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<tr><td>(i) any consultation to be undertaken in relation to the monitoring programs.</td><td>Figure 1</td></tr>
<tr><td>C12</td><td>The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C9 of this approval and must include, to the written satisfaction of the Secretary, information requested by</td><td>Figure 1</td></tr>
</table>

Clause	Detail	Reference
	an agency to be included in a Construction Monitoring Programs during such consultation. Details of all information requested by an agency including copies of all correspondence from those agencies, must be provided with the relevant Construction Monitoring Program.	
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	This report

1.0 Introduction

The purpose of the Surface Water Quality Monitoring Program (SWQMP) (detailed in Section 6.1 of the Construction Soil, Water and Groundwater Management Plan (CSWGMP): (SMCSWTSE-JCG-TPW-EM-PLN-002014) is to identify potential impacts of the JHCPBG Tunnel Station Excavation (TSE) Works on water quality in local receiving waters.

The data presented in the SWQMP Report (this report) is submitted in accordance with Condition C9 of the Project Planning Approval, which requires reporting the results of the TSE Works Water Quality Monitoring Program to the Department of Planning and Environment (DPIE), the New South Wales (NSW) Environment Protection Authority (EPA), the NSW Natural Resource Access Regulator (NRAR) and relevant councils.

This report will highlight the results from of the construction phase of the surface water monitoring program against established baseline water quality developed during pre-construction monitoring.

2.0 Compliance

2.1 Approvals

The NSW Department of Planning and Environment's list of Secretary's Environmental Assessment Requirements (SEARs) for the project require the assessment of groundwater and surface water quality impacts to reference the relevant public health and environmental water quality criteria, including those specified in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality in 2000 (the ANZECC (2000) guidelines), applicable regional, local or site specific guidelines and any licensing requirements .

The ANZECC guidelines provide specific assessment criteria and water quality guideline values that aim to protect and manage the environment supported by a water resource whilst maintaining economic and social development.

2.2 ANZECC (2000) Guidelines and Surface Water Monitoring Parameters

The ANZECC guidelines for marine water quality and freshwater quality specific to south-east Australian lowland rivers and NSW coastal rivers have been used throughout this report in accordance with the SEARs so as to inform ongoing assessments of potential impacts on water quality.

The guidelines consider a wide range of species in Australia and New Zealand, however they are not site specific and do not consider the local natural environment, i.e. the influence of local geology on water quality. An exceedance of an ANZECC guideline value is common, often a product of local natural environmental factors including water-rock hydrogeochemical interactions.

To address this, a risk-based approach has been developed (Figure 1) and implemented in the event of surface water sampling results exceeding the 80th percentile of the baseline values. The following items will be reviewed as part of the exceedance investigation.

- Climate data
- Erosion and sediment control practices on sites discharging into the specific catchment
- Recent site discharges
- Incidents on site in the preceding three months, and

- Potential impacts of offsite land use practices that might have affected the results

The results of the investigation may result in the updating of site/project trigger values as per the ANZECC guidelines.

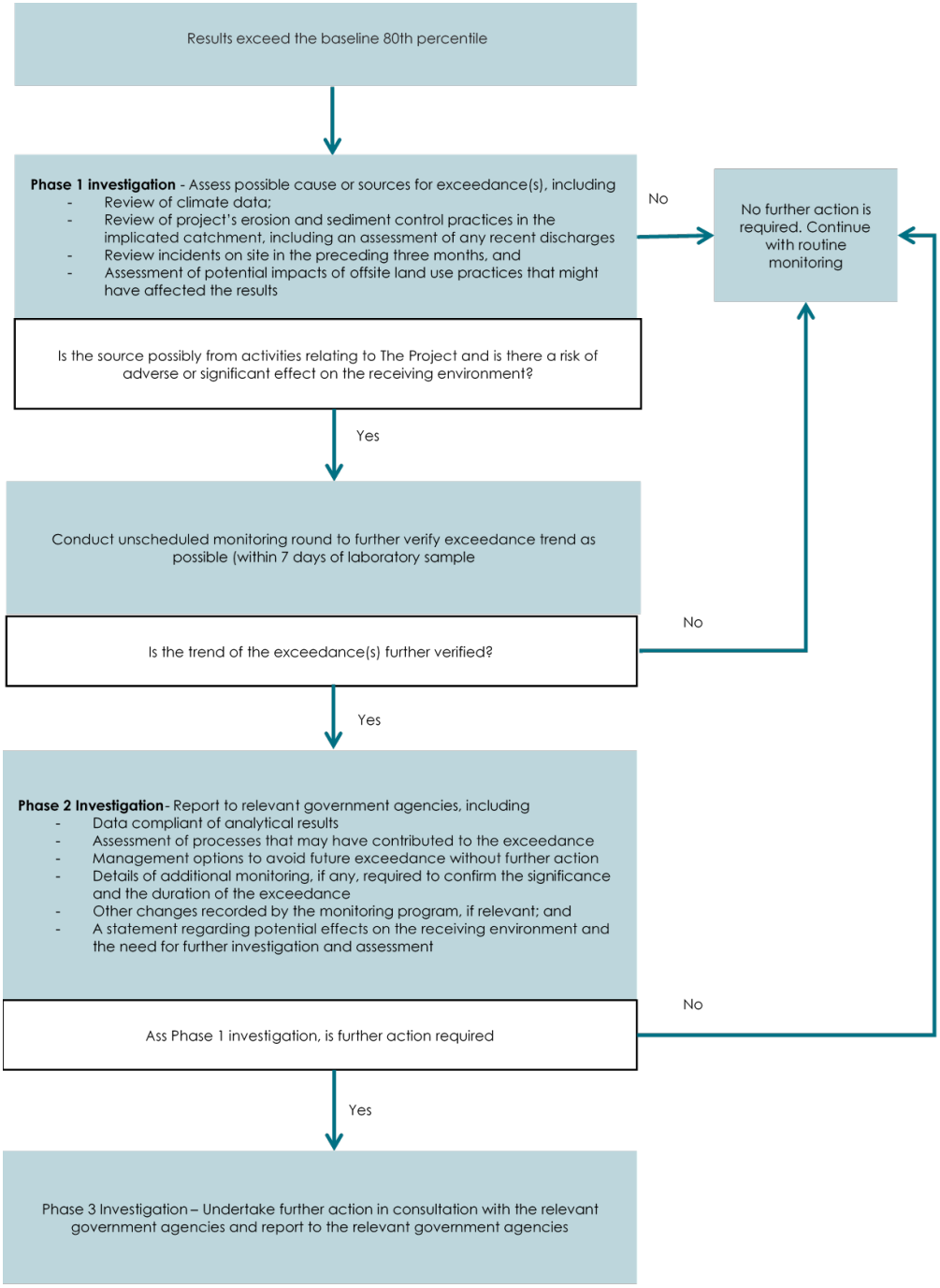

Figure 1 – Response Action Process for exceedances of Surface Water Quality

2.3 NSW Water Quality Objectives

The NSW Water Quality Objectives (WQOs) (NSW Government 2014) are the agreed environmental values and long-term goals for NSW surface waters and are to be considered when assessing and managing the likely impact of activities on waterways.

The environmental values for the project are the protection of:

1. Aquatic ecosystems;
2. Visual amenity
3. Secondary contact recreation (e.g. boating)
4. Primary contact recreation (e.g. swimming) in the longer term (10 year) and
5. For upper tributaries only, protection of aquatic foods (cooked).

'Aquatic ecosystems' is the primary environmental value of the project as the watercourses within the sub-catchments, intercepted by the project, support aquatic ecosystems.

There may be 'secondary contact recreation' and / or 'primary contact recreation' in parts of the surface water catchments within the project area. However, the objective of protection of aquatic ecosystems will also protect these additional environmental values since aquatic ecosystems are generally more sensitive to changes to the aquatic environment.

The WQOs are consistent with the agreed national framework for assessing water quality, set out in the ANZECC guidelines. While the WQOs provide environmental values for NSW waters, the ANZECC guidelines provide the technical guidance to assess the water quality needed to protect those values.

3.0 Site Characterisation

3.1 Rainfall

The Bureau of Meteorology (BoM) Sydney Observatory Hill weather station (BoM site ID 066062) is located approximately 200 metres from the Barangaroo Worksite, at the centre of the TSE Works alignment.

The average rainfall is 1210.8mm (based on records from 1858 – 2020). Autumn and winter have been identified as the wettest months in Sydney with on average the highest rainfall received in June (133.1mm). Spring is on average the driest season with September receiving the least rainfall (68.1mm).

Weather data (including rainfall) is collected using data from the Sydney Observatory Hill weather station, accessed via the Bureau of Meteorology website (http://www.bom.gov.au). Figure 2 depicts the total monthly rainfall for the monitoring period against the long-term average for the same months. During the first half of 2020, significantly higher than average rainfall was recorded in February with 441.6mm recorded compared with the historic average of 119.3mm. March and May recorded comparable rainfall volumes to historic data whilst January, April and June recorded less than average rainfall volumes. The lowest rainfall volume was recorded in April where only 27.6mm of rain was recorded compared to a historic average of 126.5mm. overall rainfall volumes for the monitoring period were above average with a total of 889.0mm of rain received, compared to a historic mean rainfall volume of 729.1mm.

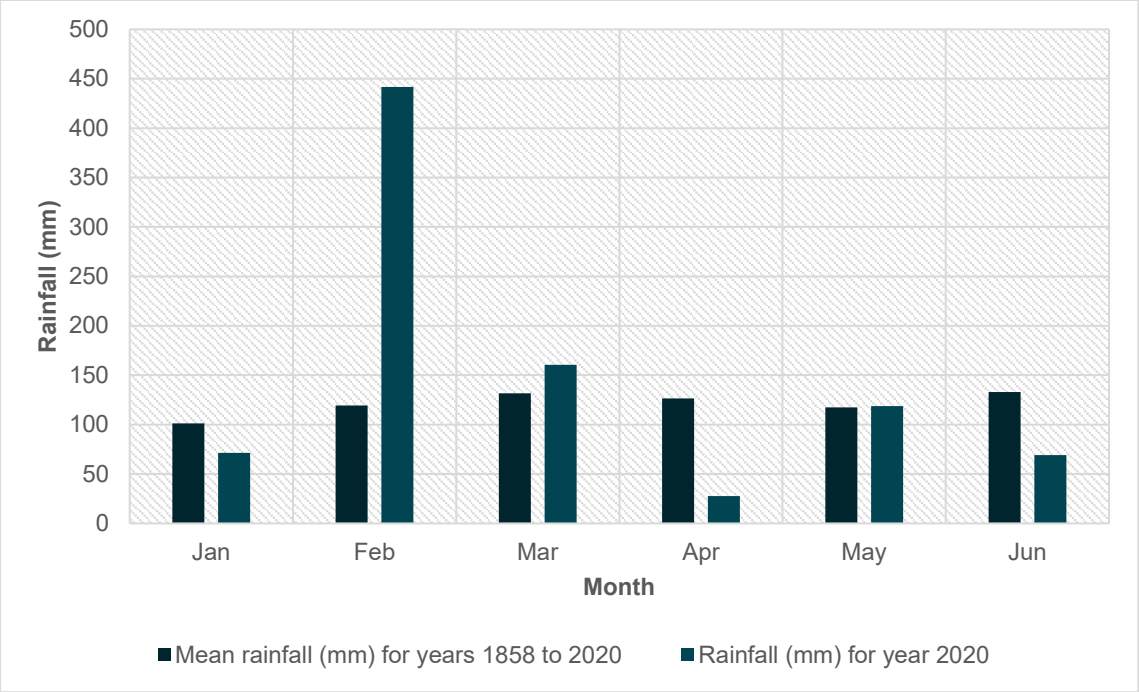

Figure 2 – Monthly average rainfall and monthly totals January to June 2020

3.2 Surface Hydrology

The project is located within the Sydney Harbour/Parramatta River catchment and the Cooks River catchment. Within these two catchments there are five local watercourses that are located along the tunnel and station excavation (TSE) works alignment, which drain into Middle Harbour, Sydney Harbour or Botany Bay (Figure 3).

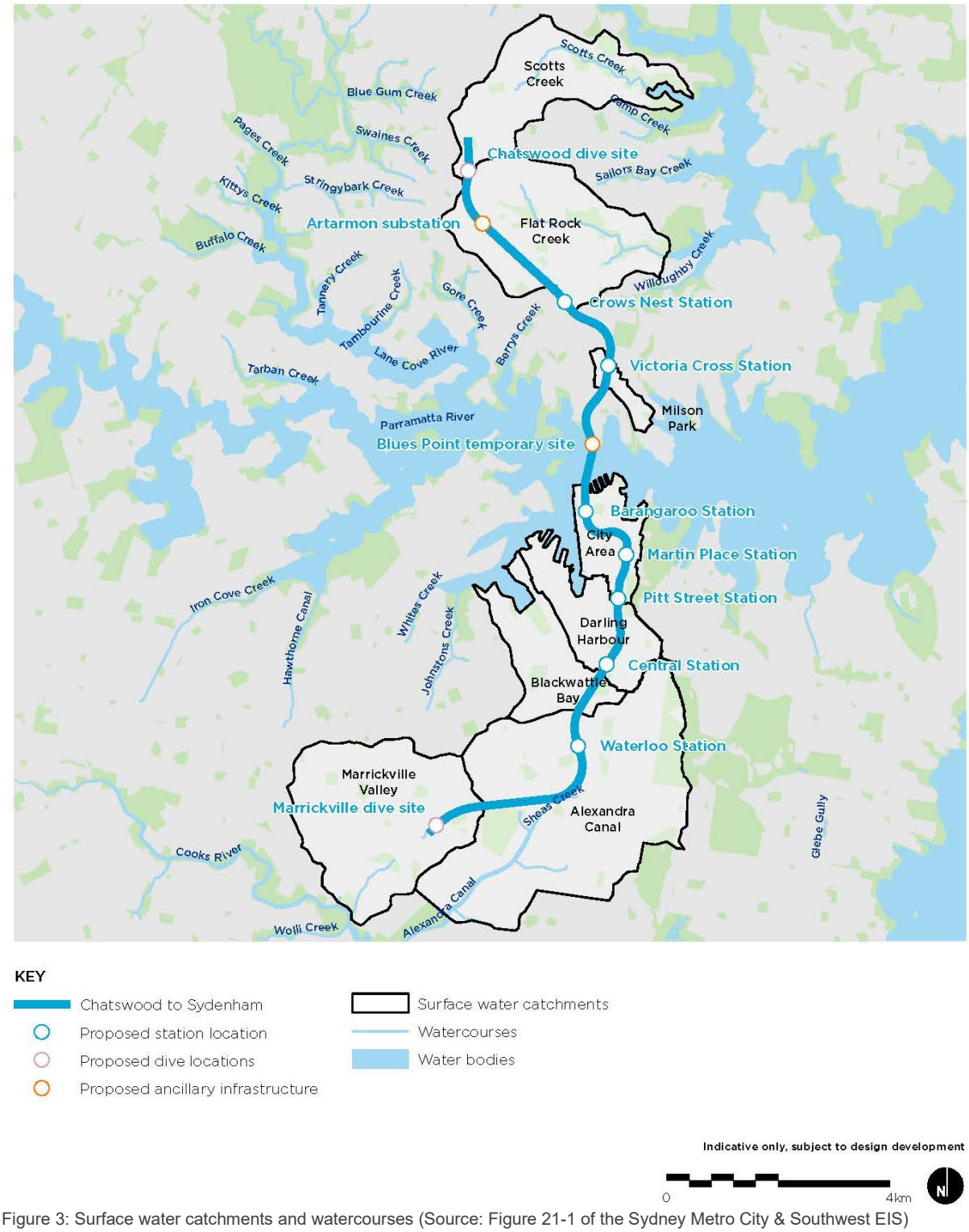

Figure 3: Surface water catchments and watercourses (Source: Figure 21-1 of the Sydney Metro City & Southwest EIS)

The sub-catchments are well established urban catchments with predominantly residential and/or commercial/industrial land use. Watercourses near the TSE Works are heavily urbanised and surface water is generally captured by developed stormwater networks. Treated construction water will be discharged into a number of waterways, including into the Sydney Harbour, via existing stormwater systems or directly into Sydney Harbour (Table 1).

Table 1 Drainage Catchments

Catchment Area	Relevant TSE Works element	Surface water sub-catchment area	Receiving water
Sydney Harbour and Parramatta River	Chatswood northern dive site	Scotts Creek and Flat Rock Creek	Middle Harbour
	Artarmon substation	Flat Rock Creek	
	Crows Nest	Flat Rock Creek tributary	
	Victoria Cross Station	Milsons Park	Sydney Harbour
	Blues Point temporary site	N/A	
	Barangaroo Station	N/A	
	Martin Place Station	City area	
	Pitt Street Station	City area	
Cooks River	Waterloo Station	Alexandra Canal	Botany Bay (via Cooks River)
	Marrickville southern dive	Marrickville Valley	

Geologically, the project area is located within the Sydney Basin. The recognised hydrogeological units within the project area are shown in Table 2.

Table 2 Hydrogeological Units within the project area

Hydrogeological Unit	Aquifer Type	Properties
Unconsolidated sediments (fill, alluvium, marine sediments)	Unconfined aquifer	Partially saturated
Ashfield Shale (Wianamatta Group)	Leaky aquifer	Mostly saturated
Hawkesbury Sandstone (including Mittagong Formation transitional unit)	Unconfined/semi-confined aquifer	Mostly saturated

The extent of development within the catchments and watercourses was assessed within the EIS. Waterways were determined to be affected by poor water quality and changed flow regime. The waterways have been greatly modified, with creek systems extensively channelised or hard edged with concrete. Wetlands have been destroyed or degraded and, where natural remnants of vegetation exist, they are often affected by weeds and rubbish. Based on the assessment in the EIS and the Pre-Construction Surface Water Quality Monitoring Programme, ecosystem disturbance for each discharge location has been determined and included in Table 3.

4.0 Project Progress

The project tunnels were largely constructed within the Ashfield Shale and the Hawkesbury Sandstone, and constructed below the water table. The Hawkesbury Sandstone is the main water bearing groundwater system in the region and forms an unconfined aquifer and is semi-confined where it is overlain by the Ashfield Shale and alluvium, where present. All tunnelling works for the project were completed in March 2020.

During the construction phase of the project, water from construction process activities (including piling, drilling, concreting and tunnelling works), surface water on site and tunnel groundwater inflows has been treated and discharged from the project water treatment plants (WTP). Treated discharge water will be the primary source of discharge into the receiving environment (i.e. waterways and the harbours) and has been managed via eight WTPs (Table 3)

Table 3 Water treatment plant details

WTP	WTP Status during reporting period.	Discharge Location	Receiving Environment	Level of ecosystem disturbance at discharge location	Groundwater system present at site
Chatswood	Active	Local stormwater system	Scott's Creek, Castle Cove, Middle Harbour	Moderate to highly disturbed	Ashfield Shale, Hawkesbury Sandstone
Crows Nest	Inactive	Local stormwater system	Flat Rock Creek, Long Bay, Middle Harbour	Moderately to highly disturbed	Hawkesbury Sandstone, minor Ashfield Shale
Victoria Cross	Active	Local stormwater system	Milson Park, Sydney Harbour	Highly disturbed	Hawkesbury Sandstone
Barangaroo	Active	Direct to Sydney Harbour	Sydney Harbour	Highly disturbed	Hawkesbury Sandstone
Martin Place	Active	Local stormwater system	Sydney Harbour	Highly disturbed	Hawkesbury Sandstone
Pitt Street	Partially active (demobilised April 2020)	Local stormwater system	Sydney Harbour	Highly disturbed	Hawkesbury Sandstone
Waterloo	Inactive	Local stormwater system	Alexandra Canal, Cooks River, Botany Bay	Highly disturbed	Ashfield Shale, Hawkesbury Sandstone

WTP	WTP Status during reporting period.	Discharge Location	Receiving Environment	Level of ecosystem disturbance at discharge location	Groundwater system present at site
Marrickville	Active	Local stormwater system	Eastern Canal, Cooks River, Botany Bay	Highly disturbed	Ashfield Shale, minor Hawkesbury Sandstone

4.1 Water Treatment Plant (WTP) Discharge

The Environmental Protection Licence for the project (EPL 20971) states that for each monitoring/discharge point, the discharged water must comply with the criteria specified in Condition L2.8 and are detailed in Table 4 .

These parameters have been included as a general indicator of the overall water quality.

Table 4 WTP Discharge Criteria (EPL 20971 Condition L2.8)

Analyte	Unit	Discharge Criteria
pH	pH units	6.5 – 8.5
Total suspended solids	Milligrams per litre	50

Water captured in the station box/shaft excavations/tunnels, the Tunnel Boring Machines (TBMs) and conveyor wash boxes is pumped to WTPs located on the surface. There are two types of WTP installed for the TSE Works:

- Coagulation, flocculation and clarification WTPs
- Ultra-filtration WTP

For the period January 2020 to June 2020, WTPs were operational at Marrickville, Pitt Street, Barangaroo, Chatswood, Martin Place and Victoria Cross. The Pitt Street WTP was demobilised in April 2020.

5.0 Water Monitoring Assessment Framework

5.1 Water Quality Trigger Values

The NSW State Government has endorsed the community's environmental values for water, known as Water Quality Objectives (WQOs) (ANZECC, 2000). The Soil and Water Quality Management Plan methodology for surface water sampling requires that during a sampling event both field measurements and laboratory analytical results are collected.

Table 5 details the parameters to be tested when monitoring the waterways and includes those required under EPL 20971.

A precautionary approach has been adopted for the surface water quality monitoring. Results collected in the current monitoring round are compared against the 80th percentile baseline data presented in Table 6. If results are greater than the baseline data 80th percentile, further investigation is undertaken including:

- Analysis of weather conditions
- Review of construction works being undertaken onsite at the time of sampling
- Re-sampling within 7 days of reviewing results where a link is established to TSE works.

Further details of the investigation are presented in Figure 1.

Table 5 Surface water quality monitoring parameters

Parameter	Sampling Method	Analytical Method	ANZECC[1, 2] Trigger Values (Lowland River)[6]	ANZECC[1, 3] Trigger Values (Estuarine Water)[7]	EPL 20971[8]	Trigger Value
Dissolved Oxygen (% Sat)	Probe	Field Analysis	85% - 110%	-	-	Baseline 20th Percentile
Turbidity (NTU)	Probe	Field Analysis	6 NTU-50 NTU	0.5 NTU–10 NTU	-	Baseline 80th Percentile
Oil and Grease	Visual / Grab Sample	Visual / Lab	-	-	No visible Oil and Grease	Baseline 80th Percentile
Conductivity (mS/cm)[5]	Grab Sample and Probe	Field / Lab	0.125mS/cm - 2.2mS/cm	-	-	Baseline 80th Percentile
Total Suspended Solids (mg/L)	Grab Sample	Lab Analysis	-	-	50 mg/L	Baseline 80th Percentile
Iron (mg/L)	Grab Sample	Lab Analysis	0.3 mg/L[4]	-	-	Baseline 80th Percentile
Manganese (mg/L)	Grab Sample	Lab Analysis	1.9 mg/L[9]	0.08mg/L[10]		Baseline 80th Percentile
pH	Grab Sample and Probe	Field / Lab	6.5 – 8.0	7.0 – 8.5	6.5 - 8.5	Baseline 80th Percentile

[1] Australian and New Zealand Environment and Conservation Council
[2] Trigger values applicable to lowland river environments
[3] Trigger values applicable to estuarine environments
[4] There is insufficient data at this stage to derive a reliable value for iron. The current Canadian guideline has been used.
[5] Conductivity will not be tested at monitoring points at Milsons Point, Blues Point, Darling Harbour and Farm Cove
[6] Applicable to monitoring locations SW-SC-01, SW-FR-02, SW-EC-01
[7] 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
[8] Where EPL criteria differs from ANZECC Criteria, EPL conditions will be complied with.
[9] Manganese toxicant value for 95% species protection in a fresh water environment
[10] Default ANZECC[1] trigger value for Manganese in marine environment

Table 6 Baseline 80th Percentile Parameters

LOCATION	PH[1]	ELECTRICAL CONDUCTIVITY[1] (MS/CM)	TSS	TURBIDITY (NTU)	DO (MG/L)	DO %	FE (MG/L)	MN (MG/L)	OIL AND GREASE (MG/L)
SW-SC-01	7.7/7.9	0.50/0.46	12.6	38.8	7.5	86.4	0.8	0.03	10
SW-SC-02	7.3/7.8	43.8/36.4	10.4	2.4	6.9	86.3	0.6	0.10	10
SW-FR-02	7.6/8.0	52.7/49.6	10.0	0.4	6.6	84.7	0.1	0.10	10
SW-MP-01	7.7/8.0	18.0/45.0	58.4	35.3	8.8	105.3	0.9	0.03	10
SW-BP-01	7.9/8.1	51.3/52.2	10.8	0.2	8.9	118.6	0.1	0.008	10
SW-FC-01	7.9/8.0	53.0/49.4	11.6	1.6	8.7	112.4	0.1	0.008	10
SW-B-01	7.7/8.0	53.0/52.0	10.4	1.6	8.3	107.3	0.03	0.008	10
SW-AC-01	7.3/8.0	0.6/0.6	10.0	14.9	9.6	103.7	0.9	0.03	10
SW-EC-01	7.7/7.7	0.6/0.6	57.0	170.2	7.6	80.4	2.8	0.3	10

[1] Field test/Laboratory test

6.0 Monitoring Program

6.1 Surface Water Monitoring Sites

Surface Water Quality is measured at ten locations along the project alignment, shown in Figure 4. Locations were chosen to be representative of water quality and identify any potential impacts of the Project should they occur. Details of the field observations are presented in Appendix A.

Surface water monitoring locations at Alexandra Canal and Flat Rock Creek have been excluded for this reporting period as the WTPs at the Waterloo and Crows Nest sites were not operational during the period.

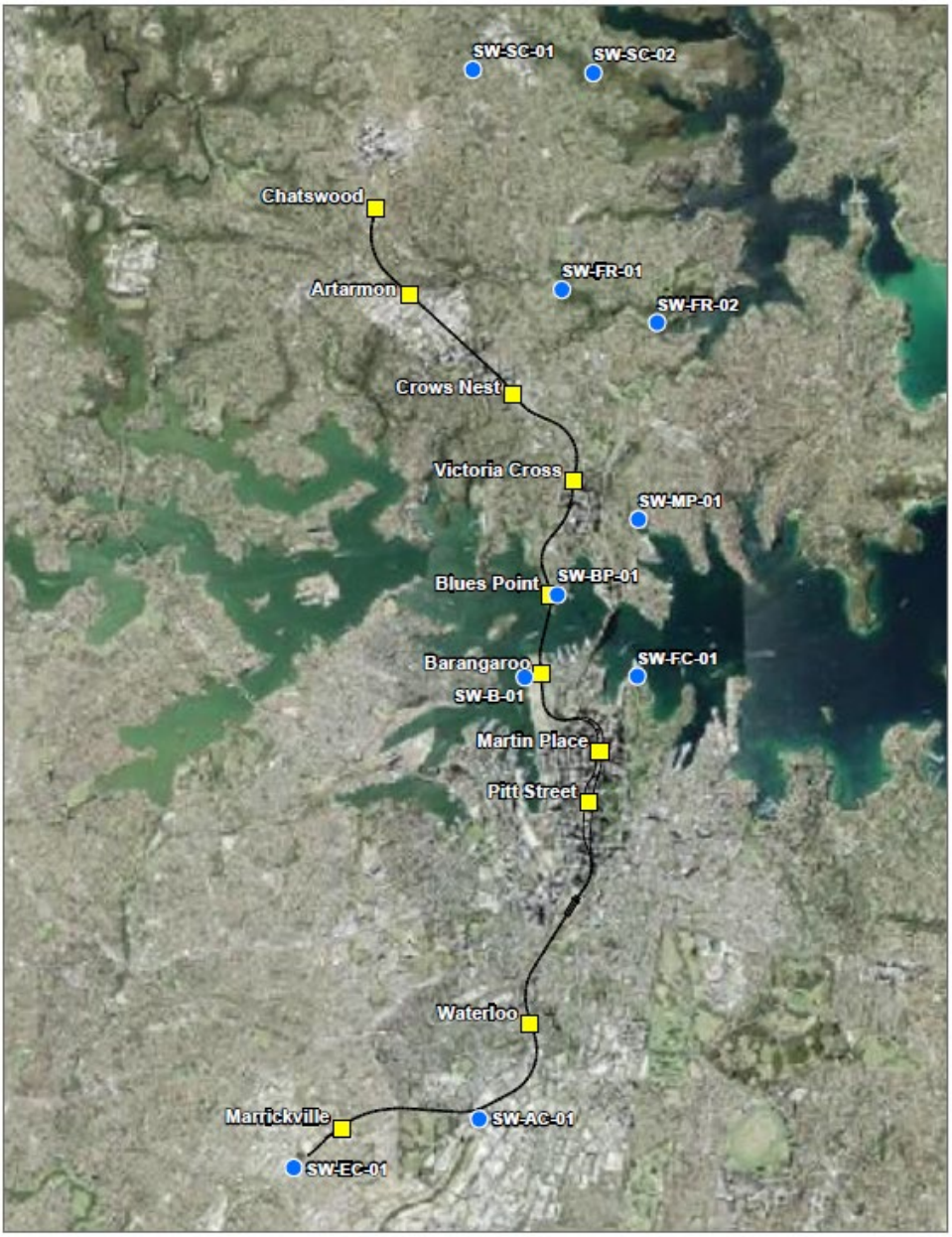

Figure 4: Surface Water Monitoring Locations

6.2 Surface Water Quality Sampling

Surface water sampling was undertaken in accordance with the Soil and Water Management Plan at the following frequencies:

- Quarterly (general sampling rounds);
- Up to four wet weather sampling events within a 12 month period (when at least 38.8mm of rain is received in the catchment in any 5 day period)

Grab samples were collected manually from the sampling locations and analysed at a NATA accredited laboratory. The volume of sample collected was suffice for the required analysis, including any repeat analysis. Samples were collected into sampling bottles and jars provided by the laboratory.

All samples were clearly labelled and stored in a refrigerated container prior to dispatch under the chain of custody procedures.

Sampling equipment was rinsed well between samples and on return to the lab at the end of each sampling trip. De-ionised and tap water will be available for washing equipment in the field. Monitoring probes will not be submerged in water showing signs of hydrocarbon contamination (oil slick etc). None of the sampling points displayed such characteristics during the sampling rounds.

6.2.1 In-situ measurements

Field water quality parameters including temperature, electric conductivity (EC) and pH will be measured at each sampling location using a multi-probe field water quality meter. Other observations including odour and colour will be recorded on the field sheets.

The multi-probe field water quality meter will be field calibrated at the start and completion of each day of water quality sampling. Calibration records (field and laboratory) are maintained on JHCPBG's ORIS system.

6.2.2 QA/QC Procedures

Quality Assurance / Quality Control (QA/QC) samples are collected to ensure the quality of the investigation procedures and sampling program. QA/QC samples provide analytical information that may be used to investigate anomalous results.

QA/QC sampling will be undertaken in accordance with AS 5667.1:1998. Only NATA registered laboratories will be used to undertake analysis.

7.0 Surface Water Quality Results

7.1 Baseline 80th Percentile Water Quality Results

Pre-construction surface water quality testing was carried out monthly from August 2017 to January 2018 to determine baseline water quality prior to discharge from construction works.

Water monitoring results were recorded and the eightieth percentile maximum calculated to define the baseline criteria of the waterway.

During baseline monitoring, the Upper Flat Rock Creek sampling location was dry and no water samples were able to be collected from this site. This has remained true for all sampling events undertaken to date on the project.

Milson Park (SW-MP-01) was determined to be freshwater environment during the baseline survey, however, following re-assessment of these sites during subsequent monitoring rounds, it was determined the water in these catchments was tidal and predominantly influenced by the adjacent marine environments (Sydney Harbour and Cooks River/Botany Bay). As such results from the monitoring locations will be assessed against the relevant ANZECC criteria as detailed in Table 5.

7.2 Surface Water Quality Results January to June 2020

The surface water quality results collected from the January to June 2020 monitoring period are presented in Appendix B alongside the baseline 80th percentile results for each catchment area.

Sampling events consist of two quarterly samples on the 12 March 2020 (Q1) and 19 June 2020 (Q2) and one post rainfall (PR) sample on the 11 February 2020. Note that sample location SW-FR-01 was dry during all three sampling events. In addition, a sample from SW-SC-02 could not be obtained during the post rainfall sampling event undertaken on 11 February 2020 as the access path was destroyed during a storm event and could not be traversed safely.

Field results are based on the readings from the Horiba water quality meter taken at the time of monitoring, samples were also collected simultaneously and submitted for analysis at a NATA accredited laboratory.

Where sampling results (either field or laboratory) were found to be outside the baseline 80th percentile trigger values, an assessment of the results against ANZECC trigger values was carried out and if required additional review undertaken.

Tables 7 to 11 present the sampling results which exceeded baseline 80th percentile, ANZECC trigger values. Surface water monitoring locations at Alexandra Canal and Flat Rock Creek have been excluded as the WTPs at the Crows Nest and Waterloo sites were not operational during the period.

7.2.1 **pH**

Table 7: Surface Water pH exceedances of the Baseline 80th Percentile and ANZECC Trigger Values.

LOCATION	SAMPLING ROUND	FIELD RECORDED VALUE	FIELD 80TH PERCENTILE BASELINE DATA	LABORATORY RECORDED VALUE	LABORATORY 80TH PERCENTILE BASELINE DATA	ANZECC TRIGGER VALUE	WTP DISCHARGE
SW-SC-01	PR	8.44	7.7	7.9	7.9	6.5 – 8.0	Y
SW-SC-01	Q1	8.47	7.7	3.5[1]	7.9	6.5 – 8.0	Y
SW-SC-01	Q2	8.33	7.7	7.5	7.9	6.5 – 8.0	Y
SW-BP-01	Q1	8.42	7.9	6.1[2]	8.1	7.0 – 8.5	N
SW-FC-01	Q1	8.42	7.9	6.3[3]	8.0	7.0 – 8.5	Y
SW-B-01	Q1	8.33	7.7	6.9[4]	8.0	7.0 – 8.5	Y
SW-EC-01	PR	9.68	7.7	7.3	7.7	6.5 – 8.0	Y

1. Low pH reading recorded in laboratory sample is not representative of offsite discharge and could be attributed to a laboratory error. The pH reading recorded in laboratory sample was compared against the WTP data logger and results from downstream sample (SW-SC-02). Data from the WTP and downstream sample were comparable indicating that the SW-SC-01 sample was an error in the lab.

2. Low pH reading recorded in the laboratory sample is not reflective of any offsite discharge. The Blues Point site does not have an active WTP and were not discharging any water prior to, or during the surface water sampling event.

3. Low pH reading recorded in the laboratory sample is not reflective of discharge water quality. Results from the surface water laboratory sample were compared against samples collected from the Martin Place and Pitt Street WTPs. Both samples collected from the treatment plants returned results within the acceptable EPL discharge range. Low pH readings could potentially be attributed to laboratory error or offsite sources not associated with the TSE scope of works.

4. Within projects EPL discharge criteria.

Surface water pH results were varied between field and laboratory results during all three monitoring events.

Field pH Values

In all field monitoring rounds, recorded pH levels were in excess of the 80th percentile baseline data. Four of these results were also above the ANZECC trigger levels. When assessed against the projects EPL all levels were within the allowable range (6.5-8.5) with the exception of the post rainfall sampling event at SW-EC-01. There are three water channels running through the EC sampling point, two of which are not influenced by the Marrickville discharge point under normal flow conditions. During fieldwork, the pH was tested in all three channels and returned similar results (even the two we do not discharge into) therefore it was concluded that elevated pH readings were not reflective of site activity including discharge.

Laboratory Results

The laboratory pH results returned low levels at monitoring locations against the 80th percentile baseline data and the lower limit of the ANZECC trigger values. An investigation into these results was undertaken and results of the investigation are detailed in the footnotes of Table 7.

No exceedances of the pH values are attributed to the TSE works.

7.2.2 Turbidity

Table 8: Surface Water Turbidity/TSS exceedances of the Baseline 80th Percentile and ANZECC Trigger Values.

LOCATION	SAMPLING ROUND	FIELD RECORDED VALUE (NTU)	FIELD 80TH PERCENTILE BASELINE DATA (NTU)	LABORATORY RECORDED VALUE (TSS)	LABORATORY 80TH PERCENTILE BASELINE DATA (TSS)	ANZECC TRIGGER VALUE (NTU)	WTP DISCHARGING AT TIME OF SAMPLING
SW-BP-01	PR	25.1	0.2	48	10.8	0.5 – 10	N
SW-BP-01	Q1	31.8	0.2	<5	10.8	0.5 – 10	N
SW-FC-01	PR	17	1.6	93	11.6	0.5 – 10	Y
SW-FC-01	Q1	6.6	1.6	19	11.6	0.5 – 10	Y
SW-B-01	PR	20.8	1.6	38	10.4	0.5 – 10	Y

Field and Laboratory TSS Values

Elevated turbidity (NTU) results were recorded at Farm Cove, Blues Point, and Barangaroo. While monitoring results were recorded in excess of the 80th percentile and ANZECC trigger values for NTU, laboratory TSS results were recorded below the 50mg/L limit stipulated in the project EPL. It should be noted the PR sampling event was undertaken after a significantly large storm event in February. The weather leading up to this rainfall event was dry and therefore would have caused a significant sediment load to be washed into the stormwater system leading to elevated turbidity levels.

Further investigation confirmed no elevated turbidity levels were recorded during discharge from the Project's WTPs and the elevated levels detailed in Table 8 are considered to be associated with other local area industry and construction works, or surface runoff from the surrounding environment.

No exceedances of the NTU or TSS are attributed to the TSE works.

7.2.3 Iron and Manganese

Table 9: Surface Water Iron and Manganese exceedances of the Baseline 80th Percentile Values.

LOCATION	SAMPLING ROUND	FE (MG/L) RECORDED VALUE	FE (MG/L) 80TH PERCENTILE BASELINE DATA	MN (MG/L) RECORDED VALUE	MN (MG/L) 80TH PERCENTILE BASELINE DATA	ANZECC TRIGGER VALUE (FE/MN)	WTP DISCHARGE
SW-BP-01	PR	0.48	0.1	0.018	0.01	- / 0.08	N
SW-B-01	PR	0.45	0.03	0.016	0.01	- / 0.08	Y
SW-B-01	Q1	0.06	0.03	0.007	0.01	- / 0.08	Y
SW-FC-01	PR	0.35	0.1	0.016	0.01	- / 0.08	Y
SW-FC-01	Q2	0.18	0.1	<0.005	0.01	- / 0.08	Y

Monitoring results for Iron were above the 80th percentile baseline for the monitoring period at 3 locations. The highest value was recorded at Blues Point, which does not have an active WTP and were not discharging prior to, or during the surface water sampling. Based on baseline groundwater data the elevated level of iron is known to be naturally occurring in the area and does not pose a risk of environmental harm at this level, iron levels will be reviewed during the next round to assess if a trend is occurring or if the result is an anomaly.

There was an elevated Iron level above 80th Percentile criteria for the Barangaroo WTP discharge in Q2. TBM tunnelling under the harbour was completed on 16/03/2020. During tunnelling monitoring results showed naturally occurring iron levels in the ground water. The result for iron in this report are considered to be reflective of the groundwater in the wider area and is not specifically related to site activities.

The water treatment plant at the Barangaroo Site has been designed to remove total and dissolved iron during the treatment process and reduces the iron concentration significantly when compared to untreated water concentrations. The Q2 surface water results show no

exceedances of baseline groundwater levels, iron levels will be reviewed during the next round to assess if a trend is occurring or if the result is an anomaly.

Monitoring results for Manganese were above the 80th percentile baseline for the monitoring period during the PR sampling events. No sampling results were recorded at concentrations above ANZECC trigger levels. The elevated results recorded are most likely associated with environmental factors such as naturally occurring sources from the surrounding geology rather than site discharge. It should be noted that both SW-BP-01 and SW-B-01 monitoring points are potentially influenced by nearby stormwater outlets during rainfall events.

7.2.4 Oil and Grease

Table 10: Surface Water Oil and Grease exceedances of the Baseline 80th Percentile Values.

LOCATION	SAMPLING ROUND	OIL AND GREASE RECORDED VALUE (MG/L)	OIL AND GREASE 80TH PERCENTILE BASELINE DATA (MG/L)	ANZECC TRIGGER VALUE	WTP DISCHARGE
SW-SC-01	Q2	**11**	5.0	-	Y
SW-EC-01	PR	**38**	5.0	-	Y

Oil and grease was detected above the 80th percentile on two occasions. No notable oil and grease was observed in the water bodies during fieldwork nor were any oil sheens identified during collection of WTP samples. No incidents were reported onsite at either Marrickville or Chatswood involving oil spills during the reporting period that could have impacted water quality. Elevated levels are considered to be associated with other local area industry and construction works in the area. It is not uncommon for stormwater systems to have low levels of oil and grease as they accept large quantities of water from roadways and other offsite sources.

No exceedances of the oil and grease are attributed to the TSE works.

7.2.5 Electrical Conductivity

Table 11: Electrical Conductivity exceedances of the Baseline 80th Percentile Values.

LOCATION	SAMPLING ROUND	EC (MS/CM) RECORDED VALUE	EC (MS/CM) 80TH PERCENTILE BASELINE DATA	LABORATORY RECORDED VALUE	LABORATORY 80TH PERCENTILE BASELINE DATA	ANZECC TRIGGER VALUE	WTP DISCHARGE
SW-SC-01	Q1	8.47	0.5	23	0.5	0.125 – 2.2	Y
SW-EC-01	Q1	3.59	0.6	3.4	0.6	0.125 – 2.2	Y
SW-EC-01	Q2	3.61	0.6	3.4	0.6	0.125 – 2.2	N

Electrical conductivity was recorded in excess of the 80th percentile and ANZECC criteria on three occasions at Scotts Creek and Eastern Creek sample points. Elevated field results were mirrored in laboratory samples from the same sampling round at these sampling points.

The result from SW-SC-01 is considered an erroneous result will be reviewed during the next round to assess if a trend is occurring or if the result is an anomaly.

During the sampling event the EC was tested in all three channels at SW-EC-01 and returned similar results (even the two we do not discharge into) therefore it was concluded that elevated EC readings were not associated with the TSE works.

7.2.6 Dissolved Oxygen

There were no occasions during the reporting period where results were recorded at concentrations lower than the 20th percentile criteria.

8.0 Conclusions

Water monitoring was conducted on three occasions during the monitoring period in accordance with the Surface Water Monitoring Program. In general, water quality results have been found to be influenced by external factors within the catchment and surrounding areas including industrial and construction discharges which are not associated with the JHCPBG works.

No exceedances of surface water quality can be attributed to the TSE works.

9.0 Appendices

Appendix B – Sampling Results