Noise and Vibration Construction Monitoring Report February 2024

SMWSASSM-PLD-1NL-NL000-NV-RPT-000001

Parklife Metro D&C

Document Approval

Revision	Author	Date	Comments	Reviewed by	Approved by
00	[redacted] Environmental Graduate	18/04/2024	Initial Draft	[redacted] Environmental Approvals	[redacted] Environment Manager
01	[redacted] Environmental Graduate	5/06/2024	Revised in response to SM and ER Comments	[redacted] Environmental Advisor	[redacted] Environment Manager
Signature					[redacted]

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Glossary/Abbreviations

Abbreviation	Expanded Text
CEMF	Construction Environmental Management Framework
CNVS	Sydney Metro Construction Noise and Vibration Standard
Condition	Planning Minister's Condition of Approval
Construction	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.
dB(A)	A-weighted decibels is an expression of the relative loudness of sounds in the air as perceived by the human ear.
DNVIS	Detailed Noise and Vibration Impact Statement
EPA	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
EPL	Environmental Protection Licence
LA_{eq}	Equivalent Continuous Sound Level
LP or SPL	Sound Pressure Level
LW or SWL	Sound Power Level
NCA	Noise Catchment Area
NML	Noise Management Level
NVCMR	Noise and Vibration Construction Monitoring Report
NVMP	Noise and Vibration Monitoring Program
OHE	Orchard Hills Station
OOHW	Out of Hours Works
Parklife Metro (PLM)	Consortium comprising entities of Plenary, Siemens, RATP Dev and Webuild as the Applicant for the Sydney Metro Western Sydney Airport SSTOM Package.
Parklife Metro D&C	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
RBL	Rating Background Noise Level
SMWSA	Sydney Metro Western Sydney Airport
SPL	Sound Pressure Level
SWL	Sound Power Level
SSTOM	Stations, Systems, Trains, Operations and Maintenance
STM	St Marys Station
the Project	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 that extends from the existing Sydney Trains suburban T1 Western Line at St Marys Station (STM) towards Orchard Hills Station (OHE) and the new Aerotropolis Core Station (AEC) in the south at Bringelly. The alignment includes a combination of tunnel, surface, bridges and viaduct sections, and comprises of six new metro stations between St Marys and the Aerotropolis Core precinct, 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.

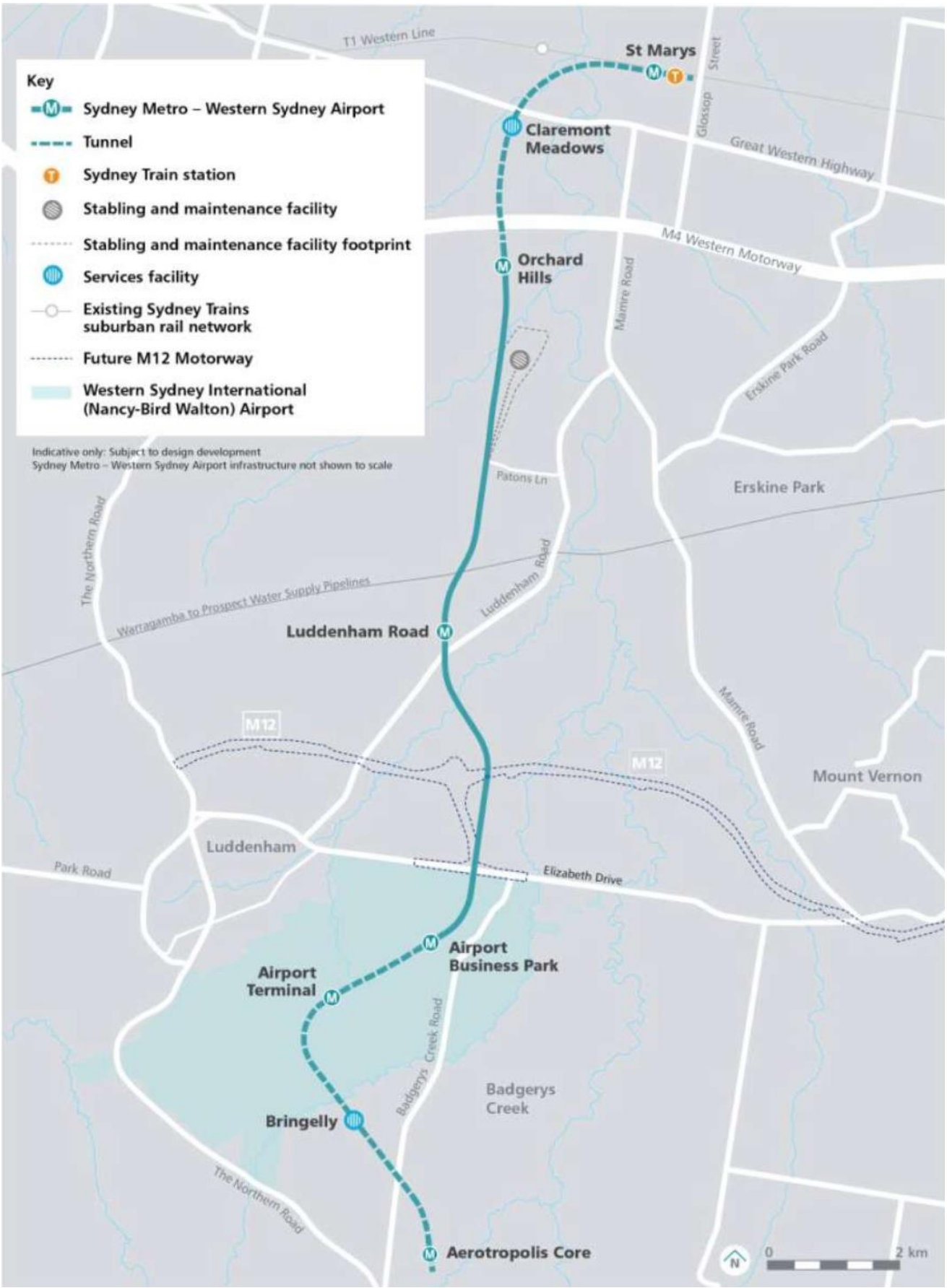

FIGURE 1 OVERVIEW OF SMWSA PROJECT

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 4 August 2023 to 3 February 2024.

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.

TABLE 1 REQUIREMENTS RELEVANT TO NOISE AND VIBRATION MONITORING REPORT

Condition	Requirement
C14	Each Construction Monitoring Program must provide: (a) details of baseline data available including the period of baseline monitoring; (b) details of baseline data to be obtained and when; (c) details of all monitoring of the project to be undertaken; (d) the parameters of the project to be monitored; (e) the frequency of monitoring to be undertaken; (f) the location of monitoring; (g) the reporting of monitoring results and analysis results against relevant criteria; (h) details of the methods that will be used to analyse the monitoring data; (i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts; (j) a consideration of SMART principles; (k) any consultation to be undertaken in relation to the monitoring programs; and (l) any specific requirements as required by Conditions C15 to C16.
C15	The Noise and Vibration Construction Monitoring Program must include: (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; (b) monitoring undertaken during the day, evening and night-time periods throughout the construction period and cover the range of activities being undertaken; (c) method and frequency for reporting monitoring results; and (d) a process to undertake real time noise and vibration monitoring. 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.
C22	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.
E38	Work must only be undertaken during the following hours: (a) 7:00am to 6:00pm Mondays to Fridays, inclusive; (b) 8:00am to 1:00pm Saturdays; and (c) at no time on Sundays or public holidays. (c) at no time on Sundays or public holidays.

E43	Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria: (a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009); (b) preferred vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); (c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives" (for human exposure); (d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and (e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage). 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.
E44	All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded: (a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and (b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A). 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.
E47	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.
CEMF 3.16a	Issue specific environmental monitoring will be undertaken as required or as additionally required by any approval, permit or licence conditions.
CNVS 6.1	Measurements of sound power level.
CNVS 6.2	Monitoring to be undertaken where a DNVIS predicts NMLs will be exceeded.
CNVS 5.1	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.

2 Monitoring

This section provides a summary of the monitoring completed in the reporting period from 4 August 2023 to 3 February 2024.

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

2.1 Attended Noise Monitoring

Attended noise monitoring is required to validate noise predictions as well as measure the effectiveness of mitigation measures outlined in the management plans and detailed noise and vibration impact statement (DNVIS). Table 2 provides a description of noise monitoring events during the reporting period. Detailed results and comments are presented in Appendix A and monitoring locations are show in Appendix C.

TABLE 2 DESCRIPTION OF ATTENDED NOISE MONITORING FOR THIS REPORTING PERIOD

Construction Activity	Date/Time	Monitoring Address	NCA	Works Period	NML LA_{eq} (15min)	Predicted Noise $LA_{eq\ (15\ min)}$	Recorded Noise LAeq (15min)	Comment
Concrete Pouring	30/01/2024 1:59pm – 2:14pm	STM - 2 Station Street (ID-1074)	03	Day	47	67	59.1	Monitoring was conducted at the front of the property facing the project boundary. Monitoring was completed 135m away from the closest concrete pour on a relatively quiet street, resulting in a lower than predicted result.
Concrete Pouring	30/01/2024 2:22pm – 2:37pm	STM - 34-36 Phillip Street (ID-1095)	03	Day	47	67	61.0	Monitoring was conducted at the front of the property facing the project boundary. Monitoring was completed 267m away from the closest concrete pouring on a busy street, resulting in higher than predicted readings.
Concrete Pouring	01/02/2024 1:47pm – 2:03pm	STM - 2A Chesham Street (ID-1034)	03	Day	47	67	54.3	Monitoring was conducted at the front of the property. Property is located 78m distance away from the concrete pouring,
Concrete Pouring	01/02/2024 2:22pm – 2:37pm	STM - 11 Phillip Street (ID-1032)	03	Day	47	67	62.4	Monitoring was at the front of the property facing the project boundary. Noise monitoring was completed 156m from the concrete pour. The monitoring was completed on a highly trafficked street, resulting in a higher than predicted result.

2.2 Unattended noise monitoring

Unattended noise monitoring targets areas with higher risk for noise impacts to sensitive receivers and is used to manage any potential noise impacts throughout construction. This data can be used to provide details on specific tasks and activities through targeted unattended noise monitoring, which is summarised below in Table 3. Unattended noise monitoring can also provide a summary of noise trends throughout the reporting period, a summary of which is provided in Appendix A.

TABLE 3 DESCRIPTION OF UNATTENDED NOISE MONITORING FOR THIS REPORTING PERIOD

Construction Activity	Date / Time	Monitoring Address	NCA	Works Period	NML LA_{eq} (15min)	Predicted $LA_{eq\ (15\ min)}$	Recorded Noise LAeq (15min)	Comment
Concrete Pouring	12/01/2024 6pm-10pm	STM – On site adjacent to laydown area	03	Evening	42	63	58.95	Unattended monitoring point located within project boundary adjacent to Phillip Street.
OSOM Delivery	24/01/2024	OHE – On site adjacent to 40 Lansdowne Rd	08	Night	45	48	52.0	The unattended noise monitor was located 20m from the closest receiver. Note; the noise monitor is located within site boundaries

Construction Activity	Date / Time	Monitoring Address	NCA	Works Period	NML LA_{eq} (15min)	Predicted $LA_{eq\ (15\ min)}$	Recorded Noise LAeq (15min)	Comment
								closer to the works hence the higher recorded reading. Recorded reading was affected by external noise factors including traffic and residential ambience.

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, and then 6 monthly intervals thereafter. Spot checks are performed for noise intensive plants where it is required to check noise emission against the manufacturer's specifications. Summary of SWL (Sound Power Level) checks for plant and equipment are listed in Table 4 and detailed data for plant and equipment checks are listed in Appendix B.

During this reporting period, sound power level checks indicated no exceedance of maximum allowable LAeq for the equipment listed in Table 4 and Appendix A. It is anticipated that additional opportunities for sound power level checks will be available during the next reporting period.

TABLE 4 SUMMARY OF PLANT/EQUIPMENT NOISE VERIFICATION.

Date	Machinery	Activity location	Recorded SWL (dBA)	Maximum SWL (dBA)	Exceedance of Predicted (dBA)	Comments
8/1/2024	Concrete pump	St Marys	102	105	No	Whilst the concrete pump was running the agitator was also present, no isolated monitoring was conducted.
8/1/2024	Concrete truck	St Marys	97	105	No	Monitoring of the concrete agitator was conducted away from the concurrent pump. There was no isolated monitoring between other construction noises and the concrete pump.

2.4 Vibration monitoring

No vibration monitoring was conducted due to no vibration impacted receivers. . The DNVIS' prepared to date has not identified vibration monitoring requirements for works undertaken during the reporting period. Activities identified in the DNVIS that will require future vibration monitoring are listed below:

- 12t vibratory roller during roadworks within 25 to 30m of residential buildings across Kent Road and Lansdowne Road at Orchard Hills.

2.5 Detailed Noise and Vibration Impact Statement (DNVIS)

DNVIS are requiredfor 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.

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 in this reporting period is provided listed in Table 5. They give an indication of potential works that may exceed NML, vibration criteria and/or ground-borne noise levels.

TABLE 5 DNVIS PREPARED

Title	Site	Scope of work
St Marys Station - Standard Hours and Oversized Plant Delivery	St Marys	DNVIS focuses on the construction of St Marys Station and out of hour deliveries for oversized plant equipment
St Marys Station - Concreting Works OOH - EPL Variation	St Marys	DNVIS focuses on concrete pouring occurring out of hours at St Marys
Orchard Hills Station - Standard Hours and Oversized Plant Delivery	Orchard Hills	DNVIS focuses on the construction of Orchard Hills Station

2.6 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.

Parklife Metro D&C

Appendices

Noise and Vibration Construction Monitoring Report February 2024

Appendix A Noise Monitoring Results

Unattended Activity-specific noise monitoring

Activity-specific noise monitoring aims to verify predicted impacts, as modelled in the EIS, Submissions Report or DNVIS.

Date	Time	Construction Activity	Activity Location	Monitoring Location	NML (dBA)	Predicted Noise Level (dBA)	Recorded LAeq(15 min) (dBA)	LAmax	Exceedance of Predicted (dBA)	Exceedance of Predicted	Comments
12/01/2024	18:30 pm	Concrete pouring OOH	SSTOM St Marys	SiteHive located within project boundary adjacent to Phillip Street (NCA03)	42	63	58.95	73.4	-4.05	No	Predicted noise level is provided from the most affected receiver identified in the DNVIS. Whereas this monitoring point is located closer to the works, and inside the existing noise walls which produces an LAeq higher than what is predicted.
24/01/2024	5:45 am	OSOM Delivery	SSTOM Orchard Hills	Orchard Hills – West onsite wall adjacent to 40 Lansdowne Rd (NCA08)	45	52	52.0	64	0	No	Noise monitoring results are consistent with the predicted impacts provided in the DNVIS. Note the recorded reading is lower due to inconsistent deliveries occurring during the night.

Attended activity-specific noise monitoring

Date	Time	Construction Activity	Activity Location	Monitoring Location	NML (dBA)	Predicted Noise Level(dBA)	Recorded LAeq(15min) (dBA)	LAmax	Exceedance of Predicted (dBA)	Exceedance of Predicted	Comments
30/01/2024	01:59 pm	Concrete pouring	SSTOM St Marys	2 Station St, St Marys NSW 2760 (NCA03)	47	69	59.1	72.3	-9.9	No	Verification noise monitoring carried out during standard construction hours. Construction activities were dominant noise source.
30/01/2024	02:22 pm	Concrete pouring	SSTOM St Marys	34-36 Phillip St, St Marys NSW 2760 (NCA03)	47	69	61.0	76.3	-8	No	Verification noise monitoring carried out during standard construction hours. Extraneous activities primarily consisting of light vehicles were dominant noise source.
01/02/2024	01:47 pm	Concrete pouring	SSTOM St Marys	2A Chesham St, St Marys NSW 2760 (NCA03)	47	69	54.3	70.9	-14.7	No	Predicted noise is provided from the worst impacted receiver identified in the DNVIS, whereas this monitoring point was situated further away from works, providing a more conservative result.
01/02/2024	02:06 pm	Concrete pouring	SSTOM St Marys	11 Phillip St, St Marys NSW 2760 (NCA03)	62.4	69	62.4	81.9	-6.6	No	Verification noise monitoring carried out during standard construction hours. Construction activities were dominant noise source.

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)			Predicted Noise Level (dBA) - Day	Recorded Day (7am to 6pm) Avg LAeq15min	Recorded Evening (6pm to 10pm) Avg LAeq	Recorded Night (10pm to 7am) Avg LAeq	Exceedance of Predicted	Comments
				Day	Evening	Night						
30/11/2023 – 9/01/2024	Pile testing, piling, geotechnical monitoring, and site establishment	SSTOM St Marys	St Marys – Onsite in the corner of the site adjacent to Phillip St and Station St (NCA03)	47	42	41	69	50	44	44	No	Monitoring occurred for early stages of work for St Marys consisting primarily of Pile Driving Analyzer (PDA). Piling occurred during standard day time hours and an OSOM delivery occurred on 11/10/2023
11/01/2024 – 22/01/2024	Site establishment	SSTOM St Marys	St Marys – West onsite wall on former Gidley St (NCA08)	47	42	41	70	65	51	51	No	Noise monitoring device was moved on 10/01. Site establishment was the primary source of noise. Piling and construction of contractor compound occurred during standard hours daytime hours.
24/01/2024 – 12/02/2024	Site establishment, deliveries	SSTOM Orchard Hills	Orchard Hills – West onsite wall adjacent to 40 Lansdowne Rd (NCA03)	54	49	45	72	57	45	44	No	Monitoring occurred during a period of low works. Data is inclusive of an Out of Hours night delivery that occurred on 24/01/2024. Minor deliveries and construction of compound during standard hours day time hours was the primary source of noise.
14/02/2024 – 29/02/2024	Piling, site establishment	SSTOM St Marys	St Marys – East onsite wall adjacent to Station St (NCA03)	47	42	41	70	60	56	49	No	Site works mostly consisted of piling works and minor site establishment works. Works occurred during standard hours day time hours.

Appendix B Sound Power Level

St Marys Concrete pump

Date	Activity location	Measured SPL (dBA)	Distance from equipment	Maximum Allowable Sound Power Level (dB)Lx)	Recorded SPL (dBA)	Exceedance of Predicted (dBA)
8/1/2024	St Marys Station	84.2	3	105	102	No
8/1/2024	St Marys Station	83.9	4	105	104	No
8/1/2024	St Marys Station	84.2	3	105	102	No
Statistic Summary						
Mean					102	No

St Marys Concrete truck

Date	Activity location	Measured SPL (dBA)	Distance from equipment	Maximum Allowable Sound Power Level (dBA)	LAeq 15min (dBA)	Exceedance of Predicted (dBA)
8/1/2024	St MarysStation	72.1	7	105	97	No
8/1/2024	St Marys Station	68	10	105	96	No
8/1/2024	St Marys Station	73.8	6	105	97	No
Statistic Summary						
Mean					97	No

Appendix C Noise 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)

Appendix D Certificate of Calibration

TSI INCORPORATED – OCONOMOWOC
1060 Corporate Center Drive, Oconomowoc, WI 53066 USA
tel 651 490 2811 + toll free 800 245 0779 + web www.tsi.com

An ISO 9001
Registered Company

Certificate of Calibration

Certificate Number: 2310201238SE40111780

Model: SE-401 Class 1
S/N: SE40111780

Date Issued: 20-Oct-2023

On this day of manufacture and calibration, TSI certifies that the above listed product meets or exceeds the performance requirements of the following acoustic standard(s):

ANSI S1.4 1983 (R 2006) - Specification for Sound Level Meters / Type 1
ANSI S1.43 1997 (R 2007) - Specification for Integrating - Averaging Sound Level Meters / Type 1
IEC 61672-1 (2002) - Electro acoustics – Sound Level Meters – Part 1: Specifications / Class 1

Test Conditions: Temp: 18-25ºC Humidity: 20-80% R.H. Barometric Pressure: 950-1050 mBar

Test Procedure: S073-706

Subassemblies:

B&K 4936	3288534
SE-400 Preamp	10220782

Reference Standard(s):

Device	Ref Standard Cal Due	Uncertainty - Estimated at 95% Confidence Level (k=2)
B&K Ensemble	07-Jan-2024	+/- 0.19dB Acoustic

Calibrated By: Michele Hust
Michele Hust - Assembler

In order to maintain best instrument performance over time and in the event of inspection, audit or litigation, we recommend the instrument be recalibrated annually. Any number of factors may cause the calibration to drift before the recommended interval has expired. See user manual for more information.

All equipment used in the test and calibration of this instrument is traceable to NIST, and applies only to the unit identified above.
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