Construction Monitoring Report - March 2019 to August 2019

SMCSWSSJ-JHL-WSS-EM-REP-000006

Document and Revision History

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0	09/19	Issued for comment	Ryan Dunne	Cameron Newling
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2	23/10/19	Issued with response to ER comments	Ryan Dunne	Cameron Newling

Management reviews

Review date	Details	Reviewed by

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Compliance Matrix

Condition	Requirement	Reference
C16	The results of the Construction Monitoring Programs must be submitted to the Secretary for information, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program	Section 1.1

1. Introduction

The Construction Monitoring Program (CMP) is being implemented to monitor impacts on surrounding surface water quality resources, and impacts from noise and vibration on the surrounding areas during the construction phase. The surface water monitoring program and noise and vibration monitoring program are also both designed to assess the effectiveness of the mitigation measures applied as part of the SMu Project.

This report provides the results of the CMP for the period March 2019 to August 2019

1.1 Submission Requirements

In accordance with condition C16, this will be submitted to the following agencies for information:

- Department of Planning, Industry and Environment (DPIE)
- NSW EPA
- Inner West Council

The Independent Environmental Representative will review and endorse as required by Condition of Approval A24 (d) prior to submission to the Secretary of DPIE.

The previous CMP was submitted on 16/5/19 to stakeholders for information. No further request was received from any of the agencies following the submission of the previous monitoring report,

1.2 Surface Water

The project site is located within the rail corridor at Sydenham Station and several hundred metres to the north and south of the station, 11 Sydenham Road, Marrickville, NSW, the Sydenham Pit and Drainage Pump Station and future precinct areas on Railway Parade and Burrows Avenue, Sydenham, NSW.

The Project site forms part of the overall Cooks River catchment with water from the area discharging into the Cooks River via the Eastern Channel. The catchment area is highly urbanised with mixed residential, commercial and industrial properties. The closest watercourses to the project are man-made, the eastern channel and connecting culverts bordering the project. These collect urban stormwater from the surrounding area and typically exhibit low flow rates outside of rain events and the operation of Sydenham drainage pump.

Water quality is measured on an ongoing basis for the wider Cooks River catchment by the NSW Office of Environment and Heritage as part of the Beachwatch programme. The monitoring point is at Kyeemagh Baths at the mouth of the Cooks River in Port Botany. Water quality within the Cooks River catchment is influenced by stormwater, fertilisers, industrial discharges and sewage contamination.

The Project site also includes the Sydenham Pit. The Sydenham Pit is a large stormwater detention structure that captures stormwater from the Marrickville and Newtown area. The water is detained temporarily before being pumped out into the Eastern Channel. The Sydenham Pit is owned and operated by Sydney Water. The project has specific requirements when working within Sydenham Pit regarding water quality and management, which includes diversion of daily stormwater flows and evacuation of the area during heavy rain events. These works have been conducted during the reporting period, in compliance with the project Environmental Protection License and operating procedure agreed with Sydney Water. Objectives for water quality management during construction are:

- The prevention of pollution of surface water through appropriate erosion and sediment control
- Maintain existing water quality of surrounding surface watercourses
- Construct the Project in accordance with the NSW Water Quality Objectives

1.3 Noise and Vibration

The area surrounding the SMu project contains a variety of land-use types and receivers, including residential receivers, commercial, industrial, sensitive non-residential receivers. These land-uses are mixed within the identified noise catchments, though in general there are clusters of industrial and commercial areas north of the rail corridor, and primarily residential areas to the south of the rail corridor. The area surrounding the project is affected by rail noise and vibration and is also underneath flight paths from Sydney airport. There are therefore a number of residential properties under the Sydney Airport Noise Management Plan. Many, though not all, of these residential receivers have been fitted with double glazed windows, leading to lower internal noise levels originating from outdoor sources, when compared with standard windows.

There are three noise sensitive areas potentially affected by the proposed construction:

- Edgeware Road / Lord Street – Located within NCA5. Many residences potentially affected by the construction works in this area have been fitted with heavy double glazing as part of the Sydney Airport Noise Management Plan, but some residences still retain standard single glazed windows.

- Burrows Avenue / Railway Road Area – Located within NCA3. All potentially affected residences in this area have been fitted with heavy double glazing as part of the Sydney Airport Noise Management Plan;

- Meeks Road Area – Located within NCA1. Many residences potentially affected by the construction works in this area have been fitted with heavy double glazing as part of the

Sydney Airport Noise Management Plan, but some residences still retain standard single glazed windows.

In addition, two sensitive non-residential receivers have been identified as potentially being affected by noise in the duration of the project, Tempe High School and Tillman Park Early Learning Centre (both located within NCA2) – see Figure 1. To date, no construction activities have taken place which were identified as significantly affecting these sensitive receivers during their operating hours.

Figure 1 - Surrounding Land-use and Sensitive Non-Residential receivers

Objectives for noise and vibration management on the project are:

- Minimise unreasonable noise and vibration impacts on residents and businesses
- Avoid structural damage to buildings or heritages items as a result of construction vibration
- Maintain positive, co-operative relationships with schools, childcare centres, local residents and building owners and undertake active community consultation

Construction noise levels for some SMu work activities are expected to exceed the external noise management level at times, particularly during works outside of standard hours, resulting in noise impacts to outdoor spaces. Internal and external noise levels will be assessed as part of the project Environmental Protection Licence and OOHW protocol and monitored accordingly.

Most construction works in this area will not generate vibration which would be perceptible within the nearest residences, but some works, such as compaction by vibratory roller may generate vibration levels above the vibration criteria at the nearest residences in Railway Road. At Meeks Road, construction noise levels may exceed the noise management levels at residences at times. However, given that most of the construction works are well removed from Meeks Road, noise impact would be expected to be limited. Equally, vibration levels above the criteria are unlikely to occur in Meeks Road.

No blasting will be undertaken, and ground-borne noise and vibration is also unlikely to occur on the SSJ project as it is typically generated by underground activities such as tunnelling.

2. Methodology

2.1 Surface Water

Surface water monitoring is undertaken at two points, one upstream (EC1) and one downstream (EC 2) of construction footprint. Both are located in the man-made eastern channel running alongside the rail corridor – See Figure 2. The channel is uncovered for the majority of its length along the project. The water level in the channel is generally fairly shallow outside of significant rain events (less than 20cm), with limited vegetation. Water sources are diverse urban run-off from collected stormwater.

The two locations identified for surface water monitoring are the only locations that offer safe access. There are several other drainage outlets along the length of the Eastern Channel that may convey water into the channel between the upstream and downstream monitoring locations, however gaining access to the channel at these point is not possible due to access and safety reasons.

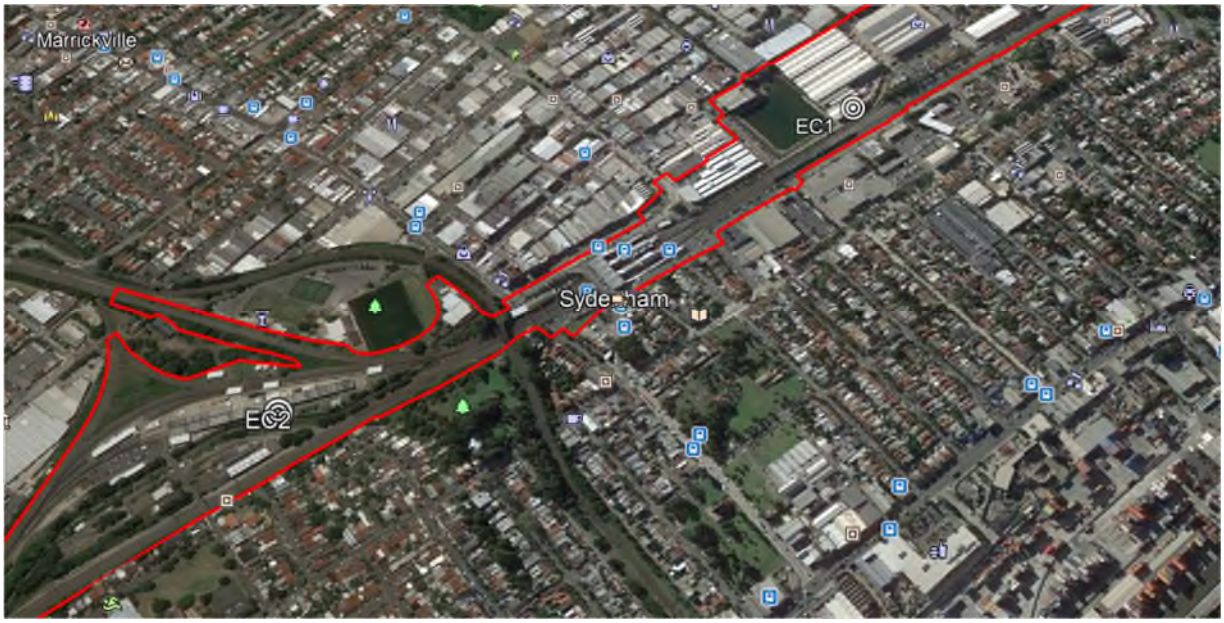

Figure 2 - Surface Water Monitoring Locations

Surface water quality monitoring is required to be undertaken as follows for the parameters in Table 1:

- Pre-construction – monthly when given site control
- SSJ construction stage – every three months and up to 4 wet weather events per year

Pre-construction monitoring was taken at points EC1 and EC2 monthly, once the project was given site control. Surface water quality monitoring of the receiving environment prior to construction is highly unlikely to define suitable standards or benchmarks for water quality discharges from the SSJ Works given that:

- Waterways along the site mostly ephemeral
- Water quality from urban areas is highly variable and changes according to prevailing weather patterns and day-to-day during rainfall.

In the event of access issues, surface water monitoring will be taken from an accessible point nearby the culvert or eastern channel where feasible and noted in monitoring results. There were no occasions where an alternative monitoring point was required during this monitoring period

The Environment Protection Licence (#21147) provides the project with criteria to discharge off-site through approved discharge points. These criteria must be met prior to discharge. A record of monitoring for dewatering on the project is maintained and made available on the EPA website. There are currently no active sediment basins on the project, and none have been identified during the construction phase of the project to date.

Table 1 - Water Monitoring Parameters

Parameter	Sampling Methods	Analytical Method	ANZECC Criteria* Freshwater	Proposed Trigger Values	Proposed Actions
Temperature (°C)	Probe	Field analysis	> 80%ile < 20%ile	Downstream results are > than upstream results in rainfall events up to and including the significant event threshold of >20mm in 24 hours.	Environment Manager (or delegate) to re-test to confirm results and undertake an inspection of the adjacent works and propose actions where required.
Dissolved Oxygen (DO)	Probe	Field analysis	Lower limit – 85 Upper limit – 110		
Turbidity (NTU)	Probe	Field analysis	6 – 50		
Oil and grease	Visual analysis, then grab sample if required	Visual assessment. Confirmed with lab analysis if required	-		
pH	Probe, grab sample if required	Field analysis, lab analysis if required	Lower limit – 6.5 Upper limit – 8.5		
Salinity (EC)	Probe	Field analysis	125 – 2200		
Total Suspended Solids (TSS)	Probe, grab sample if required	Field analysis, lab analysis if required	-		

2.2 Noise and Vibration Monitoring

As part of the Noise and Vibration Assessment within the Modification Report and Submissions report, the area surrounding the Project site was divided into 3 Noise Catchment Areas (NCAs). Noise monitoring was undertaken in 2015 and 2016 to determine the Rating Background Level for these catchments. During the development of the Construction Noise and Vibration Impact Statement (CNVIS) further background noise monitoring was undertaken within the surrounding area between 18th & 27th June 2018. The additional monitoring has taken place at the following locations;

- NCA2 – 25 Bridge St, Tempe
- NCA3 – 4 Burrows Avenue, Sydenham
- NCA4 - 80 Unwins Bridge Road, St Peters

Following the development of CNVIS and the additional monitoring, the area surrounding the project has now been split into 6 Noise Catchment Areas. Current Rating Background Levels for all NCAs are shown in Table 2

Table 2 - RBLs for SSJ Noise Catchment Areas

NCA	Daytime RBL (7am to 6pm)	Evening RBL (6pm to 10pm)	Night RBL (10pm to 7am)
1*	47	45	40
2	41	46	40
3	51	49	42
4	58	51	43
5**	58	52	38
6***	52	43	38

*Noise levels adopted from Sydenham to Bankstown EIS
**Noise levels adopted from Chatswood to Sydenham EIS
***Noise levels adopted from TSE Marrickville Dive Construction Site

Based on planned work in the construction phase, the areas most regularly impacted by construction noise and vibration are expected to be NCA1 and NCA3. These two catchments contain a number of residential properties – See Figure 3 below.

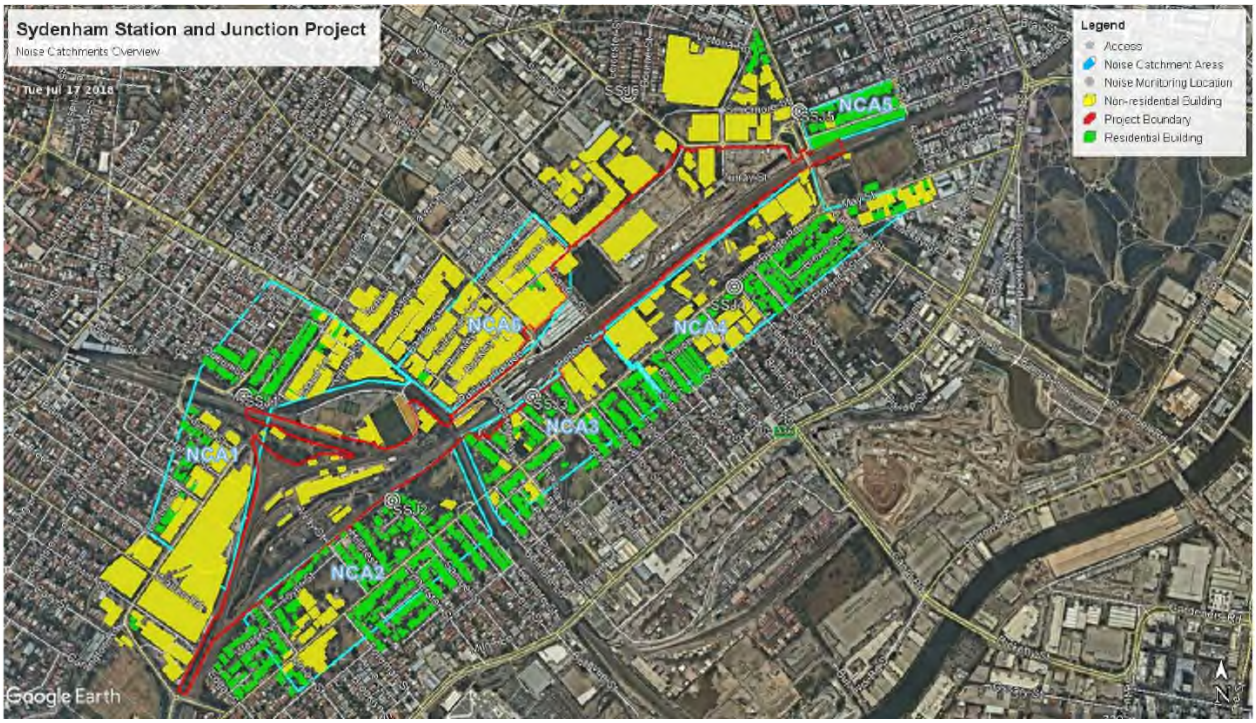

Figure 3 - NCAs and identified residential and non-residential receivers

Monitoring is required to be undertaken during construction activities (including out of hours works) where required in accordance with Section 8 of the CNVS and for validation purposes. Attended noise monitoring is also undertaken in the event of a noise complaint at the complainant's property, nearest to any work.

Vibration monitoring will be undertaken before and during works where buildings or structures exist within the safe work distances of vibratory plant. Monitoring will also be undertaken where vibration generating activities that have the potential to impact on heritage items. In accordance with CoA – E28 and the requirements of the CNVIS, the vibration limits have been set out in the British Standard BS 7385-2:1993.

The Modification Report states that "based on the typical nature of buildings around the proposed modification, the cosmetic damage screening criteria of 7.5mm/s for unreinforced or light framed structures has been uniformly applied. This same screening criteria is also relevant for heritage items". No heritage items in the footprint of the project have been screened as 'structurally unsound.'

During activities that are expected to generate maximum noise levels at impacted receivers, continuous real-time noise and vibration monitoring will be undertaken, as identified in the CNVIS. Continuous real-time noise and vibration monitoring will be undertaken on the project boundary adjacent to one of the closest residences in the Burrows Avenue / Railway Road Area, at one of the closest residences in the Meeks Road Area and at one of the closest residences in Lord Street/Edgeware Road to determine the LAeq15min and LAMax levels during times of nearby work.

There will be periods of time where no works will be completed and it is not reasonable to have the real-time system in operation during these periods. There is a high likelihood of ambient noise and vibration levels from non-construction sources will need to be accounted for, particularly on the boundary of the rail corridor. Where the noise and vibration alert levels are exceeded as a result of project related works, the construction method and equipment will be reviewed/modified.

3. Results

3.1 Surface Water

Pre-construction monitoring took place over 3 months from June-August 2018, with 4 samples collected from two identified points. As noted in surface water background, the culvert has several inflows from the surrounding urban environment, including between the two monitoring points due to access limitations. As recorded in baseline monitoring, this has been noted as accounting for the high base total suspended solids (TSS) recorded and turbidity noted in subsequent surface water monitoring, particularly when taken after a rain event. Turbid inflows of water from urban stormwater into the culvert have been visually confirmed in post-rainfall inspections.

During this period of reporting, monitoring has been undertaken on four occasions at each of the two monitoring locations (EC1 and EC2). The monitoring comprised sampling undertaken on 5 May and 30 July as well as additional sampling for two wet weather monitoring events recorded between March and August 2019, specifically the 18 March and 7 June, The results are tabulated in Table 3.

One result for quarterly monitoring in May was slightly above the accepted range of pH for discharge at both upstream and downstream sources, with pH decreasing to 8.51 downstream. Based on construction work occurring at the time and higher upstream reading, this reading was considered likely to be a result of upstream water quality from urban run-off and the surrounding industrial area. All other results fell within accepted pH range. Change in pH between upstream and downstream monitoring points tended to be minor shift towards 7.5pH. Temperature varied significantly, likely due to the low flow levels in the concrete culvert during monitoring.

Turbidity (TSS) levels within the channel have been exceeded in some baseline readings, and recorded from both EC1 and EC2 even when no construction activities have taken place. This has been observed particularly after high rainfall prior to monitoring, which is consistent with baseline readings obtained after a rain event. In combination with prior identification of the ephemeral nature of the watercourse, it is considered likely that external factors (e.g. industry/residence in the area and other rail/residential building projects nearby) are connected to the higher turbidity readings, including from inflows present from between EC1 and EC2 where a discrepancy has been noted.

Sydney Airport BOM weather observations were used to report the amount of rainfall 24hrs prior to monitoring and to determine when reportable rain event occurs.

SSJ also monitors water quality prior to any planned discharges to ensure water quality is within the parameters listed within the Environmental Protection Licence (No.21147), to minimise any potential impacts to surrounding waterways. This data is published monthly on the project website.

Table 3 - Surface Water Monitoring Results for Pre-construction and Construction Phases

				EC 1									EC 2							
Date	**Site Activities**	**Total Rainfall in Previous 24hrs (mm)**	**Comments**	**Time**	**TSS (mg/l)**	**Temp (°C)**	**pH**	**Salinity (mS/cm)[1]**	**Turbidity (NTU)**	**DO%**	**TDS (g/l)**	**Visible Oil / Grease**	**Time**	**TSS (mg/l)**	**Temp (°C)**	**pH**	**Salinity (mS/cm)**	**Turbidity (NTU)**	**DO%**	**TDS (g/l)**	**Visible Oil/Grease**
-	-	-	**ANZECC Parameters**	-	>50		6.5< x <8.5	0.125-2.2	6 - 50	85-110	-	No	-	>50		6.5< x <8.5	0.125-2.2	6 -50	85-110	-	No
18/03/2019	Post Rainfall – Excavation of Underbore.	60.8	Water noticeably turbid at both upstream and downstream monitoring points	10.01	147	19.99	8.37	0.294	153	118.3	0.191	No	10.32	136	20.96	8.18	0.29	130	76.1	0.189	No
15/05/19	Excavation in Geotech area. Piling in Sydenham Pit and along Bankstown Curve	0	Water levels low at both monitoring points	13.54	63	21.54	8.83	0.624	43	232.7	0.4	No	14.49	37	21.83	8.51	0.322	19.6	89.6	0.209	No
7/06/19	Post-rainfall. Excavation of HV, cable pulling	9.4 (38 in previous 72 hours)	Upstream dark water with visible sediment and rubbish. Approx. 1mm of rain between EC1 and EC2 monitoring	12.15	204	15.1	8.28	0	253	114.5	0	No	14.45	178	16.88	8.19	0.29	160	110	0.188	No

[1] mS/cm to EC: 1ms/cm to 1000 EC

30/07/19	Concrete Pour in Sydenham Pit, Spoil Load Out in Geotech Building	3.2	Water visibly turbid both upstream and downstream	10:30	125	15.62	6.74	0.685	120	84.1	0.438	No	11:15	92.5	15.40	6.54	0.354	92.5	150.9	0.23	No

3.2 Noise and Vibration Monitoring

Attended noise monitoring was undertaken as required for out of hours works (OOHW) and possessions, where noise modelling predicted significant exceedance of Rating Background Levels or otherwise required validation using this method.

As modelled in the CVNIS, the majority of noise and vibration impacts have occurred in NCA 3 as a result of required out-of-hours work, during both rail and local possession, under lower evening and night-time RBLs. As part of attended noise monitoring, significant extraneous noise has been recorded as impacting receivers and monitoring results, including throughout the night-time period, well above the given RBLs.

Monitoring locations and timing has been adjusted where necessary to try to isolate construction impact, however this is often not feasible. Common extraneous noise sources include:

- Loud noise from air traffic, as area is part of Sydney Airport Noise Management Plan and heavily affected by flight-path
- Road traffic, particularly near Gleeson Ave, as nearby industrial, commercial and other nearby construction projects use cause frequent heavy trucks trafficking the area
- Rail replacement buses during rail possessions
- Noise from trains passing and train signalling horns

Attended noise monitoring has been conducted for activities with significant predicted exceedances of noise management levels, mostly occurring where works are conducted in the evening or night-time periods. This occurred for nine rail possessions and two local possessions of an RMS road within the reporting period. SSJ have committed to review impacts and mitigation of construction activity and document outcomes where an exceedance is recorded or a complaint is made related to project construction activities. To date there have been no exceedances of predicted construction related noise levels assessed as relating to ongoing construction activities on the project. All elevated noise levels above predicted levels recorded by attended monitoring have been attributed to extraneous noise rather than construction activity. These are detailed in the results shown below in Table 4.

Continuous real-time noise and vibration monitoring was undertaken during seven rail possessions, during a representative period of piling works near Sydenham pit wall, and during demolition works at 11 Sydenham Road during the reporting period, in order to assess noise and vibration impacts and that confirm that impacts from works fall within relevant criteria. The data is made available in real-time as per Condition of Approval C11.

Two rail possessions were considered low risk for vibration due to limited scope, therefore only attended monitoring for noise was undertaken.

To date, there have been no exceedances of vibration from construction activities, and recorded vibration (PPV in mm/s) has been well below cosmetic vibration limits for affected structures.

As expected attended noise and vibration monitoring have identified that external non-construction noise and vibration sources are frequent in the area, which is also expected to reflect in the results of any real-time continuous monitoring. Table also includes some instances where monitoring was undertaken but could not be considered valid due to high winds above monitoring guidelines.

Table 4 - Attended Noise Monitoring Results

Date	Time	Duration Mins	Construction Activities	Main source of noise	LA(eq)	LA(Max)	Period	Audible noise from SSJ construction activities	NML	NCA	Predicted construction sound pressure level (LA(eq,15min))	Compliance with predicted measurement	Comments
4/03/2019	23:05	15	Saw cut of asphalt	Saw and Wind	62.5	72.3	Night	Saw	47	3	65	N/A	High winds outside of valid monitoring conditions. Monitoring undertaken, but unable to produce valid results.
4/03/2019	23:29	15	NDD of excavation	Construction	65.8	74.3	Night	NDD Truck	47	3	75	N/A	High winds outside of valid monitoring conditions Monitoring undertaken, but unable to produce valid results.
11/03/2019	22:21	15	Backfilling and compacting of trench	Air, road and rail traffic	62.7	85.5	Night	None	47	3	75	Y	
11/03/2019	23:19	15	Installation of Conduits	Trains	57.5	78.4	Night	Excavator	47	3	58	Y	
11/03/2019	23:39	15	Backfilling and compacting of road surface	Construction	59.4	81.5	Night	Plate compactor, excavator	47	3	75	Y	
25/03/2019	21:28	15	NDD excavation	Traffic	65.7	86.9	Evening	Vac Truck	50	3	70	Y	LaMax from loud air traffic and road traffic
30/03/2019	19:56	15	Backfilling and Compacting	Non-construction	64.2	80.6	Evening	Roller, Hydreema and Excavator	50	3	67	N/A	Strong gusts of wind throughout monitor, just exceeding valid monitoring conditions. Indicative monitoring undertaken, but unable to produce valid results.

Date	Time	Duration Mins	Construction Activities	Main source of noise	LA(eq)	LA(Max)	Period	Audible noise from SSJ construction activities	NML	NCA	Predicted construction sound pressure level (LA(eq,15min))	Compliance with predicted measurement	Comments
31/03/2019	1:14	15	Laying of ballast, pit recertification	Non-construction	58.2	71.2	Night	Hydreema, Excavator	45	2	64	N/A	Considerably windy conditions throughout monitor, exceeding valid monitoring conditions. Wind significant ambient source of noise. Monitoring undertaken, but unable to produce valid results.
20/04/2019	1:00	15	Crane idling, prep work.	Crane	61	86.2	Night	Crane	47	3	70	Y	
20/04/2019	1:15	15	Crane idling, prep work.	Crane	59.8	82.5	Night	Crane	47	3	70	Y	
20/04/2019	1:30	15	Crane idling, prep work.	Crane	59.2	77.5	Night	Crane	47	3	70	Y	
20/04/2019	1:45	15	Crane lifting over tracks, full revs	Crane	59.5	81.3	Night	Crane	47	3	70	Y	
21/04/2019	0:15	15	GLT excavation	Excavator	48.5	61.2	Night	Excavator	47	3	69	Y	
21/04/2019	0:30	15	GLT excavation	Trains	49.8	66.2	Night	Excavator	47	3	69	Y	
21/04/2019	23:15	15	GLT install	Trains and traffic	53.4	83	Night	Power tools	47	3	69	Y	
4/05/2019	20:29	15	Excavation of ULX	Air, rail and road traffic	58	76	Evening	None	54	3	66	Y	
4/05/2019	21:00	15	Loading of material	Trains	56	73	Evening	Crane	45	2	53	Y	Elevated levels due to extraneous noise from passing trains
5/05/2019	00:54	15	Installation of ULX	Traffic	54	63	Night	Excavator, Hydreema	45	2	66	Y	

Date	Time	Duration Mins	Construction Activities	Main source of noise	LA(eq)	LA(Max)	Period	Audible noise from SSJ construction activities	NML	NCA	Predicted construction sound pressure level (LA(eq,15min))	Compliance with predicted measurement	Comments
28/05/2019	23:47	15	Stripping of framework, station install of bracers	Traffic, hand tools (hammers)	51.4	80	Night	Hand tools	47	3	64	Y	
30/05/2019	1:20	15	Excavator and Hydreema	Excavator	55	76.7	Night	Excavator	47	3	64	Y	
30/05/2019	1:40	15	-	Sydney train works	64.4	78.8	Night	None	47	3	65	Y	Sydney trains conducting NDD truck work next to SSJ platform 6 works
11/06/2019	23:37	15	Piling, Sydney trains tamping	Trains	62.1	82	Night	None	45	2	65	Y	LaMax from nearby trains
12/06/2019	00:48	15	Piling	Trains	54.8	80.4	Night	Piling Rig	45	2	65	Y	LaMax from nearby trains
13/06/2019	00:20	15	-	Sydney trains tamping	66.6	71.3	Night	None	47	3	58	Y	SSJ works inaudible, Sydney trains tamping and passing trains dominant noise source
23/06/2019	1:50	15	Concrete finishing, bridge and ULX	Replacement buses and traffic	58.5	72.4	Night	Excavator, Hand tools	47	3	67	Y	
23/06/2019	16:32	15	Backfill of ULX, overhead wiring	Trains, places and replacement buses	68	83	Evening	EWP, Excavator	54	3	73	Y	LaMax and general background noise dominated by planes and buses
26/06/2019	00:34	15	Loading of spoil, OHW	Trains and excavator	53.4	72.3	Night	Excavator	45	2	64	Y	LaMax from passing trains
29/06/2019	2:00	15	Saw cut and installation of switches	Construction	59	77	Night	Concrete Saw	47	3	75	Y	

Date	Time	Duration Mins	Construction Activities	Main source of noise	LA(eq)	LA(Max)	Period	Audible noise from SSJ construction activities	NML	NCA	Predicted construction sound pressure level (LA(eq,15min))	Compliance with predicted measurement	Comments
29/06/2019	10:30	15	Crane lift	Traffic, replacement buses	68	83.6	Night	450t Crane	47	3	70	Y	LaMax and significant extraneous noise from passing buses and vehicles
30/06/2019	2:38	15	Rail tamping and grinding	Construction	73.4	76.3	Night	Rail Tamper	47	3	75	Y	
20/07/2019	23:08	15	Set up of HV works	Sydney Trains Bridge Works	64.3	76.3	Night	None	43	5	66	Y	All audible noise either road traffic or Sydney trains sandblasting
21/07/2019	1:17	15	Removal of redundant HV OHW	Sydney Trains Bridge Works	57.6	85.6	Night	Intermittent power tools at height	43	5	66	Y	Sydney Trains Sandblasting of Bridge dominant
14/08/2019	22:08	15	Saw cut and Hammering of Road	Traffic and Trains	67.8	82.5	NIght	None	47	3	58	Y	Elevated levels and LA Max due to traffic and train noise
17/08/2019	22:57	15	Backfill of ULX	Trains on Bankstown Line	54.4	78.5	NIght	Excavator	47	3	69	Y	LA Max and background noise from trains and traffic

3.3 Vibration

Table 5 - Vibration monitoring data

Monitoring Location	Date	Works being carried out	Attended or continuous	Event Base Monitoring Y/N	Measured PPV (mm/s)	Cosmetic Damage criteria (mm/s)	Compliant Y/N	Comments
Gleeson St Bridge	30/03/19 to 31/03/19	Tamping and rolling	Attended and Continuous	Y	17	25	Y	Spikes in reading not due to vibratory works
Boundary of Fraser Park and Rail Corridor	21/03/19	Piling	Attended	Y	0.511	7.5	Y	1 hour attended monitoring and 3 hours continuous monitoring
Platform 5	19/04/19 to 22/04/19	ULX Excavation	Continuous	Y	1.014	7.5	Y	
19 Sydenham Rd	04/04/19 to 04/04/19	Demolition of 11 Sydenham Rd	Attended and Continuous	Y	2.5	7.5	Y	Response to complaint from adjoining commercial property
Platform 5	04/5/19 to 06/05/19	ULX Excavations	Continuous	Y	1.007	7.5	Y	
Geotech Building	20/06/19 to 23/06/19	ULX Excavations	Continuous	Y	5.35	25	Y	
Geotech Building	28/06/19 to 30/06/19	Switch Installation and Rail Tamping	Continuous	Y	1.585	25	Y	
Platform 6	20/07/19	Crane Lift and ULX Excavation	Continuous	Y	1.72	7.5	Y	ULX distant, primarily signalling testing (no noise or vibration impact). Peak from non-vibratory works
Boundary of Fraser Park and Rail Corridor	9/08/19 to 10/8/19	Tamping and Rolling	Continuous	Y	8.95	7.5	Y	Spikes in reading not due to vibratory works
Sydenham Pit – Base of Wall	27/08/19	Piling	Attended and Continuous	Y	0.409	7.5	Y	

4. Mitigation Measures

4.1 Noise and Vibration

Standard mitigation measures were implemented as per Section 7 of the Construction Noise and Vibration Management Plan, and Sections 6.2 and 6.4 of the Construction Noise and Vibration Impact Statement. These were effective during the reporting period.

4.2 Water

Standard mitigation measures were implemented as per Section 6 of the Construction Soil and Water Management Plan. Controls were repaired as required and were effective during the reporting period.

5. Conclusion

Pre-construction surface water monitoring began in June 2018, with results showing potentially high turbidity and fluctuations due to urban environment. Construction monitoring results from locations upstream and downstream of channel show parameters vary between rain events and channel conditions, including between upstream and downstream samples. Surface water data does not provide clear relation between construction activities and water quality, due to channel access issues and ephemeral nature of channel.

Erosion-sediment control plans are maintained and reviewed regularly, and JHLOR conducts weekly and post rain environmental inspections. The Environment Representative also conducts bi-weekly inspections and any observations are closed out within agreed timeframes.

Monitoring records have validated modelled noise and are consistent with the predicted impact of construction activities on noise catchment areas, including sensitive receivers. There have not been any recorded exceedances regarding noise and vibration impacts attributed to construction noise.

Real time noise and vibration monitoring is conducted during relevant periods of construction, including for the duration of rail possessions. Both real-time and attended noise and vibration monitoring has observed exceedances due to non-construction sources, such as air, road and rail traffic.