	Bradfield	102	116	No	Measurements taken at 5m, 6m and 7m. Four measurements in total
22/10/2024	Concrete Pump	Bradfield	105	109	No	Measurements taken at 4m and 5m. Four measurements in total
8/11/2024	500T Mobile Crane	Bradfield	98	116	No	One measurement was taken on each side at 10m. Four measurements in total

1. Maximum allowable sound power levels as listed in the Noise and Vibration Management Plan.

## 2.4 Vibration monitoring

No vibration monitoring was conducted within the reporting period due to no vibration impacted receivers. The DNVIS<sup>1</sup> prepared to date has not identified vibration monitoring requirements for works undertaken during the reporting period.

## 2.5 Detailed Noise and Vibration Impact Statement (DNVIS)

DNVIS are required for any works that may exceed the NMLs, vibration criteria and / or ground-borne noise levels in Condition E43 and E44 at any residence outside construction hours specified in condition E38 or where receivers will be highly noise affected or subject to vibration levels above those determined by a suitably qualified structural engineer. The DNVIS includes specific mitigation measures identified through consultation with affected sensitive land

user(s) and mitigation measures that must be implemented for the duration of works in accordance with the Interim Construction Noise Guideline (DEC, 2009).

DNVIS are required for approvals where different construction hours are permitted or required under an EPL in force in respect of the CSSI 10051 Conditions of Approval.

Noise or vibration monitoring is conducted at the affected receivers or nominated representative locations (typically the nearest receiver where one or more receivers are affected that are identified). Monitoring is usually in the form of attended monitoring but can be in the form of unattended logging. PLM uses noise monitoring data to indicate when additional noise management measures are required.

A summary for DNVIS prepared or updated in this reporting period is provided listed in Table 4. They give an indication of potential works that may exceed NML, vibration criteria and/or ground-borne noise levels.

TABLE 4 DNVIS APPROVED DURING THE REPORTING PERIOD

Title	DNVIS ID	Approval Date	Site	Scope of work
<b>St Marys Station - Concreting Works OOH - EPL Variation</b>	STM 02	28/10/2024	St Marys	DNVIS focuses on concrete pouring occurring out of hours
<b>Bradfield Station – Concrete works OOH</b>	BRD 04	15/11/2024	Bradfield	DNVIS focuses on concrete pouring occurring out of hours
<b>Orchard Hills Station – OHE Batch Plant and Concrete OOH</b>	OHE 04	19/11/2024	Orchard Hills	DNVIS focuses on concrete batching plant operations and concrete works
<b>SMF – Site works - OOH</b>	SMF 02	16/01/2025	Stabling and Maintenance Facility	DNVIS focuses on the construction of the SMF and includes the installation of power supply
<b>Claremont Meadows Shaft - EPL Variation</b>	CMF01	24/01/2025	Claremont Meadows Service Facility	DNVIS focuses on tunnel and underground fit out works
<b>Bringelly Shaft - EPL Variation</b>	BSF01	24/01/2025	Bringelly Service Facility	DNVIS focuses on tunnel and underground fit out works

## 2.6 Conclusion

Summary results of attended and unattended noise monitoring conducted by PLM during the reporting period (Appendix A), demonstrates compliance with project requirements set out in the NVMP.

## 2.7 Correction Log

It is possible from time to time for incorrect data to get published in good faith. As soon as practicable after the licensee becomes aware that the published pollution monitoring data is incorrect or misleading, licensees must then publish a correction log to correct this data that is incorrect or misleading.

There are no matters included in the correction log for this reporting period.

# Appendices

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Noise and Vibration Construction Monitoring Report August 2024 to January 2025

## Appendix A Noise Monitoring Results

### Attended activity-specific noise monitoring

Date	Time	Time Period	Construction Activity	Site Location	Monitoring Location/Address/DNVIS ID	NCA <sup>1</sup>	NML dB(A)	Predicted LAeq(15min) dB(A)	Recorded LAeq(15min) dB(A)	LAmx dB(A)	Exceedance of Predicted values?	Comments
17/08/2024	14:00	OOH-Day	Concrete pouring	BRD	145 Badgerys Creek Road	12	43	52	43.8	61.7	No	PLM works audible during breaks in traffic and recorded below predicted, PLM works compliant
20/08/2024	22:34	OOH-Night	Generator	OHE	40 Lansdowne Road (Façade) (ID-2567)	8	45	45	46	54.2	Yes	Generator noise faintly audible, dominant noise source was traffic on the M4, Kent Road and Lansdowne Road, PLM works compliant
20/08/2024	22:50	OOH-Night	Generator	OHE	40 Lansdowne road (Verge of property)	8	45	45	44.7	51.9	No	Generator noise very faintly audible and recorded below predicted, PLM works compliant
22/08/2024	19:00	OOH-Evening	Waterproofing	BRD	145 Badgerys Creek Road	12	40	39	46.5	71.3	Yes	Construction noise inaudible, dominant noise source was traffic on Badgerys Creek Road, PLM work compliant
23/08/2024	1:29	OOH-Night	Generator	OHE	40 Lansdowne Road, Orchard Hills (ID-2567)	8	45	45	44.3	53.8	No	Dominant noise source was traffic, with generator noise recorded below predicted, PLM works compliant
23/08/2024	1:40	OOH-Night	Generator	OHE	54 Lansdowne Road, Orchard Hills	8	45	45	42.5	51.3	No	Dominant noise source was traffic, with generator noise recorded below predicted, PLM works compliant
26/08/2024	18:16	OOH-Evening	Concrete pouring	OHE	40 Lansdowne Road, Orchard Hills (ID-2567)	8	49	63	60.8	82.7	No	Dominant noise source was traffic on Kent Road and Lansdowne Road, with generator noise recorded below predicted, PLM works compliant
30/08/2024	18:13	OOH-Evening	Concrete finishing works	SMF	43A Luddenham Road, Orchard Hills	9	44	42	54.7	70.3	Yes	Dominant noise source was insects, PLM works faintly audible and compliant
2/09/2024	18:05	OOH-Evening	Concrete pouring	STM	2 Station Street St Marys	3	42	59	56.9	79.3	No	Construction noise very faintly audible and recorded below predicted, PLM works compliant
3/09/2024	22:37	OOH-Night	Generator switched on	OHE	40 Lansdowne Road, Orchard	8	45	45	50.5	69.5	Yes	Generator noise very faintly audible, dominant noise source was traffic, PLM works compliant
3/09/2024	22:46	OOH-Night	Generator switched off	OHE	40 Lansdowne Road, Orchard	8	45	45	42.9	58.1	No	Generator noise very faintly audible and recorded below predicted, PLM works compliant
5/09/2024	18:05	OOH-Evening	Concrete pouring activities	OHE	84 Samuel Marsden Road, Orchard Hills	8	49	52	53.9	70.1	Yes	Construction noise very faintly audible, dominant noise source was traffic on Samuel Marsden Road and the M4, PLM works compliant
17/09/2024	18:10	OOH-Evening	Concrete pouring activities	BRD	145 Badgerys Creek Rd, Orchard Hills	12	40	52	44.5	65	No	Construction activity audible and below predicted, PLM works compliant
19/09/2024	18:01	OOH-Evening	Concrete finishing	STM	2 Station Street, St Marys	3	42	59	49.6	64.2	No	Construction noise inaudible and below predicted, PLM works compliant
4/10/2024	6:25	OOH-Night	Concrete pouring and supporting form work	STM	3 Station Street, St Marys	3	41	60	50.7	70.8	No	Construction noise audible and below predicted, PLM works compliant
4/10/2024	22:21	OOH-Night	132kv works Patons Lane	SMF	117-119 Luddenham Road, Orchard Hills	8	45	36	43.9	61.2	Yes	Construction noise inaudible, dominant noise source was insects and frogs, PLM works compliant
4/10/2024	22:51	OOH-Night	132kv works Patons Lane	SMF	117-119 Luddenham Road, Orchard Hills	8	45	36	41.8	56.9	Yes	Construction noise inaudible, dominant noise source was traffic, insects and frogs, PLM works compliant
9/10/2024	6:10	OOH-Night	Concrete pouring and supporting form work	STM	2A Chesham St, St Marys	3	41	55	48.6	69.1	No	Construction activities faintly audible and below predicted, PLM works compliant
17/10/2024	22:42	OOH-Night	Concrete pouring	BRD	30 Klewin Park Drive Bradfield	12	40	43	36.8	65.3	No	Construction noise inaudible and below predicted, PLM works compliant
21/10/2024	23:29	OOH-Night	Concrete pouring	BRD	145 Badgerys Creek Road	12	40	47	41.2	54.1	No	Construction noise audible and below predicted, PLM works compliant
21/10/2024	23:02	OOH-Night	Concrete pouring	BRD	25 The Retreat, Bringelly	12	40	44	46	62.1	Yes	Construction noise inaudible, dominant noise source was animal activity (frogs and dogs), road and air traffic, PLM works compliant
23/10/2024	6:29	OOH-Night	Earthworks	SMF	43A Luddenham Road, Orchard Hills	9	39	61	48.3	70.1	No	Construction noise faintly audible and below predicted, PLM works compliant
24/10/2024	6:10	OOH-Night	Earthworks	SMF	8 Bordeaux Place, Orchard Hills	8	45	58	46.6	66.8	No	Construction noise inaudible and below predicted, PLM works compliant
24/10/2024	6:30	OOH-Night	Earthworks	SMF	7 Bordeaux Place, Orchard Hills	8	45	58	42.8	56.4	No	Construction noise inaudible and below predicted, PLM works compliant
26/10/2024	7:26	OOH-Night	Earthworks	SMF	8 Bordeaux Place, Orchard Hills	8	45	39	45	70.7	Yes	Dominant noise source was birds, PLM works compliant
28/10/2024	6:15	OOH-Night	Concrete pouring	STM	2 Station Street St Marys	3	41	59	52.6	45.9	No	Construction noise audible and below predicted, PLM works compliant
28/10/2024	22:35	OOH-Night	Concrete pouring	STM	2A Chesham St, St Marys	3	41	55	55.2	81	No	Construction noise audible and in line with prediction, PLM works compliant

Date	Time	Time Period	Construction Activity	Site Location	Monitoring Location/Address/DNVIS ID	NCA <sup>1</sup>	NML dB(A)	Predicted LAeq(15min) dB(A)	Recorded LAeq(15min) dB(A)	LAmx dB(A)	Exceedance of Predicted values?	Comments
30/10/2024	22:00	OOH-Night	Concrete pouring	OHE	16 Lansdowne Road, Orchard Hills	8	45	51	59.1	81	Yes	Construction noise source faintly audible, dominant noise source was fauna and traffic, PLM works compliant
6/11/2024	19:30	OOH-Evening	Concrete pouring	OHE	107 Kent Road, Orchard Hills	8	49	58	54.1	80.2	No	Construction noise faintly audible and below predicted, PLM works compliant
27/11/2024	5:36	OOH-Night	Concrete pouring	BRD	25 The Retreat, Bringelly	12	39	44	43.1	58.1	No	Construction noise inaudible and below predicted, PLM works compliant
27/11/2024	2:21	OOH-Night	Precast beams delivery and install	BRD	145 Badgerys creek Road Bradfield	12	39	42	37	60.7	No	Below predicted, PLM works compliant
27/11/2024	1:23	OOH-Night	Precast beams delivery and install	BRD	145 Badgerys creek Road Bradfield	12	39	42	37	71	No	Below predicted, PLM works compliant
4/12/2024	5:58	OOH-Night	Concrete batch plant operations	OHE	16 Lansdowne Road, Orchard Hills	8	45	46	52.5	66.3	Yes	Construction noise audible and in line with predictions during breaks in dominant noise sources, dominant noise source was traffic and birds, PLM works compliant
4/12/2024	20:00	OOH-Evening	Concrete batch plant operation/concrete pour	OHE	16 Lansdowne Road, Orchard Hills	8	49	51	57.6	82.4	Yes	Construction noise audible and in line with predictions during breaks in dominant noise sources, dominant noise source was traffic and birds, PLM works compliant
6/12/2024	6:41	OOH-Evening	Portion 3 Concrete Delivery and Paver Installation	LDN	20 Farmingdale Court, Twin Creeks Estate, Luddenham	10	35	39.5	41.7	58.8	Yes	Construction noise faintly audible, dominant noise source was birds, PLM works compliant
9/12/2024	18:54	OOH-Evening	Concrete pouring	BRD	25 The Retreat Bringelly	12	40	44	37.6	71.6	No	Construction noise inaudible and below predicted, PLM works compliant
10/12/2024	18:07	OOH-Evening	Concrete pouring and supporting formwork	STM	3 Station Street St Marys	3	42	58	54.7	83.9	No	Construction noise audible and below predicted, PLM works compliant
10/12/2024	20:07	OOH-Evening	Concrete pouring and batch plant operation	OHE	107 Kent Road, Orchard Hills	8	49	58	65.2	87.7	Yes	Construction works faintly audible, dominant noise source was traffic and birds, PLM works compliant
10/12/2024	12:09	OOH-Night	Unloading of precast beams	OHE	77 Kent Road Orchard Hills	8	45	48	44.3	59	No	Construction noise faintly audible and below below predicted, PLM works compliant
13/12/2024	6:42	OOH-Night	Boral concrete batch plant	OHE	114 Samuel Marsden Road, Orchard Hills	8	45	45	49	65.8	Yes	Construction noise faintly audible and in line with predictions during breaks in dominant noise sources, dominant noise source was traffic and birds, PLM works compliant
17/12/2024	5:50	OOH-Night	Flashbutt welding	LWD	14 Farmingdale Court, Luddenham	10	35	35	38	45	Yes	Construction noise inaudible, dominant noise source was birds, PLM works compliant
18/12/2024	6:04	OOH-Night	Concrete pouring	SMF	9 Bordeaux PI, Orchard Hills	8	45	53	43.9	62.5	No	Construction noise faintly audible and below predicted, PLM works compliant
18/12/2024	6:35	OOH-Night	Boral concrete batch plant	OHE	40A Lansdowne Rd, Orchard Hills	8	45	54	64.1	85.3	Yes	Construction noise faintly audible, dominant noise source was traffic on Kent and Lansdowne Roads, PLM works compliant
20/12/2024	6:12	OOH-Night	Concrete pour and delivery	BRD	25 The Retreat, Bringelly	12	39	42	43.3	62.1	Yes	Construction noise very faintly audible, dominant noise source was traffic, PLM works compliant
21/01/2025	20:55	OOH-Evening	Concrete pouring and batch plant operation	OHE	40 Lansdowne Rd, Orchard Hills	8	49	59	56.8	79	No	Construction noise inaudible and below predicted, PLM works compliant
23/01/2025	1:21	OOH-Night	Precast beams delivery and install	BRD	145 Badgerys creek Road Bradfield	11	39	42	38.3	67.9	No	Construction noise audible and below predicted, PLM works compliant
23/01/2025	6:33	OOH-Night	Concrete pour	SMF	12 Bordeaux PI, Orchard Hills	8	45	51	42.5	61.2	No	Construction noise faintly audible and below predicted, PLM works compliant
29/01/2025	11:53	Daytime works	Batch plant, concrete pour in station box	OHE	95 Samuel Marsden Road, Orchard Hills	8	54	54	47	68.5	No	Construction noise faintly audible and below predicted, PLM works compliant
31/01/2025	6:29	OOH-Night	Concrete pour set up and FRP works	STM	3 Chesham St, St Marys	3	41	57	49.7	67.8	No	Construction noise audible and below predicted, PLM works compliant

1. Refer to Appendix C for NCA maps

## Unattended Site Monitoring Data

Unattended noise monitoring data is provided as an average LAeq for each 15 minute period over the representative period, during the date range of monitoring, and provides noise trends during the various construction periods.

Date	Construction Activities	Activity Location	Monitoring Location	NML (dBA)			Recorded Day (7am to 6pm) Avg LAeq15min	Recorded Evening (6pm to 10pm) Avg LAeq	Recorded Night (10pm to 7am) Avg LAeq	Comments
				Day	Evening	Night				
12/09/2024 – 31/01/2025	Earthworks, drainage, road construction, services	SSTOM Stabling and Maintenance Facility	SMF – north-east corner of SMF (NCA08)	54	49	35	54	50	53	Real time noise averages (LAeq) captured within the reporting period.
27/09/2024 – 31/01/2025	Concrete works, beam installation	SSTOM Bradfield	Bradfield – south-east corner of site (NCA12)	48	40	39	69	48	46	Real time noise averages (LAeq) captured within the reporting period.
19/11/2024 – 31/01/2025	Site establishment, deliveries, earthworks, concreting, craneage, FRP, structures	SSTOM Luddenham Road	Luddenham – south of carpark NCA10)	45	35	35	56	55	51	Real time noise averages (LAeq) captured within the reporting period.

## Appendix B Monitoring Locations



FIGURE 2 LOCATIONS OF NOISE MONITORING UNDERTAKEN THIS REPORTING PERIOD (ST MARYS)

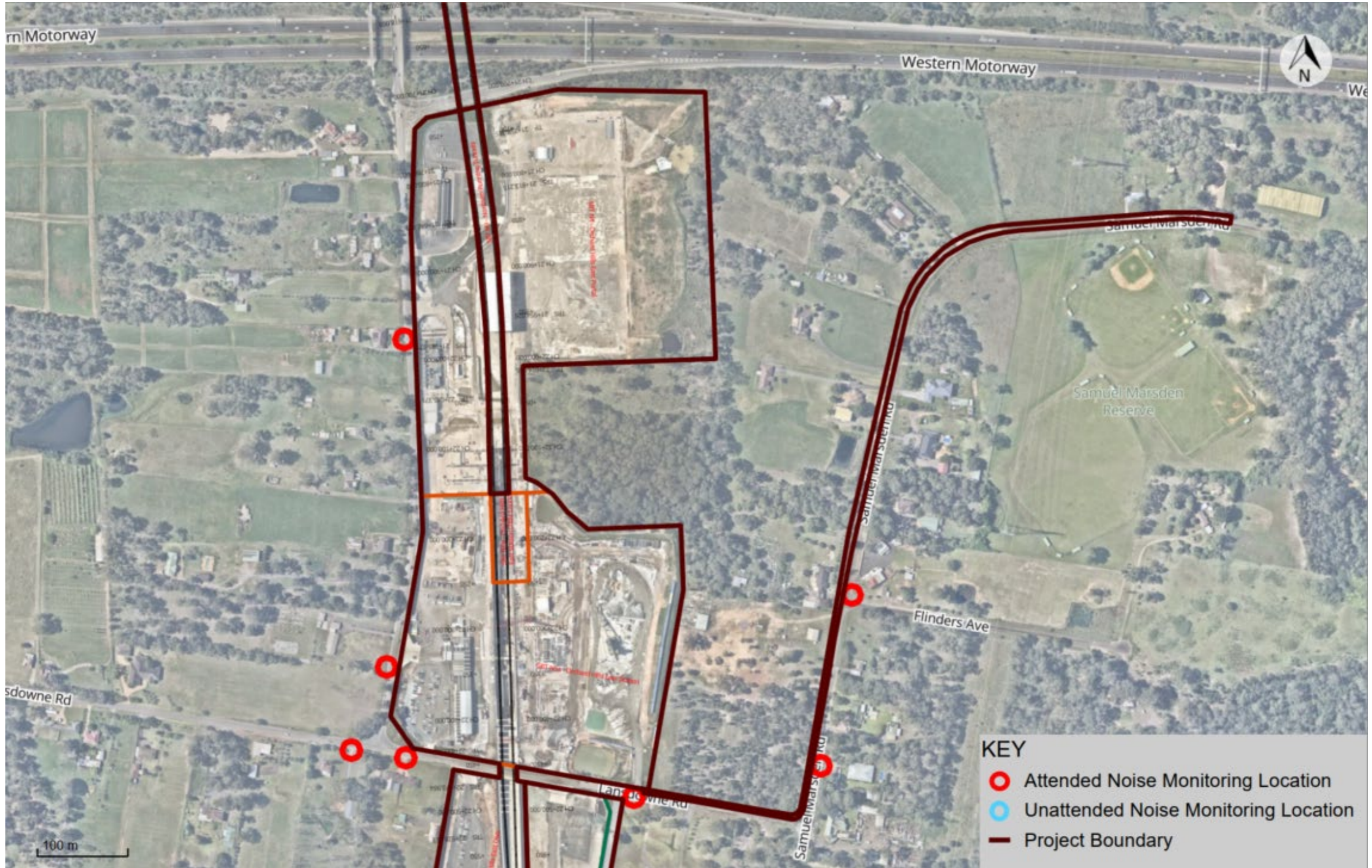


FIGURE 3 NOISE MONITORING UNDERTAKEN DURING THIS MONITORING PERIOD (ORCHARD HILLS)



FIGURE 4 LOCATIONS OF NOISE MONITORING UNDERTAKEN THIS REPORTING PERIOD (STABLING AND MAINTENANCE FACILITY)



FIGURE 5 NOISE MONITORING UNDERTAKEN DURING THIS MONITORING PERIOD (LINEWIDE)

**KEY**




- Attended Noise Monitoring Location
- Unattended Noise Monitoring Location
- Project Boundary

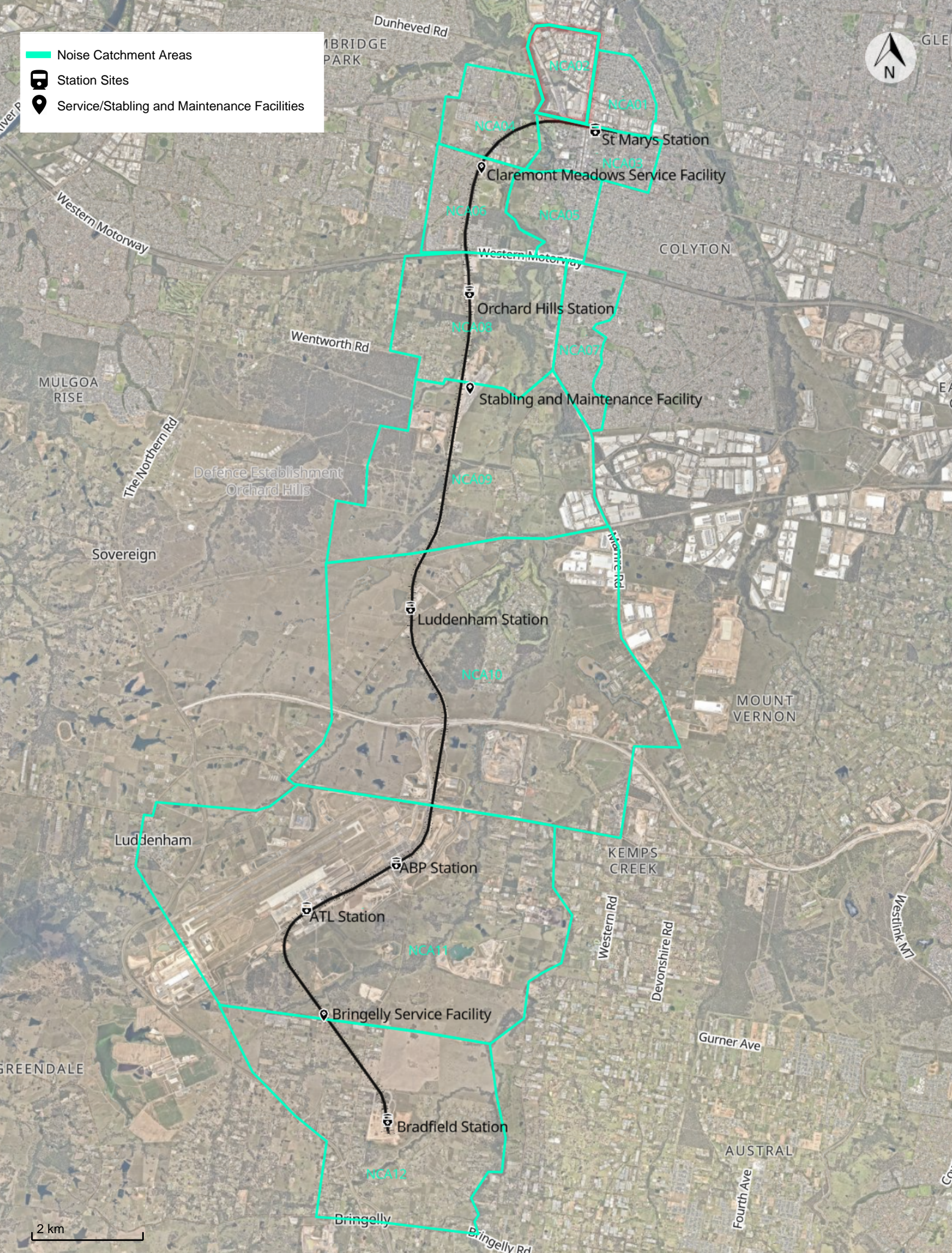


FIGURE 6 NOISE MONITORING UNDERTAKEN DURING THIS MONITORING PERIOD (BRADFIELD)

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## Appendix C Noise Catchment Areas

-  Noise Catchment Areas
-  Station Sites
-  Service/Stabling and Maintenance Facilities



2 km

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## Appendix D Certificate of Calibration



## Sound Level Meter

IEC 61672-3:2013

# Calibration Certificate

Calibration Number C24733

<b>Client Details</b>	PARKLIFE METRO D&C Level 7, 175 Liverpool Street Sydney NSW, 2000
-----------------------	---

<b>Equipment Tested/ Model Number :</b>	Rion NL-53
<b>Instrument Serial Number :</b>	00630296
<b>Microphone Serial Number :</b>	23664
<b>Pre-amplifier Serial Number :</b>	33121
<b>Firmware Version :</b>	01.02

Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions
<b>Ambient Temperature :</b> 23.2 °C	<b>Ambient Temperature :</b> 22.7 °C
<b>Relative Humidity :</b> 44.1 %	<b>Relative Humidity :</b> 44.6 %
<b>Barometric Pressure :</b> 101.17 kPa	<b>Barometric Pressure :</b> 101.18 kPa

<b>Calibration Technician :</b> Peter Elters	<b>Secondary Check:</b> Cooper Sallway
<b>Calibration Date :</b> 8 Oct 2024	<b>Report Issue Date :</b> 9 Oct 2024

**Approved Signatory :**

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	Pass
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
8kHz	±0.14 dB	Barometric Pressure	±0.11 kPa
Electrical Tests	±0.13 dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.  
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.



## Sound Level Meter

IEC 61672-3:2013

# Calibration Certificate

Calibration Number C24734

<b>Client Details</b>	PARKLIFE METRO D&C Level 7, 175 Liverpool Street Sydney NSW 2000
-----------------------	--

<b>Equipment Tested/ Model Number :</b>	Rion NL-53
<b>Instrument Serial Number :</b>	00440980
<b>Microphone Serial Number :</b>	25418
<b>Pre-amplifier Serial Number :</b>	33881
<b>Firmware Version :</b>	01.02

Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions
<b>Ambient Temperature :</b> 23.3 °C	<b>Ambient Temperature :</b> 23.8 °C
<b>Relative Humidity :</b> 47.8 %	<b>Relative Humidity :</b> 46.3 %
<b>Barometric Pressure :</b> 101.26 kPa	<b>Barometric Pressure :</b> 101.21 kPa

<b>Calibration Technician :</b> Jeff Yu	<b>Secondary Check:</b> Emanuel Eid
<b>Calibration Date :</b> 8 Oct 2024	<b>Report Issue Date :</b> 8 Oct 2024

**Approved Signatory :** 

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	Pass
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
8kHz	±0.14 dB	Barometric Pressure	±0.11 kPa
Electrical Tests	±0.13 dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



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**Sound Level Meter**  
**IEC 61672-3:2013**  
**Calibration Certificate**  
**Calibration Number C24734**

---

<b>Client Details</b>	PARKLIFE METRO D&C Level 7, 175 Liverpool Street Sydney NSW 2000
-----------------------	--

---

**Equipment Tested/ Model Number :** Rion NL-53  
**Instrument Serial Number :** 00440980  
**Microphone Serial Number :** 25418  
**Pre-amplifier Serial Number :** 33881  
**Firmware Version :** 01.02

---

Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions
<b>Ambient Temperature :</b> 23.3 °C	<b>Ambient Temperature :</b> 23.8 °C
<b>Relative Humidity :</b> 47.8 %	<b>Relative Humidity :</b> 46.3 %
<b>Barometric Pressure :</b> 101.26 kPa	<b>Barometric Pressure :</b> 101.21 kPa

---

<b>Calibration Technician :</b> Jeff Yu	<b>Secondary Check:</b> Emanuel Eid
<b>Calibration Date :</b> 8 Oct 2024	<b>Report Issue Date :</b> 8 Oct 2024

---

**Approved Signatory :** Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	Pass
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

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Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
8kHz	±0.14 dB	Barometric Pressure	±0.11 kPa
Electrical Tests	±0.13 dB		

*All uncertainties are derived at the 95% confidence level with a coverage factor of 2.*

---

This calibration certificate is to be read in conjunction with the calibration test report.

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Accredited for compliance with ISO/IEC 17025 - Calibration.

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## Sound Calibrator

IEC 60942:2017

# Calibration Certificate

Calibration Number C24736

**Client Details** PARKLIFE METRO D&C  
Level 7, 175 Liverpool Street  
Sydney NSW, 2000

**Equipment Tested/ Model Number :** Rion NC-75  
**Instrument Serial Number :** 34745923

### Atmospheric Conditions

**Ambient Temperature :** 23.1 °C  
**Relative Humidity :** 48.7 %  
**Barometric Pressure :** 101.23 kPa

**Calibration Technician :** Peter Elters  
**Calibration Date :** 08 Oct 2024  
**Secondary Check:** Cooper Sallway  
**Report Issue Date :** 9 Oct 2024

**Approved Signatory :** 

Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	Pass
Frequency Generated	Pass
Total Distortion	Pass

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.02	1000.00

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

### Uncertainties of Measurement -

Specific Tests	Environmental Conditions
Generated SPL	Temperature
Frequency	Relative Humidity
Distortion	Barometric Pressure

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.  
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.



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## Sound Calibrator

IEC 60942:2017

# Calibration Certificate

Calibration Number C24737

**Client Details** PARKLIFE METRO D&C  
Level 7, 175 Liverpool Street  
Sydney NSW, 2000

**Equipment Tested/ Model Number :** Rion NC-75  
**Instrument Serial Number :** 34645808

### Atmospheric Conditions

**Ambient Temperature :** 23.3 °C  
**Relative Humidity :** 48.3 %  
**Barometric Pressure :** 101.25 kPa

**Calibration Technician :** Peter Elters  
**Calibration Date :** 08 Oct 2024  
**Secondary Check:** Cooper Sallway  
**Report Issue Date :** 9 Oct 2024

**Approved Signatory :** 

Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	Pass
Frequency Generated	Pass
Total Distortion	Pass

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.03	1000.00

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

### Uncertainties of Measurement -

Specific Tests	Environmental Conditions
Generated SPL	Temperature
Frequency	Relative Humidity
Distortion	Barometric Pressure

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.  
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.



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## Sound Calibrator

IEC 60942:2017

# Calibration Certificate

Calibration Number C24738

**Client Details** PARKLIFE METRO D&C  
Level 7, 175 Liverpool Street  
Sydney NSW 2000

**Equipment Tested/ Model Number :** Rion NC-75  
**Instrument Serial Number :** 34645809

### Atmospheric Conditions

**Ambient Temperature :** 23.5 °C  
**Relative Humidity :** 48.3 %  
**Barometric Pressure :** 101.25 kPa

**Calibration Technician :** Peter Elters  
**Calibration Date :** 08 Oct 2024  
**Secondary Check:** Emanuel Eid  
**Report Issue Date :** 8 Oct 2024

**Approved Signatory :** 

Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	Pass
Frequency Generated	Pass
Total Distortion	Pass

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.04	1000.00

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

### Uncertainties of Measurement -

Specific Tests	Environmental Conditions
Generated SPL	Temperature
Frequency	Relative Humidity
Distortion	Barometric Pressure

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



WORLD RECOGNISED  
ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.  
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

# Hexanode Calibration Certificate



06 Nov 2023

Thank you for choosing SiteHive for your realtime environmental management. This calibration certificate is valid for the device below.

## Noise

The Hexanode sound level meter has been pressure calibrated by SiteHive using a NATA Certified (IEC 60942: Sound calibrators) Sound Level Calibrator, at 2 Foveaux Street, Surry Hills, NSW, 2010.

Serial Number	Calibration Date	Calibration Value
HEX-000080	06 Oct 2023	3.37246

Accuracy:	Complies with precision requirements of IEC 61672 for Class 2
Acoustic overload point:	135 dB SPL
Frequency Range:	20 Hz ~ 12.5 kHz
Frequency Rating:	Z, A and C weighting
Parameters (dB):	Frequency & time weighted integrations, statistical levels, and more
Direction of Arrival:	Device angle & cartesian angle (0°-360°) of dominant noise source

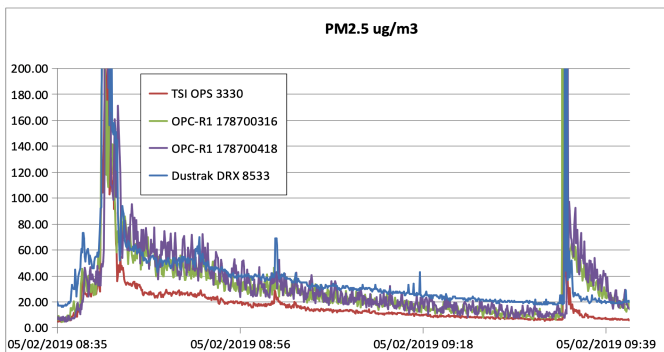
The SiteHive Hexanode uses innovative digital MEMS microphones, and as such cannot achieve full pattern approval in line with international standard IEC 61672, which is written for analogue condenser microphones. However, the SiteHive Hexanode sound level meter has been rigorously tested by the the [National Measurement Institute \(NMI\)](#), the division of the Australian Federal Government Department of Industry, Science, Energy & Resources responsible for providing world-class measurement services to support a fair, safe, healthy and competitive Australia. The National Measurement Institute's (NMI) [acoustic, ultrasound and vibration measurement services](#) are the most accurate in Australia, and include providing the certification for NATA (National Association of Testing Authorities) testing facilities, who provide class certification for noise meters. NMI undertook all of the possible tests outlined in IEC 61672-2, with the Hexanode passing all precision requirements within the criteria of a class 2 device.

## Dust

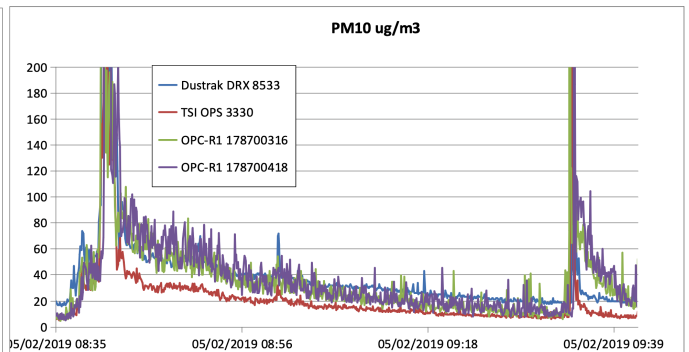
The Hexanode utilises the Alphasense R2 Optical Particle Sensor, to provide real-time dust measurements. Whilst the R2 does not have any gravimetric sampling capabilities, measurements can be adjusted using a K-Factor if one is available. SiteHive software will also provide measurements from the nearest Government air quality station for reference. The full data sheet for the Alphasense R2 is available [here](#).

Particle range	µm spherical equivalent size (based on RI of 1.5)	0.30 to 12.4
Size categorisation	Number of software bins	16
Sampling interval	Histogram period (seconds)	2 to 30
Total flow rate	L/min (typical)	0.24
Max particle count rate	particles/second	10,000
Max coincidence probability	% concentration at 10 <sup>6</sup> particles/L	0.7

Prior to deployment, the R2 is tested against [TSI Optical Particle Sizer 3330](#) and [DustTrak instruments](#).



Comparison of PM2.5 monitoring by OPC-R2 sensor and TSI OPS 3330 and DustTrak instruments. All are set at 5s averaging and are sampling the ambient air of a workshop, the raw 3330 data has been used to calculate a PM figure.



Comparison of PM10 monitoring by OPC-R2 sensor and TSI OPS 3330 and DustTrak instruments. All are set at 5s averaging and are sampling the ambient air of a workshop, the raw 3330 data has been used to calculate a PM figure.

# Hexanode Calibration Certificate

10 Sep 2024

Thank you for choosing SiteHive for your realtime environmental management. This calibration certificate is valid for the device below.

## Noise

The Hexanode sound level meter has been pressure calibrated by SiteHive using a NATA Certified (IEC 60942: Sound calibrators) Sound Level Calibrator, at 2 Foveaux Street, Surry Hills, NSW, 2010.

Serial Number	Calibration Date	Calibration Value
HEX-000641	22 Aug 2024	2.850185

Accuracy:	Complies with precision requirements of IEC 61672 for Class 2
Acoustic overload point:	135 dBSPL
Frequency Range:	20 Hz ~ 12.5 kHz
Frequency Rating:	Z, A and C weighting
Parameters (dB):	Frequency & time weighted integrations, statistical levels, and more
Direction of Arrival:	Device angle & cartesian angle (0°-360°) of dominant noise source

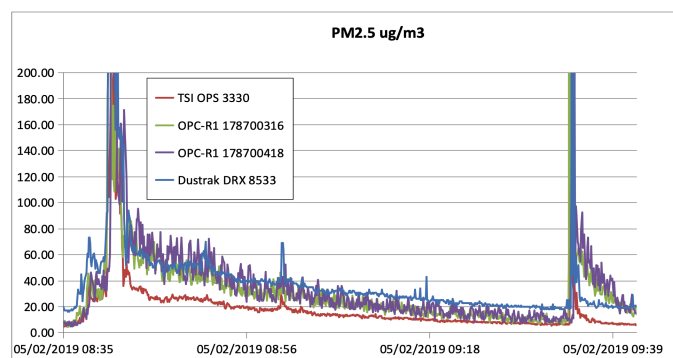
The SiteHive Hexanode uses innovative digital MEMS microphones, and as such cannot achieve full pattern approval in line with international standard IEC 61672, which is written for analogue condenser microphones. However, the SiteHive Hexanode sound level meter has been rigorously tested by the the [National Measurement Institute \(NMI\)](#), the division of the Australian Federal Government Department of Industry, Science, Energy & Resources responsible for providing world-class measurement services to support a fair, safe, healthy and competitive Australia. The National Measurement Institute's (NMI) [acoustic, ultrasound and vibration measurement services](#) are the most accurate in Australia, and include providing the certification for NATA (National Association of Testing Authorities) testing facilities, who provide class certification for noise meters. NMI undertook all of the possible tests outlined in IEC 61672-2, with the Hexanode passing all precision requirements within the criteria of a class 2 device.

## Dust

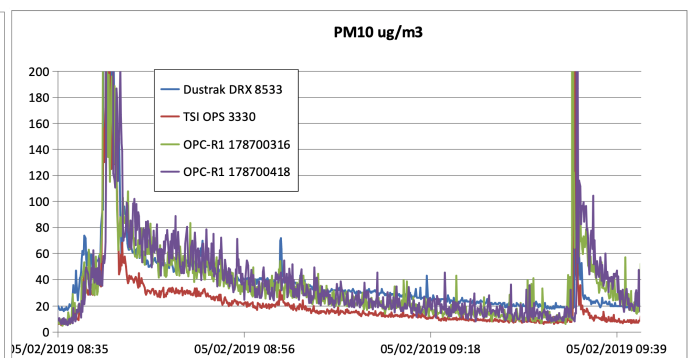
The Hexanode utilises the Alphasense R2 Optical Particle Sensor, to provide real-time dust measurements. Whilst the R2 does not have any gravimetric sampling capabilities, measurements can be adjusted using a K-Factor if one is available. SiteHive software will also provide measurements from the nearest Government air quality station for reference. The full data sheet for the Alphasense R2 is available [here](#).

Particle range	µm spherical equivalent size (based on RI of 1.5)	0.30 to 12.4
Size categorisation	Number of software bins	16
Sampling interval	Histogram period (seconds)	2 to 30
Total flow rate	L/min (typical)	0.24
Max particle count rate	particles/second	10,000
Max coincidence probability	% concentration at 10 <sup>6</sup> particles/L	0.7

Prior to deployment, the R2 is tested against [TSI Optical Particle Sizer 3330](#) and [DustTrak](#) instruments.



Comparison of PM2.5 monitoring by OPC-R2 sensor and TSI OPS 3330 and DustTrak instruments. All are set at 5s averaging and are sampling the ambient air of a workshop, the raw 3330 data has been used to calculate a PM figure.



Comparison of PM10 monitoring by OPC-R2 sensor and TSI OPS 3330 and DustTrak instruments. All are set at 5s averaging and are sampling the ambient air of a workshop, the raw 3330 data has been used to calculate a PM figure.

# Hexanode Calibration Certificate

10 Sep 2024

Thank you for choosing SiteHive for your realtime environmental management. This calibration certificate is valid for the device below.

## Noise

The Hexanode sound level meter has been pressure calibrated by SiteHive using a NATA Certified (IEC 60942: Sound calibrators) Sound Level Calibrator, at 2 Foveaux Street, Surry Hills, NSW, 2010.

Serial Number	Calibration Date	Calibration Value
HEX-000642	22 Aug 2024	2.92317

Accuracy:	Complies with precision requirements of IEC 61672 for Class 2
Acoustic overload point:	135 dBSPL
Frequency Range:	20 Hz ~ 12.5 kHz
Frequency Rating:	Z, A and C weighting
Parameters (dB):	Frequency & time weighted integrations, statistical levels, and more
Direction of Arrival:	Device angle & cartesian angle (0°-360°) of dominant noise source

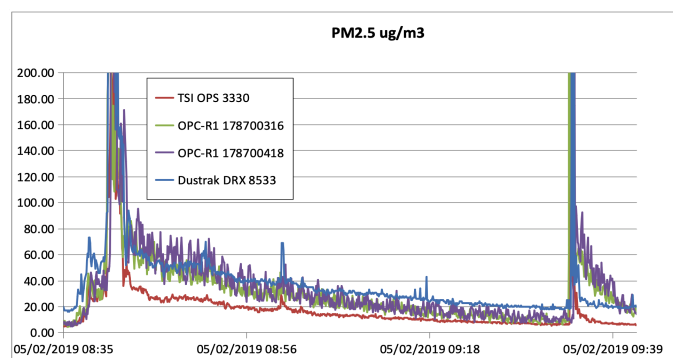
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## Dust

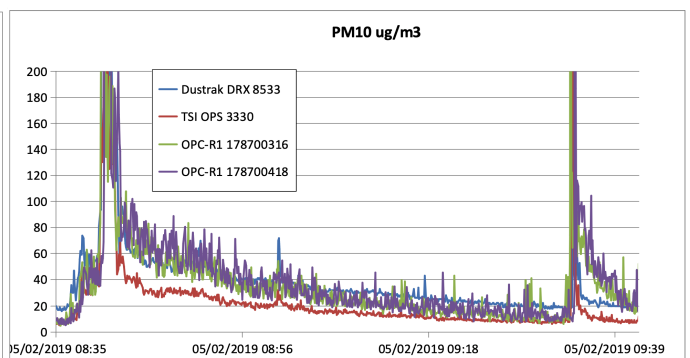
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Comparison of PM2.5 monitoring by OPC-R2 sensor and TSI OPS 3330 and DustTrak instruments. All are set at 5s averaging and are sampling the ambient air of a workshop, the raw 3330 data has been used to calculate a PM figure.



Comparison of PM10 monitoring by OPC-R2 sensor and TSI OPS 3330 and DustTrak instruments. All are set at 5s averaging and are sampling the ambient air of a workshop, the raw 3330 data has been used to calculate a PM figure.