Bi - Annual Surface Water Monitoring Report

July 2020 to December 2020

Project: Sydney Metro City & Southwest – TSE Works

Document No: SMCSWTSE-JCG-TPW-EM-RPT-097486

DOCUMENT APPROVAL

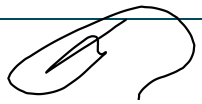
REVISION	DATE	PREPARED BY	REVIEWED BY	APPROVED BY	REMARKS
00	22/01/21	David Windnagel	Stuart Anstee	Krissy Vajda	For Issue
01	29/01/21	David Windnagel	Stuart Anstee	Krissy Vajda	For Issue
					

Table of Contents

Compliance matrix

<table>
<tr><th>Clause</th><th>Detail</th><th>Reference</th></tr>
<tr><td>C9</td><td>The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each Construction Monitoring program to compare actual performance of construction of the CSSI against predicted performance.
<table>
<tr><th></th><th>Required Construction Monitoring Programs</th><th>Relevant government agencies to be consulted for each Construction Monitoring Program</th></tr>
<tr><td>(c)</td><td>Water Quality</td><td>EPA and Relevant Council(s)</td></tr>
</table></td><td>This report</td></tr>
<tr><td rowspan="10">C10</td><td>Each Construction Monitoring Program must provide:</td><td></td></tr>
<tr><td>(a) details of baseline data available</td><td>Appendix B</td></tr>
<tr><td>(b) details of baseline data to be obtained and when;</td><td rowspan="4">Section 7.0</td></tr>
<tr><td>(c) details of all monitoring of the project to be undertaken;</td></tr>
<tr><td>(d) the parameters of the project to be monitored;</td></tr>
<tr><td>(e) the frequency of monitoring to be undertaken;</td></tr>
<tr><td>(f) the location of monitoring;</td><td>Section 6.0, Figure 4</td></tr>
<tr><td>(g) the reporting of monitoring results;</td><td>Appendix B</td></tr>
<tr><td>(h) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and</td><td>Section 6.6 of the Construction Soil Water and Groundwater Management Plan (SMCSWTSE-JCG-TPW-EM-PLN-002014)</td></tr>
<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 an agency to be included in a Construction Monitoring Programs during such consultation. Details of all information</td><td>Figure 1</td></tr>
</table>

Clause	Detail	Reference
	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
E107	The CSSI must be constructed and operated so as to maintain the NSW Water Quality Objectives where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW Water Quality Objectives over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW Water Quality Objectives, in which case those requirements must be complied with.	Section 2.3 noting an EPL is in force and provides specific requirements for the Project

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 C16 of the Project Planning Approval, which requires reporting of the results of the TSE Works Water Quality Monitoring Program to the Department of Planning, Infrastructure 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 the construction phase of the surface water monitoring program and compare these results against established baseline water quality targets developed during pre-construction monitoring.

2.0 Compliance

2.1 Approvals

The NSW DPIE's list of Secretary's Environmental Assessment Requirements (SEARs) for the project requires 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 2000 (ANZECC 2000 guidelines), applicable regional, local or site specific guidelines and any licensing requirements.

2.2 ANZECC (2000) Guidelines and Surface Water Monitoring Parameters

The ANZECC guidelines provide specific assessment criteria and water quality guideline values that aim to protect and manage water resources whilst maintaining economic and social development.

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, to inform ongoing assessments of potential impacts on water quality.

The guidelines have been developed based on ecotoxicity data for a wide range of species in Australia and New Zealand, however they are not site specific and do not consider the local environment including local influences on water quality. An exceedance of an ANZECC guideline value is common and can be a result of a range of factors, including local hydrogeological conditions. As a result the ANZECC guidelines recommend the implementation of a trigger response process to determine actual environmental risk.

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 an exceedance investigation.

- Climate data, specifically rainfall records for the period leading up to and including the sampling event
- Activities at nearby Project sites including any water discharges.

- Erosion and sediment control practices on sites discharging into the specific catchment
- Incidents at nearby Project sites in the preceding three months, and
- Potential non Project related activities in the catchment that might have affected the results

The results of the investigation may result in further actions including additional monitoring, modifications to site practices or regulatory reporting as detailed in Figure 1.

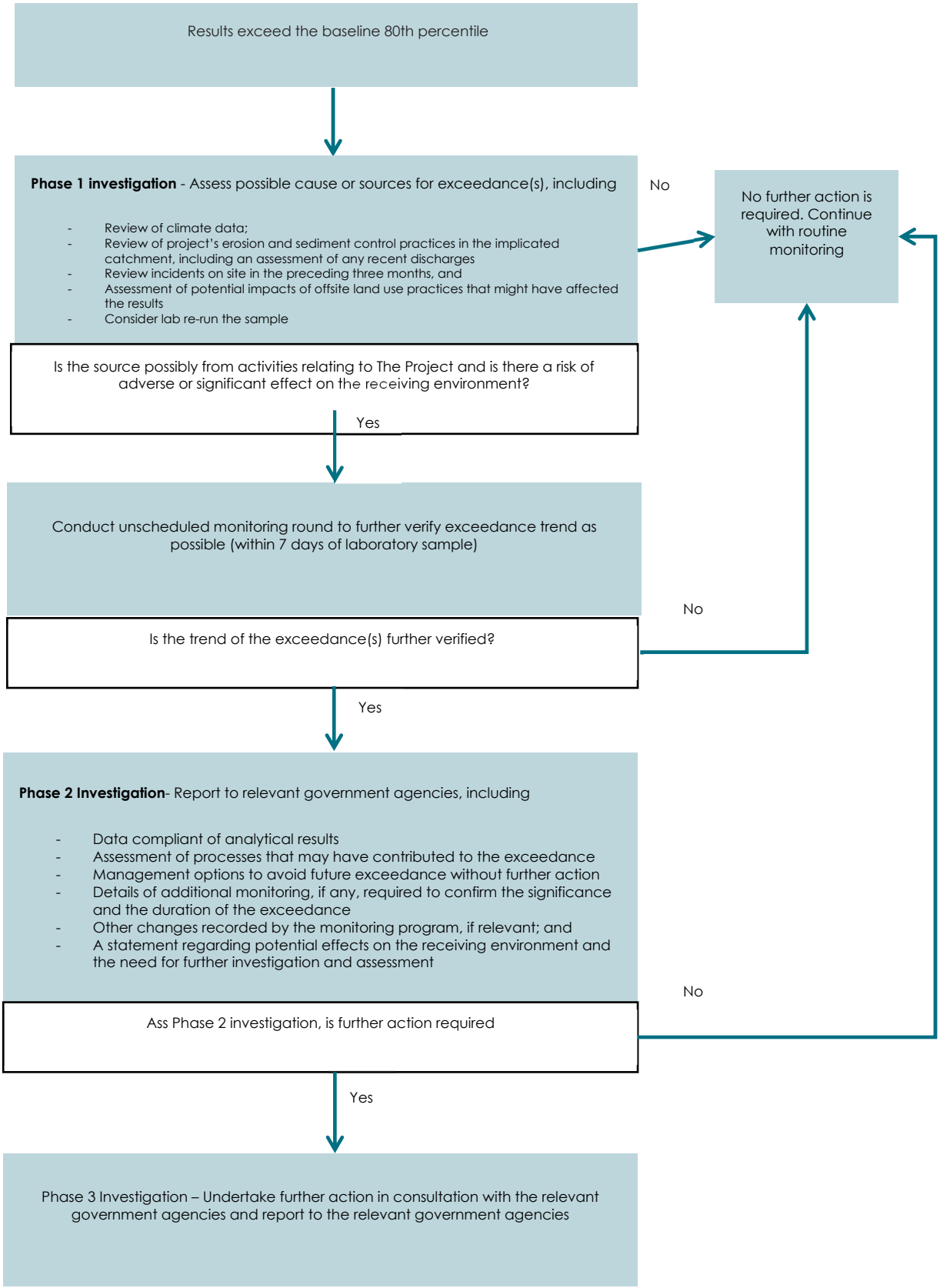


Figure 1 – Response Action Process for exceedances of Surface Water Quality

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 downstream aquatic ecosystems.

There may be 'secondary contact recreation' and / or 'primary contact recreation' in parts of the downstream 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

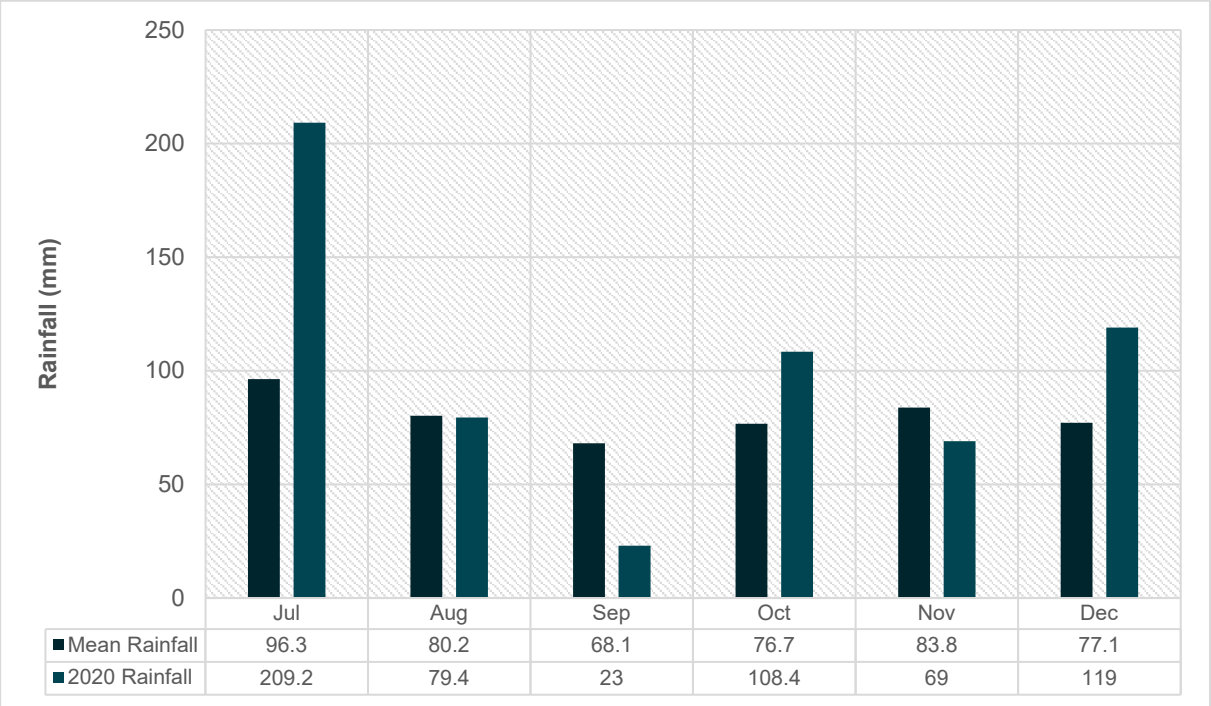
3.1 Rainfall

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 1213.4mm (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 this biannual reporting period, significantly higher than average rainfall was recorded in July (209.2mm) compared with the historic average (96.3mm). higher than average rainfall was also recorded in the months of October and December. August recorded comparable to mean rainfall whilst September and November recorded less than mean rainfall. The lowest rainfall volume was recorded in September where only 23.0mm of rain was recorded compared to a historic mean of 68.1mm. Overall rainfall volumes for the monitoring period were above the historic mean with a total of 1,551.2mm of rain received, compared to a historic mean rainfall volume of 1,211.3mm.

Sampling events were undertaken in July (Post Rainfall), September (Q3) and November (Q4).



	Jul	Aug	Sep	Oct	Nov	Dec
Mean Rainfall	96.3	80.2	68.1	76.7	83.8	77.1
2020 Rainfall	209.2	79.4	23	108.4	69	119

Figure 2 – Monthly mean rainfall compared to 2020 monthly total rainfall

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 is discharged into a number of waterways, including into 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 is primarily an unconfined aquifer but 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 is 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).

Current activities on the Project include the construction of the Station Box at Barangaroo which has involved some groundwater dewatering. Other activities include the treatment of surface water at the Marrickville Site following rainfall events.

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	Partially active (WTP handed over 01/08/20)	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	Partially active (WTP decommissioned on 21/07/2020)	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	Partially active (site handed over 11/12/20)	Local stormwater system	Sydney Harbour	Highly disturbed	Hawkesbury Sandstone
Pitt Street	Inactive	Local stormwater system	Sydney Harbour	Highly disturbed	Hawkesbury Sandstone

WTP	WTP Status during reporting period.	Discharge Location	Receiving Environment	Level of ecosystem disturbance at discharge location	Groundwater system present at site
Waterloo	Partially active (WTP handed over 01/08/20)	Local stormwater system	Alexandra Canal, Cooks River, Botany Bay	Highly disturbed	Ashfield Shale, Hawkesbury Sandstone
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 (see Table 4).

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
Oil and grease	Visible	Not visible

Water captured in the station box, as well as the site surface is captured and pumped to the WTPs. All WTPs active during the reporting period worked via a process of coagulation, flocculation and clarification with media and carbon filtration on the Barangaroo WTP for additional treatment.

For the period July 2020 to December 2020, WTPs were operational at Marrickville, Waterloo Barangaroo, Martin Place, Victoria Cross and Chatswood. The Chatswood and Waterloo WTPs were handed onto follow on contractors on 01/08/2020, Martin Place WTP was handed over 11/12/2020 and The Victoria Cross WTP was decommissioned on 21/07/2020 and subsequently moved to Barangaroo and commissioned for ongoing use for the remainder of the project.

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. Note that due to construction works occurring onsite at Marrickville and in the surrounding area, sampling point SW-EC-03 was added to the surface water sampling regime. As it was only added as of this reporting period, no baseline data is available for comparison.

Table 5 Surface water quality monitoring parameters

Parameter	Sampling Method	Analytical Method	ANZECC, Trigger Values (Lowland River)[3]	ANZECC, Trigger Values (Estuarine Water)[4]	EPL 20971[5]	Trigger Value
Dissolved Oxygen (% Sat)	Probe	Field Analysis	85% - 110%	-	-	Baseline 20th Percentile[8]
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)[2]	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[1]	-	-	Baseline 80th Percentile
Manganese (mg/L)	Grab Sample	Lab Analysis	1.9 mg/L[6]	0.08mg/L[7]		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] Taken from ANZECC 2020 draft guidelines.

[2] Conductivity trigger values not applicable to Estuarine or marine sampling points due to the naturally high salinity of the water.
[3] Applicable to monitoring locations SW-SC-01, SW-FR-02, SW-EC-01, SW-AC-01
[4] Applicable to monitoring locations SW-SC-02, SW-FR-02, SW-MP-01, SW-BP-01, SW-B-01, SW-FC-01, SW-AC-01, SW-EC-03
[5] Where EPL criteria differs from ANZECC Criteria, EPL conditions will be complied with.
[6] Manganese toxicant value for 95% species protection in a fresh water environment
[7] Default ANZECC trigger value for Manganese in marine environment
[8] 20th percentile used for the DO trigger value as a decrease of DO is perceived to be more representative of environmental degradation

Table 6 Baseline 80th Percentile Parameters

LOCATION	PH[1]	ELECTRICAL CONDUCTIVITY[1] (MS/CM)	TSS	TURBIDITY (NTU)	DO (MG/L)[2]	DO %[2]	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	5.9	68.1	0.8	0.03	5.0
SW-SC-02	7.3/7.8	43.8/36.4	10.4	2.4	3.9	51.6	0.6	0.10	5.0
SW-MP-01	7.7/8.0	18.0/45.0	58.4	35.3	7.6	98.1	0.9	0.03	5.0
SW-BP-01	7.9/8.1	51.3/52.2	10.8	0.2	7.0	98.7	0.1	0.008	5.0
SW-FC-01	7.9/8.0	53.0/49.4	11.6	1.6	6.7	94.6	0.1	0.008	5.0
SW-B-01	7.7/8.0	53.0/52.0	10.4	1.6	6.3	88.7	0.03	0.008	5.0
SW-AC-01	7.3/8.0	0.6/0.6	10.0	14.9	7.3	96.0	0.9	0.03	5.0
SW-EC-01	7.7/7.7	0.6/0.6	57.0	170.2	3.6	39.0	2.8	0.3	5.0
SW-EC-03[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1] Field test/Laboratory test

[2] 20th Percentile adopted

[3] No baseline data available for sampling point SW-EC-03

6.0 Monitoring Program

6.1 Surface Water Monitoring Sites

Surface Water Quality was measured at eight locations along the project alignment during this reporting period, 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 Flat Rock Creek were monitored in Q3 and during a post rainfall event but have been excluded from the report discussion as the Crows Nest WTP site was not operational during the reporting period. Data is provided for SW-FR-02 in Appendix A.

A new sampling point, SW-EC-03, was added to the sampling regime during this reporting period. This sampling point was added as a replacement to SW-EC-01 which will soon be redundant due to construction activities being undertaken onsite and by other contractors in the local area. An additional sampling point, SW-EC-02 was inspected for potential use but was never sampled as it was found to be dry and strongly affected by tidal movements.

It should be noted that samples were not collected from Scotts Creek sampling points during the Q4 sampling round as the Chatswood site had been handed over to follow on contractors prior to this sampling event.

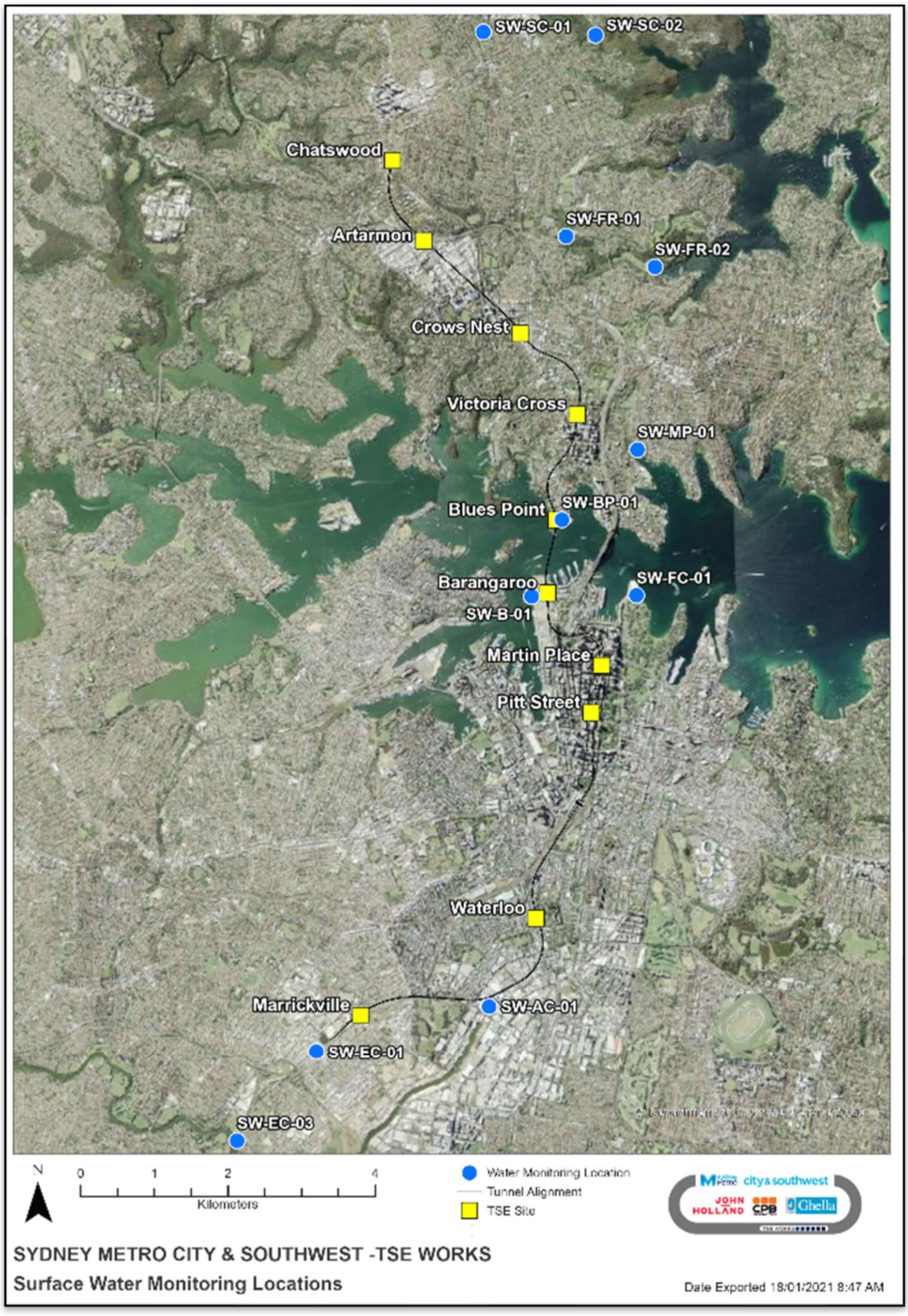


Figure 4: Surface Water Monitoring Locations

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. 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 was available for washing equipment in the field. Monitoring probes were 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 were measured at each sampling location using a multi-probe field water quality meter. Other observations including odour and colour were recorded on the field sheets.

The multi-probe field water quality meter was 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 irregular results.

QA/QC sampling is undertaken in accordance with AS 5667.1:1998. Only NATA registered laboratories are 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 80th percentile maximum calculated to define the baseline criteria of the waterway. It should be noted that a reduced metals suite of Iron and Manganese were selected for analysis during the pre-construction monitoring program. This was determined based on the level of risk associated with the known groundwater quality in the Project area. As such these parameters only have been assessed throughout the construction phase of the monitoring program.

Milson Park (SW-MP-01) was determined to be a freshwater environment during the baseline survey, however, following re-assessment of the site during subsequent monitoring rounds, it was determined the water in the catchment was tidal and predominantly influenced by the adjacent marine environment (Sydney Harbour). As such results from this monitoring location is assessed against the relevant ANZECC criteria as detailed in Table 5.

7.2 Surface Water Quality Results July to December 2020

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

Sampling events consisted of two quarterly samples on the 25th September 2020 (Q3) and 20th November 2020 (Q4) and one post rainfall (PR) sample on the 17th July 2020.

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 10 present the sampling results which exceeded both baseline 80th percentile and ANZECC trigger values.

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	8.15[1]	7.7	7.6	7.9	6.5 – 8.0	Y
SW-AC-01	PR	6.36[2]	7.3	7.8	8.0	6.5 – 8.0	Y
SW-EC-03	Q4	6.72[3]	N/A	7.7	N/A	7.0-8.5	N

1. level recorded was above the upper limit value for Lowland River Environments stated in ANZECC water quality guidelines. A laboratory sample was also undertaken during fieldwork and returned a value within the allowable ANZECC guideline range. Both field and laboratory readings were compliant with the project EPL discharge criteria.
2. Level recorded below the lower limit value for Lowland River Environments stated in ANZECC water quality guidelines. A laboratory sample was also undertaken during fieldwork and returned a value within the allowable ANZECC guideline range. Both field and laboratory readings from the WTP were compliant with the project EPL discharge criteria.
3. level recorded was below the lower limit value for Estuarine Environments stated in ANZECC water quality guidelines. A laboratory sample was also undertaken during fieldwork and returned a value within the allowable ANZECC guideline range. Both field and laboratory readings were compliant with the project EPL discharge criteria. No baseline water quality has been established for this sampling point. The Marrickville WTP was not discharging at the time of collecting this sample.

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

Field pH Values

Field pH levels were recorded in excess of the 80th percentile baseline data in most sampling points in all three monitoring rounds. three of these results were also outside the acceptable ANZECC trigger level range (Table 7). When assessed against the projects EPL all levels were within the allowable discharge range (6.5-8.5). An investigation into these results was undertaken and are detailed in the footnotes of Table 7.

Laboratory Results

All pH results reported by the laboratory during the reporting period returned results below the 80th percentile baseline data and within the appropriate ANZECC trigger values range.

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

7.2.2 Turbidity and Total Suspended Solids

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 DISCHARGE
SW-SC-01	PR	12	38.8	63[1]	12.6	50mg/L	Y
SW-SC-02	PR	0.0	43.8	400[1]	10.4	50mg/L	Y
SW-MP-01	PR	0.0	35.3	380[2]	58.4	50mg/L	Y
SW-B-01	PR	12.2[3]	1.6	400[3]	10.4	10 NTU	Y
SW-FC-01	PR	30.3[4]	1.6	98[4]	11.6	10 NTU	Y

1. TSS results above the EPL discharge criteria were recorded in lab samples from both sampling points south of the Chatswood site (SW-SC-01 and SW-SC-02) in the Post Rainfall sampling event. A laboratory sample was collected from the Chatswood WTP. The TSS reading from the WTP was recorded at <5mg/L. Therefore, it was concluded that elevated TSS readings encountered in the environment were attributed to recent heavy rainfall and not attributed to offsite discharge.
2. TSS results above the EPL discharge criteria were recorded in the SW-MP-01 lab sample in the Post Rainfall sampling event. A laboratory sample was collected from the Victoria Cross WTP during the sampling event. The TSS reading from the WTP was recorded at 16mg/L. Therefore, it was concluded that elevated TSS readings encountered in the environment were attributed to recent heavy rainfall and not attributed to offsite discharge.
3. NTU and TSS was recorded above baseline, ANZECC and EPL levels in SW-B-01 during the post rainfall sampling event. A laboratory sample was taken from the Barangaroo WTP for comparison however it was determined that the WTP was not discharging at the time of field sampling. Therefore, a follow up WTP sample was collected on 30/07/2020 as per the Response Action Process. Results of this sample for both NTU and TSS were recorded at levels compliant with both ANZECC and EPL trigger values.
4. TSS results above the EPL discharge criteria were recorded in the SW-FC-01 lab sample in the Post Rainfall sampling event. A laboratory sample was collected from the Martin Place WTP during the sampling event. The TSS

reading from the WTP was recorded at 8.0mg/L. Therefore, it was concluded that elevated TSS readings encountered in the environment were attributed to recent heavy rainfall and not attributed to offsite discharge.

Field and Laboratory Turbidity and Total Suspended Solids

Elevated turbidity (NTU) and or Total Suspended Solids (TSS) results were all recorded during the Post Rainfall sampling event on 17th July 2020. This sampling event was undertaken after a significant rainfall event which caused widespread damage and flooding in the Sydney region. Events such as this are known to increase sediment yields in catchments due to increased erosion and flooding of sealed ground surfaces such as roads. All runoff from the urban environment is directed to stormwater and flows to the closest outlet. This is the likely explanation for elevated NTU and TSS results obtained during the post rainfall sampling event as all of the surface water sampling points are known to accept stormwater runoff.

Laboratory samples collected from the Marrickville and Barangaroo WTP also recorded high TSS results in the Post Rainfall sampling event. An investigation was launched into the cause of the elevated readings. In both instances, the WTP was not discharging at the time of sampling and was recycling water back through the WTP for additional treatment. Follow on samples were collected after the post rainfall sampling event to ensure that treatment plants were functioning correctly. Both samples returned TSS below the 50mg/L TSS trigger value in the project EPL.

For the reasons identified in the footnotes of Table 8, no exceedances of 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	TRIGGER VALUE (FE/MN)	WTP DISCHARGE
SW-FC-01	PR	1.0	0.1	0.019	0.01	- / 0.08	Y
SW-FC-01	Q4	0.16	0.1	0.007	0.01	- / 0.08	Y

Monitoring results for Iron were above the 80th percentile baseline limit at sampling point SW-FC-01 during the post rainfall and Q4 sampling rounds. There is no criteria in the ANZECC 2000 guidelines to compare iron concentrations to, therefore the draft guideline proposed in ANZECC 2020 is being used for reference (0.3mg/L). Comparing against the ANZECC 2020 value, iron concentrations recorded within the post rainfall sampling event exceeded this limit.

A laboratory sample was collected from the Bligh Street WTP for comparison against field data. Iron was recorded at a concentration of 0.11mg/L in this sample. It is therefore unlikely that elevated iron levels in the environment are attributed to TSE activities from Martin Place and rather are likely due to heavy rainfall.

Manganese was also recorded in excess of the 80th percentile in the sample collected from SW-FC-01 during the Post Rainfall sampling event. The level recorded was however less than the ANZECC trigger value.

No exceedances of the iron or manganese are attributed to the TSE works.

7.2.4 Oil and Grease

Oil and grease was not detected above the laboratory reporting limit during the reporting period.

Therefore, there are no exceedances of oil and grease to be attributed to TSE works.

7.2.5 Electrical Conductivity

Table 10: Surface Water Electrical Conductivity exceedances of the Baseline 80th Percentile and ANZECC Trigger 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-EC-01	PR	10.6	0.6	0.41	0.6	2.2	Y

Electrical conductivity was recorded in excess of the 80th percentile and ANZECC criteria on one occasion during this reporting period. EC recorded at sampling point SW-EC-01 during the post rainfall sampling round exceeded both baseline and ANZECC trigger values.

Elevated field results were not mirrored in the laboratory sample collected from the same sampling round at this sampling point indicating a calibration issue with the Horiba unit used for sampling. Calibration issues were noted in field sheets by the field staff during the sampling event. The Horiba unit was recalibrated in the field after this sampling event and appeared to be accurate during all following sampling events.

7.2.6 Dissolved Oxygen

There were no occasions during the reporting period where results were recorded at concentrations lower than both the 20th percentile and ANZECC criteria. Readings were recorded outside the acceptable range stated in ANZECC criteria applicable to Lower River environments in samples collected from Eastern Creek and Scotts Creek. However, readings were comparable to baseline data. No applicable criteria exists for dissolved oxygen in estuarine environments in the ANZECC.

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.

Sampling of discharge water from the WTPs found levels to be in accordance with the assessment requirements and no exceedances of water quality can be attributed to the TSE works.

9.0 Appendices

Appendix A – Field Sheets

Sydney Metro City & Southwest – TSE works

Surface Water Monitoring Field Form

Horiba Control Unit Serial#	DDAF VIYU	Horiba Probe Serial#	X95DONU5
Date Last Serviced	July 2020	Last Calibrated (Internally)	17/07/20
Date of Monitoring	17/07/20	Persons	
Reason for Monitoring	Quarterly Monitoring ☐	Post Rain ☒	Other:

Location	Time	Temp (°C)	pH	EC (ms/cm)	Turbidity (NTU)	DO (mg/L)	DO (%)	Comment
SW-EC-01	08:25	12.17	1.42*	10.6	23.1	8.40	81.9	Clear/odourless, flowing
SW-AC-01	09:55	14.42	6.36	0.593	29.7	10.15	102.5	light brown, odourless, flowing
SW-FC-01	11:20	15.02	7.71	52.5	30.3	7.24	90.9	Clear, some debris in water, low tide.
SW-B-01	12:10	14.66	8.01	52.6	12.2	6.47	81.4	Clear, odourless, low tide, flowing
SW-BP-01	12:55	14.63	8.09	52.8	0.0	7.62	95.2	Clear, Odourless, Low tide potentially Rising?
SW-MP-01	12:15	15.25	8.09	52.6	0.0	6.49	82.2	Clear, odourless, low tide potentially, *
SW-FR-02	14:55	15.01	8.01	52.5	0.8	4.97	63.8	Clear, Odourless, Rising tide
SW-SC-02	15:35	13.50	7.71	27.3	0.0	4.95	54.4	Clear, Odourless, outflowing
SW-SC-01	16:00	13.86	8.15	0.847	12.0	7.86	77.9	Clear, Odourless

* Probe cal checked - Recalibrated then checked in canal - Reading 7.6

* water flowing through canal

Date/Time of Handover to Lab	4:00pm

Horiba Control Unit Serial#	DDAFV1YU	Horiba Probe Serial#	X95D0NU5
Date Last Serviced	30/06/2020	Last Calibrated (Internally)	25/09/20
Date of Monitoring	25/09/20	Persons	DW + AK
Reason for Monitoring	Quarterly Monitoring ☒	Post Rain ☐	Other:

Location	Time	Temp (°C)	pH	EC (ms/cm)	Turbidity (NTU)	DO (mg/L)	DO (%)	Comment
SW-EC-01	08:51	14.29	7.43	0.795	21.5	5.82	58.8	WTP Not discharging, Slightly turbid
SW-EC-03	09:55	17.95	7.34	41.9	4.9	5.05	64.0	Clear, Odourless, low tide
SW-AC-01	10:30	18.02	8.51	1.35	6.8	10.14	109.0	Clear Odourless, Flowing ~10cm deep
SW-EC-01	11:30	17.33	8.05	51.4	2.0	9.79	126.6	Clear Odourless, High/rising tide
SW-B-01	12:20	17:54	8.08	51.3	4.4	10.20	134.5	Clear Odourless, High tide
SW-BP-01	13:00	17:38	8.12	51.5	1.1	9.05	117.7	Clear Odourless, High tide
SW-MP-01	14:00	17.15	8.08	51.3	2.7	9.22	120.8	Organic odour Slightly turbid, High tide
SW-FR-02	14:25	17.83	8.00	51.0	8.0	7.43	98.0	Clear /Odourless, High tide
SW-SC-02	15:00	17.89	7.68	48.3	4.5	5.60	73.7	Slightly turbid, Odourless, High tide.
SW-SC-01	15:25	17.64	8.00	0.852	11.9	8.80	94.9	Clear, Slight organic odour

Date/Time of Handover to Lab	4:00pm

* SW-EC-02 DRY.

Horiba Control Unit Serial#	DDAFV1YU	Horiba Probe Serial#	X x95DONU5
Date Last Serviced		Last Calibrated (Internally)	20/11/20
Date of Monitoring	20/11/20	Persons	DW/JP
Reason for Monitoring	Quarterly Monitoring ☒	Post Rain ☐	Other:

Location	Time	Temp (°C)	pH	EC (ms/cm)	Turbidity (NTU)	DO (mg/L)	DO (%)	Comment
SW-EC-01	9:38am	22.9	6.97	0.623	8.2	4.5	53.7	Slightly turbid, odourless, WTP not discharging.
SW-EC-03	10:50am	22.7	6.92	47.0	2.8	7.34	104.1	Slightly turbid, odourless, High tide
SW-FC-01	12:20PM	21.3	8.09	50.5	0.0	8.75	121.4	High tide, clear, odourless, rubbish present
SW-B-01	1:07PM	21.06	8.15	50.1	0.0	8.99	125.8	"Clear, Odourless/ High tide.", clean
SW-BP-01	1:31pm	21.15	8.25	51.0	0.0	8.31	117.1	Clear Odourless, high tide
SW-MP-01	1:52pm	23.03	8.22	49.9	0.0	6.88	99.5	Slightly Brown, odourless, high tide.

* Marrickville WTP Not discharging

Date/Time of Handover to Lab	~ 3:00pm

Appendix B – Sampling Results

		Field						Lab						Comments
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease	Total Suspended Solids	Iron - Total	Manganese - Total	Flow/Tide
Monitoring Parameters	Units	°C	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Lower River (LL)		**6.5**	**0.125**	**6.0**		**85.0**	**6.5**	**0.125**					
	Lower River (UL)		**8.0**	**2.2**	**50.0**		**110.0**	**8.0**	**2.2**					
	EPL 20971 (LL)		**6.5**					**6.5**					**1.90**	
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	N/A	7.7	0.5	38.8	*N/A*	*N/A*	7.9	0.5	5.0	12.6	0.80	0.03	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*5.9*	*68.1*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	3.7	0.2	0.2	34.9	1.7	14.5	0.2	0.1	0.0	12.2	0.2	0.3	
	Max Value	23.7	8.3	1.1	116.0	10.8	104.6	8.2	0.5	5.0	46.0	0.9	1.0	
	Min Value	13.9	7.5	0.4	2.6	4.8	58.2	7.4	0.2	5.0	7.0	0.1	0.0	
Baseline dataset	24/08/2017	15.5	7.5	0.4	34.0	6.8	69.7	7.9	0.3	5.0	7.0	0.29	0.02	Flowing
	06/10/2017	19.8	7.6	0.4	4.3	8.7	98.0	7.9	0.5	5.0	10.0	0.45	0.02	Flowing
	25/10/2017	23.6	7.5	*0.6*	2.6	6.0	74.4	7.8	0.5	5.0	*15.0*	*0.84*	*0.05*	Flowing
	22/11/2017	23.7	7.6	*0.5*	10.6	*5.4*	*61.6*	7.8	0.4	-	10.0	0.46	0.02	Flowing
	06/12/2017	21.9	7.9	*0.5*	*58.2*	7.1	83.5	7.7	0.2	5.0	12.0	*0.84*	*0.03*	Heavy Flowing
	30/01/2018	-				-				-	-	-	-	
2018 Q1	29/03/2018	23.7	7.9	*0.6*	*63.7*	*4.8*	*58.2*	8.0	0.4	5.0	*33.0*	*0.85*	0.02	Flowing
2018 Q2	01/06/2018	13.9	7.8	*0.5*	6.3	10.8	104.6	7.4	*0.5*	<5	<5	0.49	*0.03*	Moderately Flowing
Post Rainfall	07/06/2018	16.6	8.1	0.5	*116.0*	8.9	94.7	8.2	0.5	<5	*46.0*	0.06	*1.00*	Flowing
2018 Q3	22/08/2018	14.1	7.6	*0.8*	14.0	7.8	78.4	7.7		<5	12.0	0.42	*0.04*	Flowing
Post Rainfall	08/10/2018	17.4	7.7	0.4	24.4	8.7	94.8	7.9		<5	8.0	0.30	0.02	Moderate flow
2018 Q4	22/11/2018	21.6	8.3	*1.1*	*74.3*	7.4	83.7	7.4	*0.5*	<5	9.0	0.33	*0.03*	
2019 Q1	22/03/2019	23.57	**5.24**	*1.61*	2.4	6.85	82.6	8	*1.5*	< 10	3.2	< 0.05	*0.031*	Organic odour, sightly turbid, mod flow. pH probe faulty
2019 Q2	31/05/2019	14.64	7.79	*1.89*	2.2	11.89	121.5	7	*1.8*	*16*	7.4	0.23	*0.037*	Turbid, organic odour
Post Rainfall	26/06/2019	14.88	7.77	0.428	32.6	9.67	99.2	7.9	0.48	*11*	*23*	*0.83*	0.017	Slightly turbid, organic odour
2019 Q3	09/08/2019													Not enough water to sample
Post Rainfall	30/08/2019	12.97	7.15	0.12	19.6	10.48	102.7	6.8	0.13	*11*	4	0.06	< 0.005	High flow, turbid, rubbish in water
2019 Q4	11/10/2019	16.53	7.51	0.5	32.1	5.94	*62.9*	7.7	*0.53*	*370*	*16*	0.53	*0.031*	Turbid, slightly organic odour
Post Rainfall	11/02/2020	23.81	8.44	*0.699*	7.9	9.1	110.4	7.9	*0.69*	< 10	11	0.43	0.019	Brown, slightly turbid
2020 Q1	12/03/2020	22.49	8.47	*8.47*	5.7	8.82	104.9	**3.5**	*23*	<10	<5	0.23	0.02	
2020 Q1 WTP - CD	12/03/2020	.	.	.	.	.	.	7.7	.	<10	2.8	<0.05	<0.005	Chatswood WTP
2020 Q2	19/06/2020	14.6	8.33	*0.529*	2.4	7.51	76.1	7.5	0.47	*11*	*17*	0.18	0.014	Low outflowing tide, clear, odourless
2020 Q2 WTP - CD	19/06/2020	.	.	.	.	.	.	7.9	0.27	<10	<1	<0.05	<0.005	Chatswood WTP
Post Rainfall	17/07/2020	13.86	8.15	*0.847*	12	7.86	77.9	7.6	*0.76*	< 10	*63*	0.24	0.019	Clear, odourless
2020 PR WTP - CD	17/07/2020	.	.	.	.	.	.	7.2	0.21	<10	<5	0.05	<0.005	Chatswood WTP
2020 Q3	25/09/2020	17.64	8	*0.852*	11.9	8.8	94.9	7.5	*0.63*	<10	7.8	0.27	0.028	Chatswood WTP no longer TSE operated
2020 Q4	20/11/2020	.	.	.	.	.	.	.	.	.	.	.	.	Chatswood WTP no longer TSE operated

		Field						Lab						Comments
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease	Total Suspended Solids	Iron - Total	Manganese - Total	Flow/Tide
Monitoring Parameters	Units	oC	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Estuarine (LL)		**7.0**		**0.5**			**7.0**						
	Esturaine (UL)		**8.5**		**10.0**			**8.5**					**0.08**	
	EPL 20971 (LL)		**6.5**					**6.5**						
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	N/A	7.3	43.8	2.4	*N/A*	*N/A*	7.8	36.4	5.0	10.4	0.60	0.10	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*3.9*	*51.6*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	4.9	0.3	14.6	5.1	2.1	18.9	0.2	13.7	0.7	2.0	0.1	0.1	
	Max Value	30.0	8.3	46.7	16.2	10.4	111.1	7.8	42.0	7.0	11.0	0.7	0.2	
	Min Value	12.6	7.1	0.4	0.0	3.2	45.0	7.0	0.4	5.0	5.0	0.3	0.0	
Baseline dataset	24/08/2017	14.5	7.3	*43.1*	1.6	6.5	78.4	7.8	15.0	5.0	5.0	*0.70*	0.10	Outgoing
	06/10/2017	19.8	*7.6*	*36.6*	0.6	5.1	65.2	7.8	19.0	5.0	10.0	0.29	0.02	Outgoing
	25/10/2017	21.6	7.1	26.1	1.2	8.7	103.0	7.7	30.0	5.0	*11.0*	0.55	0.08	Outgoing
	22/11/2017	22.9	7.1	*46.7*	*3.4*	*3.2*	*45.0*	7.5	42.0	5.0	10.0	0.54	0.05	Outgoing
	06/12/2017	22.1	7.2	*42.9*	2.1	3.9	*51.6*	7.0	35.0	5.0	<5	0.47	0.06	
	30/01/2018	30.0	7.2	36.2	*13.7*	4.7	71.8	7.7	31.0	5.0	10.0	0.52	0.05	Outgoing
2018 Q1	29/03/2018	23.9	*7.4*	*37.3*	1.8	5.5	75.7	7.6	6.8	5.0	10.0	0.31	0.04	Incoming Tide
2018 Q2	01/06/2018	14.2	*7.6*	34.6	*3.3*	7.1	78.2	7.3	27.0	<5	<5	0.25	0.03	Outgoing
Post Rainfall	07/06/2018	15.0	*7.6*	0.4	2.4	6.6	65.9	7.8	0.4	<5	<5	<0.01	*0.24*	Outgoing
2018 Q3	22/08/2018	12.6	*8.3*	34.8	0.8	8.9	98.0	7.8		<5	<5	0.45	0.03	Incoming tide
Post Rainfall	08/10/2018	17.0	*7.4*	0.4	*16.2*	10.4	111.1	7.8		<5	<5	0.25	<0.01	Low tide, outflowing
2018 Q4	22/11/2018	21.4	*7.7*	29.6	0.0	5.5	70.9	7.7	2.3	*7.0*	<5	0.42	0.02	
2019 Q1	22/03/2019	22.81	**5.17**	2.66	1.3	5.93	73.6	7.7	2.2	< 10	1.1	0.13	0.023	Low tide, water clowdy. pH probe faulty
2019 Q2	31/05/2019	13.84	*7.84*	22.7	0	10.79	115.6	7.7	17	< 10	8.4	0.33	0.018	Still, calm, clear water
Post Rainfall	26/06/2019	14.03	*7.69*	0.2	*6.4*	9.38	93.4	7.7	0.35	*13*	7.8	0.33	0.008	Outward flow, slightly turbid
2019 Q3	09/08/2019	13.83	*8.91*	1.33	*2.7*	13.67	<37	*7.9*	*56*	< 10	*13*	0.1	< 0.005	
Post Rainfall	30/08/2019	12.88	*7.41*	0.141	*18.4*	9.3	91	6.9	0.16	*13*	*11*	0.07	< 0.005	High flow, slightly turbid
2019 Q4	11/10/2019	15.07	*7.5*	0.344	*3.8*	6.04	61.6	7.5	0.25	*240*	3.3	0.18	0.007	Near low tide, minimal flow, clear
Post Rainfall	11/02/2020	.	.	.	.	.	.	.	.	.	.	.	.	No Sample - path to sampling point destroyed in storm
2020 Q1	12/03/2020	22.06	*7.74*	35.5	2.2	7.02	93.6	7	6.2	<10	<5	0.33	0.028	
2020 Q2	19/06/2020	13.31	*7.57*	18.9	0.6	*3.62*	*37.2*	7.6	2.2	< 10	*17*	0.23	0.009	Clear, organic odour
Post Rainfall	17/07/2020	13.5	*7.71*	27.3	0	4.95	54.4	7.6	15	< 10	*400*	0.21	0.018	Clear, odourless, outflowing
2020 PR WTP - CD	17/07/2020	.	.	.	.	.	.	7.2	0.21	<10	<5	0.05	<0.005	Chatswood WTP
2020 Q3	25/09/2020	17.89	*7.68*	*48.3*	*4.5*	5.6	73.7	7.6	34	<10	10	0.26	0.019	Chatswood WTP no longer TSE operated
2020 Q4	20/11/2020	.	.	.	.	.	.	.	.	.	.	.	.	Chatswood WTP no longer TSE operated

		Field						Lab						
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease (LLE)	Total Suspended Solids	Iron - Total	Manganese - Total	Flow/Tide
Monitoring Parameters	Units	oC	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Estuarine (LL)		**7.0**		**0.5**			**7.0**						
	Esturaine (UL)		**8.5**		**10.0**			**8.5**					**0.08**	
	EPL 20971 (LL)		**6.5**					**6.5**						
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	N/A	7.7	18.0	35.3	*N/A*	*N/A*	8.0	45.0	5.0	58.4	0.90	0.03	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*7.6*	*98.1*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	3.6	0.3	16.9	271.2	1.2	20.5	0.5	21.8	0.3	215.1	0.5	1.5	
	Max Value	27.3	8.3	49.8	1000.0	10.9	134.0	9.6	49.0	6.0	800.0	1.9	5.4	
	Min Value	15.2	7.2	0.5	0.2	6.5	67.3	7.8	0.4	5.0	7.0	0.1	0.0	
Baseline dataset	24/08/2017	16.0	7.7	*49.8*	0.3	7.7	*98.1*	8.0	49.0	5.0	7.0	0.06	0.01	No water in Canal
	06/10/2017	17.8	*8.0*	0.5	3.0	9.5	134.0	7.9	0.4	5.0	14.0	0.73	0.03	Outgoing
	25/10/2017	22.7	*7.9*	5.9	0.2	8.6	118.0	8.0	44.0	5.0	10.0	0.20	0.01	High
	22/11/2017	22.4	*8.1*	10.0	*100.0*	*7.6*	*90.5*	7.9	1.1	5.0	*100.0*	*1.50*	0.02	Outgoing
	06/12/2017	20.7	*7.8*	0.5	19.0	*7.1*	105.0	7.9	42.0	<5	48.0	0.68	0.04	Outgoing
	30/01/2018	27.3	7.2	3.9	6.2	8.4	103.0	8.1	4.6	5.0	10.0	0.27	0.01	Still
2018 Q1	29/03/2018	22.8	*7.8*	1.5	5.1	*7.4*	*88.5*	7.8	1.0	5.0	10.0	0.77	0.03	Outgoing Tide
2018 Q2	31/05/2018	15.2	7.6	0.5	0.3	*6.8*	*67.4*	7.9		<5	*94.0*	*1.10*	0.03	Flowing, Milky
Post Rainfall	07/06/2018	15.7	*7.7*	0.5	*1000.0*	*6.9*	*69.6*	*9.6*	0.4	<5	*800.0*	0.20	5.40	Outgoing
2018 Q3	22/08/2018	15.7	*8.0*	1.2	*59.9*	*6.5*	*67.3*	*8.1*		<5	12.0	0.82	0.03	Low flow, Milky
Post Rainfall	05/10/2018	18.5	*8.2*	1.2	*85.0*	10.9	119.8	7.9		<5	22.0	*1.90*	0.07	Flowing
2018 Q4	22/11/2018	20.1	*8.3*	*44.8*	12.2	*7.3*	*97.8*	7.9	*46.0*	*6.0*	8.0	0.20	<0.01	No water in Canal
2019 Q1	22/03/2019	24.3	**4.05**	*50*	0.2	*6.92*	101.8	*8.1*	45	< 10	3.1	< 0.05	0.007	High tide, slight organic matter. pH probe faulty
2019 Q2	31/05/2019	18.15	*8.15*	*52*	0	10.01	134.1	8	*53*	*20*	20	< 0.05	< 0.005	Calm water, clear, incoming tide
Post Rainfall	26/06/2019	.	.	.	.	.	.	*8.1*	*49*	*17*	33	< 0.25	< 0.025	
2019 Q3	09/08/2019	14	*8.77*	*42.8*	1.2	13.21	156.3	*8.1*	*56*	< 10	25	0.67	0.022	Sample from harbour, debris in sample, earth works near sample local
Post Rainfall	30/08/2019	13.93	*7.97*	*31.4*	6.9	11.1	121	7.9	34	< 10	12	< 0.05	< 0.005	High flow, odourless, turbid, low tide
2019 Q4	11/10/2019	17.87	*7.97*	*36.4*	10.1	*5.49*	*68.7*	8	37	*15*	22	*0.95*	0.024	Light brown, slightly turbid
Post Rainfall	11/02/2020	25.15	*8.03*	*28.2*	14.7	8.51	115.5	7.7	20	< 10	43	0.24	0.022	Brown, turbid, high tide
2020 Q1	12/03/2020	21.73	*8.35*	*42.8*	2.4	*7.6*	104	7.2	17	<10	<5	0.47	0.026	
2020 Q1 WTP - VC	12/03/2020	.	.	.	.	.	.	6.6	.	<10	<5	<0.05	<0.005	Victoria Cross WTP
2020 Q2	19/06/2020	15.89	*8.35*	*45.9*	2.2	8.3	102.4	7.8	37	< 10	9	0.28	0.014	Lowtide, odourless, slightly turbid
2020 Q2 WTP - VC	19/06/2020	.	.	.	.	.	.	7.3	.	<10	5.8	0.11	0.006	Victoria Cross WTP
Post Rainfall	17/07/2020	15.25	*8.09*	*52.6*	0	*6.49*	*82.2*	7.9	*46*	< 10	*380*	0.07	0.006	Clear, odourless, low tide (rising)
2020 PR WTP - VC	17/07/2020	.	.	.	.	.	.	7.5	0.22	<10	16	<0.05	<0.005	Victoria Cross WTP
2020 Q3	25/09/2020	.	.	.	.	.	.	.	.	.	.	.	.	Victoria Cross WTP no longer TSE operated
2020 Q4	20/11/2020	.	.	.	.	.	.	.	.	.	.	.	.	Victoria Cross WTP no longer TSE operated

		Field						Lab						
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease (LLE)	Total Suspended Solids	Iron - Total	Manganese - Total	Flow/Tide
Monitoring Parameters	Units	oC	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Estuarine (LL)		**7.0**		**0.5**			**7.0**						
	Esturaine (UL)		**8.5**		**10.0**			**8.5**					**0.08**	
	EPL 20971 (LL)		**6.5**					**6.5**						
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	N/A	7.9	51.3	0.2	*N/A*	*N/A*	8.1	52.2	5.0	10.8	0.10	0.01	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*7.0*	*98.7*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	3.1	0.7	2.7	0.7	1.2	14.9	0.1	1.2	0.0	4.8	0.1	0.0	
	Max Value	25.2	9.3	55.1	2.3	10.1	125.0	8.2	53.0	5.0	22.0	0.2	0.1	
	Min Value	14.3	5.9	45.8	0.0	5.2	66.5	7.8	49.0	5.0	5.0	0.0	0.0	
Baseline dataset	24/08/2017	15.4	7.7	50.9	0.0	10.1	125.0	8.1	51.0	5.0	5.0	0.02	0.01	Outgoing
	06/10/2017	18.4	7.6	50.0	0.0	7.6	102.0	8.1	52.0	5.0	10.0	0.06	0.01	Outgoing
	25/10/2017	20.8	7.8	50.1	0.0	8.7	117.0	8.1	53.0	5.0	*14.0*	0.06	0.01	Incoming
	22/11/2017	20.9	7.9	46.9	1.2	7.7	104.6	7.9	49.0	5.0	10.0	0.03	0.01	Outgoing
	06/12/2017	20.2	7.9	*53.0*	0.0	*7.0*	*96.0*	8.0	50.0	5.0	10.0	0.04	0.01	Outgoing
	30/01/2018	25.2	7.8	*53.4*	1.1	*6.5*	*98.7*	7.9	52.0	5.0	10.0	0.09	0.01	Outgoing
2018 Q1	29/03/2018	23.5	*8.2*	*53.2*	*2.3*	7.7	114.2	8.1	51.0	5.0	*22.0*	0.06	0.01	Outgoing tide
2018 Q2	31/05/2018	16.5	*8.1*	*53.3*	0.1	*5.2*	*66.5*	7.8		<5	<5	0.04	<0.01	
Post Rainfall	07/06/2018	16.4	*8.0*	45.8	0.3	7.7	*97.4*	8.1	50.0	<5	6.0	<0.01	0.07	Low tide
2018 Q3	22/08/2018	14.3	*9.3*	*55.1*	0.0	8.4	105.6	8.1		<5	6.0	0.06	<0.01	Calm, low tide
Post Rainfall	05/10/2018	18.2	*8.4*	48.3	0.4	*6.5*	*89.0*	*8.2*		<5	<5	*0.24*	<0.02	Low tide
2018 Q4	22/11/2018	20.3	**5.9**	50.6	0.0	8.6	118.4	8.1	52.0	<5	6.0	0.10	<0.01	
2019 Q1	22/03/2019	23.36	**4.47**	49.7	0	*5.89*	*88.7*	8.1	51	< 10	2.1	< 0.05	< 0.005	High tide, moderate swell. pH probe faulty
2019 Q2	31/05/2019	17.81	*8.16*	*53.9*	0	9.83	132.2	8	50	< 10	8.2	< 0.05	< 0.005	Incoming mid-tide, appears murky, clear in sample bucket
Post Rainfall	26/06/2019	16	*8.13*	48.1	0	8.71	111.1	8.1	*54*	*11*	*45*	< 0.05	< 0.025	Clear, odourless
2019 Q3	09/08/2019	15.08	*9.84*	7.47	*79.6*	16.36	*17.3*	8	*55*	*12*	*33*	< 0.05	< 0.005	Low tide, site not discharging
Post Rainfall	30/08/2019	14.12	7.87	48	*1.8*	8.6	104.3	8	*54*	< 10	*13*	< 0.05	< 0.005	Clear, odourless, rubbish in water
2019 Q4	11/10/2019	18.51	*7.97*	48.6	0.2	*5.5*	*72.4*	8.1	*55*	*17*	*25*	< 0.05	< 0.005	Clear, outgoing tide
Post Rainfall	11/02/2020	23.71	7.85	24.6	*25.1*	7.15	*94.6*	7.5	21	< 10	*48*	*0.48*	*0.018*	Brown, slight turbidity, high tide
2020 Q1	13/03/2020	21.36	*8.42*	21.6	*31.8*	9.54	117.1	**6.1**	50	<10	<5	0.07	0.007	
2020 Q2	19/06/2020	16.17	*8.38*	46.9	0.2	10.37	122	7.8	44	< 10	*13*	0.06	< 0.005	Lowtide, clear, odourless
Post Rainfall	17/07/2020	14.63	*8.09*	*52.8*	0	7.62	*95.2*	8	47	< 10	*370*	< 0.05	< 0.005	Clear, odourless, lowtide (rising)
2020 Q3	25/09/2020	17.38	*8.12*	51.5	1.1	9.05	117.7	8	51	< 10	*12*	< 0.05	< 0.005	Clear, odourless, high tide
2020 Q4	20/11/2020	21.15	*8.25*	51	0	8.31	117.1	8	51	< 10	6.6	< 0.05	< 0.005	Clear, odourless, high tide

		Field						Lab						
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease (LLE)	Total Suspended Solids	Iron - Total	Manganese Total	Flow/Tide
Monitoring Parameters	Units	oC	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Estuarine (LL)		**7.0**		**0.5**			**7.0**						
	Esturaine (UL)		**8.5**		**10.0**			**8.5**					**0.08**	
	EPL 20971 (LL)		**6.5**					**6.5**						
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	N/A	7.7	53.0	1.6	*N/A*	*N/A*	8.0	52.0	5.0	10.4	0.03	0.01	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*6.3*	*88.7*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	3.3	0.7	1.9	1.7	1.1	15.5	0.1	1.2	0.0	4.8	0.1	0.0	
	Max Value	25.4	9.3	54.8	6.2	9.2	119.1	8.1	52.0	5.0	22.0	0.3	0.0	
	Min Value	14.2	6.0	48.3	0.0	5.0	63.3	7.8	49.0	5.0	5.0	0.0	0.0	
Baseline dataset	24/08/2017	15.2	7.6	50.8	0.0	8.4	105.2	8.0	50.0	5.0	5.0	*0.02*	0.01	Outgoing
	06/10/2017	18.3	7.6	50.0	*6.2*	8.0	115.0	8.0	52.0	5.0	10.0	*0.03*	0.01	Outgoing
	25/10/2017	21.0	7.7	49.9	0.0	8.3	115.6	8.0	52.0	5.0	*12.0*	*0.03*	0.01	Incoming
	22/11/2017	21.3	7.7	*53.0*	0.5	*6.3*	*88.7*	7.8	49.0	5.0	10.0	*0.04*	0.01	Incoming
	06/12/2017	20.8	7.8	*53.1*	0.0	6.6	92.7	8.0	49.0	5.0	10.0	*0.03*	0.01	Incoming
	30/01/2018	25.4	7.7	*53.4*	0.0	*6.2*	*85.0*	8.0	52.0	5.0	10.0	*0.04*	0.01	Outgoing
2018 Q1	29/03/2018	23.4	*8.2*	*53.1*	*2.4*	7.4	109.5	*8.1*	50.0	5.0	*22.0*	*0.03*	0.01	Outgoing tide
2018 Q2	31/05/2018	17.1	*8.1*	*53.2*	0.1	*5.0*	*63.3*	7.8	.	<5	<5	*0.05*	<0.01	
Post Rainfall	07/06/2018	15.8	8.0	51.5	0.4	7.1	90.4	8.0	50.0	<5	<5	<0.01	0.04	Low tide
2018 Q3	22/08/2018	14.2	*9.3*	*54.8*	0.0	7.4	93.8	8.0	.	<5	<5	*0.04*	<0.01	Clear odourless, calm
Post Rainfall	05/10/2018	17.3	*8.1*	48.3	0.5	9.2	119.1	8.0	.	<5	<5	*0.27*	<0.02	Outgoing
2018 Q4	22/11/2018	20.6	**6.0**	49.5	0.0	7.9	109.0	8.0	52.0	<5	<5	*0.04*	<0.01	
2019 Q1	22/03/2019	23.58	**5.88**	46.8	0.5	*5.61*	*79.2*	8	49	< 10	3.4	< 0.05	< 0.005	High tide, moderate swell. pH probe faulty
2019 Q2	31/05/2019	17.71	*8.14*	*54.1*	0	7.12	95.6	8	51	*15*	*14*	< 0.05	< 0.005	Low tide, clear
Post Rainfall	26/06/2019	16.47	*8.09*	46.6	0	8.3	98.9	8	*53*	*17*	*40*	< 0.25	< 0.025	Clear, odourless
2019 Q3	09/08/2019	15.21	*9.07*	45.5	0.3	14.7	180.4	**2.5**	*57*	*17*	*11*	< 0.05	< 0.005	Low tide, no debris
Post Rainfall	30/08/2019	14.44	7.85	47.3	0.4	8.46	103	7.8	52	< 10	*12*	< 0.05	< 0.005	Clear water, odourless, high tide
2019 Q4	11/10/2019	18.13	7.91	40.6	*2.2*	6.31	*82.1*	*8.1*	*54*	*23*	4.9	< 0.05	< 0.005	Clear, high tide
Post Rainfall	11/02/2020	24.33	7.72	17.3	*20.8*	8.41	108.3	7.6	15	< 10	*38*	*0.45*	*0.016*	Brown, slight turbid, high tide
2020 Q1	12/03/2020	21.56	*8.33*	36.7	*6.6*	9.1	117.5	6.9	49	<10	<5	*0.06*	0.007	
2020 Q1 WTP - BN	12/03/2020	.	.	.	.	.	.	6.6	.	<10	2.2	<0.05	<0.005	Barangaroo WTP
2020 Q2	19/06/2020	15.46	*8.34*	45.8	*3.3*	9.25	113	7.8	44	< 10	*26*	< 0.05	0.005	Lowtide, clear, odourless
2020 Q2 WTP - BN	19/06/2020	.	.	.	.	.	.	7.1	25	<10	*11*	*1*	**0.64**	Barangaroo WTP
Post Rainfall	17/07/2020	14.66	*8.01*	52.6	*12.2*	6.47	*81.4*	7.9	47	< 10	**400.0**	< 0.05	< 0.005	Clear, odourless, lowtide
2020 PR WTP - BN	17/07/2020	.	.	.	.	.	.	7.6	31	<10	**120.0**	*1.3*	**4.60**	Barangaroo WTP (not discharging)
2020 PR WTP - BN	30/07/2020	.	.	.	.	.	.	7.7	.	<10	*17*	*1.2*	**2.80**	Barangaroo WTP
2020 Q3	25/09/2020	17.54	*8.08*	51.3	*4.4*	10.2	134.5	7.9	50	< 10	8.2	< 0.05	< 0.005	Clear, odourless, high tide
2020 Q3 WTP - BN	25/09/2020	.	.	.	.	.	.	8	.	< 10	*42*	*0.73*	**0.32**	Barangaroo WTP
2020 Q4	20/11/2020	21.06	*8.15*	50.1	0	8.99	125.8	8	50	< 10	*31*	< 0.05	< 0.005	Clear, odourless high tide, WTP not discharging
2020 Q4 WTP - BN	20/11/2020	.	.	.	.	.	.	.	.	.	.	.	.	Barangaroo WTP (not discharging)

		Field						Lab						
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease (LLE)	Total Suspended Solids	Iron - Total	Manganese - Total	Flow/Tide
Monitoring Parameters	Units	oC	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Estuarine (LL)		7.0		0.5			7.0						
	Esturaine (UL)		8.5		10.0			8.5					0.08	
	EPL 20971 (LL)		**6.5**					**6.5**						
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	N/A	7.9	53.0	1.6	*N/A*	*N/A*	8.0	49.4	5.0	11.6	0.10	0.01	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*6.7*	*94.6*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	2.9	0.7	1.6	9.4	2.2	27.8	0.1	1.9	0.0	5.3	0.1	0.1	
	Max Value	24.7	9.0	54.7	31.7	14.6	193.0	8.1	51.0	5.0	25.0	0.6	0.3	
	Min Value	14.2	6.0	48.7	0.0	5.9	86.2	7.8	45.0	5.0	5.0	0.0	0.0	
Baseline dataset	24/08/2017	15.7	7.6	50.5	0.4	8.5	106.2	8.0	49.0	5.0	*18.0*	0.04	0.01	Outgoing
	06/10/2017	18.4	7.7	50.0	0.0	9.5	128.0	8.0	51.0	5.0	10.0	0.06	0.01	Outgoing
	25/10/2017	20.5	7.9	50.1	*6.5*	7.9	108.5	7.9	48.0	5.0	10.0	0.08	0.01	Incoming
	22/11/2017	20.8	7.8	*53.0*	0.2	*6.7*	*94.6*	7.8	46.0	5.0	10.0	0.05	0.01	Incoming
	06/12/2017	19.6	7.9	*53.1*	0.4	7.4	101.4	8.0	49.0	5.0	10.0	0.05	0.01	Outgoing
	30/01/2018	24.7	7.7	50.9	*19.0*	*6.3*	*93.0*	8.0	50.0	5.0	*14.0*	*0.20*	0.01	Outgoing
2018 Q1	29/03/2018	23.4	*8.2*	51.5	*3.9*	*5.9*	*87.1*	8.0	48.0	5.0	*25.0*	*0.21*	0.01	Outgoing Tide
2018 Q2	31/05/2018	17.2	*8.1*	52.7	*31.7*	7.3	*93.3*	7.8		<5	<5	0.10	<0.01	
Post Rainfall	07/06/2018	17.2	*8.0*	51.3	1.3	6.7	*86.2*	*8.1*	45.0	<5	11.0	<0.01	0.28	Low tide
2018 Q3	22/08/2018	14.2	*9.0*	*54.7*	*8.0*	8.1	101.5	8.0		<5	9.0	0.10	<0.01	Low tide, calm
Post Rainfall	05/10/2018	17.2	*9.0*	52.1	1.1	14.6	193.0	*8.1*		<5	5.0	*0.58*	<0.02	High Tide
2018 Q4	22/11/2018	20.0	**6.0**	48.7	0.0	8.1	110.2	8.0	*51.0*	<5	<5	*0.20*	<0.01	
2019 Q1	22/03/2019	23.16	**6.03**	50.1	0.5	*6.11*	*90.6*	*8.1*	48	< 10	2.7	< 0.05	< 0.005	High tide, some sediment in water. pH probe faulty
2019 Q2	31/05/2019	17.84	*8.21*	*53.9*	0	8.47	113.9	8	*52*	< 10	*41*	0.1	< 0.005	Murkey appearance, clean in sample
Post Rainfall	26/06/2019	16.05	*8.14*	48	*3.5*	8.33	104.2	*8.1*	*54*	*17*	*42*	< 0.25	< 0.025	Hydrocarbon odour and sheen on water (boat fuel) and litter
2019 Q3	09/08/2019	12.24	*8.82*	49.9	0	17.2	215	*8.1*	*56*	*12*	*14*	*0.11*	< 0.005	Low tide, no debris
Post Rainfall	30/08/2019	15.06	7.53	49.1	*2.2*	*6.63*	*82.5*	8	41	< 10	*34*	< 0.05	< 0.005	Yellow brown sediment plume, odourless
2019 Q4	11/10/2019	17.88	7.89	49.3	0	*5.73*	*75.1*	*8.1*	*54*	*20*	5.7	< 0.05	< 0.005	Clear, high tide
Post Rainfall	11/02/2020	23.29	7.6	27.1	*17*	8.78	114.7	7.7	25	< 10	*93*	*0.35*	*0.016*	Slight organic odour, slight turbidity (brown), high tide
2020 Q1	12/03/2020	21.56	*8.42*	21.6	*31.8*	9.54	117.1	**6.3**	*50*	<10	*19*	<0.05	0.006	
2020 Q1 WTP -PS	12/03/2020	.	.	.	.	.	.	6.6	.	<10	*16*	*0.21*	0.06	Pitt Street WTP
2020 Q1 WTP - BL	12/03/2020	.	.	.	.	.	.	7.1	.	<10	7.2	*0.19*	0.037	Martin Place WTP
2020 Q2	19/06/2020	16.3	*8.22*	45	*2*	9.5	116.1	7.8	42	< 10	*20*	*0.18*	< 0.005	Low tide, odourless, some sediment
2020 Q2 WTP -PS	19/06/2020	.	.	.	.	.	.	.	.	.	.	.	.	No discharge from Pitt St
2020 Q2 WTP - BL	12/03/2020	.	.	.	.	.	.	7.7	25	<10	2.2	<0.05	0.015	Martin Place WTP
Post Rainfall	17/07/2020	15.02	7.71	52.5	*30.3*	7.24	*90.9*	7.9	46	< 10	**98**	*1*	0.019	Clear, some debris, low tide
2020 PR WTP - BL	17/07/2020	.	.	.	.	.	.	7.4	0.53	<10	8	*0.11*	0.008	Martin Place WTP
2020 Q3	25/09/2020	17.33	*8.05*	51.4	*2*	9.79	126.6	8	*50*	< 10	*26*	< 0.05	< 0.005	Clear, odourless, rising tide
2020 Q3 WTP - BL	25/09/2020	.	.	.	.	.	.	7	1.3	<10	*24*	*0.15*	0.021	Martin Place WTP
2020 Q4	20/11/2020	21.3	*8.09*	50.5	0	8.75	121.4	7.8	45	< 10	*20*	*0.16*	0.007	High tide, clear, odourless, some rubbish in water
2020 Q4 WTP - BL	20/11/2020	.	.	.	.	.	.	7.3	1.9	<10	*18*	0.1	0.027	Martin Place WTP

		Field						Lab						
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease (LLE)	Total Suspended Solids	Iron - Total	Manganese - Total	Flow/Tide
Monitoring Parameters	Units	oC	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Lower River (LL)		6.5	0.125	6.0		85.0	6.5	0.125					
	Lower River (UL)		8.0	2.2	50.0		110.0	8.0	2.2				1.90	
	EPL 20971 (LL)		**6.5**					**6.5**						
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	*N/A*	*7.7*	*0.6*	*170.2*	*N/A*	*N/A*	*7.7*	*0.6*	*5.0*	*57.0*	*2.80*	*0.30*	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*3.6*	*39.0*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	4.4	0.8	0.6	181.0	4.8	49.7	0.6	0.2	1.0	59.6	1.4	0.4	
	Max Value	24.3	8.6	2.3	687.0	20.9	220.7	9.0	1.0	8.0	230.0	4.6	1.6	
	Min Value	8.6	5.6	0.1	5.0	2.8	32.4	6.6	0.1	5.0	10.0	0.0	0.0	
Baseline dataset	24/08/2017	15.4	7.4	*0.7*	38.1	10.2	103.6	7.8	0.6	5.0	**51.0**	0.58	0.06	Low
	06/10/2017	19.2	7.3	0.6	27.3	3.6	*39.0*	7.7	0.6	5.0	32.0	1.50	0.30	Low
	25/10/2017	21.0	7.0	0.5	22.9	5.6	63.5	7.6	*0.6*	5.0	12.0	2.50	0.30	Low
	22/11/2017	20.7	6.8	0.1	170.0	6.9	74.6	7.1	0.1	5.0	*81.0*	2.60	0.04	High
	06/12/2017	21.4	7.3	0.5	*171.0*	4.4	49.6	7.2	0.5	5.0	42.0	*3.50*	0.08	Still
	30/01/2018	24.3	5.6	0.4	5.0	3.0	*36.5*	7.0	0.5	5.0	10.0	0.62	0.09	Still
2018 Q1	29/03/2018	21.8	7.4	*2.3*	22.9	2.8	*32.4*	7.6	*1.0*	5.0	22.0	0.67	0.20	Low
2018 Q2	31/05/2018	14.5	*8.2*	0.4	21.4	9.5	94.2	*7.8*		<5	18.0	0.46	0.03	Flowing
Post Rainfall	07/06/2018	13.2	7.1	0.5	71.2	10.4	98.8	*9.0*	0.5	<5	13.0	0.02	*1.60*	Flowing
2018 Q3	22/08/2018	8.6	*8.1*	0.3	39.5	5.8	51.1	7.6		<5	10.0	0.10	0.02	Limited flow
Post Rainfall	05/10/2018	16.3	*8.6*	0.2	144.0	20.9	220.7	*8.3*		<5	13.0	0.68	0.02	Flowing
2018 Q4	22/11/2018	22.3	**6.1**	0.2	*687.0*	9.2	108.3	6.6	0.2	*8.0*	*230.0*	*4.60*	0.20	High
2019 Q1	22/03/2019							*7.9*	*1.2*	<10	7.7	<0.05	0.022	No access into canal for field testing
2019 Q2	31/05/2019	14.86	*8.86*	0.4	9.1	12.84	131.2	*8.6*	0.33	*22*	16	0.21	0.008	Slowly flowing, relatively clear
Post Rainfall	26/06/2019	15.35	*8.03*	*0.775*	*183*	10.92	112.9	6.8	*0.87*	< 10	*120*	2.3	0.053	High flow rate, turbid water, odourless
2019 Q3	09/08/2019	16.67	*8.81*	*2.23*	30	15.61	166.6	7.6	*4.1*	*26*	12	0.39	0.045	Shallow, mod flow, algae in canal, no grease/oil
Post Rainfall	30/08/2019	14.32	6.71	*1.66*	19.4	9.74	98.8	6.9	*1.8*	< 10	12	< 0.05	0.023	Discharge canal clear, others turbid
2019 Q4	11/10/2019	17.85	7.05	*3.3*	3.7	8.49	93.1	7.5	*3.5*	*22*	18	0.13	0.054	Shallow water, clear, minimal buildup
Post Rainfall	11/02/2020	23.16	*9.68*	*1.8*	1.8	9.29	111	7.3	*1.5*	*38*	14	0.39	0.023	pH comparable to non-discharge channel in canal
2020 Q1	12/03/2020	21.06	*7.99*	*3.59*	1	8.72	101.5	6.7	*3.4*	<10	25	0.25	0.025	
2020 Q1 WTP - MD	12/03/2020	.	.	.	.	.	.	6.6	.	<10	<5	0.05	0.091	Marrickville WTP
2020 Q2	19/06/2020	15.68	7.03	*3.61*	8.6	12.01	124.9	7.2	*3.4*	< 10	23	0.2	0.048	Clear, odourless, WTP not discharging
2020 Q2 WTP - MD	19/06/2020	.	.	.	.	.	.	.	.	.	.	.	.	Marrickville WTP not discharging
Post Rainfall	17/07/2020	12.17	7.6	*10.6*	23.1	8.4	81.9	*7.9*	0.41	< 10	27	0.54	0.014	Clear, odourless, flowing
2020 PR WTP - MD	17/07/2020	.	.	.	.	.	.	7.6	*30*	<10	*260*	1.5	*5.3*	Marrickville WTP (not discharging)
2020 PR WTP - MD	07/08/2020	.	.	.	.	.	.	6.8	.	.	40	.	.	Marrickville WTP
2020 Q3	25/09/2020	14.29	7.43	*0.795*	21.5	5.82	58.8	7.6	*0.72*	< 10	15	0.64	0.15	WTP not discharging, slightly turbid
2020 Q3 WTP - MD	25/09/2020	.	.	.	.	.	.	.	.	.	.	.	.	WTP not Discharging
2020 Q4	20/11/2020	22.9	6.97	*0.623*	8.2	4.5	53.7	7.5	*0.6*	< 10	13	1	0.26	WTP not discharging, slightly turbid
2020 Q4 WTP - MD	20/11/2020	.	.	.	.	.	.	.	.	.	.	.	.	WTP not Discharging

APPENDIX B **SW-AC-01**

		Field						Lab						
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease (LLE)	Total Suspended Solids	Iron - Total	Manganese - Total	Flow/Tide
Monitoring Parameters	Units	oC	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Lower River (LL)		6.5	0.125	6.0		85.0	6.5	0.125					
	Lower River (UL)		8.0	2.2	50.0		110.0	8.0	2.2				1.90	
	EPL 20971 (LL)		**6.5**					**6.5**						
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	N/A	7.3	0.6	14.9	*N/A*	*N/A*	8.0	0.6	5.0	10.0	0.90	0.03	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*7.3*	*96.0*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	3.3	0.9	0.2	59.3	2.1	20.9	0.6	0.1	0.3	230.2	4.8	0.2	
	Max Value	25.6	9.6	0.8	203.0	14.2	150.0	9.2	0.5	6.0	820.0	18.0	0.6	
	Min Value	14.3	6.0	0.2	0.0	6.6	68.9	6.8	0.2	5.0	5.0	0.0	0.0	
Baseline dataset	24/08/2017	16.7	7.3	0.5	*22.5*	9.8	104.0	8.0	0.5	5.0	5.0	0.80	*0.05*	Fast flow
	06/10/2017	18.8	7.2	0.4	3.4	9.2	97.0	8.0	0.5	5.0	10.0	0.50	0.03	Fast flow
	25/10/2017	20.6	7.3	*0.8*	0.5	*6.6*	103.2	8.3	0.5	5.0	10.0	0.33	0.01	Fast flow
	22/11/2017							7.1	0.2	5.0	10.0	0.42	0.02	Very fast flow
	06/12/2017							8.0	0.5	5.0	10.0	*1.30*	0.02	Very fast flow
	30/01/2018	25.6	6.4	0.5	4.3	7.8	*94.4*	7.8	0.5	5.0	10.0	0.23	0.01	Fast flow
2018 Q1	29/03/2018	22.6	8.1	0.5	7.4	8.2	97.2	*8.1*	0.5	5.0	*25.0*	0.55	*0.04*	fast flow
2018 Q2	31/05/2018	16.5	7.7	*0.7*	9.0	*6.8*	*68.9*	7.6		<5	*86.00*	*3.70*	*0.30*	Moderate Flow, light brown
Post Rainfall	07/06/2018	16.3	7.4	0.5	3.7	7.6	*76.9*	7.8	0.5	<5	<5	0.03	*0.55*	Flowing
2018 Q3	22/08/2018	14.3	8.2	0.5	*50.8*	8.5	*86.2*	7.9		<5	6.0	0.45	0.02	Moderate flow, worksite
Post Rainfall	05/10/2018	16.6	**9.6**	0.3	0.0	14.2	150.0	*9.2*		<5	*820.00*	*18.00*	*0.40*	Flowing, turbid
2018 Q4	22/11/2018	20.6	**6.0**	0.2	*203.0*	9.7	110.8	6.8	0.2	*6.0*	*76.00*	*3.80*	*0.10*	fast flow
2019 Q1	22/03/2019	22.1	**4.8**	0.518	14.2	*6.62*	*76.3*	*8*	0.45	< 10	5.6	0.15	0.03	Fast flow, slightly turbid. pH probe faulty
2019 Q2	31/05/2019	16	7.9	0.57	0	10.35	108	7.7	0.58	*15*	< 5	0.34	0.023	slow flow, clear
Post Rainfall	26/06/2019	17.14	6.97	0.381	14.2	7.77	*82.8*	7.6	0.4	*13*	*16*	0.51	*0.033*	high flow, clear, no odour
2019 Q3	09/08/2019							7.9	0.53	*11*	*74.00*	*2.3*	*0.07*	too shallow, cannot take readings
Post Rainfall	30/08/2019	14.23	**4.81**	0.308	7.8	8.51	*85.6*	7.5	0.26	< 10	3.8	0.12	0.013	light brown, ex-situ sample
2019 Q4	11/10/2019	17.92	**6.34**	0.476	1.2	*6.65*	*72.1*	*8.4*	0.45	*64*	2.1	0.2	< 0.005	low water level, clear, pH re-calibrated, reading within range (results acceptable)
Post Rainfall	11/02/2020	23.81	7.29	*0.653*	12	7.8	*94.4*	*8*	*0.61*	< 10	*14*	0.5	*0.04*	Clear, odourless
2020 Q1	12/03/2020							7.4	0.43	<10	<5	*0.97*	*0.041*	To shallow, cannot take readings
2020 Q2	19/06/2020	16.32	8.15	0.452	0.9	14.6	145.8	7.7	0.42	< 10	*53.00*	0.23	0.01	flowing, clear, debris, WTP not connected
Post Rainfall	17/07/2020	14.42	**6.36**	0.593	*29.7*	10.15	102.5	7.8	0.41	< 10	*23*	0.36	0.018	light brown, odourless, flowing, WTP not operational
2020 PR WTP - WL	17/07/2020	.	.	.	.	.	.	7.9	*1.3*	<10	*24*	<0.05	0.027	Waterloo WTP
2020 Q3	25/09/2020	.	.	.	.	.	.	.	.	.	.	.	.	Waterloo WTP no longer TSE operated
2020 Q4	20/11/2020	.	.	.	.	.	.	.	.	.	.	.	.	Waterloo WTP no longer TSE operated

		Field						Lab						
	Analyte	Temp	pH	Electrical Conductivity	Turbidity	DO	DO	pH	Electrical Conductivity	Oil & Grease (LLE)	Total Suspended Solids	Iron - Total	Manganese - Total	Flow/Tide
Monitoring Parameters	Units	oC	pH Units	mS/cm)	NTU	mg/L	%	pH Units	mS/cm)	(LLE)	mg/L	mg/L	mg/L	
	Estuarine (LL)		7.0		0.5			7.0						
	Esturaine (UL)		8.5		10.0			8.5					0.08	
	EPL 20971 (LL)		**6.5**					**6.5**						
	EPL 20971 (UL)		**8.5**					**8.5**			**50.0**			
	Baseline 80%ile	N/A	N/A	N/A	N/A	*N/A*	*N/A*	N/A	N/A	N/A	N/A	N/A	N/A	
	Baseline 20%ile	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	
	Standard Dev	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Max Value	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Min Value	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2020 Q3	25/09/2020	17.95	7.34	41.9	4.9	5.05	64	7.5	38	< 10	*17*	*0.21*	0.028	Clear, odourless, low tide
2020 Q3 WTP - MD	25/09/2020	.	.	.	.	.	.	.	.	.	.	.	.	WTP not Discharging
2020 Q4	20/11/2020	22.7	6.7	47	2.8	7.34	104.1	7.7	47	< 10	10	*0.15*	0.016	Slightly turbid, odourless, high tide
2020 Q4 WTP - MD	20/11/2020	.	.	.	.	.	.	.	.	.	.	.	.	WTP not Discharging