

# SYDNEY METRO MARTIN PLACE – INTEGRATED STATION DEVELOPMENT NOISE AND VIBRATION MONITORING REPORT JAN-JUN 2021



## REVISION STATUS

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## 1.0 INTRODUCTION

### 1.1 Sydney Metro project background

The New South Wales (NSW) Government through Transport for NSW (TfNSW) is implementing Sydney's Rail Future, a plan to transform and modernise Sydney's rail network so that it can grow with the city's population and meet the needs of commuters and customers in the future.

Sydney Metro is a new standalone rail network identified in Sydney's Rail Future. The Sydney Metro network consists of Sydney Metro Northwest (previously known as the North West Rail Link), Sydney Metro City & Southwest and Sydney Metro West.

This monitoring report has been developed for the Martin Place Metro Station construction.

### 1.2 Martin Place Integrated Station Development

The Martin Place Integrated Station Development (MPISD) comprises of the new Martin Place Metro Station. The Martin Place Metro Station works will be completed as part of the Critical State Significant Infrastructure (CSSI) project (reference SSI 7400), and as approved by SSI 7400 MOD 3. The south tower and north tower Over Station Development (OSD) works will be completed under separate State Significant Development (SSD) approvals.

MPISD occupied the Martin Place North site, South site, tunnels, station caverns and Bligh Street compound for the duration of this report.

### 1.3 Project location and monitoring locations

The Project is located between Hunter Street to the north, 50 Martin Place to the south, Elizabeth Street to the east and Castlereagh Street to the west, also termed the Martin Place north site. The location of this Project is shown in the figure below.

Realtime noise and vibration monitors have been placed at 50 Martin Place, as this is the most potentially impacted building and group of receivers. At the request of the building owner, vibration monitors were installed in the sub-basement, lower basement, upper basement and ground floor. A noise monitor was located on the ground floor.

Attended noise monitoring has taken place at various locations and receivers around the MPISD work site.



Figure 1 - Project Site Location



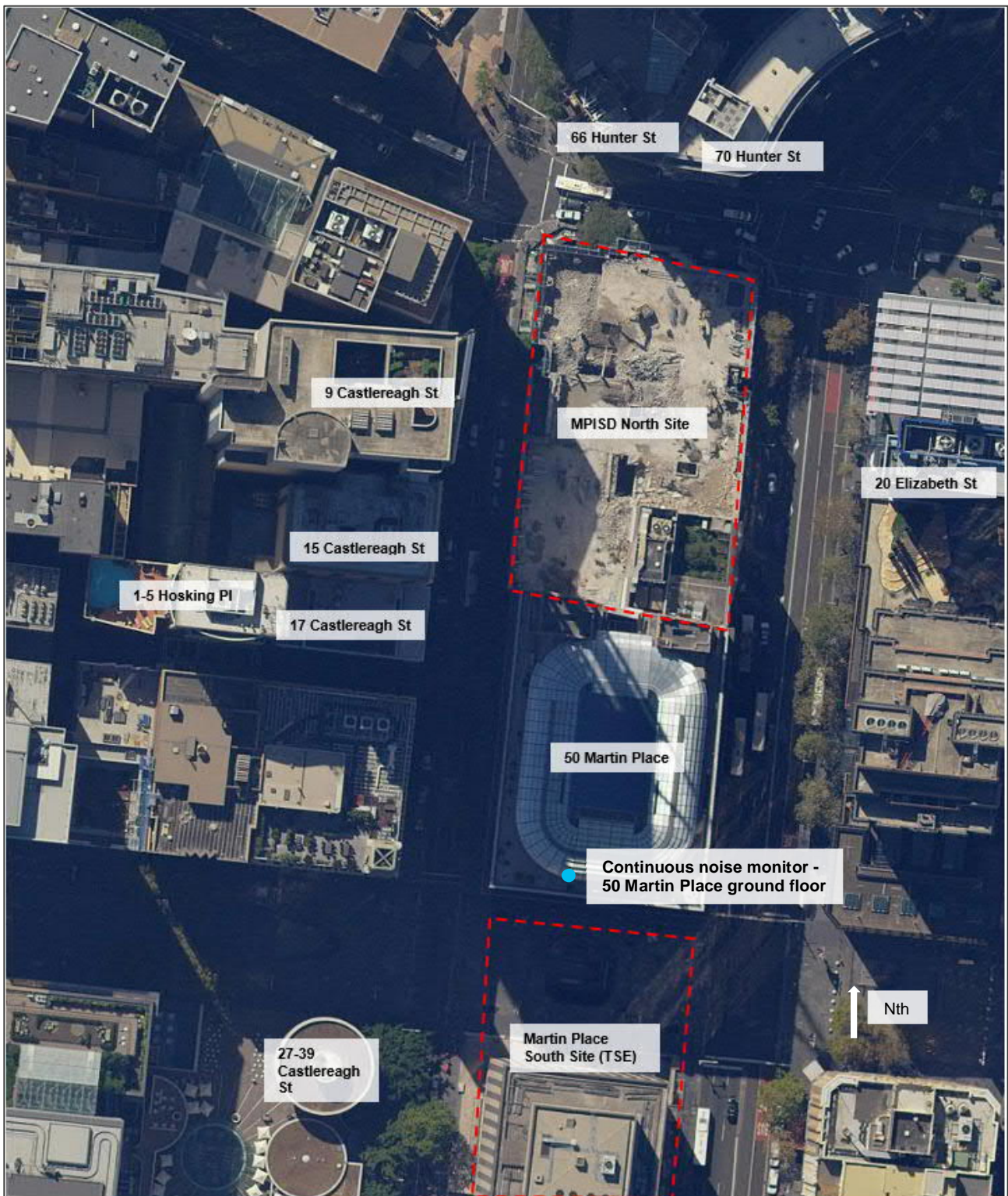


Figure 2 - Attended & continuous noise monitoring locations

(Source: maps.six.nsw.gov.au)

## 2.0 WORK ACTIVITIES

Works have comprised of the following activities:

- Deliveries
- Detailed earthworks using hydraulic hammers.
- Saw cutting perimeter walls and isolation cuts.
- Loading and haulage of excavated material.
- Tunnelling for pedestrian link under 50 Martin Place.
- Excavation of station footings and foundations using hydraulic hammers and saws.
- Construction of station footings and foundations including steel and concrete placement.
- Waterproofing.
- Structural station elements including steel and concrete placement.
- Operation of the Bligh Street compound.

Working hours have been in accordance with allowances of the CSSI planning approval. Standard approved working hours are;

- 7:00am to 6:00pm Mondays to Fridays, and
- 8:00am to 1:00pm Saturdays.

CSSI conditions E38 and E44 allow for works to be undertaken outside the standard approved hours where a negotiated agreement has been reached with a substantial majority of potentially affected sensitive receivers. As such, a community negotiated agreement has been reached and approved, which includes provision for;

- 5am to 6am Monday to Saturday - site, plant and equipment set up, material deliveries, spoil haulage and hoist operations (north site only)
- 6am to 7am Monday to Saturday - material deliveries, spoil haulage, tower crane operations, hoist operations, concrete pours and general construction works
- 6pm to 10pm Monday to Saturday - material deliveries, spoil haulage, concrete pours, concrete finishing, tower crane operations, hoist operations and general construction works
- 5am to 8am, 12pm to 1pm and 7pm to 10pm Monday to Saturday - no high impact noise/vibration activities to occur (jack hammering, rock breaking, vibratory rolling, any other works occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics).

### 3.0 NOISE AND VIBRATION CRITERIA

Relevant noise and vibration criteria have been nominated in the MPISD Construction Noise and Vibration Management Plan and are reproduced below.

#### 3.1 Noise

Between the hours 7am and 8pm, the following internal noise control limits apply:

- LAeq(15minute) > 60 dBA for no longer than 6.5 hours
- LAeq(15minute) < 55 dBA for at least 3.25 hours
- The above are inclusive of a 5 dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise or a perceptible level of vibration

#### 3.2 Vibration

The following vibration screening criteria has generally been applied to 50 Martin Place:

- Screening criteria - 7.5 mm/s

As per CSSI condition E28.1, a vibration impact assessment was prepared by DPIE approved specialists for the pedestrian tunnel works underneath 50 Martin Place. The assessment;

- included structural engineering inspection of the parts of the building predicted to be affected by vibration levels above 7.5mm/s;
- concluded that vibration up to 20mm/s (or more) is appropriate for newer (non-heritage) structures;
- retained the 7.5mm/s vibration screening criterion for heritage parts of the building; and
- was endorsed by the Acoustic Advisor on 25 November 2020.

Specific revised screening criteria for 50 Martin Place are outlined below;

Table 1 – Vibration screening criteria for 50 Martin Place

Location	PPV Vibration Criterion, mm/s
50 Martin Place building (unless noted otherwise)	7.5mm/s
Concrete sub-basement structure if frequency dependent vibration monitoring is not used	20mm/s
Concrete sub-basement structure if frequency dependent vibration monitoring is used	<ul style="list-style-type: none"> <li>• 20mm/s for vibration frequency &lt; 20Hz</li> <li>• 25mm/s for vibration frequency &gt; 20Hz</li> <li>• or the frequency dependant vibration criterion in line 1 of Table 1 in DIN4150 (refer to Figures 11 &amp; 12)</li> </ul>

Note; vibration levels are measured in Peak Particle Velocity (PPV).

## 4.0 MONITORING EQUIPMENT

The monitors used for the various monitoring completed during the reporting period are outlined below. Attended monitors were field calibrated before each field measurement.

Table 2 - Monitoring equipment details

Equipment Details	Monitoring Type	Location(s)	Serial No.	NATA Calibration Date	Envirosuite Ref.
Bruel & Kjaer Type 2245 Type 1 sound level meter	Attended noise	Various, as per Table 4	2245-100100	04/07/19	N/A
Bruel & Kjaer Type 4231 Type 1 sound level meter calibrator	Attended noise	Various, as per Table 4	3023895	04/07/19	N/A
Brüel & Kjær 2250 sound level meter	Real-time noise	50 Martin Place Ground Floor C1	3023931	09/10/19	GF C1
Brüel & Kjær 4450 vibration monitor	Real-time vibration	50 Martin Place sub-basement	1000126	07/12/20	SB C10
Brüel & Kjær 4450 vibration monitor	Real-time vibration	50 Martin Place lower basement	1000114	08/12/20	LB C8, SB C6, SB C8
Brüel & Kjær 4450 vibration monitor	Real-time vibration	50 Martin Place upper basement	3117885	07/12/20	UB C9
Brüel & Kjær 4450 vibration monitor	Real-time vibration	50 Martin Place sub-basement & lower basement	1000082	07/12/20	SB C8-9, LB C1



## 5.0 MONITORING RESULTS

### 5.1 Attended vibration monitoring summary

Attended vibration monitoring was not required during the monitoring period.

Vibration within 50 Martin Place was monitored real-time, as discussed in Section 5.3 below.

### 5.2 Attended noise monitoring summary

Attended noise monitoring was undertaken at various representative locations around the MPISD work site as outlined in Figure 2. Detailed earthworks and tunnelling utilising hydraulic hammering was the highest impact to surrounding receivers during the initial part of this period, and as such attended monitoring was focussed on this activity. Once detailed excavation was completed, potential impacts of construction noise was reduced to the equipment associated with structural works.

It is noted that the surrounding buildings are predominantly used for commercial purposes with assumed façade transmission loss of airborne noise of 20-35 dB(A), as per the MPISD Construction Noise and Vibration Impact Statement.

### 5.3 Real-time vibration monitoring summary

Vibration data collected for the MPISD works have been based on the real-time monitoring results as these are considered to best represent the most impacted structure, being 50 Martin Place, and group of receivers, being the personnel working within 50 Martin Place. Vibration data for 50 Martin Place is included in Appendix 2.

Real-time vibration monitors were located across level 1, ground floor, upper basement, lower basement and sub-basement of 50 Martin Place during the reporting period. The locations were changed as tunnelling progressed under the building.

Screening criteria are outlined in Section 3.2.

Five exceedances of vibration criteria were recorded during the reporting period, as per Table 3. All were confirmed to be false alarms. No exceedances were identified to be caused by MPISD works.

Table 3 - Vibration monitoring recorded exceedance summary

Date	50 Martin Place Location	Recorded Vibration (mm/s)	Screening Level mm/s	Investigation Results
01/04/21	Lower basement	69.9	7.5	<b>False alarm.</b> 50 Martin Place building manager confirmed bumped by cleaning staff.
27/04/21	Sub-basement	142.4	20	<b>False alarm.</b> 50 Martin Place building manager confirmed bumped by maintenance technician.
28/04/21	Lower basement	86.3	7.5	<b>False alarm.</b> 50 Martin Place building manager confirmed bumped by maintenance technician.
05/05/21	Sub-basement	65.7	20	<b>False alarm.</b> 50 Martin Place building manager confirmed bumped by cleaning staff.
25/05/21	Lower basement	49.4	7.5	<b>False alarm.</b> 50 Martin Place building manager confirmed bumped by cleaning staff.

For real-time vibration monitoring, all instances showing vibration levels above the 7.5mm screening criteria have been confirmed to be caused by factors outside of the MPISD works.

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*Table 4 – Attended noise monitoring results*

Location/ Receiver	Date <sup>2</sup>	Main Activities	Noise period	External L <sub>Aeq</sub> (15minute) dB(A)	Assumed façade loss dB(A)	Penalty applied dB(A)	Internal L <sub>Aeq</sub> (15minute) dB(A)	Goal L <sub>Aeq</sub> (15minute) dB(A)	Compliant	Notes
27-39 Castlereagh	28/01/21	Tunnelling	Evening	67	20	5	52	60	Yes	Local traffic and mechanical plant audible during monitoring.
27-39 Castlereagh	02/02/21	Tunnelling	Evening	70	20	5	55	60	Yes	Local traffic and mechanical plant audible during monitoring.
165 Phillip St	02/02/21	Tunnelling	Evening	68	20	5	53	60	Yes	Local traffic and mechanical plant audible during monitoring.
1-5 Hosking <sup>1</sup>	02/02/21	Tunnelling	Evening	61	30 <sup>1</sup>	5	36	61	Yes	Local traffic and mechanical plant audible during monitoring.
37 Bligh St	24/02/21	Haulage, steel, concrete	Daytime	-	-	-	42	60	Yes	Internal measurement in office adjacent to north site.
61-101 Phillip St	04/03/21	Adit hammering	Evening	68	20	5	53	60	Yes	Adit hammering not audible, at least 10dBA lower than measured.
1-5 Hosking <sup>1</sup>	04/03/21	Adit hammering	Evening	61	30 <sup>1</sup>	5	36	57	Yes	Adit hammering not audible, at least 10dBA lower than measured.
9 Castlereagh	28/05/21	Haulage, steel, hammering, concrete	Daytime	66	25	5	46	60	Yes	Local traffic and buses on Castlereagh Street dominant noise.
70 Hunter	28/05/21	Haulage, steel, hammering, concrete	Daytime	67	25	5	47	60	Yes	Dominant noise source observed from local traffic on Hunter Street.
20 Elizabeth	28/05/21	Haulage, steel, hammering, concrete	Daytime	64	20	5	49	60	Yes	Local traffic and buses on Elizabeth Street during works.
1-5 Hosking <sup>1</sup>	28/05/21	Haulage, steel, hammering, concrete	Daytime	66	30 <sup>1</sup>	5	41	60	Yes	Local traffic and buses on Castlereagh Street dominant noise.
9 Castlereagh	18/06/21	Haulage, steel, concrete	Daytime	68	25	0	43	60	Yes	Local traffic and buses on Castlereagh Street dominant noise.
70 Hunter	18/06/21	Haulage, steel, concrete	Daytime	65	25	0	40	60	Yes	Dominant noise source observed from local traffic on Hunter Street.
20 Elizabeth	18/06/21	Haulage, steel, concrete	Daytime	65	20	0	45	60	Yes	Local traffic and buses on Elizabeth Street during works.
1-5 Hosking <sup>1</sup>	18/06/21	Haulage, steel, concrete	Daytime	68	30 <sup>1</sup>	0	38	60	Yes	Local traffic and buses on Castlereagh Street dominant noise.

<sup>1</sup>External noise level at 1-5 Hosking Place assumes a façade loss of 20 dB(A), and 10 dB(A) additional loss due to distance attenuation and shielding. Measurements taken at footpath outside 17 Castlereagh Street as internal access to 1-5 Hosking Place unavailable.

<sup>2</sup>All measurements for airborne noise.

## 5.4 Real-time noise monitoring summary

CSSI condition E38 requires that between the hours 7am and 8pm, the following internal noise criteria apply:

- Criteria 1 - LAeq(15minute) > 60 dBA no longer than 6.5 hours
- Criteria 2 - LAeq(15minute) < 55 dBA for at least 3.25 hours

To monitor compliance with criteria 1 and 2, the number of 15 minute periods between 7am and 8pm that internal noise levels were observed to be above 60dBA (LEq15) and below 55dBA, respectively, have been counted. Within these hours, works are 'permitted' up to 6.5 hours (26x15 minute periods) of noise greater than 60dBA and 'require' minimum 3.25 hours (13x15 minute periods) less than 55dBA.

Real-time monitoring results for January to June 2021 within 50 Martin Place are outlined in Appendix 1.

Criteria 1 was not observed to be exceeded during the reporting period.

It is noted that although hydraulic hammering was intermittently used through the reporting period, the stated 5dB(A) penalty and resulting criteria of 55dB(A) does not provide an accurate representation of construction impact, as the internal background noise of 50 Martin Place is consistently at or above 55dB(A) without construction works being undertaken. This is illustrated by LAeq levels observed in Figures 4 and 5. With noisy works (hydraulic hammering) not being completed between 7-8am and 12-1pm each day and completed by 6:00pm, it can be seen that the LAeq level stays constant, at or above 55dB(A). The screening criteria has therefore been left at 60dB(A).

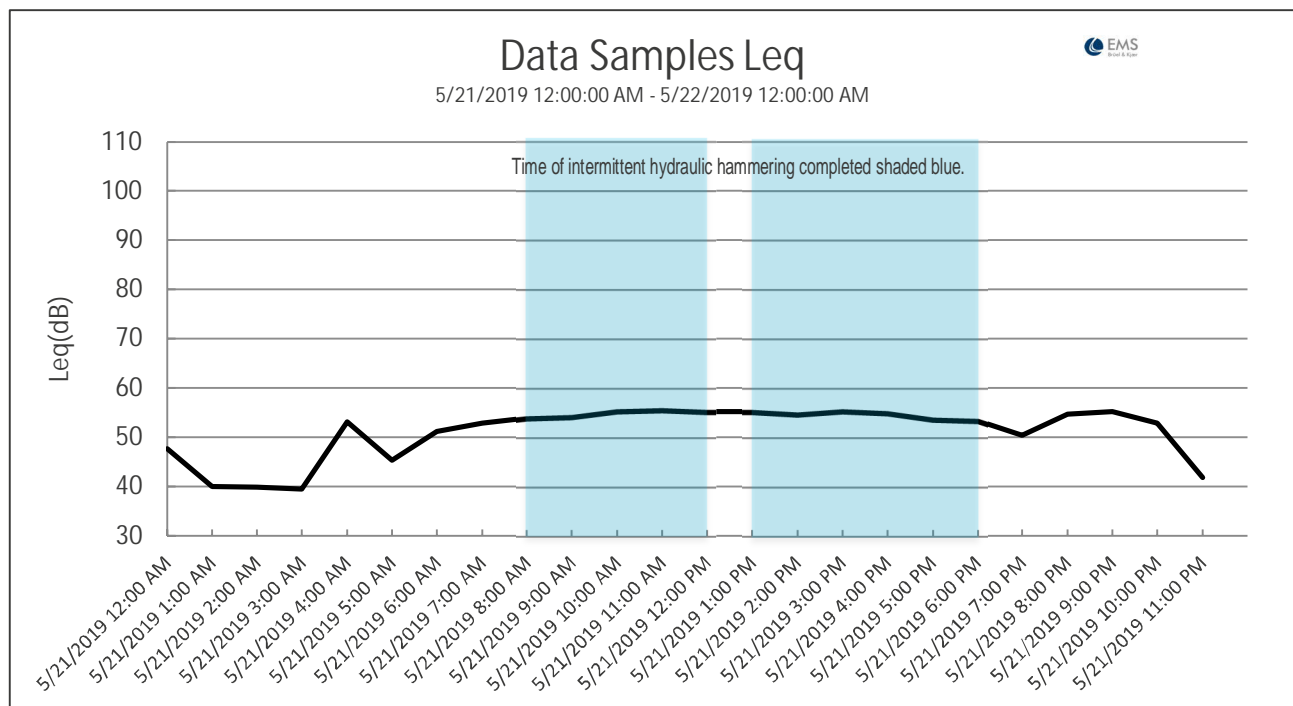


Figure 3 - LAeq levels 21 May 2019.

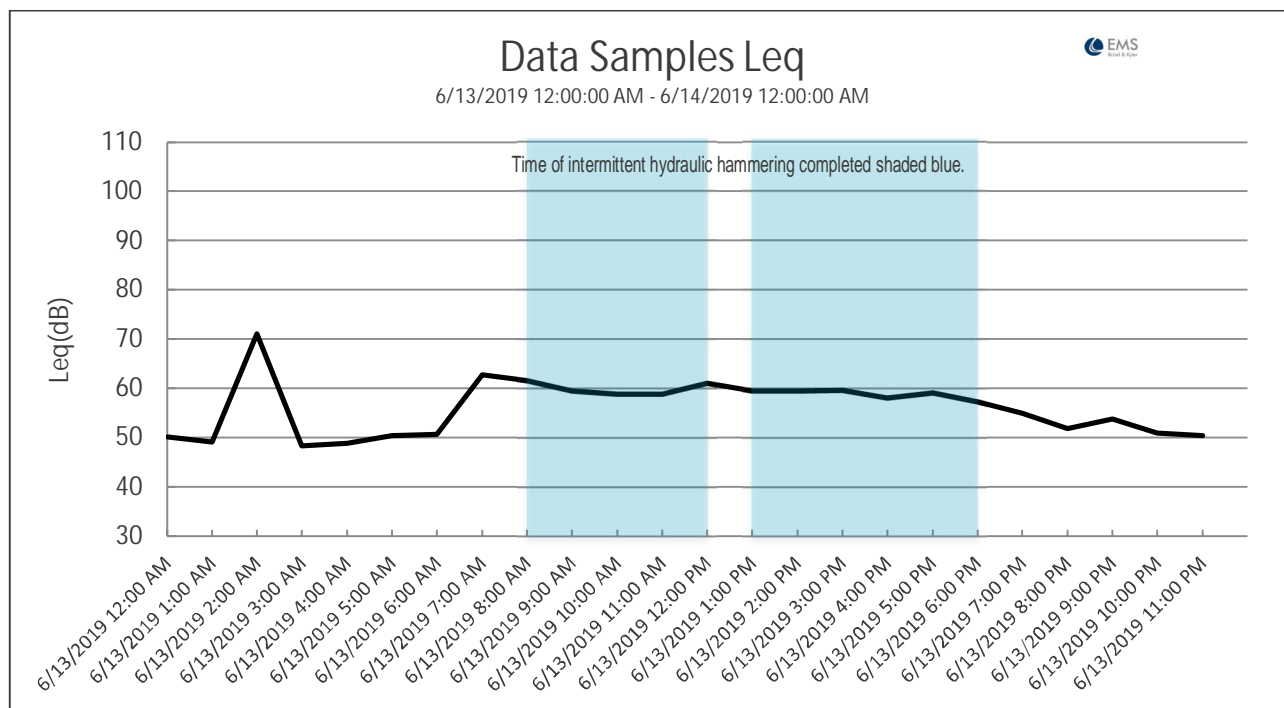


Figure 4 - LAeq levels 13 June 2019.

Noise levels were not observed to exceed Criteria 2.

For the reporting period, respites from hydraulic hammering have been in place Monday to Saturday 7am to 8am and 12pm to 1pm. In addition, main construction works were not completed between 6pm and 8pm. As such, there have been at least 8 hours per day where noise resulting from construction activities was below 55dBA.

It is noted that it is assumed that rock hammering is the loudest activity undertaken as part of the works, and that no other activity has generated noise levels as high as rock hammering.

Note that all monitoring data will be provided to DPIE at the completion of monitoring.

## 6.0 CONCLUSION

Observed noise and vibration levels are generally in accordance with, or below, the forecasts presented in the Construction Noise and Vibration Impact Statements.

Based on the monitoring results and site investigations, noise and vibration associated with construction works was compliant with project approvals and requirements during the monitoring period.



## APPENDIX 1: REAL-TIME NOISE MONITORING RESULTS SUMMARY

## January 2021 Noise

*Table 5 – January 2021 Real-time noise summary 50 Martin Place*

Location	Start Time	End Time	Criteria 1 Hours >60dB	Criteria 2 Hours <55dB
Noise - GF C1	1/01/2021 7:00:00 AM	1/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	2/01/2021 7:00:00 AM	2/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	3/01/2021 7:00:00 AM	3/01/2021 8:00:00 PM	0.00	12.75
Noise - GF C1	4/01/2021 7:00:00 AM	4/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	5/01/2021 7:00:00 AM	5/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	6/01/2021 7:00:00 AM	6/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	7/01/2021 7:00:00 AM	7/01/2021 8:00:00 PM	0.00	12.75
Noise - GF C1	8/01/2021 7:00:00 AM	8/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	9/01/2021 7:00:00 AM	9/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	10/01/2021 7:00:00 AM	10/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	11/01/2021 7:00:00 AM	11/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	12/01/2021 7:00:00 AM	12/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	13/01/2021 7:00:00 AM	13/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	14/01/2021 7:00:00 AM	14/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	15/01/2021 7:00:00 AM	15/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	16/01/2021 7:00:00 AM	16/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	17/01/2021 7:00:00 AM	17/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	18/01/2021 7:00:00 AM	18/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	19/01/2021 7:00:00 AM	19/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	20/01/2021 7:00:00 AM	20/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	21/01/2021 7:00:00 AM	21/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	22/01/2021 7:00:00 AM	22/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	23/01/2021 7:00:00 AM	23/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	24/01/2021 7:00:00 AM	24/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	25/01/2021 7:00:00 AM	25/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	26/01/2021 7:00:00 AM	26/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	27/01/2021 7:00:00 AM	27/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	28/01/2021 7:00:00 AM	28/01/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	29/01/2021 7:00:00 AM	29/01/2021 8:00:00 PM	1.00	9.75
Noise - GF C1	30/01/2021 7:00:00 AM	30/01/2021 8:00:00 PM	0.00	12.75
Noise - GF C1	31/01/2021 7:00:00 AM	31/01/2021 8:00:00 PM	0.00	13.00

## February 2021 Noise

*Table 6 – February 2021 Real-time noise summary 50 Martin Place*

Location	Start Time	End Time	Criteria 1 Hours >60dB	Criteria 2 Hours <55dB
Noise - GF C1	1/02/2021 7:00:00 AM	1/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	2/02/2021 7:00:00 AM	2/02/2021 8:00:00 PM	0.00	11.75
Noise - GF C1	3/02/2021 7:00:00 AM	3/02/2021 8:00:00 PM	3.50	8.25
Noise - GF C1	4/02/2021 7:00:00 AM	4/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	5/02/2021 7:00:00 AM	5/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	6/02/2021 7:00:00 AM	6/02/2021 8:00:00 PM	3.25	9.00
Noise - GF C1	7/02/2021 7:00:00 AM	7/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	8/02/2021 7:00:00 AM	8/02/2021 8:00:00 PM	1.00	11.50
Noise - GF C1	9/02/2021 7:00:00 AM	9/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	10/02/2021 7:00:00 AM	10/02/2021 8:00:00 PM	0.00	12.25
Noise - GF C1	11/02/2021 7:00:00 AM	11/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	12/02/2021 7:00:00 AM	12/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	13/02/2021 7:00:00 AM	13/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	14/02/2021 7:00:00 AM	14/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	15/02/2021 7:00:00 AM	15/02/2021 8:00:00 PM	0.00	12.75
Noise - GF C1	16/02/2021 7:00:00 AM	16/02/2021 8:00:00 PM	0.00	12.75
Noise - GF C1	17/02/2021 7:00:00 AM	17/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	18/02/2021 7:00:00 AM	18/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	19/02/2021 7:00:00 AM	19/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	20/02/2021 7:00:00 AM	20/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	21/02/2021 7:00:00 AM	21/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	22/02/2021 7:00:00 AM	22/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	23/02/2021 7:00:00 AM	23/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	24/02/2021 7:00:00 AM	24/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	25/02/2021 7:00:00 AM	25/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	26/02/2021 7:00:00 AM	26/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	27/02/2021 7:00:00 AM	27/02/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	28/02/2021 7:00:00 AM	28/02/2021 8:00:00 PM	0.00	13.00

## March 2021 Noise

*Table 7 – March 2021 Real-time noise summary 50 Martin Place*

Location	Start Time	End Time	Criteria 1 Hours >60dB	Criteria 2 Hours <55dB
Noise - GF C1	1/03/2021 7:00:00 AM	1/03/2021 8:00:00 PM	0.00	11.75
Noise - GF C1	2/03/2021 7:00:00 AM	2/03/2021 8:00:00 PM	0.00	11.75
Noise - GF C1	3/03/2021 7:00:00 AM	3/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	4/03/2021 7:00:00 AM	4/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	5/03/2021 7:00:00 AM	5/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	6/03/2021 7:00:00 AM	6/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	7/03/2021 7:00:00 AM	7/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	8/03/2021 7:00:00 AM	8/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	9/03/2021 7:00:00 AM	9/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	10/03/2021 7:00:00 AM	10/03/2021 8:00:00 PM	0.00	12.00
Noise - GF C1	11/03/2021 7:00:00 AM	11/03/2021 8:00:00 PM	0.00	11.25
Noise - GF C1	12/03/2021 7:00:00 AM	12/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	13/03/2021 7:00:00 AM	13/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	14/03/2021 7:00:00 AM	14/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	15/03/2021 7:00:00 AM	15/03/2021 8:00:00 PM	0.00	12.75
Noise - GF C1	16/03/2021 7:00:00 AM	16/03/2021 8:00:00 PM	0.00	12.25
Noise - GF C1	17/03/2021 7:00:00 AM	17/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	18/03/2021 7:00:00 AM	18/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	19/03/2021 7:00:00 AM	19/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	20/03/2021 7:00:00 AM	20/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	21/03/2021 7:00:00 AM	21/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	22/03/2021 7:00:00 AM	22/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	23/03/2021 7:00:00 AM	23/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	24/03/2021 7:00:00 AM	24/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	25/03/2021 7:00:00 AM	25/03/2021 8:00:00 PM	0.00	12.25
Noise - GF C1	26/03/2021 7:00:00 AM	26/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	27/03/2021 7:00:00 AM	27/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	28/03/2021 7:00:00 AM	28/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	29/03/2021 7:00:00 AM	29/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	30/03/2021 7:00:00 AM	30/03/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	31/03/2021 7:00:00 AM	31/03/2021 8:00:00 PM	0.00	13.00



## April 2021 Noise

*Table 8 – April 2021 Real-time noise summary 50 Martin Place*

Location	Start Time	End Time	Criteria 1 Hours >60dB	Criteria 2 Hours <55dB
Noise - GF C1	1/04/2021 7:00:00 AM	1/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	2/04/2021 7:00:00 AM	2/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	3/04/2021 7:00:00 AM	3/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	4/04/2021 7:00:00 AM	4/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	5/04/2021 7:00:00 AM	5/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	6/04/2021 7:00:00 AM	6/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	7/04/2021 7:00:00 AM	7/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	8/04/2021 7:00:00 AM	8/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	9/04/2021 7:00:00 AM	9/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	10/04/2021 7:00:00 AM	10/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	11/04/2021 7:00:00 AM	11/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	12/04/2021 7:00:00 AM	12/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	13/04/2021 7:00:00 AM	13/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	14/04/2021 7:00:00 AM	14/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	15/04/2021 7:00:00 AM	15/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	16/04/2021 7:00:00 AM	16/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	17/04/2021 7:00:00 AM	17/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	18/04/2021 7:00:00 AM	18/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	19/04/2021 7:00:00 AM	19/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	20/04/2021 7:00:00 AM	20/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	21/04/2021 7:00:00 AM	21/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	22/04/2021 7:00:00 AM	22/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	23/04/2021 7:00:00 AM	23/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	24/04/2021 7:00:00 AM	24/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	25/04/2021 7:00:00 AM	25/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	26/04/2021 7:00:00 AM	26/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	27/04/2021 7:00:00 AM	27/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	28/04/2021 7:00:00 AM	28/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	29/04/2021 7:00:00 AM	29/04/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	30/04/2021 7:00:00 AM	30/04/2021 8:00:00 PM	0.00	13.00

## May 2021 Noise

*Table 9 – May 2021 Real-time noise summary 50 Martin Place*

Location	Start Time	End Time	Criteria 1 Hours >60dB	Criteria 2 Hours <55dB
Noise - GF C1	1/05/2021 7:00:00 AM	1/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	2/05/2021 7:00:00 AM	2/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	3/05/2021 7:00:00 AM	3/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	4/05/2021 7:00:00 AM	4/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	5/05/2021 7:00:00 AM	5/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	6/05/2021 7:00:00 AM	6/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	7/05/2021 7:00:00 AM	7/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	8/05/2021 7:00:00 AM	8/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	9/05/2021 7:00:00 AM	9/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	10/05/2021 7:00:00 AM	10/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	11/05/2021 7:00:00 AM	11/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	12/05/2021 7:00:00 AM	12/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	13/05/2021 7:00:00 AM	13/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	14/05/2021 7:00:00 AM	14/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	15/05/2021 7:00:00 AM	15/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	16/05/2021 7:00:00 AM	16/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	17/05/2021 7:00:00 AM	17/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	18/05/2021 7:00:00 AM	18/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	19/05/2021 7:00:00 AM	19/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	20/05/2021 7:00:00 AM	20/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	21/05/2021 7:00:00 AM	21/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	22/05/2021 7:00:00 AM	22/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	23/05/2021 7:00:00 AM	23/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	24/05/2021 7:00:00 AM	24/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	25/05/2021 7:00:00 AM	25/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	26/05/2021 7:00:00 AM	26/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	27/05/2021 7:00:00 AM	27/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	28/05/2021 7:00:00 AM	28/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	29/05/2021 7:00:00 AM	29/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	30/05/2021 7:00:00 AM	30/05/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	31/05/2021 7:00:00 AM	31/05/2021 8:00:00 PM	0.00	13.00

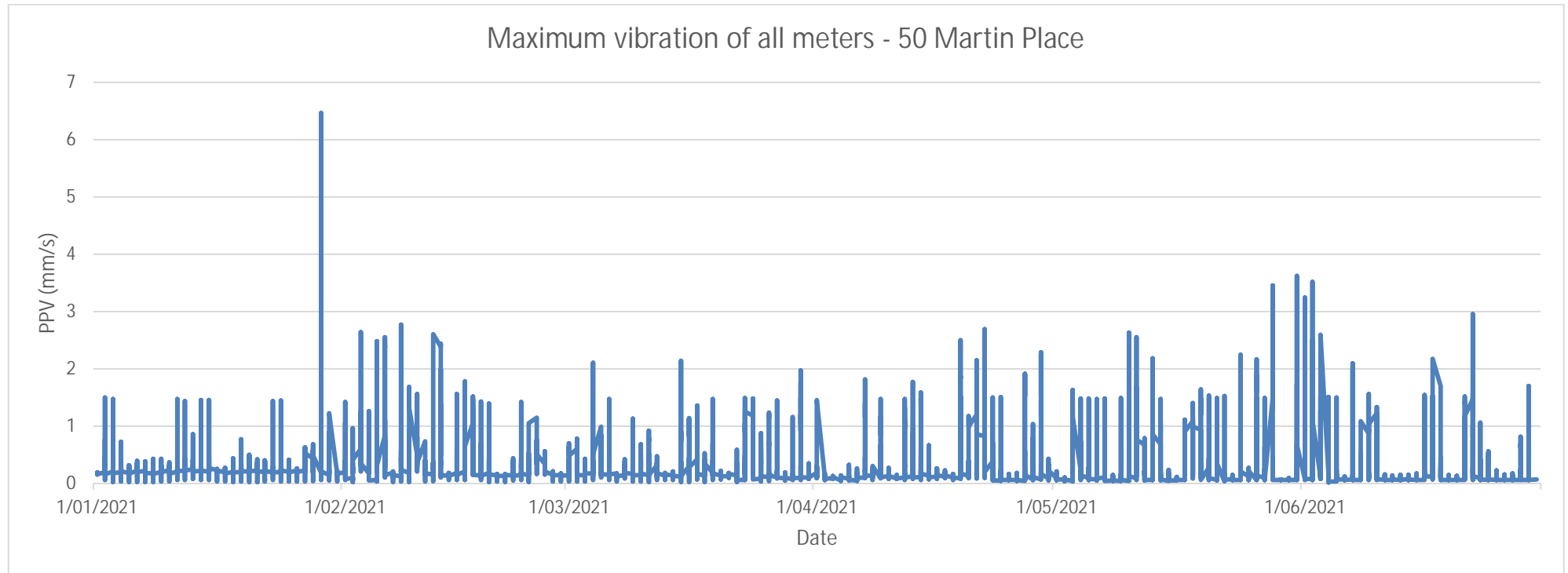
## June 2021 Noise

*Table 10 – June 2021 Real-time noise summary 50 Martin Place*

Location	Start Time	End Time	Criteria 1 Hours >60dB	Criteria 2 Hours <55dB
Noise - GF C1	1/06/2021 7:00:00 AM	1/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	2/06/2021 7:00:00 AM	2/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	3/06/2021 7:00:00 AM	3/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	4/06/2021 7:00:00 AM	4/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	5/06/2021 7:00:00 AM	5/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	6/06/2021 7:00:00 AM	6/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	7/06/2021 7:00:00 AM	7/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	8/06/2021 7:00:00 AM	8/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	9/06/2021 7:00:00 AM	9/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	10/06/2021 7:00:00 AM	10/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	11/06/2021 7:00:00 AM	11/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	12/06/2021 7:00:00 AM	12/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	13/06/2021 7:00:00 AM	13/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	14/06/2021 7:00:00 AM	14/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	15/06/2021 7:00:00 AM	15/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	16/06/2021 7:00:00 AM	16/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	17/06/2021 7:00:00 AM	17/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	18/06/2021 7:00:00 AM	18/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	19/06/2021 7:00:00 AM	19/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	20/06/2021 7:00:00 AM	20/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	21/06/2021 7:00:00 AM	21/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	22/06/2021 7:00:00 AM	22/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	23/06/2021 7:00:00 AM	23/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	24/06/2021 7:00:00 AM	24/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	25/06/2021 7:00:00 AM	25/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	26/06/2021 7:00:00 AM	26/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	27/06/2021 7:00:00 AM	27/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	28/06/2021 7:00:00 AM	28/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	29/06/2021 7:00:00 AM	29/06/2021 8:00:00 PM	0.00	13.00
Noise - GF C1	30/06/2021 7:00:00 AM	30/06/2021 8:00:00 PM	0.00	13.00

## APPENDIX 2: REAL-TIME VIBRATION MONITORING RESULTS SUMMARY

### January - June 2021 Vibration





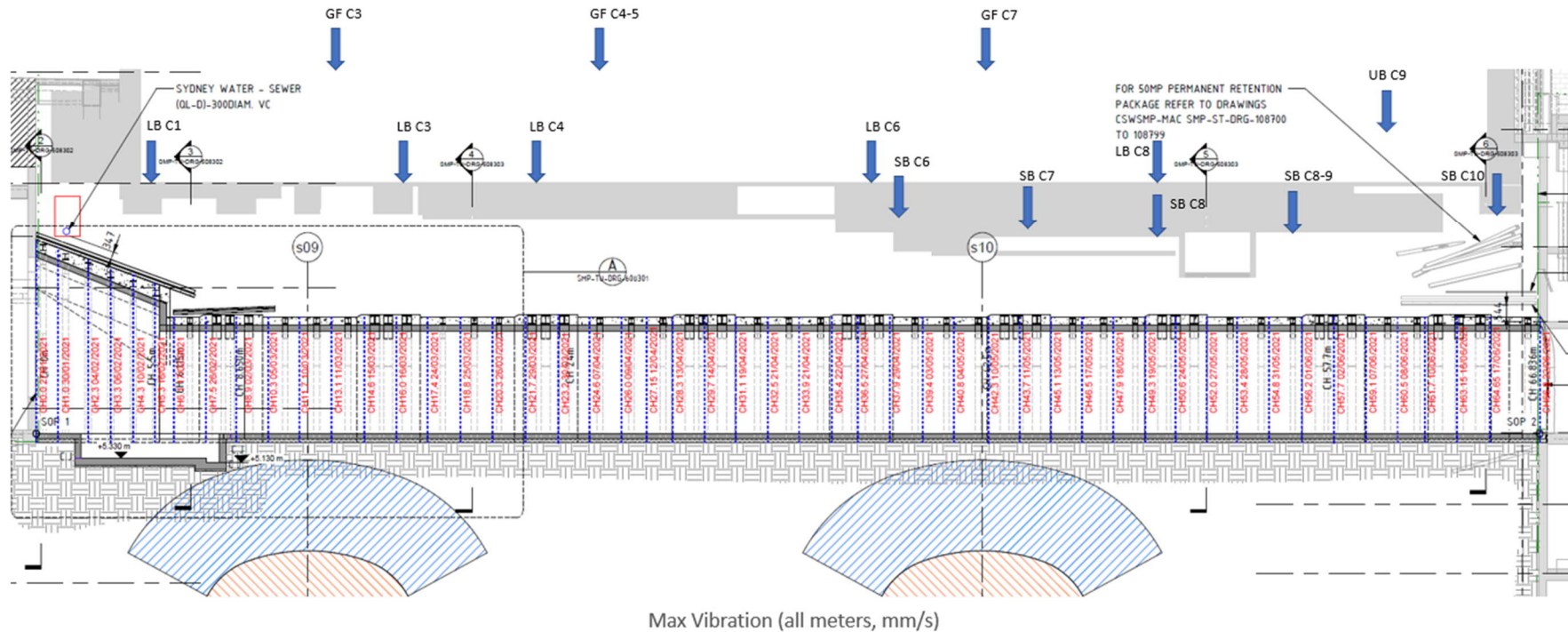
# SYDNEY METRO MARTIN PLACE STATION – INTEGRATED STATION DEVELOPMENT NOISE & VIBRATION MONITORING REPORT JAN-JUN 2021



## 50MP Max Vibration Readings During B3 Pedlink Tunnel Excavation

Indicative 50MP meter locations along tunnel alignment

Combined vibration data output for all monitor locations within 50 Martin Place to monitor pedestrian tunnelling activities from the south site to the north site.



Max Vibration (all meters, mm/s)

