Water Quality and Monitoring Program: 2020 – 2021 Annual Report

Project Name: WestConnex M8

Project: M8

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Document Approval

Rev.	Date	Prepared By	Reviewed By	Approved By	Comments
1	20/06/2021	J. Wheatley	J. Hazelbrook	J. Hazelbrook	Initial Draft
2	17/08/2021	K.Guven	J. Hazelbrook	J. Hazelbrook	Finalise groundwater data
3	20/08/2021	J. Hazelbrook	A. Hewitt	A. Hewitt	Final review, issue to WCX

Details of Revision Amendments

Amendments

Any revisions or amendments must be approved by the O and M Manager before being distributed or implemented.

Glossary of Terms

Term/Abbreviation	Definition
ANZECC	Australia and New Zealand Guideline for Fresh and Marine Water Quality 2000 (Australian and New Zealand Environment and Conservation Council)
BOM	Bureau of Meteorology
CoA	Minister's Condition of Approval (to be obtained with Infrastructure Approval)
DPI&E	Department of Planning, Industry and Environment
EPL	Environmental Protection Licence
FHEOM	Fulton Hogan Egis Operations and Maintenance
GDE	Groundwater Dependent Ecosystem
Infrastructure Approval	Approval under the Environmental Planning and Assessment Act 1979 for SSI-6788 signed by the Minister for Planning on 20 April 2016
mg/L	Milligrams per litre
NATA	National Association of Testing Authorities
NTU	Nephelometric Turbidity Units
TKN	Total Kjeldahl Nitrogen
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
WQMP	Water Quality Monitoring Program

Contents

Summary

Water quality data for both the surface and ground water monitoring is presented in this report for the period from July 2020 to June 2021 (the first year of operations of the M8 Project). All water quality monitoring was undertaken in accordance with the WQMP and included:

- Water quality monitoring at discharge points;
- Monthly surface water monitoring at the operational surface water monitoring locations;
- Wet weather monitoring as required in the WQMP, Table 19;
- The continuation of visual inspections for potential sensitive receiving environments;
- 6-monthly groundwater monitoring and trend analysis for selected analytes; and
- Groundwater level monitoring at all locations noted in the WQMP, table 20.

Surface water quality and groundwater quality monitoring was completed in accordance with the WQMP, whilst occasional parameters or analytes were noted above respective trigger values, investigation and assessment did not link elevated concentrations to project works. Trends were more notably related to catchment variability and external factors such as the high urbanisation of the surrounding catchment area. Importantly, during the monitoring period, no adverse water quality impacts were observed at surface water or groundwater locations that could be attributed to the project's activities.

1. Introduction

1.1 Purpose and Application

Section 9, Table 23: Operating Reporting Schedule of the Water Quality Monitoring Program (WQMP), required under Condition B14 of the Infrastructure Approval (SSI-6307), requires an annual summary of the operational water quality data. This report has been prepared to satisfy this requirement. Water quality monitoring is undertaken to monitor the effectiveness of mitigation measures as they relate to water quality for the WestConnex M8 Project. This report presents the data and analysis as required by the approved WQMP, for the first year of operation. In accordance with these requirements, this report will be distributed to DPI&E, EPA and relevant councils.

1.2 Scope

This report presents and interprets water quality data collected during the first year of operation of the project (July 2020 – July 2021: the monitoring year).
The scope of monitoring works has been undertaken in accordance with Water Quality Monitoring Program (WQMP). All supporting information, including methods for data collection and analysis are provided in the WQMP. This report does not cover the Alexandra Landfill leachate monitoring, results will be covered under the annual return as required under Environmental Protection Licence 4627.

2. Rainfall Data

Rainfall data has been collected from weather stations identified in section 7 of the WQMP. Data was obtained from the Bureau of Meteorology (BOM) Sydney Airport Weather Station, being the geographically most relevant location available. The monthly totals for rainfall are detailed in Table 1.

Table 1. Monthly Rainfall Data (mm). Long term averages from the Bureau of Meteorology's climate statistics are provided in brackets.

Monthly rainfall totals (mm) for the reporting period	
Month	**Sydney Airport #066037**
Jul - 20	145.6 (69.2)
Aug - 20	60 (75.6)
Sep - 20	29 (59.7)
Oct - 20	64.8 (70.1)
Nov - 20	42.2 (79.5)
Dec - 20	72 (72.8)
Jan - 21	62.8 (93.8)
Feb - 21	116.4 (114.3)
Mar - 21	350.4 (120.7)
Apr - 21	16.6 (105.0)
May - 21	87.8 (95.3)
Jun - 21	26.2 (124.8)
Total	1141 (1079.1)

3. Water Discharge and Targets

3.1 Discharge and Monitoring Locations

The operational Water Treatment Plant (WTP) discharges to a tidal storage basin which drains during an outgoing tide via "wet well" into the southern bank of the Cooks River. The discharge location to the river was selected as close to the saline environment as possible, whilst avoiding existing infrastructure / utilities to minimise the potential impacts due to excavation and laying new pipes. The water treatment has been available and active throughout the entire first year of operations (Table 2).

Table 2. Discharge and monitoring Locations

Water Treatment Plant	Easting	Northing	Months Active											
			Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21
Cintra Park Water Treatment Plant															
Water Treatment Plant ARN-2	329565	6243133	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

3.2 Discharge Criteria

The operational WTP discharges water that is continuously monitored for pH and turbidity in order to meet the requirements of EPL (21351). The concentration limits referenced in Environmental Protection Licence 21351 are listed below in Table 3. The concentration limits outline the acceptable discharge criteria from the Arncliffe Water Treatment Plant. A monthly grab sample is collected for analysis.

Table 3. WTP Discharge and Monitoring Pollutant and concentration limits.

Analyte	Unit	50th Percentile Concentration Limit	90th Percentile Concentration Limit	100th Percentile Concentration Limit
pH (field)	pH Units			6.5 - 8.5
Turbidity	NTU			25
Aluminium	µg/L	500	600	
Cobalt	µg/L	2.8	8	
Copper	µg/L	2.9	10.3	
Manganese	µg/L	2000	10600	
Zinc	µg/L	48	150	
Total Recoverable Hydrocarbons				
C10 - C16	µg/L	<100	<100	
C16 - C34	µg/L	<100	<100	
C34 - C40	µg/L	<100	<100	

3.3 Management Trigger Values and Selected Analytes for Monitoring

3.3.1 Surface Water

For parameters where the 80th percentile value is lower than the ANZECC (2000) default value, the ANZECC default value was adopted as the trigger value. Surface water quality data was divided into two categories when evaluating the relevant management trigger value which was based on the receiving watercourses:

- Freshwater: Comprising Wolli Creek and Sheas' Creek; and
- Estuary: Comprising Cooks River and Alexandra Canal.

The M8 project falls within the catchment of Cooks River. Historically the receiving waters to the Cooks River is poor, due to the estuary being heavily modified due to urbanisation. There are a large number of pollutant sources from urban areas in the estuary catchment, including:

- Nutrients, e.g. from fertilisers and cleaning products;
- Heavy metals, e.g. from some industrial sites and roads;
- Organochlorine and organophosphate pesticides;
- Polycyclic aromatic hydrocarbons associated with heavy industry/combustion;
- Phenols used in industrial chemical synthesis; and
- Sewage from sewer overflows.

The management responses were triggered when monitoring values exceeded the limits specified below (Table 4).

Table 4. Management Surface Water Trigger Values (SSTV's) for each respective water body.

Analyte	Unit	LOR	Freshwater SSTV's	Estuary SSTV's
pH (field)	pH Units	0.01	6.5 - 8.5	7.0 - 8.5
Conductivity	µS/cm	1	311 - 1660	50200
Dissolved Oxygen	% Sat	0.1	60	60 - 110
Turbidity	NTU	0.1	29	10
Total suspended solids	mg/L	5	50	21
Arsenic	mg/L	0.001	0.36	0.0024
Cadmium	mg/L	0.0001	0.0008	0.0005
Chromium	mg/L	0.001	0.04	0.0004
Copper	mg/L	0.001	0.012	0.0003
Lead	mg/L	0.001	0.0094	0.0004
Nickel	mg/L	0.001	0.017	0.007
Zinc	mg/L	0.05	0.059	0.0056
Iron	mg/L	0.05	0.3	0.3
Ammonia as N	mg/L	0.01	2.3	0.091
Nitrate as N	mg/L	0.01	17	0.07
Total Nitrogen as N	mg/L	0.1	2.89	1.2
Total phosphorus as P	mg/L	0.001	0.12	0.17

The selected analytes required for surface water quality monitoring are listed in Table 5. These are considered sufficient to determine any impacts the motorway may have on surrounding aquatic environments.

Table 5. Operational surface water quality monitoring parameters.

Frequency	Chemical Group	Analyte
Monthly	General Parameters	pH (Field)
		Electrical Conductivity (Field)
		Temperature (Field)
		Dissolved Oxygen (Field)
		Redox (Field)
		Total Dissolved Solids (TDS) (Field)
		Total Suspended Solids (TSS)
		Turbidity (Field)
	Dissolved Metals	Arsenic
		Cadmium
		Chromium
		Copper
		Lead
		Nickel
		Zinc
		Iron
		Mercury
	Nutrients	Ammonium as N
		Ammonia as N
		Nitrite as N
		Nitrate as N
		Nitrite and Nitrate as N
		Total Nitrogen as N
		Total Kjeldahl Nitrogen (TKN) as N
		Total Phosphorus as P
	Hydrocarbons	Total Petroleum Hydrocarbons C6-C36
		Total Recoverable Hydrocarbons C6-C40
		BTEXN

3.3.2 Groundwater

Groundwater quality has been monitored to determine if any selected analytes deviate throughout the operational monitoring period. The analytes monitored throughout the operational water quality monitoring program are listed below in Table 6.

Table 6. Operational groundwater quality monitoring parameters

Analyte(s)	Rationale for selection
pH	Monitor for any potential influence from acid sulphate soil possibly present in some of the project area
EC	Monitor for potential saltwater intrusion from Cooks River.
Arsenic **Chromium** **Copper** **Lead** **Iron** **Ammonia**	Monitor for potential mobilisation of these analytes from the surrounding environment based on the potential ecotoxicology of these metals and based on baseline observations.
TRH **BTEX**	Monitor for potential mobilisation of these analytes from the surrounding environment (i.e., petrol stations).

4. Operational Water Quality Monitoring Locations

Figure 1: Operational surface water quality monitoring locations across the M8 project from July 2020 to July 2021 inclusive of the Cooks River Catchment

Figure 2A: Operational ground water quality monitoring locations across the M8 project from July 2020 to July 2021.

Figure 2B: Operational ground water quality monitoring locations across the M8 project from July 2020 to July 2021.

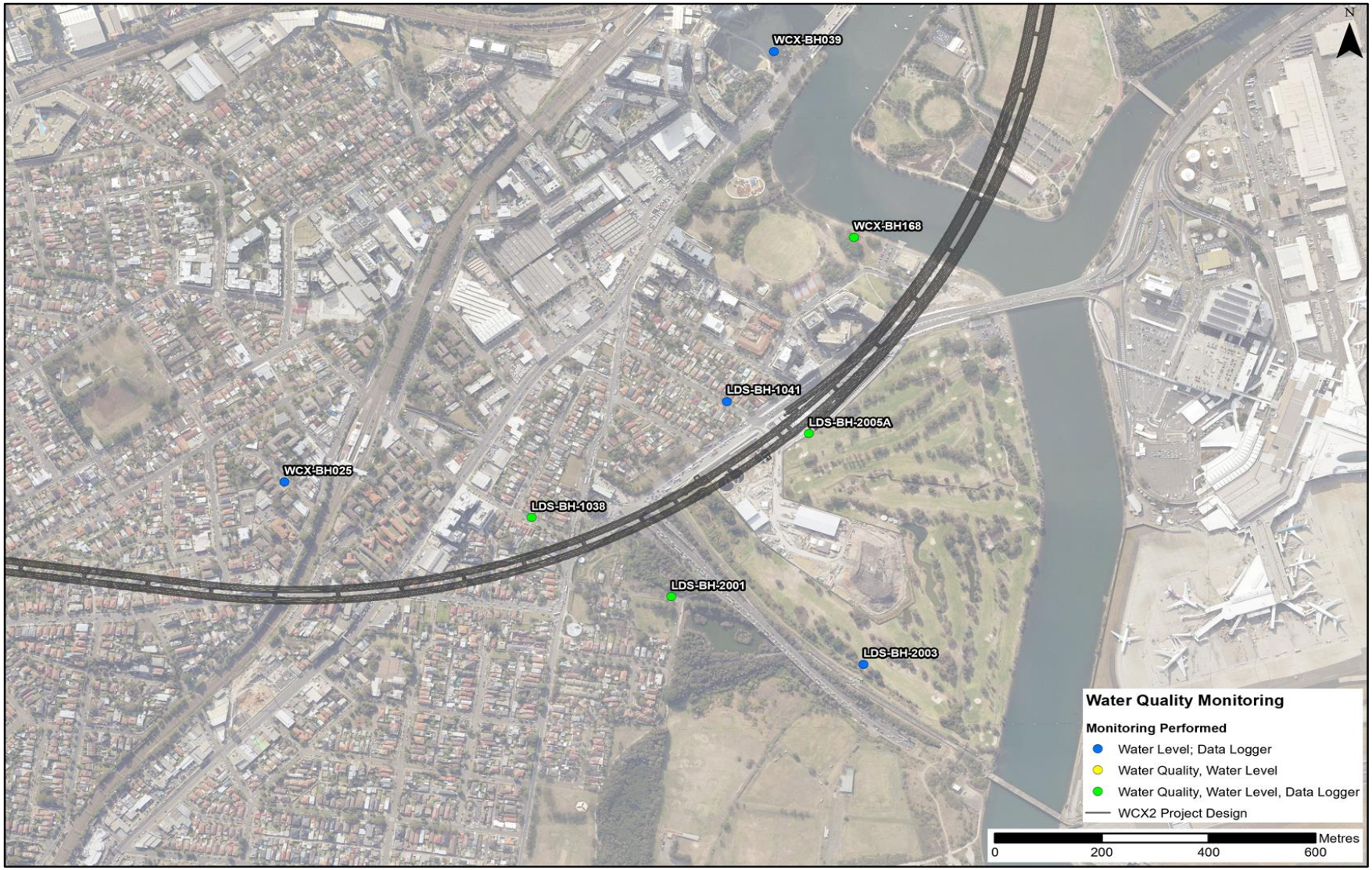

Figure 2C: Operational ground water quality monitoring locations across the M8 project from July 2020 to July 2021.

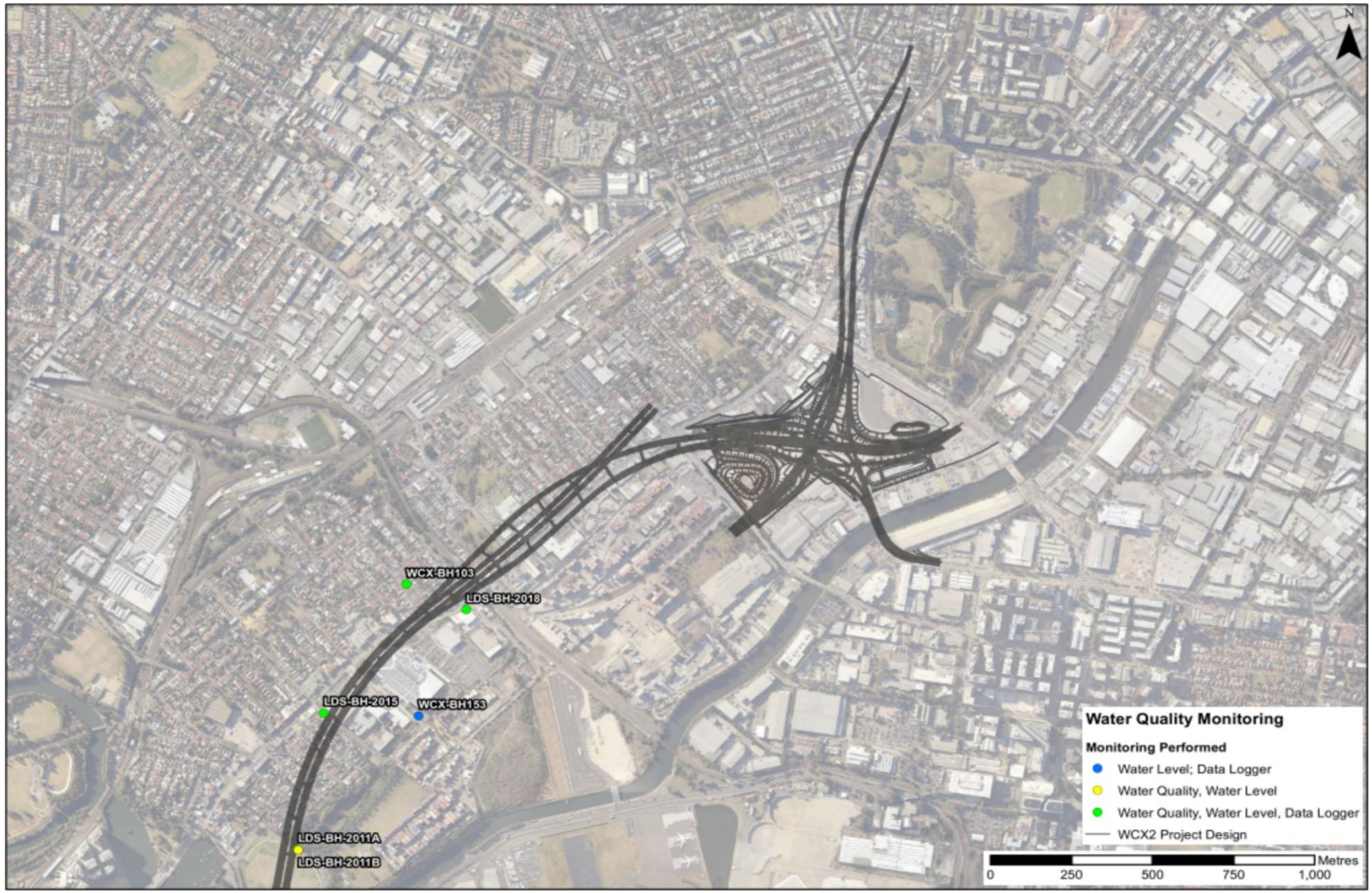

Figure 2D: Operational ground water quality monitoring locations across the M8 project from July 2020 to July 2021.

4.1 Locations of surface water monitoring points

Surface water quality monitoring was undertaken at ten sites with two sites designated as wet weather monitoring locations (Figure 1, Table 7). Sampling was conducted in accordance with the WQMP and was sampled monthly during the first year of operation (July 2020- June 2021). The monitoring locations incorporate upstream (control) sites and downstream (impact) sites. This monitoring allows for the assessment of trends in water quality, including natural variations and any potential impacts during operation. However, upon commencement of monitoring one site (LDS-SW-03) was decommissioned due its inaccessibility, this was the result of Sydenham Metro upgrade.

Table 7: Surface water quality monitoring locations

Site ID	Upstream or Downstream	Watercourse Name	Eastings	Northings	Freshwater or estuarine/marine
LDS-SW-01	Upstream	Sheas' Creek	332938	6246524	Freshwater
LDS-SW-02	Downstream	Alexandra Canal	331540	6244935	Estuarine/marine
LDS-SW-05	Upstream	Cooks River	329491	6244746	Estuarine/marine
LDS-SW-06	Downstream	Cooks River	329895	6243716	Estuarine/marine
LDS-SW-07	Downstream	Cooks River	330120	6243607	Estuarine/marine
LDS-SW-08*	Upstream	Wolli Creek	322993	6242760	Freshwater
LDS-SW-09*	Upstream	Wolli Creek	324663	6243087	Freshwater
LDS-SW-10	Upstream	Wolli Creek	325577	6243239	Freshwater
LDS-SW-11	Downstream	Wolli Creek	327910	6244087	Freshwater
LDS-SW-12	Adjacent	Cooks River	329991	6243607	Estuarine/marine

*Wet weathering monitoring only

4.2 Locations of groundwater monitoring points

Groundwater quality monitoring was undertaken at seventeen sites between July 2020 and June 2021 (Figure 2A-D, Table 8). The monitoring locations incorporate Hawkesbury Sandstone and Alluvium bores. This monitoring allows for the assessment of trends in water quality, including natural variations and any potential impacts during operation.

Table 8. Groundwater quality site locations, lithology, elevation and bore depth.

Site	Easting	Northing	Screened Lithology	Elevation (m AHD)	Bore Depth (m bgl)
LDS-BH-1027	324475	6242852	Hawkesbury Sandstone	20.17	
LDS-BH-1031	325760	6243091	Hawkesbury Sandstone	13.89	43.4
LDS-BH1033B	326949	6243223	Hawkesbury Sandstone	12.57	
LDS-BH-1038	329099	6243198	Hawkesbury Sandstone	15.15	
LDS-BH-1041	329465	6243437	Alluvium/ Hawkesbury Sandstone	1.93	
LDS-BH-1066	326531	6242873	Hawkesbury Sandstone	12.59	39.8
LDS-BH-2001	329361	6243035	Alluvium	2.21	4.72
LDS-BH-2003	329720	6242895	Alluvium	2..41	9.95
LDS-BH-2005A	329618	6243371	Hawkesbury Sandstone	1.10	
LDS-BH-2011A	330097	6244325	Hawkesbury Sandstone	2.22	
LDS-BH-2011B	330097	6244323	Alluvium	2.19	
LDS-BH-2015	330176	6244776	Hawkesbury Sandstone	15.8	49.2
LDS-BH-2018	330615	6245117	Hawkesbury Sandstone	12.67	13.0
WCX-BH018	326717	6243422	Hawkesbury Sandstone	34.84	54.0
WCX-BH024	327222	6243306	Hawkesbury Sandstone	8.17	40.0
WCX-BH025	328637	6243271	Hawkesbury Sandstone	23.85	
WCX-BH039	329553	6244158	Hawkesbury Sandstone	3.32	53.0
WCX-BH84	325613	6243435	Hawkesbury Sandstone	…	50.5
WCX-BH88	326182	6243434	Hawkesbury Sandstone	16.78	44.5
WCX-BH093	327657	6243183	Hawkesbury Sandstone	36.39	51.0
WCX-BH094	327867	6243174	Hawkesbury Sandstone	31.17	
WCX-BH103	330431	6245201	Hawkesbury Sandstone	11.10	
WCX-BH137	324858	6243065	Hawkesbury Sandstone	15.15	57.0
WCX-BH153	330468	6244766	Hawkesbury Sandstone	11.24	44.0
WCX-BH168	329702	6243775	Hawkesbury Sandstone	1.36	51.3

5. Results and Discussion

5.1 Water Treatment Plant Discharge Monitoring

Water Treatment Plant Discharge has been regulated by the Environmental Protection Agency as a scheduled activity, which in this instance is contaminated groundwater treatment.

Monthly treated water monitoring data is found in Appendix C. For the monitoring period, July 2020 to June 2021, pollutant limits for aluminium, cobalt, copper, manganese, and zinc, were not exceeded. Turbidity and pH levels were within the acceptable range, limits are outlined in Table 3.

Total recoverable hydrocarbon (TRH), C10-C16 levels exceeded both the 50th and 90th percentile concentration limits throughout the monitoring period. Further detailed requirements were submitted to the Environmental Protection Agency under condition R1 of the Environmental Protection Licence (21351).

The total discharge volume recorded at WTP for the first year of operations was 684,879 kL. Influent water quality is poor, with high levels of iron, chloride, electrical conductivity and total dissolved solid (TDS) being recorded.

5.2 Results of Surface water quality monitoring results

The sections below summarise surface water quality monitoring results into quarters taken from each month between July 2020 and June 2021. Throughout the period laboratory methods were impacted due to matrix interference, resulting in limits of reporting being raised. This was a result of elevated levels of total dissolved solids. Certain analytes, such as: arsenic, cadmium, chromium, copper, lead, and nickel were raised higher than the corresponding trigger value. Each instance this occurred, it was captured within the water quality register .

Wet weather monitoring of surface water sampling sites occurred in August 2020, March 2021, and May 2021.

5.2.1 First Quarter (July 2020 – September 2020)

i. July

Sampling across the project alignment was completed during fine conditions with 10.4mm of rain recorded in the week prior to sampling.

Samples collected within Sheas' Creek (LDS-SW-01) recorded levels of iron, turbidity, and total nitrogen above the adopted trigger values. The elevated readings were not detected at the downstream sampling location of Alexandra Canal (LDS-SW-02) however, an additional five analytes indicated increased levels greater than the respective trigger values (pH, copper, zinc, ammonia, nitrite, and total phosphorus). Excluding pH, a number of estuarine sites (LDS-SW-05, LDS-SW-06 and LDS-SW-07 and LDS-SW-12) recorded similar results, indicating a broader catchment issue.

Samples collected from upstream of Wolli Creek (LDS-SW-10) observed an elevated pH reading. Further down Wolli Creek at Turrella, location LDS-SW-11, pH was well within the adopted range.

Limits of reporting for dissolved metals had been raised for a number of sites (LDS-SW-02, LDS-SW-05, LDS-SW-06, LDS-SW-07 and LDS-SW-12) throughout Cooks River. This was the case for some laboratory results, specifically chromium and lead. This was apparent due to the brackish conditions of the estuarine environments, high levels of TDS were recorded at each corresponding site.

ii. August

Sampling was undertaken across the project alignment two days following 28.2mm of rain, this was recorded at the BoM Sydney Airport weather station. This sampling round was recorded as a wet weather monitoring event. A total of 55.0 mm of rain was recorded one week prior to sampling.

Sheas' Creek (LDS-SW-01) observed elevated levels of iron and total nitrogen. The downstream site Alexandra Canal (LDS-SW-02) recorded similar levels but also noted increased levels of pH, turbidity, copper, lead, zinc, ammonia, nitrite, and total phosphorus. Comparatively, all Cook's River sites (LDS-SW-05, LDS-SW-06 and LDS-SW-07 and LDS-SW-12) recorded similar, elevated values (copper, lead, zinc, iron, ammonia, nitrite, and total nitrogen). This was indicative of a broader catchment issue.

Limits of reporting for dissolved metals had been raised for a number of sites (LDS-SW-02, LDS-SW-05, LDS-SW-06, LDS-SW-07 and LDS-SW-12) throughout Cooks River. This was caused by the laboratory noting matrix interference due to the high levels of TDS, this was specifically for chromium and lead results.

iii. September

Sampling across the project alignment was completed during fine conditions with 8.2mm of rain recorded in the week prior to sampling. During this sampling round one site at Wolli Creek did not have enough water to sample but this does not affect sampling as site LDS-SW-08* is expected to be dry after periods of low rainfall.

High levels of zinc were recorded throughout the catchment. Alexandra Canal (LDS-SW-02) and Cooks River (LDS-SW-05, LDS-SW-06, LDS-SW-07 and LDS-SW-12) recorded elevated levels of zinc whilst only one other freshwater site (LDS-SW-11) recorded elevated levels, indicating a broader catchment issue. It was also apparent that all estuarine sites observed high levels of TDS, affecting the limits of reporting. This was apparent for various dissolved metals; arsenic, cadmium, chromium, copper, lead, and nickel. These levels are a result of the tidal nature of specific sites.

Two upstream sites at Wolli Creek (LDS-SW-09*) and (LDS-SW-10) recorded elevated levels of pH and copper. When compared to its corresponding downstream site (LDS-SW-11), these levels fell within the adopted range.

5.2.2 Second Quarter (October 2020 – December 2020)

i. October

Sampling was undertaken across the project alignment during fine conditions with 2.6mm of rain recorded at the BoM Sydney Airport weather station a week prior to sampling.

High levels of TDS were recorded for all estuarine locations, affecting the limit of reporting. Similar results were obtained to the previous, September sampling period. All estuarine sites within the project recorded elevated levels of arsenic, cadmium, chromium, copper, lead, and nickel. This was a result of limits of reporting being raised.
The sites located within the Alexandra Canal and Cooks River also observed increased levels of ammonia, nitrate, and total phosphorus.

Sheas' Creek (LDS-SW-01) recorded elevated total nitrogen levels. LDS-SW-09* which is usually dry, had moderate flowing water. Water quality samples were taken.
The Wolli Creek upstream site (LDS-SW-10) observed a white precipitate leaching into the creek from an external source.

ii. November

Sampling was undertaken across the project alignment during fine conditions with 22.8 mm of rain recorded at the BoM Sydney Airport weather station a week prior to sampling. Site LDS-SW-09, a wet weather monitoring site, had an adequate flow of water for sampling. However, site LDS-SW-08 remained dry.

General field parameters recorded in Wolli Creek (LDS-SW-11) were within the respective trigger values. Following similar trends as the previous month, high levels of TDS were observed for estuarine sites. Limits of reporting were raised, resulting in arsenic, cadmium, chromium, copper, lead, and nickel to be above the respective trigger value.
Alexandra Canal (LDS-SW-02) and Cooks River (LDS-SW-05, LDS-SW-06, LDS-SW-07 and LDS-SW-12) recorded elevated levels of zinc whilst only one other freshwater site (LDS-SW-11) noted similar results. This was attributed to a broader catchment issue.

Nutrient levels in most estuarine sites recorded elevated readings. Freshwater sampling locations indicated similar results for total nitrogen within Sheas' Creek (LDS-SW-01).

iii. December

Sampling in December took place following 14.2 mm of rain, which was recorded at the BoM Sydney Airport weather station a week prior to sampling. Wet weather sites LDS-SW-08 and LDS-SW-09 were dry.

Turbidity and corresponding TSS results for both upstream and downstream sites of Cook's River were elevated. Estuarine sites again, recorded elevated levels of TDS. Limits of reporting were subsequently raised following laboratory analysis. Arsenic, cadmium, chromium, copper, lead and nickel were at the limit of reporting but were above the respective trigger values.

Zinc recorded at multiple sites (LDS-SW-01, LDS-SW-02, LDS-SW-05, LDS-SW-06, LDS-SW-07, LDS-SW-12), throughout multiple watercourses recorded elevated levels of zinc.

Nutrient results at Alexandra Canal (LDS-SW-02) and Cook's River (LDS-SW-05, LDS-SW-06), recorded values of ammonia above the trigger value.

5.2.3 Third Quarter (January 2021 – March 2021)

i. January

Sampling across the project alignment during January occurred after 21.7 mm of rain, which was recorded in the week prior. The Wolli Creek upstream, wet weather monitoring location LDS-SW-08, had an insufficient amount of water to be sampled. Although, the other wet weather monitoring location, LDS-SW-09 had adequate flow and was able to be sampled.

Generally, sampling across all site locations recorded lower levels of TDS, turbidity and electrical conductivity than previous sampling periods. pH levels were similar to previous months. Although, Wolli Creek upstream locations LDS-SW-09 and LDS-SW-10 recorded elevated pH levels, which remained out of the acceptable range, recording 9.67 and 8.67 respectively.

Generally, dissolved metal analytes displayed lower levels than the previous month, despite limits of reporting being altered due to elevated TDS readings. Zinc levels exceeded trigger values across all upstream fresh water and estuarine sample sites, except for Wolli Creek which recorded no elevated levels zinc, upstream or downstream.

Nutrient results indicated elevated levels in both Alexandra Canal and Cook's river, most notably total nitrogen. In general, higher levels of ammonia and nitrate where also exhibited in the broader estuarine areas of Cook's River.

Levels of Total Recoverable Hydrocarbon (TRH) were recorded across various project locations, including Alexandra Canal (LDS-SW-02), upstream Cook's River (LDS-SW-05, LDS-SW-12) and downstream Wolli Creek (LDS-SW-11). The TRH fractions recorded above the trigger value were both C16-C34 and C34-C40.

With 7.2mm of rain recorded on the day of sampling, it is highly likely that run-off within the surrounding urban area has attributed to both the elevated levels of petroleum hydrocarbons and nutrients.

ii. February

Sampling across the project alignment was undertaken during fine conditions with 1.4mm of rain recorded in the week prior to sampling. Limited rainfall over the sampling period, resulted in LDS-SW-08 not being sampled.

High levels of TDS were recorded for all estuarine locations, affecting the limit of reporting. All estuarine sites within the project recorded elevated levels of arsenic, cadmium, chromium, copper, lead, and nickel. This was a result of limits of reporting being raised.

The upstream site of Wolli Creek (LDS-SW-10) recorded an elevated pH reading which is consistent with the January sampling period. Comparing this to the downstream site (LDS-SW-11), the pH was within the respective range.

iii. March

Sampling across the project alignment was completed during fine conditions with 10.4mm of rain recorded in the week prior to sampling. During this sampling round, two wet weather monitoring sites (LDS-SW-08, LDS-SW-09) did not have enough water to sampled. These are expected to be dry after periods of low rainfall.

Sheas' Creek (LDS-SW-01) recorded only one elevated analyte, total nitrogen. The downstream site, Alexandra Canal (LDS-SW-02) recorded total nitrogen being well below its trigger value. High levels of TDS were recorded for all estuarine locations (LDS-SW-02, LDS-SW-05, LDS-SW-06, LDS-SW-07 and LDS-SW-12), affecting the limit of reporting. As a result, all estuarine sites within the project recorded elevated levels of arsenic, cadmium, chromium, copper, lead, and nickel. This was a result of limits of reporting being raised.

The upstream site of Wolli Creek (LDS-SW-10) recorded an elevated pH reading which is consistent with the January - February sampling period. Comparing this to the downstream site (LDS-SW-11), the pH was within the respective range.

Wet Weather Monitoring Event

Sampling was undertaken across project alignment one day following 24.2mm of rain, which was recorded at the BoM Sydney Airport weather station. This sampling round was classified as the second wet weather monitoring event for the project.

All sites excluding LDS-SW-08, noted elevated levels of total nitrogen greater than the respective trigger value. This is consistent with urban-runoff and was expected following a wet weather sampling event. Similarly, elevated levels of zinc were recorded across almost all sites.

No TRH were recorded throughout the wet weather monitoring event.

5.2.4 Fourth Quarter (April 2021 – June 2021)

i. April

Sampling across the project alignment was completed during fine conditions with 2.8mm of rain recorded in the week prior to sampling. Limited rainfall over the sampling period, resulted in LDS-SW-08 not being sampled, this is expected to be dry after periods of low rainfall.

Sheas' Creek (LDS-SW-01) recorded elevated levels of total nitrogen which was also observed at its downstream site at Alexandra Canal (LDS-SW-02) but was significantly reduced.

Cook's River upstream (LDS-SW-05) located recorded three analytes (zinc, ammonia and nitrite) above the respective trigger values. Six dissolved metals (arsenic, cadmium, chromium, copper, lead, and nickel) also recorded elevated levels, but this was due to the high levels of TDS recorded within the sample. As a result, the limits of reporting were raised and the metals were at the limit of reporting which was greater than the trigger value.

Wolli Creek observed elevated pH readings at both of its upstream sites (LDS-SW-09, LDS-SW-10) but when compared to the Wolli Creek downstream site (LDS-SW-11) pH was well within its respective range.

ii. May

Sampling was undertaken across the project alignment one day following 19mm of rain, which was recorded at the BoM Sydney Airport weather station. This sampling round was classified as the third wet weather monitoring event for this project.

Sheas' Creek (LDS-SW-01) recorded three analytes (electrical conductivity, zinc and total nitrogen) above the respective trigger values. Elevated levels of electrical conductivity and total nitrogen was similarly recorded in the downstream site (LDS-SW-02), although the concentration of zinc was reduced.

During this sampling period, Wolli Creek sites (LDS-SW-08, LDS-SW-09, LDS-SW-10, LDS-SW-11) did not report any values outside of the respective trigger values (metals, nutrients, and TRH). All elevated recordings were upstream related; this is consistent with a wet weather monitoring event. Cook's River (LDS-SW-05, LDS-SW-06, LDS-SW-07) indicated high levels of total suspended solids, turbidity, zinc, ammonia, nitrite, total nitrogen, and total phosphorus.

Wolli Creek (LDS-SW-09, LDS-SW-10, LDS-SW-11) recorded low levels of electrical conductivity. This is again consistent with the wet weather monitoring event.

iii. June

A total 8.8 mm of rain was recorded at the BoM Sydney Airport weather station a week prior to sampling. Sites LDS-SW-08 and LDS-SW-09 were dry.

Wolli Creek upstream (LDS-SW-10) recorded an elevated pH reading of 9.44, above the respective freshwater trigger value of 8.5. Downstream (LDS-SW-11) recorded a value of 7.77 which falls back within range. With the impact site recording a result within the relative range, a localised issue with Wolli Creek has been attributed to the elevated reading.

Alexandra Canal (LDS-SW-02) and Cook's River (LDS-SW-05, LDS-SW-06, LDS-SW-07) all recorded high levels of TDS. Consistent with the brackish nature of the estuarine environment. Consequently, matrix interference occurred within the laboratory samples and limits of reporting were raised. Arsenic, cadmium, chromium, copper, lead and nickel all had the limits of reporting raised greater than the trigger value.

Zinc in all sites except Wolli Creek downstream (LDS-SW-11) recorded levels above both the freshwater and estuary trigger values. Due to the widespread, elevated concentrations, it has been attributed to a broader catchment issue.

No TRH was recorded throughout the sampling period.

3.1 Results of groundwater quality monitoring results

During the operational monitoring of the project groundwater quality, sampling has been completed at the locations referenced in Table 8 and Figures 2A-D. Groundwater monitoring has been undertaken on a six-monthly basis for the first year of operations. The sections below summarise groundwater quality monitoring results taken between July 2020 and June 2021.

3.1.1 First 6-month Period (July 2020 - December2020)

Groundwater sampling was completed across the project alignment under fine conditions during the first six months of operation. Two bores were unable to be sampled during this round of sampling. Groundwater bore LDS-BH-2005a was impeded by machinery and was inaccessible, bore WCX-BH103 was dry and unable to be sampled.

During the first 6 months of operation elevated readings of electrical conductivity were reported in seven bores across the project (LDS-BH-2018, WCX-BH137, WCX-BH168, LDS-BH-1027, LDS-BH-1033B, LDS-BH-2011A and LDS-BH-2011B). Two bores (WCX-BH168, LDS-BH-1027) recorded low pH results at 2.90 and 2.39 respectively. Dissolved metals results for bore WCX-BH168 indicated elevated levels of copper, lead and iron which exceeded the respective Hawksbury Sandstone trigger values. Elevated levels of arsenic were found in one alluvium bore (LD-BH-2001).

Hydrocarbons (C16-C34) were detected in one bore (LDS-BH-1038) recording a result just above the limit of reporting at 150 µg/L.

3.1.2 Second 6-month Period (January 2021 – June 2021)

Groundwater sampling was completed across the project alignment under fine conditions throughout the second 6-month period, inclusive of the first year of operations. A total of five bores could not be sampled during the period.

Two bores (LDS-BH-2011A and LDS-BH-2011B) were inaccessible due to the Tempe Reserve Upgrade. Groundwater bore LDS-BH-2018 could not be sampled as a result of residential vehicle obstructions. The bore was visited on multiple occasions but remained inaccessible. An obstruction in bore LDS-BH-1038 meant it could not be sampled. Consistent with the previous sampling period, bore WCX-BH103 was dry.

Four bores (LDS-BH-1026, WCX-BH137, WCX-BH168 and LDS-BH-1027) recorded elevated levels of electrical conductivity. Similar with previous results, bore WCX-BH168 indicated elevated levels of dissolved metals, specifically copper, lead and iron. Arsenic concentrations in bore LDS-BH-2001 recorded elevated levels, similar to previous results.

No hydrocarbons or BTEXN were not detected in any groundwater bores throughout the monitoring period.

3.1.3 Groundwater Quality Summary

Overall water quality remained consistent between the two sampling periods. The pH data whilst fluctuating, remained within the respective trigger values for all bores within the second 6-monthly sampling period. Total Recoverable Hydrocarbons remained undetected in almost all samples, excluding one. This was determined as an isolated event.

Whilst some trigger values have been exceeded, the cause of the elevated readings have not been attributed to the project's operation.

Specific physiochemical parameters and some analytes that have exceeded the respective trigger values on both sampling occasions have been selected for trend analysis. These include electrical conductivity, copper, iron, and lead. The trend analysis can be seen below in Figure 3 – Figure 6.

3.1.3.1 Electrical Conductivity

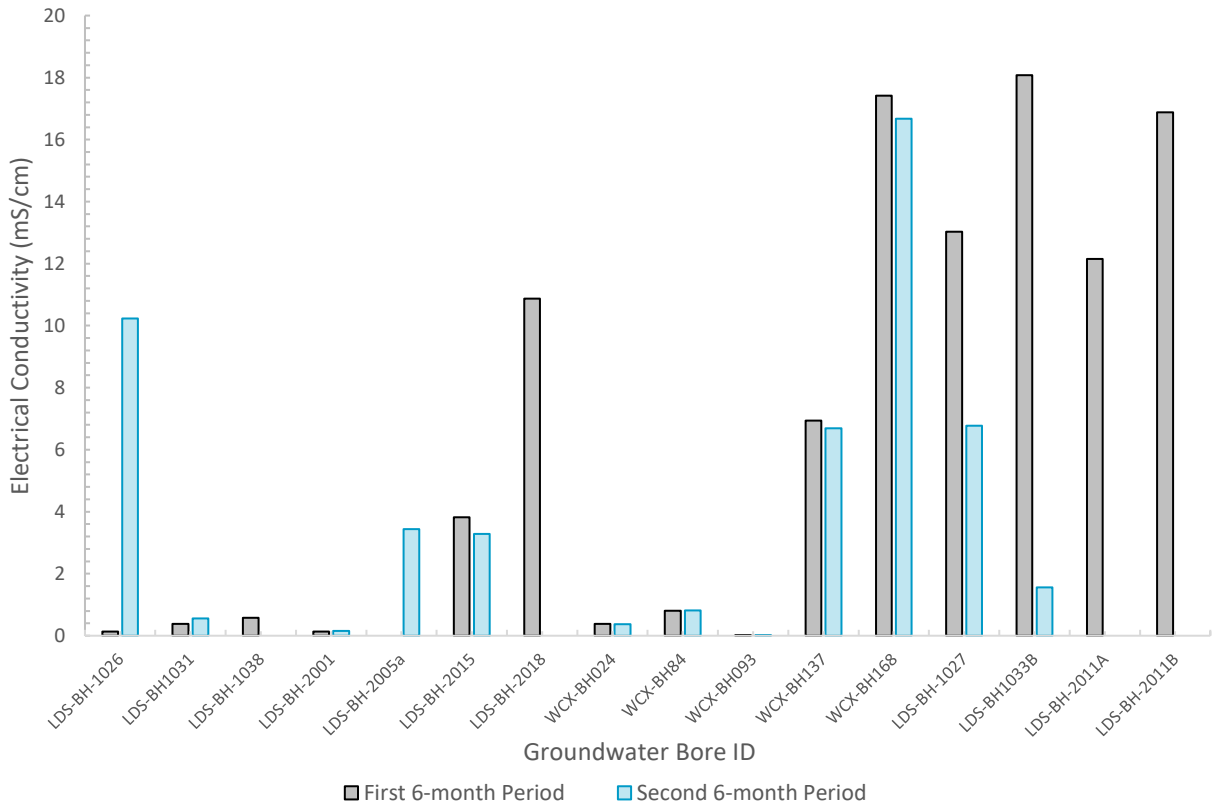

Figure 3. Trend analysis for electrical conductivity in all groundwater bores

3.1.3.2 Copper

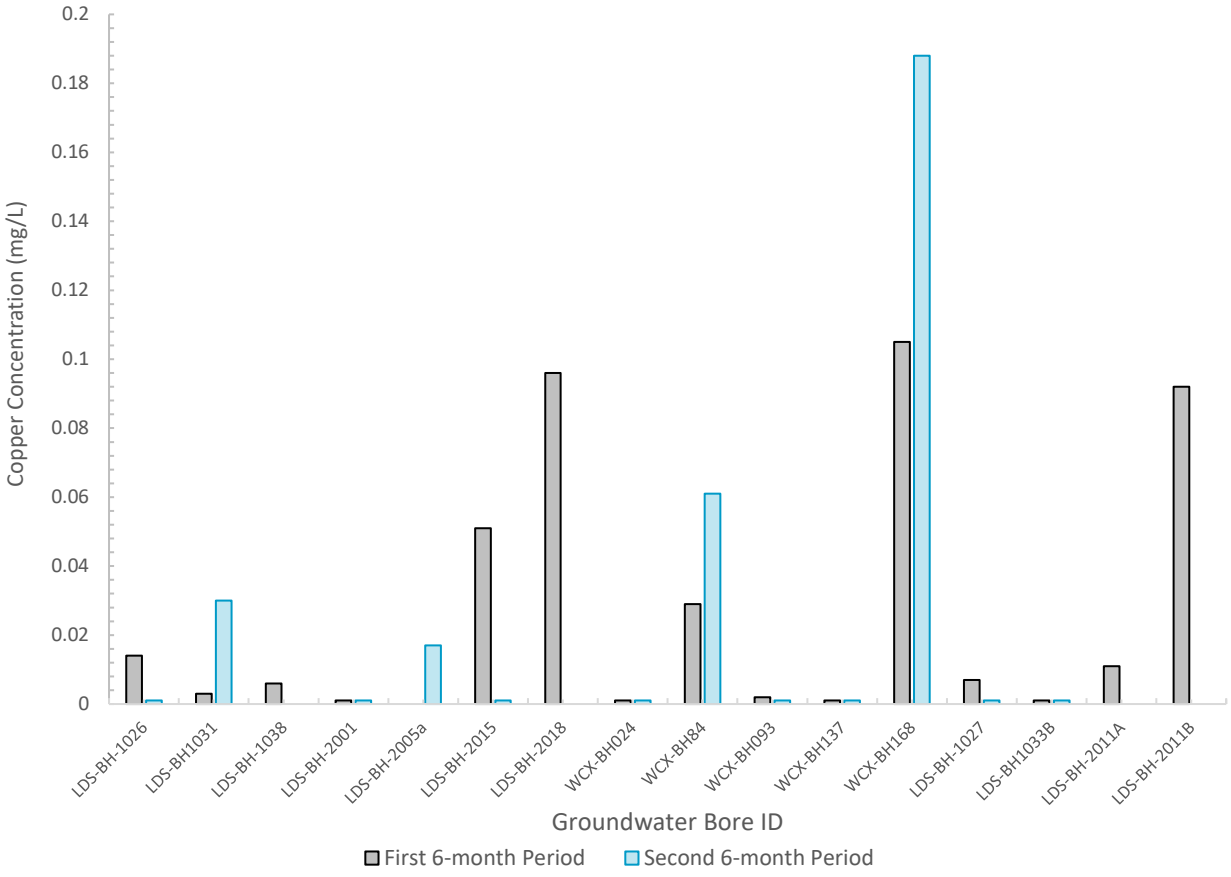

Figure 4. Trend analysis for copper concentrations in all groundwater bores

3.1.3.3 Iron

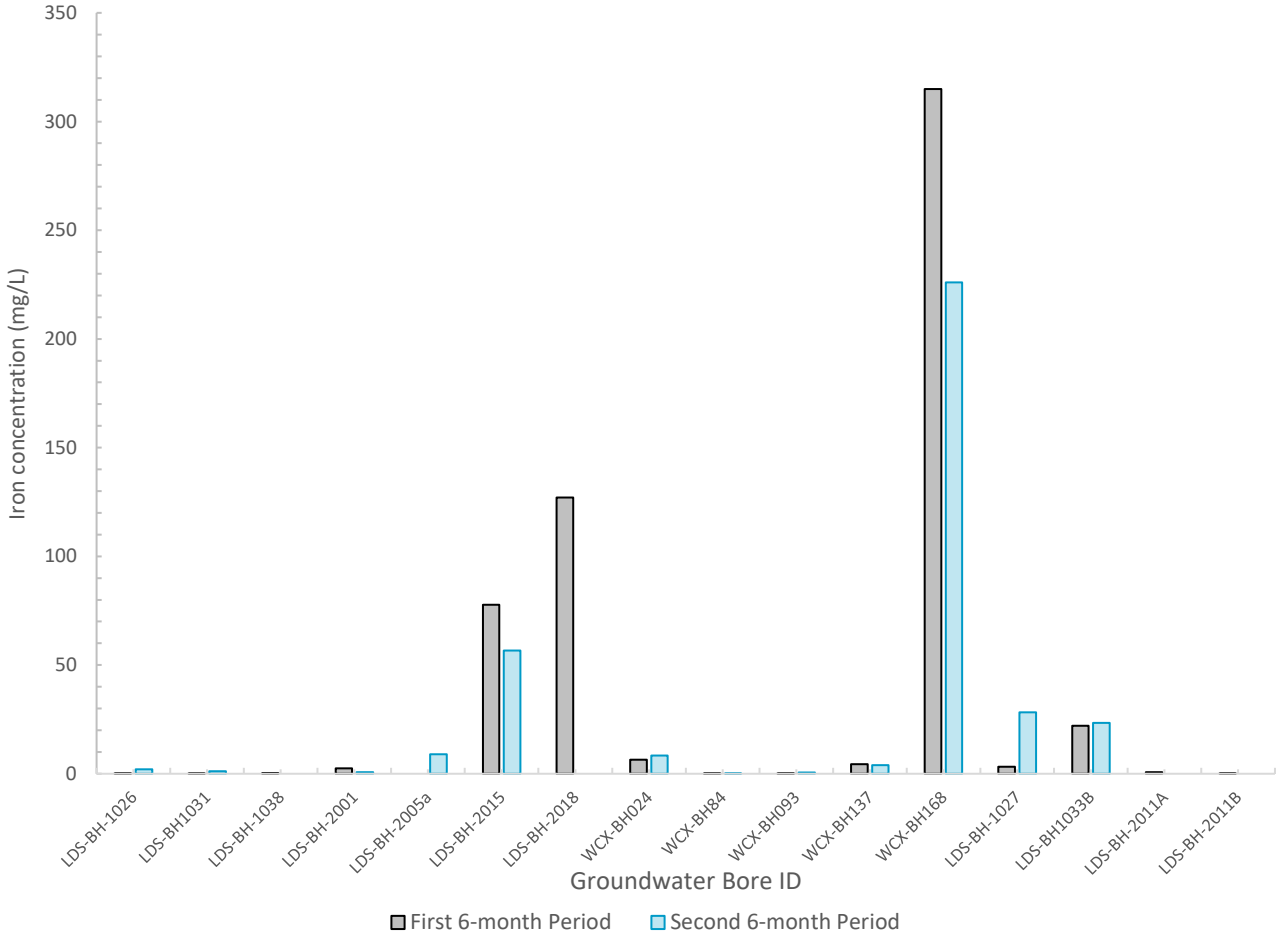

Figure 5. Trend analysis for iron concentrations in all groundwater bores

3.1.3.4 Lead

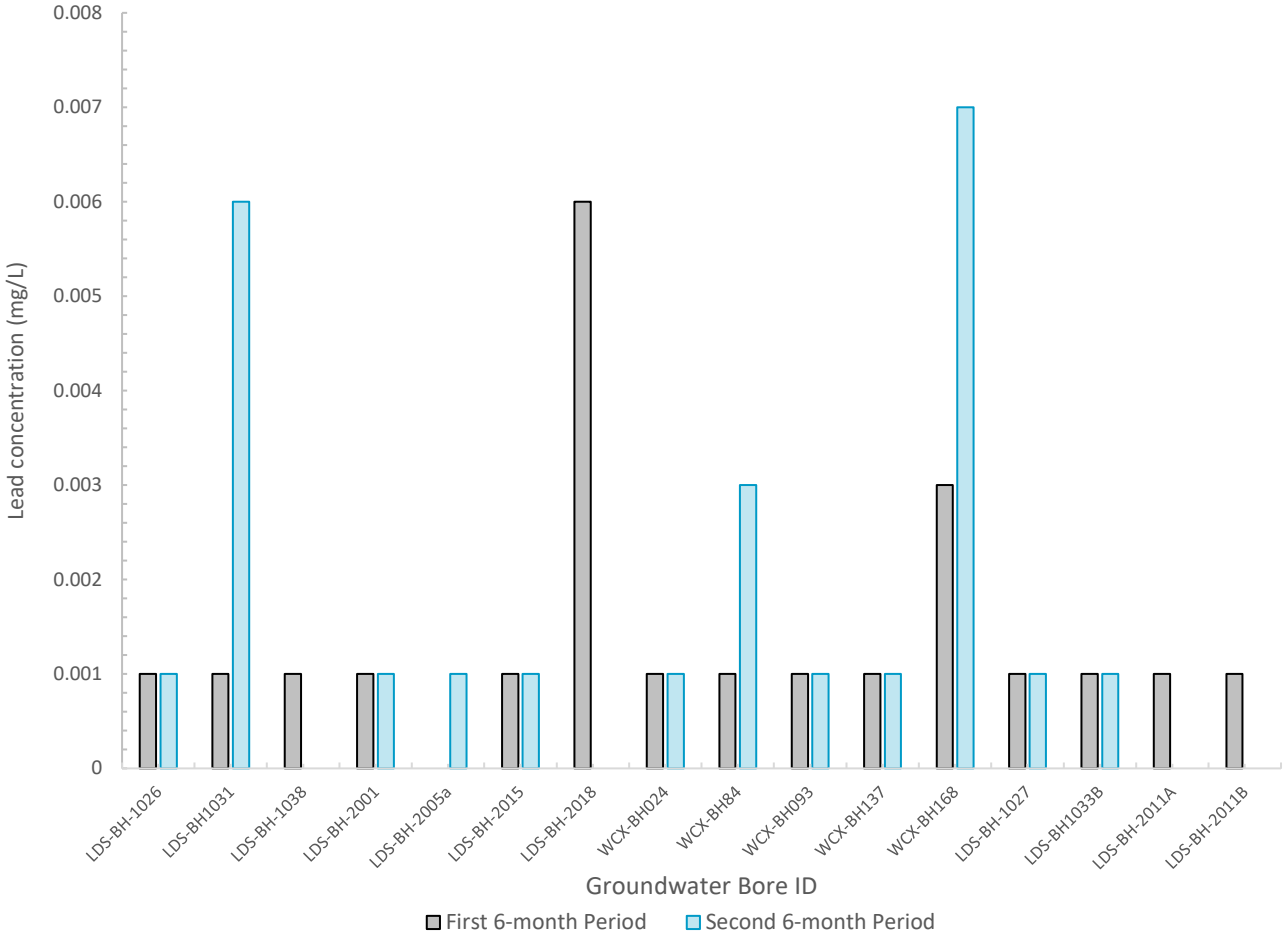

Figure 6. Trend analysis for lead concentrations in all groundwater bores

References

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Appendix A: Surface Water Quality Raw Data (July 2020 – June 2021)

				General Parameters								Metals								Nutrients								TRH							BTEXN							TPH(V)/BTEX Surrogates		
				pH	Electrical Conductivity	Temperature	Dissolved Oxygen	Oxygen Reduction Potential	Total Suspended Solids	Total Dissolved Solids	Turbidity	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Iron	Mercury	Ammonium	Ammonia	Nitrite	Nitrate	Nitrite and Nitrate	Total Kjeldahl Nitrogen	Total Nitrogen	Total Phosphorous	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene	Benzene	Toluene	Ethylbenzene	meta & para - Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	1,2-Dichloroethane-D4	Toluene-D8	4-Bromofluorobenzene
												As	Cd	Cr	Cu	Pb	Ni	Zn	Fe	Hg	N	N	N	N	N	N (TKN)	N	P																		
Legend	Exceedance	Prefix																																										
	Exceedance due to LOR changed	Unit		pH Units	uS/cm	°C	mg/L	mV	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	%	%	%
	Exceedance is upstream related	LOR		0.10	0.10	0.1	0.01	1	5	0.1	1	0.0010	0.0001	0.0010	0.0010	0.0010	0.0010	0.05	0.0500	0.0050	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	2	2	2
		ANZECC SSTV	Freshwater	6.5 - 8.5	0.31-1.66		60		50		29	0.3600	0.0008	0.0400	0.0120	0.0094	0.0170	0.0590	0.3000	0.0054		2.30		17				2.89	0.12																	
			Estuary	7.0 - 8.5	50.20		60 - 110		21		10	0.0024	0.0005	0.0004	0.0003	0.0004	0.0070	0.0056	0.3000	0.0004		0.091		0.07				1.2	0.17																	

	Site	Date	Time	Comments																																									
	Surface Water				Surface Water																																								
W/O	Jul-20	Date Sampled	Time Sampled	Comments																																									
ES2024765 ES2025968 ES2025968	LDS-SW-01	17/07/20	9:30:00		7.81	0.32	14.8	9.11	477	22	0.2	38.2	0.001	0.0001	0.001	0.008	0.0020	0.0010	0.047	0.40	0.0001	0.51	0.52	0.15	2.40	2.55	1.0	3.6	0.12	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	100	104	102
	LDS-SW-02	17/07/20	9:00:00	Outgoing tide	7.46	14.64	13.5	7.76	501	6	9.5	4.6	0.002	0.0001	0.0010	0.008	0.0010	0.0010	0.079	0.18	0.0001	0.49	0.49	0.04	0.52	0.56	1.4	2.0	0.2	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	101	106	102
	LDS-SW-03	17/07/20	10:05:00		2.33	1.49	13.2	9.34	622	13	1	6.1	0.004	0.005	0.0390	0.074	0.0930	0.0170	2.05	6.07	0.0001	0.31	0.31	0.02	0.81	0.83	0.8	1.6	0.13	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	99.2	105	101
	LDS-SW-05	17/07/20	10:40:00		6.15	31.14	13.9	6.08	602	10	20.2	0.3	0.001	0.0001	0.0010	0.003	0.0010	0.0010	0.044	0.05	0.0001	0.31	0.31	0.02	0.18	0.20	0.5	0.5	0.44	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	102	103	102
	LDS-SW-06	17/07/20	11:23:00		7.07	33.90	14.2	5.30	567	5	22	0.4	0.001	0.0001	0.0010	0.004	0.0010	0.0020	0.042	0.05	0.0001	0.28	0.28	0.02	0.17	0.19	0.5	0.5	0.35	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	106	109	106
	LDS-SW-07	17/07/20	13:05:00		7.46	39.02	14.5	5.86	542	5	25.3	1.3	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.055	0.10	0.0001	0.23	0.23	0.02	0.16	0.18	0.5	0.5	0.18	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	102	106	103
	LDS-SW-08*	28/07/20	12:00:00	Water flowing fast	8.18	0.46	16.3	8.83	554	9	0.3	11.9	0.001	0.0001	0.002	0.004	0.0010	0.0010	0.017	0.17	0.0001	0.04	0.04	0.02	1.37	1.39	0.6	2.0	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	101	106	107
	LDS-SW-09*	28/07/20	11:30:00	Water flowing fast	7.97	0.37	16.3	9.84	590	9	0.2	15.7	0.001	0.0001	0.001	0.006	0.0010	0.0010	0.024	0.17	0.0001	0.01	0.01	0.02	1.63	1.65	0.8	2.4	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	101	105	106
	LDS-SW-10	17/07/20	14:30:00	Visible sheen	9.36	0.77	15.1	12.68	500	15	0.5	5	0.001	0.0001	0.001	0.006	0.0010	0.0010	0.018	0.20	0.0001	0.01	0.02	0.03	0.80	0.83	0.4	1.2	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	102	109	104
	LDS-SW-11	17/07/20	14:00:00		7.09	0.29	14.4	5.48	493	16	0.2	11.3	0.001	0.0001	0.001	0.006	0.0010	0.0010	0.051	0.59	0.0001	0.2	0.20	0.02	0.80	0.82	0.5	1.3	0.03	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	103	114	105
	LDS-SW-12	17/07/20	11:10:00	Outgoing tide	6.98	34.62	14.2	5.34	586	9	22.5	0.2	0.001	0.0001	0.0010	0.004	0.0010	0.0010	0.041	0.05	0.0001	0.32	0.32	0.02	0.02	0.04	0.5	0.5	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	109	118	110
W/O	Aug-20	Date Sampled	Time Sampled	Comments																																								
ES2028456 ES2030234 (5.5mm recorded week prior)	LDS-SW-01	12/08/220	10:44:00	Clear	7.60	0.36	16.7	11.16	556	5	0.2	5.9	0.002	0.0001	0.001	0.006	0.0010	0.0010	0.04	0.40	0.0001	0.24	0.24	0.06	2.44	2.50	1.0	3.5	0.06	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	103	105	103
	LDS-SW-02	12/08/220	10:00:00	Clear	6.90	6.29	14.8	7.24	632	12	4.1	14.7	0.002	0.0001	0.0010	0.006	0.0040	0.0020	0.07	0.50	0.0001	0.84	0.84	0.06	1.05	1.11	1.7	2.8	0.25	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	103	105	103
	LDS-SW-05	12/08/220	11:26:00		6.60	18.68	14.8	5.82	622	7	12.1	9.8	0.002	0.0001	0.0010	0.007	0.0020	0.0010	0.046	0.47	0.0001	0.32	0.32	0.04	0.82	0.86	1.0	1.9	0.09	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	102	105	103
	LDS-SW-06	13/08/220	16:10:00	Clear	7.20	27.70	17.6	5.94	530	5	18	3.2	0.002	0.0001	0.0010	0.002	0.0010	0.0010	0.039	0.27	0.0001	0.39	0.39	0.03	0.54	0.57	1.2	1.8	0.08	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	103	107	103
	LDS-SW-07	12/08/220	15:35:00	Visible sheen	7.10	18.08	16.0	6.77	594	8	11.8	8.7	0.002	0.0001	0.0010	0.004	0.0020	0.0010	0.041	0.43	0.0001	0.33	0.33	0.04	0.84	0.88	0.9	1.8	0.09	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	105	104	102
	LDS-SW-08*	12/08/220	14:30:00		7.80	1.21	15.5	10.58	551	5	0.8	0.8	0.001	0.0001	0.001	0.002	0.0010	0.0010	0.013	0.32	0.0001	0.03	0.03	0.01	1.09	1.10	0.5	1.6	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	104	106	101
	LDS-SW-09*	12/08/220	13:50:00	Fast flow, clear	8.70	0.81	16.9	12.29	544	6	0.5	4.1	0.001	0.0001	0.001	0.003	0.0010	0.0020	0.02	0.32	0.0001	0.03	0.04	0.02	1.86	1.88	1.0	2.9	0.03	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	104	105	103
	LDS-SW-10	12/08/220	13:30:00	Clear	8.40	0.77	16.2	12.45	538	5	0.5	1.9	0.001	0.0001	0.001	0.003	0.0010	0.0030	0.024	0.27	0.0001	0.02	0.02	0.02	1.68	1.70	0.7	2.4	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	104	104	101
	LDS-SW-11	12/08/220	13:00:00		6.80	0.28	14.9	5.76	530	5	0.2	8.9	0.001	0.0001	0.001	0.006	0.0020	0.0020	0.072	0.85	0.0001	0.49	0.49	0.04	1.41	1.45	1.2	2.6	0.06	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	104	105	101
	LDS-SW-12	13/08/220	15:48:00	Clear	7.20	27.60	18.1	5.96	540	9	17.9	3	0.002	0.0001	0.0010	0.002	0.0010	0.0010	0.036	0.28	0.0001	0.4	0.40	0.03	0.55	0.58	0.7	1.3	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	100	100	96.6
W/O	Sep-20	Date Sampled	Time Sampled	Comments																																								
ES2031729 ES2033783 (8.2mm recorded week prior)	LDS-SW-01	7/09/2020	8:49:00	Incoming tide, moderate flow	8.50	0.35	17.7	9.89	293	5	0.2	1.2	0.002	0.0001	0.002	0.008	0.0010	0.0010	0.07	0.26	0.0001	0.11	0.12	0.04	2.39	2.43	0.5	2.4	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	94.7	103	97.9
	LDS-SW-02	7/09/2020	9:10:00	Incoming tide, moderate flow	8.12	37.17	16.9	5.64	565	20	24.2	5.6	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.167	0.27	0.0001	0.25	0.26	0.03	0.17	0.20	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	103	110	103
	LDS-SW-05	7/09/2020	9:57:00	Incoming tide, clear, fast flow	8.29	47.29	17.3	4.73	434	5	30.8	8.4	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.167	0.14	0.0001	0.15	0.16	0.02	0.09	0.11	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	112	120	111
	LDS-SW-06	7/09/2020	11:00:00	incoming tide, clear, moderate flow	7.95	46.47	18.5	4.78	524	5	30.2	9.4	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.067	0.15	0.0001	0.18	0.19	0.02	0.08	0.10	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	118	124	114
	LDS-SW-07	7/09/2020	11:57:00	Outgoing tide, moderate flow	7.87	46.04	19.2	5.41	361	5	29.9	10.3	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.063	0.10	0.0001	0.21	0.22	0.02	0.13	0.15	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	115	125	113
	LDS-SW-08*	8/09/2020	14:23:00	Dry - Not Sampled, very slow flow	DRY NO SAMPLE																																								
	LDS-SW-09*	8/09/2020	14:01:00	Outgoing tide, little water flowing	9.61	0.43	23.0	12.43	346	5	0.3	6.5	0.001	0.0001	0.001	0.015	0.0010	0.0010	0.013	0.28	0.0001	0.01	0.02	0.04	0.46	0.50	0.5	1.0	0.02	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	94.2	104	98.4
	LDS-SW-10	7/09/2020	14:55:00	Outgoing tide, white precipate leaking into strean	10.13	0.79	22.2	13.02	-113	6	0.5	1.5	0.001	0.0001	0.001	0.013	0.0010	0.0020	0.023	0.14	0.0001	0.01	0.01	0.07	0.17	0.24	0.6	0.8	0.02	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	99.8	111	104
	LDS-SW-11	8/09/2020	11:34:00	Outgoing tide, clear, slow flow	7.11	0.43	16.4	4.83	415	6	0.3	1.3	0.001	0.0001	0.002	0.006	0.0020	0.0010	0.078	1.01	0.0001	1.04	1.04	0.03	0.75	0.78	1.3	2.1	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	104	117	106
	LDS-SW-12	7/09/2020	10:41:00	incoming tide, clear, moderate flow	7.79	46.20	18.3	4.85	813	5	30	9.2	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.059	0.10	0.0001	0.3	0.31	0.02	0.08	0.10	1.2	1.3	0.17	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	113	120	112

Fulton Hogan egis

					General Parameters									Metals										Nutrients								TRH							BTEXN								TPH(V)/BTEX Surrogates		
					pH	Electrical Conductivity	Temperature	Dissolved Oxygen	Oxygen Reduction Potential	Total Suspended Solids	Total Dissolved Solids	Turbidity	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Iron	Mercury	Ammonium	Ammonia	Nitrite	Nitrate	Nitrite and Nitrate	Total Kjeldahl Nitrogen	Total Nitrogen	Total Phosphorous	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene	Benzene	Toluene	Ethylbenzene	meta & para - Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	1,2-Dichloroethane-D4	Toluene-D8	4-Bromofluorobenzene
Legend	Exceedance	Prefix											As	Cd	Cr	Cu	Pb	Ni	Zn	Fe	Hg	N	N	N	N	N	N (TKN)	N	P																			
	Exceedance due to LOR changed	Unit			pH Units	uS/cm	°C	mg/L	mV	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	%	%	%
	Exceedance is upstream related	LOR			0.10	0.10	0.1	0.01	1	5	0.1	1	0.0010	0.0001	0.0010	0.0010	0.0010	0.0010	0.05	0.0500	0.0050	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	2	2	2
		ANZECC SSTV	Freshwater		6.5 - 8.5	0.31-1.66		60		50		29	0.3600	0.0008	0.0400	0.0120	0.0094	0.0170	0.0590	0.3000	0.0054		2.30		17			2.89	0.12																			
			Estuary		7.0 - 8.5	50.20		60 - 110		21		10	0.0024	0.0005	0.0004	0.0003	0.0004	0.0070	0.0056	0.3000	0.0004		0.091		0.07			1.2	0.17																			
W/O	Oct-20	Date Sampled	Time Sampled	Comments																																												
ES2035167 ES2036019 (5.6mm recorded week prior)	LDS-SW-01	6/10/2020	10:14:00	Clear moderate flow incoming tide	8.23	0.51	18.4	9.98	-132	5	0.3	0.2	0.001	0.0001	0.001	0.005	0.0010	0.0010	0.055	0.16	0.0001	0.15	0.16	0.06	2.78	2.84	0.8	3.6	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	113	92.4	86.8
	LDS-SW-02	6/10/2020	10:49:00	Fast flow incoming tide	7.88	48.92	19.5	4.67	339	8	31.8	2.8	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.16	0.17	0.01	0.14	0.14	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	126	107	100
	LDS-SW-05	6/10/2020	11:28:00	Clear slow flow incoming tide	7.99	51.45	19.5	5.40	276	5	33.4	5.6	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.12	0.12	0.01	0.07	0.07	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	123	104	96.8
	LDS-SW-06	7/10/2020	9:50:00	Clear, moderate flow	7.64	50.54	19.8	4.40	900	5	32.8	4.5	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.11	0.0001	0.42	0.43	0.01	0.10	0.10	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	104	89.7	80.5
	LDS-SW-07	7/10/2020	10:11:00	Clear moderate flow	7.84	51.90	19.8	5.40	823	5	33.7	5.2	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.25	0.26	0.01	0.05	0.05	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	126	107	96
	LDS-SW-08*	6/10/2020	13:58:00	Dry not enough to sample	DRY NO SAMPLE																																										
	LDS-SW-09*	6/10/2020	13:44:00	Clear moderate flow outgoing tide	10.04	0.69	21.8	10.24	142	5	0.4	2.2	0.001	0.0005	0.001	0.011	0.1230	0.0010	0.025	0.70	0.0001	0.01	0.03	0.04	0.56	0.60	1.3	1.9	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	127	119	105
	LDS-SW-10	6/10/2020	13:24:00	into creek, hydrocarbon sheen visible, cloudy,	9.43	0.57	21.5	11.30	80	9	0.4	7.7	0.001	0.0001	0.001	0.004	0.0010	0.0010	0.007	0.47	0.0001	0.02	0.04	0.05	0.28	0.33	0.7	1.0	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	107	97.4	85.2
	LDS-SW-11	6/10/2020	12:16:00	af litter, outgoing tide, clear, grease on surface	7.38	0.52	19.3	6.21	-79	6	0.3	0.1	0.001	0.0001	0.001	0.001	0.0010	0.0020	0.016	0.50	0.0001	1.93	1.95	0.06	0.34	0.40	2.7	3.1	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	126	116	102
	LDS-SW-12	7/10/2020	9:35:00	Clear, moderate flow	7.37	50.04	19.9	4.85	900	5	32.5	4.6	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.11	0.10	0.0001	0.1	0.10	0.01	0.14	0.14	1.0	1.0	0.22	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	133	113	106
W/O	Nov-20	Date Sampled	Time Sampled	Comments																																												
ES2039143 ES2040775 (22.8mm recorded week prior)	LDS-SW-01	4/11/2020	10:59:00	Clear, fast flowing outgoing tide	8.03	0.39	22.0	10.41	-101	5	0.3	2	0.001	0.0001	0.001	0.004	0.0010	0.0010	0.037	0.10	0.0001	0.14	0.15	0.06	2.53	2.59	0.9	3.5	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	106	117	122
	LDS-SW-02	4/11/2020	11:24:00	Clear fast flowing outgoing tide	7.53	28.06	21.2	5.65	257	7	18.2	6.8	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.029	0.05	0.0001	0.01	0.10	0.03	0.30	0.33	0.5	0.8	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	103	114	119
	LDS-SW-05	4/11/2020	11:57:00	Outgoing tide	7.95	43.32	21.8	6.24	240	8	28.2	11.3	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.085	0.10	0.0001	0.01	0.10	0.01	0.04	0.04	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	105	115	118
	LDS-SW-06	4/11/2020	15:24:00	Moderate flow, outgoing tide	7.85	40.68	21.8	5.05	361	9	26.4	9.5	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.059	0.10	0.0001	0.01	0.10	0.01	0.07	0.07	0.5	0.5	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	112	125	127
	LDS-SW-07	4/11/2020	15:44:00	Moderate flow, outgoing tide	7.83	37.45	22.1	5.88	144	9	24.3	9.2	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.28	0.0001	1.74	1.80	0.03	0.13	0.16	2.2	2.4	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	104	112	115
	LDS-SW-08*	4/11/2020	12:33:00	Dry, not enough water to sample	DRY NO SAMPLE																																										
	LDS-SW-09*	4/11/2020	12:42:00	Slow flow clear, outogoing tide	9.69	0.83	28.8	9.72	-159	9	0.5	5.5	0.001	0.0001	0.004	0.007	0.0010	0.0010	0.01	0.08	0.0001	0.01	0.01	0.04	0.84	0.88	0.6	1.5	0.02	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	105	116	120
	LDS-SW-10	4/11/2020	13:05:00	Clear moderate flow, outgoing tide	9.41	0.76	28.3	9.40	-69	5	0.5	2	0.001	0.0001	0.008	0.006	0.0010	0.0010	0.016	0.13	0.0001	0.01	0.01	0.03	0.27	0.30	0.5	0.8	0.03	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	103	116	118
	LDS-SW-11	4/11/2020	9:04:00	Incoming tide clear slow flow	7.02	0.13	18.8	2.47	-42	8	0.1	2.1	0.001	0.0001	0.001	0.003	0.0010	0.0010	0.084	0.46	0.0001	0.3	0.30	0.02	0.24	0.26	0.7	1.0	0.07	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	100	109	113
	LDS-SW-12	4/11/2020	15:09:00	Moderate flow, outgoing tide	7.80	40.78	22.3	5.30	477	7	26.5	9.4	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.24	0.25	0.01	0.06	0.07	1.4	1.5	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	115	130	123
W/O	Dec-21	Date Sampled	Time Sampled	Comments																																											
ES2043566 ES2042601 (14.2mm recorded week prior)	LDS-SW-01	8/12/2020	8:16:00	Moderate flow, clear, outgoing tide	7.51	0.29	19.1	8.79	159	5	0.2	2	0.001	0.0001	0.001	0.005	0.0010	0.0010	0.16	0.09	0.0001	0.13	0.13	0.06	2.39	2.45	0.7	3.2	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	124	108	107
	LDS-SW-02	8/12/2020	8:38:00	Fast flow, slightly cloudy, outgoing tide	7.86	40.96	20.6	5.17	159	34	26.6	17.3	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.01	0.10	0.01	0.04	0.04	1.0	1.0	0.24	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	137	123	116
	LDS-SW-05	8/12/2020	9:22:00	Moderate flow, clear, incoming tide	7.66	40.94	21.4	3.74	152	6	26.6	11.5	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.156	0.10	0.0001	0.01	0.10	0.01	0.03	0.03	0.5	0.5	0.12	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	133	117	110
	LDS-SW-06	8/12/2020	11:28:00	Fast flow, slightly cloudy, incoming tide	7.87	49.30	23.2	5.28	147	7	32	14.5	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.01	0.10	0.01	0.02	0.02	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	132	113	113
	LDS-SW-07	8/12/2020	13:10:00	Fast flow, clear, incoming tide	8.06	52.64	22.6	6.35	141	10	34.2	16.2	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.128	0.10	0.0001	0.02	0.02	0.01	0.01	0.01	1.0	1.0	0.11	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	126	106	105
	LDS-SW-08*	8/12/2020	11:55:00	Dry, not enough water to sample	DRY NO SAMPLE																																										
	LDS-SW-09*	8/12/2020	12:04:00	Dry, not enough water to sample	DRY NO SAMPLE																																										
	LDS-SW-10	8/12/2020	12:31:00	Sheen visible, cloudy, incoming tide	8.37	0.85	26.6	7.65	117	22	0.6	22.5	0.001	0.0001	0.001	0.003	0.0010	0.0010	0.049	0.23	0.0001	0.05	0.06	0.01	0.02	0.03	1.4	1.4	0.25	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	133	118	115
	LDS-SW-11	1/12/2020	12:28:00	Clear, slow flow, outoging tide	7.44	3.88	25.0	10.81	542	8	2.5	3.2	0.001	0.0001	0.001	0.001	0.0010	0.0010	0.005	0.07	0.0001	0.02	0.02	0.04	0.50	0.54	0.8	1.3	0.06	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	122	124	121
	LDS-SW-12	8/12/2020	11:16:00	Slow flow, clear, incoming tide	7.84	49.03	23.1	5.14	154	7	31.9	15	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.09	0.09	0.01	0.01	0.02	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	133	114	114

					General Parameters								Metals								
					pH	Electrical Conductivity	Temperature	Dissolved Oxygen	Oxygen Reduction Potential	Total Suspended Solids	Total Dissolved Solids	Turbidity	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Iron	Mercury
	Legend	Exceedance		Prefix									As	Cd	Cr	Cu	Pb	Ni	Zn	Fe	Hg
		Exceedance due to LOR changed		Unit	pH Units	uS/cm	°C	mg/L	mV	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		Exceedance is upstream related		LOR	0.10	0.10	0.1	0.01	1	5	0.1	1	0.0010	0.0001	0.0010	0.0010	0.0010	0.0010	0.05	0.0500	0.0050
			ANZECC SSTV	Freshwater	6.5 - 8.5	0.31-1.66		60		50		29	0.3600	0.0008	0.0400	0.0120	0.0094	0.0170	0.0590	0.3000	0.0054
				Estuary	7.0 - 8.5	50.20		60 - 110		21		10	0.0024	0.0005	0.0004	0.0003	0.0004	0.0070	0.0056	0.3000	0.0004
W/O	Jan-21	Date Sampled	Time Sampled	Comments																	
ES2100541 (21.7mm recorded week prior)	LDS-SW-01	8/01/2021	7:51:00	Moderate flow, clear outgoing tide	7.81	0.35	20.1	8.59	900	5	0.2	0	0.001	0.0001	0.001	0.005	0.0010	0.0010	0.108	0.12	0.0001
	LDS-SW-02	8/01/2021	8:15:00	Slow flow, clear, outgoing tide	7.71	14.51	19.9	5.90	900	5	9.4	4.5	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.036	0.05	0.0001
	LDS-SW-05	8/01/2021	8:39:00	ount of leaf litter, clear, moderate flow, outgoi	7.71	29.47	21.8	3.36	900	5	19.1	4.6	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.162	0.05	0.0001
	LDS-SW-06	8/01/2021	9:14:00	Clear, moderate flow, outgoing tide	7.79	33.02	22.0	3.98	900	5	21.5	5.5	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001
	LDS-SW-07	8/01/2021	10:01:00	Clear, moderate flow, outgoing tide	7.82	36.53	22.0	5.01	900	5	23.7	6.7	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001
	LDS-SW-08*	8/01/2021	10:25:00	Not enough water to sample	DRY NO SAMPLE																
	LDS-SW-09*	8/01/2021	10:54:00	small amount of leaf litter, slightly cloudy, outg	9.67	0.38	20.9	10.16	524	5	0.3	9.9	0.001	0.0001	0.001	0.010	0.0010	0.0010	0.011	0.05	0.0001
	LDS-SW-10	8/01/2021	11:10:00	moderate flow, hydrocarbons visible incoming	8.67	0.20	21.2	9.04	680	5	0.1	9.6	0.001	0.0001	0.001	0.002	0.0010	0.0010	0.026	0.12	0.0001
	LDS-SW-11	8/01/2021	9:37:00	Clear, moderate flow, yellow tinge in colour	7.01	0.13	21.6	1.63	753	5	0.1	0.5	0.001	0.0001	0.001	0.002	0.0010	0.0010	0.021	0.53	0.0001
	LDS-SW-12	8/01/2021	9:05:00	Clear, moderate flow, outgoing tide	7.80	32.86	21.7	3.77	900	5	21.4	5.7	0.002	0.0001	0.0010	0.001	0.0010	0.0010	0.043	0.05	0.0001
W/O	Feb-21	Date Sampled	Time Sampled	Comments																	
ES2104620 (1.4mm recorded week prior)	LDS-SW-01	10/02/2021	8:31:00	Moderate flow, clear, outgoing tide	6.77	0.15	21.2	7.19	589	7	0.1	4.7	0.001	0.0001	0.001	0.005	0.0010	0.0010	0.103	0.10	0.00
	LDS-SW-02	10/02/2021	8:58:00	onstruction ongoing next to site, clear, modera	7.72	32.26	22.0	4.44	596	8	21	6.9	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001
	LDS-SW-05	10/02/2021	9:42:00	Moderate flow, slightly cloudy, outgoing tide	8.32	49.18	22.8	4.91	541	6	32	10.3	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001
	LDS-SW-06	10/02/2021	11:01:00	Moderate flow, slightly cloudy, outgoing tide	8.14	49.78	24.2	5.36	552	8	32.4	10.9	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.062	0.10	0.0001
	LDS-SW-07	10/02/2021	11:47:00	Moderate flow, slightly cloudy, outgoing tide	8.21	49.67	24.4	6.01	510	10	32.3	10.5	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001
	LDS-SW-08*	10/02/2021	13:04:00	Not enough water to sample	DRY NO SAMPLE																
	LDS-SW-09*	10/02/2021	13:23:00	r, moderate flow, low water volume, outgoing t	9.55	0.50	26.1	10.06	468	5	0.3	1.3	0.001	0.0001	0.001	0.004	0.0010	0.0010	0.017	0.08	0.0001
	LDS-SW-10	10/02/2021	13:52:00	Clear, moderate flow, outoging tide	8.94	0.34	28.0	8.17	470	8	0.2	6.6	0.001	0.0001	0.002	0.006	0.0010	0.0010	0.018	0.06	0.0001
	LDS-SW-11	10/02/2021	10:21:00	Clear, moderate flow, outgoing tide	7.32	0.37	22.5	3.66	501	5	0.2	0.9	0.001	0.0001	0.001	0.001	0.0010	0.0010	0.005	0.21	0.0001
	LDS-SW-12	10/02/2021	11:20:00	Moderate flow, slightly cloudy, outgoing tide	8.09	49.80	24.0	5.52	520	5	32.4	10.8	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.052	0.10	0.0001
W/O	Mar-21	Date Sampled	Time Sampled	Comments																	
ES2108491 (5.2mm recorded week prior)	LDS-SW-01	10/03/2021	8:18:00	Clear, moderate flow, outgoing tide	7.95	0.40	21.5	7.80	564	10	0.3	0.9	0.002	0.0010	0.0001	0.003	0.0010	0.0020	0.059	0.07	0.0001
	LDS-SW-02	10/03/2021	8:44:00	Slow flow, clear, outgoing tide	8.20	34.75	22.4	5.47	583	16	22.6	6.5	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001
	LDS-SW-05	10/03/2021	9:17:00	Moderate flow, slightly cloudy, outgoing tide	8.37	49.64	22.9	4.67	550	8	32.3	10.8	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001
	LDS-SW-06	10/03/2021	10:38:00	Clear, moderate flow, outgoing tide	8.28	50.33	23.2	4,87	547	12	32.7	11.2	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.068	0.10	0.0001
	LDS-SW-07	10/03/2021	11:29:00	Clear, moderate flow, outgoing tide	8.45	50.98	23.2	5.72	520	13	33.1	11	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.055	0.10	0.0001
	LDS-SW-08*	10/03/2021	12:22:00	Dry not enough water to sample	DRY NO SAMPLE																
	LDS-SW-09*	10/03/2021	12:42:00	Dry not enough water to sample	DRY NO SAMPLE																
	LDS-SW-10	10/03/2021	13:10:00	ave fallen into creek which may influence resul	9.84	0.76	24.9	9,61	476	25	0.5	4.4	0.005	0.0001	0.001	0.004	0.0010	0.0010	0.024	0.08	0.0001
	LDS-SW-11	10/03/2021	9:57:00	d in water and were removed where possible.	7.71	1.63	22.1	4.78	512	8	1.1	1.2	0.001	0.0001	0.001	0.001	0.0010	0.0010	0.013	0.06	0.0001
	LDS-SW-12	10/03/2021	10:51:00	Clear, moderate flow, outgoing tide	8.28	48.74	23.0	5.30	532	5	31.7	10.4	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001
W/O	Mar-21	Date Sampled	Time Sampled	Comments																	
ES2110862 Wet Weather Monitoring Event (24.2mm recorded 24/03/2021)	LDS-SW-01	25/03/2021	8:43:00	Fast flow, clear, outoging tide	8.07	0.46	20.8	7.86	399	5	0.4	4.4	0.002	0.0001	0.001	0.004	0.0010	0.0010	0.093	0.12	0.0001
	LDS-SW-02	25/03/2021	9:09:00	Slow flow, lightly cloudy, outoging tide	7.80	0.98	20.8	5.59	423	7	0.6	8.8	0.002	0.0001	0.0010	0.002	0.0010	0.0010	0.095	0.06	0.0001
	LDS-SW-05	25/03/2021	9:42:00	Moderate flow, clear, outgoing tide	7.59	10.24	20.7	1.95	449	8	6.7	4.1	0.002	0.0001	0.0010	0.004	0.0010	0.0010	0.161	0.13	0.0001
	LDS-SW-06	25/03/2021	10:38:00	e flow, clear, moderate amount of leaf debris p	7.55	14.79	21.4	2.14	467	10	9.6	8.2	0.002	0.0001	0.0010	0.004	0.0010	0.0010	0.078	0.11	0.0001
	LDS-SW-07	25/03/2021	11:32:00	, clear, high amount of leaf and general debris	7.51	10.04	22.4	3.42	458	5	6.5	5.2	0.005	0.0001	0.0010	0.004	0.0010	0.0020	0.078	0.09	0.0001
	LDS-SW-08*	25/03/2021	12:25:00	Clear, outgoing tide, moderate flow	7.90	0.82	23.5	6.83	464	5	0.5	3.2	0.001	0.0001	0.001	0.002	0.0010	0.0010	0.055	0.11	0.0001
	LDS-SW-09*	25/03/2021	12:42:00	Clear, fast flow, outgoing tide	9.04	0.81	25.9	9.34	470	10	0.5	6.5	0.001	0.0001	0.001	0.005	0.0010	0.0010	0.015	0.07	0.0001
	LDS-SW-10	25/03/2021	13:03:00	Clear, Moderate flow, outoging tide	8.99	0.78	25.1	8.46	476	5	0.5	4.9	0.001	0.0001	0.001	0.006	0.0010	0.0020	0.04	0.05	0.0001
	LDS-SW-11	25/03/2021	10:15:00	Really fast flow, clear, outoging tide	7.41	0.44	20.4	2.86	441	5	0.3	5.8	0.001	0.0001	0.001	0.008	0.0010	0.0020	0.107	0.38	0.0001
	LDS-SW-12	25/03/2021	11:01:00	e flow, clear, moderate amount of leaf debris p	7.54	14.74	22.3	3.08	446	6	9.6	7.9	0.002	0.0001	0.0010	0.003	0.0010	0.0010	0.127	0.11	0.0001

		Nutrients								TRH							BTEXN								TPH(V)/BTEX Surrogates		
Sample	Date Sampled	Ammonium	Ammonia	Nitrite	Nitrate	Nitrite and Nitrate	Total Kjeldahl Nitrogen	Total Nitrogen	Total Phospherous	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene	Benzene	Toluene	Ethylbenzene	meta & para - Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	1.2-Dichloroethane-D4	Toluene-D8	4-Bromofluorobenzene
Prefix		N	N	N	N	N	N (TKN)	N	P																		
Unit		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	%	%	%
LOR		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	2	2	2
ANZECC SSTV Freshwater			2.30		17			2.89	0.12																		
ANZECC SSTV Estuary			0.091		0.07			1.2	0.17																		
LDS-SW-01	8/01/2021	0.1	0.10	0.06	2.35	2.41	0.6	3.0	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	108	103	104
LDS-SW-02	8/01/2021	0.44	0.45	0.03	0.36	0.39	0.9	1.3	0.04	20	20	100	290	110	400	100	1	2	2	2	2	2	1	5	113	112	111
LDS-SW-05	8/01/2021	0.14	0.14	0.02	0.10	0.12	0.6	0.7	0.05	20	20	100	310	120	430	100	1	2	2	2	2	2	1	5	107	104	103
LDS-SW-06	8/01/2021	0.14	0.15	0.02	0.19	0.21	1.0	1.2	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	122	122	120
LDS-SW-07	8/01/2021	0.35	0.36	0.02	0.11	0.13	0.7	0.8	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	120	122	120
LDS-SW-08*	8/01/2021	DRY NO SAMPLE																									
LDS-SW-09*	8/01/2021	0.01	0.01	0.02	0.44	0.46	0.4	0.9	0.02	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	88.6	86.7	86.9
LDS-SW-10	8/01/2021	0.01	0.01	0.01	0.75	0.75	0.6	1.4	0.03	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	111	112	108
LDS-SW-11	8/01/2021	0.47	0.47	0.02	0.10	0.12	0.8	0.9	0.12	20	20	100	110	100	110	100	1	2	2	2	2	2	1	5	116	112	112
LDS-SW-12	8/01/2021	0.14	0.14	0.02	0.09	0.11	0.6	0.7	0.05	20	20	100	120	100	120	100	1	2	2	2	2	2	1	5	125	123	118
LDS-SW-01	10/02/2021	0.06	0.06	0.12	1.42	1.54	0.8	2.3	0.13	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	92.5	106	102
LDS-SW-02	10/02/2021	0.28	0.29	0.03	0.41	0.44	1.3	1.7	0.07	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	93.2	107	102
LDS-SW-05	10/02/2021	0.01	0.10	0.01	0.01	0.01	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	92.5	107	98.5
LDS-SW-06	10/02/2021	0.01	0.10	0.01	0.02	0.02	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	98.2	105	103
LDS-SW-07	10/02/2021	0.01	0.10	0.01	0.02	0.02	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	97.5	110	106
LDS-SW-08*	10/02/2021	DRY NO SAMPLE																									
LDS-SW-09*	10/02/2021	0.01	0.01	0.01	0.08	0.08	0.5	0.6	0.02	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	94.8	107	102
LDS-SW-10	10/02/2021	0.01	0.01	0.01	0.02	0.02	0.6	0.6	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	101	112	107
LDS-SW-11	10/02/2021	0.17	0.17	0.03	0.13	0.16	0.8	1.0	0.08	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	96.4	112	105
LDS-SW-12	10/02/2021	0.15	0.16	0.01	0.03	0.03	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	94.3	108	99.8
LDS-SW-01	10/03/2021	0.49	0.51	0.05	2.82	2.87	0.7	3.6	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	102	98.6	116
LDS-SW-02	10/03/2021	0.09	0.10	0.02	0.52	0.54	0.5	0.5	0.12	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	109	118	118
LDS-SW-05	10/03/2021	0.1	0.10	0.01	0.04	0.04	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	113	100	108
LDS-SW-06	10/03/2021	0.1	0.10	0.01	0.04	0.04	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	107	111	114
LDS-SW-07	10/03/2021	0.1	0.10	0.01	0.04	0.04	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	116	124	119
LDS-SW-08*	10/03/2021	DRY NO SAMPLE																									
LDS-SW-09*	10/03/2021	DRY NO SAMPLE																									
LDS-SW-10	10/03/2021	0.01	0.02	0.03	0.11	0.14	0.9	1.0	0.09	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	98.6	106	106
LDS-SW-11	10/03/2021	0.55	0.56	0.05	0.30	0.35	0.8	1.2	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	112	106	108
LDS-SW-12	10/03/2021	0.37	0.41	0.01	0.04	0.05	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	110	85.9	94.5
LDS-SW-01	25/03/2021	0.26	0.36	0.08	3.10	3.18	1.0	4.2	0.07	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	115	112	110
LDS-SW-02	25/03/2021	0.56	0.58	0.04	1.18	1.22	1.0	2.2	0.12	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	123	118	117
LDS-SW-05	25/03/2021	0.56	0.57	0.07	0.84	0.91	1.2	2.1	0.25	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	127	121	117
LDS-SW-06	25/03/2021	0.65	0.66	0.07	0.76	0.83	1.3	2.1	0.23	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	122	112	115
LDS-SW-07	25/03/2021	0.79	0.80	0.08	1.80	1.88	1.3	3.2	0.37	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	130	122	119
LDS-SW-08*	25/03/2021	0.07	0.07	0.02	0.90	0.92	0.5	1.4	0.06	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	124	122	120
LDS-SW-09*	25/03/2021	0.01	0.02	0.03	2.17	2.20	0.7	2.9	0.04	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	124	121	121
LDS-SW-10	25/03/2021	0.02	0.03	0.03	2.19	2.22	0.7	2.9	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	118	111	110
LDS-SW-11	25/03/2021	1.4	1.42	0.1	2.01	2.11	1.9	4.0	0.09	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	125	119	116
LDS-SW-12	25/03/2021	0.71	0.72	0.06	0.66	0.72	1.3	2.0	0.21	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	133	125	121

Fulton Hogan egis

				General Parameters									Metals								Nutrients								TRH								BTEXN								TPH(V)/BTEX Surrogates		
				pH	Electrical Conductivity	Temperature	Dissolved Oxygen	Oxygen Reduction Potential	Total Suspended Solids	Total Dissolved Solids	Turbidity	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Iron	Mercury	Ammonium	Ammonia	Nitrite	Nitrate	Nitrite and Nitrate	Total Kjeldahl Nitrogen	Total Nitrogen	Total Phospherous	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene	Benzene	Toluene	Ethylbenzene	meta & para - Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	1,2-Dichloroethane-D4	Toluene-D8	4-Bromofluorobenzene
Legend	Exceedance	Prefix										As	Cd	Cr	Cu	Pb	Ni	Zn	Fe	Hg	N	N	N	N	N	N (TKN)	N	P																		
	Exceedance due to LOR changed	Unit		pH Units	uS/cm	°C	mg/L	mV	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	%	%	%
	Exceedance is upstream related	LOR		0.10	0.10	0.1	0.01	1	5	0.1	1	0.0010	0.0001	0.0010	0.0010	0.0010	0.0010	0.05	0.0500	0.0050	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	2	2	2
		ANZECC SSTV	Freshwater	6.5 - 8.5	0.31-1.66		60		50		29	0.3600	0.0008	0.0400	0.0120	0.0094	0.0170	0.0590	0.3000	0.0054		2.30		17			2.89	0.12																		
			Estuary	7.0 - 8.5	50.20		60 - 110		21		10	0.0024	0.0005	0.0004	0.0003	0.0004	0.0070	0.0056	0.3000	0.0004		0.091		0.07			1.2	0.17																		
W/O	Apr-21	Date Sampled	Time Sampled	Comments																																										
ES2 112958 (2. 8mm recorded week prior)	LDS-SW-01	9/04/2021	8:08:00	Clear, moderate flow, outgoing tide	7.72	0.37	20.9	7.73	489	5	0.2	14.4	0.001	0.0001	0.001	0.004	0.0010	0.0010	0.059	0.12	0.0001	0.26	0.27	0.08	2.65	2.73	0.9	3.6	0.07	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	101	107	106
	LDS-SW-02	9/04/2021	8:32:00	w flow, clear, hydrocarbons visible, outgoing tid	7.55	17.23	20.6	5.58	536	5	11.2	4.1	0.001	0.0001	0.0010	0.002	0.0010	0.0010	0.03	0.05	0.0001	0.4	0.41	0.04	0.70	0.74	0.8	1.5	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	96.5	107	101
	LDS-SW-05	9/04/2021	9:05:00	Fast flow, clear, outoging tide	7.92	39.91	22.3	3.25	519	5	25.9	3	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.34	0.35	0.01	0.08	0.08	0.6	0.7	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	85.1	91.5	85.7
	LDS-SW-06	9/04/2021	9:53:00	Clear, moderate flow, outgoing tide	7.95	41.90	23.3	3.26	522	5	27.2	2	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.3	0.31	0.01	0.08	0.08	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	103	103	100
	LDS-SW-07	9/04/2021	10:27:00	low, clear, outgoing tide, large amount of debr	7.82	40.35	23.8	4.33	496	5	26.2	2.5	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.32	0.33	0.01	0.13	0.13	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	102	102	103
	LDS-SW-08*	9/04/2021	10:52:00	Not enough water to sample	DRY NO SAMPLE																																								
	LDS-SW-09*	9/04/2021	11:11:00	Clear, moderate flow, outgoing tide	9.18	1.22	24.0	10.13	456	5	0.8	2.8	0.001	0.0001	0.001	0.005	0.0010	0.0010	0.017	0.05	0.0001	0.02	0.03	0.02	1.06	1.08	0.8	1.9	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	102	105	99.1
	LDS-SW-10	9/04/2021	11:34:00	Slow flow, clear, hydrocarbons visible	8.88	0.65	22.9	9.48	468	5	0.4	3.6	0.001	0.0001	0.001	0.004	0.0010	0.0020	0.022	0.12	0.0001	0.03	0.04	0.03	0.41	0.44	0.6	1.0	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	99.5	101	99.6
	LDS-SW-11	9/04/2021	9:30:00	Clear, moderate flow, outgoing tide	7.19	0.11	20.9	2.49	482	5	0.1	5.7	0.001	0.0001	0.001	0.004	0.0010	0.0010	0.042	0.21	0.0001	1.1	1.11	0.06	0.39	0.45	1.4	1.8	0.08	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	102	102	101
	LDS-SW-12	9/04/2021	10:06:00	Clear, moderate flow, outgoing tide	8.00	44.97	23.7	3.55	501	5	29.2	2.3	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.05	0.10	0.0001	0.39	0.41	0.01	0.10	0.10	1.0	1.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	93.2	85	85.5
W/O	May-21	Date Sampled	Time Sampled	Comments																																										
ES2 117170 Wet Weather Monitoring Event (19mm recorded 06/05/2021)	LDS-SW-01	7/05/2021	8:13:00	Clear, moderate flow, outgoing tide	7.69	0.11	20.1	8.21	564	16	0.1	7.9	0.001	0.0001	0.002	0.004	0.0010	0.0010	0.187	0.10	0.0001	0.12	0.12	0.04	2.31	2.35	1.0	3.4	0.09	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	107	109	118
	LDS-SW-02	7/05/2021	8:39:00	tae flow, outgoing tide, small amount of debr	7.56	1.29	19.5	7.61	582	19	0.8	11.1	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.026	0.05	0.0001	0.14	0.14	0.03	0.31	0.34	0.4	0.7	0.08	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	105	106	115
	LDS-SW-05	7/05/2021	9:04:00	Slow flow, slightly cloudy, outoging tide	7.56	1.47	19.3	6.39	579	47	1	37.4	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.025	0.05	0.0001	0.16	0.16	0.03	0.55	0.58	0.8	1.4	0.18	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	106	110	122
	LDS-SW-06	7/05/2021	9:52:00	Moderate flow, outoging tide	7.50	6.64	20.0	5.60	581	36	4.3	28.6	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.044	0.05	0.0001	0.8	0.81	0.04	0.73	0.77	2.1	2.9	0.3	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	104	109	119
	LDS-SW-07	7/05/2021	10:40:00	Clear, moderate flow, outgoing tide	7.38	8.69	21.6	5.50	538	31	5.7	18.4	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.063	0.05	0.0001	1.51	1.53	0.05	0.76	0.81	3.2	4.0	0.4	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	110	108	124
	LDS-SW-08*	7/05/2021	11:09:00	Clear, fast flow, outgoing tide	7.69	0.47	20.6	6.90	508	8	0.3	6.4	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.018	0.07	0.0001	0.05	0.05	0.02	0.46	0.48	0.5	1.0	0.05	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	112	115	127
	LDS-SW-09*	7/05/2021	11:24:00	Clear, fast flow, outgoing tide	8.07	0.30	20.5	8.97	526	8	0.2	11.8	0.001	0.0001	0.0010	0.002	0.0010	0.0010	0.038	0.05	0.0001	0.04	0.04	0.01	0.65	0.66	0.5	1.2	0.06	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	99.4	99.1	105
	LDS-SW-10	7/05/2021	11:49:00	Slightly cloudy, moderate flow, outgoiing tide	8.82	0.26	21.3	9.20	397	19	0.2	24.1	0.001	0.0001	0.0010	0.003	0.0010	0.0010	0.011	0.05	0.0001	0.01	0.01	0.02	1.30	1.32	0.7	2.0	0.1	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	108	106	121
	LDS-SW-11	7/05/2021	9:30:00	Overflow, fast flow, clear, outgoing tide	7.17	0. (141)	19.3	6.43	574	17	0..0	12.7	0.001	0.0001	0.0010	0.002	0.0010	0.0010	0.031	0.08	0.0001	0.08	0.08	0.01	0.51	0.52	0.4	0.9	0.08	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	108	106	115
	LDS-SW-12	7/05/2021	10:12:00	Moderate flow, outoging tide	7.50	9.26	21.1	5.67	553	21	6	22.1	0.001	0.0001	0.0010	0.001	0.0010	0.0010	0.053	0.05	0.0001	1.04	1.05	0.04	0.68	0.72	2.1	2.8	0.24	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	108	106	117
W/O	Jun-21	Date Sampled	Time Sampled	Comments																																										
(8.8mm recorded week prior)	LDS-SW-01	8/06/2021	9:31:00	Slow flow, clear, outgoing tide	7.85	0.34	16.4	9.08	547	5	0.2	1.5	0.001	0.0001	0.001	0.004	0.0010	0.0010	0.061	0.10	0.0001	0.19	0.19	0.12	2.25	2.37	1.1	3.5	0.09	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	91.7	99.4	104
	LDS-SW-02	8/06/2021	9:55:00	Moderate flow, clear, outgoing tide	8.03	37.37	15.5	5.60	594	16	24.3	8.6	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.056	0.10	0.0001	0.22	0.23	0.02	0.3	0.32	1	1.3	0.12	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	95.4	102	105
	LDS-SW-05	8/06/2021	10:25:00	Moderate flow, clear, outgoing tide	8.23	44.99	15.0	4.59	571	25	29.2	9.8	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.072	0.10	0.0001	0.12	0.13	0.01	0.09	0.1	0.7	0.8	0.09	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	87.6	103	103
	LDS-SW-06	8/06/2021	11:20:00	Moderate flow, clear, outgoing tide	8.50	48.48	15.0	5.35	571	22	31.5	9.8	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.054	0.10	0.0001	0.07	0.08	0.01	0.1	0.1	0.6	0.7	0.11	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	88.2	99	97.7
	LDS-SW-07	8/06/2021	11:57:00	Moderate flow, clear, outgoing tide	8.51	48.45	15.2	6.11	557	24	31.5	10	0.010	0.0010	0.0100	0.010	0.0100	0.0100	0.072	0.10	0.0001	0.2	0.22	0.01	0.11	0.11	0.5	0.6	0.06	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	89.9	105	103
	LDS-SW-08*	8/06/2021	12:24:00	low flow, outgoing tide, not enough water to sa	DRY NO SAMPLE																																								
	LDS-SW-09*	8/06/2021	12:31:00	derate flow, outgoing tide, not enough water to	DRY NO SAMPLE																																								
	LDS-SW-10	8/06/2021	12:38:00	carbons present throughout site, outgoing tide	9.44	0.71	13.2	13.48	516	6	0.5	2.1	0.001	0.0001	0.001	0.004	0.001	0.001	0.118	0.12	0.0001	0.01	0.01	0.04	0.33	0.37	0.6	1	0.06	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	91.2	104	106
	LDS-SW-11	8/06/2021	10:56:00	lear, hydroarbons present throughout site, out	7.77	0.42	10.8	5.48	533	6	0.3	4.4	0.001	0.0001	0.001	0.002	0.001	0.001	0.033	0.21	0.0001	0.99	1	0.04	0.43	0.47	1.4	1.9	0.1	20	20	100	200	100	200	100	1	2	2	2	2	2	1	5	94.3	104	102
	LDS-SW-12	8/06/2021	11:32:00	Moderate flow, clear, outgoing tide	8.50	49.42	15.1	5.90	564	21	32.1	11.4	0.01	0.001	0.01	0.01	0.01	0.01	0.246	0.1	0.0001	0.19	0.21	0.01	0.07	0.08	0.7	0.8	0.11	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	89.8	106	106

Appendix B: Groundwater Quality Raw Data (July 2020 – June 2021)

			General Parameters			Metals					Nutrients	TRH							BTEXN								TPH(V)/BTEX Surrogates		
			pH	Electrical Conductivity	Temperature	Arsenic	Chromium	Copper	Lead	Iron	Ammonia	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene	Benzene	Toluene	Ethylbenzene	meta & para - Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	1.2-Dichloroethane-D4	Toluene-D8	4-Bromofluorobenzene
Prefix						As	Cr	Cu	Pb	Fe	N																		
Unit			pH Units	mS/cm	°C	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	%	%	%
LOR			0.01	0.1	0.1	0.0010	0.0010	0.0010	0.0010	0.05	0.01	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	2	2	2
ANZECC SSTV	Alluvium		3.01 - 7.43	9.6		0.0012	0.0010	0.0139	0.0012	24.00																			
	Ashfield Shale		3.74 - 7.54	14.4		0.0036	0.0012	0.0024	0.0012	10.44																			
	Hawkesbury Standstone		3.54 - 7.75	5.9		0.0132	0.0024	0.0072	0.0012	9.94																			
	Site	Down to Water Level	Date	Time Sampled	Date Sampled																								
	Ground Water					Ground Water																							
W/O	1 - 6 Month	DTW (m)	Date Sampled	Time Sampled	Comments	July - December 2020																							
ES2025052, ES2039956, ES2040348, ES2027954	LDS-BH-1026	27.54	10/08/2020	16:18:00		6.4	0.13	16.68	0.001	0.001	0.014	0.001	0.05	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	103	100	102
	LDS-BH1031	3.85	11/08/2020	8:38:00	Cloudy, turbid brown	4.6	0.38	17.17	0.001	0.001	0.003	0.001	0.17	0.03	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	107	103	99.1
	LDS-BH-1038	16.53	10/08/2020	8:38:00	Clear	7.2	0.58	16.95	0.002	0.001	0.006	0.001	0.32	0.16	20	20	100	150	100	150	100	<1	<2	<2	<2	<2	<2	<1	<5	105	104	104
	LDS-BH-2001	0.56	20/07/2020	14:20:00	Cloudy, Sulfur like odour	4.59	0.13	17.38	0.015	0.001	0.001	0.001	2.55	0.96	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	99.9	94	96.4
	LDS-BH-2005a	Inaccessible				Inaccessible																							
	LDS-BH-2015	20.65	20/07/2020	8:00:00	Clear	3.72	3.82	15.57	0.001	0.001	0.051	0.001	77.80	0.14	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	104	99.1	98.4
	LDS-BH-2018	13.4	20/07/2020	10:00:00	Clear	3.58	10.87	18.22	0.001	0.004	0.096	0.006	127.00	0.28	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	110	96.4	89
	WCX-BH024	11.73	20/07/2020	15:22:00	Cloudy	5.39	0.38	18.96	0.001	0.001	0.001	0.001	6.52	2.95	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	100	95.2	88.8
	WCX-BH84	34.56	13/11/2020	13:52:00	Slightly coudy	6.04	0.81	29.17	0.001	0.001	0.029	0.001	0.05	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	125	106	106
	WCX-BH093	11.26	21/07/2020	12:50:00	Clear	5.05	0.02	19.72	0.001	0.001	0.002	0.001	0.05	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	98.5	97.9	104
	WCX-BH103	45.8	21/07/2020	7:40:00	Dry	Dry																							
	WCX-BH137	17.3	9/11/2020	12:30:00	Clear	6.31	6.94	22.62	0.001	0.001	0.001	0.001	4.37	2.85	20	20	100	100	100	100	100	<1	2	<2	<2	<2	<2	2	<5	90.1	90	109
	WCX-BH168	46.84	21/07/2020	10:15:00	Clear	2.9	17.42	17.66	0.001	0.001	0.105	0.003	315.00	0.61	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	110	91.6	90.7
	LDS-BH-1027	6.02	10/08/2020	15:35:00		2.39	13.03	17.41	0.001	0.001	0.007	0.001	3.29	0.07	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	107	104	102
	LDS-BH1033B	9.27	21/07/2020	13:40:00	Clear	5.91	18.08	1.47	0.003	0.001	0.001	0.001	22.00	59	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	96.7	104	93.3
	LDS-BH-2011A	8.66	21/07/2020	9:15:00	Clear * Labelled LDS-BH-2005a	6.1	12.15	0.35	0.001	0.001	0.011	0.001	0.73	0.1	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	125	109	103
	LDS-BH-2011B	3.2	21/07/2020	1:00:00	Clear	4.95	16.88	1.72	0.001	0.003	0.092	0.001	0.12	0.02	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	129	106	104

				General Parameters			Metals					Nutrients	TRH							BTEXN								TPH(V)/BTEX Surrogates		
				pH	Electrical Conductivity	Temperature	Arsenic	Chromium	Copper	Lead	Iron	Ammonia	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene	Benzene	Toluene	Ethylbenzene	meta & para - Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	1,2-Dichloroethane-D4	Toluene-D8	4-Bromofluorobenzene
Prefix							As	Cr	Cu	Pb	Fe	N																		
Unit				pH Units	mS/cm	°C	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	%	%	%
LOR				0.01	0.1	0.1	0.0010	0.0010	0.0010	0.0010	0.05	0.01	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	2	2	2
ANZECC SSTV			Alluvium	3.01 - 7.43	9.6		0.0012	0.0010	0.0139	0.0012	24.00																			
			Ashfield Shale	3.74 - 7.54	14.4		0.0036	0.0012	0.0024	0.0012	10.44																			
			Hawkesbury Standstone	3.54 - 7.75	5.9		0.0132	0.0024	0.0072	0.0012	9.94																			
	Site	Down to Water Level	Date	Time Sampled	Date Sampled																									
	Ground Water					Ground Water																								
W/O	6 - 12 Month	DTW (m)	Date Sampled	Time Sampled	Comments	January - June 2021																								
ES2102148	LDS-BH-1026	27.95	20/01/2021	11:53:00	Clear	6.19	10.23	20.27	0.001	0.001	0.001	0.001	2.08	1.81	20	20	100	100	100	100	100	<1	2	<2	<2	<2	<2	2	<5	118	106	107
	LDS-BH1031	3.55	20/01/2021	13:44:00	Brackish, cloudy	3.87	0.56	24.06	0.001	0.001	0.03	0.006	1.21	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	120	108	108
	LDS-BH-1038	...	20/01/2021	10:20:00	Tubes obstructing bore	Tubes obstructing bore																								
	LDS-BH-2001	0.83	19/01/2021	8:57:00	Cloudy	5.65	0.15	23.07	0.012	0.001	0.001	0.001	0.67	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	120	108	108
	LDS-BH-2005a	13.7	21/01/2021	10:17:00	Turbid brown, cloudy	6.09	3.44	20.79	0.004	0.001	0.017	0.001	8.93	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	129	116	114
	LDS-BH-2015	20.44	20/01/2021	9:53:00	Slightly cloudy, slightly brackish	6.1	3.28	20.16	0.001	0.001	0.001	0.001	56.70	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	119	108	108
	LDS-BH-2018	...	19/01/2021-21/01/21		Car parked over bore	Car parked over bore																								
	WCX-BH024	12.1	19/01/2021	14:41:00	Cloudy, brackish	5.75	0.37	20.36	0.001	0.001	0.001	0.001	8.42	3.44	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	112	99.3	101
	WCX-BH84	34.4	21/01/2021	8:34:00	Clear	5.37	0.82	20.44	0.001	0.001	0.061	0.003	0.05	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	109	89.5	93.6
	WCX-BH093	12.62	19/01/2021	12:14:00	Clear	5.44	0.02	26.04	0.001	0.001	0.001	0.001	0.51	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	116	102	102
	WCX-BH103	45.85	20/01/2021	9:35:00	Dry	Dry																								
	WCX-BH137	17.33	20/01/2021	12:43:00	Clear * labelled LDS-BH-1037	6.37	6.69	21.98	0.001	0.001	0.001	0.001	3.96	0.01	20	20	100	100	100	100	100	<1	2	<2	<2	<2	<2	2	<5	118	106	107
	WCX-BH168	47.6	19/01/2021	10:39:00	Brackish	4.48	16.67	22.78	0.001	0.001	0.188	0.007	226.00	1.33	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	123	106	105
	LDS-BH-1027	6.34	20/01/2021	11:03:00	Brackish, cloudy	5.2	6.77	20.18	0.001	0.001	0.001	0.001	28.30	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	117	102	104
	LDS-BH1033B	4.75	19/01/2021	13:53:00	Cloudy, brackish	5.51	1.56	21.2	0.005	0.002	0.001	0.001	23.40	0.01	20	20	100	100	100	100	100	<1	<2	<2	<2	<2	<2	<1	<5	126	113	111
	LDS-BH-2011A	...	19/01/2021	8:42:00	Inaccessible due to construction	Inaccessible due to construction																								
	LDS-BH-2011B	...	19/01/2021	8:42:00	Inaccessible due to construction	Inaccessible due to construction																								

Appendix C – Water Treatment Plant Monthly EPL 21351 Reporting

Environmental Protection Licence Monitoring Data

Project Name: WestConnex - M8
Licensee: WCX M5 PT PTY LTD
Monitoring Period: 1/07/2020 - 30/06/2021
Website: www.westconnex.com.au/NewM5Environment
Environmental Protection Licence: 21351
Premise Address: Operational Water Treatment Plant M8 - Motorway Operations Complex 3 Arncliffe NSW 2205

Monitoring Type:

Sample Date	Discharge/Monitoring Point	Sampling Method
Ongoing	Water Treatment Plant ARN-2	Grab Sample

	General				Metals (µg/L)										Total Recoverable Hydrocarbons					
	pH		Turbidity (NTU)		Aluminium		Cobalt		Copper		Manganese		Zinc		C10-C16		C16-C34		C34-C40	
Date	Limit	Results	Limit	Results	Limit*	Result	Limit*	Result	Limit*	Result	Limit*	Result	Limit*	Result	Limit*	Result	Limit*	Results	Limit*	Results
Jul-20	6.5 - 8.5	**7.60**	25	**0.7**	600	**360**	8.0	**<1.0**	10.3	**<1.0**	10600	**963**	150	**<5**	<100	**<100**	<100	**<100**	<100	**<100**
Aug-20	6.5 - 8.5	**7.18**	25	**8.7**	600	**160**	8.0	**2.0**	10.3	**<1.0**	10600	**1180**	150	**<5**	<100	**<100**	<100	**190**	<100	**<100**
Sep-20	6.5 - 8.5	**7.24**	25	**4.8**	600	**80**	8.0	**<1.0**	10.3	**<1.0**	10600	**1260**	150	**<5**	<100	**130**	<100	**<100**	<100	**<100**
Oct-20	6.5 - 8.5	**7.51**	25	**5.9**	600	**70**	8.0	**<1.0**	10.3	**<1.0**	10600	**1310**	150	**5**	<100	**210**	<100	**<100**	<100	**<100**
Nov-20	6.5 - 8.5	**7.28**	25	**4.1**	600	**150**	8.0	**<1.0**	10.3	**<1.0**	10600	**984**	150	**<5**	<100	**350**	<100	**220**	<100	**<100**
Dec-20	6.5 - 8.5	**6.91**	25	**19.4**	600	**20**	8.0	**2.0**	10.3	**<1.0**	10600	**1400**	150	**9**	<100	**160**	<100	**<100**	<100	**<100**
Jan-21	6.5 - 8.5	**7.03**	25	**7**	600	**40**	8.0	**<1.0**	10.3	**<1.0**	10600	**1280**	150	**9**	<100	**1540**	<100	**<100**	<100	**<100**
Feb-21	6.5 - 8.5	**7.21**	25	**12.7**	600	**170**	8.0	**<1.0**	10.3	**<1.0**	10600	**1080**	150	**9**	<100	**710**	<100	**<100**	<100	**<100**
Mar-21	6.5 - 8.5	**7.45**	25	**9.4**	600	**70**	8.0	**<1.0**	10.3	**<1.0**	10600	**1070**	150	**<5**	<100	**830**	<100	**<100**	<100	**<100**
Apr-21	6.5 - 8.5	**7.63**	25	**6.7**	600	**50**	8.0	**<1.0**	10.3	**2.0**	10600	**1110**	150	**40**	<100	**290**	<100	**<100**	<100	**<100**
May-21	6.5 - 8.5	**7.90**	25	**5**	600	**380**	8.0	**<1.0**	10.3	**<1.0**	10600	**1050**	150	**40**	<100	**470**	<100	**<100**	<100	**<100**
Jun-21	6.5 - 8.5	**7.78**	25	**9.1**	600	**140**	8.0	**<1.0**	10.3	**<1.0**	10600	**1190**	150	**<5**	<100	**<100**	<100	**<100**	<100	**<100**

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