



# Southwest Metro Early Works Construction Monitoring Report - February to July 2020

SMCSWSSJ-JHL-WEC-EM-REP-000009

## Document and Revision History

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## Compliance Matrix

Condition	Requirement	Reference
C14	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, 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 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 Southwest Metro Early Works (SMEW).

### 1.1 Submission Requirements

In accordance with condition C14, this will be submitted to the following agencies for information:

- City of Canterbury Bankstown
- Inner West Council
- DPIE

The Independent Environmental Representative will review the report prior to submission.

### 1.2 Surface Water

The project site is located within the rail corridor on the T3 Bankstown line between Sydenham and Campsie, NSW.

The Project site forms part of the overall Cooks River catchment with water from the area discharging into the Cooks River via local stormwater drainage or overland flow. The catchment area is highly urbanised with mixed residential, commercial and industrial properties.

Project works occur adjacent to the Cooks River at the Canterbury (Cooks River) Underbridge. Project works occurring adjacent to the Cooks River include embankments stabilisation, combined service route installation and construction of security fencing.

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.

Objectives for water quality management during construction are:

- Minimise pollution of surface water through appropriate erosion and sediment control
- Maintain existing water quality of surrounding surface watercourses

### 1.3 Noise and Vibration

The area surrounding the SMEW 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 surrounding stations, and primarily residential areas between stations. The area surrounding the project is affected by rail noise and vibration.

The majority of works will occur within the rail corridor between stations, works will mainly occur adjacent to residential properties.

A number of sensitive non-residential receivers have been identified within the vicinity of the project works. These include;

- Casimir Catholic College
- St Maroun's College
- Dulwich Hill Childcare Centre
- Canterbury Family Day Care

To date, no noise or vibration intensive construction activities have taken place in in the vicinity of these facilities.

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 SMEW 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 OOHW protocol and monitored accordingly.

Most construction works 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 on Garnet Street, Dulwich Hill and Charles Street, Canterbury.

## 2. Methodology

### 2.1 Surface Water

Surface water monitoring is undertaken at four points adjacent to the Canterbury Cooks River Underbridge, two upstream (Cooks River East 1 and Cooks River West 1) and two downstream (Cooks River East 2 and Cooks River West 2). All locations are located at the bank of the Cooks River as these are the locations that are generally accessible. Refer to Figure 1 for sampling locations.

The Cooks River is tidal at the test locations. During low tide events some sample locations are inaccessible.

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 locations identified for surface water monitoring are the only locations that generally offer safe access. There are several drainage outlets between the upstream and downstream sampling points on both sides of the Cooks River.



Figure 1 - Surface Water Monitoring Locations

In accordance with the Monitoring Program, surface water quality monitoring is to be undertaken as follows for the parameters in Table 1:

- Pre-construction – monthly, pending safe access
- SMEW construction stage – every three months & following wet weather events (>20mm in 24hrs), pending safe access



Pre-construction monitoring was undertaken monthly prior to the start of Construction in August 2019. 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 SMEW site given that water quality from urban areas that contribute water to the Cooks River between upstream and downstream test locations are highly variable and change according to activities within the local catchment, prevailing weather patterns and day-to-day during rainfall.

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

The Environment Protection Licence (#21147) provides the project with criteria to discharge off-site through approved discharge points. Discharge points are located within both SSJ and SMEW. These criteria must be met prior to discharge. A record of monitoring for dewatering on the project is maintained and made available on the Project website. No discharges occurred from SMEW during the reporting period. 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 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	-		
Total phosphorus	Grab sample	Lab analysis	25ug/L		
Total nitrogen	Grab sample	Lab analysis	350ug/L		
Chlorophyll-a	Grab sample	Lab analysis	3ug/L		

## 2.2 Noise and Vibration monitoring

As part of the Noise and Vibration Assessment within the Sydney Metro Sydenham to Bankstown Upgrade Environmental Impact Statement, the area surrounding the SMEW site was divided into 7 Noise Catchment Areas (NCAs). Noise monitoring was undertaken in 2016 to determine the Rating Background Level for these catchments. The 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	38	38	33
2	38	38	33
3	38	38	34
4	40	40	35
5	36	36	32
6	45	42	35
7	41	41	35

Based on planned work in the construction phase, the areas most regularly impacted by construction noise and vibration are expected to be NCA4 and NCA5, adjacent to embankment stabilisation works. These two catchments contain a number of residential properties – See Figure 2 below.

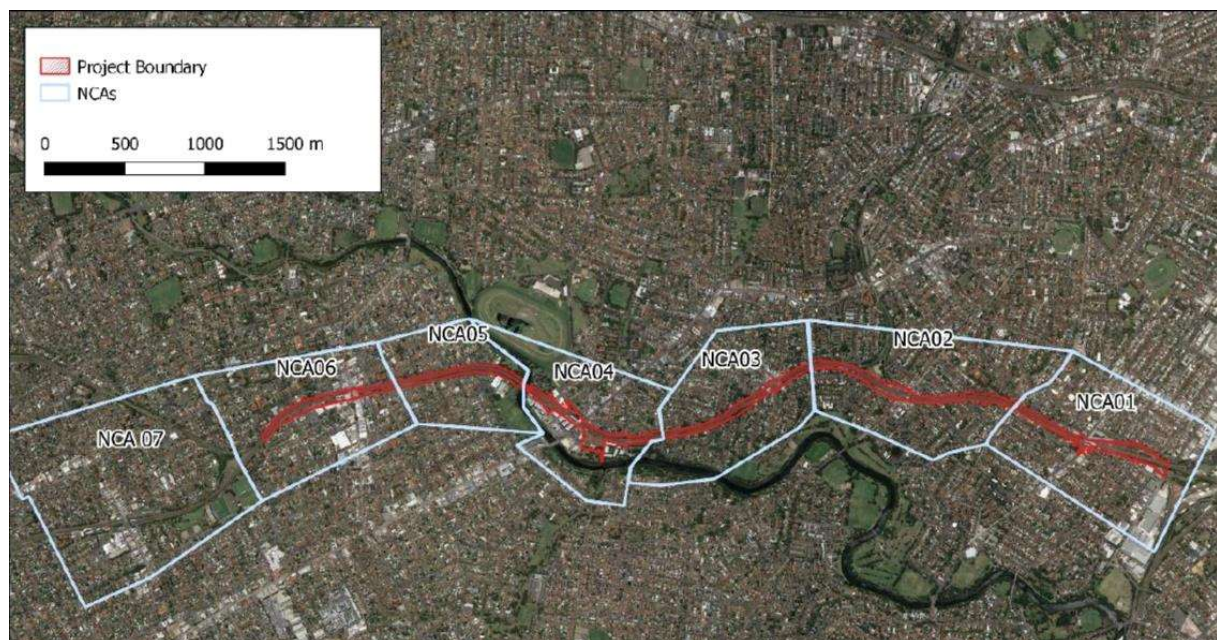


Figure 2 – Noise Catchment Areas

Monitoring is 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 undertaken in the event of a noise complaint. Where a complaint occurs, monitoring will be undertaken 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. Monitoring will be undertaken for vibration causing "activities" at a structure and applied as indicative across the project area in similar circumstances (e.g. the methods and plant used for the compaction of batters is consistent across the site, as such the monitoring at one structure is representative of the impacts at other structures). Representative monitoring should be undertaken at the most sensitive structure for which it is to be applied. In accordance with the requirements of the CNVS, the vibration limits have been set out in the British Standard BS 7385-2:1993.

### 3. Results

#### 3.1 Surface Water

Pre-construction monitoring took place over three months from May-July 2019, with four rounds of sampling collected from each of the four sampling points. Two rounds of sampling occurred during dry weather and two rounds of monitoring occurred during wet weather (i.e. greater than 20mm of rainfall in a 24 hour period). The results of the pre-construction monitoring are included within the previous SMEW Construction Monitoring Report (*SMCSWSSJ-JHL-WEC-EM-REP-000007 - Construction Monitoring Report 001 August 2019 - January 2020*).

Pre-construction monitoring indicated that in some instances the existing pH, turbidity, salinity, dissolved oxygen, total phosphorus, total nitrogen and chlorophyll levels exceed the ANZECC lowlands river criteria on a number of occasions.

Monitoring during construction phase took place once per quarter. In addition, seven wet weather monitoring events were recorded during the reporting period as per Table 3.

During the monitoring period, there was one occasion where the monitoring sites could not be safely accessed after heavy rain on 8<sup>th</sup> June 2020.

Monitoring during the construction phase indicates that pH met the ANZECC criteria. Other parameters, including salinity, turbidity, dissolved oxygen, total phosphorus, total nitrogen and chlorophyll exceeded the ANZECC criteria, however the exceedances are comparable to those observed within the pre-Construction phase. Downstream and upstream readings are consistent.

It is noted that SMEW 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.



				CRE 1												CRE 2											
Date	Site Activities	Total Rainfall in Previous 24hrs (mm)	Comments	Time	TSS (mg/l)	Temp (°C)	pH	Salinity (mS/cm)	Turbidity (NTU)	DO%	TDS (g/l)	Visible Oil / Grease	TP(ug/L)	TN (ug/L)	Chlorophyll												
5/02/2020	Construction - Wet weather	Extended rainfall event - 36mm over past 48hours	Low tide Sample taken from top of water column CIC piling occurring on-site	13:50	42	26.06	7.25	1.08	22.5	49.9	0.693	No	280	2400	5												
11/02/2020	Construction - Wet weather	Extended rainfall event - 393mm over 4 days	High tide Sample taken from top of water column Lots of rubbish observed on bank of river	13:00	45	26.38	7.14	0.877	27.9	59.1	0.562	Yes	300	4800	1												
7/03/2020	Construction - Wet weather	Extended rainfall event - 63mm over 3 days	High tide Sample taken from top of water column CFA Piling	11:02	21	23.45	7.71	0.594	10.3	104.8	0.38	Yes	240	1300	5												

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8/03/2020	Quarterly	10mm	High tide Sample taken from top of water column CFA Piling Occurring on-site	10:53	30	21.44	7.74	0.481	20.8	96.3	0.313	No	140	1100	1	10:46	24	21.97	7.59	0.698	13.4	78.4	0.447	No	170	1400	2
26/03/2020	Construction - Wet weather	26mm	Mid tide Sample taken from top of water column	8:43	48	19.81	7.53	1.51	33.3	39.3	1.51	Yes	210	1200	3	8:53	46	20.51	7.54	4.55	32.9	93	2.91	Yes	190	1800	2
1/05/2020	Construction - Wet weather	21mm	High Tide Setting up piling rig RW1 earthworks	16:01	45	17.03	7.64	19.4	20.8	59.2	12	No	70	0	1	15:49	48	17.23	7.79	20.9	20.14	122.3	13	No	60	0	1
23/05/2020	Construction - Wet weather	37mm over 48 hours	High Tide RW1, RW2 and RW3 earthworks	14:32	64	14.34	7.93	7.62	52.9	135.8	0.8	No	220	2100	14	14:22	51	14.32	7.83	10.5	36.2	107.8	6.5	No	140	1600	2
4/06/2020	Quarterly	0mm	Mid Tide RW1, RW2 and RW3 earthworks	16:30	40	16.29	8.29	21	35.6	136	13.8	No	70	800	46	16:41	40	15.38	8.17	23.1	24.6	118.2	14.4	No	80	800	51
29/07/2020	Wet weather	109mm over 72hrs	Mid Tide RW2 and RW3 earthworks	15:53	27	15.91	8.12	4.11	32.6	65.6	2.63	No	150	2700	1	15:40	26	16.04	8.13	5.52	23.9	75.3	3.48	No	150	2800	1

Note: Table 3 colour coding is defined as;

- Black – no ANZECC Australian and New Zealand guidelines for fresh and marine water quality criteria applicable. Also note, there is insufficient historical data to make a meaningful analysis of water temperature – as such this has been colour coded as black.
- Green – Criteria under ANZECC Australian and New Zealand guidelines for fresh and marine water quality was met for the sample
- Red – Criteria under ANZECC Australian and New Zealand guidelines for fresh and marine water quality was not met for the sample



### 3.2 Noise and Vibration Monitoring

Attended noise monitoring was undertaken as required for OOHW and possessions, where noise modelling predicted significant exceedance of Rating Background Levels or otherwise required validation using this method. Works during the period occurred predominately in the following noise catchment areas;

- NCA3 – Combined Service Route (CSR) works
- NCA4 – CSR works
- NCA5 – embankment stabilisation works

Results from attended noise monitoring are summarised in Table 4. Noise monitoring results from the reporting period indicated that works occurred at noise levels at or below predicted levels. It is noted that wind speeds exceeded the recommended maximum level for noise monitoring as described within “AS1055-2018 *Description and measurement of environmental noise*” on a number of occasions, leading to exceedances. Monitoring was undertaken during these periods to provide indicative noise monitoring results only.

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:

- Noise from passing freight trains on the ARTC line
- Road traffic, particularly rail replacement buses during rail possessions

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 four rail possessions within the reporting period. SMEW 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 or complaints assessed as relating to ongoing construction activities on the project. All exceedances 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

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.

Table 4 - Attended Noise Monitoring Results

NCA	Date	Time (hrs)	Duration	Time Units	Construction Activities	Audible noise from SSJ construction activities	Main source of noise	LA(eq)	LA <sub>Max</sub>	Period	Predicted construction sound pressure level (LA(eq,15min))	Compliance	Comments
NCA5	6/03/2020	2:00	15	minutes	Piling Rig delivery	Truck movements	Truck movements	N/A	N/A	Night	50	Y	Monitoring cancelled due to ongoing rain
NCA4	7/03/2020	21:28	15	minutes	Stockpiling and piling	Excavator	Traffic	52.0	70.8	Evening	51	Y	Traffic dominant, piling rig faintly audible
NCA5	7/03/2020	22:27	15	minutes	Piling	Excavator	Piling rig	47.8	69.9	Night	53	Y	Piling rig just audible
NCA5	8/03/2020	2:22	15	minutes	Piling	Excavator	Piling rig	39.0	55.8	Night	53	Y	Piling rig just audible
NCA5	8/03/2020	12:22	15	minutes	Piling	Excavator	Traffic	61.9	82.7	Day	53	Y	Traffic dominant, excavator audible for short period
NCA5	11/03/2020	19:04	15	minutes	Piling	Excavator/Piling Rig	Traffic/Trains	66.1	85.7	Evening	62	Y	Traffic dominant, piling rig faintly audible
NCA4	11/03/2020	19:43	15	minutes	Piling	Excavator/Piling Rig	People talking/traffic	58.3	76.6	Evening	54	Y	Piling rig just audible
NCA5	16/03/2020	22:20	15	minutes	Piling	Excavator/Piling Rig	Traffic	60.1	76.0	Night	62	Y	Piling rig audible for short period
NCA5	18/03/2020	1:20	15	minutes	Piling Rig demob	Truck movements	Traffic and trains	52.6	73.3	Night	50	Y	Noise was for short period only, most time truck and rig idling. Passing freight train and passenger trains added to noise
NCA4	3/05/2020	0:34	15	Mins	Generator, CSR over Cooks River	Faint Generator and Power Tools	Vent or Unit from Building, Traffic	51.4	70.8	Night	62	Y	Windy conditions well above valid monitoring conditions. Generator noise investigated after complaint, attributed to non-project source. LAMax from loud car
NCA5	3/05/2020	0:44	15	Mins	Piling, CSR over Cooks River	No	Traffic, Wind	47.8	73.3	Night	51	Y	Windy conditions well above valid monitoring conditions. LAMax from loud car

NCA	Date	Time (hrs)	Duration	Time Units	Construction Activities	Audible noise from SSJ construction activities	Main source of noise	LA(eq)	LA <sub>max</sub>	Period	Predicted construction sound pressure level (LA(eq,15min))	Compliance	Comments
NCA4	3/05/2020	1:06	15	Mins	CSR over Cooks River	Yes, power tools, EWP and lighting tower	Power tools (intermittent) and Lighting Tower	61.5	69.6	Night	62	Y	Windy conditions well above valid monitoring conditions. Lamax from loud car
NCA4	3/05/2020	5:30	15	Mins	CSR over Cooks River	Yes, power tools, EWP and lighting tower	Power tools (intermittent) and Lighting Tower	55	72.1	Night	62	Y	
NCA6	3/05/2020	7:04	15	Mins	CSR	Yes	Non-project construction and cars	54.0	74.1	Night	62	Y	Non-project construction nearby creating irritating intermittent noise
NCA5	3/05/2020	6:57	15	Mins	Piling	No	Traffic	55.0	77.6	Night	53	Y	Construction essentially inaudible, noise from passing traffic
NCA4	23/05/2020	14:39	15	Mins	RW1 HLRW and Cooks River Bridge works	Excavator, posneg, power tools	Construction/wind	58.1	79.0	Day	62	Y	Wind Levels above AS1055 recommended levels
NCA3	23/05/2020	15:54	15	Mins	CSR attachment to Foord Avenue bridge	Crane, power tools	Construction	63.2	80.1	Day	70	Y	
NCA4	24/05/2020	2:16	15	Mins	CSR over Cooks River	Yes, power tools, EWP and lighting tower	Construction	58.9	79.1	Night	62	Y	
NCA3	24/05/2020	6:01	15	Mins	CSR attachment to Foord Avenue bridge	Crane, power tools, lighting tower	Construction	64.5	89.5	Night	70	Y	
NCA4	24/05/2020	6:51	15	Mins	RW1 HLRW and Cooks River Bridge works	Excavator, power tools	Construction/wind	53.8	76.1	Night	62	Y	Wind Levels above AS1055 recommended levels
NCA5	24/05/2020	7:46	15	Mins	RW3	Excavator, dump truck	Construction	59.5	77.5	Night	63	Y	

Note: Yellow highlighted boxes appear where an exceedance to the predicted noise levels have occurred due to extraneous sources but where compliance has still be achieved based on observations during attended monitoring.

### 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
Cooks River Bridge	2/02/20	Retaining wall 2 earthworks and concrete injected column piling	Attended	Y	0.7	25*	Y	
Cooks River Bridge	21/04/20 – 29/04/20	Retaining Wall 1 works – compaction with roller and compaction plates	Continuous	Y	1.2	25*	Y	
20 Charles Street Commercial Structure	21/04/20 – 29/04/20	Retaining Wall 1 works – compaction with roller and compaction plates	Continuous	Y	7	25	Y	
Foord Ave Bridge	18/05/20 – 25/05/20	CSR works	Continuous	Y	0.7	25*	Y	Note – real time clock on monitor had been reset to January 2017 – not notice until after monitoring.

\*Note: From the SMEW CNVIS; The British Standard states that “A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.” Additionally, the CNVS provides screening criteria for construction activities that have the potential to cause building damage. These criteria, based on a conservative 50% of the British Standard BS 7385-2:1993 levels, measured as Peak Component Particle Velocity (PCPV), are:

- Reinforced or framed structures: 25.0mm/s
- Unreinforced or light framed structures: 7.5mm/s



The CNVS suggests that heritage structures should not be assumed to be more sensitive to vibration sources and should be assessed by the same screening criteria, unless they are found to be structurally unsound after inspection.



## 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 May 2019, with results showing exceedances to a number of parameters under existing conditions. Construction monitoring results from the period at locations upstream and downstream of the Cooks River Bridge show pH has remained within acceptable range, but all other parameters vary between rain events and river conditions. However, upstream and downstream samples are consistent. Surface water data does not provide clear relation between construction activities and water quality.

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 or project-related complaints regarding noise and vibration impacts.