

Upper South Creek

Advanced Water Recycling Centre and Pipelines

Noise and Vibration Construction Monitoring Report

Document Number: USCP-JHG-RPT-ENV-0012
Revision: A

Revisions and Distribution

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Date:	15/05/2024

Revisions

Draft issues of this document shall be identified as Revision 01, 02, 03 etc. Upon initial issue (generally Contract Award) this shall be changed to a sequential number commencing at Revision A. Revision numbers shall commence at Rev. A, B etc.

Date	Rev	Remarks	Section	Prepared By	Reviewed By & Approved By
126/03/2024	0	Initial version for review	All	Darragh O'Brien	Ryan Maxwell
05/05/2024	01	Update based on AA/SW comments	All	Ryan Maxwell	Alyce Harrington
15/05/2024	A	Approved and issued to DPHI	AI	Ryan Maxwell	Alyce Harrington

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1 Background

The Upper South Creek Advanced Water Recycling Centre and Pipelines project (the project) has been proposed to support the population growth and economic development of the Western Sydney Aerotropolis Growth Area (WSAGA or Aerotropolis), South West Growth Area (SWGA) and the new Western Sydney International Airport. The project will provide wastewater services to Western Sydney to produce high-quality treated water for non-drinking reuse and for release to local waterways.

The project comprises of the following components:

- A new Advanced Water Recycling Centre (AWRC) to collect wastewater from businesses and homes and treat it, producing high-quality treated water, renewable energy and biosolids for beneficial reuse
- A new green space area around the AWRC, adjacent to South Creek and Kemps Creek, to support the ongoing development of a green spine through Western Sydney
- New infrastructure from the AWRC to South Creek, to release excess treated water during significant wet weather events, estimated to occur about 3 – 14 days each year
- A new treated water pipeline from the AWRC to Nepean River at Wallacia Weir, to release high-quality treated water to the river during normal weather conditions
- A new brine pipeline from the AWRC connecting into Sydney Water's existing wastewater system to transport brine to the Malabar Wastewater Treatment Plant
- A range of ancillary infrastructure.

2 Purpose

This Noise and Vibration Construction Monitoring Report (NVMR) has been prepared to:

- validate the impacts of noise and vibration predicted for the project
- measure the effectiveness of environmental controls and implementation of the CEMP (specifically the Noise and Vibration CEMP Sub Plan (NVCSP) and the Noise and Vibration Monitoring Program (NVMoP))
- address approval requirements in accordance with CoA C18.

In accordance with the NVMoP (Appendix E of the NVCSP), monitoring reports are to be prepared on a bi-annual basis (every 6 months) in response to noise and vibration monitoring undertaken during the reporting period and will capture the following details.

- The location and description on monitoring undertaken.
- A tabulation of results (e.g., for noise including L_{max}, L₁₀, L₉₀ LA_{eq} noise levels) together with notes identifying the principal sources and operations.
- Summary of any measurements exceeding the nominated criteria and descriptions of the plant or operations causing the exceedances.
- Details of any corrective actions and confirmation of their successful implementation.

Construction Monitoring Reports will be provided to the Department of Planning, Housing and Infrastructure (DPHI) for information, in accordance with CoA C18. The report will also be provided to the Environmental Representative (ER) and Acoustic Auditor (AA) in accordance with the CoA. In line with CoA C18, the following report details the noise and vibration records from 28 August 2023 to 29 February 2024.

3 Construction Activities During Reporting Period

Construction activities undertaken across the project during the reporting period include:

- AWRC
 - Site Establishment
 - Clearing and Grubbing
 - Bulk Earthworks
 - Piling Works
 - Steel fixing
 - FRP Works
 - Concrete Pours
- Treated Water and Brine Pipeline
 - Site Establishment
 - Clearing and Grubbing
 - Sand and Spoil Haulage and Stockpiling
 - Cutting and Excavating Roadways
 - Asphalt laying and Compacting
 - HDD and Micro-Tunnelling

4 Noise & Vibration Monitoring

4.1 Noise Monitoring

4.1.1 Noise Monitoring Methodology

Noise monitoring and assessment has been undertaken and recorded in accordance with the NVMoP and relevant noise measurement requirements in the reference standards listed below:

The main guidelines, specifications and policy documents relevant to this NVMR include:

- NSW EPA 2022. Approved methods for the measurement and analysis of environmental noise in NSW
- NSW Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009;
- NSW Road Noise Policy, Department of Environment, Climate Change and Water 2011;
- Noise Policy for Industry, Environment Protection Authority 2017;
- NSW Assessing Vibration – a technical guideline, Department of Environment and Conservation 2006;
- Australian Standard 2659.1 – 1998 Guide to the use of sound measuring equipment – portable sound level meters;
- Australian Standard IEC 61672.1 Electroacoustic – Sound Level Meters – Specifications;
- Australian Standard 2775 Mechanical Mounting of Accelerometers;
- Australian Standard 1055 Acoustics – Description and Measurement of Environmental Noise;
- Australian Standard AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors;
- Australian Standard 2834-1995 Computer Accommodation, Chapter 2.9 Vibration;
- Australian Standard AS 2187.2 Explosives - Storage and use - Part 2 Use of explosives;
- Australian Standard AS2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- British Standard BS 6472-2008, 'Evaluation of human exposure to vibration in buildings (1-80Hz);
- British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings;
- German Standard DIN4150-2016 Structural vibration Part 3: Effects of vibration on Structures.

Attended monitoring of construction noise levels has been undertaken during the reporting period as follows:

- At locations identified as part of noise prediction assessments;
- Monitoring has been carried out at the commencement of activities for which a location and activity specific noise and vibration impact assessment has been prepared to confirm predicted values;
- In response to noise related complaints;
- As required by the CNVIS and/or EPL;
- Ongoing spot checks for noise intensive plant and equipment;

Each noise monitoring period has covered a representative period of the construction activity for which verification has been carried-out.

Where possible, monitoring has been undertaken at the most affected noise sensitive receiver's location in proximity to the Project's construction activities. Noise monitoring locations have considered factors including:

- The location of previous monitoring sites;
- The proximity of the receiver to a Project worksite;
- The sensitivity of the receiver to noise;
- Background noise levels; and
- The expected duration of the impact.

Monitored noise levels have been analysed against the predictions made in the relevant CNVIS or using the Project's predictive tools, this analysis is provided in Section 4.3 below.

4.1.2 Monitored Parameters and Record Keeping for Noise Monitoring

All environmental noise monitoring was taken with the following noise meter settings:

- Time Constant: Fast (i.e. 125 milliseconds);
- Frequency Weightings: A-weighting; and
- Sample period: 15 minutes.

Environmental noise monitoring (excluding spot checks of plant and equipment) was recorded over 15-minute sample intervals. The range of noise metrics stored in the memory of the noise meter on each occasion includes the following A-weighted noise levels: L_{A90} , L_{Aeq} , L_{A10} , L_A (min) and $L_{A(max)}$.

Duration of monitoring periods for spot checks of noise intensive plant and equipment depended on the source of noise being monitored.

Measurements have been recorded on a field data collection form an example is attached as Appendix 1.

4.1.3 Calibration, QA and Competency for Noise Monitoring

Noise monitoring has been carried out in accordance with the EPA's *Approved Methods for the Measurement and Analysis of Environmental Noise in NSW* (Approved Methods).

All monitoring has been undertaken by competent personnel, suitability certified, trained and experienced in undertaking noise measurements.

Noise monitoring equipment used throughout the reporting period was a Type 1 instrument as per the Approved Methods. The noise meters and calibrators which were used are detailed below:

- NL-53EX Sound Level Meter x2
- NC-75 Acoustic Calibrator x2

The noise monitor and calibrator used have been calibrated in a NATA accredited laboratory prior to use. Calibration certificates can be found in Appendix 2. The calibration of the monitoring equipment is also checked in the field before each noise measurement period.

All outdoor noise measurements have been undertaken with a windscreen over the microphone and measurements of noise have been disregarded when rain adversely affects the measurement and/or the wind speed has been greater than 5 m/s at the microphone (18 km/h).

4.2 Vibration Monitoring

4.2.1 Vibration Monitoring Methodology

Vibration monitoring and assessment has been undertaken in accordance with the NVMoP and relevant vibration measurement requirements in the reference standards listed below:

Attended vibration monitoring has been undertaken during the reporting period as follows:

- At the commencement of operation for each activity on site, which had the potential to generate significant vibration levels as determined by a vibration assessment;
- At the commencement of vibration generating activities that have the potential to impact on heritage items to confirm the minimum working distances to prevent cosmetic damage;
- Where vibration sensitive locations have been determined to fall within the 'minimum working distances' established for each item of plant;
- In response to a vibration related complaints.

Vibration monitoring has been undertaken in accordance with the relevant vibration measurement requirements in the reference standards and documents in Section 4.1.1.

On each occasion of vibration monitoring during the reporting period:

- Vibration monitoring equipment has been placed outside at the footings or foundations of the building of interest, closest to the vibrating plant;
- Where possible, the surface has been solid and rigid to best represent the vibration entering the structure under investigation;
- The vibration sensor has not been mounted on loose tiles, loose gravel or other non-resilient surfaces;
- The vibration sensor has been directly mounted to the vibrating surface using bees wax; and
- Where a suitable mounting surface has been unavailable at the Upper Canal, a metal stake of 300mm in length was driven into solid ground adjacent to the structure and the vibration sensor has been mounted on that. It's also noted that the Upper Canal is a heritage listed structure.

Monitored vibration levels have been analysed against the predictions made in the relevant CNVIS.

4.2.2 Monitored Parameters and Record keeping for Vibration Monitoring

Vibration data has been processed statistically and stored in memory before being transferred to records. The vibration metrics stored in memory include the following:

- Root-Mean-Square acceleration (RMS);
- Vector-sum peak-particle velocity (PPV).

All short term attended vibration monitoring has been recorded over a representative sampling interval where the worst-case vibration levels have been captured. Where unattended vibration monitoring has been required, monitoring has been undertaken continuously whilst the vibrating plant has been operational to capture the worst-case vibration levels.

4.2.3 Calibration, QA and Competency for Vibration Monitoring

All monitoring has been undertaken by competent personnel, suitability trained and experienced in undertaking vibration measurements.

All vibration instruments have been calibrated in accordance with manufacturers specifications or relevant Australian Standards. Monitoring equipment used during the reporting period are listed below and records of monitoring equipment calibration are found in Appendix 2:

- Meter - Svan-958A
- Transducer – SV 84

4.3 Noise Monitoring Results

4.3.1 AWRC

Table 1 below sets out the results of construction noise monitoring events at the AWRC site between August 2023 and February 2024. An assessment of the results is given in Section 4.3.2 below. Due to difficulty gaining access to the nearest residential properties surrounding the AWRC site, 146B Clifton Avenue (South of site) and 203-229 Clifton Avenue (East of site), monitoring has been carried out at Sitehives established at the southernmost and easternmost points of the site. The distance from these monitoring points to the nearest residential receivers has been ascertained to develop a corresponding NML when monitoring at these locations i.e. 60dB recorded at the Sitehive located at the AWRC Car Park will result in 45dB at the nearest sensitive receiver 203-229 Clifton Avenue due to the distance of 460m from the Car Park Sitehive to the resident. Similarly, 60dB measured at the SiteHive located near the Inlet will result in 45dB at the nearest sensitive receiver 146B Clifton Avenue. The locations of these Sitehives in relation to their nearest sensitive receiver is shown below in Figure 1.



Figure 1: Location of nearest sensitive receivers to AWRC and Monitoring Points

Table 1: Results of noise verification undertaken between August 2023 and February 2024 for the AWRC Site

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	Predicted Noise Level (Leq, 15min)		Measured Noise Level				Compliant Y/N	Comments
						At Receiver	At Site Hive	Leq, 15min	Lmax	L90	L10		
T1	AWRC Site Car Park (Sitehive location)	5/09/2023	30m	Site Establishment (Clearing, Earthworks)	Excavator (closest to monitoring location)	39 ¹	64	57.4	80.1	51.1	N/A	Y	Monitoring undertaken at the SiteHive
T1	AWRC Site Car Park (Sitehive location)	27/09/2023	30m	Bulk Earthworks	Smooth drum roller (closest to monitoring location)	42 ¹	67	59.8	80.9	56.1	61.7	Y	Monitoring undertaken at the SiteHive
T1	SiteHive at Inlet	28/09/2023	100m	Bulk Earthworks	LV's passing through	42 ¹	57	51.9	81.2	41	48	Y	Monitoring undertaken at the SiteHive
T1	AWRC Site Car Park (Sitehive location)	28/09/2023	20m	Bulk Earthworks	Truck and dogs	42 ¹	71	62.5	95.3	57.3	62.4	Y	Monitoring undertaken at the SiteHive
T1	230-234 Clifton Ave	9/10/2023	500m	Bulk Earthworks	Birds, M12 works	42 ¹	N/A	57.9	77.2	41.3	57.5	Y	Construction works inaudible. Exceedance not caused by construction
T1	146B Clifton Ave	18/10/2023	650m	Bulk Earthworks, Piling, Concrete Pour	Birds and helicopter overhead	42 ¹	N/A	55.7	88.7	41.3	54.7	Y	Construction works inaudible. Exceedance not caused by construction
T1	146B Clifton Ave	18/10/2023	650m	Bulk Earthworks, Piling, Concrete Pour	Birds, helicopter overhead and passing resident car	42 ¹	N/A	59	76.8	40.5	57.9	Y	Construction works inaudible. Exceedance not caused by construction
T1	Site Hive on the inlet pad	1/11/2023	20m	Concrete Pour x3, Piling Breakback, Earthworks	Jack hammer	46 ¹	75	66.4	79.1	56.9	70	Y	Standard Construction Hours
T1	AWRC Site Car Park (Sitehive location)	1/11/2023	30m	Concrete Pour x3, Piling Breakback, Earthworks	Handtools (installation of roofing)	46 ¹	71	49.5	63.1	46.2	52	Y	Monitoring undertaken at the SiteHive
T1	Site Hive at Inlet	30/11/2023*	100m	Concrete Pour	Concrete AGI arriving and leaving ; dominant noise is birds	40 ²	56	41.1	56.4	35.7	44.1	Y	Monitoring undertaken at the SiteHive

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	Predicted Noise Level (Leq, 15min)		Measured Noise Level				Compliant Y/N	Comments
						At Receiver	At Site Hive	Leq, 15min	Lmax	L90	L10		
T1	Site Hive at Inlet	30/11/2023*	100m	Concrete Pour	Concrete AGI arriving and leaving ; dominant noise is birds	40 ²	56	41.5	61.3	39.1	43.3	Y	Monitoring undertaken at the SiteHive
T1	Site Hive at Inlet	30/11/2023*	100m	Concrete Pour	Concrete AGI arriving and leaving ; dominant noise is birds	40 ²	56	41.7	62.4	37	45	Y	Monitoring undertaken at the SiteHive
T1	Site Hive at Inlet	9/12/2023*	150m	Steel fixing	Light vehicles	40 ²	52	55.1	69.3	45.9	60.1	Y	Monitoring undertaken at the SiteHive. Exceedance not caused by construction.
T1	230-234 Clifton Ave	9/12/2023*	550m	Steel fixing	Birds, crickets and resident car running near to meter	40 ²	N/A	43.8	65.6	37.1	44.9	Y	Steel fixing works inaudible Monitoring undertaken at the SiteHive
T1	Site Hive at Inlet	16/12/2023*	200m	Concrete Base Slab Pour	Concrete AGI arriving and leaving	48 ³	57	51.4	67.5	46	55.2	Y	OOHW Permit Monitoring undertaken at the SiteHive
T1	Site Hive at Inlet	16/12/2023*	200m	Concrete Base Slab Pour	Concrete AGI arriving and leaving	48 ³	57	51.7	66.2	47	54.9	Y	Monitoring undertaken at the SiteHive
T1	Site Hive at Inlet	16/12/2023*	200m	Concrete finishing works and FRP works	Concrete AGI arriving and leaving	48 ³	57	53.3	76.4	45.5	56.7	Y	Monitoring undertaken at the SiteHive
T1	230-234 Clifton Ave	11/01/2024*	500m	Steel fixing	Birds, Passing traffic	36 ²	N/A	54.9	80.1	39.6	52.5	Y	Steel fixing works inaudible. Dominant noise from traffic and birds.
T1	230-234 Clifton Ave	14/01/2024*	500m	Steel fixing	Birds, resident operating forklift on property	36 ²	N/A	46.3	72.3	35	43.6	Y	Construction inaudible. Dominant noise from resident and birds
T1	230-234 Clifton Ave	24/01/2024*	500m	Concrete Base Slab Pour	Traffic on Paper Rd	48 ³	N/A	63.7	83.5	41.9	63.7	Y	Concrete pour works inaudible
T1	Site Hive at Carpark	24/01/2024*	100m	Concrete Base Slab Pour	Insects, AGIs arriving and leaving	48 ³	63	61.2	70.1	43.7	66.5	Y	Monitoring undertaken at the SiteHive

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	Predicted Noise Level (Leq, 15min)		Measured Noise Level				Compliant Y/N	Comments
						At Receiver	At Site Hive	Leq, 15min	Lmax	L90	L10		
T1	Site Hive at Carpark	24/01/2024*	100m	Concrete Base Slab Pour	Insects, AGIs arriving and leaving	48 ³	63	51	66.7	45.3	54.3	Y	Monitoring undertaken at the SiteHive
T1	Site Hive at Carpark	25/01/2024*	100m	Concrete Base Slab Pour	Insects, AGIs arriving and leaving	48 ³	63	46.5	59.7	43.6	48.6	Y	Monitoring undertaken at the SiteHive
T1	Site Hive at Carpark	30/01/2024*	150m	MBR Concrete Pour	Insects	48 ³	63	43	58.9	39.6	45.1	Y	Monitoring undertaken at the SiteHive
T1	Site Hive Carpark	30/01/2024*	150m	MBR Concrete Pour	Insects	48 ³	63	43.3	57.8	39.8	45.7	Y	Monitoring undertaken at the SiteHive
T1	Site Hive Carpark	30/01/2024*	150m	MBR Concrete Pour	Insects	48 ³	63	49.1	62.7	42.6	54.4	Y	Monitoring undertaken at the SiteHive
T1	Site Hive Inlet	30/01/2024*	150m	MBR Concrete Pour	Insects	48 ³	63	53.8	73.7	50.5	55.5	Y	Monitoring undertaken at the SiteHive

* Monitoring which occurred outside standard construction hours

¹Predicted value from CNVIS

²Predicted value from NML

³Predicted value from Gatewave Noise Model

4.3.2 Assessment of noise monitoring results at AWRC

Noise verification monitoring was carried out at the AWRC on 27 occasions during the reporting period. 9 verification monitoring events were carried out during standard hours for the activities of site establishment, bulk earthworks and structure construction. All 9 events determined that noise from construction activities during standard hours were within the predicted levels of the CNVIS. Appropriate mitigation measures were in place where noise levels exceeded the applicable NML for the noise catchment area (NCA).

18 verification monitoring periods were carried out during out of hours (OOH) periods where works had been carried out in accordance with an Out of Hours permit. Monitoring events were predominantly within the predicted levels of the associated noise and vibration impact assessment. Where an exceedance of predicted levels was identified, these have been determined to be related to external factors not relating to construction noise. No non-compliances were identified

Monitoring was pre-dominantly conducted at the closest SiteHive due to access restrictions at the nearest resident.. The following equation was used to determine the noise limit at the Site Hive and resident in consultation with the Project Acoustic Advisor.

$$L_p = L_W - 20\log_{10}(r) - 8 \text{ dB}$$

4.3.3 Brine and Treated Water Pipeline

Table 2 below sets out the results of construction noise monitoring events at both the Brine and Treated Water Pipelines between August 2023 and February 2024. An assessment of the results is given in Section 4.3.4 below.

Table 2: Results of noise verification undertaken between August 2023 and February 2024 for the Pipelines

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	NML	Predicted Noise Level (Leq, 15min)	Measured Noise Level				Compliant	Comments
								Leq, 15min	Lmax	L90	L10		
B12	286 John Street	8/11/2023	10m	Pipe Installation + Open trenching + Backfilling	John Street Traffic	55	87	71.6	87.6	61.7	75.9	Y	Noise blankets in place
B11	42 Edenzor Road	8/11/2023	8m	NDD Operation	Edenzor Street Traffic	55	79	71.8	83.3	69.2	73.3	Y	Noise blankets in place
B11	42 Edenzor Road	8/11/2023	10m	NDD Operation + Use of jackhammer	Edenzor Street Traffic	55	79	69.2	79	61.9	71	Y	Noise blankets in place
B5	111 Feodore Drive	17/11/2023 *	15m	Pipe Installation + Open trenching + Backfilling	Saw	49	94	66	95.4	62.6	66.1	Y	Noise blankets in place
B5	107 Feodore Drive	17/11/2023 *	12m	Pipe Installation + Open trenching + Backfilling	Jackhammer	49	94	69.8	89.4	69.5	71	Y	Noise blankets in place
B5	107 Feodore Drive	17/11/2023 *	12m	Pipe Installation + Open trenching + Backfilling	Wet Vac	45	94	70	87.6	68.8	70.2	Y	Noise blankets in place
B5	08 Maud Close	17/11/2023 *	15m	Pipe Installation + Open trenching + Backfilling	Saw	45	79	78.5	98.3	75.9	81.5	Y	Noise blankets in place
B5	08 Maud Close	1/12/2023*	10m	Pipe Installation + Open trenching + Backfilling	Wet Vac	49	79	71	97.4	68	75.2	Y	Noise blankets in place, public traffic audible

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	NML	Predicted Noise Level (Leq, 15min)	Measured Noise Level				Compliant	Comments
								Leq, 15min	Lmax	L90	L10		
B5	111 Frederick Street	1/12/2023*	10m	Pipe Installation + Open trenching + Backfilling	Wet Vac	49	94	64.8	79.4	63.9	65.9	Y	Noise blankets in place, squawkers in use
B11/ B12	40 John Street	13/12/2023*	15m	Pipe Installation + Open trenching + Backfilling	Traffic John Street	45	95	65.8	89.6	57.2	66.4	Y	Noise blankets in place
B11/ B12	38 Cumberland Highway	13/12/2023*	10m	Pipe Installation + Open trenching + Backfilling	Traffic John Street	45	95	72.8	88.4	63.8	76.4	Y	Noise blankets in place
B11/ B12	38 Cumberland Highway	13/12/2023*	10m	Pipe Installation + Open trenching + Backfilling	Traffic John Street	40	95	73.9	86.7	65.6	77.5	Y	Noise blankets in place
B11/ B12	38 Cumberland Highway	13/12/2023*	5m	Vac Truck	Traffic John Street	40	95	77.1	81.1	74.6	79.6	Y	Verification of vac truck SWL
B11/ B12	38 Cumberland Highway	13/12/2023*	N/A	No Construction noise	Traffic John Street	40	95	64.7	78.2	83.9	78.2	Y	Background monitoring of John Street
NCA B6	345 North Liverpool Road	20/12/2023*	15m	Saw cutting for potholing works, vac trucks	Road saw and vac truck	50	86	80.2	90	79.2	80.9	Y	Intermittent saw cutting. Vac truck working throughout entire monitoring period. Noise blankets in place
NCA B6	341 North Liverpool Road	20/12/2023*	15m	Potholing using vac truck	Vac truck	45	86	83.5	86.1	82.8	84.2	Y	Infrequent non-construction traffic noise. Noise blankets in place
NCA B6	341 North Liverpool Road	20/12/2023*	7m	Vac truck SWL test	Vac truck	45	84	83.7	85.3	-	-	Y	Spot check of SWL of vac truck. Taken 7m from the noisiest part of the vac truck.

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	NML	Predicted Noise Level (Leq, 15min)	Measured Noise Level				Compliant	Comments
								Leq, 15min	Lmax	L90	L10		
NCA B10	628 Cabramatta Road West	7/01/2024*	5m	Placement of traffic barriers	Non-construction Traffic	50	50	57.4	72.5	48	62.1	Y	Unloading water barriers from truck and manoeuvring into position. Exceedance was deemed to be from non-construction traffic.
NCA B10	628 Cabramatta Road West	7/01/2024*	5m	Placement of traffic barriers	Non-construction Traffic	50	50	61.8	81.4	56.1	64.5	Y	Unloading water barriers from truck and manoeuvring into position. Exceedance was deemed to be from non-construction traffic.
NCA B10	628 Cabramatta Road West	13/01/2024*	10m	Pipe pulling using excavator	Excavator	45	72	67.4	85.2	63.4	-	Y	Pipe pulling using an excavator to pull the pipe, and another excavator to hold/align the pipe. Intermittent use of excavator to track along the road. Actual pipe pulling itself not noisy
NCA B10	628 Cabramatta Road West	13/01/2024	10m	Pipe pulling and welding	Excavator and welding	55	72	67.2	87.9	63.8	-	Y	Pipe pulling using an excavator to pull the pipe, and another excavator to hold/align the pipe. Intermittent use of excavator to track along the road. Welding machine tracking generated noise, welding activity itself very quiet (almost inaudible).
NCA B10	628 Cabramatta Road West	14/01/2024*	10m	Nil - background monitoring only	Non-construction traffic	50	87	62.4	80.7	-	-	Y	Background readings when no works occurring.
NCA B7	323 North Liverpool Road	23/01/2024*	12m	Pavement breakout and potholing	Road saw, vac truck and excavator	50	92	74.5	86.2	-	-	Y	Vac truck potholing with intermittent breakout of pavement using excavator with hammer attachment and road saw. Lighting towers also in use. Non-construction traffic intermittently making noise.
NCA B7	329 North Liverpool Road	23/01/2024*	10m	Pavement breakout and potholing	Road saw, vac truck and excavator	45	92	82.6	88.4	78.1	84.4	Y	Vac truck potholing with intermittent breakout of pavement using excavator with hammer attachment and road saw. Lighting towers also in use. Non-construction traffic intermittently making noise.
B9/B10	677 Cabramatta Rd WEst	25/01/2024*	10m	Potholing	Saw	50	79	72	81.8	65	76.1	Y	Noise blankets in place, traffic audible.

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	NML	Predicted Noise Level (Leq, 15min)	Measured Noise Level				Compliant	Comments
								Leq, 15min	Lmax	L90	L10		
B9/B10	4 Katinka Street	25/01/2024*	10m	Potholing	Saw	50	94	82.9	89.7	74.4	86.2	Y	Noise blankets in place, traffic audible.
B14	27 East Parade	7/02/2024	80m	Spoil movement and loading, truck movement, excavator movement and equipment loading	Cicadas	55	62	63.5	81.2	66.2	-	Y	Monitoring in response to noise complaint at C12. Area was surrounded by trees with high levels of cicada activity. Site works were inaudible over cicada noise.
B14	West of C12 compound	7/02/2024	80m	Spoil movement and loading, truck movement, excavator movement and equipment loading	excavator	55	62	57.5	80.5	60.1	49.1	Y	Monitoring in response to noise complaint at C12. Moved to an alternate location with similar distance and obstructions to that of the above monitoring complaint response to reduce the impact the cicadas had on the results
B8/9	699 Cabramatta Rd	8/02/2024*	N/A	No Construction noise - background road prior to arrival	traffic vehicles	50	82	69.5	89.3	56	73	Y	No construction works occurring
B8/9	689 Cabramatta Rd	8/02/2024*	20m	Road saw and potholing with vac truck	Road saw	50	81	78.1	87.9	65.7	83.3	Y	Noise blankets in place
B8/B9	behind 5 Tarlington Pl within Hebblewhite Reserve	9/02/2024*	10m	vac truck potholing	vac truck	45	80	76.7	82.5	70.5	77.6	Y	Noise blankets in place
NCA B14	South S12, O/S 27 East Pde	26/02/2024	N/A	Background compound monitoring	N/A	55	55	53.1	69	47.4	54.1	Y	Monitoring of background noise levels. Frequent trains and non-construction traffic passing. No construction works during monitoring period.

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	NML	Predicted Noise Level (Leq, 15min)	Measured Noise Level				Compliant	Comments
								Leq, 15min	Lmax	L90	L10		
NCA B14	27 East Parade	26/02/2024 *	15m	Prestart	crickets in area	45	54	59	66.8	57.3	60.2	Y	Crickets in area were dominant noise. Trains and non-construction vehicles passing nearby. Works not audible.
NCA B10	11C Meadows Rd	26/02/2024 *	10m	potholing, roadsaw	road saw, excavator dropping materials	50	83	83	103.1	70.3	86.9	Y	Non-construction related traffic passing monitor. Noise blankets in place.
NCA B10	11B Meadows Rd	26/02/2024 *	10m	potholing and roadsaw	roadsaw, jackhammer	45	83	75.1	90.1	65.8	78.4	Y	Non-construction related traffic passing monitor. Noise blankets in place.
NCA B10	11B Meadows Rd	26/02/2024 *	9m	potholing	excavator w/ jackhammer	45	83	76.9	82.7	75.2	78.3	Y	Non-construction related traffic passing monitor. Noise blankets in place.
NCA B12	203 John St (east)	27/02/2024 *	8m	Road saw	road saw	45	87	81.8	89.4	66.2	85.3	Y	Non-construction related traffic passing monitor. Noise blankets in place.
NCA B12	203 John St (east)	27/02/2024 *	8m	Potholing	jackhammer, excavator	45	87	71	88.9	59.4	70.9	Y	Non-construction related traffic passing monitor. Noise blankets in place.
NCA B05	C10 - 10m from 63 Edinburgh Court	29/02/2024 *	15m	Vehicles exiting C10	Cowpasture Road	49	75	53.6	61.7	50.5	55.5	Y	Cowpasture road traffic dominant
NCA B05	C10 - 10m from 63 Edinburgh Court	29/02/2024 *	15m	Vehicles exiting C10	Cowpasture Road	49	75	55.7	72.4	51.8	57.6	Y	Cowpasture road traffic dominant

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	NML	Predicted Noise Level (Leq, 15min)	Measured Noise Level				Compliant	Comments
								Leq, 15min	Lmax	L90	L10		
T2	-33.874187, 150.757894 Elizabeth Dr	28/09/2023	35m	Site Establishment Topsoil Stripping	Heavy Vehicles on Elizabeth Dr	50	72	65.0	84.6	55.7	68.1	Y	Non-construction traffic dominant noise during monitoring period.
T3	-33.87418, 150.757894 Elizabeth Dr	28/09/2023	17m	Site Establishment Stockpiling/ plant and equipment mobilisation	Traffic on Elizabeth Dr	52	72	59.6	73.7	51.9	62.6	Y	Non-construction traffic dominant noise during monitoring period.
T5	Opposite 279 Park Rd	4/10/2023	20m	Site Establishment Tree Clearing	Excavator with saw	55	75	63.6	95	53.7	65.8	Y	02:00 - 03:00 Hydraulic Saw cutting 64.9 dB, Tree dropping 63.7dB 04:00 - 05:00 Hydraulic Saw cutting 69.1
T5	273 Park Road	4/10/2023	5m	Site Compound Establishment Topsoil stripping, ATF fencing	Excavator movement	55	75	65.4	95.2	54.7	68	Y	Occasional metal on metal noise from fencing movement
T4	2241 Elizabeth Dr, Luddenham	20/10/2023	15m	Site Compound Establishment Topsoil stripping, container mobilisation	Excavator movement	55	69	53.9	78.3	45.4	56.9	Y	No excessive noise from works, occasion HV movement in front of monitor, 54m away from resident
T3	1783 Elizabeth Dr, Luddenham	20/10/2023	17m	Trenchless Reaming	Heavy Vehicles on Elizabeth Dr	52	72	64.5	77.9	60.2	66.9	Y	Multiple heavy vehicles passing by on Elizabeth Dr with direct line of sight
T3	2241 Elizabeth Dr, Luddenham	16/11/2023	6m	Trenchless Pipe pull / Install	Background noise on Elizabeth Dr	52	93	56.8	74.9	47	60.1	Y	Elizabeth drive traffic noise dominant.
T4	2241 Elizabeth Dr, Luddenham	16/11/2023	10m	Pipe Install		55	93	56.7	76.4	41.8	58.5	Y	

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	NML	Predicted Noise Level (Leq, 15min)	Measured Noise Level				Compliant	Comments
								Leq, 15min	Lmax	L90	L10		
T3	1783 Elizabeth Dr	16/11/2023	15m	Trenchless Pipe pull / Install	Vacc truck, recycling system	52	86	72.3	85.5	64.4	76.7	Y	Multipl truck movements in work area / in front of monitor
T1	949A Mamre Road, Kemps Creek	16/11/2023	5m	Excavation Pipe Welding		45	78	56.9	86.1	38.8	56.4	Y	
T1	949A Mamre Road, Kemps Creek	14/12/2023	5m	Site Establishment Tree Clearing		45	78	66.4	91.4	51.9	67.5	Y	
T1	146B Clifton Avenue, Kemps Creek	14/12/2023	10m	Pipe Install		45	69	64	95.8	54.7	60.4	Y	
T6	68 Park Rd	15/12/2023	5m	Trenchless	HDD Operation	55	81	66.4	91.1	53.7	68.7	Y	
T6	36 Park Rd	15/12/2023	10m	Trenchless Pipe Install	Vacuum Truck	55	89	81.6	90.5	68.1	86.9	Y	
T5	322 Park Rd	19/12/2023	20m	Excavation	Spoil Hualage and passing vehicles	55	79	68.5	91	54.7	70	Y	
T4	2289 Elizabeth Drive, Ludenham	19/12/2023	35m	Excavation Pipe Install	Excavator tracking, spoil truck moving	55	78	67.5	92.5	51.9	66.4	Y	
T2	1783 Elizabeth Drive, Ludenham	19/12/2023	20m	Trenchless Pipe Install / Pipe Pull	Excavator tracking,	50	86	73.3	96.6	56.1	69.7	Y	
T7	2720 Silverdale Road, Wallacia	31/01/2023	35m	Potholing and Early Works	Metal on metal due to bore	50	60	53.4	76.4	48.3	51.8	Y	

NCA	Location of Monitoring	Date	Distance to Works	Construction Activities on Site	Dominant Noise	NML	Predicted Noise Level (Leq, 15min)	Measured Noise Level				Compliant	Comments
								Leq, 15min	Lmax	L90	L10		
T3	889 Ludenham Road	7/03/2024*	270m	Potholing	Traffic on Ludenham Road	44	61	60.5	85.5	50.1	56.8	Y	Works only slightly audible during dips in traffic
T3	889 Ludenham Road	7/03/2024*	270m	Potholing	Traffic on Ludenham Road	44	61	58.8	80.4	44.9	54.7	Y	Works only slightly audible during dips in traffic
T6	1 Shelley Road	2/03/2024	100m	Drilling/HDD	Vac truck and drilling rig	55	69	51.8	59.8	48.3	54.8	Y	Consistent noise throughout the monitoring period. Sucker truck and drill rig generator in constant use around 50-52dBA.

* Monitoring which occurred outside standard construction hours

4.3.4 Assessment of noise monitoring results at the Brine and Treated Water Pipelines

Noise verification monitoring was carried out on the Brine Pipeline on 40 occasions during the reporting period. 7 verification monitoring events were carried out during standard hours for the activities of site establishment, potholing, open trenching and HDD. All 7 events determined that noise from construction activities during standard hours were within the predicted levels of the CNVIS. Appropriate mitigation measures were in place where noise levels exceeded the applicable NML for the NCA.

33 verification monitoring periods were carried out during out of hours (OOH) periods where works had been carried out in accordance with an Out of Hours permit. Monitoring events were predominantly within the predicted levels of the associated noise and vibration impact assessment. Where an exceedance of predicted levels was identified, these have been determined to be related to external factors not relating to construction noise. No non-compliances were identified.

Verification monitoring was carried out at the following Brine NCAs during the reporting period:

- NCA B5
- NCA B6
- NCA B7
- NCA B8
- NCA B9
- NCA B10
- NCA B11
- NCA B12
- NCA B14

Noise verification monitoring was carried out on the Treated Water Pipeline on 21 occasions during the reporting period. 19 verification monitoring events were carried out during standard hours for the activities of site establishment, potholing, open trenching and HDD. All 19 events determined that noise from construction activities during standard hours were within the predicted levels of the CNVIS. Appropriate mitigation measures were in place where noise levels exceeded the applicable NML for the NCA.

2 verification monitoring periods were carried out during out of hours (OOH) periods where works had been carried out in accordance with an Out of Hours permit. Both monitoring events were within the predicted levels of the associated noise and vibration impact assessment, no non-compliances were identified.

Verification monitoring was carried out at the following Treated Water NCAs during the reporting period:

- NCA T1
- NCA T2
- NCA T3
- NCA T4
- NCA T5
- NCA T6
- NCA T7

4.4 Vibration Monitoring Results

Vibration verification was undertaken on 12 occasions on the Brine Pipeline during the reporting period. Vibration monitoring has not been required at the AWRC site or the Treated Water pipeline during the period. The specific details of principle sources of vibration (plant) and activities being monitored are detailed in Table 4 below. An assessment of the results is given in Section 4.4.1 below.

Table 3: Results of vibration verification undertaken between August 2023 to February 2024.

Date	Purpose	Receiver Type	Work Location	Work Description	Plant & Equipment in use	Monitoring Location	Safe Work Distance (m)	Distance from activity to receiver (m)	Type	Vibration Limit (mm/s)	Highest Recorded Level (mm/s)	Compliant (Y/N)
30/10/2023	Verification of minimum working distance	Upper Canal (Heritage)	Shooting Centre, adjacent to Upper Canal structure	HDD under Upper Canal	HDD Rig	Upper Canal Structure	5	10m	Cosmetic/structural Damage for heritage	3	0.5	Y
19/12/2023	Verification of minimum working distance	Jemena Gas Main	Shooting Centre, adjacent to Jemena gas main	Underbore adjacent to the Jemena gas main	HDD Rig	Directly above the Jemena gas main	5	5m	Cosmetic/structural Damage	7.5	5.5	Y
19/12/2023	Verification of minimum working distance	Jemena Gas Main	Shooting Centre, adjacent to Jemena gas main	Underbore adjacent to the Jemena gas main	HDD Rig	Directly above the Jemena gas main	5	5m	Cosmetic/structural Damage	7.5	5.5	Y
14/02/2024	Verification of minimum working distance	Residential	N Liverpool Rd East of T-Way	Potholing	N/A (background)	235 North Liverpool Rd	N/A	5-50m (moving source)	Cosmetic/structural Damage	7.5	9.44	Y
14/02/2024	Verification of minimum working distance	Residential	N Liverpool Rd East of T-Way	Potholing	Excavator with hammer	225 North Liverpool Rd	5	5m	Cosmetic/structural Damage	7.5	1.6	Y
22/02/2024	Verification of minimum working distance	Residential	Cabramatta Rd at Hebblewhite Reserve	Potholing	N/A (background)	5 Tarlington Parade	5	5-20m	Cosmetic/structural Damage	7.5	0.0891	Y
22/02/2024	Verification of minimum working distance	Residential	Cabramatta Rd at Hebblewhite Reserve	Potholing	Excavator, jackhammer	5 Tarlington Parade	5	15-20m	Cosmetic/structural Damage	7.5	0.468	Y
27/02/2024	Verification of minimum working distance	Residential	John St east	Roadsaw and potholing	Road saw, truck, excavator	203 John St	5	5-20m	Cosmetic/structural Damage	7.5	3.89	Y
27/02/2024	Verification of minimum working distance	Residential	John St east	Roadsaw and potholing	Roadsaw, jackhammer, excavator	203 John St	5	8-30m	Cosmetic/structural Damage	7.5	3.89	Y
29/02/2024	Response to complaint	Residential	Access to Western Sydney	Vibratory roller	Vibratory Roller	18 Kensington Close	5	20m	Cosmetic/structural Damage	7.5	0.741	Y

Date	Purpose	Receiver Type	Work Location	Work Description	Plant & Equipment in use	Monitoring Location	Safe Work Distance (m)	Distance from activity to receiver (m)	Type	Vibration Limit (mm/s)	Highest Recorded Level (mm/s)	Compliant (Y/N)
			Parklands (Eastern Side)									
29/02/2024	Response to complaint	Residential	Access to Western Sydney Parklands (Eastern Side)	Background	N/A	20 Kensington Close	5	N/A	Cosmetic/structural Damage	7.5 mm/s	0.008	Y
29/02/2024	Response to complaint	Residential	Access to Western Sydney Parklands (Eastern Side)	Vibratory Roller	Vibratory Roller	22 Kensington Close	5	20m	Cosmetic/structural Damage	7.5 mm/s	1	Y

4.4.1 Assessment of Vibration Monitoring Results

Vibration verification monitoring was undertaken on 12 occasions on the Brine Pipeline during the reporting period. Vibration monitoring has not been required at the AWRC site or the Treated Water pipeline during the period. Vibration monitoring has been carried out when works have been within of the proximity of heritage structures (Upper Canal – State Significant Heritage Structure), when works are close to existing third-party assets (Jemena gas main) and when vibratory works have been near to residential structures. Vibration monitoring was also carried out on 3 occasions on the 29/02/2024 in response to a vibration complaint relating to the use of a vibratory roller at the entrance to the Western Sydney Parklands near Kensington Close. Verification monitoring has confirmed that while the criteria for human annoyance was reached, criteria for cosmetic damage was not. Use of the vibratory roller was ceased following this complaint.

During the reporting period, vibratory works have not been carried out within the minimum working distance which may cause cosmetic or structural harm. A single exceedance of vibration criteria has been recorded during the reporting period on the 14/02/2024. This exceedance was caused by construction workers walking nearby to the monitoring equipment during the monitoring event. A follow up monitoring event was carried out with no disruption and confirmed that works did not cause vibration at the receiver near to the vibration criteria for cosmetic damage.

4.5 Conclusion

Noise and vibration monitoring has been carried out during the reporting period (28 August 2023 to 29 February 2024) at the AWRC, the Brine Pipeline and the Treated Water Pipeline in accordance with the project CNVMoP. No exceedances of applicable noise or vibration criteria as a result of construction works have been identified during this period and no non-compliances have been identified with the CoAs.

Appendix 1 – Example of Noise Data Record Sheet

DETAILS		
LOCATION OF CONSTRUCTION ACTIVITY: C10	MONITORING LOCATION/CATCHMENT AREA: NCA C10 - 63 Edinburgh Court 10m	
DATE & TIME OF TEST: 29/02/24 20:00	TEST CONDUCTED BY: D. O'Brien	
CONSTRUCTION ACTIVITY: Vehicles exiting C10	DISTANCE FROM NOISE SOURCE: 20m	
METEROLOGICAL CONDITIONS ¹ : clear, calm		
WIND SPEED: <u>None</u> Light Moderate Strong	WIND DIRECTION: N/A	
NOISE ENVIRONMENT ² : Hared		
NOISE LEVELS AT MONITORING LOCATION		
DAY NML: 55	EVENING NML: 49	NIGHT NML: 45
PREDICTED NOISE LEVEL (LAeq15min): 75	NOISE ESTIMATE REFERENCE: (for example - CNVIS, OOHV noise assessment) 75 (OOHV Permit)	
SUBJECTIVE ASSESSMENT (mark all that apply and refer over page for detail minute by minute)		
Construction noise inaudible .	Construction noise sometimes audible ✓	Construction noise audible at most times .
Construction noise clearly audible .	Construction noise is dominant noise source .	
Impulsive Construction noise audible (e.g. rock-breaker) .	Tonal Construction noise audible (e.g. cutting steel) .	
SOUND LEVEL METER ASSESSMENT		
Start Time: 20:00	End Time: 20:15	Duration of Measurement: 15 minutes
File Name: 001-001	Select time weighting "Fast" not slow	Select frequency weighting "A" not C or Linear
Leq: 53.6	Exceedance of NML: LAeq15min 4.6	Difference to prediction: LAeq15min -21.4
LE: 83.2		
LAmix: 61.7		
LAmix: 67.1		
LA10 (15 min): 55.5		
LA50 (15 min): 53.3		
LA90 (15 min): 50.5		
SITE ACTIVITIES / MONITORING COMMENTS:		
Was metal on metal bangs minimized? ✓		
Were Flood lights (if any) directed to prevent light spill? ✓		
Was plant that was not in use switched off? ✓		
Was there signaling by horns? ✓		
Were airbrake silencers correctly installed? ✓		
Was there any shouting? ✓		

¹ i.e. temperature, humidity, cloud cover

² e.g. hard/soft groundcover, built or natural solid barrier

Were there any loud radios, Bluetooth speakers or the equivalent in use?

OBSERVATIONS

0.00 – 1.00	• Traffic Comparison road dominant throughout
1.00 – 2.00	• Vehicles audible when leaving site → H/S + Bunker
2.00 – 3.00	• Monitor calibrated at 94dBA prior to works
3.00 – 4.00	
4.00 – 5.00	
5.00 – 6.00	
6.00 – 7.00	
7.00 – 8.00	
8.00 – 9.00	
9.00 – 10.00	
10.00 – 11.00	
11.00 – 12.00	
12.00 – 13.00	
13.00 – 14.00	
14.00 – 15.00	

MAP

Appendix 2 – Calibration Certificates of Noise and Vibration Monitoring Equipment

CERTIFICATE OF CALIBRATION

CERTIFICATE No: **G37191**

EQUIPMENT TESTED : Ground Vibration Monitor

Manufacturer: Svantek

Meter Type: SVAN-958A

Transducers A: SV-84

Serial No: 99115

Serial No: R6092

Owner: John Holland Rail Pty
Ltd
Level 3, 65 Pirrama Road
Pyrmont NSW 2009

Tests Performed: Measured Frequency response, Correct level display,
Linearity display and Nominal Sensitivity
Comments: Detailed overleaf.

CONDITION OF TEST:

Temperature 22 °C $\pm 1^\circ$ C
Relative Humidity 42 % $\pm 5\%$

Date of Receipt : 28/08/2020

Date of Calibration : 28/08/2023

Date of Issue : 28/08/2023

Acu-Vib Test Procedure: AVP15 (Ground vibration Monitor & Low Frequency
Transducer) based on AS2187.2 & DIN45669-1

CHECKED BY:

AUTHORISED SIGNATURE:

Helen Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.



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Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

CERTIFICATE OF CALIBRATION

CERTIFICATE No: **G37190**

EQUIPMENT TESTED : Ground Vibration Monitor

Manufacturer: Svantek

Meter Type: SVAN-958A

Transducers A: SV-84

Serial No: 99116

Serial No: R6094

Owner: John Holland Rail Pty Ltd
Level 3, 65 Pirrama Road
Pyrmont NSW 2009

Tests Performed: Measured Frequency response, Correct level display,
Linearity display and Nominal Sensitivity
Comments: Detailed overleaf.

CONDITION OF TEST:

Temperature 23 °C $\pm 1^{\circ}$ C

Relative Humidity 42 % $\pm 5\%$

Date of Receipt : 28/08/2023

Date of Calibration : 28/08/2023

Date of Issue : 28/08/2023

Acu-Vib Test Procedure: AVP15 (Ground vibration Monitor & Low Frequency
Transducer) based on AS2187.2 & DIN45669-1

CHECKED BY:

AUTHORISED SIGNATURE:

Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration

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(02) 9680 8133
www.acu-vib.com.au



**Acoustic
Research
Labs Pty Ltd**

Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C23672

Client Details John Holland Group
Level 3, 65 Pirrama Road
Pyrmont NSW 2009

Equipment Tested/ Model Number : NC-75
Instrument Serial Number : 34835114

Atmospheric Conditions

Ambient Temperature : 24.4 °C
Relative Humidity : 35 %
Barometric Pressure : 100.38 kPa

Calibration Technician : Max Moore
Calibration Date : 19 Sep 2023

Secondary Check: Dhanush Bonu
Report Issue Date : 20 Sep 2023

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	±0.10 dB	Temperature	±0.1 °C
Frequency	±0.07 %	Relative Humidity	±1.9 %
Distortion	±0.20 %	Barometric Pressure	±0.014 kPa

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.



**Acoustic
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Labs Pty Ltd**

Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C23673

Client Details John Holland Group
Level 3, 65 Pirrama Road
Pyrmont NSW 2009

Equipment Tested/ Model Number : NC-75
Instrument Serial Number : 34735010

Atmospheric Conditions

Ambient Temperature : 24.6 °C
Relative Humidity : 34.3 %
Barometric Pressure : 100.36 kPa

Calibration Technician : Max Moore
Calibration Date : 19 Sep 2023

Secondary Check: Dhanush Bonu
Report Issue Date : 20 Sep 2023

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	±0.10 dB	Temperature	±0.1 °C
Frequency	±0.07 %	Relative Humidity	±1.9 %
Distortion	±0.20 %	Barometric Pressure	±0.014 kPa

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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Research
Labs Pty Ltd**


Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter

IEC 61672-3:2013

Calibration Certificate

Calibration Number C23693

Client Details		John Holland Group Level 3, 65 Pirrama Road Pyrmont NSW 2009	
Equipment Tested/ Model Number :		NL-53EX	
Instrument Serial Number :		00730321	
Microphone Serial Number :		23781	
Pre-amplifier Serial Number :		33173	
Firmware Version :		V1.0	
Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature : 23.6 °C		Ambient Temperature : 23.6 °C	
Relative Humidity : 37.8 %		Relative Humidity : 38.3 %	
Barometric Pressure : 100.55 kPa		Barometric Pressure : 100.5 kPa	
Calibration Technician : Max Moore		Secondary Check: Dhanush Bonu	
Calibration Date : 19 Sep 2023		Report Issue Date : 20 Sep 2023	
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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in 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	±0.014 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.



**Acoustic
Research
Labs Pty Ltd**


Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter

IEC 61672-3:2013

Calibration Certificate

Calibration Number C23694

Client Details		John Holland Group Level 3, 65 Pirrama Road Pyrmont NSW 2009
Equipment Tested/ Model Number :		NL-53EX
Instrument Serial Number :		00730322
Microphone Serial Number :		23782
Pre-amplifier Serial Number :		33174
Firmware Version :		V1.0
Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions
Ambient Temperature : 23.9 °C		Ambient Temperature : 24.5 °C
Relative Humidity : 37.8 %		Relative Humidity : 34.6 %
Barometric Pressure : 100.43 kPa		Barometric Pressure : 100.39 kPa
Calibration Technician : Max Moore		Secondary Check: Dhanush Bonu
Calibration Date : 19 Sep 2023		Report Issue Date : 20 Sep 2023
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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
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Appendix 3 – Evidence of consultation

ACOUSTICS ADVISOR ENDORSEMENT SYDNEY WATER UPPER SOUTH CREEK PROJECT

Project:	SSI 8609189	Stage:	Concept and Stage 1
Review of	Noise and Vibration Construction Monitoring Report August 2023 to February 2024.	Reviewed document reference:	Upper South Creek Advanced Water Recycling Centre and Pipelines
Prepared by:	Larry Clark, Acoustics Advisor		Noise and Vibration Construction Monitoring Report
Date of issue:	14 May 2024		Document Number: USCP-JHG-RPT-ENV-0012 Revision: 1 Dated: 5 May 2024

As approved Acoustics Advisor (AA) for the Sydney Water Upper South Creek Project I reviewed and provided comments on a previous version of the Noise and Vibration Construction Monitoring Report (NVMoR) for August 2023 to February 2024, for Sydney Water's Advanced Water Recycling Centre and Pipelines.

I am satisfied that my comments have been adequately addressed, and I endorse the NVMoR, as required by Condition of Approval A34 (e).

Larry Clark

Larry Clark, Acoustics Advisor