Construction Monitoring Report March – August 2022

Sydney Metro City & Southwest – Line-wide Works

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1. Introduction

1.1 Project Summary

The Sydney Metro City & Southwest (SMCSW) is the second portion of the new standalone rail network known as the Sydney Metro, which is Australia's largest public transport infrastructure project and a priority rail project for the NSW Government. The project will extend Sydney Metro Northwest to the CBD and beyond to Bankstown. The project is being delivered through a suite of contracts for the tunnels, stations, Line-wide infrastructure and systems. Line-wide is a key component of the SMCSW, with works taking place over the full length of the project as shown in Figure 1 below:

Figure 1: Line-wide Locations

1.2 Planning Approval Requirements

The Sydney Metro Authority received planning approval to construct the project from the Department of Planning, Industry and Environment. The Conditions of Approval CSSI 7400 cover the works from Chatswood to Sydenham and the Conditions of Approval CSSI 8256 cover the works from Marrickville to Bankstown.

A Construction Environmental Management Plan and sub-plans were developed for the project to address all environmental aspects, including construction monitoring. Approval of the plans enabled commencement of construction on 4 March 2020. The plans for the Line-wide works were developed to address the requirements of both planning approvals in each plan or sub-plan. Construction monitoring requirements are detailed in the Soil, Water and Groundwater Management Sub-Plan C2B and the Construction Noise and Vibration Management Plan – C2B. The plans can be accessed at the CPB Sydney Metro City & Southwest Line-wide Works Project website:

https://www.cpbcon.com.au/en/our-projects/2018/sydney-metro-line-wide-works

The objectives for this report are to provide construction monitoring results for the fourth 6 months of works on the Line-wide Project, from the start of March 2022 to the end of August 2022. This report is provided for information to the Department of Planning and Environment. It is intended to address the requirements of Conditions C16 of CSSI 7400 and C14 of CSSI 8256.

2. Water Quality Monitoring

The Soil, Water and Groundwater Management Sub-Plan C2B requires that water quality monitoring will be undertaken for controlled discharges offsite to watercourses and stormwater drainage to ensure compliance with discharge criteria. The discharge criteria are shown in Table 1 below:

Table 1: Discharge Criteria

Parameter	Measurement and Assessment			Discharge Criteria
	Percentile Concentration Limit	**Sample Method & Frequency**	**Units**	
pH	100	Probe/ grab sample Prior to discharge	pH	6.5-8.5
Total Suspended Solids	100	Probe/ grab sample Prior to discharge	mg/L	<50
Oil and Grease	100	Visual Prior to discharge	mg/L	<10 and no visible trace

2.1 Permit to Dewater

Systems Connect have an internal Permit to Dewater system, which ensures compliance with discharge criteria at all times. Monitoring is done prior to each dewatering event. The Systems Connect Permit to Dewater and Water Quality Monitoring Register is provided in Appendix A. This demonstrates that discharge criteria were met for all discharges.

2.2 Water Treatment Plant

On 1 August 2020, Systems Connect took possession of a portion of the Chatswood Dive site from the Tunneling and Station Excavation Contractor. The portion contains the Chatswood Water Treatment Plant, which is now operated by Systems Connect. It collects surface water from the Chatswood Dive site, and tunnel water from between Barangaroo and the Chatswood Dive.

From November 2021, the Water Treatment Plant at Marrickville became operational. This WTP takes water from the tunnels between Barangaroo and the Marrickville Dive.

A WTP Checklist is completed by the WTP operator daily (working days), where a range of WTP observations, parameters and chemical levels are noted. This includes water discharge parameters required for regulatory compliance. The compliance results from the checklists completed during the reporting period are described in Table 2 below:

Table 2: WTP Compliance Results

WTP	Date	pH	Turbidity (NTU)	Oil and Grease
Chatswood	01/03/2022 to 31/08/2022	6.9 - 8.5	0.1 – 10.7	None visible
Marrickville	01/03/2022 to 31/08/2022	6.7 - 8.1	1.0 – 29.5	None visible

At each water treatment plant under Systems Connect control, the discharge parameters pH, TSS and NTU are to be sampled monthly. Results demonstrating compliance are provided in Appendix B.

2.3 Receiving Water Monitoring

The Soil, Water and Groundwater Management Sub-Plan C2B requires that monitoring of receiving waters will occur three-monthly, while WTPs are active and in SC control. Monitoring parameters are provided in Table 3 below:

Table 3: Surface Water Quality Parameters

Parameter	Sample Method	Analytical method	ANZECC[1, 2] Criteria (freshwater)[7]	ANZECC [1, 3] Criteria (marine water)[8]	EPL 21423	Trigger Values	Action
Temperature (ºC)	Probe	Field Analysis	>80%ile[4] <20%ile[4]			Results are > than the baseline 80th percentile	Environment Coordinators to re-test to confirm results. Environment Coordinator is to undertake an inspection of the Works and propose actions where required Note: There is a delay in receiving the results from grab samples. Environment Coordinator to obtain further grab samples for testing to confirm results. Environment Coordinator to undertake an inspection once results received and establish what activities had been undertaken prior to the tests being undertaken and propose actions where required.
Dissolved Oxygen (%Sat)	Probe	Field Analysis	Lower Limit: 85 Upper Limit: 110	Lower Limit: 90 Upper Limit: 110			
Turbidity (NTU)	Probe	Field Analysis	6-50	0.5-10			
Oil and Grease	Visual analysis, then grab sample if required	Visual Assessment Lab Analysis	-	-	No visible sign of oil and grease	Visible oil and grease	
Conductivity (µS/cm)[6]	Grab Sample and Probe	Field Analysis Lab Analysis	125 – 2200	-		Results are > than the baseline 80th percentile	
Total Suspended Solids (TSS: mg/L)	Grab Sample	Lab Analysis	-	-	50mg/L		
Iron (mg/L)			0.3[5]	-			
Manganese(mg/L)			1.7	0.8			
pH	Grab Sample and Probe	Field Analysis Lab Analysis	Lower Limit: 6.5 Upper Limit: 8.0	Lower Limit: 8.0 Upper Limit: 8.4	6.5 -8.5		

Notes:

[1] 95% protection level – most commonly applied to ecosystems that could be classified as slightly to moderately disturbed.

[2] ANZECC (2000) guidelines for the protection of freshwater aquatic ecosystems

[3] ANZECC (2000) guidelines for the protection of marine aquatic ecosystems

[4] Default trigger value for each ecosystem-type

[5] There is insufficient data at this stage to derive a reliable value for iron. The current Canadian guideline has been used.

[6] Conductivity will not be tested at monitoring points at estuarine/marine catchments.

- No data available

[7] Applicable to monitoring locations SW-SC-01, SW-FR-02, SW-EC-01

[8] Applicable to monitoring locations SW-SC-01, SW-FR-02, SW-MP-01, SW-BP-01, SW-B-01, SW-FC-01, SW-AC-01

Only the receiving waters downstream of the Chatswood WTP and Marrickville WTP are applicable for monitoring during this period. All other WTPs are being operated by other Sydney Metro contractors. The two monitoring sites downstream of the Chatswood WTP are both in the Scotts Creek/Middle Harbour Catchment. The sampling point downstream of the Marrickville WTP is in the Alexandra Canal. Sampling points are described in Table 4 below:

Table 4: Sampling Point Information

Site ID	Site interaction	Relative location	Catchment	Sampling address	Easting	Northing	Type
SW-SC-01	Receiving waters from Chatswood WTP discharges. Monitoring location active while the Chatswood WTP is active and in SC control.	Downstream	Scotts Creek / Middle Harbour	Muston Park, access via Eden Street, Chatswood	330586	6245923	Freshwater
SW-SC-02				Access via North Arm Track, North Arm Road, Chatswood	332788	6246304	Estuarine / Marine
SW-AC-01	Receiving waters from Marrickville WTP discharges. Monitoring location active while the Marrickville WTP is active and in SC control.	Downstream	Alexandra Canal	Access via bicycle track from the end of Coward Street, Mascot	331342	6244783	Estuarine

The results of the receiving water monitoring are provided in Appendix C.

3. Noise and Vibration

The Construction Noise and Vibration Management Plan – C2B includes the Construction Noise and Vibration Monitoring Program. This program requires that the results of construction noise and vibration monitoring will be reported every six months. The results for this monitoring period are included in this report.

3.1 Noise Monitoring

Section 8.1.4 of the CNVMP states that: “Attended monitoring of construction noise levels will be undertaken as follows:

- At the first opportunity following the commencement of construction activity to confirm the effectiveness of actions and measures determined in CNVIS process
- Repeated as described in the CNVIS, as part of the audit cycle to ensure that noise and vibration levels in the adjacent community remain consistent with the predicted levels in the CNVIS
- Where appropriate in response to a noise related complaint(s) (determined on a case-by-case basis)
- During sensitive periods (i.e. night works)
- As directed by an authorised officer of the EPA.

Monitoring would be undertaken at the potentially most exposed receivers in proximity to construction activities. Noise monitoring locations should be consistent with the distances/ locations identified in the CNVIS and will consider factors including:

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

Summary results of attended noise monitoring conducted by Systems Connect in the reporting period are provided in Appendix D (Systems Connect Noise Monitoring Register), demonstrating compliance with project requirements, including the above extract from the management plan.

Noise monitoring equipment details, including make, model, serial number, last calibration date and NATA testing facility, are provided in Appendix E.

Further details are collected for each field reading, including time, duration, meteorological conditions and extraneous noise sources during reading. Samples of Noise Monitoring Record Sheets are provided in Appendix F. Others are available on request.

3.2 Vibration Monitoring

The Construction Noise and Vibration Management Plan – C2B explains that: “the requirement for real time vibration monitoring will be determined on a site by site basis and identified in the CNVIS for LW worksites between Chatswood and Sydenham. Real time vibration monitoring will be deployed to manage vibration impacts from ‘high risk’ sites, where the CNVIS vibration predictions identify there is a high risk of annoyance (or potential building damage) from construction vibration.”

During the reporting period, there were numerous locations and work campaigns where vibration monitoring was done. Summary results demonstrating compliance with vibration criteria are included in Appendix G (Systems Connect Vibration Monitoring Register).

Samples of Vibration Monitoring Reports are provided in Appendix H. Others are available on request.

Appendix A: Systems Connect Permit to Dewater and Water Quality Monitoring Register

Systems Connect LWW Permit to Dewater and Water Quality Monitoring Register

Permit to Dewater	Date	Location	Detailed Monitoring Location	Single or Continuous	Reason	Discharge Point	Water Quality Analyser	pH	Turbidity NTU	Oil & Grease
Permit to Dewater LWW-157	2/03/2022	Chatswood Dive	N/A	Continuous	For discharge approval	Chatswood WTP Discharge Point 1	WTP	NA	NA	NA
Permit to Dewater LWW-158	Not used									
Permit to Dewater LWW-159	11/03/2022	Southern Dive	N/A	Continuous	Discharged under the approved 'Controlled Water Overflow Strategy' following major rain event	Stormwater Drain adjacent Gate E2	NA	NA	NA	NA
Permit to Dewater LWW-160	10/03/2022	Marrickville WTP	N/A	Continuous	For discharge approval	Marrickville WTP Discharge Point 2	WTP	NA	NA	NA
Permit to Dewater LWW-161	Not used									
Permit to Dewater LWW-162	4/04/2022	Chatswood Dive	N/A	Continuous	For discharge approval	Chatswood WTP Discharge Point 1	WTP	NA	NA	NA
Permit to Dewater LWW-163	7/04/2022	Southern Dive	N/A	Continuous	Discharged under the approved 'Controlled Water Overflow Strategy' following major rain event	Stormwater drain adjacent Gate E2	NA	NA	NA	NA
Permit to Dewater LWW-164	7/04/2022	Northern Dive	N/A	Continuous	Discharged under the approved 'Controlled Water Overflow Strategy' following major rain event	Stormwater Drain	NA	NA	NA	NA
Permit to Dewater LWW-165	7/04/2022	Crows Nest	N/A	Continuous	Discharged under the approved 'Controlled Water Overflow Strategy' following major rain event	Storm water drain at entrance of Clark Lane	NA	NA	NA	NA
Permit to Dewater LWW-166	12/04/2022	Campsie BPS	Cooks Ave Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.23	42.4	None Visible
Permit to Dewater LWW-167	13/04/2022	Campsie BPS	Anzac Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.87	13.2	None Visible
Permit to Dewater LWW-168	10/04/2022	Marrickville WTP	N/A	Continuous	For discharge approval	Marrickville WTP Discharge Point 2	WTP	NA	NA	NA
Permit to Dewater LWW-169	21/04/2022	SMTF-S	Clarifier tank - Operational WTP	Single	For discharge approval	SMTF-S	Horiba U-52	8.19	6	None Visible
Permit to Dewater LWW-170	22/04/2022	Campsie BPS	Cooks Ave Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.79	25.1	None Visible
Permit to Dewater LWW-170	22/04/2022	Campsie BPS	Gould Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.33	33.5	None Visible
Permit to Dewater LWW-171	26/04/2022	Campsie BPS	Anzac Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.5	10	None Visible
Permit to Dewater LWW-172	4/05/2022	Chatswood Dive	N/A	Continuous	For discharge approval	Chatswood WTP Discharge Point 1	WTP	NA	NA	NA
Permit to Dewater LWW-173	3/05/2022	Campsie BPS	Cooks Ave Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.05	35.8	None Visible
Permit to Dewater LWW-173	3/05/2022	Campsie BPS	Anzac Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.51	7.5	None Visible
Permit to Dewater LWW-174	6/05/2022	Campsie BPS	Gould Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.81	35.4	None Visible
Permit to Dewater LWW-175	10/05/2022	Marrickville WTP	N/A	Continuous	For discharge approval	Marrickville WTP Discharge Point 2	WTP	NA	NA	NA
Permit to Dewater LWW-176	12/05/2022	Campsie BPS	Anzac Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.16	25.6	None Visible
Permit to Dewater LWW-177	14/05/2022	Campsie BPS	Cooks Ave Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.89	37.9	None Visible
Permit to Dewater LWW-178	16/05/2022	Campsie BPS	Gould Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.17	8.5	None Visible
Permit to Dewater LWW-179	19/05/2022	Campsie BPS	Anzac Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.25	15.4	None Visible
Permit to Dewater LWW-180	23/05/2022	Campsie BPS	Anzac Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.05	36	None Visible
Permit to Dewater LWW-181	24/05/2022	Campsie BPS	Gould Street	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.57	49.8	None Visible
Permit to Dewater LWW-181	24/05/2022	Campsie BPS	South Parade	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.72	49.7	None Visible
Permit to Dewater LWW-182	30/05/2022	Campsie BPS	Gould Street	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.63	3.1	None Visible
Permit to Dewater LWW-183	31/05/2022	Campsie BPS	South Parade	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.93	14.2	None Visible
Permit to Dewater LWW-184	3/06/2022	Chatswood Dive	N/A	Continuous	For discharge approval	Chatswood WTP Discharge Point 1	WTP	NA	NA	NA
Permit to Dewater LWW-185	7/06/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.77	34.9	None Visible
Permit to Dewater LWW-186	8/06/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.22	38.1	None Visible
Permit to Dewater LWW-186	8/06/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.12	27.4	None Visible
Permit to Dewater LWW-187	9/06/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.65	30.5	None Visible
Permit to Dewater LWW-188	10/06/2022	Marrickville WTP	N/A	Continuous	For discharge approval	Marrickville WTP Discharge Point 2	WTP	NA	NA	NA
Permit to Dewater LWW-189	15/06/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.31	36.3	None Visible

Permit to Dewater LWW-190	21/06/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.42	20.7	None Visible
Permit to Dewater LWW-191	22/06/2022	Campsie BPS	Gould Street	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.28	24.1	None Visible
Permit to Dewater LWW-191	22/06/2022	Campsie BPS	South Parade	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.49	29.1	None Visible
Permit to Dewater LWW-192	29/06/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.97	19	None Visible
Permit to Dewater LWW-193	1/07/2022 - 12/07/2022	Marrickville	Southern Dive - Marrickville	Continuous	Discharged under the approved 'Controlled Water Overflow Strategy' following major rain event	Stormwater drain adjacent Gate E2	NA	NA	NA	NA
Permit to Dewater LWW-194	1/07/2022 - 12/07/2022	Chatswood Dive	Chatswood Dive	Continuous	Discharged under the approved 'Controlled Water Overflow Strategy' following major rain event	Stormwater Pit	NA	NA	NA	NA
Permit to Dewater LWW-195	4/07/2022	Chatswood Dive	N/A	Continuous	For discharge approval	Chatswood WTP Discharge Point 1	WTP	NA	NA	NA
Permit to Dewater LWW-196	1/07/2022 - 12/07/2022	Crows Nest	Crows Nest	Continuous	Discharged under the approved 'Controlled Water Overflow Strategy' following major rain event	Stormwater Pit	NA	NA	NA	NA
Permit to Dewater LWW-197	4/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.49	49.3	None Visible
Permit to Dewater LWW-198	4/07/2022	Campsie BPS	South Parade	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.36	21.6	None Visible
Permit to Dewater LWW-199	5/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.79	43.2	None Visible
Permit to Dewater LWW-200	6/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.54	38.4	None Visible
Permit to Dewater LWW-201	Not used									
Permit to Dewater LWW-202	6/07/2022	Campsie BPS	South Parade	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.48	26.4	None Visible
Permit to Dewater LWW-202	6/07/2022	Campsie BPS	Gould Street	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.48	23.4	None Visible
Permit to Dewater LWW-203	7/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.60	18	None Visible
Permit to Dewater LWW-204	8/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.27	35.9	None Visible
Permit to Dewater LWW-205	10/07/2022	Marrickville WTP	N/A	Continuous	For discharge approval	Marrickville WTP Discharge Point 2	WTP	NA	NA	NA
Permit to Dewater LWW-206	11/07/2022	Campsie BPS	Gould Street	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.34	17.3	None Visible
Permit to Dewater LWW-207	11/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.31	14.3	None Visible
Permit to Dewater LWW-208	13/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.61	33.5	None Visible
Permit to Dewater LWW-209	18/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.04	6.2	None Visible
Permit to Dewater LWW-210	18/07/2022	Campsie BPS	Gould Street	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.66	10.3	None Visible
Permit to Dewater LWW-210	18/07/2022	Campsie BPS	South Parade	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.93	4	None Visible
Permit to Dewater LWW-211	22/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.94	11	None Visible
Permit to Dewater LWW-212	25/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	7.75	26.8	None Visible
Permit to Dewater LWW-213	28/07/2022	BPS Surry Hills	Belmore Street Joint Bay	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	6.73	21.3	None Visible
Permit to Dewater LWW-214	4/08/2022	Chatswood Dive	N/A	Continuous	For discharge approval	Chatswood WTP Discharge Point 1	WTP	NA	NA	NA
Permit to Dewater LWW-215	10/08/2022	Marrickville WTP	N/A	Continuous	For discharge approval	Marrickville WTP Discharge Point 2	WTP	NA	NA	NA
Permit to Dewater LWW-216	29/08/2022	Campsie BPS	Gould Street	Single	For discharge approval	Roadside stormwater gutter	Horiba U-52	8.17	39.3	None Visible

Appendix B: Monthly WTP Sampling

Monthly Water Quality Monitoring - Chatswood WTP

CHW2 Discharge point

Date	Time	Sample ID	pH	Total Suspended Solids (mg/L)	Turbidity (NTU)
23/03/2022	9:45	CHW2	7.33	7	1.9
22/04/2022	14:15	CHW2	7.89	<5	1.2
25/05/2022	10:40	CHW2	7.79	<5	1.4
23/06/2022	9:15	CHW2	7.84	<5	1.5
22/07/2022	9:15	CHW2	7.99	17	11.6
25/08/2022	15:20	CHW2	7.96	<5	2.2

Monthly Water Quality Monitoring - Marrickville WTP

MKV2 Discharge point

Date	Time	Sample ID	pH	Total Suspended Solids (mg/L)	Turbidity (NTU)
21/03/2022	8:00:00 AM	MKV2	7.94	<5	4.2
27/04/2022	10:00:00 AM	MKV2	8.36	<5	0.3
26/05/2022	9:15:00 AM	MKV2	7.97	6	1.6
23/06/2022	8:20:00 AM	MKV2	8.03	<5	1.7
18/07/2022	9:15:00 AM	MKV2	8.05	<5	0.7
25/08/2022	10:00:00 AM	MKV2	8.14	<5	1.7

Appendix C: Receiving Water Monitoring Results

Quarterly Surface Water Quality Monitoring - Chatswood

			Field Results						Lab Results				
Date	Time	Sample ID	Temperature (C)	Dissolved Oxygen (%)	Turbidity (NTU)	Conductivity (µS/cm)	pH	Oil & Grease (Y/N)	Total Suspended Solids (mg/L)	Iron (Fe)	Manganese (Mn)	pH	Oil & Grease (mg/L)
23/03/2022	11:00:00 AM	SW-SC-01	21.91	62.3	6.3	752	7.72	N	<5	<0.05	0.004	7.63	Not tested
23/03/2022	11:15:00 AM	SW-SC-02	21.82	58.9	3.1	17600	7.05	N	8	0.17	0.027	7.75	Not tested
23/06/2022	10:00:00 AM	SW-SC-01	14.16	83.6	7.6	325	7.45	N	<5	<0.05	0.01	7.6	Not tested
23/06/2022	11:00:00 AM	SW-SC-02	12.05	74.7	4.6	1800	7.44	N	<5	0.12	0.008	7.69	Not tested

Quarterly Surface Water Quality Monitoring - Marrickville

			Field Results						Lab Results				
Date	Time	Sample ID	Temperature (C)	Dissolved Oxygen (%)	Turbidity (NTU)	Conductivity (µS/cm)	pH	Oil & Grease (Y/N)	Total Suspended Solids (mg/L)	Iron	Manganese	pH	Oil & Grease (mg/L)
22/04/2022	1:00:00 PM	SW-AC-01	19.87	4.98	13.1	15900	7.2	N	11	0.06	0.051	7.76	Not tested
18/07/2022	8:10:00 AM	SW-AC-01	12.64	10.78	7	24800	7.54	N	8	<0.05	0.054	7.8	Not tested

Appendix D: Systems Connect Noise Monitoring Register

Systems Connect LWW Noise Monitoring Register

Date	Location	Detailed Monitoring Location	NCA	Predicted Noise Level	Measured L_{Aeq}	Comments
19/03/2022	Lakemba TSS	13 The Boulevarde, Lakemba	S2B_08	74	76	Review of works, assessment and monitoring has been completed. 2 dB higher than the predicted can be attributed to the measurement being 9m from the source. It is likely that 4m back from the measurement location in the front yard of 13 The Boulevarde, the measured noise would be at the predicted level. LW works compliant
19/03/2022	Lakemba TSS	11 The Boulevarde, Lakemba	S2B_08	76	66	Below predicted, LW works compliant
19/03/2022	Lakemba TSS	16 The Boulevarde, Lakemba	S2B_08	76	58	Below predicted, LW works compliant
19/03/2022	Canterbury TSS	8 Hutton Street, Hurlstone Park	S2B_03	78	64	Below predicted, LW works compliant
19/03/2022	Canterbury TSS	6 Hutton Street, Hurlstone Park	S2B_03	76	66	Below predicted, LW works compliant
19/03/2022	Canterbury TSS	24 Hutton Street, Hurlstone Park	S2B_03	73	54	Below predicted, LW works compliant
19/03/2022	Canterbury TSS	2 Canberra Street, Hurlstone Park	S2B_03	79	55	Below predicted, LW works compliant
21/03/2022	BPS Surry Hills	1-5 Randle Street, Surry Hills	CS_G	102	87.6	Below predicted, LW works compliant
21/03/2022	BPS Surry Hills	30-34 Chalmers Street, Surry Hills	CS_G	85	67.5	Below predicted, LW works compliant
26/03/2022	Canterbury TSS	8 Hutton Street, Hurlstone Park	S2B_03	75	59	Below predicted, LW works compliant
26/03/2022	Canterbury TSS	24 Hutton Street, Hurlstone Park	S2B_03	70	55	Below predicted, LW works compliant
26/03/2022	Canterbury TSS	2 Canberra Street, Hurlstone Park	S2B_03	76	56	Below predicted, LW works compliant
26/03/2022	Northern Connection	3 Berkely Court, Chatswood	CDS_03	49	52	Traffic noise dominant, LW works compliant
26/03/2022	Northern Connection	340 Mowbray Road, Artarmon	CDS_06	49	67	Traffic noise dominant, LW works compliant
30/03/2022	Waterloo Station	104 Raglan Street, Waterloo	WS_02	75	72.8	Below predicted, LW works compliant
30/03/2022	Waterloo Station	209 Cope Street, Waterloo	WS_02	75	72.4	Below predicted, LW works compliant
2/04/2022	Northern Connection	12 Drake Street, Artarmon	CDS_05	71	54	Below predicted, LW works compliant
2/04/2022	Northern Connection	8-10 Brand Street, Artarmon	CDS_05	70	65	Below predicted, LW works compliant
2/04/2022	Northern Connection	7 Raleigh Street, Artarmon	CDS_05	54	55	Traffic noise dominant, LW works compliant
2/04/2022	Northern Connection	4 Chapman Avenue, Chatswood	CDS_04	59	57	Below predicted, LW works compliant
2/04/2022	Northern Connection	2 Nelson Street, Chatswood	CDS_03	76	52	Below predicted, LW works compliant
7/05/2022	Punchbowl TSS	66 South Terrace, Punchbowl	S2B_10	69	69	As predicted, LW works compliant
7/05/2022	Punchbowl TSS	68 South Terrace, Punchbowl	S2B_10	70	66	Below predicted, LW works compliant
7/05/2022	Punchbowl TSS	64 South Terrace, Punchbowl	S2B_10	70	67	Below predicted, LW works compliant
7/05/2022	Punchbowl TSS	54 South Terrace, Punchbowl	S2B_10	63	63	As predicted, LW works compliant
7/05/2022	Punchbowl TSS	62 South Terrace, Punchbowl	S2B_10	70	63	Below predicted, LW works compliant
7/05/2022	Campsie TSS	62 Lilian Street, Campsie	S2B_06	69	64	Below predicted, LW works compliant
7/05/2022	Campsie TSS	60 Lilian Street, Campsie	S2B_06	69	62	Below predicted, LW works compliant
7/05/2022	Campsie TSS	49-51 Anglo Road, Campsie	S2B_06	73	66	Below predicted, LW works compliant
7/05/2022	Campsie TSS	50 Lilian Street, Campsie	S2B_06	71	71	As predicted, LW works compliant
7/05/2022	Campsie TSS	52 Lilian Street, Campsie	S2B_06	73	71	Below predicted, LW works compliant
7/05/2022	Northern Connection	13 Drake Street, Artarmon	CDS_05	73	48	Below predicted, LW works compliant
7/05/2022	Northern Connection	1 Hill Street, Roseville	HS_02	62	49	No LW works during monitoring period
7/05/2022	Northern Connection	3 Ellis Street, Chatswood	CDS_03	66	52	Below predicted, LW works compliant
7/05/2022	Northern Connection	13 Hopetoun Avenue, Chatswood	CDS_04	69	53	Below predicted, LW works compliant
7/05/2022	Northern Connection	1-3 Gordon Avenue, Chatswood	CDS_03	72	57	Below predicted, LW works compliant
8/05/2022	Dulwich Hill TSS	20 Randall Street, Marrickville	S2B_02	76	76	As predicted, LW works compliant
8/05/2022	Dulwich Hill TSS	18 Randall Street, Marrickville	S2B_02	70	74	4dB above predicted day time OOH level. Review of works, assessment and monitoring has been completed. The monitoring location was on the footpath, approximately 4m from the property façade. Renzo have provided advice following assessment, to be addressed where applicable for future similar activities.
8/05/2022	Dulwich Hill TSS	16 Randall Street, Marrickville	S2B_02	70	61	Below predicted, LW works compliant
8/05/2022	Punchbowl Station	41 Urunga Parade, Punchbowl	S2B_10	70	66	Below predicted, LW works compliant
8/05/2022	Punchbowl Station	40 Urunga Parade, Punchbowl	S2B_10	65	58	Below predicted, LW works compliant
26/05/2022	Southern Dive	76 Unwins Bridge Road, Marrickville	MDS_04	59	68.6	Traffic noise dominant, LW works compliant
26/05/2022	Southern Dive	76 Unwins Bridge Road, Marrickville	MDS_04	59	68.1	Traffic noise dominant, LW works compliant
26/05/2022	Southern Dive	76 Unwins Bridge Road, Marrickville	MDS_04	59	67.6	Traffic noise dominant, LW works compliant
2/06/2022	Chatswood Dive	344 Mowbray Road, Chatswood	CDS_06	45	62.5	Traffic noise dominant, LW works compliant
4/06/2022	BPS Surry Hills	34 Belmore Street, Surry Hills	CS_G	82	72	Below predicted, LW works compliant
4/06/2022	BPS Surry Hills	21 Belmore Street, Surry Hills	CS_G	77	69	Below predicted, LW works compliant
4/06/2022	BPS Surry Hills	40 Belmore Street, Surry Hills	CS_G	82	76	Below predicted, LW works compliant
6/06/2022	BPS Surry Hills	30-34 Chalmers Street, Surry Hills	CS_G	68	62.6	Below predicted, LW works compliant
6/06/2022	BPS Surry Hills	38 Chalmers Street, Surry Hills	CS_G	66	64.3	Below predicted, LW works compliant
12/06/2022	BPS Surry Hills	40 Belmore Street, Surry Hills	CS_G	71	64	Below predicted, LW works compliant
12/06/2022	BPS Surry Hills	401 Elizabth Street, Surry Hills	CS_G	78	66	Below predicted, LW works compliant
12/06/2022	BPS Surry Hills	1-5 Randle Street, Surry Hills	CS_G	76	67	Below predicted, LW works compliant
19/06/2022	Northern Connection	13 Drake Street, Artarmon	CDS_05	63	53	Below predicted, LW works compliant
19/06/2022	Northern Connection	11-13 Hopetoun Avenue, Chatswood	CDS_04	62	54	Below predicted, LW works compliant
19/06/2022	Northern Connection	1-3 Gordon Avenue, Chatswood	CDS_03	64	50	Below predicted, LW works compliant
19/06/2022	Northern Connection	7 Rayleigh Street, Artarmon	CDS_05	53	53	As predicted, LW works compliant

19/06/2022	Northern Connection	11 Drake Street, Artarmon	CDS_05	58	67	Above predicted, due to noise from a concrete agi truck. The concrete agi was included in the OOH permit, however modelling of predicted levels did not include the agi. Re-modelling has been completed to check the agi AMMs, and compare respites that had been offered with what would have been triggered. This was confirmed to be compliant, nearest residents had all been eligible for and offered AA, hence a higher level of AMM was not triggered.
7/07/2022	BPS Surry Hills	40 Belmore Street, Surry Hills	CS_G	57	59.6	Calculated noise contribution of generator as predicted, LW works compliant.
7/07/2022	BPS Surry Hills	29 Belmore Street, Surry Hills	CS_G	51	54.5	Calculated noise contribution of generator as predicted, LW works compliant.
7/07/2022	BPS Surry Hills	30 Belmore Street, Surry Hills	CS_G	56	54.8	Below predicted, LW works compliant
14/07/2022	Dulwich Hill TSS	18 Randall Street, Marrickville	S_B02	71	61	Below predicted, LW works compliant
14/07/2022	Dulwich Hill TSS	20 Randall Street, Marrickville	S_B02	73	71	Below predicted, LW works compliant
14/07/2022	Dulwich Hill TSS	16 Randall Street, Marrickville	S_B02	72	68	Below predicted, LW works compliant
14/07/2022	Dulwich Hill TSS	21 Albermarle Street, Marrickville	S_B02	67	55	Below predicted, LW works compliant
27/07/2022	Blues Point	1 Warung Street, McMahons Point	BP_02	88	76	Below predicted, LW works compliant
27/07/2022	Blues Point	40 Blues Point Road, McMahons Point	BP_01	85	74	Below predicted, LW works compliant
30/07/2022	Northern Connection	13 Drake Street, Artarmon	CDS_05	73	55	Below predicted, LW works compliant
30/07/2022	Northern Connection	7 Rayleigh Street, Artarmon	CDS_05	57	49	Below predicted, LW works compliant
30/07/2022	Northern Connection	6 Orchard Road, Chatswood	CDS_05	54	53	Below predicted, LW works compliant
30/07/2022	Northern Connection	7-11 Nelson Street, Chatswood	CDS_03	65	49	Below predicted, LW works compliant
30/07/2022	Northern Connection	13 Hopetoun Avenue, Chatswood	CDS_04	67	54	Below predicted, LW works compliant
10/08/2022	Chatswood Dive	15 Nelson Street, Chatswood	CDS_03	65	54.4	Below predicted, LW works compliant
10/08/2022	Chatswood Dive	2 Berkeley Court, Chatswood	CDS_03	65	49.7	Below predicted, LW works compliant
10/08/2022	Chatswood Dive	6 Gilham Street, Chatswood	CDS_06	65	58.3	Below predicted, LW works compliant
10/08/2022	Waterloo Station Surface (CP2)	219 Cope Street, Waterloo	WS_02	LW - 49	65.3	Noise from JHG works dominant, LW works compliant.
10/08/2022	Waterloo Station Surface (CP2)	123 Wellington Street, Waterloo	WS_02	LW - 55	64	Noise from JHG works dominant, LW works compliant.
10/08/2022	Waterloo Station Surface (CP2)	122 Wellington Street, Waterloo	WS_03	LW -49	69.6	Noise from JHG works dominant, LW works compliant.
10/08/2022	Waterloo Station Surface (CP2)	124 Wellington Street, Waterloo	WS_03	LW - 50	58.2	Noise from JHG works dominant, LW works compliant.
10/08/2022	Waterloo Station Surface (CP2)	122 Wellington Street, Waterloo	WS_03	LW - 49	57.1	Noise from JHG works dominant, LW works compliant.
10/08/2022	Waterloo Station Surface (CP2)	123 Wellington Street, Waterloo	WS_02	LW - 55	62.5	Noise from JHG works dominant, LW works compliant.
14/08/2022	Southwest Corridor HV Cabling	9-11 Warburton Street, Marrickville	S2B_01	57	56	Below predicted, LW works compliant
14/08/2022	Southwest Corridor HV Cabling	7 Warburton Street, Marrickville	S2B_01	56	52	Below predicted, LW works compliant
14/08/2022	Southwest Corridor HV Cabling	2 Arthur Street, Marrickville	S2B_01	58	56	Below predicted, LW works compliant
14/08/2022	Dulwich Hill TSS	14 Randall Street, Marrickville	S2B_02	72	78	6dB above predicted level. Renzo Tonin advised the measurement location was on the footpath outside the residence, located approximately 4m from the closest facade. Adjusting for this distance offset, it is likely that the measured LAeq would be reduced by 2 dB(A). The residence was eligible for and offered alternative accommodation, hence a higher level of AMM was not triggered.Review of works, assessment and monitoring has been completed. Noise modelling revised for future works.
14/08/2022	Dulwich Hill TSS	20 Randall Street, Marrickville	S2B_02	81	77	Below predicted, LW works compliant
14/08/2022	Dulwich Hill TSS	18 Randall Street, Marrickville	S2B_02	72	73	Review of works, assessment and monitoring has been completed. LW works compliant
14/08/2022	Dulwich Hill TSS	12 Marrickville Avenue, Marrickville	S2B_02	66	54	Below predicted, LW works compliant
17/08/2022	Waterloo Station Surface (CP1)	215 Cope Street, Waterloo	WS_03	LW - 52	59	Noise from JHG works dominant, LW works compliant.
17/08/2022	Waterloo Station Surface (CP1)	219 Cope Street, Waterloo	WS_02	LW - 53	61	Noise from JHG works dominant, LW works compliant.
17/08/2022	Waterloo Station Surface (CP1)	215 Cope Street, Waterloo	WS_03	LW - 52	56	Noise from JHG works dominant, LW works compliant.
17/08/2022	Waterloo Station Surface (CP1)	122 Wellington Street, Waterloo	WS_02	LW - 49	57	Noise from JHG works dominant, LW works compliant.

Appendix E: Noise Monitoring Equipment Details

RION Tracking and Calibration Records

Bag No.	Make	Model	Device Serial Number	Previous Calibration Date	External Calibration Date 2022	Place of Calibration
1	RION	NL-42	00509242	7/09/2021	5/09/2022	Acoustic Research Lab
		NC-75 - Portable Calibrator	34202225	7/09/2021	5/09/2022	Acoustic Research Lab
2	RION	NL-42	01000278	18/03/2021	23/03/2022	Acoustic Research Lab
		NC-75 - Portable Calibrator	34212953	18/03/2021	23/03/2022	Acoustic Research Lab
3	RION	NL-42	00269685	9/07/2021	7/07/2022	Acoustic Research Lab
		NC-75 - Portable Calibrator	00970021	8/07/2021	7/07/2022	Acoustic Research Lab
4	RION	NL-42	00469907	27/07/2021	18/08/2022	Acoustic Research Lab
		NC-75 - Portable Calibrator	34502426	27/07/2021	18/08/2022	Acoustic Research Lab
5	RION	NL-21	00877037	5/10/2021	5/10/2022	Acoustic Research Lab
	Pulsar	100B - Portable Calibrator	42184	5/10/2021	5/10/2022	Acoustic Research Lab

Appendix F: Noise Monitoring Record Sheet Samples

Noise Monitoring Record Sheet

DATE:	19-March-2022	**MAIN ACTIVITY**	TSS Building Delivery, Crane Operation
CONDUCTED BY:	Lachlan Woolf	**LOCATION OF WORKS:**	Exclusion zone between 11-17 The Boulevarde, Lakemba
METEROLOGICAL CONDITIONS:		Overcast; air temperature 21°C, wind speed <5 m/s, relative humidity 81%	
DAY, EVENING OR NIGHT PERIOD?		Day	
MAKE / MODEL:	NTi XL2 (07)	**SERIAL NUMBER:**	A2A-19156-E0
TIME WEIGHTING:	FAST / ~~SLOW~~	**FREQUENCY WEIGHTING:**	A / ~~C / FLAT~~
FIELD CALIBRATION:	93.8	**POST CALIBRATION CHECK:**	93.8
COMMUNITY NOTIFICATIONS GONE OUT FOR THE WORKS?		YES	
LIGHT SPILL into residences?		-	
Are noise mitigation measures installed?		Yes - noise blankets around lighting towers and generators on The Boulevarde	

MONITORING LOCATION 1				
LOCATION:	13 The Boulevarde, Lakemba			
ACTIVITIES:	TSS Building Delivery, Crane Operation			
PLANT:	400T Crane, Trucks			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
10:51	11:06	52	57	S2B_08
L_{Aeq} (dBA)	**L_{max} (dBA)**	**L_{min} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
76	88	66	82	68
PREDICTED NOISE LEVEL (dBA):		74		
LAeq ABOVE PREDICTED NOISE LEVEL:		2		
Measured noise level with no construction activity (if applicable)				
MONITORING COMMENTS	10:52 Truck and crane idling (LAF 69) 10:54 Truck and crane idling (LAF 69) 10:55 Crane idling (LAF 68) 10:56 Crane idling (LAF 68) 10:57 Truck compressed air release (LAF 80) 10:58:28 Crane retracting winch (LAF 76) 10:58:50 Crane turning and increasing load (LAF 86) 10:59:30 Crane turning (LAF 81) 11:00 Crane turning (LAF 82) 11:01 Crane idling (LAF 71) 11:01:45 Crane retract winch (LAF 81) 11:02:33 Crane drop winch (LAF 82) 11:03 Crane drop winch (LAF 81) 11:04 Crane drop winch (LAF 82) 11:05 Crane idling (LAF 73)			
	The noise at this location was dominated by operation of the 400T crane. Loud noise events originated from the crane turning or operating under increased load. The measured LAeq is 2 dB higher than the predicted level. This can be attributed to the measurement being performed at approximately 9m from the crane engine (see photo). It is likely that 4m back from the measurement location in the front yard at 13 The Boulevarde, the measured noise would be at the predicted level. Measurement was not performed at this location due to a lack of explicit consent from the property owner.			

MONITORING LOCATION 2				
LOCATION:	11 The Boulevarde, Lakemba			
ACTIVITIES:	TSS Building Delivery, Crane Operation			
PLANT:	400T Crane, Trucks, Generator, Handheld Tools, EWP			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
11:29	11:44	52	57	S2B_08
L_{Aeq} (dBA)	**L_{max} (dBA)**	**L_{min} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
66	88	61	70	63
PREDICTED NOISE LEVEL (dBA):		76		
Laeq ABOVE PREDICTED NOISE LEVEL:		-10		
Measured noise level with no construction activity (if applicable)				
MONITORING COMMENTS	11:30 Workers closing metal container (LAF 86) 11:30:30 Chains being dragged, crane retracting winch (LAF 76) 11:31 Truck idling (LAF 66) 11:31:30 Crane retract winch (LAF 69) 11:31:40 Distant sawing from on-site work area (LAF 65) 11:32:40 Crane turning, sawing (LAF 66-68) 11:33:25 Jangling chains (LAF 73) 11:35 Crane retract winch (LAF 68) 11:36 Workers talking (LAF 72) 11:37 Chains being dragged, crane retracting winch (LAF 77) 11:38 Truck idling (LAF 63) 11:39 Workers talking (LAF 64) 11:40 Dragging hook (LAF 64) 11:41 Bus reversing passby (LAF 69-71) 11:42 Unknown noise from distant works (LAF 70) 11:43 EWP quacker movement alarm (LAF 66) 11:44 Sawing (LAF 65)			
	The noise at this location was dominated by truck idle noise as well as operation of the crane and fitting chains. Loud noise events originated from chains being dragged on the road surface. The measured LAeq is significantly below the the predicted LAeq. This can be attributed to loud noise events only being intermittent and of short duration.			

MONITORING LOCATION 3				
LOCATION:	16 The Boulevarde, Lakemba			
ACTIVITIES:	TSS Building Delivery, Crane Operation			
PLANT:	400T Crane, Handheld Tools, Trucks			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
11:53	12:08	52	57	S2B_08
L_{Aeq} (dBA)	**L_{max} (dBA)**	**L_{min} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
58	68	54	61	55
PREDICTED NOISE LEVEL (dBA):		76		
Laeq ABOVE PREDICTED NOISE LEVEL:		-18		
Measured noise level with no construction activity (if applicable)				
MONITORING COMMENTS	11:54 Crane idling (LAF 56) 11:54 Traffic passbys on Dennis St (LAF 64) 11:54:50 Workers malleting/hammering under pre-fab building in the on-site work area (LAF 57) 11:55:40 Workers malleting/hammering under pre-fab building in the on-site work area (LAF 57) 11:56:30 Crane idling (LAF 56) 11:56:45 Traffic passbys on Dennis St (LAF 58) 11:58 Workers malleting/hammering under pre-fab building in the on-site work area (LAF 60) 11:59 Crane idling (LAF 56) 12:00 Truck brake squeal (LAF 67) 12:00:40 Truck compressed air release (LAF 65) 12:02 Crane idling (LAF 57) 12:03 Workers malleting/hammering under pre-fab building in the on-site work area (LAF 58) 12:04 Crane retract winch (LAF 60) 12:05 Crane idling (LAF 58) 12:06 Light truck pull up alongside and briefly idle (LAF 61) 12:06:30 Bus passby on Dennis St (LAF 68) 12:07 Light truck door slam (LAF 63) 12:07:30 Workers malleting/hammering under pre-fab building in the on-site work area (LAF 62)			
	The noise at this location was dominated by truck and crane idling sound. Consistant loud events can be attributed to handheld malleting/hammering works occuring in the on-site work area underneath the pre-fabricated building. The measured LAeq is significantly below the predicted LAeq. This can be attributed to the crane not lifting under significant load and loud noise events only lasting for a short duration.			

LOCATION 1 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location

LOCATION 2 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location

LOCATION 3 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location

Noise Monitoring Record Sheet

DATE:	12-June-2022	**MAIN ACTIVITY**	HV cabling installation	
CONDUCTED BY:	Lachlan Woolf	**LOCATION OF WORKS:**	Surry Hills BPS	
METEROLOGICAL CONDITIONS:		Clear sky; air temperature 10°C, wind speed <5 m/s, relative humidity 69%		
DAY, EVENING OR NIGHT PERIOD?		Night		
MAKE / MODEL:	NTi XL2 (07)	**SERIAL NUMBER:**	A2A-19156-E0	
TIME WEIGHTING:	FAST / ~~SLOW~~	**FREQUENCY WEIGHTING:**		A / ~~C / FLAT~~
FIELD CALIBRATION:	94	**POST CALIBRATION CHECK:**		94
COMMUNITY NOTIFICATIONS GONE OUT FOR THE WORKS?		YES		
LIGHT SPILL into residences?		-		
Are noise mitigation measures installed?		Noise blankets installed around Belmore St and Elizabeth St work areas		

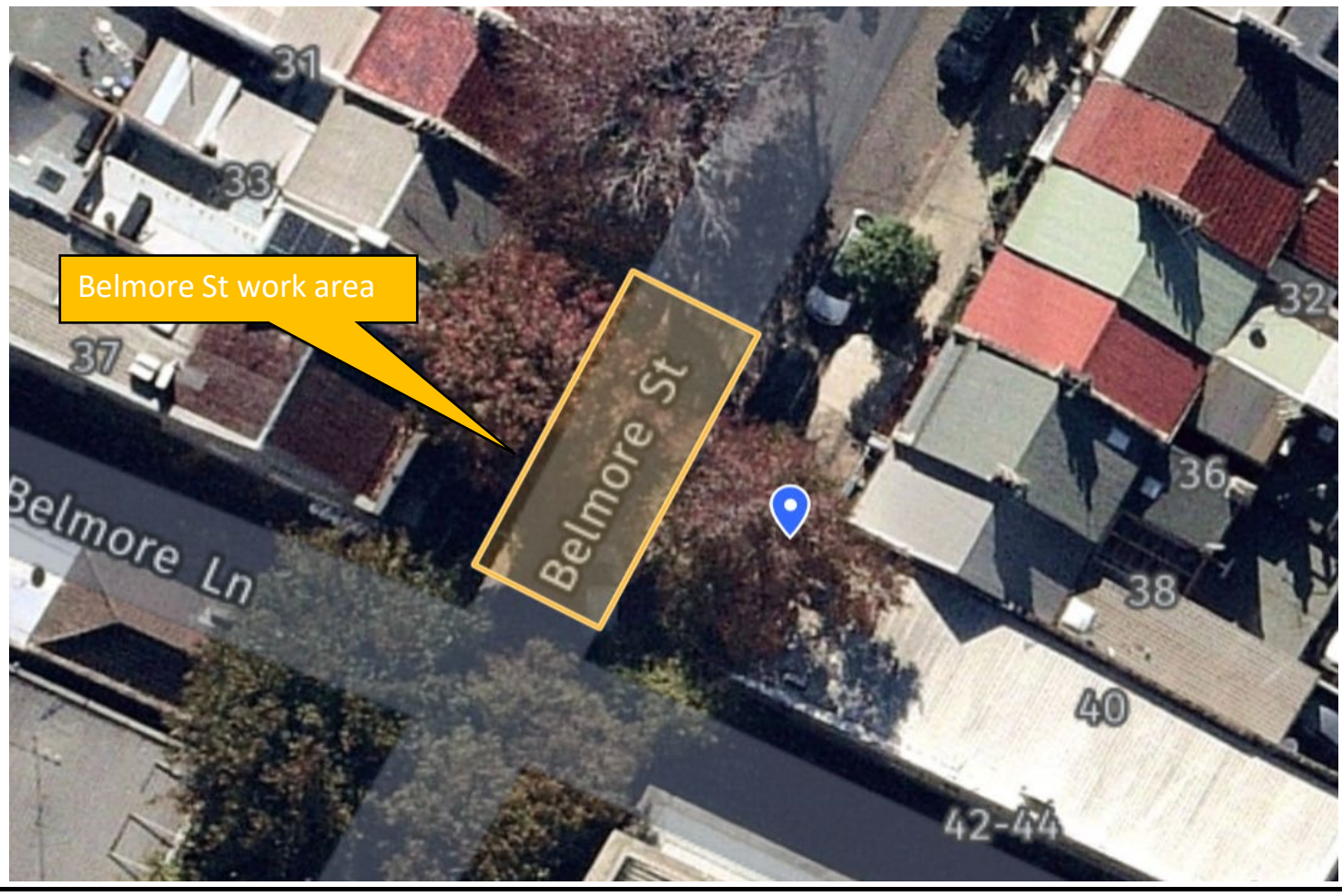
MONITORING LOCATION 1				
LOCATION:	40 Belmore Street, Surry Hills			
ACTIVITIES:	HV cabling installation			
PLANT:	13T excavator with bucket attachment, lighting tower, diesel generator			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
22:17	22:34	45	50	CS_G
L_{Aeq} (dBA)	**L_{max} (dBA)**	**L_{min} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
64	69	58	65	60
PREDICTED NOISE LEVEL (dBA):		71		
LAeq ABOVE PREDICTED NOISE LEVEL:		-7		
Measured noise level with no construction activity (if applicable)				
MONITORING COMMENTS	22:18 13T excavator idling (LAF 64-65) 22:19 13T excavator idling, road traffic along Foveaux St barely audible (LAF 64-65) 22:20 Bus passby along Foveaux St and 13T excavator idling (LAF 66) 22:21 13T excavator idling (LAF 64-65) 22:21:30 Car horn on Foveaux St (LAF 67) 22:23 13T excavator idling (LAF 64-65) 22:24 13T excavator idling (LAF 64-65) 22:24:30 Scooter passby (LAF 66) 22:26 13T excavator idling (LAF 64-65) 22:27 13T excavator idling (LAF 64-65) 22:28 13T excavator idling (LAF 64-65) 22:29 13T excavator idling and workers talking (LAF 66) 22:31 13T excavator turned off, audible generator hum (LAF 60) 22:32 Generator hum (LAF 60) 22:33 Generator hum (LAF 60) 22:34 Generator hum (LAF 60)			
	The ambient noise environment at the monitoring location was primarily influenced by idling noise from the 13T excavator and generator operation. The background noise level at this location was influenced by road traffic noise from Foveaux Street. The measured LAeq is below the predicted level. This can be attributed to less noise intensive works and plant being operated than anticipated.			

MONITORING LOCATION 2				
LOCATION:	401 Elizabeth Street, Surry Hills			
ACTIVITIES:	HV cabling installation			
PLANT:	Lighting tower			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
23:09	23:24	65	70	OSR
L_{Aeq} (dBA)	**L_{max} (dBA)**	**L_{min} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
66	88	56	69	60
PREDICTED NOISE LEVEL (dBA):		78		
Laeq ABOVE PREDICTED NOISE LEVEL:		-12		
Measured noise level with no construction activity (if applicable)				
MONITORING COMMENTS	23:09:29 Pedestrians (LAF 63) 23:09:49 Road traffic along Elizabeth St (LAF 69-71) 23:10:50 Road traffic along Elizabeth St (LAF 68) 23:11:08 ATC placing traffic cones near measurement position (LAF 87) 23:12 Road traffic along Elizabeth St (LAF 67-73) 23:13 Pedestrians and road traffic (LAF 69) 23:14 Road traffic along Elizabeth St (LAF 67) 23:16 Road traffic along Elizabeth St (LAF 66) 23:17 Distant traffic noise and barely audible lighting tower (LAF 66) 23:17 Bus passby (LAF 85) 23:18 Pedestrians and road traffic (LAF 73-75) 23:19 Road traffic along Elizabeth St (LAF 67-73) 23:20:30 Lighting tower barely audible, no nearby traffic noise (LAF 60) 23:21 ATC radio (LAF 67) 23:22 Road traffic along Elizabeth St (LAF 63-66) 23:23 Road traffic along Elizabeth St (LAF 65-73) 23:24 Truck door slam (LAF 61) 23:24:20 Truck door slam (LAF 65)			
	The ambient noise environment at this location was dominated by road traffic along Elizabeth Street. Typically this was in the range of 65-73 dB(A). Noise from the lighting tower was barely audible and observed to be typically 60dB(A) when road traffic noise was not the dominant source. Loud noise events can be attributed to bus passbys and ATC activity near the measurement position. The measured LAeq is significantly below the predicted level. This can be attributed to less plant and noise intensive works occuring than aniticipated.			

MONITORING LOCATION 3				
LOCATION:	1-5 Randle Street (rear of in Randle Lane work area)			
ACTIVITIES:	HV cabling installation			
PLANT:	Lighting tower, cable drum			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
23:39	23:55	45	50	CS_G
L_{Aeq} (dBA)	**L_{max} (dBA)**	**L_{min} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
67	82	65	68	67
PREDICTED NOISE LEVEL (dBA):		76		
Laeq ABOVE PREDICTED NOISE LEVEL:		-9		
Measured noise level with no construction activity (if applicable)				
MONITORING COMMENTS	23:40 Lighting tower, nearby apartment HVAC in background (LAF 67) 23:41 Car horn (LAF 71) 23:42 Lighting tower (LAF 67) 23:43 Road traffic noise from Elizabeth St (LAF 73) 23:44 Lighting tower (LAF 67) 23:45 Lighting tower (LAF 67) 23:46 Lighting tower (LAF 67) 23:47 Lighting tower (LAF 67) 23:48 Lighting tower (LAF 67) 23:49 Lighting tower (LAF 67) 23:50 Lighting tower (LAF 67) 23:51 Lighting tower (LAF 67) 23:52 Van door slam (LAF 68) 23:52:50 Loud slam from workers operating cable drum (LAF 82) 23:54 Cable drum generator idle and workers talking (LAF 67-70) 23:54:45 Van door slam (LAF 70)			
	The ambient noise environment at the monitoring location was primarily influenced by operation of the lighting tower located approximately 7m from the sound level meter. The background noise level at this location was influenced by road traffic noise from Elizabeth St and HVAC noise from adjacent apartments. Loud noise events can be attributed to the brief operation of the cable drum. The measured LAeq is below the predicted level. This can be attributed to less noise intensive works taking place during the monitoring period than anticipated.			

LOCATION 1- DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location

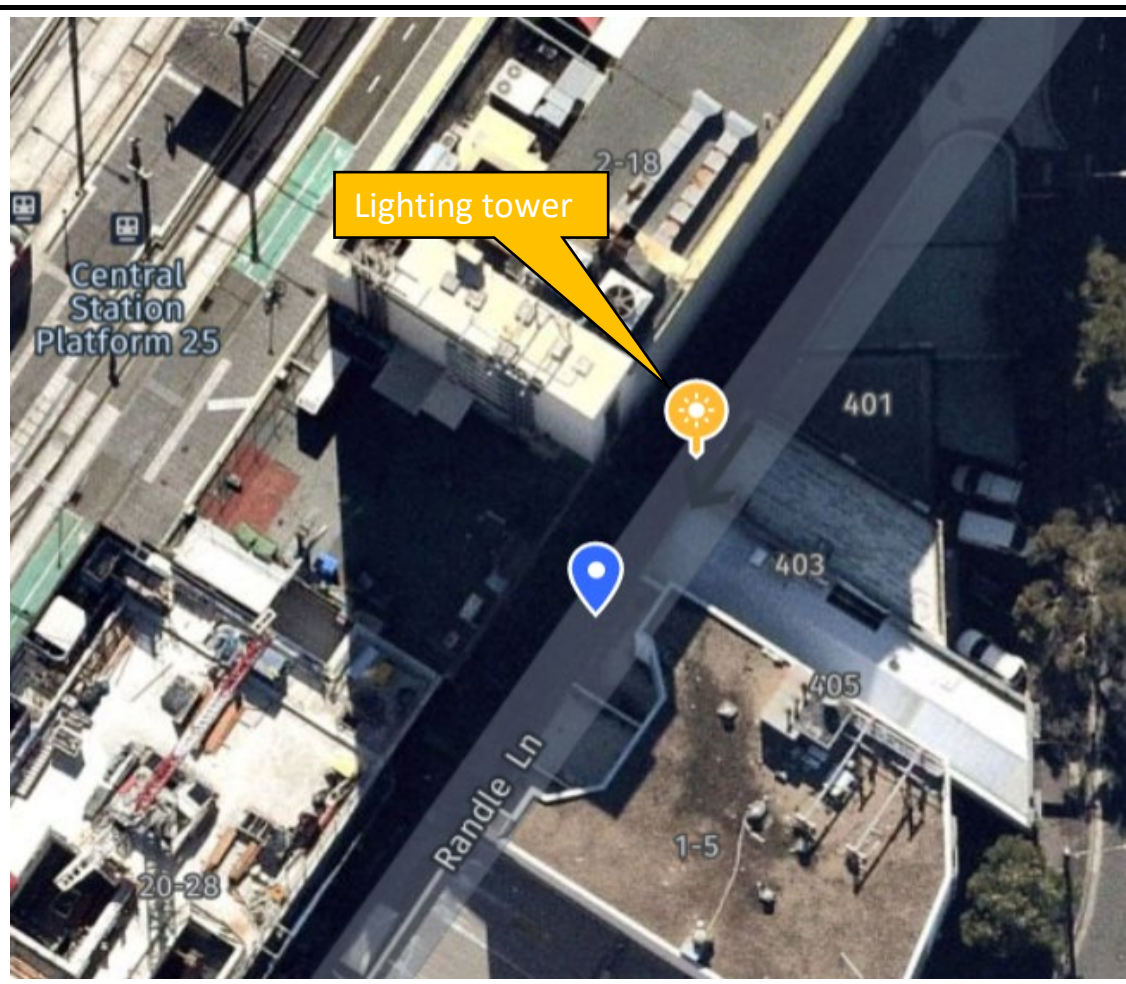


LOCATION 2 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location

LOCATION 3 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location



Noise Monitoring Record Sheet

DATE:	30-July-2022	**MAIN ACTIVITY**	PMF Channel Drainage, Acoustic Shed Demolition, Delineation Fence Foundations
CONDUCTED BY:	Lachlan Woolf	**LOCATION OF WORKS:**	Northern Connection
METEROLOGICAL CONDITIONS:		Clear sky; air temperature 9°C, wind speed <5 m/s, relative humidity 79%	
DAY, EVENING OR NIGHT PERIOD?		Night	
MAKE / MODEL:	NTi XL2	**SERIAL NUMBER:**	A2A-19156-E0
TIME WEIGHTING:	FAST / ~~SLOW~~	**FREQUENCY WEIGHTING:**	A / ~~C / FLAT~~
FIELD CALIBRATION:	94	**POST CALIBRATION CHECK:**	94
COMMUNITY NOTIFICATIONS GONE OUT FOR THE WORKS?		YES	
LIGHT SPILL into residences?		-	
Are noise mitigation measures installed?		Noise blankets installed on the Drake Street gate	

MONITORING LOCATION 1				
LOCATION:	13 Drake Street, Artarmon			
ACTIVITIES:	PMF channel drainage			
PLANT:	15T Hi-rail excavator with lifting hooks			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
22:14	22:29	34	39	CDS_05
L_{Aeq} (dBA)	**L_{Amax} (dBA)**	**L_{Amin} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
55	69	39	61	42
PREDICTED NOISE LEVEL (dBA):		73		
LAeq ABOVE PREDICTED NOISE LEVEL:		-18		
Measured noise level with no construction activity (if applicable)			LAF	41-42
MONITORING COMMENTS	22:14 15T Hi-rail excavator lifting load (LAF 63) 22:16 15T Hi-rail excavator moving with quacker alarm (LAF 54) 22:17 15T Hi-rail excavator horn blow (LAF 69) 22:19 No audible construction activities (LAF 42) 22:20 Distant road traffic (LAF 49) 22:22 No audible construction activities (LAF 41) 22:23 Workers car reversing into Drake Street compound (LAF 59-65) 22:24 Workers car door slam (LAF 59) 22:25 15T Hi-rail excavator lifting load (LAF 54) 22:26 15T Hi-rail excavator lifting load (LAF 64) 22:27 15T Hi-rail excavator moving with quacker (LAF 61-63) 22:28 15T Hi-rail excavator idling (LAF 51)			
	The ambient noise environment is primarily influenced by the hi-rail excavator activities. The background noise environment at the monitoring location is influenced by natural sounds (e.g. trees) and distant road traffic. Loud noise events originated from the use of horn and lifting loads with the hi-rail excavator. The measured LAeq is significantly lower than the predicted noise level. This can be attributed to the intermittent use of the hi-rail excavator during the monitoring.			

MONITORING LOCATION 2				
LOCATION:	7 Raleigh Street, Artarmon			
ACTIVITIES:	PMF channel drainage and shed demolition			
PLANT:	15T Hi-rail excavator with lifting hooks, hydrema and power tools			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
23:19	23:33	34	39	CDS_05
L_{Aeq} (dBA)	**L_{Amax} (dBA)**	**L_{Amin} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
49	64	41	54	44
PREDICTED NOISE LEVEL (dBA):		57		
Laeq ABOVE PREDICTED NOISE LEVEL:		-8		
Measured noise level with no construction activity (if applicable)			LAF	43-47
MONITORING COMMENTS	23:20 Hydrema moving (LAF 53) 23:21 Hydrema moving (LAF 53) 23:22 Power tools being used for shed removal (LAF 60) 23:23 15T Hi-rail excavator moving with quacker alarm (LAF 53) 23:26 Audible power tool use at shed removal work area and hydrema movement within the rail corridor (LAF 60) 23:28 Audible use of horn from site (LAF 56) 23:29 No audible construction activites (LAF 45) 23:30 15T Hi-rail excavator moving with quacker alarm (LAF 50) 23:31 15T Hi-rail excavator lifting load (LAF 54) 23:33 No audible construction activities (LAF 43-47)			
	The ambient noise environment at this location was primarily influenced by movements within the rail corridor from hydremas and the 15T hi-rail excavator with lifting hooks. During the monitoring, barely audible plant hum was observed (LAF 43). The background noise environment at this location is influenced distant road traffic. Loud noise events originated from the use of power tools for the shed demolition works. The measured noise level is below the predicted level. This can be attributed to the intermittent nature of the measured works during the monitoring.			

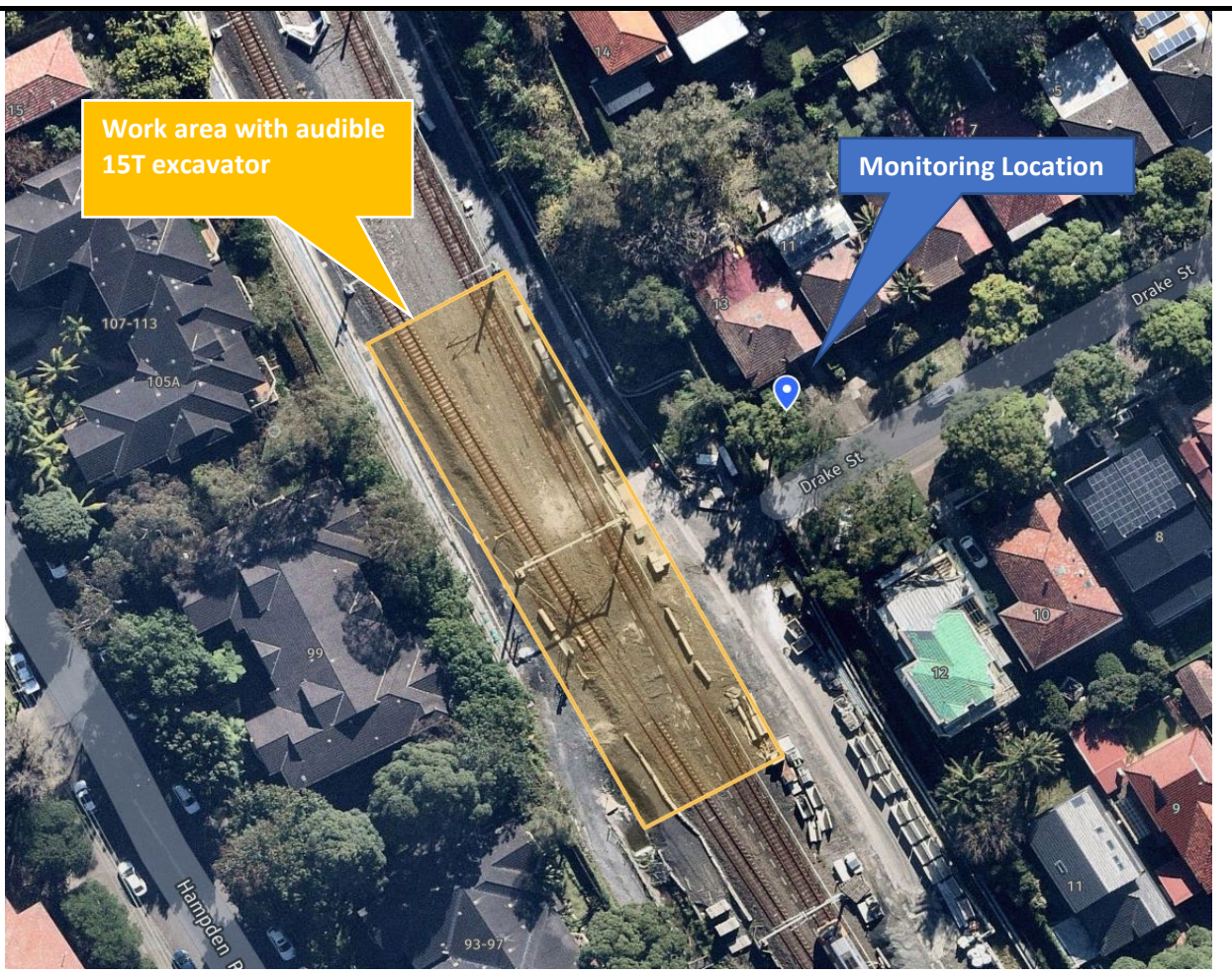
MONITORING LOCATION 3				
LOCATION:	6 Orchard Road, Chatswood			
ACTIVITIES:	Shed demolition			
PLANT:	Hand tools, EWP, 130T mobile crane (x2)			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
23:43	00:02	39	44	CDS_05
L_{Aeq} (dBA)	**L_{Amax} (dBA)**	**L_{Amin} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
53	70	42	57	44
PREDICTED NOISE LEVEL (dBA):		54		
Laeq ABOVE PREDICTED NOISE LEVEL:		-1		
Measured noise level with no construction activity (if applicable)			LAF	44
MONITORING COMMENTS	23:48 Crane hum (LAF 48) 23:49 Hand tools (LAF 51) 23:50 Hand tool use and malleting (LAF 66) 23:51 Hand tool use and malleting (LAF 67) 23:52 Hand tools (LAF 62) 23:53 Crane slewing (LAF 56) 23:55 Road traffic along Mowbray Road (LAF 54-59) 23:56 Barely audible EWP (LAF 49) 23:57 Road traffic along Mowbray Road (LAF 57) 23:58 No audible construction activities (LAF 44) 23:59 Road traffic along Orchard Road and Mowbray Road (LAF 46-55) 00:00 Car pass by along Mowbray Road (LAF 55)			
	The ambient noise environment is primarily influenced by the crane activities and power tool use during the shed demolition. The background noise environment at this location is influenced by road traffic along Mowbray Road and Orchard Road. Loud noise events originated from the use of a mallet on site during the shed demolition works. The measured LAeq is lower than the predicted noise level. This can be attributed to the intermittent nature of the measured works during the monitoring.			

MONITORING LOCATION 4				
LOCATION:	7-11 Nelson Street, Chatswood			
ACTIVITIES:	Shed demolition			
PLANT:	130T mobile crane (x2), EWP			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
00:28	00:43	39	44	CDS_03
L_{Aeq} (dBA)	**L_{Amax} (dBA)**	**L_{Amin} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
49	56	44	52	46
PREDICTED NOISE LEVEL (dBA):		65		
LAeq ABOVE PREDICTED NOISE LEVEL:		-16		
Measured noise level with no construction activity (if applicable)			LAF	48-51
MONITORING COMMENTS	00:31 Road traffic along Princes Highway (LAF 48-51) 00:32 Dropped item on site (LAF 58) 00:33 Audible quacker alarm from site (LAF 48) 00:34 Crane hook banging into an object (LAF 54) 00:35 Road traffic along Princes Highway (LAF 52) 00:36 Dropped item on site (LAF 53) 00:37 Audible quacker alarm from site (LAF 47) 00:39 Road traffic along Princes Highway (LAF 50) 00:40 Audible quacker alarm from site (LAF 47) 00:42 Audible quacker alarm from site (LAF 48) 00:43 Road traffic along Princes Highway (LAF 52)			
	The ambient noise environment at the monitoring location is primarily influenced by audible quacker alarms from the shed demolition work area. The background noise environment at this location is influenced by road traffic along the Princes Highway. Loud noise events were caused by dropped items on site. The measured LAeq is significantly lower than the predicted noise level. This can be attributed to the intermittent nature of the measured works during the monitoring as well as temporary fencing providing shielding.			

MONITORING LOCATION 5				
LOCATION:	13 Hopetoun Avenue, Chatswood			
ACTIVITIES:	PMF channel drainage and delineation fence foundations			
PLANT:	15T Hi-rail excavator with lifting hooks attachment, 15T excavator with bucket attachment, hydrema, diesel generator, hand tools			
START TIME	**END TIME**	**RBL (dBA)**	**NML (dBA)**	**NCA**
00:52	01:08	35	40	CDS_04
L_{Aeq} (dBA)	**L_{Amax} (dBA)**	**L_{Amin} (dBA)**	**L_{A10} (dBA)**	**L_{A90} (dBA)**
54	65	49	58	50
PREDICTED NOISE LEVEL (dBA):		67		
LAeq ABOVE PREDICTED NOISE LEVEL:		-13		
Measured noise level with no construction activity (if applicable)				
MONITORING COMMENTS	00:54 15T Hi-rail excavator moving with quacker alarm (LAF 58) 00:56 Generator noise (LAF 50) 00:57 Generator noise and quacker alarm (LAF 53) 00:58 15T Hi-rail excavator, generator and hydrema (LAF 55) 00:59 15T Hi-rail excavator and hydrema (LAF 61) 01:00 15T Hi-rail excavator slamming bucket attachment (LAF 64) 01:01 Dropping item into 15T Hi-rail excavator bucket attachment (LAF 65) 01:02 Generator noise and quacker alarm (LAF 54) 01:03 Generator noise and quacker alarm (LAF 53) 01:04 Hand tool use and generator (LAF 54) 01:05 Generator noise and quacker alarm (LAF 53) 01:06 Generator noise and quacker alarm (LAF 53) 01:07 Generator noise and quacker alarm (LAF 53)			
	The ambient noise environment at the monitoring location is primarily influenced by the diesel generator and movement of the 15T hi-rail excavators with quacker alarms. Loud noise events were caused by dropped items on site. The measured LAeq is significantly lower than the predicted noise level. This can be attributed to the intermittent nature of the hi-rail excavator activity during the monitoring.			

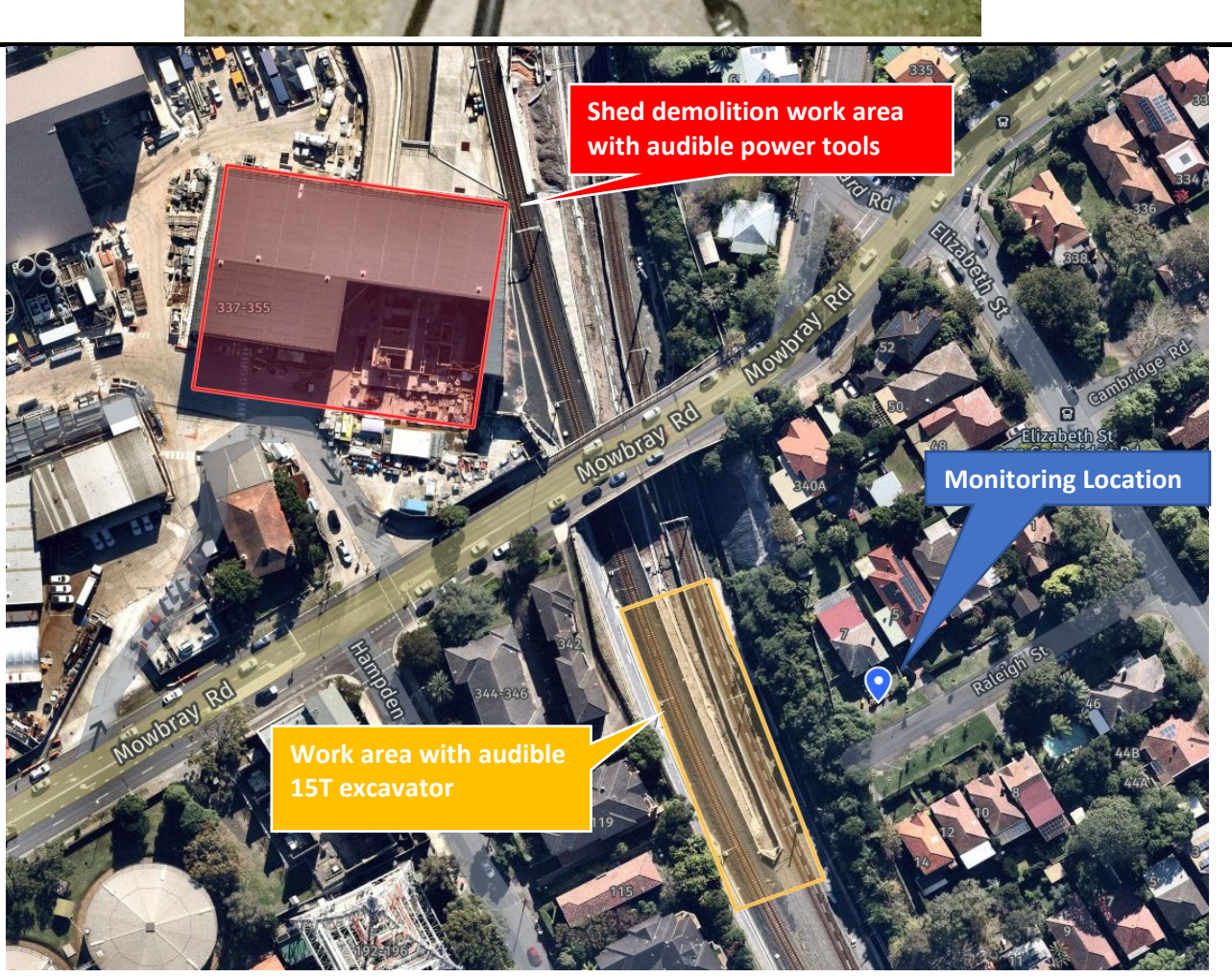
LOCATION 1 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location



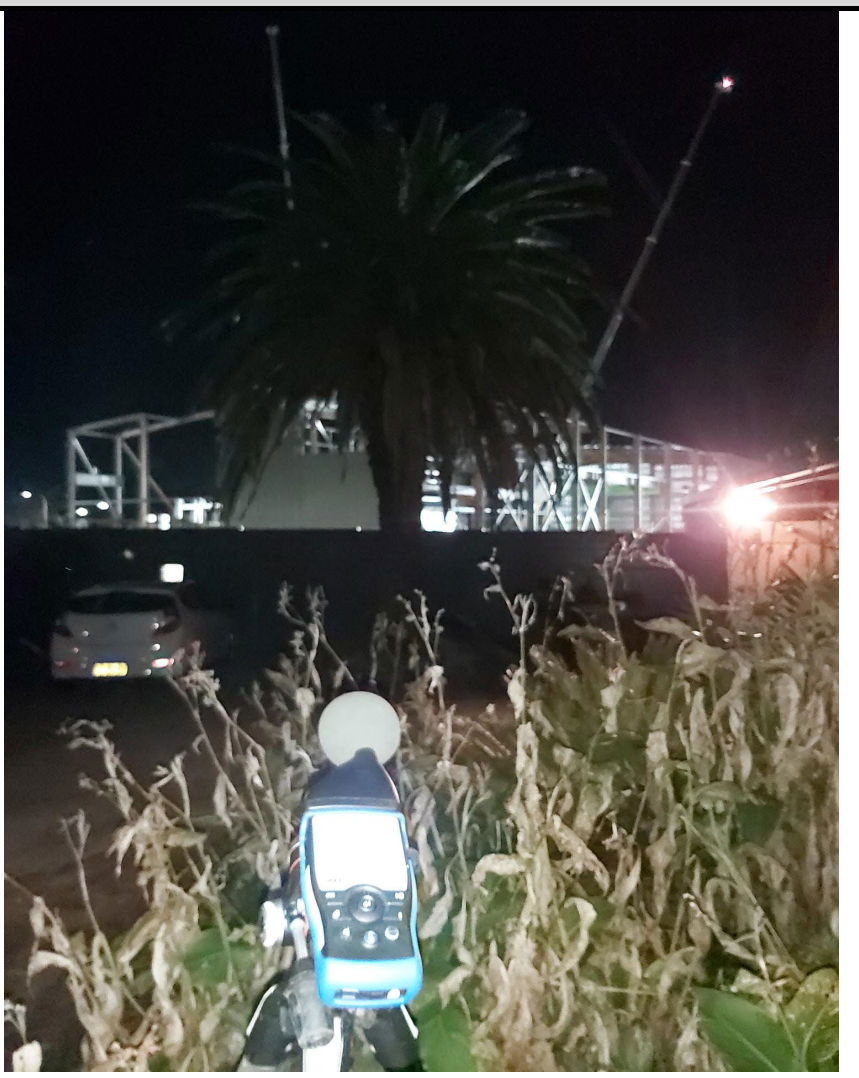
LOCATION 2 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location



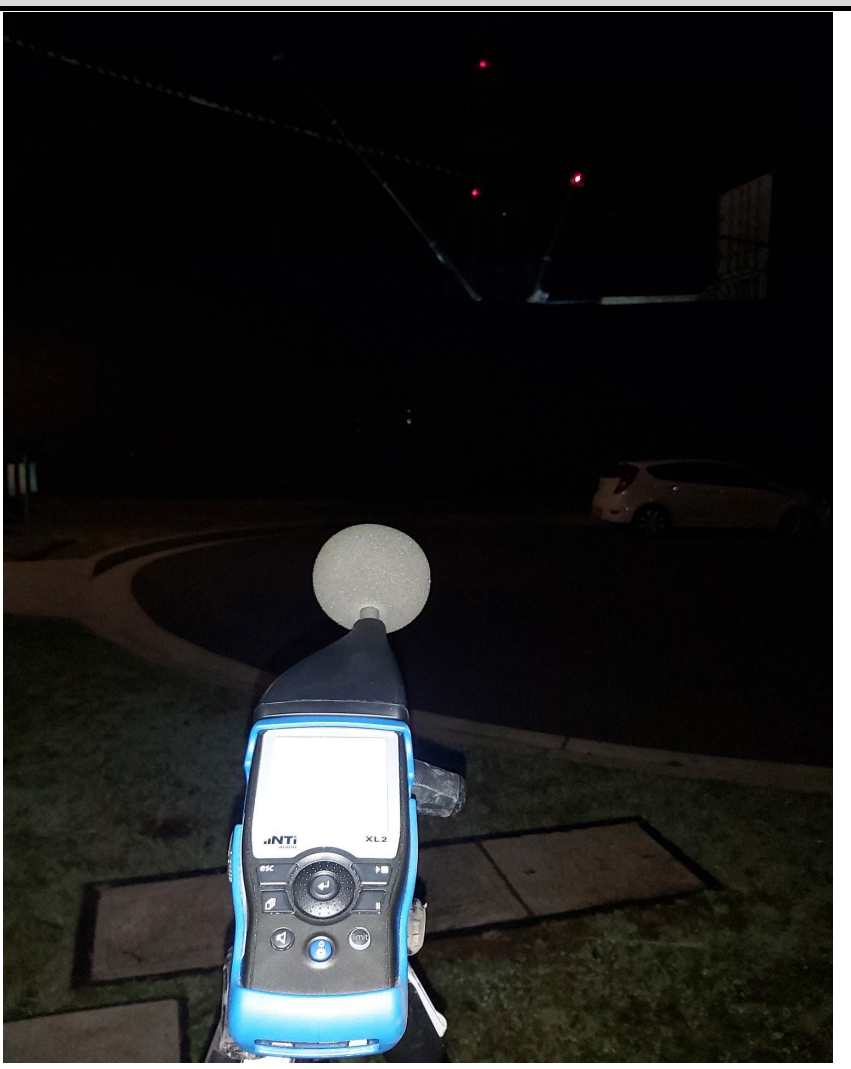
LOCATION 3 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location



LOCATION 4 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location



LOCATION 5 - DIAGRAMS AND PHOTOS

Insert:
- Photo of works being monitored
- Map showing monitoring location or Screenshot of GPS Location

Appendix G: Systems Connect Vibration Monitoring Register

Systems Connect Vibration Monitoring Register

Start Date	End Date	Conducted By	Location	Detailed Monitoring Location	Attended or Continuous	Vibration Criteria mm/s	Compliant with Vibration Criteria or Monitorong Protocol Y/N
21/03/2022	24/03/2022	Renzo Tonin	BPS Surry Hills	Randall Lane, Surry Hills (Dental Hospital address location is 2-18 Chalmers Street, Surry Hills)	Unattended	25	Y
5/06/2022	14/06/2022	Renzo Tonin Jason Fenton Wayne Moloney	BPS Surry Hills	Randall Lane, Surry Hills (Dental Hospital address location is 2-18 Chalmers Street, Surry Hills)	Attended	25	Y
21/07/2022	2/09/2022	Renzo Tonin Adam Binning	Blues Point	Blues Point Road, McMahons Point	Attended	2.5 Unreinforced or light framed heritage structure	Y
30/07/2022	3/08/2022	Renzo Tonin Wayne Moloney	BPS Surry Hills	Randall Lane, Surry Hills (Dental Hospital address location is 2-18 Chalmers Street, Surry Hills)	Attended	25	Y

Appendix H: Vibration Monitoring Report Samples

25 March 2022
TK685-03-05F04 C2S_P3 BPS Surry Hills Vibration Monitoring Report (r1)

Systems Connect
Level 3, 116 Miller Street
North Sydney NSW 2060

Sydney Metro Line Wide Works - Surry Hills BPS Works - Randle Lane OOHW - Vibration Monitoring Results

1 Introduction

Renzo Tonin and Associates was engaged by Systems Connect to conduct vibration monitoring during the BPS works on Randle Lane, Surry Hills. Vibration monitoring was undertaken to minimise and manage the potential vibration impacts to the nearby TAFE NSW Randwick College, Sydney Dental Hospital building.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

2 Methodology

The instrumentation used for these vibration measurements are summarised Table 2-1. The monitoring location is shown in Figure 2-1 and instrumentation set up is shown in Figure 2-2.

Table 2-1: Instrumentation

Type	Make / Model
Triaxial Transducers	Sigicom C12 (SN: 66830)

The triaxial transducers used in the measurements have current calibration certificates.

Figure 2-1: Monitoring location – Randle Lane unattended vibration monitoring

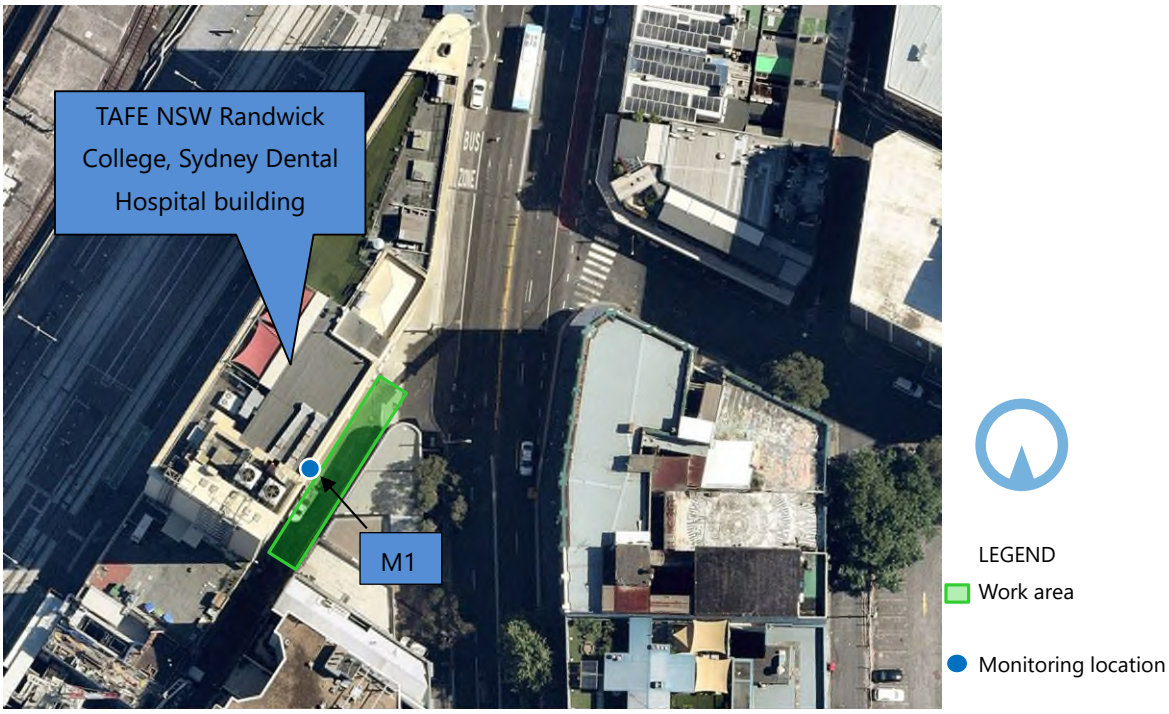


Figure 2-2: Instrumentation set up – Randle Lane unattended vibration monitoring

3 Vibration criteria

The established vibration criteria in the *Sydney Metro – City and Southwest – Construction Noise and Vibration Management Plan* are given below:

3.1 Cosmetic damage to buildings

BS7385 suggests levels at which 'cosmetic', 'minor' and 'major' categories of damage might occur. The 'cosmetic' damage levels set by BS 7385 are considered 'safe limits' up to which no damage due to vibration effects has been observed for particular building types. Damage comprises minor non-structural effects such as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks and separation of partitions or intermediate walls from load bearing walls. 'Minor' damage is considered possible at vibration magnitudes which are twice those given and 'major' damage to a building structure may occur at levels greater than four times those values.

Table 3-1 sets out the recommended limits from BS7385 for transient vibration to ensure minimal risk of cosmetic damage to residential, commercial and industrial buildings.

These limits relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table 3-1 may need to be reduced by up to 50 for Residential Buildings.

Note: rock breaking/hammering and sheet piling activities are considered to have the potential to cause dynamic loading in some structures (e.g. residences) and it may be appropriate to reduce the transient values by 50%. In addition, for most construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers, excavators and the like, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). Furthermore, a Structural Condition and Trench Impact Assessment of the heritage building (Robert Bird Group December 2020, reference: 20309-RBG-ZZ-XX-RP-CE-C1005) found that the building was sound. On this basis, consistent with the SM-CNVS a conservative vibration damage screening level for the TAFE NSW Randwick College, Sydney Dental Hospital building is given below:

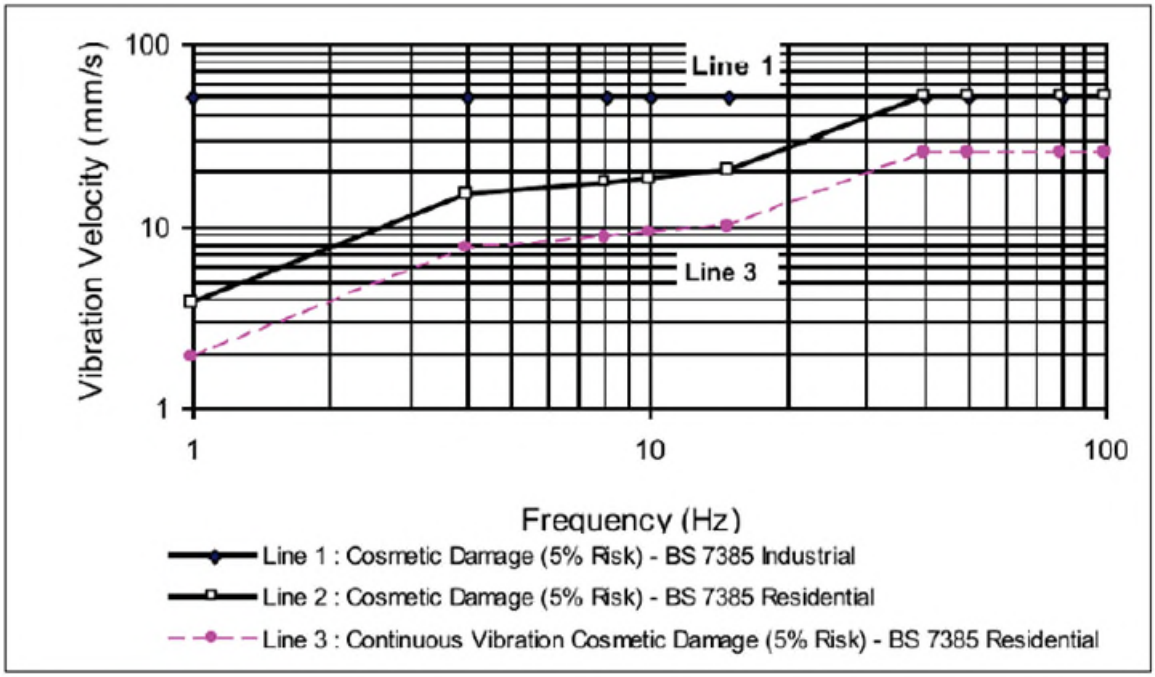
- Reinforced or framed structures (Line 1): 25.0 mm/s

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity), a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be required to determine the applicable safe vibration level. The analysis would take into consideration the transient vibration guide values for minimal risk of cosmetic damage set out in Table 3-1 and Figure 3-1 following.

Table 3-1: Transient vibration guide values – minimal risk of cosmetic damage (BS 7385) – peak component particle velocity

Line	Type of structure	Frequency range 4 to 15 Hz	Frequency range 15 to 40 Hz	Frequency range 40 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s	50 mm/s	50 mm/s
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4Hz, increasing to 20 mm/s at 15Hz	20 mm/s at 15Hz, increasing to 50 mm/s at 40Hz	50 mm/s

Figure 3-1: Graph of Transient Peak Component Particle Velocity Vibration Guide Values for Cosmetic Damage



4 Vibration monitoring results

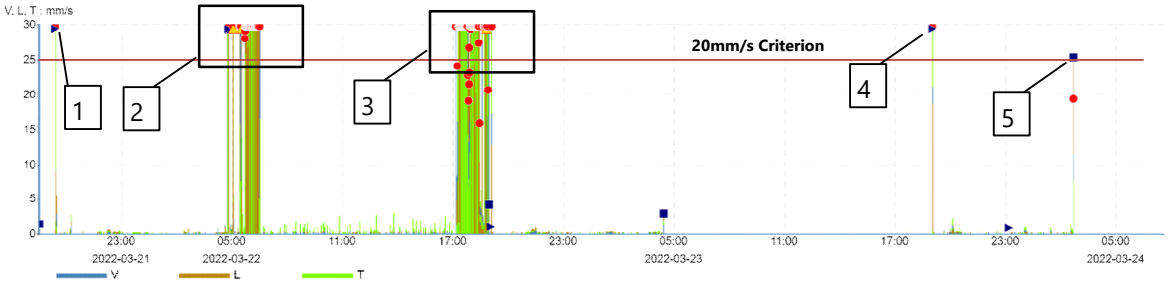
The vibration measurements were conducted at the following location:

Table 4-1: Attended vibration measurement locations

Measurement ID	Assessment Point	Date and Time	Measured plant	Approx. distance to measured plant
M1	TAFE NSW Randwick College, Sydney Dental Hospital building (Figure 2-1 and Figure 2-2)	21.03.2022 – 24.03.2022 07:20pm – 02:41am	Concrete saw, 5T excavator with bucket and ripper attachment, plate compactor	3m – 10m

The results of the unattended vibration monitoring are presented in Figure 4-1 below.

Figure 4-1: Unattended vibration monitoring results



The discussion of the unattended vibration monitoring is summarised in Table 4-2 below.

Table 4-2: Unattended vibration monitoring summary

Exceedance ID	Date and Time	Cause of exceedance
1	21.03.2022 07:23pm	At this time, a Renzo Tonin & Associates' engineer checked and tested if the vibration monitor was operating correctly. As a result, this exceedance was not caused by the nearby construction activity.
2	22.03.2022 04:47am – 06:30am	The works were completed prior to 4:47am. At this time, the site engineer removed the vibration monitor from the monitoring location and transporting the monitor out of the site (without disabling the 'recording mode'). Therefore the exceedance was not caused by the nearby construction activity.
3	22.03.2022 05:22pm – 06:56pm	The site engineer was transporting the monitor to the site (without disabling the 'recording mode') over this period. There were no works at this time. This exceedance was not caused by the nearby construction activity.
4	23.03.2022 07:00pm	At this time, a Renzo Tonin & Associates' engineer checked and tested if the vibration monitor was operating correctly. As a result, this exceedance was not caused by the nearby construction activity.
5	24.03.2022 02:41am	The works were finished prior to 2:41am. At this time, the site engineer removed the vibration monitor from the monitoring location. This exceedance was not caused by the nearby construction activity.

It can be seen in Figure 4-1 that the vibration levels produced from the measured vibration intensive activities were below 25 mm/s. As a result, the risk of cosmetic damage from the measured vibration intensive works is considered low. Note that there were events that resulted in instantaneous vibration levels of above 25 mm/s. The cause of each exceedance has been justified in Table 4-2.

Given that the measured vibration levels are significantly below 25 mm/s, no further vibration monitoring is required (as the works are progressing away from the monitoring location).

5 Conclusion

Renzo Tonin and Associates was engaged by Systems Connect to conduct vibration monitoring during the BPS works on Randle Lane, Surry Hills. Vibration monitoring was undertaken to minimise and manage the potential vibration impacts to the nearby TAFE NSW Randwick College, Sydney Dental Hospital building.

The results of the unattended vibration monitoring indicated that the vibration levels produced from the measured vibration intensive activities were below 25 mm/s. As a result, the risk cosmetic damage from the measured vibration intensive works is considered low. Note that there were events that resulted in instantaneous vibration levels of above 25 mm/s. However, these were not caused by the nearby construction activity, as justified in Table 4-2.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
25.03.2022	First Issue	0	1	R. Zhafranata	T. Gowen	T. Gowen

File Path: R:\AssocSydProjects\TK651-TK700\TK685 PK SMCSW Linewide Works (CPB UGL)\1 Docs\100 CONSTRUCTION\3-05 CNVIS C2S_P3 BPS Surry Hills\TK685-03-05F04 C2S_P3 BPS Surry Hills Vibration Monitoring Report (r1).docx

Vibration Monitoring Record Sheet

START DATE:	5/06/2022	**PROJECT AREA:**	Surry Hills BPS
FINISH DATE:	14/06/2022	**MAIN ACTIVITY**	BPS trenching and cable pulling bay, HV cable pulling
CONDUCTED BY:	Raihan Zhafranata (RZ) Jason Fenton Wayne Moloney	**LOCATION OF WORKS:**	Randle Lane Surry Hills
DAY, EVENING OR NIGHT PERIOD:	Day, Evening and Night		
MONITORING EQUIPMENT:	Sigicom INFRA C12 vibration monitor (supplied by Renzo Tonin)		
VIBRATION MONITORING PLAN:	TK685-03-05F02 BPS Surry Hills monitoring plan, dated: 10.03.2022, Revision 2		

LOCATION:	2-18 Chalmers Street (Dental Hospital Building)		
DATES:	5 June to 14 June 2022		
ACTIVITIES:	Road surface cutting, breaking and removal, trenching, conduit installation, HV cable pulling, backfilling, temporary road reinstatement		
PLANT:	Road saw; 5T excavator with hammer; 5T excavator with bucket; vac truck; cable winch; 2T vibratory roller; tipper trucks; road plates, bins		
STRUCTURE TYPE:	Heritage building, classified as structurally sound commercial building		
VIBRATION CRITERIA:	Reinforced building (commercial): 25 mm/s		
APPLICABLE MWD:	5m	**ACTUAL WORKING DISTANCE:**	2m minimum
VIBRATION MONITOR MOUNTING METHOD:	Steel baseplate taped to concrete floor of emergency exit alcove of Dental Hospital building. Initial mounting on 05/06/2022 conducted by Raihan of Rezo Tonin. Subsequent mounting on 06/06/2022 conducted by Jason Fenton.		

EXCEEDENCES OF VIBRATION CRITERIA (Refer to monitoring data for all results)

Date and Time	V (mm/s)	L (mm/s)	T (mm/s)	Reason
Please refer to attached time trace graph				

COMPLIANT WITH VIBRATION CRITERIA:	Yes

MONITORING COMMENTS OR ACTIONS TAKEN TO ADDRESS EXCEEDENCES OF VIBRATION CRITERIA

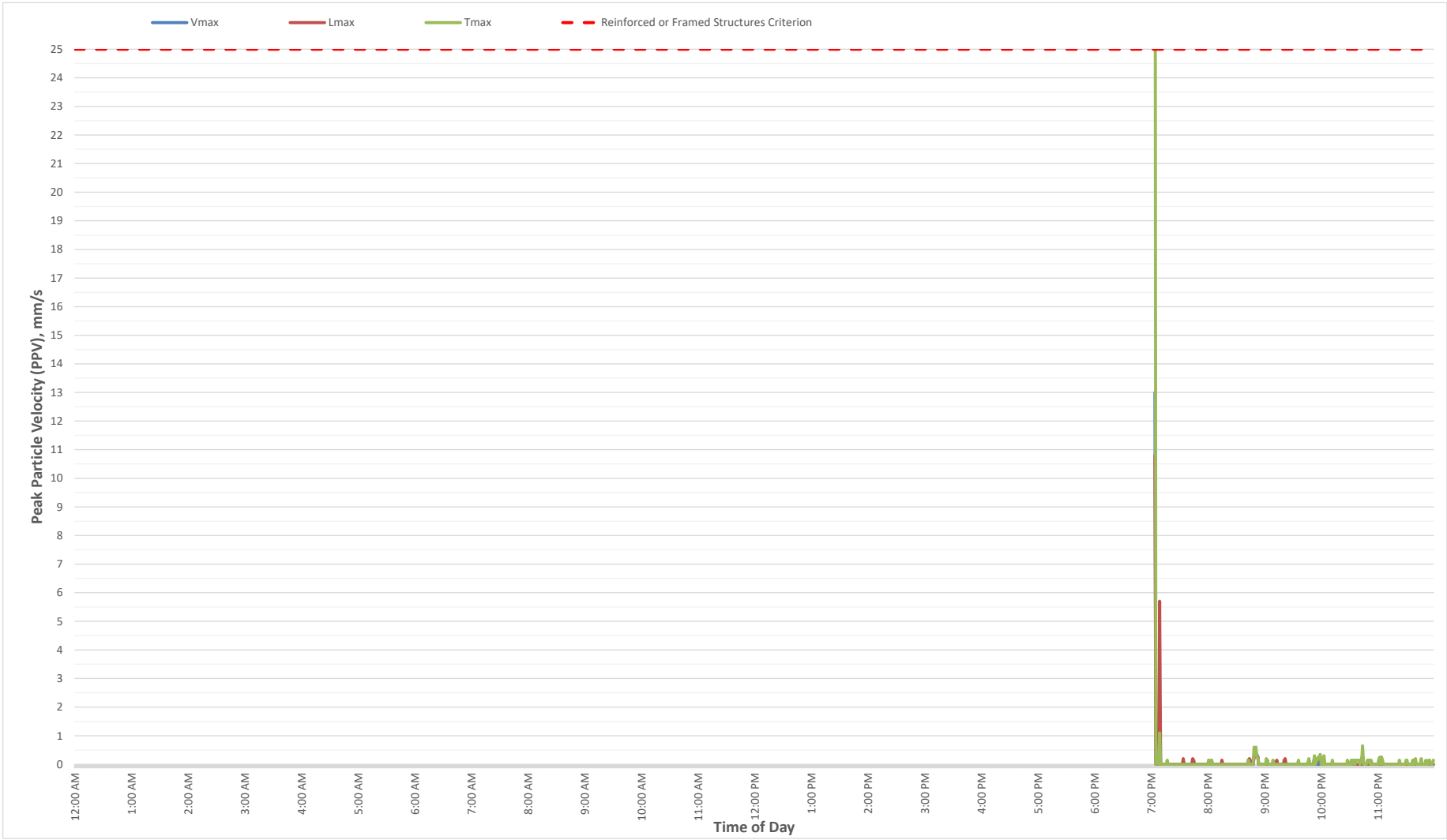
Randle Lane	No vibration exceedances due to operation of vibratory equipment

Unattended Vibration Monitoring Results

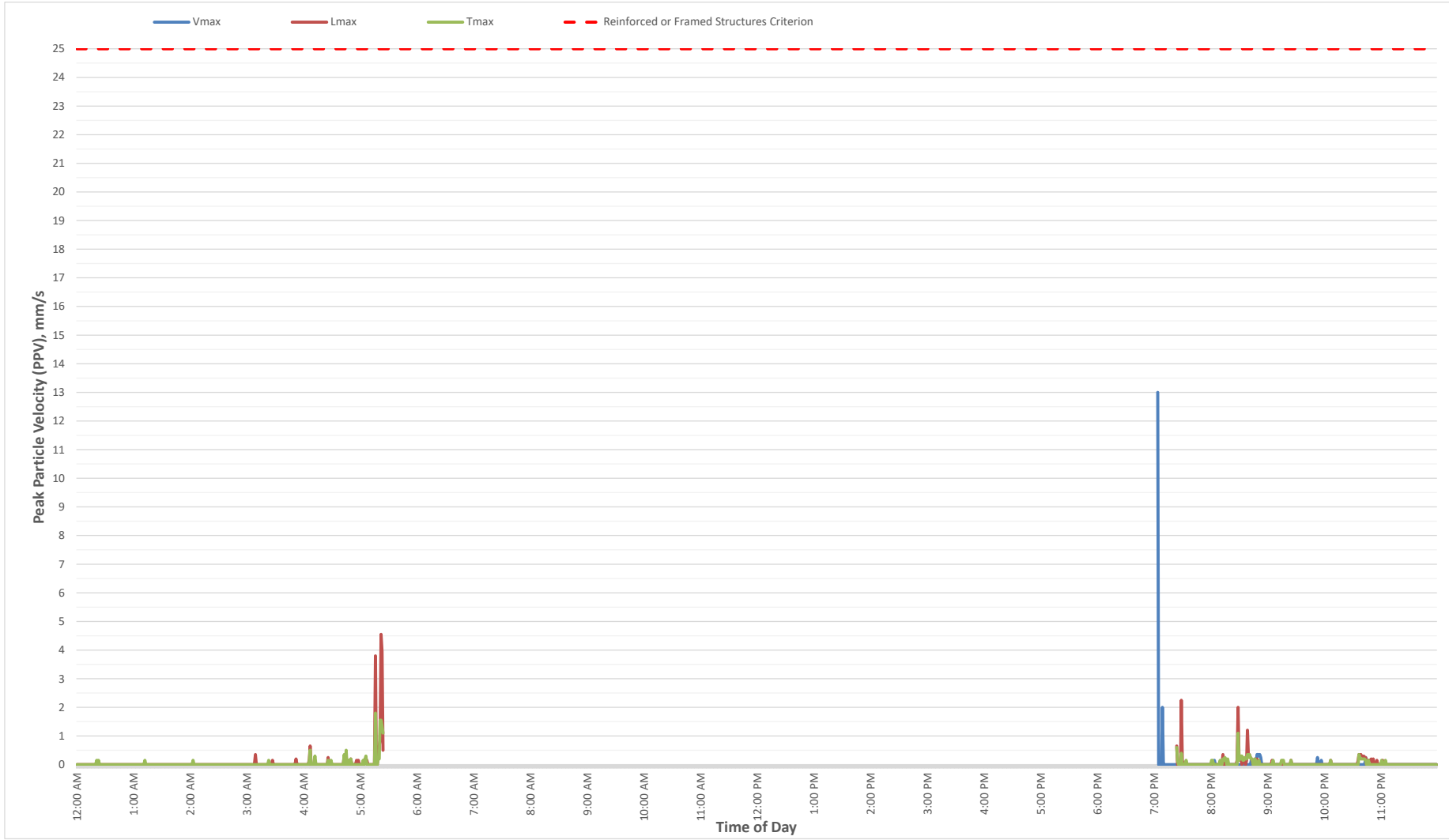
Randle Lane, Surry Hills **D1 - D7**

Monitor Location: 2-18 Chalmers Street (Dental Hospital Building)

2022-06-05 **D1**



2022-06-06 **D2**


Vmax
Lmax
Tmax
Reinforced or Framed Structures Criterion
Peak Particle Velocity (PPV), mm/s
0
1
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8
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11
12
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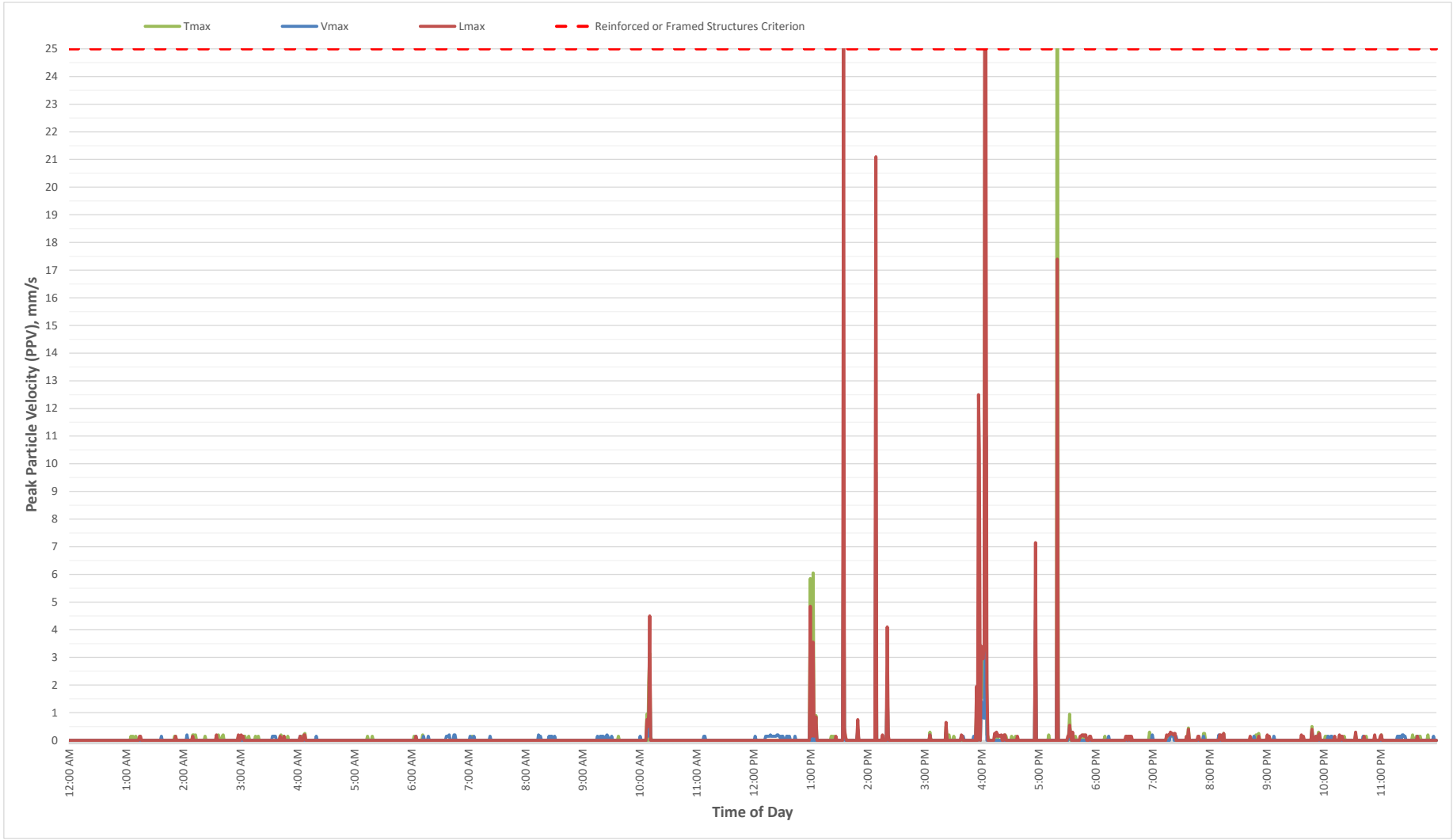
9:00 PM
10:00 PM
11:00 PM
Time of Day

2022-06-07 **D3**


Tmax
Vmax
Lmax
Reinforced or Framed Structures Criterion
Peak Particle Velocity (PPV), mm/s
0
1
2
3
4
5
6
7
8
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12:00 AM
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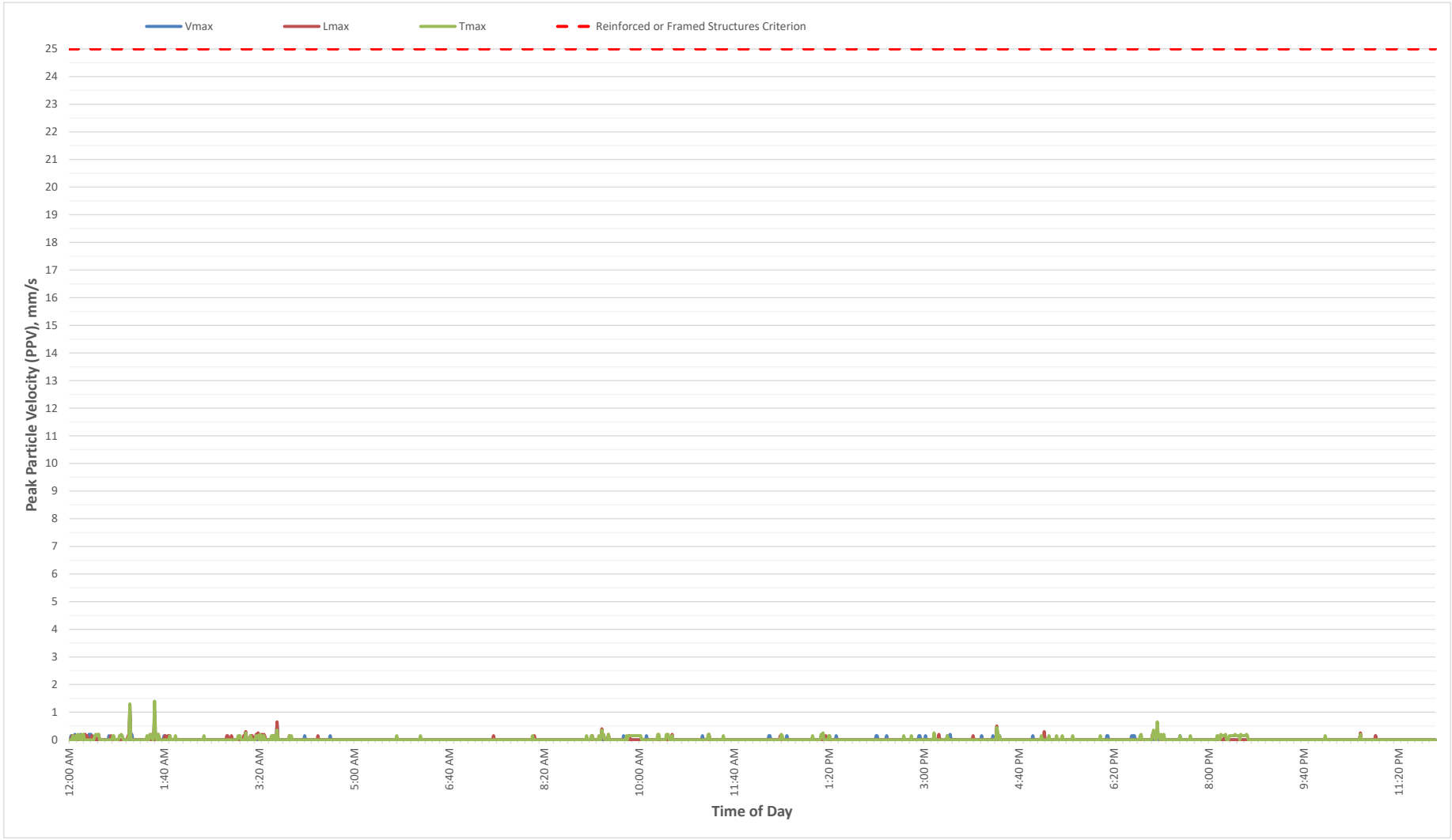
Time of Day

2022-06-08 **D4**


Vmax
Lmax
Tmax
Reinforced or Framed Structures Criterion
Peak Particle Velocity (PPV), mm/s
25
24
23
22
21
20
19
18
17
16
15
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3
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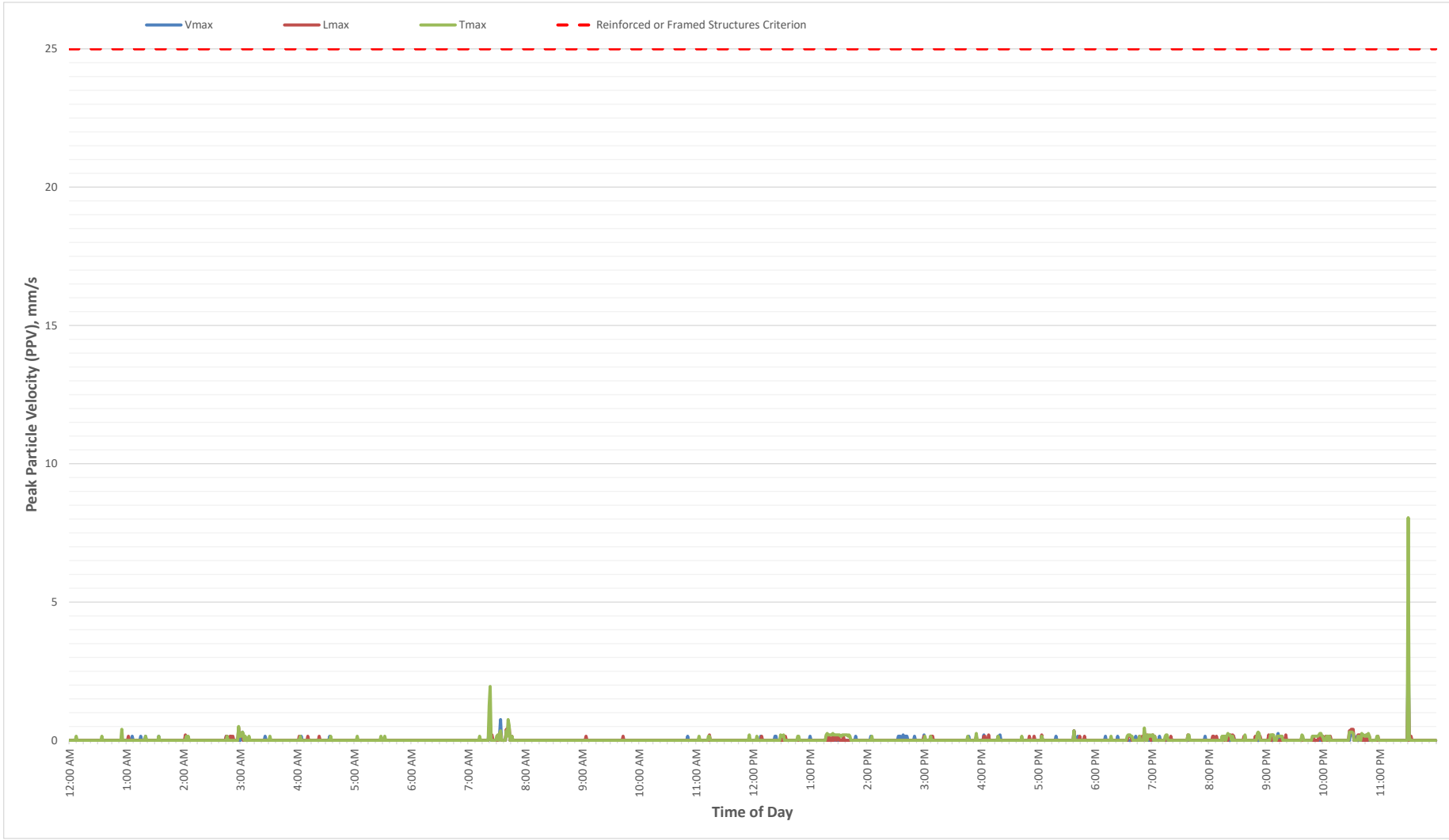
1
0
12:00 AM
1:40 AM
3:20 AM
5:00 AM
6:40 AM
8:20 AM
10:00 AM
11:40 AM
1:20 PM
3:00 PM
4:40 PM
6:20 PM
8:00 PM
9:40 PM
11:20 PM
Time of Day

2022-06-09 **D5**


Vmax
Lmax
Tmax
Reinforced or Framed Structures Criterion
25
20
15
10
5
0
Peak Particle Velocity (PPV), mm/s
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
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8:00 AM
9:00 AM
10:00 AM
11:00 AM
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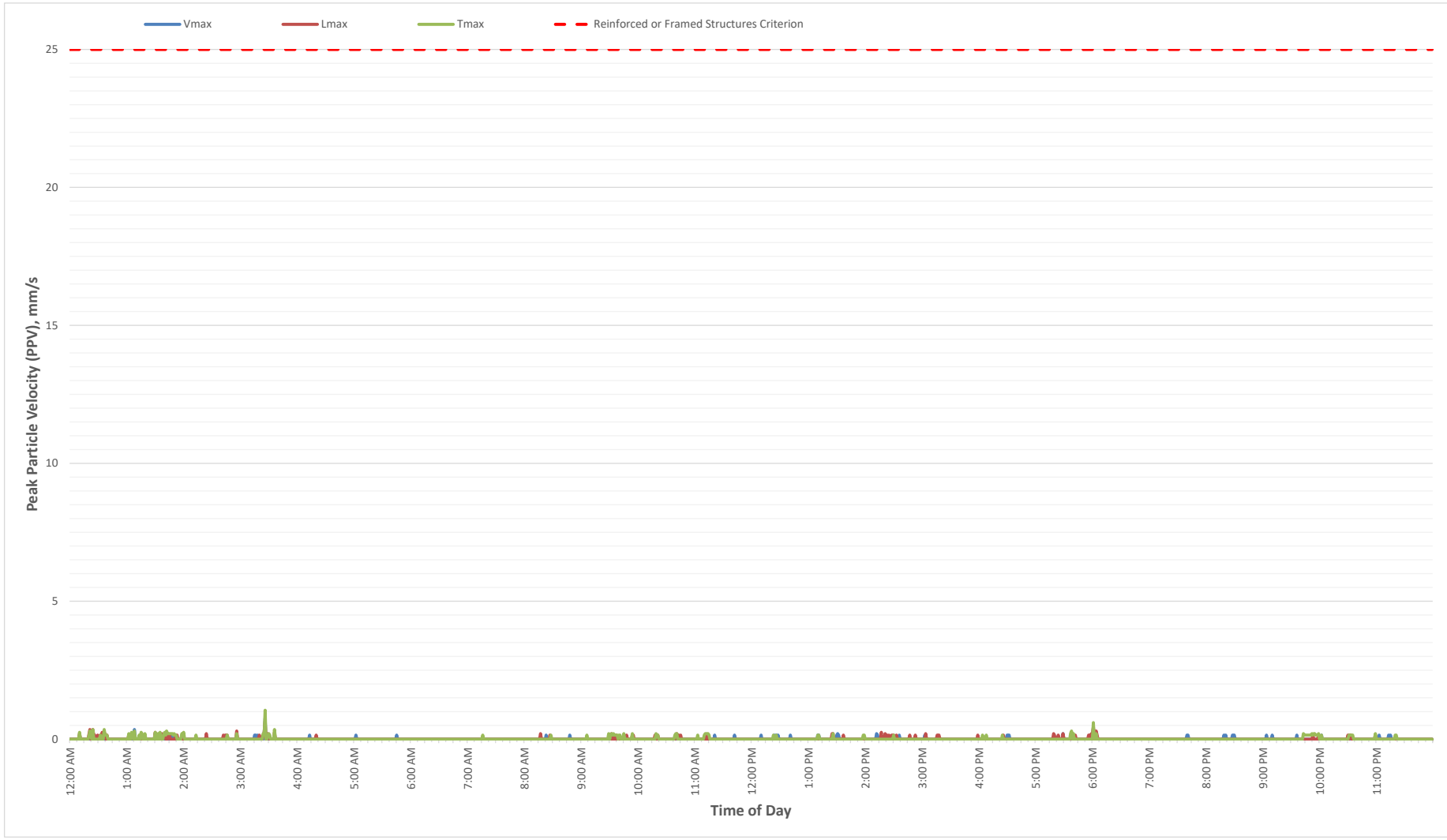
Time of Day

2022-06-10 **D6**


Vmax
Lmax
Tmax
Reinforced or Framed Structures Criterion
25
20
15
10
5
0
Peak Particle Velocity (PPV), mm/s
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
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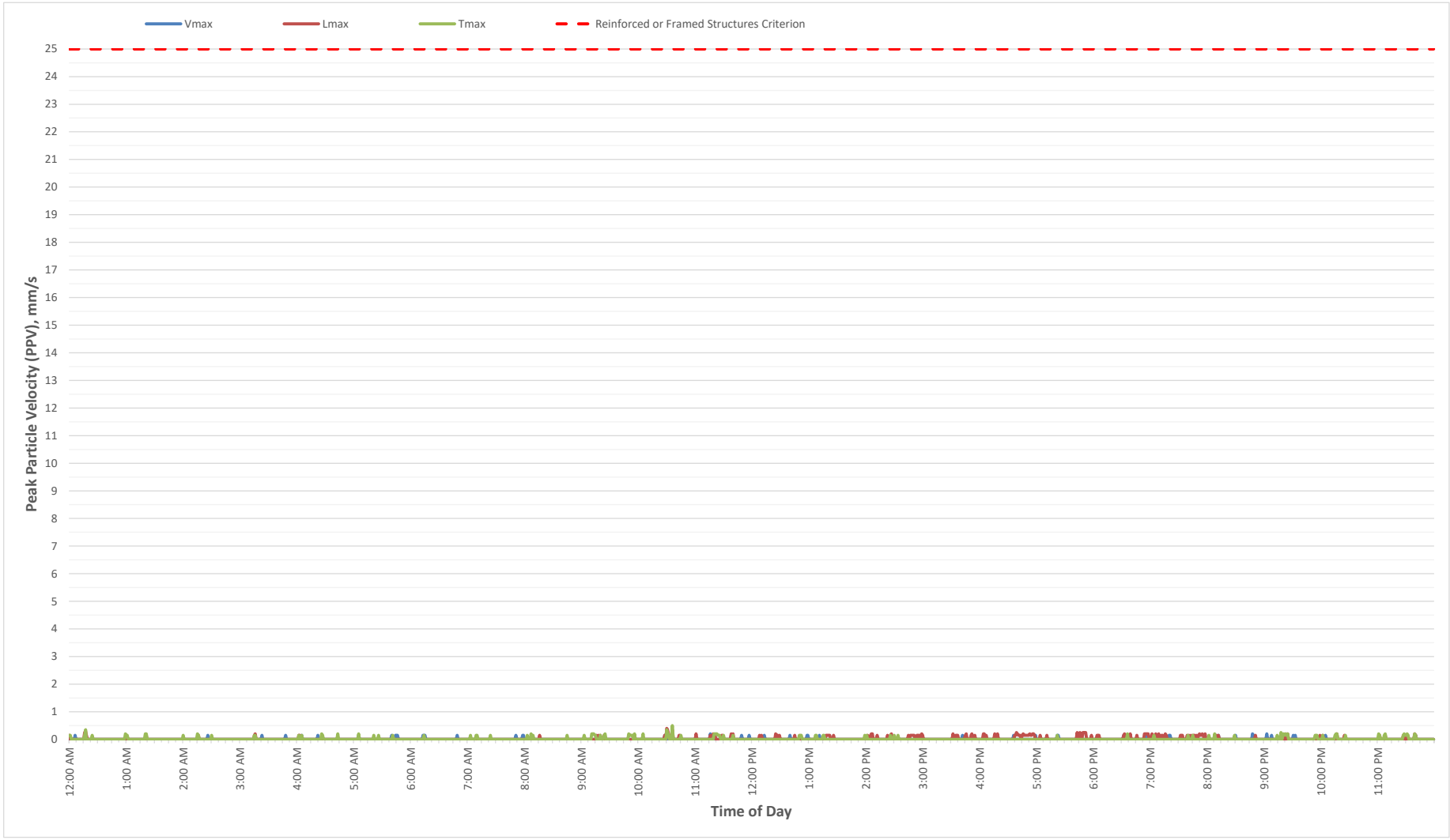
11:00 PM
Time of Day

2022-06-11 **D7**


Vmax
Lmax
Tmax
Reinforced or Framed Structures Criterion
Peak Particle Velocity (PPV), mm/s
0
1
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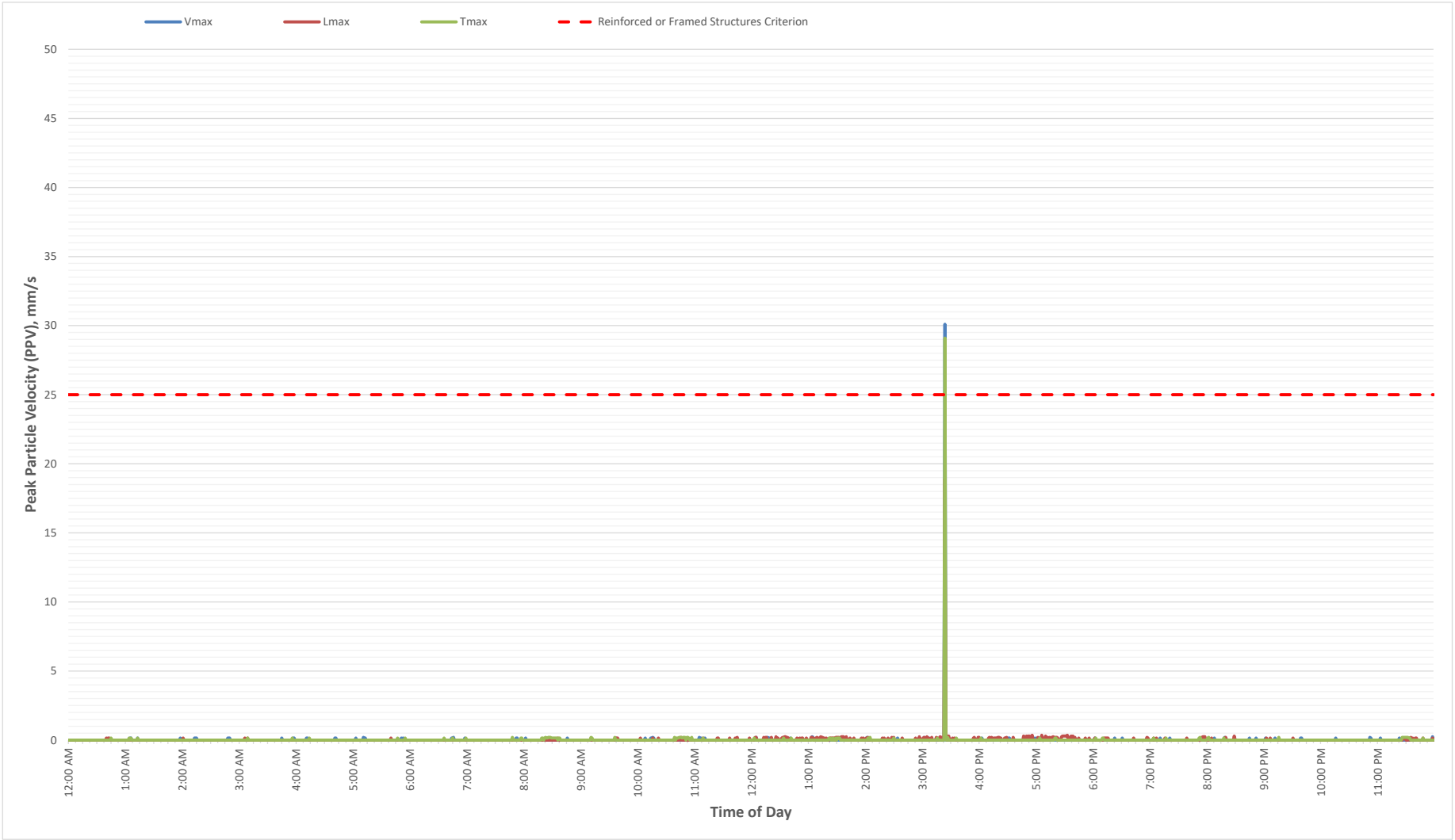
11:00 PM
Time of Day

Unattended Vibration Monitoring Results

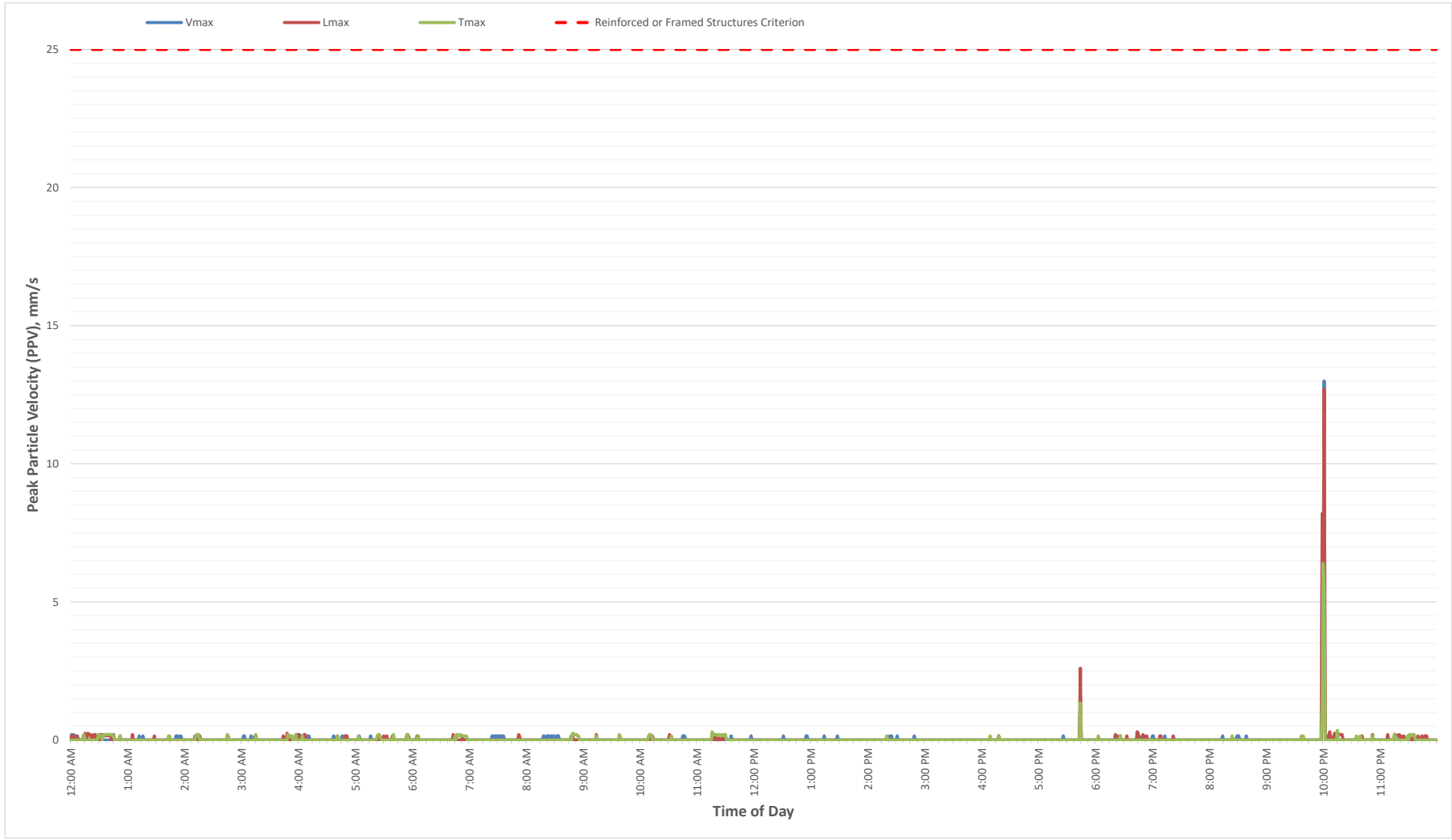
Randle Lane, Surry Hills **D8 - D10**

Monitor Location: 2-18 Chalmers Street (Dental Hospital Building)

2022-06-12 **D8**



2022-06-13 **D9**


Vmax
Lmax
Tmax
Reinforced or Framed Structures Criterion
25
20
15
10
5
0
Peak Particle Velocity (PPV), mm/s
12:00 AM
1:00 AM
2:00 AM
3:00 AM
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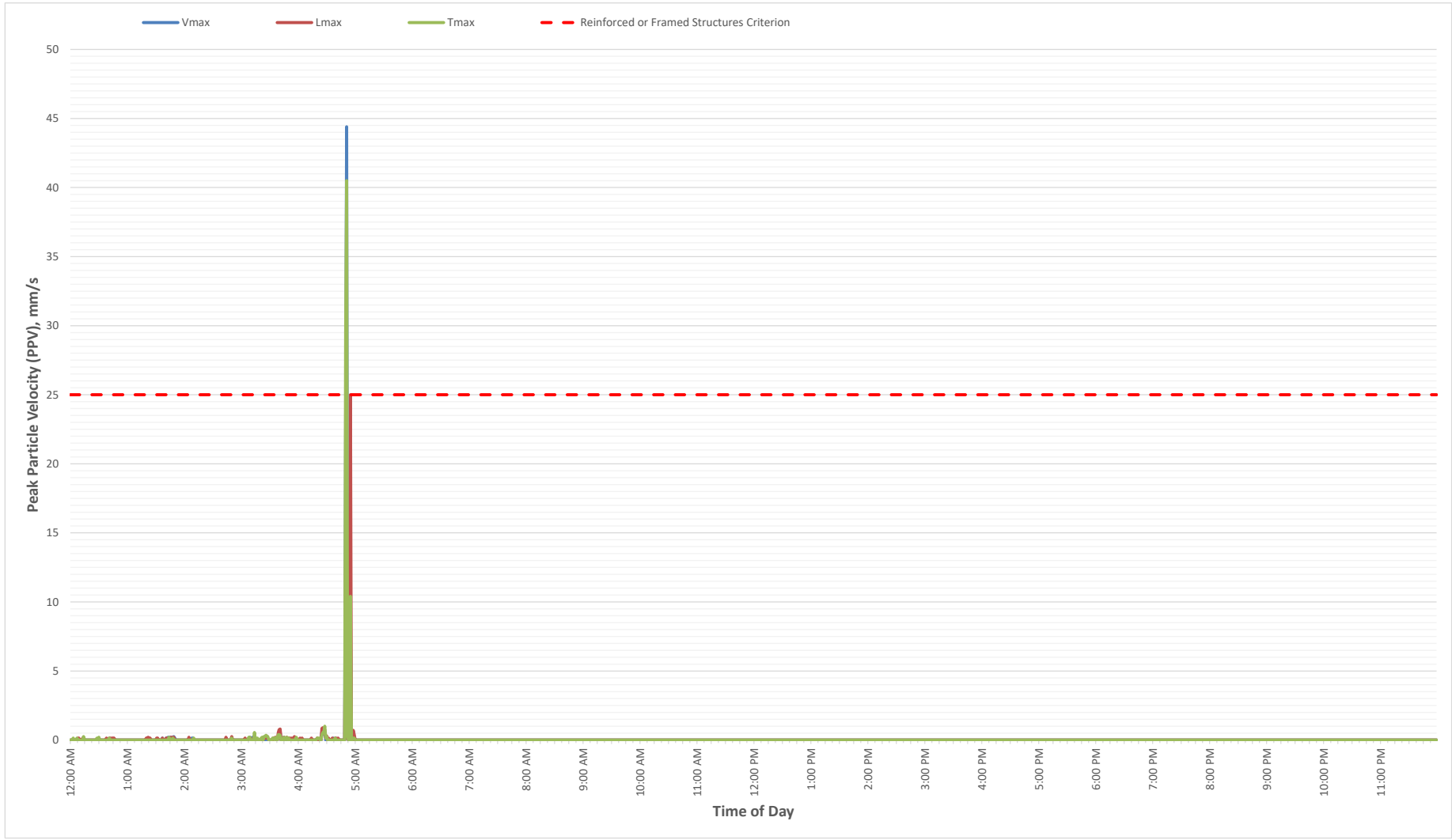
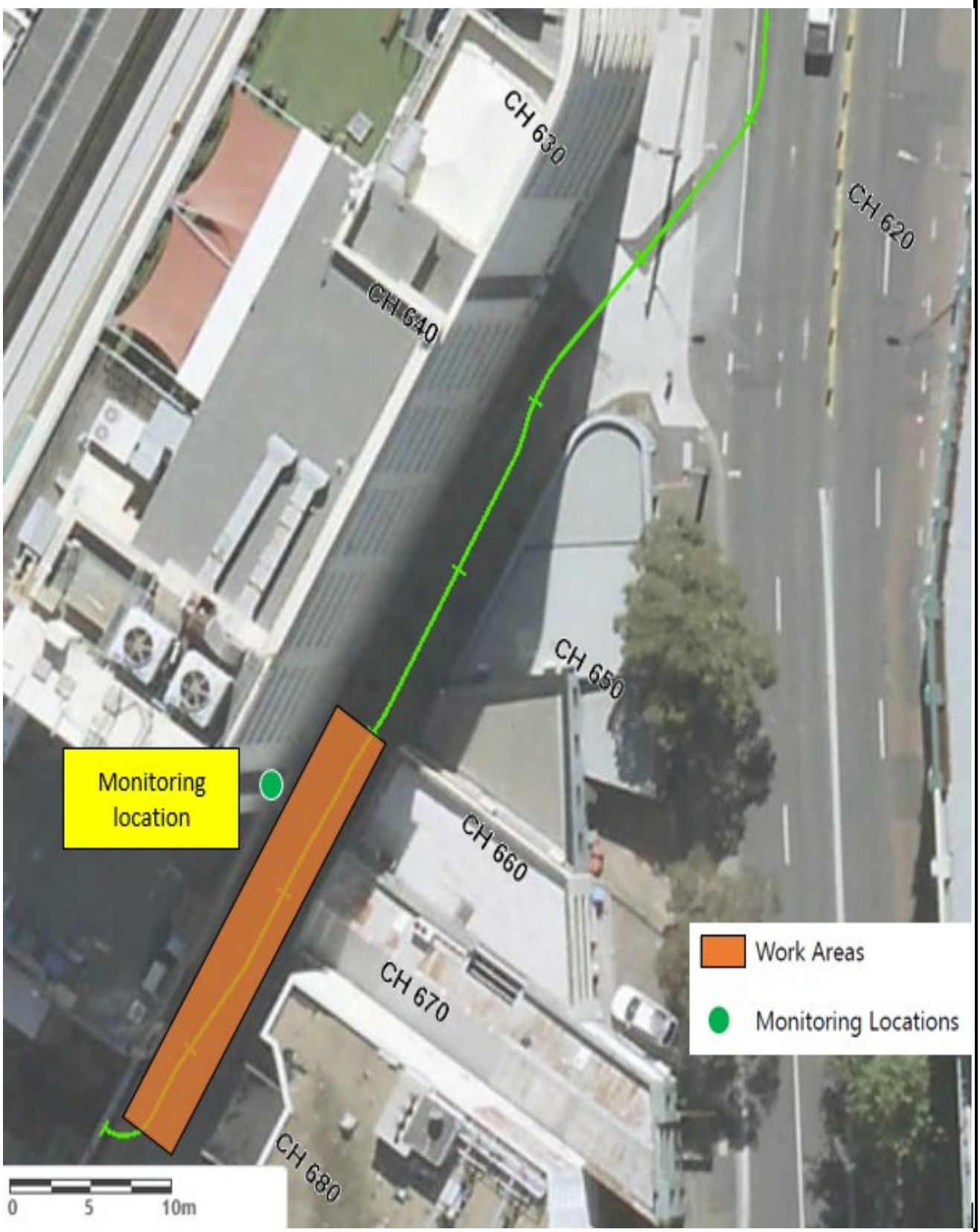
Time of Day

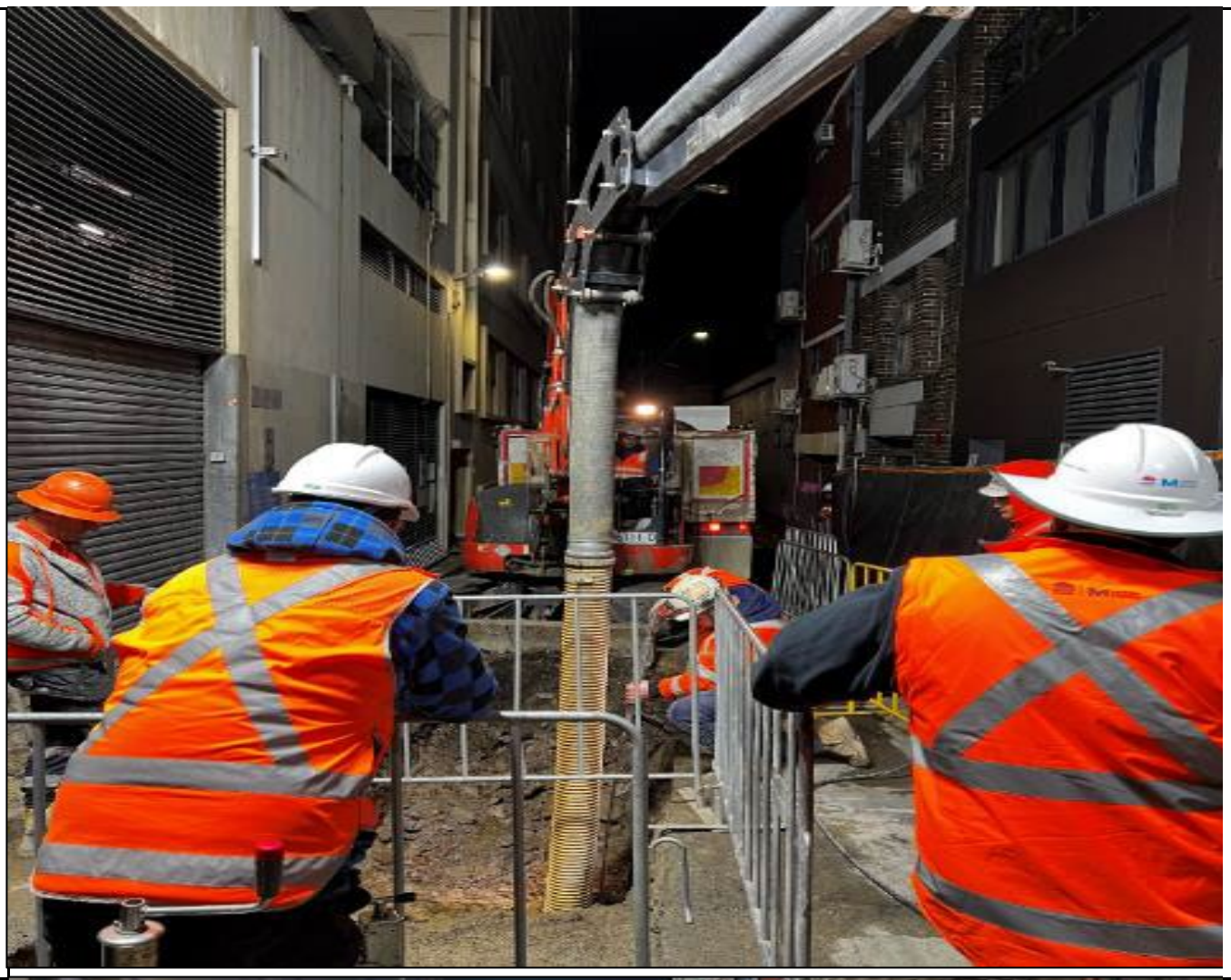
2022-06-14 **D10**



DIAGRAM


CH 630
CH 620
CH 640
CH 650
Monitoring location
CH 660
CH 670
CH 680
Work Areas
Monitoring Locations
0
5
10m

PHOTOS		
05/06/2022	19:10	
06/06/2022	19:26	

06/06/2022	23:06	
12/06/2022	23:55	

Vibration Monitoring Record Sheet

START DATE:	21/07/2022	**PROJECT AREA:**	Blues Point Road, McMahons Point NSW
FINISH DATE:	2/09/2022	**MAIN ACTIVITY**	Road/pavement demolition then reconstruction, inclusive of service installation works
CONDUCTED BY:	Raihan Zhafranata (RZ) Jason Fenton and Adam Binning	**LOCATION OF WORKS:**	Blues Point Road, McMahons Point NSW
DAY, EVENING OR NIGHT PERIOD:		Day	
MONITORING EQUIPMENT:		Sigicom INFRA C12 vibration monitor (supplied by Renzo Tonin)	
VIBRATION MONITORING PLAN:		TK685-03-11F04 CNVIS_ADD2 Blues Point Streetscaping Works, dated: 16.06.2022, Revision 2; and Blues Point Vibration Memo, AMBS (Ref: 19683), dated: 01/07/2022	

LOCATION:	Blues Point Road adjacdent to heritage listed sandstone wall		
DATES:	21July to 2 September 2022		
ACTIVITIES:	Vibratory activities include: pavement and road surface cutting, breaking and removal, compaction		
PLANT:	Road saw; 14T excavator with bucket; plate compactor / road plate; hand held jackhammer		
STRUCTURE TYPE:	Heritage listed sandstone retaining wall and ferry wharf - Unreinforced structures (heritage)		
VIBRATION CRITERIA:	Unreinforced structures (heritage): 2.5 mm/s		
APPLICABLE MWD:	7m	**ACTUAL WORKING DISTANCE:**	Various
VIBRATION MONITOR MOUNTING METHOD:	Steel baseplate taped to concrete pavement. Initial mounting on 21/07/2022 conducted by Raihan Zhafranata of Rezo Tonin. Subsequent mounting beyond 21/07/2022 conducted by Jason Fenton/Adam Binning.		

EXCEEDENCES OF VIBRATION CRITERIA (Refer to monitoring data for all results)

Date and Time	V (mm/s)	L (mm/s)	T (mm/s)	Reason
Please refer to attached time trace graph				

COMPLIANT WITH VIBRATION CRITERIA:	Yes

MONITORING COMMENTS OR ACTIONS TAKEN TO ADDRESS EXCEEDENCES OF VIBRATION CRITERIA

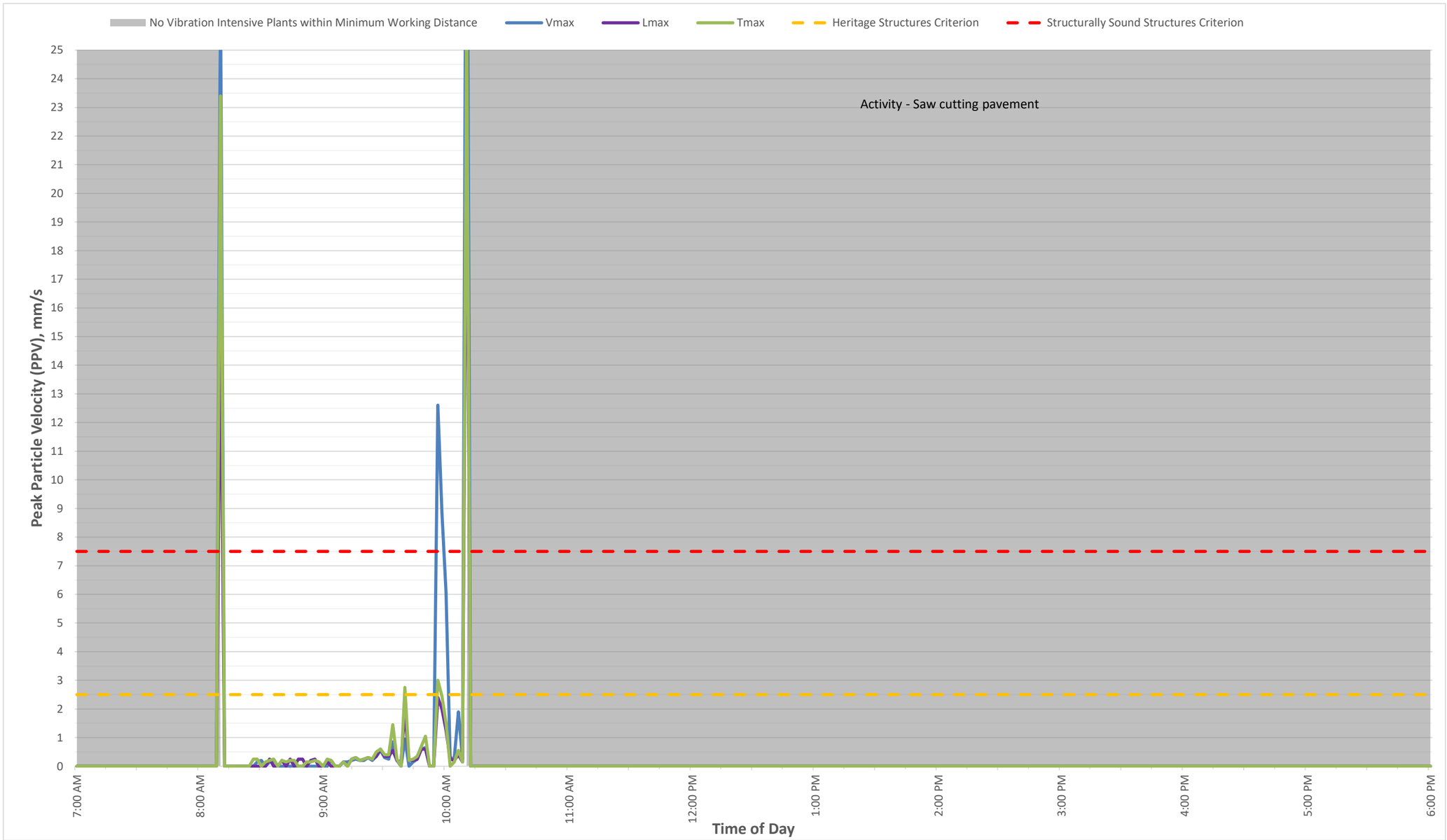
Blues Point	The Blues Point vibration time trace graph shows results of monitoring undertaken for the required construction work activities conducted in a campaigned basis. Non-vibratory construction activities and vibratory activities undertaken outside the minimum working distances were not monitored during the defined working period (unless the heritage consultant advised differently). The structural engineering report for the very robust retaining wall at Blues Point was silent on the matter of being structurally sound, therefore the very stringent criteria for heritage structures (2.5 mm/S) was adopted for the works. The methodologies for the work were adjusted to avoid vibratory works as much as possible within minimum working distances, for example concrete paving was cut using a concrete saw and sections removed with excavator and bucket. All excavation works at the site were undertaken under the supervison of a heritage consultant who often insisted monitoring be done for non-vibratory activities that were not required to be monitored within the CNVIS. This data is also included in the time trace report. Survey has been undertaken following completion of vibratory works demonstrating no impacts to heritage wall.

Unattended Vibration Monitoring Results

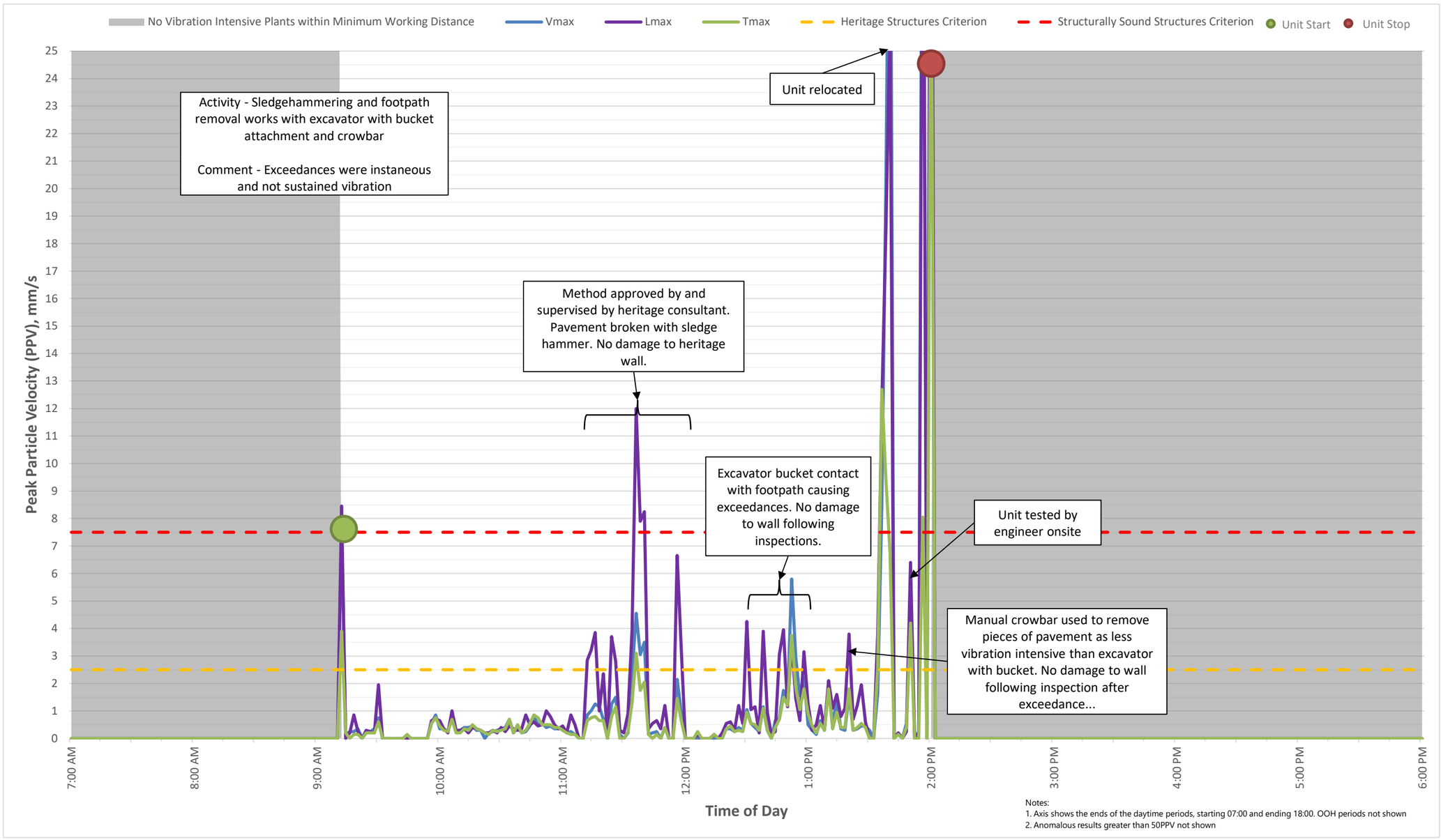
Blues Point Road, McMahons Point **D1 - D7**

Monitor Location: Blues Point Road adjacent to heritage listed sandstone wall

2022-07-21 **D1**

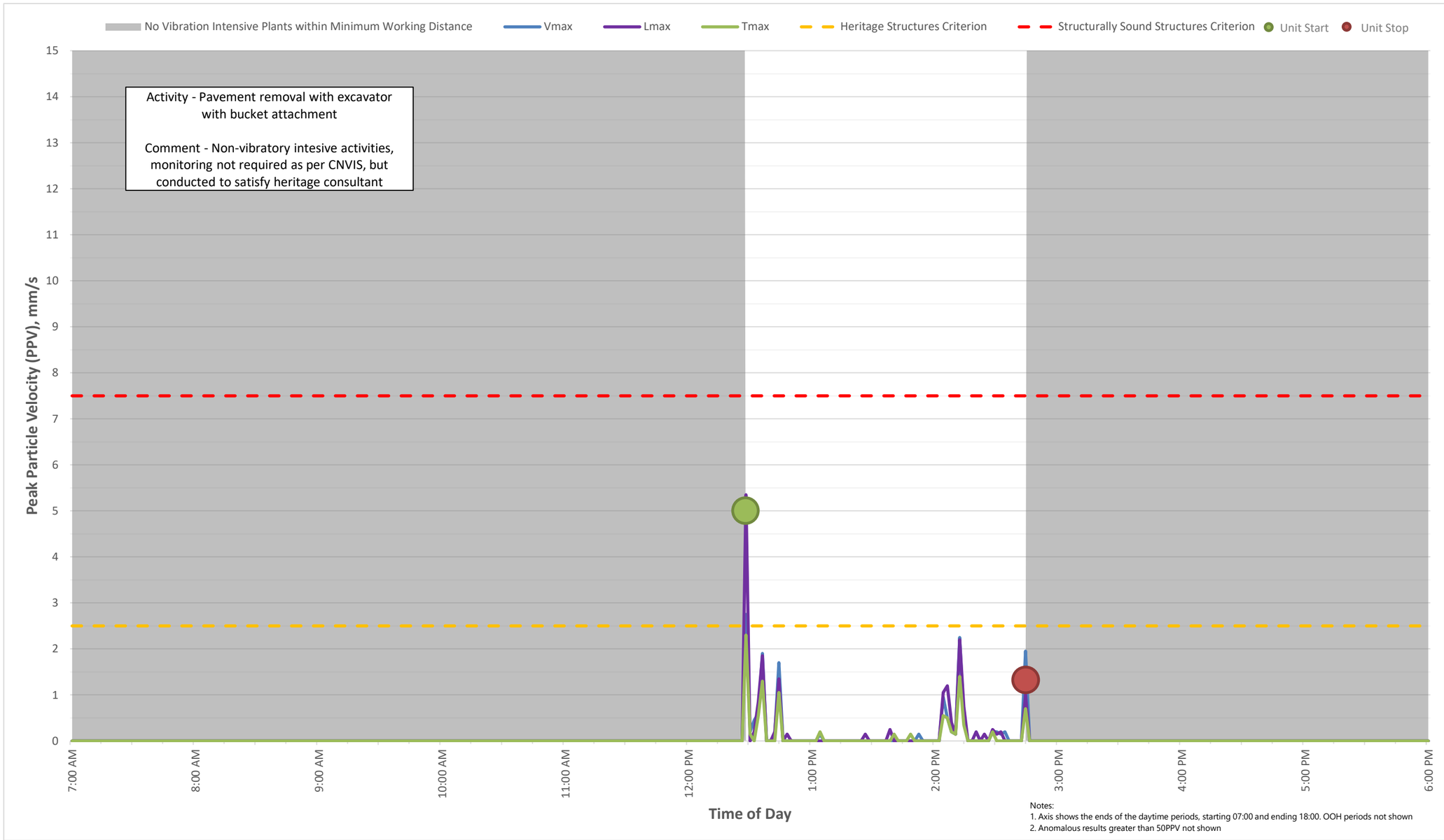


2022-07-25 **D2**



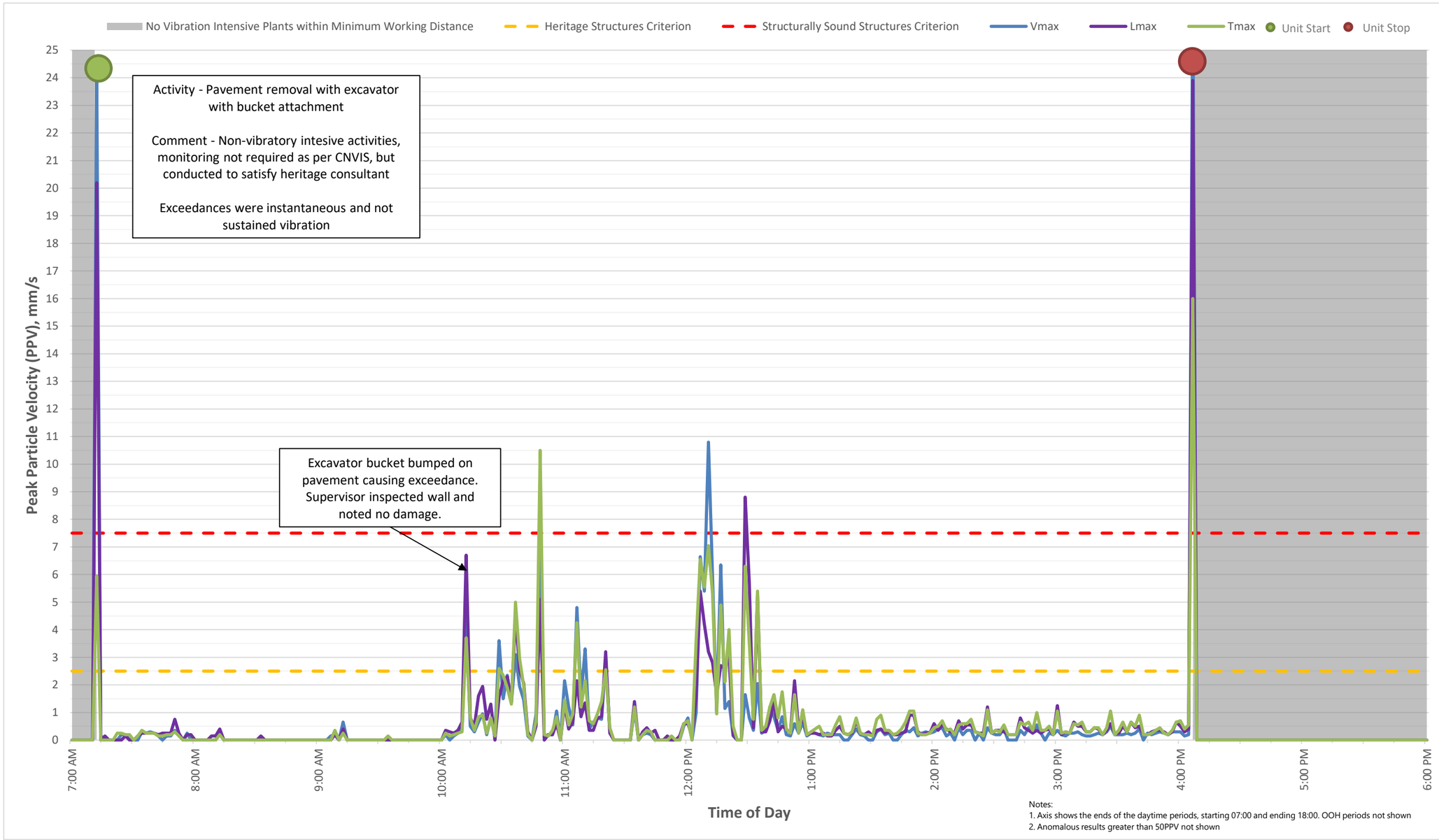
Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

2022-07-26 **D3**



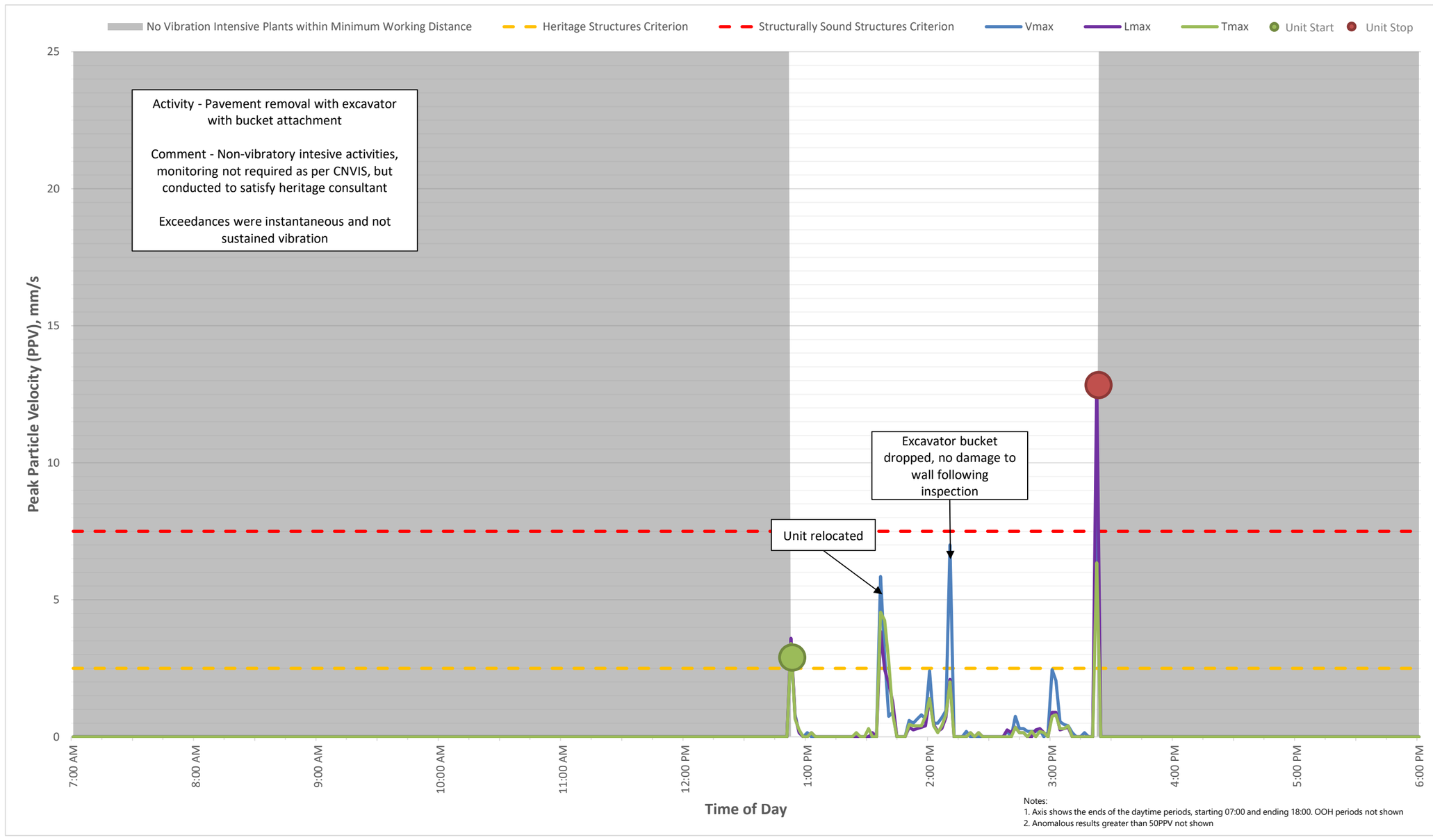
Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

2022-07-29 **D4**



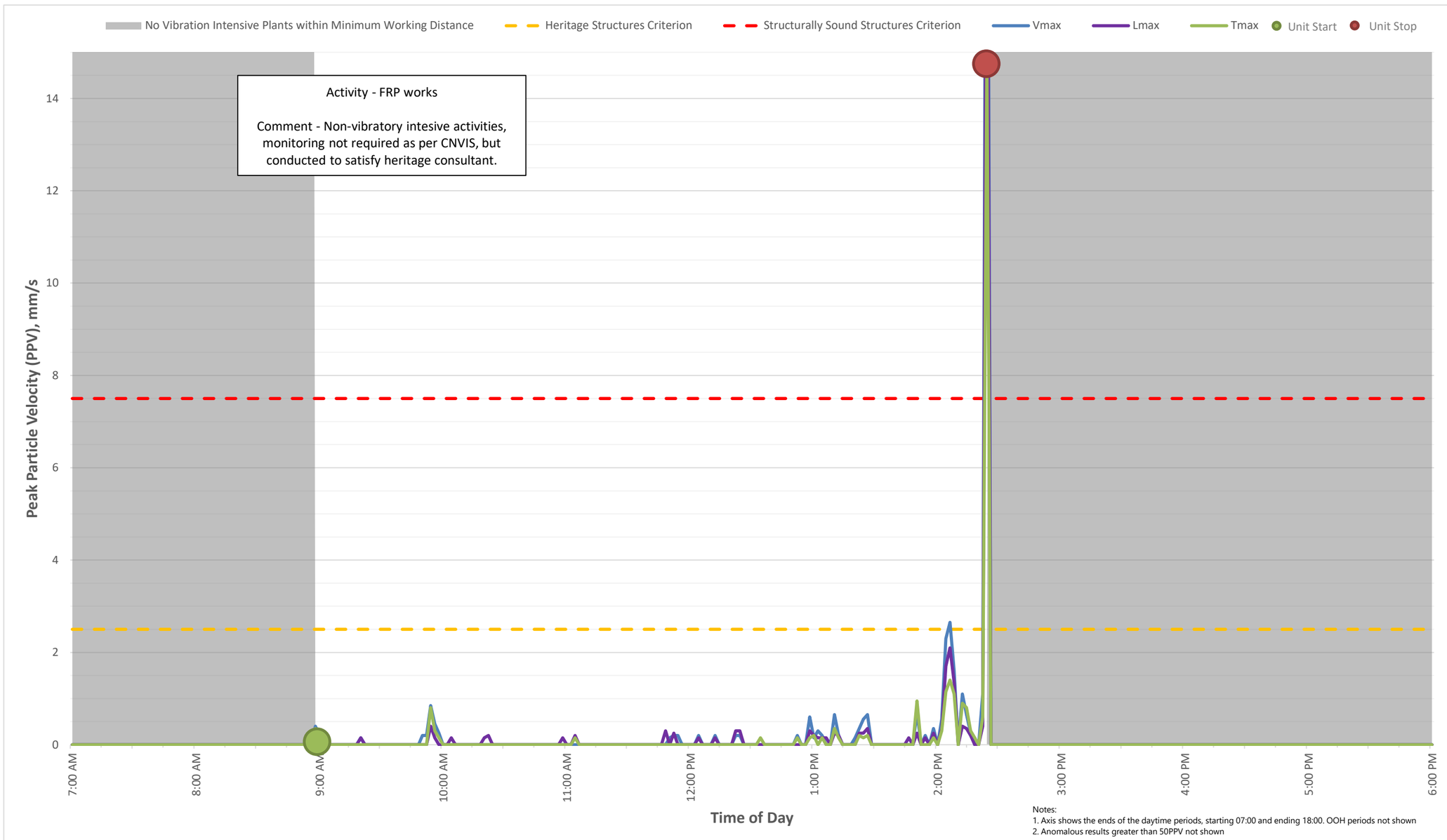
Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

2022-08-01 **D5**



Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

2022-08-03 **D6**



Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

2022-08-04 **D7**

Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

Unattended Vibration Monitoring Results

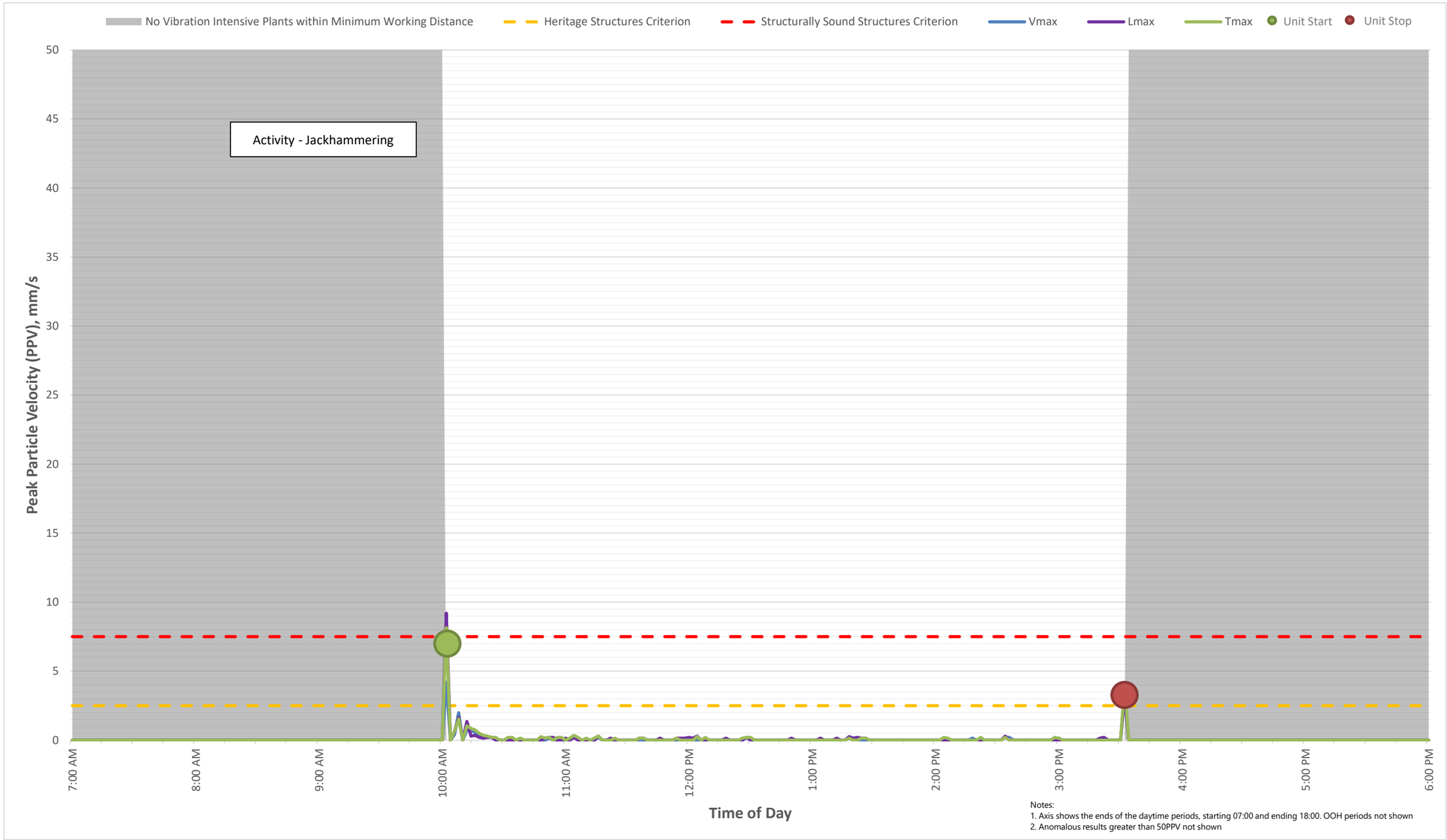
Blues Point Road, McMahons Point **D8 - D15**

Monitor Location: Blues Point Road adjacent to heritage listed sandstone wall

2022-08-05 **D8**

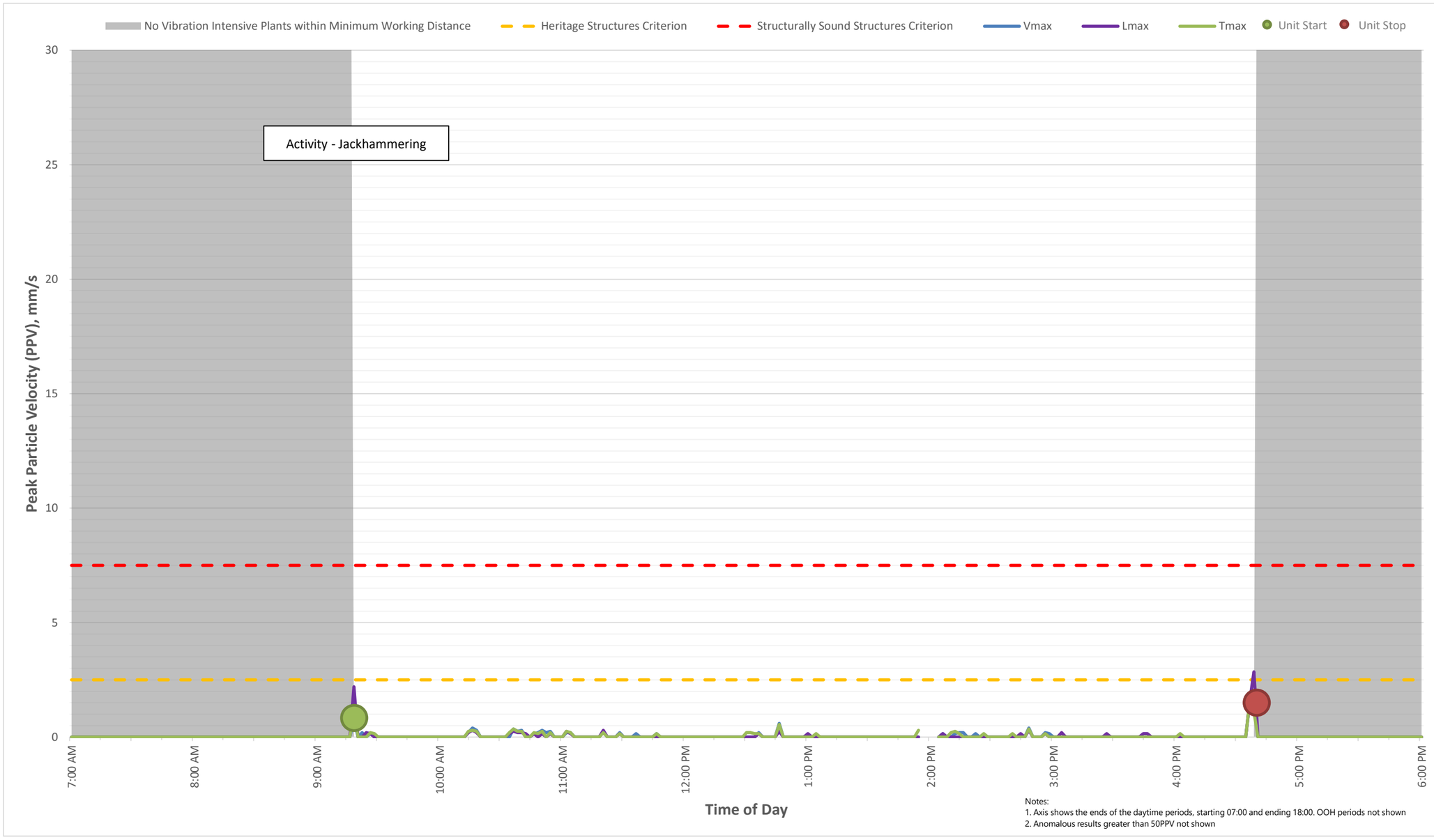
Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

2022-08-10 **D9**



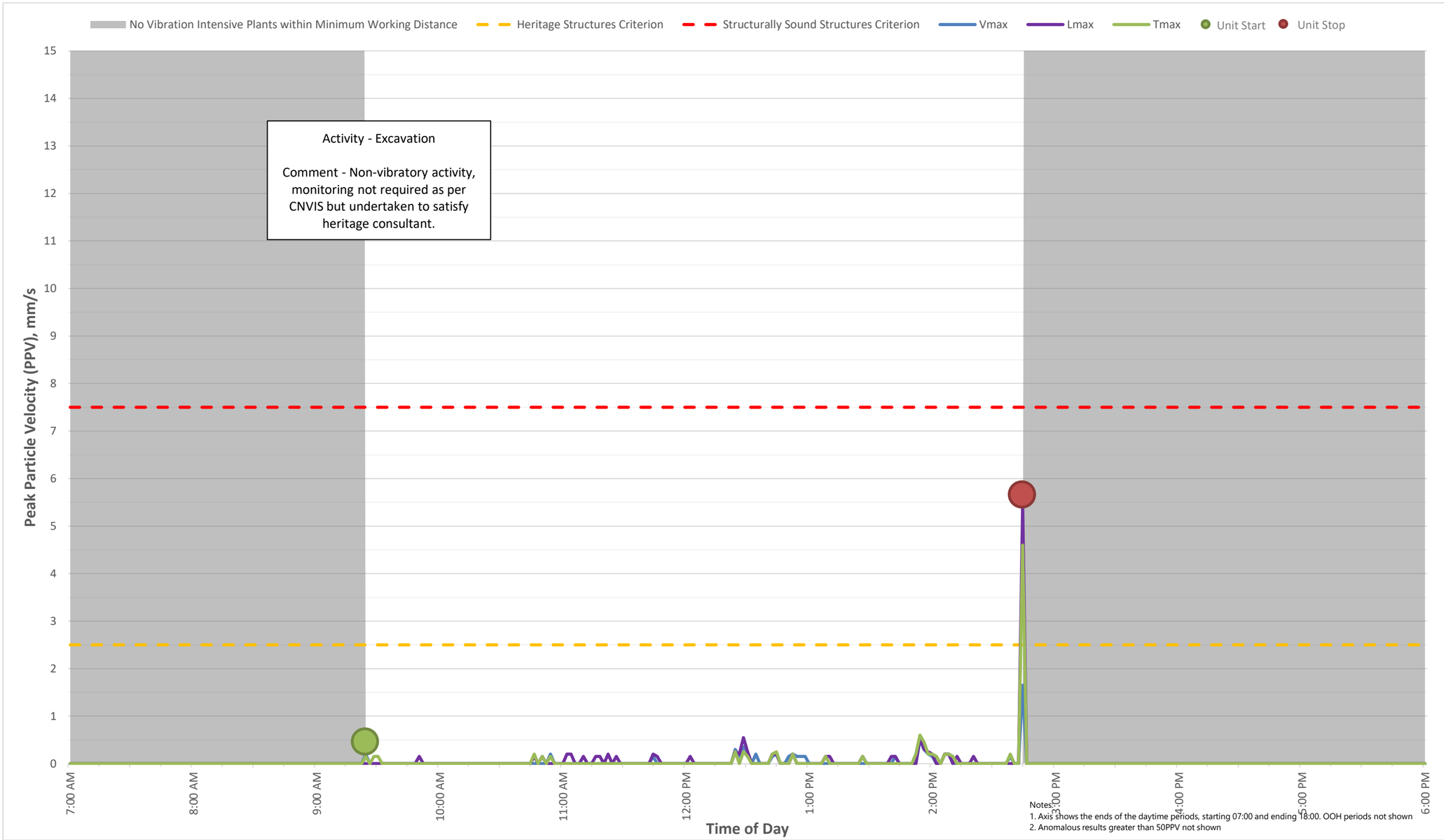
Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

2022-08-17 **D10**

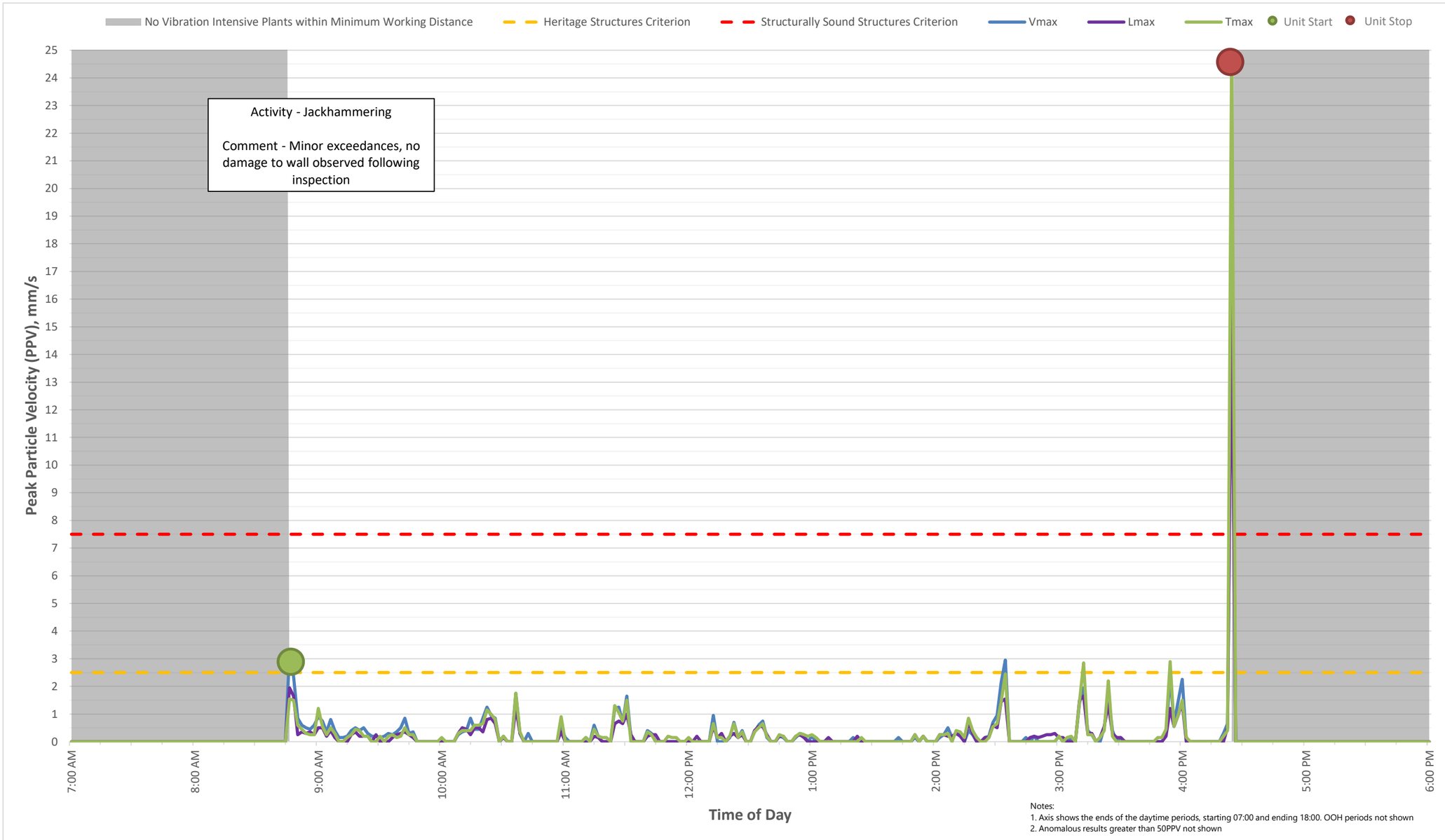


Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

2022-08-23 **D11**

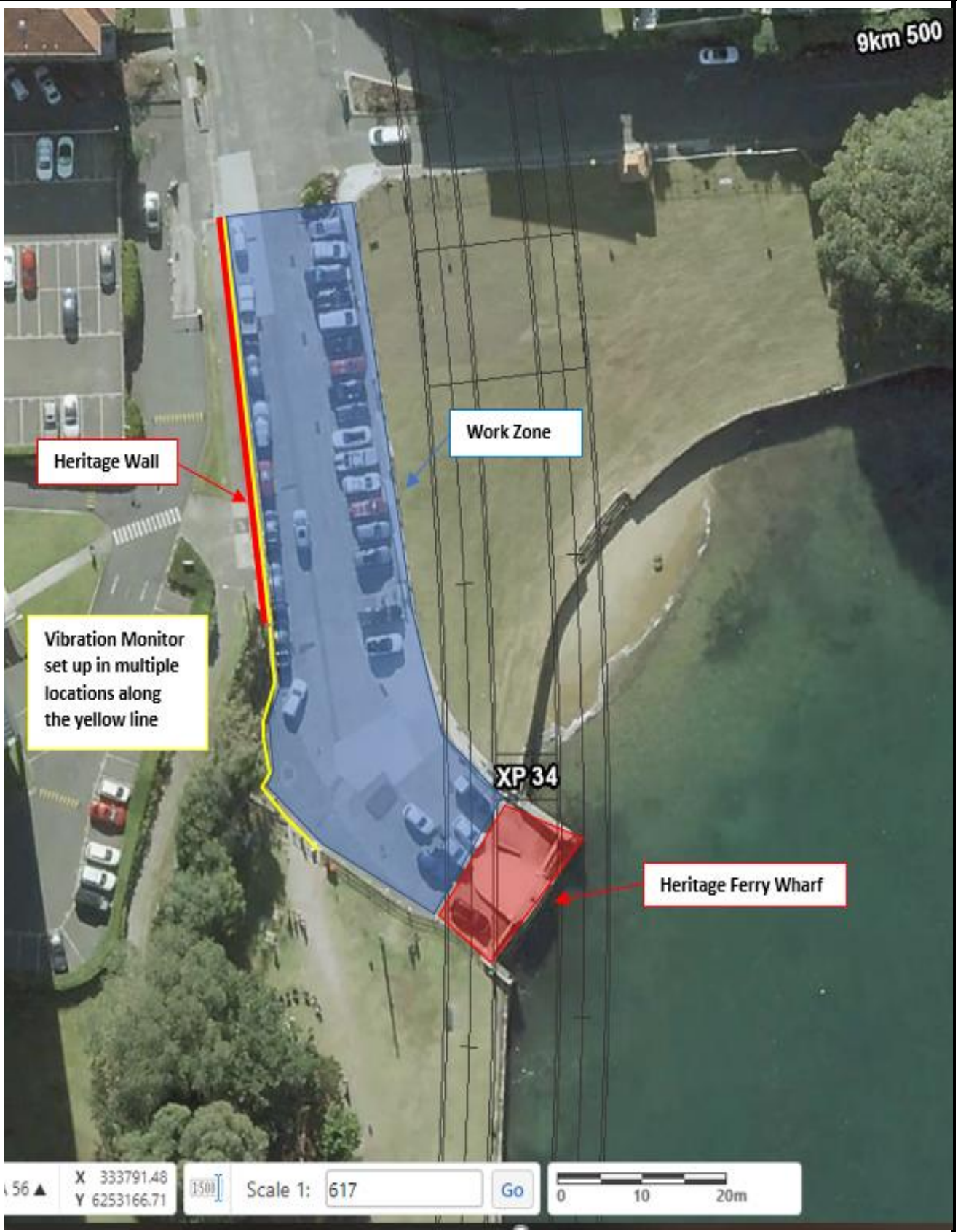


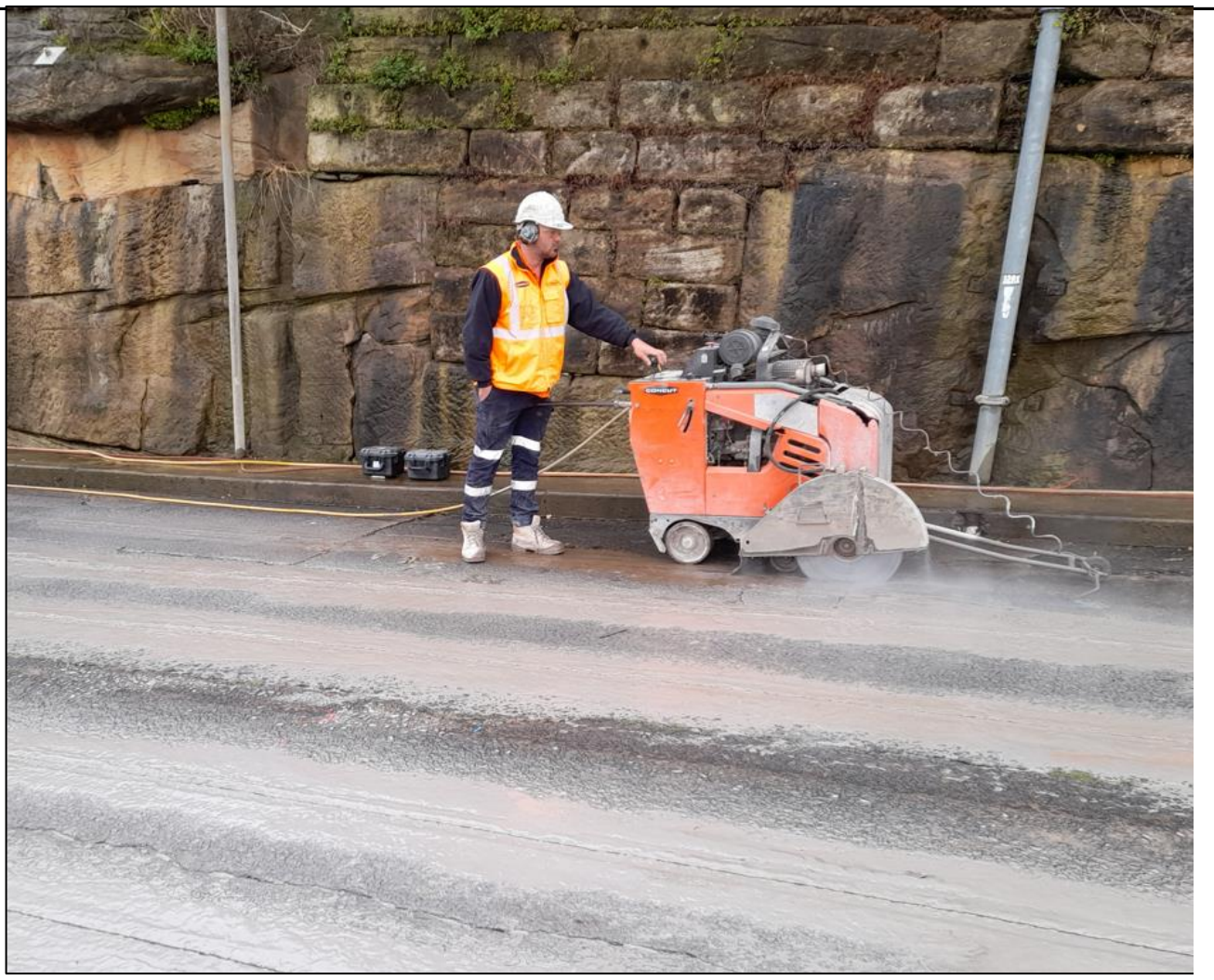
2022-09-02 **D12**



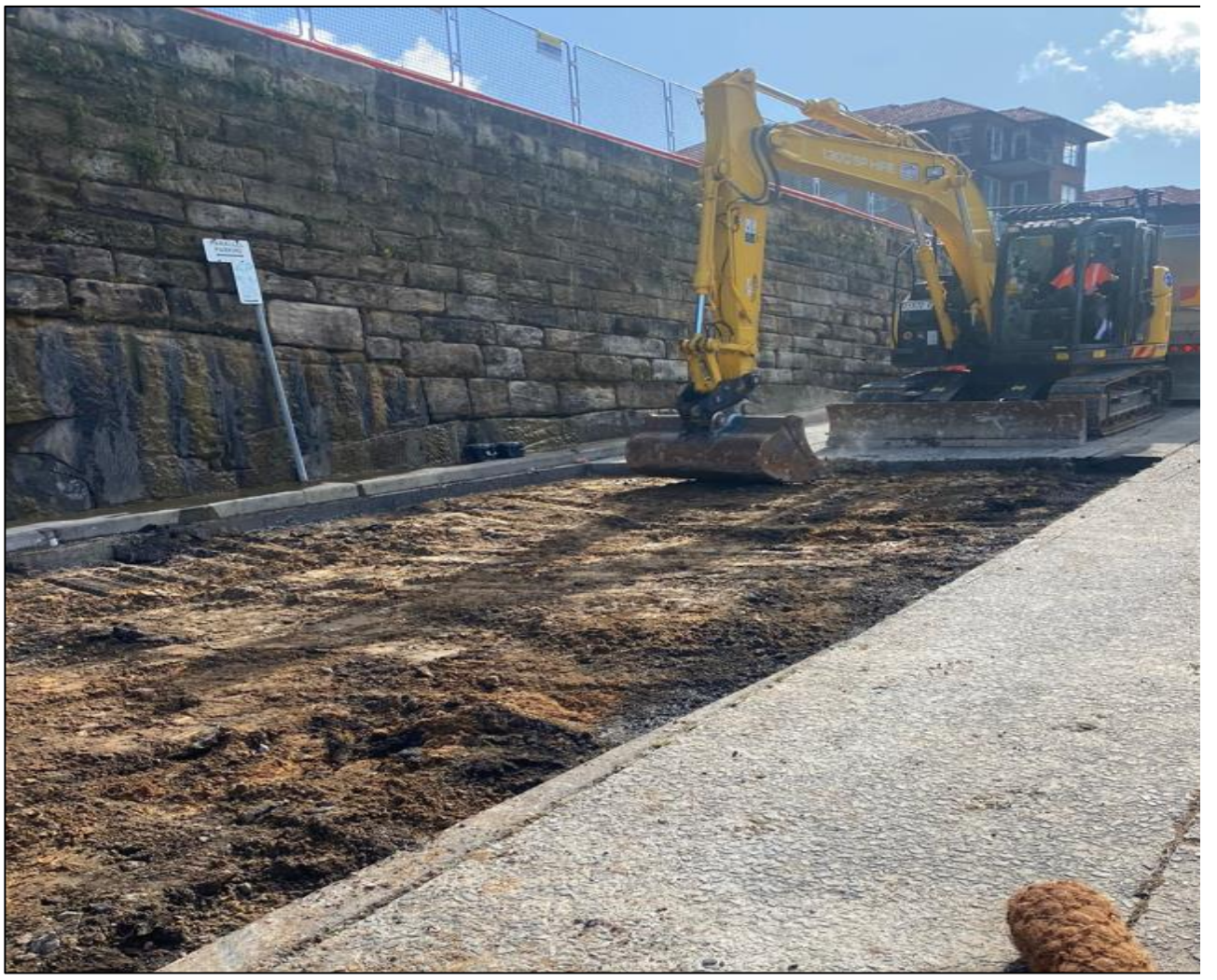
Notes:
1. Axis shows the ends of the daytime periods, starting 07:00 and ending 18:00. OOH periods not shown
2. Anomalous results greater than 50PPV not shown

DIAGRAMS


9km 500
Work Zone
Heritage Wall
Vibration Monitor set up in multiple locations along the yellow line
XP 34
Heritage Ferry Wharf
X 333791.48
Y 6253166.71
Scale 1: 617
Go
0
10
20m

PHOTOS		
21/07/2022	8:05	
21/07/2022	9:05	

21/07/2022	9:16	
25/07/2022	12:00	

26/07/2022	9:35	
29/07/2022	8:10	

APPROVAL

CITY & SOUTHWEST ACOUSTICS ADVISOR

Review of	**Construction Monitoring Report March - August 2022**	**Document reference:**	**Construction Monitoring Report March - August 2022** **Sydney Metro City & Southwest – Line-wide Works** *N21063* *SMCSWLWC-SYC-CSW-EM-REP-014616* *Dated 14 February 2023* *Revision 2*
Prepared by:	Carl Fokkema Alternate Acoustics Advisor		
Date of issue:	22 May 2023		

As approved Alternate Acoustics Advisor for the Sydney Metro City & Southwest project, I have reviewed and provided comment on the Construction Monitoring Report March – August 2022 Sydney Metro City & Southwest – Line-wide Works Document No. SMCSWLWC-SYC-CSW-EM-REP-014616 dated 14 February 2023, as required under A27 (d) of the project approval conditions (SSI 15-7400).

The Line-wide CMR is to be submitted to the Department of Planning and Environment in accordance with Condition of Approval C16 (CSSI 7400), C14 (CSSI 8256) and monitoring requirements of the Construction Noise and Vibration Management Plan C2B.

I have reviewed the monitoring report and am satisfied that my comments have been adequately addressed, and that it meets the requirements for construction noise and vibration monitoring for Line-wide. I endorse the report.

Carl Fokkema, City & Southwest Alternate Acoustics Advisor