

## MEMO

Date: 4 February 2021  
 To: Andrew Grime (Arup Senior Engineer)  
 From: Alan Foley  
 Pages: 9 inc. this page excluding attachments  
 Regarding: Surface Water Quality – Event #6 summary

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### Fremantle Swan River Crossing – Surface Water Quality Monitoring Event #6

## Background

Arup on behalf of Main Roads Western Australia (MRWA), has commissioned RPS Australia West Pty Ltd (RPS) to provide environmental services to support the Swan River Crossing (SRC) project development. The works include the replacement of the Fremantle Traffic Bridge and the improvement/duplication of the Fremantle Rail Bridge. As detailed within the Preliminary Environmental Impact Assessment (MRWA, 2020), surface water quality has the potential to be impacted during new bridge construction and demolition of the old structure. As such, a baseline assessment of the surface water quality is being completed to inform a future Construction Environment Management Plan (CEMP) monitoring program. This memo provides details on the surface water monitoring Event #6, completed in January 2021.

## Sampling locations

The program includes collection of surface water samples from five locations. Further details on sampling locations are presented in Figure A and Table 1.

*For previous sampling events, Event #1 (August 2020) and Event #2 (September 2020), the program was reduced to four locations with background location WS-5 excluded due to the project awaiting Department Biodiversity, Conservation and Attractions (DBCA) access approval. Approval was received for sampling within the Swan River DBCA control area on 5 October 2020. As such, all sampling locations have been included from Event #3 onwards.*

A copy of the DBCA approval, 2020-1928 Permit P12652, has been included in Appendix A.

**Table 1: Surface water sampling locations summary**

Sampling point	Swan River Bathymetry <sup>1,2</sup> (m)	Commentary
WS1	~4.0-6.0 <sup>1</sup>	<ul style="list-style-type: none"> <li>Central channel (northern side)</li> <li>Sample collected from Fremantle Traffic Bridge northern access point</li> </ul>
WS2	~4.0-6.0 <sup>1</sup>	<ul style="list-style-type: none"> <li>Central channel (southern side)</li> <li>Sample collected from Fremantle Traffic Bridge southern access point</li> </ul>
WS3	~2.0-4.0 <sup>1</sup>	<ul style="list-style-type: none"> <li>Northern shoreline</li> </ul>
WS4	~4.0-5.0 <sup>1</sup>	<ul style="list-style-type: none"> <li>Southern shoreline</li> <li>Small craft pen jetty</li> </ul>
WS5	~2.0-6.0 <sup>2</sup>	<ul style="list-style-type: none"> <li>Southern shoreline</li> <li>Public jetty</li> <li>Background location</li> </ul>

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Notes: 1. Results of a geophysical survey of the portions of the site was undertaken in 2012 (Marine & Earth Sciences, 2012), which was used inform the Arup reports (Arup, 2013a and 2013b)

2. Swan and Canning Rivers navigation chart 1:25,000. April 2014, Edition 7. Department of Transport  
[https://www.transport.wa.gov.au/imagery/coastaldata/nauticalcharts/pdfs/WA898\\_swan\\_and\\_canning\\_rivers.pdf](https://www.transport.wa.gov.au/imagery/coastaldata/nauticalcharts/pdfs/WA898_swan_and_canning_rivers.pdf).

## Sampling program schedule overview

The proposed SWQS sampling program schedule is presented in Table 2.

**Table 2: Sampling program**

Event	Sampling locations	Event Date	Date Completed	Status
Event 1	WS2, WS4	August 2020	7/08/2020	Completed
Event 2	WS1-WS4	September 2020	10/09/2020	Completed
Event 3	WS1-WS5	October 2020	7/10/2020	Completed
Event 4	WS1-WS5	November 2020	5/11/2020	Completed
Event 5	WS1-WS5	December 2020	3/12/2020	Completed
Event 6	WS1-WS5	January 2021	13/01/2021	Completed – this round
Event 7	WS1-WS5	February 2021	-	TBC
Event 8	WS1-WS5	March 2021	-	TBC

Notes: To be completed (TBC)

## Surface water sampling methodology

Surface water sampling was conducted in accordance with the following relevant guidance:

- Department of Water and Environmental Regulation, *Assessment and Management of Contaminated Sites – Contaminated Sites Guidelines* (DER, 2014)
- National Environment Protection (Assessment of Site Contamination) Measure 1999, *Schedule B – General Guidelines for the Assessment of Site Contamination* (NEPC, 2013)
- *Water Quality—Sampling. Part 1: Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples* (Standards Australia, 1998. AS/NZS 5667.1:1998)
- *Water Quality—Sampling. Part 6: Guidance on sampling of rivers and streams* (Standards Australia, 1998. AS/NZS 5667.6:1998)
- *Water Quality—Sampling. Part 9: Guidance on sampling from marine waters* (Standards Australia, 1998. AS/NZS 5667.9:1998)
- Heads of EPAs Australia and New Zealand (HEPA), *PFAS National Environmental Management Plan, Version 2.0* (HEPA, 2020).

Each Swan River surface water sample was collected using a Niskin Flask or surface water sampling pole depending upon water column depth as detailed below:

- Where the water column was >2 m, the following two depths were targeted:
  - Sample 1 (shallow sample): collected at ~1 m below surface level
  - Sample 2 (deep sample): collected ~1 m above riverbed level.

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- Where the water column was <2 m (WS3), the sample was collected in the middle of the water column, using a surface water pole sampler.

Field observations were collected during each sampling event and included commentary on weather conditions, tides and vessel movement within the Fremantle port and surrounding waters.

## Analysis Program

All samples were analysed for the following analytical suite:

- Dissolved metals and metalloids: aluminium, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silicon, silver, and zinc.
- Total metals: aluminium and iron.
- Major anions: sulfate ( $\text{SO}_4^{2-}$ ), chloride ( $\text{Cl}^-$ ), fluoride ( $\text{F}^-$ ), alkalinity (hydroxide  $\text{OH}^-$ , carbonate  $\text{CO}_3^{2-}$ , bicarbonate  $\text{HCO}_3^-$ ).
- Major cations: sodium, potassium, calcium, magnesium.
- Nutrients: total and reactive phosphorus, total nitrogen, total Kjeldahl nitrogen (TKN), total ammonia ( $\text{NH}_4\text{-N} + \text{NH}_3\text{-N}$ ), nitrates and nitrites ( $\text{NO}_x\text{-N}$ ).
- Sulfide ( $\text{S}^{2-}$ )
- Total dissolved solids (TDS) and Total suspended solids (TSS)
- Turbidity
- Hydrocarbons: Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX) and polycyclic aromatic hydrocarbons (PAH)
- Organochlorine Pesticides (OCP)
- Per- and poly-fluoroalkyl substances (PFAS)
- Dissolved organic carbon (DOC)
- Chlorophyll-A and Phaeophytin-A.

Water column profiles for temperature, salinity (electrical conductivity (EC)), pH and dissolved oxygen (DO) were also collected at each sampling location.

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## Surface water assessment levels

All analytes were compared against relevant Water Quality Australia 2019 guidelines, nominally (95% species protection) as follows:

- Water Quality Australia (WQA, 2019)
  - Marine Water Guidelines (MWG) 95% species protection level
    - Estuary water (for nutrients and pH only).
  - Recreational Water Guidelines (RWG)
- PFAS National Environmental Management Plan (HEPA, 2020).
  - Marine Guidelines 99% species protection level<sup>1</sup>
  - Recreational Water
- Treatment and management of soil and water in acid sulfate soil landscapes (DER, June 2015b).
  - Guideline levels for ASS surface water quality (ASS)

## Site conditions

Site conditions noted during the monitoring Event #6 are summarised within Table 3.

**Table 3: Site conditions**

Items	Commentary
<b>Weather conditions (during sampling event)</b>	Sunny, with east-south-easterly winds in the morning, turning south-easterly in the afternoon 11-13 km/hr, maximum temperature of 33.1°C.
<b>Rainfall (noted during the previous week)</b>	There was no rain measured at the Perth Station (Number: 9225) in the week prior to sampling.
<b>Tide condition and direction</b>	<ul style="list-style-type: none"><li>• Incoming tide.</li><li>• Closest peak:<ul style="list-style-type: none"><li>– Low tide (6:37 am / 0.34 m)</li><li>– High tide (9:15 pm / 1.17 m)</li></ul></li></ul>
<b>Fremantle Port and Swan River vessel activities</b>	<ul style="list-style-type: none"><li>• WS1: Low general harbour / river traffic during sampling. Cargo ship being birthed.</li><li>• WS2: Low general harbour / river traffic during sampling.</li><li>• WS3: Low general harbour / river traffic during sampling.</li><li>• WS4: One tugboat located adjacent to sampling location on small craft jetty. Four ships being unloaded. Low general river traffic during sampling.</li><li>• WS5: No boat traffic during sampling.</li></ul>

<sup>1</sup> The 99% species protection value is considered to most appropriate as PFAS is known bioaccumulate in aquatic organisms.

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## Monitoring Results Discussion

Results have been tabulated and are presented in Tables A to E, with laboratory reporting presented in Appendix B. Further commentary on specific analytes is provided below.

### Field parameters

Field parameters were measured throughout the water column prior to sampling at each location. The water column profiles are presented in surface water sampling logs at the rear of the report (Appendix C), with field parameters of sampling depths summarised in Table 4.

**Table 4: Sampling location field parameters**

Sample Location	Depth (m)	Temp (°C)	pH	EC (µS/cm)	Redox (mV)	DO (%sat)
WS1-S	1.00	23.8	8.17	54,827	93	102
WS1-D	3.00	23.8	8.16	54,836	92	97
WS2-S	1.00	23.8	8.10	54,365	93	87
WS2-D	3.50	23.8	8.10	54,420	95	84
WS3-S	0.15	23.7	8.19	55,172	102	101
WS4-S	1.00	23.7	7.88	54,357	145	83
WS4-D	3.00	23.7	7.98	54,348	124	86
WS5-S	1.00	23.9	8.19	54,706	96	98
WS5-D	6.00	20.9	8.19	54,732	93	92

Physical parameters were noted to be relatively consistent throughout the profile i.e., alkaline, saline and in an oxidising state. These conditions are consistent with the significant flushing that occurs as a result of daily tidal movement of marine waters. RPS did note the following minor trends and guideline exceedances:

- Trends:
  - Redox marginally decreased with depth at all locations except WS2. Marginal increases of pH with depth were observed at WS4. Marginal decreases of pH with depth were observed at WS1.
  - Dissolved oxygen decreased with depth at all locations except WS4.
- Guideline exceedances:
  - DO percentage saturation (%sat) did not comply with the MWG (90-110%sat) in four samples; WS2-S, WS2-D, WS4-S and WS4-D. DO percentage saturations were comparable to previous events with values ranging from 83%sat (WS4-S) to 102%sat (WS1-S).

### Acid sulfate soil parameters

Acid sulfate soil (ASS) parameters observed during Event #6 can be summarised as follows:

- Total acidity was below the laboratory LOR (<5 mg/L) in all samples and therefore was below the relevant guideline. Overall, total acidity concentrations were marginally lower than previous events.
- Sulfide concentrations exceeded the ASS guideline (>0.5 mg/L) in all locations except WS4-D, WS5-S and WS5-D (all <0.5 mg/L) with a maximum concentration of 0.8 mg/L observed at WS2-S. The sulfide concentrations observed at WS4-D and WS5-D (both <0.5 mg/L) were lower than concentrations

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observed during the previous sampling event (December 2020). However, the results of this sampling event are consistent with all other previous sampling events.

- Sulfate concentrations exceeded the recreational water guideline (500 mg/L) at all locations with a mean of 2,833 mg/L and a maximum of 2,900 mg/L observed at WS1-D, WS3-S and WS5-S. These concentrations are consistent with previous events and is typical of water quality at the mouth of the Swan River.
- Total alkalinity results were consistent throughout all locations with a concentration of 130 mg/L observed at each location. All results were consistent with previous events.

## Solids

- TDS concentrations were relatively consistent over all locations and ranged from 37,000 mg/L (WS1, WS2-S, WS4-D and WS5-S) to 38,000 mg/L (WS2-D, WS3-S, WS4-S and WS5-D). All results were consistent with previous events.
- TSS was below the LOR (<5 mg/L) at all locations. These results are relatively consistent with previous events, except for a significant decrease in concentration within WS3-S. This variation at WS3-S is potentially due to shallow nature of the location and the potential to mobilise sediment during sampling events.
- Turbidity results ranged from 0.5 (WS2-S and WS3-S) to 0.8 (WS1-D) NTU<sup>2</sup>. Turbidity was relatively consistent with previous events with marginal decreases observed at WS3-S, WS4-D and WS5-D.

## Nutrients

Nutrient analytical results observed during Event #6 can be summarised as follows:

- Reactive phosphorus (RP) marginally exceeded the MWG (0.005 mg/L) in all samples except WS3-S (0.005 mg/L). Concentrations ranged from 0.005 mg/L (WS3-S) to 0.009 mg/L (WS2-S and WS2-D), with a mean of 0.007 mg/L.
- All other nitrogen and phosphorus species were at or below relevant MWG and RWG assessment criteria. Results were relatively consistent with previous sampling events, with marginal decreases in total nitrogen observed at all locations.

## Chlorophyll

All Chlorophyll "A" sample results were below the MWG (0.003 mg/L) with a concentration range of 0.0012 mg/L (WS3-S) to 0.0024 mg/L (WS5-S) observed. All results were consistent with previous events.

Low concentrations of Phaeophytin "A" were detected within all surface water samples with concentrations ranging from 0.0006 mg/L (WS1, WS2-D, WS3-S and WS5) to 0.0007 mg/L (WS2-S and WS4). All results were consistent with previous events.

## Metals and metalloids

Metal analytical results observed during Event #6 can be summarised as follows:

- Dissolved metals:

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<sup>2</sup> NTU: Nephelometric Turbidity unit, i.e. the unit used to measure the turbidity of a fluid or the presence of suspended particles in water.

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- The concentration of all dissolved metals were below the adopted criteria for all samples.
- A significant decrease in the concentration of nickel from 0.022 mg/L (Event #5) to <0.002 mg/L (Event #6) was observed at WS5-D. Event #6 results are consistent with all other previous events.
- Total metals:
  - Total aluminium concentrations were relatively consistent for all locations with a mean of 0.04 mg/L and a range of <0.02-0.09 mg/L observed.
  - All total iron concentrations were significantly below the MWG (1 mg/L) with a mean of 0.04 mg/L and a maximum of 0.08 mg/L (WS1-S) observed.
  - All results were consistent with previous events.

## Hydrocarbons

All hydrocarbon results (BTEX, TRH and PAH) were below their relevant LOR.

## Pesticides

All organochlorine pesticides results were below their relevant LOR.

## PFAS

PFAS analytical results observed during Event #6 can be summarised as follows:

- Perfluorooctanesulfonate (PFOS) exceeded the 99% species protection MWG (0.00023 µg/L) in all samples, ranging from 0.0010 µg/L (WS1-D and WS3-S) to 0.0028 µg/L (WS2-D) with a mean of 0.0021 µg/L observed, which is lower than the previous event and historical average (0.0031 µg/L).
- Minor detections of Perfluorohexanesulfonic acid (PFHxS), Perfluorohexanoic acid, Perfluoroheptanoic acid and Perfluorooctanoic acid (PFOA) were observed marginally above their relevant LOR. However, all concentrations were significantly below all relevant guidelines or no guidelines are available.
- Total PFAS were relatively consistent between all locations and ranged from 0.0028 µg/L (WS3-S) to 0.0074 µg/L (WS4-S) with a mean of 0.0058 µg/L, which is marginally lower than the Event #5 (0.0092 µg/L) and historical average (0.0079 µg/L).

## Quality Control and Quality Assurance

To maintain a high level of Quality Control and Quality Assurance (QAQC) sampling and analysis was undertaken with reference to relevant guidelines (DER, 2014, NEPC, 2013 and HEPA, 2020) and *Australian Standard 4482.1:1997* (Standards Australia, 2005). Strict hygiene procedures were applied throughout to assure a high level of sample integrity and quality was maintained, including the decontamination of all sampling equipment between sampling locations to prevent possible cross-contamination.

In accordance with HEPA (2020) guidance, one field duplicate was collected per 10 primary samples. In addition, one field blank, trip blank and field rinsate was collected per day of sampling. The results are presented in Tables F to N and summarised as follows:

- A total of 117 of the 120 (98%) analyte tests performed on the field duplicate sample had a Relative Percentage Difference (RPD) within 30% of the original samples indicating the sampling and analysis procedures applied by RPS and the laboratory were generally reproducible.

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- All three of the duplicate RPD failures were considered insignificant as both the primary and duplicate results were less than 5 x LOR. In such instances the elevated RPD merely indicates that analytical precision decreases as concentrations approach the LOR.
- As a result of minor residual surface water particulates being present following decontamination, the following detections were noted within the field rinsate sample (WR1):
  - Silicon concentrations (0.2 mg/L) was marginally above to the LOR (0.1 mg/L).
  - PFOA concentrations (0.0002 µg/L) were marginally above the LOR (0.0002 µg/L).
- With the exception of silicon, all field blank analytes were below their relevant LOR. Minor exceedances of acceptance criteria (>LOR) are potentially a reflection of the quality of deionised water used for the blank collection.
- All trip blank samples were below their respective LORs.
- All internal laboratory QAQC procedures (method blanks, matrix spikes, laboratory control standards, internal duplicates) except for the following were within acceptable limits:
  - Dissolved zinc internal duplicate returned a result outside of acceptable RPD limits.
  - The matrix spike recovery for total aluminium was outside acceptable limits. This was most likely caused by sample matrix interference. All other criteria were within acceptable laboratory limits.
- All samples were analysed within the recommended holding time for each analyte with the exception of Chlorophyll “A” and Phaeophytin “A” which were noted to exceed holding time criteria, however, this was due to extract or analysis dates not being provided. As such, the holding times could not be calculated.

The conclusion of the QAQC assessment indicates that sampling and analysis was generally reproducible and complied with accepted standards. As such, the data collected is considered representative of the site and suitable for the data assessment undertaken.

## Conclusions

Surface water monitoring Event #6 was completed on 13 January 2020. Samples were collected from all five of the sampling locations (Figure A). A shallow and deep sample were collected at each sampling point utilising the defined Niskin flask methodology, with the exception of WS3. Due to the shallow nature of WS3 (water column depth approximately ~0.30 m) a shallow sample was collected utilising a surface water sampling pole from a central point in the water column (~0.15 m).

A review of the analytical data collected indicates that the site waters were alkaline, saline and in an oxidising state. Minor exceedances of assessment criteria were noted (DO, sulfide and sulfate), however, these conditions are consistent with the marine environment present at the mouth of the Swan River.

Minor exceedances of reactive phosphorus MWG (0.005 mg/L) were observed in all samples except WS3-S (0.005 mg/L). All other nitrogen and phosphorous concentrations were below relevant criteria. Results were relatively consistent with previous sampling events with marginal decreases in total nitrogen observed at all locations.

The concentrations of all metal and metalloids were below relevant guidelines at all locations. A significant decrease in nickel was observed at WS5-D between Event #5 and Event #6. All other results were relatively consistent with previous events.

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All hydrocarbon and organochlorine pesticides results were below their relevant LOR and as such, adopted criteria in all samples analysed.

Minor detections of PFAS (PFHxS, PFOS and PFOA), were detected within all samples. The 99% species protection PFOS MWG (0.00023 mg/L) was exceeded in all samples, however, was significantly below the 95% species protection MWG (0.13 mg/L). No exceedances of any other relevant MWG or RWG were noted. PFAS concentrations were marginally lower than historical data.

We trust that this is to your satisfaction, should you have any queries please contact the undersigned.



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Enc. Tables  
Figure A - Water quality sampling locations  
Appendix A – DBCA approval  
Appendix B – Laboratory reports  
Appendix C – Surface water sampling logs



**TABLES**

# Table A Surface Water Results: Field Parameters, ASS, Cations, Nutrients and Miscellaneous

**Definitions:**

MWG (Marine Water Estuary Guideline) for slightly - moderately disturbed systems, RWG (Recreational Water Guidelines), ASS (Acid Sulfate Soils) Standing Advice from DWER on dewatering trigger values taken from ASS Guideline Series (2015), - (No Guideline), --- not tested, LOR (Limit of Reporting), # duplicate value

**Notes:**

- Guideline values have been adopted from the following guidance documentation:
  - Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DER 2015b)
  - Assessment and Management of Contaminated Sites (DER 2014)
  - Freshwater and Marine Water Quality Guidelines Chapter 3 (ANZECC/ARMCANZ 2000)

All results expressed as mg/L except for pH (pH units), ratios (unitless), Redox mV (mili Volts), turbidity (NTU) and EC (µS/cm)  
 a) Values for estuary environments - Table 3.3.6 ANZECC/ARMCANZ 2000 Freshwater and Marine WQ Guidelines Chapter 3  
 c) Values based on Austalina Government, National Health and Medical Research Council, Guideline for Managing Risks in Recreational Water (NHMRC, 2008)  
 d) Recreational water guideline values based on drinking water guidelines NHMRC & ARMCANZ (2011) Australian Drinking Water Guidelines  
 e) TKN concentration calculated (TKN = TN-NOx-N)  
 Denotes less than LOR

Sample ID	Date	Trigger	Field Parameters				Acid Sulfate Soil Parameters and Anions								ASS Ratios		Cations				Nutrients					Miscellaneous						
			pH	EC	Redox	DO	Total Acidity (CaCO3)	Total Alkalinity (CaCO3)	TDS	TSS	Turbidity	Sulfide	Sulfate	Chloride	Flouride	Acidity: Alkalinity	Sulfate: Chloride	Calcium	Magnesium	Potassium	Sodium	Total P	Reactive P	Total N	TKN <sup>e</sup>	NH <sub>3</sub> -N	NO <sub>3</sub> -N	Dissolved Organic Carbon (DOC)	Chlorophyll "A"	Phaeophytin "A"		
			Units	pH units	µS/cm	mV	%sat	mg/L	mg/L	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	mg/L
			MWG	7.5-8.5	-	-	90-110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03 <sup>a</sup>	0.005 <sup>a</sup>	0.75 <sup>a</sup>	-	0.62 <sup>b</sup>	0.045 <sup>a</sup>	-	0.003 <sup>a</sup>	-
WS1 - S	10/09/2020		8.18	50,919	80	104	9	120	36,000	<5	0.5	<0.5	2,400	18,000	---	0.08	0.13	390	1200	360	11000	0.03	0.006	0.2	0.2	0.009	<0.005	2	0.0012	0.0006		
WS1 - S	7/10/2020		8.25	52,200	134	106	7	120	37,000	<5	0.4	0.6	2,300	17,000	<5	0.06	0.14	400	1300	380	10000	0.03	0.007	0.2	0.2	<0.005	<0.005	2	0.0009	0.0005		
WS1 - S	5/11/2020		8.11	51,108	128	82	<5	120	37,000	<5	0.7	<0.5	2,800	20,000	<5	0.04	0.14	350	1200	310	10000	0.02	0.006	0.2	0.2	<0.007	<0.005	3	0.0015	0.0006		
WS1 - S	3/12/2020		8.08	49,503	178	86	---	120	37,000	<5	0.8	<0.5	2,700	19,000	<5	---	0.14	410	1300	390	12000	0.02	<0.005	0.6	0.6	<0.005	0.005	3	0.0014	0.0005		
WS1 - S	13/01/2021		8.17	54,827	93	102	<5	130	37,000	<5	0.7	0.6	2,800	21,000	1	0.04	0.13	390	1200	390	11000	0.02	0.007	0.3	0.3	<0.005	<0.005	2	0.0017	0.0006		
WS1 - D	10/09/2020		8.20	50,935	91	107	9	120	36,000	<5	0.7	<0.5	2,400	18,000	---	0.08	0.13	390	1200	360	11000	0.03	0.005	0.2	0.2	0.008	<0.005	2	0.0008	0.0006		
WS1 - D	7/10/2020		8.29	53,399	131	104	7	120	37,000	<5	0.5	0.6	2,500	18,000	<5	0.06	0.14	420	1300	400	11000	0.04	0.005	0.1	0.1	0.006	0.007	2	0.0008	0.0004		
WS1 - D	5/11/2020		8.12	51,230	125	80	<5	130	37,000	<5	0.7	<0.5	2,800	20,000	<5	0.04	0.14	350	1200	310	11000	0.02	0.006	0.2	0.2	0.009	<0.005	3	0.0012	0.0005		
WS1 - D	3/12/2020		8.08	49,803	178	87	---	130	37,000	<5	0.8	0.6	2,800	20,000	<5	---	0.14	410	1300	390	12000	0.02	0.005	0.6	0.6	0.006	<0.005	2	0.0011	0.0004		
WS1 - D	13/01/2021		8.16	54,836	92	97	<5	130	37,000	<5	0.8	0.7	2,900	21,000	1	0.04	0.14	380	1200	390	11000	0.02	0.006	0.2	0.2	<0.005	<0.005	2	0.0018	0.0006		
WS2 - S	7/08/2020		8.70	50,710	181	105	6	120	39,000	9	0.6	0.9	2,800	20,000	---	0.05	0.14	420	1300	370	12000	<0.05	<0.005	0.1	0.1	0.007	<0.005	<1	0.0004	0.0005		
WS2 - S	10/09/2020		8.11	50,645	60	110	9	120	36,000	<5	0.6	<0.5	2,400	19,000	---	0.08	0.13	410	1300	360	11000	0.03	<0.005	0.2	0.2	0.007	0.009	2	0.0010	0.0005		
WS2 - S	7/10/2020		8.16	49,541	94	102	6	120	34,000	<5	0.6	0.7	2,300	17,000	<5	0.05	0.14	380	1200	360	9700	0.04	<0.005	0.2	0.2	<0.005	0.017	2	0.0019	0.0006		
WS2 - S	5/11/2020		8.07	49,927	60	79	7	120	36,000	<5	0.6	<0.5	2,700	19,000	<5	0.06	0.14	330	1100	300	10000	0.02	0.007	0.2	0.2	0.007	0.01	3	0.0017	0.0006		
WS2 - S	3/12/2020		8.06	48,338	145	78	---	130	36,000	<5	0.7	0.6	2,700	19,000	<5	---	0.14	400	1300	380	12000	0.02	<0.005	0.8	0.8	<0.005	0.01	3	0.0022	0.0006		
WS2 - S	13/01/2021		8.10	54,365	93	87	<5	130	37,000	<5	0.5	0.8	2,800	21,000	1	0.04	0.13	390	1200	390	11000	0.03	0.009	0.3	0.3	0.008	0.01	2	0.0014	0.0007		
WS2 - D	7/08/2020		8.19	50,966	179	105	7	120	39,000	5	0.5	0.8	2,800	20,000	---	0.06	0.14	410	1300	360	11000	<0.05	<0.005	0.1	0.1	0.007	<0.005	<1	0.0005	0.0005		
WS2 - D	10/09/2020		8.19	50,453	79	110	9	120	35,000	<5	0.6	<0.5	2,400	18,000	---	0.08	0.13	380	1200	350	11000	0.03	<0.005	0.2	0.2	0.006	0.009	2	0.0011	0.0004		
WS2 - D	7/10/2020		8.23	50,511	97	100	7	120	35,000	<5	0.5	0.6	2,400	17,000	<5	0.06	0.14	400	1200	380	10000	0.04	<0.005	0.3	0.3	<0.005	0.022	2	0.0017	0.0006		
WS2 - D	5/11/2020		8.09	50,009	68	78	6	130	36,000	<5	0.8	<0.5	2,700	19,000	<5	0.05	0.14	330	1100	290	9700	0.02	0.006	0.2	0.2	0.006	0.01	3	0.0016	0.0007		
WS2 - D	3/12/2020		8.06	48,410	155	74	---	130	35,000	<5	1	0.5	2,700	19,000	<5	---	0.14	400	1300	380	12000	0.03	<0.005	0.8	0.8	0.005	0.015	3	0.0017	0.0008		
WS2 - D	13/01/2021		8.10	54,420	95	84	<5	130	38,000	<5	0.6	0.7	2,800	21,000	1	0.04	0.13	380	1200	380	11000	0.03	0.009	0.3	0.3	0.008	0.015	2	0.0014	0.0006		
WS3 - S	10/09/2020		8.25	50,920	109	128	7	120	35,000	14	1.8	<0.5	2,400	19,000	---	0.06	0.13	390	1200	350	11000	0.04	0.005	0.2	0.2	<0.005	<0.005	2	0.0006	0.0008		
WS3 - S	7/10/2020		8.29	52,289	132	115	7	120	37,000	33 <sup>#</sup>	1.6	0.8	2,400	18,000	<5	0.06	0.13	420	1300	400	11000	0.05	0.006	0.2	0.2	0.018	0.043	1	0.0019	0.0009		
WS3 - S	5/11/2020		8.15	51,444	126	55	6	120	37,000	7	1	<0.5	2,700	19,000	<5	0.05	0.14	350	1200	310	11000	0.02	0.006	0.2	0.2	0.01	<0.005	2	0.0017	0.0009		
WS3 - S	3/12/2020		8.11	49,569	184	98	---	110	38,000	19	2.4	<0.5	2,700	19,000	<5	---	0.14	380	1200	370	12000	0.03	0.006	0.8	0.8	<0.005	<0.005	2	0.0013	0.0011		
WS3 - S	13/01/2021		8.19	55,172	102	101	<5	130	38,000	<5	0.5	0.7	2,900	21,000	1	0.04	0.14	390	1200	400	11000	0.03 <sup>#</sup>	0.005	0.2	0.2	0.006	0.006	2 <sup>#</sup>	0.0012	0.0006		
WS4 - S	7/08/2020		8.27	50,809	106	106	6	130	40,000	16	0.6	0.7	3,100	21,000	---	0.05	0.15	400	1300	370	11000	<0.05	0.006	0.2	0.2	0.008	<0.005	1	0.0005	0.0005		
WS4 - S	10/09/2020		7.93	50,651	42	109	9	120	35,000	11	0.5	0.6	2,400	18,000	---	0.08	0.13	390	1200	350	11000	0.03	<0.005	0.2	0.2	0.008	0.01	2	0.0007	0.0007		
WS4 - S	7/10/2020		7.82	49,672	55	95	8	120	36,000	<5	0.3	0.8	2,300	17,000	<5	0.07	0.14	390	1200	370	10000	0.03	<0.005	0.2	0.2	0.006	0.007	2	0.0016	0.0007		
WS4 - S	5/11/2020		7.89	50,039	32	81	7	130	36,000	<5	0.6	<0.5	2,700	19,000	<5	0.05	0.14	340	1100	300	10000	0.02	0.006	0.2	0.2	0.009	0.008	2	0.0013	0.0005		
WS4 - S	3/12/2020		7.94	48,677	105	85	---	130	37,000	<5	0.8	0.8	2,700	19,000	<5	---	0.14	400	1200	380	12000	0.02	<0.005	0.6	0.6	<0.005	0.01	3	0.0016	0.0006		
WS4 - S	13/01/2021		7.88	54,357																												

Sample ID	Date	Trigger	Field Parameters				Acid Sulfate Soil Parameters and Anions								ASS Ratios		Cations				Nutrients						Miscellaneous					
			pH	E.C	Redox	DO	Total Acidity (CaCO3)	Total Alkalinity (CaCO3)	TDS	TSS	Turbidity	Sulfide	Sulfate	Chloride	Flouride	Acidity: Alkalinity	Sulfate: Chloride	Calcium	Magnesium	Potassium	Sodium	Total P	Reactive P	Total N	TKN <sup>e</sup>	NH <sub>3</sub> -N	NO <sub>x</sub> -N	Dissolved Organic Carbon (DOC)	Chlorophyll "A"	Phaeophytin "A"		
			Units	pH units	µS/cm	mV	%sat	mg/L	mg/L	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	mg/L
			MWG	7.5-8.5	-	-	90-110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03 <sup>a</sup>	0.005 <sup>a</sup>	0.75 <sup>a</sup>	-	0.62 <sup>b</sup>	0.045 <sup>a</sup>	-	0.003 <sup>a</sup>	-
WS4-D	7/08/2020		8.27	50,996	108	105	<5	130	40,000	21	0.5	0.7	2,800	20,000	--	0.04	0.14	420	1300	380	12000	<0.05	<0.005	0.1	0.1	0.007	<0.005	<1	0.0004	0.0006		
WS4-D	10/09/2020		8.05	50,680	56	112	9	120	35,000	7	0.7	<0.5	2,400	18,000	--	0.08	0.13	370	1200	340	10000	0.03	<0.005	0.2	0.2	0.007	0.008	2	0.0008	0.0006		
WS4-D	7/10/2020		8.04	50,044	63	98	8	120	35,000	<5	0.4	<0.5	2,400	18,000	<5	0.07	0.13	410	1300	390	10000	0.03	<0.005	0.1	0.1	0.006	0.01	2	0.0015	0.0006		
WS4-D	5/11/2020		7.97	50,024	40	81	5	120	36,000	6	0.7	<0.5	2,700	19,000	<5	0.04	0.14	350	1200	300	10000	0.02	0.006	0.2	0.2	0.008	0.008	2	0.0012	0.0007		
WS4-D	3/12/2020		7.98	48,630	115	83	--	130	37,000	7	1.1	3.8	2,600	19,000	<5	--	0.14	400	1200	380	12000	0.02	<0.005	0.7	0.7	<0.005	0.008	3	0.0016	0.0006		
WS4-D	13/01/2021		7.98	54,348	124	86	<5	130	37,000	<5	0.6	<0.5	2,800	21,000	1	0.04	0.13	390	1200	390	11000	0.03	0.008	0.2	0.2	<0.005	0.04	2	0.0021	0.0007		
WS5-S	7/10/2020		8.24	49,470	118	108	7	120	35,000	<5	0.3	<0.5	2,400	18,000	<5	0.06	0.13	410	1300	390	10000	0.04	<0.005	0.2	0.2	<0.005	0.015	2	0.0016	0.0005		
WS5-S	5/11/2020		8.10	49,829	81	79	8	130	36,000	<5	0.6	<0.5	2,700	19,000	<5	0.06	0.14	380	1200	330	10000	0.02	0.006	0.2	0.2	0.008	<0.005	2	0.0017	0.0007		
WS5-S	3/12/2020		8.10	49,008	166	109	--	130	36,000	7	1.1	0.6	2,700	19,000	<5	--	0.14	410	1300	390	12000	0.02	0.005	0.6	0.6	0.006	0.012	2	0.0017	0.0006		
WS5-S	13/01/2021		8.19	54,706	96	98	<5	130	37,000	<5	0.6	<0.5	2,900	21,000	1	0.04	0.14	390	1200	390	11000	0.03	0.006	0.2	0.2	<0.005	0.008	2	0.0024	0.0006		
WS5-D	7/10/2020		8.30	52,146	117	109	7	120	36,000	<5	0.4	0.9	2,400	17,000	<5	0.06	0.14	420	1300	400	11000	0.03	0.006	0.1	0.1	0.006	<0.005	2	0.0011	0.0006		
WS5-D	5/11/2020		8.12	49,820	91	71	9	120	36,000	7	0.7	<0.5	2,700	19,000	<5	0.08	0.14	340	1200	310	11000	0.03	0.005	0.2	0.2	<0.005	<0.005	2	0.0022	0.0007		
WS5-D	3/12/2020		8.09	49,116	175	103	--	120	37,000	6	1.4	2	2,700	19,000	<5	--	0.14	410	1300	400	12000	0.02	0.006	0.7	0.7	<0.005	0.009	2	0.0013	0.0006		
WS5-D	13/01/2021		8.19	54,732	93	92	<5	130	38,000	<5	0.7	<0.5	2,800	21,000	1	0.04	0.13	390	1200	390	11000	0.03	0.006	0.2	0.2	<0.005	0.01	2	0.0021	0.0006		

## Table B Surface Water Results: Metals

### Definitions:

MWG (Marine Water Estuary Guideline) for slightly - moderately disturbed systems, RWG (Recreational Water Guidelines), ASS (Acid Sulfate Soils) Standing Advice from DWER on dewatering trigger values taken from ASS Guideline Series (2015), - (No Guideline), --- not tested, LOR (Limit of Reporting),\* value for hexavalent chromium, # duplicate value

### Notes:

Guideline values have been adopted from the following guidance documentation:

- *Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes* (DER 2015b)
- *Assessment and Management of Contaminated Sites* (DER 2014)
- *Freshwater and Marine Water Quality Guidelines Chapter 3* (ANZECC/ARMCANZ 2000)

All results expressed as mg/L except for pH (pH units), ratios (unitless), Redox mV (mili Volts), turbidity (NTU) and EC (µS/cm)

a) Chemicals for which possible bioaccumulation and secondary poisoning should be considered

b) Recreational water guideline values based on drinking water guidelines NHMRC & ARMCANZ (2011) Australian Drinking Water Guidelines

Denotes less than LOR

Sample ID	Date	Trigger	Dissolved Metals & Metalloids																	Total Metals		
			Aluminium	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Manganese	Molybdenum	Nickel	Selenium	Silicon	Silver	Zinc	Total Aluminium	Total Iron	
Units	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	mg/L	mg/L	mg/L		
		MWG	-	-	-	-	-	0.001	0.0013	-	0.0044	0.0001 <sup>a</sup>	-	-	-	-	-	0.0014	-	-	1 <sup>b</sup>	
		RWG	-	0.003 <sup>b</sup>	0.007 <sup>b</sup>	0.002 <sup>b</sup>	0.05 <sup>b</sup>	-	2 <sup>b</sup>	-	0.01 <sup>b</sup>	0.001 <sup>b</sup>	0.5 <sup>b</sup>	-	0.02 <sup>b</sup>	0.01 <sup>b</sup>	-	-	-	-	-	
		ASS	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		LOR	0.01	0.002	0.001	0.0001	0.001	0.002	0.002	0.05	0.001	0.00005	0.001	0.001	0.001	0.01	0.1	0.00005	0.005	0.01	0.01	
WS1 - S	10/09/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	---	0.00006	0.002	0.02	0.02	
WS1 - S	7/10/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	<0.5	0.00005	0.003	<0.02	0.02	
WS1 - S	5/11/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.014	<0.002	<0.002	<0.5	<0.0001	0.006	0.03	0.03	
WS1 - S	3/12/2020		0.03	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	0.011	0.012	<0.002	<0.002	<1	0.0001	0.006	0.03	0.03	
WS1 - S	13/01/2021		<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	0.7	<0.0001	0.005	0.04	0.08	
WS1 - D	10/09/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	---	0.00006	0.003	0.03	0.04	
WS1 - D	7/10/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	<0.5	<0.00005	0.002	0.02	<0.02	
WS1 - D	5/11/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<0.5	<0.0001	0.004	0.03	0.03	
WS1 - D	3/12/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<1	<0.0001	0.004	0.02	0.02	
WS1 - D	13/01/2021		0.07	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	0.7	0.0002	0.043	0.05	0.07	
WS2 - S	7/08/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	---	<0.0001	0.003	<0.02	<0.02	
WS2 - S	10/09/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	---	<0.00005	0.003	0.02	0.02	
WS2 - S	7/10/2020		<0.01	<0.001	0.001	<0.0001	<0.001	<0.001	<0.001	0.002	<0.01	<0.001	<0.00005	<0.005	0.011	<0.001	<0.001	0.7	<0.00005	0.003	<0.02	<0.02
WS2 - S	5/11/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<0.5	<0.0001	0.004	0.03	0.04	
WS2 - S	3/12/2020		0.04	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<1	0.0002	0.0099	0.07	0.02	
WS2 - S	13/01/2021		<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.015	<0.002	<0.002	0.9	0.0002	0.007	0.09	0.03	
WS2 - D	7/08/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	---	<0.0001	0.007	0.03	0.02	
WS2 - D	10/09/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	---	0.00006	0.003	0.02	0.02	
WS2 - D	7/10/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	0.7	<0.00005	0.003	<0.02	<0.02	
WS2 - D	5/11/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	<0.5	<0.0001	0.007	0.03	0.04	
WS2 - D	3/12/2020		0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	<1	<0.0001	0.005	0.03	0.04	
WS2 - D	13/01/2021		<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	0.9	0.0001	0.004	<0.02	0.03	

Sample ID	Date	Trigger	Dissolved Metals & Metalloids																	Total Metals		
			Aluminium	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Manganese	Molybdenum	Nickel	Selenium	Silicon	Silver	Zinc	Total Aluminium	Total Iron	
			Units	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	mg/L	mg/L
			MWG	-	-	-	-	-	0.001	0.0013	-	0.0044	0.0001 <sup>a</sup>	-	-	-	-	-	0.0014	-	-	1 <sup>b</sup>
			RWG	-	0.003 <sup>b</sup>	0.007 <sup>b</sup>	0.002 <sup>b</sup>	0.05 <sup>b</sup>	-	2 <sup>b</sup>	-	0.01 <sup>b</sup>	0.001 <sup>b</sup>	0.5 <sup>b</sup>	-	0.02 <sup>b</sup>	0.01 <sup>b</sup>	-	-	-	-	-
ASS	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
LOR	0.01	0.002	0.001	0.0001	0.001	0.002	0.002	0.05	0.001	0.00005	0.001	0.001	0.001	0.01	0.1	0.00005	0.005	0.01	0.01			
WS3-S	10/09/2020	<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	---	<0.00005	0.003	0.05	0.08			
WS3-S	7/10/2020	<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.00005	<0.005	0.013	<0.001	<0.001	<0.5	<0.00005	0.003	0.02	0.2			
WS3-S	5/11/2020	0.07	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	<0.5	<0.0001	0.034	0.06	0.05			
WS3-S	3/12/2020	0.03	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.014	<0.002	<0.002	<1	<0.0001	0.008	0.05	0.09			
WS3-S	13/01/2021	<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.014	<0.002	<0.002	<0.5	0.0001	0.005	0.02	0.03			
WS4-S	7/08/2020	<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	---	0.0002	0.004	0.02	0.03			
WS4-S	10/09/2020	<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	---	<0.00005	0.002	0.02	0.02			
WS4-S	7/10/2020	<0.01	<0.001	0.001	<0.0001	<0.001	<0.001	0.001	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	0.6	<0.00005	0.003	<0.02	<0.02			
WS4-S	5/11/2020	<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<0.5	<0.0001	0.004	0.03	0.04			
WS4-S	3/12/2020	<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	<1	<0.0001	0.004	0.03	0.03			
WS4-S	13/01/2021	<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.014	<0.002	<0.002	0.9	0.0002	0.003	0.03	0.04			
WS4-D	7/08/2020	<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	---	<0.0001	0.003	<0.02	<0.02			
WS4-D	10/09/2020	<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	---	<0.00005	0.002	0.02	0.02			
WS4-D	7/10/2020	<0.01	<0.001	0.001	<0.0001	<0.001	<0.001	0.001	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	0.6	<0.00005	0.003	<0.02	<0.02			
WS4-D	5/11/2020	<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.015	<0.002	<0.002	<0.5	<0.0001	0.004	0.04	0.04			
WS4-D	3/12/2020	0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<1	<0.0001	0.003	0.03	0.03			
WS4-D	13/01/2021	<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.014	<0.002	<0.002	0.9	0.0001	0.006	0.03	0.03			
WS5-S	7/10/2020	<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	0.002	<0.001	<0.00005	<0.005	0.024	<0.001	<0.001	0.8	<0.00005	0.004	<0.02	0.02			
WS5-S	5/11/2020	<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<0.5	<0.0001	0.005	0.04	0.04			
WS5-S	3/12/2020	<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<1	<0.0001	0.004	0.03	0.03			
WS5-S	13/01/2021	<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	0.8	0.0001	0.004	0.02	0.02			
WS5-D	7/10/2020	<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	<0.5	<0.00005	0.002	<0.02	<0.02			
WS5-D	5/11/2020	<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<0.5	<0.0001	0.006	0.03	0.04			
WS5-D	3/12/2020	0.04	<0.002	0.002	<0.0002	0.005	<0.002	<0.002	0.04	<0.00005	<0.01	0.013	0.022	<0.002	<1	<0.0001	0.019	0.03	0.03			
WS5-D	13/01/2021	0.03	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	0.8	0.0001	0.01	0.02	0.02			

# Table C

## Surface Water Results: MTBE, BTEX and TRH

### Definitions:

MWG (Marine Water Guideline) for slightly - moderately disturbed systems, RWG (Recreational Water Guidelines)  
 LOR (Limits of Reporting), '-' denotes no guideline. '---' denotes not tested.

### Notes:

All values in mg/L unless specified otherwise

All guideline values are adopted from:

- National Environment Protection (Assessment of Site Contamination) Measure 1999, Guideline on Investigation Levels for Soil and Groundwater (NEPC 2013)
- Assessment and Management of Contaminated Sites (DWER 2014)
- Health screening for petroleum hydrocarbons in soil and groundwater Part 2: Application document (CRC Care 2011)

a) Value may not protect key test species from chronic toxicity, refer to chapter eight of ANZECC & ARMCANZ (2000)

b) Recreational water guideline values based on drinking water guidelines NHMRC & ARMCANZ (2011) Australian Drinking Water Guidelines

Table uses colour coding for data interpretation, avoid black and white reproduction.

Denotes <LOR

Sample ID	Date	Trigger	MTBE		BTEX					TRH				Polycyclic Aromatic Hydrocarbons																
			MTBE	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-xylene	F1: C6-C10 minus BTEX	F2: C>10-C16 minus N	F3: C>16-C34	F4: C>34-C40	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j,k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Total Carcinogenic PAHs	Total Positive PAHs	
			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	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			MWG	0.50 <sup>a</sup>	-	-	-	-	-	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	-	0.00001 <sup>b</sup>	-	-	-	-
RWG	-	0.001 <sup>b</sup>	0.8 <sup>b</sup>	0.3 <sup>b</sup>	-	0.6 <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
LOR	0.001	0.001	0.001	0.001	0.002	0.001	0.01	0.05	0.1	0.1	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0005	0.0001		
WS1 - S	10/09/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001		
WS1 - S	7/10/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001		
WS1 - S	5/11/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS1 - S	3/12/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS1 - S	13/01/2021		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS1 - D	10/09/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS1 - D	7/10/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS1 - D	5/11/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS1 - D	3/12/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS1 - D	13/01/2021		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-S	7/08/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-S	10/09/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-S	7/10/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-S	5/11/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-S	3/12/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-S	13/01/2021		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-D	7/08/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-D	10/09/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-D	7/10/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-D	5/11/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-D	3/12/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS2-D	13/01/2021		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS3-S	10/09/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS3-S	7/10/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS3-S	5/11/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS3-S	3/12/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS3-S	13/01/2021		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS4-S	7/08/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS4-S	10/09/2020		<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS4-S	7/10/2020		<0.003	<0.003	<0.003	<0.003	<0.006	<0.003	<0.01	<0.05	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001			
WS4-S	5/11/2020		<0.																											



**Table E**  
**Surface Water Results: Per- and Poly-Fluoroalkyl Substances**

**Definitions:**  
 LOR (Limits of Reporting), MWG (Marine Water Guideline) -99 (99% species protection level) -95 (95% species protection level), RWG (Recreational Water Guidelines)  
 - denotes no guideline. --- denotes not tested.

**Notes:**  
 All values in µg/L unless specified otherwise  
 Table uses colour coding for data interpretation, avoid black and white reproduction.  
 All guideline values are adopted from:  
 - PFAS National Environmental Management Plan Version 2.0 (HEPA 2020)  
 --- Denotes <LOR

Sample ID	Date	Trigger	Perfluoroalkyl Sulfonic Acids										Perfluoroalkyl Carboxylic Acids										(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides					PFAS Sums		
			Perfluorobutanesulfonic acid	Perfluoropentanesulfonic acid	Perfluorohexanesulfonic acid	Perfluoroheptanesulfonic acid	Perfluorooctanesulfonate PFOS	Perfluorodecane sulfonic acid	Perfluorobutanoic acid	Perfluoropentanoic acid	Perfluorohexanoic acid	Perfluoroheptanoic acid	Perfluorooctanoic acid PFOA	Perfluorononanoic acid	Perfluorodecanoic acid	Perfluoroundecanoic acid	Perfluorododecanoic acid	Perfluorotridecanoic acid	Perfluorotetradecanoic acid	4:2 FTSA	6:2 FTSA	8:2 FTSA	10:2 FTSA	Perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamide	N-Ethyl perfluorooctanesulfonamide	N-Me perfluorooctanesulfonamid- oethanol	N-Et perfluorooctanesulfonamid- oethanol	MePerfluorooctanesulf- amid oacetic acid	EtPerfluorooctanesulf- amid oacetic acid	Total Positive PFHxS & PFOS	Total Positive PFOS & PFOA	Total Positive PFAS	
			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	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	µg/L	µg/L
			MWG-99	MWG-95	RWG	LOR	MWG-99	MWG-95	RWG	LOR	MWG-99	MWG-95	RWG	LOR	MWG-99	MWG-95	RWG	LOR	MWG-99	MWG-95	RWG	LOR	MWG-99	MWG-95	RWG	LOR	MWG-99	MWG-95	RWG	LOR	MWG-99	MWG-95	RWG	LOR
WS1-S	10/09/2020		0.0004	<0.001	0.0020	<0.001	0.0030	<0.002	<0.002	0.001	0.0004	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	0.05	0.001	0.0004	0.0004	0.002	0.01	0.005	0.01	0.005	0.05	<0.002	<0.002	0.0002	0.0002	0.0002		
WS1-S	7/10/2020		<0.0004	<0.001	0.0020	<0.001	0.0021	<0.002	<0.002	<0.002	0.0008	<0.0004	0.0005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0041	0.0026	0.0054		
WS1-S	5/11/2020		0.0004	<0.001	0.0020	<0.001	0.0025	<0.002	<0.002	0.001	0.0005	0.0007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0045	0.0032	0.0071			
WS1-S	3/12/2020		<0.0004	<0.001	0.0020	<0.001	0.0024	<0.002	<0.002	0.0009	0.002	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0044	0.003	0.0079			
WS1-S	13/01/2021		<0.0004	<0.001	0.0010	<0.001	0.0020	<0.002	<0.002	0.0008	0.0004	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.003	0.0026	0.0048			
WS1-D	10/09/2020		<0.0004	<0.001	0.0020	<0.001	0.0026	<0.002	<0.002	0.001	0.0004	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0046	0.0032	0.0066			
WS1-D	7/10/2020		<0.0004	<0.001	0.0010	<0.001	0.0020	<0.002	<0.002	0.0007	<0.0004	0.0004	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.003	0.0024	0.0041			
WS1-D	5/11/2020		<0.0004	<0.001	0.0020	<0.001	0.0028	<0.002	<0.002	0.001	0.0005	0.0007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0048	0.0035	0.007			
WS1-D	3/12/2020		0.0004	<0.001	0.0020	<0.001	0.0026	<0.002	<0.002	0.0009	0.002	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0046	0.0032	0.0085			
WS1-D	13/01/2021		<0.0004	<0.001	0.0010	<0.001	0.0010	<0.002	<0.002	0.001	0.0007	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.002	0.002	0.0045			
WS2-S	7/08/2020		<0.0004	<0.001	0.0004	<0.001	0.0006	<0.002	<0.002	<0.0004	<0.0004	0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.001	0.0008	0.001			
WS2-S	10/09/2020		<0.0004	<0.001	0.0020	<0.001	0.0024	<0.002	<0.002	0.001	0.0004	0.0005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0044	0.0029	0.0063			
WS2-S	7/10/2020		0.0006	<0.001	0.0027	<0.001	0.0038	<0.002	<0.002	0.001	0.0006	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0065	0.0046	0.0095			
WS2-S	5/11/2020		0.0006	<0.001	0.0022	<0.001	0.0039	<0.002	<0.002	0.002	0.0007	0.0009	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0061	0.0048	0.01			
WS2-S	3/12/2020		0.0005	<0.001	0.0021	<0.001	0.0045	<0.002	<0.002	0.001	0.002	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0066	0.0053	0.011			
WS2-S	13/01/2021		<0.0004	<0.001	0.0020	<0.001	0.0027	<0.002	<0.002	0.001	0.0006	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0047	0.0035	0.0071			
WS2-D	7/08/2020		<0.0004	<0.001	0.0005	<0.001	0.0005	<0.002	<0.002	<0.0004	<0.0004	0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.001	0.0007	0.001			
WS2-D	10/09/2020		<0.0004	<0.001	0.0020	<0.001	0.0022	<0.002	<0.002	0.001	0.0005	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0042	0.0028	0.0063			
WS2-D	7/10/2020		0.0004	<0.001	0.0024	<0.001	0.0035	<0.002	<0.002	0.001	0.0006	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0059	0.0043	0.0087			
WS2-D	5/11/2020		0.0006	<0.001	0.0024	<0.001	0.0035	<0.002	<0.002	0.002	0.0007	0.0009	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0059	0.0044	0.01			
WS2-D	3/12/2020		0.0005	<0.001	0.0022	<0.001	0.0039	<0.002	<0.002	0.001	0.002	0.0009	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0061	0.0048	0.01			
WS2-D	13/01/2021		<0.0004	<0.001	0.0020	<0.001	0.0028	<0.002	<0.002	0.001	0.0006	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0048	0.0036	0.0072			
WS3-S	10/09/2020		0.0005	<0.001	0.0030	<0.001	0.0044	<0.002	<0.002	0.001	0.0004	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0074	0.005	0.0099			
WS3-S	7/10/2020		<0.0004	<0.001	0.0010	<0.001	0.0021	<0.002	<0.002	0.0007	<0.0004	0.0005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0048 <sup>#</sup>	0.0026	0.0061 <sup>#</sup>			
WS3-S	5/11/2020		0.0005	<0.001	0.0020	<0.001	0.0047	<0.002	<0.002	0.001	0.0005	0.0007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.0067	0.0054	0.0094			
WS3-S	3/12/2020		0.0007	<0.001	0.0028	<0.001	0.0084	<0.002	<0.002	0.001	0.004	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002	0.011	0.0092	0.018			
WS3-S	13/01/2021		<0.0004	<0.001	0.0008	<0.001	0.0010	<0.002	<0.002	0.0005	<0.0004	0.0005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002							

**Table E**  
**Surface Water Results: Per- and Poly-Fluoroalkyl Substances**

**Definitions:**

LOR (Limits of Reporting), MWG (Marine Water Guideline) -99 (99% species protection level) -95 (95% species protection level), RWG (Recreational Water Guidelines)  
- denotes no guideline. --- denotes not tested.

**Notes:**

All values in µg/L unless specified otherwise

Table uses colour coding for data interpretation, avoid black and white reproduction.

All guideline values are adopted from:

- PFAS National Environmental Management Plan Version 2.0 (HEPA 2020)

Denotes <LOR

Sample ID	Date	Trigger	Perfluoroalkyl Sulfonic Acids										Perfluoroalkyl Carboxylic Acids										(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides						PFAS Sums		
			Perfluorobutanesulfonic acid	Perfluoropentanesulfonic acid	Perfluorohexanesulfonic acid	Perfluoroheptanesulfonic acid	Perfluorooctanesulfonate PFOS	Perfluorodecane sulfonic acid	Perfluorobutanoic acid	Perfluoropentanoic acid	Perfluorohexanoic acid	Perfluoroheptanoic acid	Perfluorooctanoic acid PFOA	Perfluorononanoic acid	Perfluorodecanoic acid	Perfluoroundecanoic acid	Perfluorododecanoic acid	Perfluorotridecanoic acid	Perfluorotetradecanoic acid	4:2 FTSA	6:2 FTSA	8:2 FTSA	10:2 FTSA	Perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamide	N-Ethyl perfluorooctanesulfonamide	N-Me perfluorooctanesulfonamid- oethanol	N-Et perfluorooctanesulfonamid- oethanol	MePerfluorooctanesulf- amid oacetic acid	EtPerfluorooctanesulf- amid oacetic acid	Total Positive PFHxS & PFOS	Total Positive PFOS & PFOA	Total Positive PFAS		
			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	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	µg/L	µg/L	
			MWG-99	-	-	-	-	0.00023	-	-	-	-	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WS4-D	7/08/2020		<0.0004	<0.001	0.0003	<0.001	0.0003	<0.002	<0.002	<0.002	<0.0004	<0.0004	<0.002	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0006	0.0003	0.0006	
WS4-D	10/09/2020		<0.0004	<0.001	0.0020	<0.001	0.0025	<0.002	<0.002	<0.002	0.001	0.0004	0.0006	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0045	0.0031	0.0065	
WS4-D	7/10/2020		0.0004	<0.001	0.0026	<0.001	0.0034	<0.002	<0.002	<0.002	0.001	0.0005	0.0008	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.006	0.0042	0.0087	
WS4-D	5/11/2020		0.0005	<0.001	0.0022	<0.001	0.0033	<0.002	<0.002	<0.002	0.002	0.0006	0.0009	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0055	0.0042	0.0095	
WS4-D	3/12/2020		0.0005	<0.001	0.0022	<0.001	0.0038	<0.002	<0.002	<0.002	0.001	0.002	0.0009	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.006	0.0047	0.01	
WS4-D	13/01/2021		0.0004	<0.001	0.0020	<0.001	0.0026	<0.002	<0.002	<0.002	0.001	0.0006	0.0007	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0046	0.0033	0.0073	
WS5-S	7/10/2020		0.0004	<0.001	0.0025	<0.001	0.0035	<0.002	<0.002	<0.002	0.001	0.0005	0.0007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.006	0.0042	0.0086		
WS5-S	5/11/2020		0.0006	<0.001	0.0021	<0.001	0.0029	<0.002	<0.002	<0.002	0.002	0.0007	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.005	0.0037	0.0091		
WS5-S	3/12/2020		0.0005	<0.001	0.0021	<0.001	0.0034	<0.002	<0.002	<0.002	0.001	0.002	0.0007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0055	0.0041	0.0097		
WS5-S	13/01/2021		<0.0004	<0.001	0.0010	<0.001	0.0021	<0.002	<0.002	<0.002	0.0009	0.0005	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0031	0.0027	0.0051		
WS5-D	7/10/2020		<0.0004	<0.001	0.0020	<0.001	0.0022	<0.002	<0.002	<0.002	0.0008	<0.0004	0.0005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0042	0.0027	0.0055		
WS5-D	5/11/2020		0.0006	<0.001	0.0023	<0.001	0.0033	<0.002	<0.002	<0.002	0.002	0.0007	0.0009	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0056	0.0042	0.0098		
WS5-D	3/12/2020		0.0005	<0.001	0.0020	<0.001	0.0047	<0.002	<0.002	<0.002	0.001	0.003	0.0007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0067	0.0054	0.012		
WS5-D	13/01/2021		<0.0004	<0.001	0.0020	<0.001	0.0022	<0.002	<0.002	<0.002	0.001	0.0005	0.0006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	0.0042	0.0028	0.0063		

**Table F**  
**Surface Water QAQC Results (RPD Assessment): ASS, Cations, Nutrients and Miscellaneous**

**Definitions:**

LOR 1° (Limit of Reporting, Primary Laboratory). --- denotes not tested. # denoted not calculated.

**Notes:**

All values in mg/L unless specified otherwise

Table uses colour coding for data interpretation, avoid black and white reproduction.

	denotes <LOR (primary laboratory)
	denotes <5x LOR (primary laboratory)
	denotes exceedance of acceptance criteria (30%) where samples <5x LOR
	denotes exceedance of acceptance criteria (30%) where sample(s) >5x LOR

Sample ID	Sample Type	Date	Trigger	Acid Sulfate Soil Parameters									Cations				Nutrients						Miscellaneous		
				Total Acidity (CaCO3)	Total Alkalinity (CaCO3)	TDS	TSS	Turbidity	Sulfide	Sulfate	Chloride	Fluoride	Calcium	Magnesium	Potassium	Sodium	Total P	Reactive P	Total N	TKN	NH <sub>3</sub> -N	NO <sub>x</sub> -N	Dissolved Organic Carbon (DOC)	Chlorophyll "a"	Phaeophytin "a"
				Units	mg/L	mg/L	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
LOR				1	1	10	5	0.1	0.1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.0001	0.0002
WS2-S	Primary	7/08/2020		6	120	39,000	9	0.6	0.9	2800	20,000	---	420	1300	370	12000	<0.05	<0.005	0.1	0.1	0.007	<0.005	<1	0.0004	0.0005
WZ1	Duplicate			7	120	39,000	6	0.6	0.8	2800	20,000	---	420	1300	370	11000	<0.05	<0.005	0.1	0.1	0.009	<0.005	<1	0.0005	0.0003
RPD %				15	0	0	40	0	12	0	0	#	0	0	0	9	0	0	0	2	25	0	0	22	50
WS1-S	Primary	10/09/2020		9	120	36,000	<5	0.5	<0.5	2400	18,000	---	390	1200	360	11000	0.03	0.006	0.2	0.19	0.009	<0.005	2	0.0012	0.0006
WZ1	Duplicate			9	120	36,000	6	0.7	<0.5	2300	18,000	---	400	1300	360	11000	0.03	<0.005	0.2	0.19	0.008	<0.005	2	0.0012	0.0005
RPD %				0	0	0	18	33	0	4	0	#	3	8	0	0	0	18	0	1	12	0	0	0	18
WS3-S	Primary	7/10/2020		7	120	37,000	8	1.6	0.8	2400	18,000	<5	420	1300	400	11000	0.05	0.006	0.2	0.18	0.018	0.043	1	0.0019	0.0009
WZ1	Duplicate			7	130	37,000	33	0.9	0.7	2400	18,000	<5	410	1300	390	11000	0.05	0.005	0.1	0.10	<0.005	<0.005	1	0.0011	0.0008
RPD %				0	8	0	122	56	13	0	0	0	2	0	3	0	0	18	67	63	113	158	0	53	12
WS2-D	Primary	5/11/2020		6	130	36,000	<5	0.8	<0.5	2700	19,000	<5	330	1100	290	9700	0.02	0.006	0.2	0.19	0.006	0.01	3	0.0016	0.0007
WZ1	Duplicate			7	130	36,000	<5	1	<0.5	2700	19,000	<5	360	1200	320	11000	0.02	0.006	0.2	0.19	0.006	0.01	2	0.0015	0.0006
RPD %				15	0	0	0	22	0	0	0	0	9	9	10	13	0	0	0	0	0	0	40	6	15
WS2-S	Primary	3/12/2020		---	130	36,000	<5	0.7	0.6	2700	19,000	<5	400	1300	380	12000	0.02	<0.005	0.8	0.79	<0.005	0.01	3	0.0022	0.0006
WZ1	Duplicate			---	130	36,000	<5	0.9	0.7	2700	19,000	<5	400	1300	380	12000	0.02	<0.005	0.7	0.69	<0.005	0.011	3	0.0018	0.0006
RPD %				---	0	0	0	25	15	0	0	0	0	0	0	0	0	0	13	14	0	10	0	20	0
WS3-S	Primary	13/01/2021		<5	130	38,000	<5	0.5	0.7	2900	21,000	1.3	390	1200	400	11000	0.02	0.005	0.2	0.2	0.006	0.006	1	0.0012	0.0006
WZ1	Duplicate			<5	130	39,000	<5	0.5	0.7	2800	21,000	1.3	390	1200	390	11000	0.03	0.006	0.2	0.2	0.007	<0.005	2	0.0011	0.0005
RPD %				0	0	3	0	0	0	4	0	0	0	0	3	0	40	0	0	0	0	18	67	9	18

# Table G Surface Water QAQC Results (RPD Assessment): Metals

**Definitions:**

LOR 1° (Limit of Reporting, Primary Laboratory). --- denotes not tested. # denoted not calculated.

**Notes:**

All values in mg/L unless specified otherwise

Table uses colour coding for data interpretation, avoid black and white reproduction.

	denotes <LOR (primary laboratory)
	denotes <5x LOR (primary laboratory)
	denotes exceedance of acceptance criteria (30%) where samples <5x LOR
	denotes exceedance of acceptance criteria (30%) where sample(s) >5x LOR

Sample ID	Sample Type	Date	Trigger	Dissolved Metals & Metalloids																		Total Metals	
				Aluminium	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Manganese	Molybdenum	Nickel	Selenium	Silicon	Silver	Zinc	Total Aluminium	Total Iron	
				Units	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	mg/L	mg/L
				LOR	0.01	0.001	0.001	0.0001	0.002	0.001	0.02	0.05	0.001	0.00005	0.001	0.001	0.001	0.01	0.0002	0.00005	0.001	0.01	0.02
WS2-S	Primary	7/08/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	---	<0.0001	0.003	<0.02	<0.02
WZ1	Duplicate			<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	---	<0.0001	0.004	0.03	0.02
RPD %					0	0	0	0	0	0	0	0	0	0	0	8	0	0	#	0	29	40	0
WS1-S	Primary	10/09/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	---	0.00006	0.002	0.02	0.02
WZ1	Duplicate			<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.00005	<0.005	0.013	<0.001	<0.001	---	<0.00005	0.003	0.02	0.03
RPD %					0	0	0	0	0	0	0	0	0	0	8	0	0	#	18	40	0	40	0
WS3-S	Primary	7/10/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.00005	<0.005	0.013	<0.001	<0.001	<5	<0.00005	0.003	0.02	0.04
WZ1	Duplicate			<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	0.001	<0.01	<0.001	<0.00005	<0.005	0.012	<0.001	<0.001	<5	<0.00005	0.004	<0.02	0.2
RPD %					0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	29	0	133
WS2-D	Primary	5/11/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	<0.5	<0.0001	0.007	0.03	0.04
WZ1	Duplicate			<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	<0.5	<0.0001	0.005	0.03	0.04
RPD %					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0
WS2-S	Primary	3/12/2020		0.04	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.012	<0.002	<0.002	<1	0.0002	0.0099	0.07	0.02
WZ1	Duplicate			<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.013	<0.002	<0.002	<1	<0.0001	0.005	<0.02	0.02
RPD %					67	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	66	111	0
WS3-S	Primary	13/01/2021		<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.014	<0.002	<0.002	<0.5	0.0001	0.005	0.02	0.03
WZ1	Duplicate			<0.02	<0.002	0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.00005	<0.01	0.016	<0.002	<0.002	0.5	<0.0001	0.005	<0.02	0.02
RPD %					0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	40







**Table K**  
**Surface Water QAQC Results (Rinsate, Field Blank and Trip-Blank): Metals and Turbidity**

**Definitions:**

LOR 1° (Limit of Reporting, Primary Laboratory), --- denotes not tested.

**Notes:**

All values in mg/L unless specified otherwise

Table uses colour coding for data interpretation, avoid black and white reproduction.

denotes <LOR (primary laboratory)

denotes exceedance of acceptance criteria > LOR

Sample ID	Sample Type	Date	Trigger	Dissolved Metals & Metalloids																		Total Metals		Turbidity
				Aluminium	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Iron	Mercury	Manganese	Molybdenum	Nickel	Lead	Selenium	Silicon	Silver	Zinc	Total Aluminium	Total Iron	Turbidity	
				Units	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	mg/L	mg/L	mg/L
LOR	0.01	0.001	0.001	0.0001	0.001	0.001	0.001	0.01	0.00005	0.005	0.001	0.001	0.001	0.001	0.1	0.00005	0.001	0.01	0.01	0.01	0.01	0.1		
<b>Rinsates</b>																								
WR1	Water	7/08/2020		<0.01	<0.001	<0.001	0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	---	<0.00005	<0.001	<0.01	<0.01	0.2	
WR1	Water	10/09/2020		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	---	<0.00005	<0.001	<0.01	<0.01	0.1	
WR1	Water	7/10/2020		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	---	<0.00005	<0.001	<0.01	<0.02	<0.1	
WR1	Water	5/11/2020		<0.01	<0.001	<0.001	0.0002	<0.001	<0.001	0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	0.3	<0.00005	0.005	<0.01	<0.01	0.3	
WR1	Water	3/12/2020		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	0.008	0.01	<0.00005	<0.005	<0.001	<0.001	0.021	<0.001	---	<0.00005	0.015	<0.01	0.02	0.5	
WR1	Water	13/01/2021		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	0.2	<0.00005	<0.001	<0.01	<0.02	<0.1	
<b>Field Blank</b>																								
WB1	Water	7/08/2020		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	---	<0.00005	<0.001	<0.01	<0.01	0.2	
WB1	Water	10/09/2020		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	---	<0.00005	<0.001	<0.01	<0.01	0.1	
WB1	Water	7/10/2020		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	---	<0.00005	<0.001	<0.01	<0.02	<0.1	
WB1	Water	5/11/2020		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	0.3	<0.00005	<0.001	<0.01	<0.01	0.2	
WB1	Water	3/12/2020		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.1	<0.00005	<0.001	<0.01	<0.01	0.1	
WB1	Water	13/01/2021		<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	<0.001	<0.001	<0.001	<0.001	0.2	<0.00005	<0.001	<0.01	<0.02	<0.1	



# Table M

## Surface Water QAQC Results (Rinsate, Field Blank and Trip-Blank): OC/OP Pesticides

**Definitions:**

LOR 1° (Limit of Reporting, Primary Laboratory), --- denotes not tested.

**Notes:**

All values in mg/L unless specified otherwise

Table uses colour coding for data interpretation, avoid black and white reproduction.

denotes <LOR (primary laboratory)

denotes exceedance of acceptance criteria > LOR

Sample ID	Sample type	Date	Trigger	Organochlorine Pesticides																			
				Aldrin	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	a-Chlordane	g-Chlordane	DDD	DDE	DDT	DDD + DDE + DDT	Dieldrin	a-Endosulfan	b-Endosulfan	Endosulfan sulphate	Endrin	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor
				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	mg/L	mg/L	mg/L
LOR	0.00001	0.00005	0.00005	0.00005	0.00005	0.00001	0.00001	0.00001	0.00001	0.00006	0.00003	0.00001	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	
<b>Rinsates</b>																							
WR1	Water	7/08/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WR1	Water	10/09/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WR1	Water	7/10/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WR1	Water	5/11/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WR1	Water	3/12/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WR1	Water	13/01/2021		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
<b>Field Blank</b>																							
WB1	Water	7/08/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WB1	Water	10/09/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WB1	Water	7/10/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WB1	Water	5/11/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WB1	Water	3/12/2020		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
WB1	Water	13/01/2021		<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002

**Table N**  
**Surface Water QAQC Results (Rinsate, Field Blank and Trip-Blank): Per- and Poly-Fluoroalkyl Substances**

**Definitions:**

LOR 1\* (Limit of Reporting, Primary Laboratory), --- denotes not tested.

**Notes:**

All values in mg/L unless specified otherwise

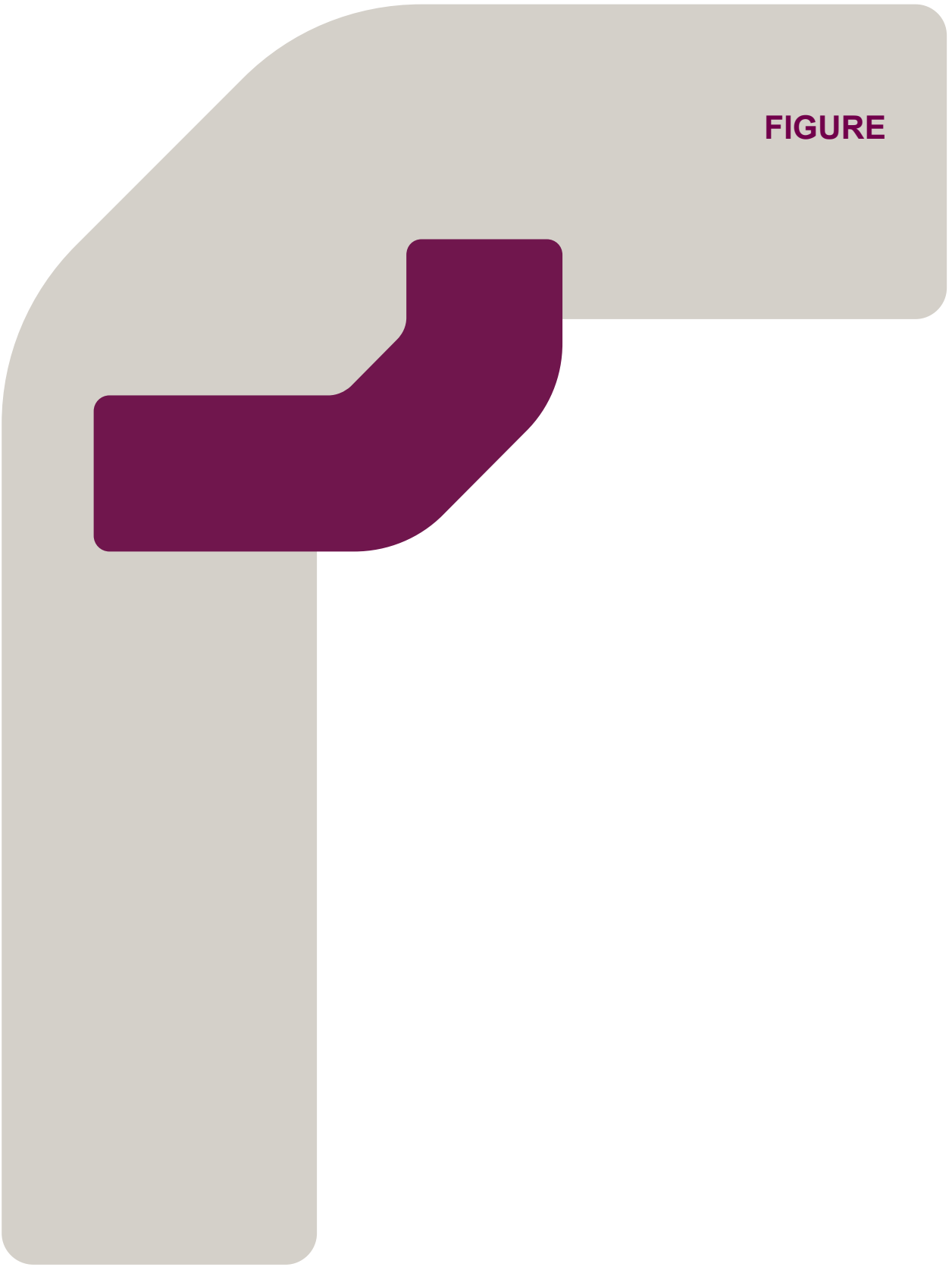
Table uses colour coding for data interpretation, avoid black and white reproduction.

denotes <LOR (primary laboratory)

denotes exceedance of acceptance criteria > LOR

Sample ID	Sample type	Date	Trigger	Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides						(n:2) Fluorotelomer Sulfonic Acids				PFAS Sums				
				Perfluorobutanesulfonic acid	Perfluoropentanesulfonic acid	Perfluorohexanesulfonic acid	Perfluoroheptanesulfonic acid	Perfluorooctanesulfonate PFOS	Perfluorodecane sulfonic acid	Perfluorobutanoic acid	Perfluoropentanoic acid	Perfluorohexanoic acid	Perfluoroheptanoic acid	Perfluorooctanoic acid PFOA	Perfluorononanoic acid	Perfluorodecanoic acid	Perfluoroundecanoic acid	Perfluorododecanoic acid	Perfluorotridecanoic acid	Perfluorotetradecanoic acid	Perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamide	N-Ethyl perfluorooctanesulfonamide	N-Me perfluorooctanesulfonamide- isothanol	N-Et perfluorooctanesulfonamide- isothanol	MePerfluorooctanesulf- amid oacetic acid	EtPerfluorooctanesulf- amid oacetic acid	4:2 FTSA	6:2 FTSA	8:2 FTSA	10:2 FTSA	Total Positive PFHxS & PFOS	Total Positive PFOA & PFOA	Total Positive PFAS
				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	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	µg/L
<b>Rinsates</b>																																		
WR1	Water	7/08/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	0.0003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	0.0003	0.0003	
WR1	Water	10/09/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WR1	Water	7/10/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WR1	Water	5/11/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WR1	Water	5/11/2020		0.0008	<0.001	0.0046	<0.001	0.016	<0.002	<0.002	<0.0004	0.0009	0.0004	0.0008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	0.0006	<0.0004	<0.002	0.021	0.017	0.024		
WR1	Water	13/01/2021		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.0002	0.0002	0.0002		
<b>Field Blank</b>																																		
WB1	Water	7/08/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WB1	Water	10/09/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WB1	Water	7/10/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WB1	Water	5/11/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WB1	Water	5/11/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WB1	Water	13/01/2021		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.0002	<0.0002	<0.0002	<0.0002	
<b>Trip-Blank</b>																																		
WTB1	Water	7/08/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WTB1	Water	10/09/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WTB1	Water	7/10/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WTB1	Water	7/10/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WTB1	Water	3/12/2020		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	<0.0002	<0.0002	<0.0002	
WTB1	Water	13/01/2021		<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.0002	<0.0002	<0.0002	<0.0002	

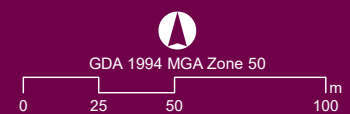
**FIGURE**






**Figure A**  
**Swan River crossing**  
**Water quality sampling locations**

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Job Number: C20078-004  
 Doc Number: 001  
 Date: 29.06.20  
 Scale: 1:2,500 @ A3  
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# MEMO

Date: 3 February 2021  
Regarding: Surface Water Quality – Event #6 summary

**Appendix A**  
DBCA Approval

**2020/1928**  
**PERMIT P12652**

Pursuant to Part 4 (Regulation 29) of the Swan and Canning Rivers Management Regulations 2007, this is to certify that a permit is issued to the person(s) or organisation described hereunder as permit holder and that person(s) or organisation is permitted to carry out the authorised works, acts or activities for the duration specified, subject to the conditions listed below.

Permit holder: Main Roads Western Australia (John Braid)

Authorised works, acts or activities: Swan River Crossings Project – In-river scientific investigations – sampling suite includes contaminants, water quality, benthic habitat and sediment analysis

Location of works, acts or activities: Swan River between Fremantle Traffic Bridge and Stirling Bridge, Fremantle; and Lot 2010 on Plan 18598 and Lot 1941 on Plan 213981

Approval date: 2 October 2020

Expiry date: 31 December 2021

**CONDITIONS**

1. The applicant shall notify the Department of Biodiversity, Conservation and Attractions in writing not less than three (3) days prior to the commencement of works (see **Advice Note 1**).
2. The applicant shall ensure that all contractors and personnel involved in the investigations approved by the Department of Biodiversity, Conservation and Attractions are familiar with the conditions and requirements of this approval at all times.
3. The works shall take place in accordance with the methodologies provided in the *Swan River Crossings Project-Environmental (in-river) Surveys September 2020 V6.0*, unless modified by a condition of this approval.
4. The results of the benthic habitat surveys, once collated, shall be provided to the Department of Biodiversity, Conservation and Attractions (see **Advice Note 1**).
5. Further to **Condition 4**, the applicant shall undertake any necessary additional sampling and/or modify the scientific investigation methodologies as required by the Department of Biodiversity, Conservation and Attractions on review of the results of the benthic habitat surveys and deduced potential impacts to known benthic habitat and communities.
6. The applicant shall ensure that all equipment is visually inspected for any traces of aquatic organisms and shall remove the organisms prior to the equipment entering the Swan Canning Development Control Area.
7. The applicant shall monitor all works and ensure that appropriate measures are implemented to contain turbidity and prevent sediment plumes spreading and shall have a silt curtain readily available to deploy in order to contain any turbidity and sediment plumes that are uncontrolled or move beyond the immediate area of works (see **Advice Note 2**).
8. Water-based activities shall cease if a dolphin comes within 50 metres of any water vessel involved in the approved activities and shall not recommence until any dolphin has moved away more than 200 metres or has not been observed for 20 minutes.
9. Any refuelling shall take place outside of the Swan Canning Development Control Area or at a licensed refuelling facility.



## 2020/1928 PERMIT P12652

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10. A spill kit shall be maintained on all vessels and shall be utilised to contain and clean up any spills that occur.
11. The applicant shall take all precautions to ensure no damage to the foreshore, riverbank or waterway (including infrastructure and vegetation) occurs as a result of the works. Should any inadvertent damage occur, the applicant is required to notify the Department of Biodiversity, Conservation and Attractions within 48 hours of that damage occurring (see **Advice Note 2**).
12. The applicant shall rectify at its expense any damage to the foreshore, riverbank or waterway (including infrastructure and vegetation) that occurs as a result of the works.
13. Within 24 hours of the completion of the activities, the applicant shall remove all waste materials, equipment and machinery.
14. An electronic copy of the report, addressing the findings of the scientific investigations approved under this permit shall be forwarded to the Department of Biodiversity, Conservation and Attractions prior to the expiration of this permit (see **Advice Note 1**).

### ADVICE TO APPLICANT

1. Notifications and information can be emailed to [rivers.planning@dbca.wa.gov.au](mailto:rivers.planning@dbca.wa.gov.au).
2. In the event of spills, waste materials impacting the river or turbidity or sediment plumes, the Department of Biodiversity, Conservation and Attractions' Duty Officer (Riverpark) can be contacted on 9278 0981 (24 hrs) or Pollution Response Officer (Marine) on 9480 9924 (24 hrs).
3. The Department of Transport (DoT) Navigational Safety advises the applicant that:
  - Main Roads Western Australia (MRWA) and/or its contractors are to develop a communication plan with Commercial Ferry Operators and are to consult with commercial operators to gain comment and support for the Vessel Management Plan [Regarding 4.2 Legislative and Other Provisions (page 13 of the Vessel Management Plan): Should also include the '*Western Australian Marine Act 1982*' and the '*Marine Safety (Domestic Commercial Vessel) National Law Act 2012*'];
  - MRWA and/or its contractors are to monitor VHF Channel 16 during operating hours;
  - The works area and any hazards should be marked with yellow special marker buoys, approximately 1 metre in height equipped with flashing yellow lights;
  - All vessels taking part in the works must display shapes and lights in accordance with the Prevention of Collisions at Sea Regulations 1983 at all times;
  - Should diving operations be conducted between the Fremantle Rail Bridge and Fremantle Traffic Bridge, a closure of the respective navigation span will be required;
  - Navigational channels are to remain open wherever possible and only one navigation span is to be impeded at any one time;
  - Any anchor points which encroach the channel should be marked;
  - A Temporary Notice to Mariners (TNTM) must be issued by DoT outlining the scope of the works, the works area, navigational marking (lighting) and dates of the works, prior to commencement. MRWA and/or its contractors are to provide notification of the works to DoT a minimum of 21 days prior to the works commencing to enable a TNTM to be published, by email to: [navigational.safety@transport.wa.gov.au](mailto:navigational.safety@transport.wa.gov.au);
  - MRWA and/or its contractors are to provide sufficient notification of any ad hoc day closures of navigational channels so that a TNTM can be published to alert mariners; and




**2020/1928**  
**PERMIT P12652**

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- MRWA and/or its contractors are to seek approval from Fremantle Ports Authority for any works to the west of the Fremantle Traffic and Rail Bridges.
4. The applicant is advised that the proposed works are located in a high to moderate and moderate to low acid sulphate soils risk area. The Acid Sulfate Soils Guideline Series for guidance on the identification, assessment and management of acid sulphate soils in Western Australia is available from the Department of Water and Environmental Regulation website at [www.dwer.wa.gov.au](http://www.dwer.wa.gov.au). If any acid sulfate soils are exposed during the works the Department of Water and Environmental Regulation should be contacted for further advice.
  5. The applicant is advised that this approval does not negate the need to obtain any other approval from relevant agencies, or from the Department of Biodiversity, Conservation and Attractions.

PERMIT APPROVED

Signed:  Date: 02/10/20

Jacey Mills  
Manager, Statutory Assessments  
As delegate of CEO  
Under Section 38 of the SCRM Act 2006

# MEMO

Date: 3 February 2021  
Regarding: Surface Water Quality – Event #6 summary

## Appendix B Laboratory reports



## CERTIFICATE OF ANALYSIS 255713

### Client Details

<b>Client</b>	RPS Australia West Pty Ltd
<b>Attention</b>	Alan Foley
<b>Address</b>	Level 2, 27-31 Troode St, WEST PERTH, WA, 6005

### Sample Details

<b>Your Reference</b>	<u>EEC20078.004 - Fremantle Traffic Bridge</u>
<b>Number of Samples</b>	13 Water
<b>Date samples received</b>	13/01/2021
<b>Date completed instructions received</b>	13/01/2021

### Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.  
Samples were analysed as received from the client. Results relate specifically to the samples as received.  
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.  
**Please refer to the last page of this report for any comments relating to the results.**

### Report Details

<b>Date results requested by</b>	28/01/2021
<b>Date of Issue</b>	02/02/2021
<b>Reissue Details</b>	This report replaces R00 created on 28/01/2021 due to: Reanalysis Sulphide WS3-S and WZ1
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b>	

#### Results Approved By

Heram Halim, Operations Manager  
Travis Carey, Organics - Team Leader

#### Authorised By

Michael Kubiak, Laboratory Manager

Miscellaneous Inorganics							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Date analysed	-		13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Total Dissolved Solids (grav)	mg/L	5	37,000	37,000	37,000	38,000	38,000
Total Suspended Solids	mg/L	5	<5	<5	<5	<5	<5
Turbidity	NTU	0.1	0.7	0.8	0.5	0.6	0.5
Dissolved Organic Carbon	mg/L	1	2	2	2	2	1
Acidity as CaCO <sub>3</sub>	mg/L	5	<5	<5	<5	<5	<5
Sulphide in water*	mg/L	0.5	0.6	0.7	0.8	0.7	0.7
Fluoride	mg/L	0.1	1.3	1.3	1.2	1.2	1.3

Miscellaneous Inorganics							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Date analysed	-		13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Total Dissolved Solids (grav)	mg/L	5	38,000	37,000	37,000	38,000	39,000
Total Suspended Solids	mg/L	5	<5	<5	<5	<5	<5
Turbidity	NTU	0.1	0.6	0.6	0.6	0.7	0.5
Dissolved Organic Carbon	mg/L	1	2	2	2	2	2
Acidity as CaCO <sub>3</sub>	mg/L	5	<5	<5	<5	<5	<5
Sulphide in water*	mg/L	0.5	0.7	<0.5	<0.5	<0.5	0.7
Fluoride	mg/L	0.1	1.2	1.2	1.2	1.2	1.3

Miscellaneous Inorganics				
Our Reference			255713-11	255713-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			13/01/2021	13/01/2021
Type of sample			Water	Water
Date prepared	-		13/01/2021	13/01/2021
Date analysed	-		13/01/2021	13/01/2021
Turbidity	NTU	0.1	0.4	0.4

Ionic Balance							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Date analysed	-		13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Calcium - Dissolved	mg/L	0.5	390	380	390	380	390
Potassium - Dissolved	mg/L	0.5	390	390	390	380	400
Magnesium - Dissolved	mg/L	0.5	1,200	1,200	1,200	1,200	1,200
Sodium - Dissolved	mg/L	0.5	11,000	11,000	11,000	11,000	11,000
Bicarbonate HCO <sub>3</sub> <sup>-</sup> as CaCO <sub>3</sub>	mg/L	5	130	130	130	130	130
Carbonate CO <sub>3</sub> <sup>2-</sup> as CaCO <sub>3</sub>	mg/L	5	<5	<5	<5	<5	<5
Hydroxide OH <sup>-</sup> as CaCO <sub>3</sub>	mg/L	5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	130	130	130	130	130
Chloride	mg/L	1	21,000	21,000	21,000	21,000	21,000
Sulphate	mg/L	1	2,800	2,900	2,800	2,800	2,900
Ionic Balance	%		-3.0	-4.2	-2.9	-3.9	-2.8
Hardness as CaCO <sub>3</sub>	mg/L	3	6,100	6,000	6,000	5,900	6,100

Ionic Balance							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Date analysed	-		13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Calcium - Dissolved	mg/L	0.5	390	390	390	390	390
Potassium - Dissolved	mg/L	0.5	390	390	390	390	390
Magnesium - Dissolved	mg/L	0.5	1,200	1,200	1,200	1,200	1,200
Sodium - Dissolved	mg/L	0.5	11,000	11,000	11,000	11,000	11,000
Bicarbonate HCO <sub>3</sub> <sup>-</sup> as CaCO <sub>3</sub>	mg/L	5	130	130	130	130	130
Carbonate CO <sub>3</sub> <sup>2-</sup> as CaCO <sub>3</sub>	mg/L	5	<5	<5	<5	<5	<5
Hydroxide OH <sup>-</sup> as CaCO <sub>3</sub>	mg/L	5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	130	130	130	130	130
Chloride	mg/L	1	21,000	21,000	21,000	21,000	21,000
Sulphate	mg/L	1	2,800	2,800	2,900	2,800	2,800
Ionic Balance	%		-3.3	-3.4	-3.6	-3.3	-2.7
Hardness as CaCO <sub>3</sub>	mg/L	3	6,000	6,000	6,100	6,000	6,000

Nutrients in Water							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Date analysed	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Total Nitrogen	mg/L	0.1	0.3	0.2	0.3	0.3	0.2
NOx as N	mg/L	0.005	<0.005	<0.005	0.01	0.015	0.006
Ammonia as N	mg/L	0.005	<0.005	<0.005	0.008	0.008	0.006
Total Phosphorus	mg/L	0.01	0.02	0.02	0.03	0.03	0.02
Phosphate as P	mg/L	0.005	0.007	0.006	0.009	0.009	0.005

Nutrients in Water							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Date analysed	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Total Nitrogen	mg/L	0.1	0.3	0.2	0.2	0.2	0.2
NOx as N	mg/L	0.005	0.010	0.040	0.008	0.010	<0.005
Ammonia as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	0.007
Total Phosphorus	mg/L	0.01	0.03	0.03	0.03	0.03	0.03
Phosphate as P	mg/L	0.005	0.008	0.008	0.006	0.006	0.006

Total Metals in water							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date digested	-		19/01/2021	19/01/2021	19/01/2021	19/01/2021	19/01/2021
Date analysed	-		19/01/2021	19/01/2021	19/01/2021	19/01/2021	19/01/2021
Aluminium-Total	mg/L	0.01	0.04	0.05	0.09	<0.02	0.02
Iron-Total	mg/L	0.01	0.08	0.07	0.03	0.03	0.03

Total Metals in water							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date digested	-		19/01/2021	19/01/2021	19/01/2021	19/01/2021	19/01/2021
Date analysed	-		19/01/2021	19/01/2021	19/01/2021	19/01/2021	19/01/2021
Aluminium-Total	mg/L	0.01	0.03	0.03	0.02	0.02	<0.02
Iron-Total	mg/L	0.01	0.04	0.03	0.02	0.02	0.02

Total Metals in water				
Our Reference			255713-11	255713-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			13/01/2021	13/01/2021
Type of sample			Water	Water
Date digested	-		19/01/2021	19/01/2021
Date analysed	-		19/01/2021	19/01/2021
Aluminium-Total	mg/L	0.01	<0.01	<0.01
Iron-Total	mg/L	0.01	<0.01	<0.01

Dissolved Metals in Water							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		19/01/2021	19/01/2021	19/01/2021	19/01/2021	19/01/2021
Date analysed	-		19/01/2021	19/01/2021	19/01/2021	19/01/2021	19/01/2021
Silicon - Dissolved	mg/L	0.1	0.7	0.7	0.9	0.9	<0.5
Silver-Dissolved Ultra Low	mg/L	0.00005	<0.0001	0.0002	0.0002	0.0001	0.0001
Aluminium-Dissolved	mg/L	0.01	<0.02	0.07	<0.02	<0.02	<0.02
Arsenic-Dissolved	mg/L	0.001	0.002	0.002	0.002	0.002	0.002
Cadmium-Dissolved	mg/L	0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Cobalt-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Copper-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Iron-Dissolved	mg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02
Mercury-Dissolved	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Manganese-Dissolved	mg/L	0.005	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum-Dissolved	mg/L	0.001	0.013	0.013	0.015	0.013	0.014
Nickel-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Lead-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Antimony-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Selenium-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc-Dissolved	mg/L	0.001	0.005	0.043	0.007	0.004	0.005

Dissolved Metals in Water							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		19/01/2021	19/01/2021	19/01/2021	19/01/2021	19/01/2021
Date analysed	-		19/01/2021	19/01/2021	19/01/2021	19/01/2021	19/01/2021
Silicon - Dissolved	mg/L	0.1	0.9	0.9	0.8	0.8	0.5
Silver-Dissolved Ultra Low	mg/L	0.00005	0.0002	0.0001	0.0001	0.0001	<0.0001
Aluminium-Dissolved	mg/L	0.01	<0.02	<0.02	<0.02	0.03	<0.02
Arsenic-Dissolved	mg/L	0.001	0.002	0.002	0.002	0.002	0.002
Cadmium-Dissolved	mg/L	0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Cobalt-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Copper-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Iron-Dissolved	mg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02
Mercury-Dissolved	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Manganese-Dissolved	mg/L	0.005	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum-Dissolved	mg/L	0.001	0.014	0.014	0.013	0.013	0.016
Nickel-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Lead-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Antimony-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Selenium-Dissolved	mg/L	0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc-Dissolved	mg/L	0.001	0.003	0.006	0.004	0.010	0.005

Dissolved Metals in Water				
Our Reference			255713-11	255713-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			13/01/2021	13/01/2021
Type of sample			Water	Water
Date prepared	-		19/01/2021	19/01/2021
Date analysed	-		19/01/2021	19/01/2021
Silicon - Dissolved	mg/L	0.1	0.2	0.2
Silver-Dissolved Ultra Low	mg/L	0.00005	<0.00005	<0.00005
Aluminium-Dissolved	mg/L	0.01	<0.01	<0.01
Arsenic-Dissolved	mg/L	0.001	<0.001	<0.001
Cadmium-Dissolved	mg/L	0.0001	<0.0001	<0.0001
Cobalt-Dissolved	mg/L	0.001	<0.001	<0.001
Chromium-Dissolved	mg/L	0.001	<0.001	<0.001
Copper-Dissolved	mg/L	0.001	<0.001	<0.001
Iron-Dissolved	mg/L	0.01	<0.01	<0.01
Mercury-Dissolved	mg/L	0.00005	<0.00005	<0.00005
Manganese-Dissolved	mg/L	0.005	<0.005	<0.005
Molybdenum-Dissolved	mg/L	0.001	<0.001	<0.001
Nickel-Dissolved	mg/L	0.001	<0.001	<0.001
Lead-Dissolved	mg/L	0.001	<0.001	<0.001
Antimony-Dissolved	mg/L	0.001	<0.001	<0.001
Selenium-Dissolved	mg/L	0.001	<0.001	<0.001
Zinc-Dissolved	mg/L	0.001	<0.001	<0.001

vTRH(C6-C10)/MBTEXN in water							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date analysed	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	10	<50	<50	<50	<50	<50
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	10	<50	<50	<50	<50	<50
TRH C <sub>6</sub> -C <sub>10</sub> less BTEX (F1)	µg/L	10	<50	<50	<50	<50	<50
MTBE	µg/L	1	<3	<3	<3	<3	<3
Benzene	µg/L	1	<3	<3	<3	<3	<3
Toluene	µg/L	1	<3	<3	<3	<3	<3
Ethylbenzene	µg/L	1	<3	<3	<3	<3	<3
m+p-xylene	µg/L	2	<6	<6	<6	<6	<6
o-xylene	µg/L	1	<3	<3	<3	<3	<3
Naphthalene	µg/L	1	<3	<3	<3	<3	<3
Surrogate Dibromofluoromethane	%		99	100	100	101	100
Surrogate toluene-d8	%		97	95	95	96	97
Surrogate 4-BFB	%		98	97	96	95	98

vTRH(C6-C10)/MBTEXN in water							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date analysed	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	10	<50	<50	<50	<50	<50
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	10	<50	<50	<50	<50	<50
TRH C <sub>6</sub> -C <sub>10</sub> less BTEX (F1)	µg/L	10	<50	<50	<50	<50	<50
MTBE	µg/L	1	<3	<3	<3	<3	<3
Benzene	µg/L	1	<3	<3	<3	<3	<3
Toluene	µg/L	1	<3	<3	<3	<3	<3
Ethylbenzene	µg/L	1	<3	<3	<3	<3	<3
m+p-xylene	µg/L	2	<6	<6	<6	<6	<6
o-xylene	µg/L	1	<3	<3	<3	<3	<3
Naphthalene	µg/L	1	<3	<3	<3	<3	<3
Surrogate Dibromofluoromethane	%		100	98	101	100	103
Surrogate toluene-d8	%		97	95	96	96	97
Surrogate 4-BFB	%		97	99	100	97	97

vTRH(C6-C10)/MBTEXN in water					
Our Reference			255713-11	255713-12	255713-13
Your Reference	UNITS	PQL	WR1	WB1	WTB1
Date Sampled			13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water
Date analysed	-		14/01/2021	14/01/2021	14/01/2021
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	10	<10	<10	<10
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	10	<10	<10	<10
TRH C <sub>6</sub> -C <sub>10</sub> less BTEX (F1)	µg/L	10	<10	<10	<10
MTBE	µg/L	1	<1	<1	<1
Benzene	µg/L	1	<1	<1	<1
Toluene	µg/L	1	<1	<1	<1
Ethylbenzene	µg/L	1	<1	<1	<1
m+p-xylene	µg/L	2	<2	<2	<2
o-xylene	µg/L	1	<1	<1	<1
Naphthalene	µg/L	1	<1	<1	<1
Surrogate Dibromofluoromethane	%		101	100	98
Surrogate toluene-d8	%		97	96	95
Surrogate 4-BFB	%		98	98	97

svTRH(C10-C40) in water							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Date analysed	-		15/01/2021	15/01/2021	15/01/2021	15/01/2021	15/01/2021
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	50	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	100	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	100	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	50	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> -C <sub>16</sub> less N (F2)	µg/L	50	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	100	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	100	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%		91	86	89	86	97

svTRH(C10-C40) in water							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Date analysed	-		15/01/2021	15/01/2021	15/01/2021	15/01/2021	15/01/2021
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	50	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	100	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	100	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	50	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> -C <sub>16</sub> less N (F2)	µg/L	50	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	100	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	100	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%		81	87	87	98	99

svTRH(C10-C40) in water				
Our Reference			255713-11	255713-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			13/01/2021	13/01/2021
Type of sample			Water	Water
Date extracted	-		14/01/2021	14/01/2021
Date analysed	-		15/01/2021	15/01/2021
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	100	<100	<100
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	50	<50	<50
TRH >C <sub>10</sub> -C <sub>16</sub> less N (F2)	µg/L	50	<50	<50
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	100	<100	<100
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	100	<100	<100
Surrogate o-Terphenyl	%		76	77

PAHs in Water							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Date analysed	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Naphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-D <sub>14</sub>	%		93	93	96	89	99

PAHs in Water							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Date analysed	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Naphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-D <sub>14</sub>	%		96	97	90	96	93

PAHs in Water				
Our Reference			255713-11	255713-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			13/01/2021	13/01/2021
Type of sample			Water	Water
Date extracted	-		14/01/2021	14/01/2021
Date analysed	-		14/01/2021	14/01/2021
Naphthalene	µg/L	0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	0.5	<0.5	<0.5
Total +ve PAH's	µg/L	0.1	<0.1	<0.1
Surrogate p-Terphenyl-D <sub>14</sub>	%		110	107

Low Level OCP in water							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Date analysed	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Hexachlorobenzene (HCB)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
a-BHC	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lindane (g-BHC)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
b-BHC	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
d-BHC	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
g-Chlordane	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
a-Chlordane	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
a-Endosulfan	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
pp-DDE	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pp-DDD	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
b-Endosulfan	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
pp-DDT	µg/L	0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Endosulfan Sulphate	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Methoxychlor	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Surrogate 2-chlorophenol-d4	%		94	89	93	88	102

Low Level OCP in water							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Date analysed	-		14/01/2021	14/01/2021	14/01/2021	14/01/2021	14/01/2021
Hexachlorobenzene (HCB)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
a-BHC	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lindane (g-BHC)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
b-BHC	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
d-BHC	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
g-Chlordane	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
a-Chlordane	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
a-Endosulfan	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
pp-DDE	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pp-DDD	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
b-Endosulfan	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
pp-DDT	µg/L	0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Endosulfan Sulphate	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Methoxychlor	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Surrogate 2-chlorophenol-d4	%		91	95	89	98	93

Low Level OCP in water				
Our Reference			255713-11	255713-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			13/01/2021	13/01/2021
Type of sample			Water	Water
Date extracted	-		14/01/2021	14/01/2021
Date analysed	-		14/01/2021	14/01/2021
Hexachlorobenzene (HCB)	µg/L	0.01	<0.01	<0.01
a-BHC	µg/L	0.05	<0.05	<0.05
Lindane (g-BHC)	µg/L	0.05	<0.05	<0.05
b-BHC	µg/L	0.05	<0.05	<0.05
Heptachlor	µg/L	0.01	<0.01	<0.01
d-BHC	µg/L	0.05	<0.05	<0.05
Aldrin	µg/L	0.01	<0.01	<0.01
Heptachlor Epoxide	µg/L	0.01	<0.01	<0.01
g-Chlordane	µg/L	0.01	<0.01	<0.01
a-Chlordane	µg/L	0.01	<0.01	<0.01
a-Endosulfan	µg/L	0.02	<0.02	<0.02
pp-DDE	µg/L	0.01	<0.01	<0.01
Dieldrin	µg/L	0.01	<0.01	<0.01
Endrin	µg/L	0.01	<0.01	<0.01
pp-DDD	µg/L	0.01	<0.01	<0.01
b-Endosulfan	µg/L	0.02	<0.02	<0.02
pp-DDT	µg/L	0.006	<0.006	<0.006
Endosulfan Sulphate	µg/L	0.02	<0.02	<0.02
Methoxychlor	µg/L	0.02	<0.02	<0.02
Surrogate 2-chlorophenol-d4	%		105	99

PFAS in water TRACE Extended							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		20/01/2021	20/01/2021	20/01/2021	20/01/2021	20/01/2021
Date analysed	-		21/01/2021	21/01/2021	21/01/2021	21/01/2021	21/01/2021
Perfluorobutanesulfonic acid	µg/L	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Perfluoropentanesulfonic acid	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorohexanesulfonic acid	µg/L	0.0002	0.001	0.001	0.0020	0.0020	0.0008
Perfluoroheptanesulfonic acid	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonate PFOS	µg/L	0.0002	0.0020	0.001	0.0027	0.0028	0.001
Perfluorodecanesulfonic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorobutanoic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexanoic acid	µg/L	0.0004	0.0008	0.001	0.001	0.001	0.0005
Perfluoroheptanoic acid	µg/L	0.0004	0.0004	0.0007	0.0006	0.0006	<0.0004
Perfluorooctanoic acid PFOA	µg/L	0.0002	0.0006	0.0008	0.0008	0.0008	0.0005
Perfluorononanoic acid	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorodecanoic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4:2 FTS	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 FTS	µg/L	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
8:2 FTS	µg/L	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
10:2 FTS	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
N-Methyl perfluorooctane sulfonamide	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctanesulfon -amide	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
N-Me perfluorooctanesulfonamid -oethanol	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
N-Et perfluorooctanesulfonamid -oethanol	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Surrogate <sup>13</sup> C <sub>8</sub> PFOS	%		97	99	99	110	102
Surrogate <sup>13</sup> C <sub>2</sub> PFOA	%		100	100	96	98	98
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFBS	%		86	84	93	86	86
Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS	%		86	88	91	88	89
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS	%		61	66	67	61	65
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFBA	%		69	72	64	73	77

PFAS in water TRACE Extended							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFPeA	%		80	80	84	80	81
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFHxA	%		85	87	90	86	91
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFHpA	%		81	82	87	83	83
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA	%		78	80	86	82	84
Extracted ISTD <sup>13</sup> C <sub>5</sub> PFNA	%		74	78	80	79	75
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDA	%		59	62	63	63	63
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFUnDA	%		46	51	48	46	47
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDoDA	%		46	46	44	43	41
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFTeDA	%		86	91	86	76	72
Extracted ISTD <sup>13</sup> C <sub>2</sub> 4:2FTS	%		88	92	99	91	95
Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS	%		90	91	95	90	91
Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS	%		66	69	70	66	70
Extracted ISTD <sup>13</sup> C <sub>8</sub> FOSA	%		42	44	42	44	46
Extracted ISTD d <sub>3</sub> N MeFOSA	%		31	33	31	36	34
Extracted ISTD d <sub>5</sub> N EtFOSA	%		33	33	31	39	36
Extracted ISTD d <sub>7</sub> N MeFOSE	%		42	44	39	48	46
Extracted ISTD d <sub>9</sub> N EtFOSE	%		46	49	47	51	46
Extracted ISTD d <sub>3</sub> N MeFOSAA	%		44	46	46	45	44
Extracted ISTD d <sub>5</sub> N EtFOSAA	%		42	43	41	41	39
Total Positive PFHxS & PFOS	µg/L	0.0002	0.0030	0.002	0.0047	0.0048	0.002
Total Positive PFOS & PFOA	µg/L	0.0002	0.0026	0.002	0.0035	0.0036	0.002
Total Positive PFAS	µg/L	0.0002	0.0048	0.0045	0.0071	0.0072	0.0028

PFAS in water TRACE Extended							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		20/01/2021	20/01/2021	20/01/2021	20/01/2021	20/01/2021
Date analysed	-		21/01/2021	21/01/2021	21/01/2021	21/01/2021	21/01/2021
Perfluorobutanesulfonic acid	µg/L	0.0004	0.0005	0.0004	<0.0004	<0.0004	<0.0004
Perfluoropentanesulfonic acid	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorohexanesulfonic acid	µg/L	0.0002	0.0020	0.0020	0.001	0.0020	0.0008
Perfluoroheptanesulfonic acid	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonate PFOS	µg/L	0.0002	0.0026	0.0026	0.0021	0.0022	0.001
Perfluorodecanesulfonic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorobutanoic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexanoic acid	µg/L	0.0004	0.001	0.001	0.0009	0.001	0.0006
Perfluoroheptanoic acid	µg/L	0.0004	0.0006	0.0006	0.0005	0.0005	<0.0004
Perfluorooctanoic acid PFOA	µg/L	0.0002	0.0007	0.0007	0.0006	0.0006	0.0005
Perfluorononanoic acid	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorodecanoic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4:2 FTS	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 FTS	µg/L	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
8:2 FTS	µg/L	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
10:2 FTS	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
N-Methyl perfluorooctane sulfonamide	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctanesulfon -amide	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
N-Me perfluorooctanesulfonamid -oethanol	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
N-Et perfluorooctanesulfonamid -oethanol	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Surrogate <sup>13</sup> C <sub>8</sub> PFOS	%		104	104	97	105	97
Surrogate <sup>13</sup> C <sub>2</sub> PFOA	%		97	97	102	97	98
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFBS	%		80	80	80	79	79
Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS	%		87	90	86	85	86
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS	%		61	63	64	64	66
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFBA	%		69	75	73	65	76

PFAS in water TRACE Extended							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFPeA	%		81	80	77	77	78
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFHxA	%		90	93	89	88	91
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFHpA	%		84	88	82	83	84
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA	%		84	84	80	82	82
Extracted ISTD <sup>13</sup> C <sub>5</sub> PFNA	%		78	76	75	78	76
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDA	%		62	61	61	59	63
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFUnDA	%		48	48	48	45	49
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDoDA	%		47	48	47	46	46
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFTeDA	%		61	75	87	67	84
Extracted ISTD <sup>13</sup> C <sub>2</sub> 4:2FTS	%		95	96	88	92	90
Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS	%		90	88	86	88	86
Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS	%		69	62	66	65	65
Extracted ISTD <sup>13</sup> C <sub>8</sub> FOSA	%		48	47	47	47	44
Extracted ISTD d <sub>3</sub> N MeFOSA	%		40	39	40	39	36
Extracted ISTD d <sub>5</sub> N EtFOSA	%		45	43	43	41	37
Extracted ISTD d <sub>7</sub> N MeFOSE	%		47	53	50	50	45
Extracted ISTD d <sub>9</sub> N EtFOSE	%		60	58	54	58	49
Extracted ISTD d <sub>3</sub> N MeFOSAA	%		48	48	48	46	43
Extracted ISTD d <sub>5</sub> N EtFOSAA	%		46	47	46	44	41
Total Positive PFHxS & PFOS	µg/L	0.0002	0.0046	0.0046	0.0031	0.0042	0.002
Total Positive PFOS & PFOA	µg/L	0.0002	0.0033	0.0033	0.0027	0.0028	0.002
Total Positive PFAS	µg/L	0.0002	0.0074	0.0073	0.0051	0.0063	0.0029

PFAS in water TRACE Extended					
Our Reference			255713-11	255713-12	255713-13
Your Reference	UNITS	PQL	WR1	WB1	WTB1
Date Sampled			13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water
Date prepared	-		20/01/2021	20/01/2021	20/01/2021
Date analysed	-		21/01/2021	21/01/2021	21/01/2021
Perfluorobutanesulfonic acid	µg/L	0.0004	<0.0004	<0.0004	<0.0004
Perfluoropentanesulfonic acid	µg/L	0.001	<0.001	<0.001	<0.001
Perfluorohexanesulfonic acid	µg/L	0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanesulfonic acid	µg/L	0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonate PFOS	µg/L	0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanesulfonic acid	µg/L	0.002	<0.002	<0.002	<0.002
Perfluorobutanoic acid	µg/L	0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid	µg/L	0.002	<0.002	<0.002	<0.002
Perfluorohexanoic acid	µg/L	0.0004	<0.0004	<0.0004	<0.0004
Perfluoroheptanoic acid	µg/L	0.0004	<0.0004	<0.0004	<0.0004
Perfluorooctanoic acid PFOA	µg/L	0.0002	0.0002	<0.0002	<0.0002
Perfluorononanoic acid	µg/L	0.001	<0.001	<0.001	<0.001
Perfluorodecanoic acid	µg/L	0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	µg/L	0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid	µg/L	0.005	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	µg/L	0.05	<0.05	<0.05	<0.05
4:2 FTS	µg/L	0.001	<0.001	<0.001	<0.001
6:2 FTS	µg/L	0.0004	<0.0004	<0.0004	<0.0004
8:2 FTS	µg/L	0.0004	<0.0004	<0.0004	<0.0004
10:2 FTS	µg/L	0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	µg/L	0.01	<0.01	<0.01	<0.01
N-Methyl perfluorooctane sulfonamide	µg/L	0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctanesulfonamide	µg/L	0.01	<0.01	<0.01	<0.01
N-Me perfluorooctanesulfonamide -oethanol	µg/L	0.005	<0.005	<0.005	<0.005
N-Et perfluorooctanesulfonamide -oethanol	µg/L	0.05	<0.05	<0.05	<0.05
MePerfluorooctanesulfonamide acetic acid	µg/L	0.002	<0.002	<0.002	<0.002
EtPerfluorooctanesulfonamide acetic acid	µg/L	0.002	<0.002	<0.002	<0.002
Surrogate <sup>13</sup> C <sub>8</sub> PFOS	%		96	105	104
Surrogate <sup>13</sup> C <sub>2</sub> PFOA	%		100	96	96
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFBS	%		87	86	84
Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS	%		89	84	84
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS	%		73	67	68
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFBA	%		89	88	89

PFAS in water TRACE Extended					
Our Reference			255713-11	255713-12	255713-13
Your Reference	UNITS	PQL	WR1	WB1	WTB1
Date Sampled			13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFPeA	%		88	88	88
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFHxA	%		92	90	91
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFHpA	%		88	86	88
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA	%		85	86	84
Extracted ISTD <sup>13</sup> C <sub>5</sub> PFNA	%		83	81	80
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDA	%		70	62	67
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFUnDA	%		52	44	44
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDoDA	%		48	35	38
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFTeDA	%		95	107	98
Extracted ISTD <sup>13</sup> C <sub>2</sub> 4:2FTS	%		90	90	88
Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS	%		94	91	92
Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS	%		79	77	73
Extracted ISTD <sup>13</sup> C <sub>8</sub> FOSA	%		57	54	57
Extracted ISTD d <sub>3</sub> N MeFOSA	%		47	38	43
Extracted ISTD d <sub>5</sub> N EtFOSA	%		51	37	43
Extracted ISTD d <sub>7</sub> N MeFOSE	%		61	53	56
Extracted ISTD d <sub>9</sub> N EtFOSE	%		66	49	60
Extracted ISTD d <sub>3</sub> N MeFOSAA	%		45	36	41
Extracted ISTD d <sub>5</sub> N EtFOSAA	%		47	33	37
Total Positive PFHxS & PFOS	µg/L	0.0002	<0.0002	<0.0002	<0.0002
Total Positive PFOS & PFOA	µg/L	0.0002	0.0002	<0.0002	<0.0002
Total Positive PFAS	µg/L	0.0002	0.0002	<0.0002	<0.0002

Chlorophyll a & Phaeophytin a							
Our Reference			255713-1	255713-2	255713-3	255713-4	255713-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Chlorophyll a	µg/L	0.1	1.7	1.8	1.4	1.4	1.2
Phaeophytin a	µg/L	0.2	0.6	0.6	0.7	0.6	0.6

Chlorophyll a & Phaeophytin a							
Our Reference			255713-6	255713-7	255713-8	255713-9	255713-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Type of sample			Water	Water	Water	Water	Water
Chlorophyll a	µg/L	0.1	2.2	2.1	2.4	2.1	1.1
Phaeophytin a	µg/L	0.2	0.7	0.7	0.6	0.6	0.5

Method ID	Methodology Summary
<b>Ext-058</b>	Analysed by The Marine and Freshwater Research Laboratory, accreditation number 10603
<b>INORG-005</b>	Acidity - determined by titration based on APHA latest edition, Method 2310 B. Soils reported from a 1:5 water extract unless otherwise specified.
<b>INORG-006</b>	Alkalinity - determined titrimetrically based on APHA latest edition, Method 2320-B. Soils reported from a 1:5 water extract unless otherwise specified.
<b>INORG-018</b>	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±10°C
<b>INORG-019</b>	Suspended Solids - determined gravimetrically by filtration of the sample. The solids are dried at 104±5°C
<b>INORG-022</b>	Turbidity - measured nephelometrically using a turbidimeter, in accordance with APHA latest edition, 2130 B.
<b>INORG-040</b>	Ion Balance Calculation: Cations in water by ICP-OES; Anions in water by IC; Alkalinity in water by Titration using APHA methods.
<b>INORG-051</b>	Determination of sulphide by titration and/or colourimetric determination. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present may also included in the determination.
<b>INORG-055</b>	NOx - determined colourimetrically. Soils are analysed from a water extract.
<b>INORG-057</b>	Ammonia by colourimetric analysis based on APHA latest edition 4500-NH3 F.
<b>INORG-060</b>	Phosphate- determined colourimetrically. Soils are analysed from a water extract.
<b>INORG-060</b>	Total Phosphorus by colourimetric analysis based on APHA latest edition 4500-P J.
<b>INORG-081</b>	Anions - a range of anions are determined by Ion Chromatography based on APHA latest edition Method 4110-B. Soils and other sample types reported from a water extract unless otherwise specified (standard soil extract ratio 1:5).
<b>INORG-110</b>	Total Nitrogen by high temperature catalytic combustion with chemiluminescence detection. Dissolved/Total Carbon and Dissolved/Total Organic and Inorganic Carbon by high temperature catalytic combustion with NDIR
<b>METALS-008</b>	Hardness calculated from Calcium and Magnesium as per APHA latest edition 2340B.
<b>METALS-020</b>	Determination of various metals by ICP-AES.
<b>METALS-021</b>	Determination of Mercury by Cold Vapour AAS.  For urine samples total Mercury is determined, however, mercury in urine is almost entirely in the inorganic form (CDC).
<b>METALS-022</b>	Determination of various metals by ICP-MS.
<b>Org-020</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.

**Client Reference: EEC20078.004 - Fremantle Traffic Bridge**

Method ID	Methodology Summary
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM draft B1 Guideline on Investigation Levels for Soil and Groundwater.
<b>Org-023</b>	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
<b>Org-029</b>	<p>Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLP/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3.</p> <p>Analysis is undertaken with LC-MS/MS.</p> <p>PFAS results include the sum of branched and linear isomers where applicable.</p> <p>Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.3 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components.</p> <p>Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.</p>

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-2
Date prepared	-			13/01/2021	1	13/01/2021	13/01/2021		13/01/2021	13/01/2021
Date analysed	-			13/01/2021	1	13/01/2021	13/01/2021		13/01/2021	13/01/2021
Total Dissolved Solids (grav)	mg/L	5	INORG-018	<5	1	37000	[NT]		99	[NT]
Total Suspended Solids	mg/L	5	INORG-019	<5	1	<5	[NT]		96	[NT]
Turbidity	NTU	0.1	INORG-022	<0.1	1	0.7	[NT]		113	[NT]
Dissolved Organic Carbon	mg/L	1	INORG-110	<1	1	2	2	0	100	97
Acidity as CaCO <sub>3</sub>	mg/L	5	INORG-005	<5	1	<5	<5	0	108	[NT]
Sulphide in water*	mg/L	0.5	INORG-051	<0.5	1	0.6	[NT]		82	[NT]
Fluoride	mg/L	0.1	INORG-081	<0.1	1	1.3	[NT]		92	90

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	3	13/01/2021	13/01/2021		[NT]	[NT]
Date analysed	-			[NT]	3	13/01/2021	13/01/2021		[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	INORG-018	[NT]	3	37000	[NT]		[NT]	[NT]
Total Suspended Solids	mg/L	5	INORG-019	[NT]	3	<5	[NT]		[NT]	[NT]
Turbidity	NTU	0.1	INORG-022	[NT]	3	0.5	[NT]		[NT]	[NT]
Dissolved Organic Carbon	mg/L	1	INORG-110	[NT]	3	2	[NT]		[NT]	[NT]
Acidity as CaCO <sub>3</sub>	mg/L	5	INORG-005	[NT]	3	<5	[NT]		[NT]	[NT]
Sulphide in water*	mg/L	0.5	INORG-051	[NT]	3	0.8	[NT]		[NT]	[NT]
Fluoride	mg/L	0.1	INORG-081	[NT]	3	1.2	1.2	0	[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	7	13/01/2021	13/01/2021		[NT]	[NT]
Date analysed	-			[NT]	7	13/01/2021	13/01/2021		[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	INORG-018	[NT]	7	37000	[NT]		[NT]	[NT]
Total Suspended Solids	mg/L	5	INORG-019	[NT]	7	<5	[NT]		[NT]	[NT]
Turbidity	NTU	0.1	INORG-022	[NT]	7	0.6	0.6	0	[NT]	[NT]
Dissolved Organic Carbon	mg/L	1	INORG-110	[NT]	7	2	[NT]		[NT]	[NT]
Acidity as CaCO <sub>3</sub>	mg/L	5	INORG-005	[NT]	7	<5	[NT]		[NT]	[NT]
Sulphide in water*	mg/L	0.5	INORG-051	[NT]	7	<0.5	[NT]		[NT]	[NT]
Fluoride	mg/L	0.1	INORG-081	[NT]	7	1.2	[NT]		[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	13/01/2021	13/01/2021		[NT]	[NT]
Date analysed	-			[NT]	11	13/01/2021	13/01/2021		[NT]	[NT]
Turbidity	NTU	0.1	INORG-022	[NT]	11	0.4	[NT]		[NT]	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: Ionic Balance						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-2
Date prepared	-			13/01/2021	1	13/01/2021	13/01/2021		13/01/2021	13/01/2021
Date analysed	-			13/01/2021	1	13/01/2021	13/01/2021		13/01/2021	13/01/2021
Calcium - Dissolved	mg/L	0.5	METALS-020	<0.5	1	390	[NT]		101	[NT]
Potassium - Dissolved	mg/L	0.5	METALS-020	<0.5	1	390	[NT]		104	[NT]
Magnesium - Dissolved	mg/L	0.5	METALS-020	<0.5	1	1200	[NT]		101	[NT]
Sodium - Dissolved	mg/L	0.5	METALS-020	<0.5	1	11000	[NT]		102	[NT]
Bicarbonate HCO <sub>3</sub> as CaCO <sub>3</sub>	mg/L	5	INORG-006	<5	1	130	130	0	101	[NT]
Carbonate CO <sub>3</sub> <sup>2-</sup> as CaCO <sub>3</sub>	mg/L	5	INORG-006	<5	1	<5	<5	0	101	[NT]
Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	INORG-006	<5	1	130	130	0	101	[NT]
Chloride	mg/L	1	INORG-081	<1	1	21000	21000	0	88	89
Sulphate	mg/L	1	INORG-081	<1	1	2800	2900	4	88	110
Hardness as CaCO <sub>3</sub>	mg/L	3	METALS-008	<3	1	6100	[NT]		[NT]	[NT]

QUALITY CONTROL: Ionic Balance						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	4	13/01/2021	13/01/2021		[NT]	[NT]
Date analysed	-			[NT]	4	13/01/2021	13/01/2021		[NT]	[NT]
Calcium - Dissolved	mg/L	0.5	METALS-020	[NT]	4	380	380	0	[NT]	[NT]
Potassium - Dissolved	mg/L	0.5	METALS-020	[NT]	4	380	390	3	[NT]	[NT]
Magnesium - Dissolved	mg/L	0.5	METALS-020	[NT]	4	1200	1200	0	[NT]	[NT]
Sodium - Dissolved	mg/L	0.5	METALS-020	[NT]	4	11000	11000	0	[NT]	[NT]
Bicarbonate HCO <sub>3</sub> as CaCO <sub>3</sub>	mg/L	5	INORG-006	[NT]	4	130	[NT]		[NT]	[NT]
Carbonate CO <sub>3</sub> <sup>2-</sup> as CaCO <sub>3</sub>	mg/L	5	INORG-006	[NT]	4	<5	[NT]		[NT]	[NT]
Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	INORG-006	[NT]	4	130	[NT]		[NT]	[NT]
Chloride	mg/L	1	INORG-081	[NT]	4	21000	[NT]		[NT]	[NT]
Sulphate	mg/L	1	INORG-081	[NT]	4	2800	[NT]		[NT]	[NT]
Hardness as CaCO <sub>3</sub>	mg/L	3	METALS-008	[NT]	4	5900	6000	2	[NT]	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: Nutrients in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-2
Date prepared	-			14/01/2021	1	14/01/2021	14/01/2021		14/01/2021	14/01/2021
Date analysed	-			14/01/2021	1	14/01/2021	14/01/2021		14/01/2021	14/01/2021
Total Nitrogen	mg/L	0.1	INORG-110	<0.1	1	0.3	0.2	40	93	94
NOx as N	mg/L	0.005	INORG-055	<0.005	1	<0.005	<0.005	0	102	107
Ammonia as N	mg/L	0.005	INORG-057	<0.005	1	<0.005	<0.005	0	94	120
Total Phosphorus	mg/L	0.01	INORG-060	<0.01	1	0.02	0.03	40	109	102
Phosphate as P	mg/L	0.005	INORG-060	<0.005	1	0.007	0.008	13	107	107

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: Total Metals in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-2
Date digested	-			19/01/2021	1	19/01/2021	15/01/2021		19/01/2021	15/01/2021
Date analysed	-			19/01/2021	1	19/01/2021	15/01/2021		19/01/2021	15/01/2021
Aluminium-Total	mg/L	0.01	METALS-022	<0.01	1	0.04	0.06	40	97	#
Iron-Total	mg/L	0.01	METALS-022	<0.01	1	0.08	0.08	0	102	96

QUALITY CONTROL: Total Metals in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date digested	-			[NT]	11	19/01/2021	15/01/2021		[NT]	[NT]
Date analysed	-			[NT]	11	19/01/2021	15/01/2021		[NT]	[NT]
Aluminium-Total	mg/L	0.01	METALS-022	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
Iron-Total	mg/L	0.01	METALS-022	[NT]	11	<0.01	<0.01	0	[NT]	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: Dissolved Metals in Water				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			19/01/2021	4	19/01/2021	15/01/2021		19/01/2021	[NT]
Date analysed	-			19/01/2021	4	19/01/2021	15/01/2021		19/01/2021	[NT]
Silicon - Dissolved	mg/L	0.1	METALS-020	<0.1	4	0.9	0.9	0	107	[NT]
Silver-Dissolved Ultra Low	mg/L	0.00005	METALS-022	<0.00005	4	0.0001	[NT]		103	[NT]
Aluminium-Dissolved	mg/L	0.01	METALS-022	<0.01	4	<0.02	[NT]		106	[NT]
Arsenic-Dissolved	mg/L	0.001	METALS-022	<0.001	4	0.002	[NT]		102	[NT]
Cadmium-Dissolved	mg/L	0.0001	METALS-022	<0.0001	4	<0.0002	[NT]		103	[NT]
Cobalt-Dissolved	mg/L	0.001	METALS-022	<0.001	4	<0.002	[NT]		97	[NT]
Chromium-Dissolved	mg/L	0.001	METALS-022	<0.001	4	<0.002	[NT]		95	[NT]
Copper-Dissolved	mg/L	0.001	METALS-022	<0.001	4	<0.002	[NT]		98	[NT]
Iron-Dissolved	mg/L	0.01	METALS-022	<0.01	4	<0.02	[NT]		101	[NT]
Mercury-Dissolved	mg/L	0.00005	METALS-021	<0.00005	4	<0.00005	[NT]		105	[NT]
Manganese-Dissolved	mg/L	0.005	METALS-022	<0.005	4	<0.01	[NT]		101	[NT]
Molybdenum-Dissolved	mg/L	0.001	METALS-022	<0.001	4	0.013	[NT]		99	[NT]
Nickel-Dissolved	mg/L	0.001	METALS-022	<0.001	4	<0.002	[NT]		97	[NT]
Lead-Dissolved	mg/L	0.001	METALS-022	<0.001	4	<0.002	[NT]		102	[NT]
Antimony-Dissolved	mg/L	0.001	METALS-022	<0.001	4	<0.002	[NT]		111	[NT]
Selenium-Dissolved	mg/L	0.001	METALS-022	<0.001	4	<0.002	[NT]		100	[NT]
Zinc-Dissolved	mg/L	0.001	METALS-022	<0.001	4	0.004	[NT]		101	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: Dissolved Metals in Water				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	5	19/01/2021	15/01/2021		[NT]	[NT]
Date analysed	-			[NT]	5	19/01/2021	15/01/2021		[NT]	[NT]
Silicon - Dissolved	mg/L	0.1	METALS-020	[NT]	5	<0.5	[NT]		[NT]	[NT]
Silver-Dissolved Ultra Low	mg/L	0.00005	METALS-022	[NT]	5	0.0001	[NT]		[NT]	[NT]
Aluminium-Dissolved	mg/L	0.01	METALS-022	[NT]	5	<0.02	[NT]		[NT]	[NT]
Arsenic-Dissolved	mg/L	0.001	METALS-022	[NT]	5	0.002	[NT]		[NT]	[NT]
Cadmium-Dissolved	mg/L	0.0001	METALS-022	[NT]	5	<0.0002	[NT]		[NT]	[NT]
Cobalt-Dissolved	mg/L	0.001	METALS-022	[NT]	5	<0.002	[NT]		[NT]	[NT]
Chromium-Dissolved	mg/L	0.001	METALS-022	[NT]	5	<0.002	[NT]		[NT]	[NT]
Copper-Dissolved	mg/L	0.001	METALS-022	[NT]	5	<0.002	[NT]		[NT]	[NT]
Iron-Dissolved	mg/L	0.01	METALS-022	[NT]	5	<0.02	[NT]		[NT]	[NT]
Mercury-Dissolved	mg/L	0.00005	METALS-021	[NT]	5	<0.00005	<0.00005	0	[NT]	[NT]
Manganese-Dissolved	mg/L	0.005	METALS-022	[NT]	5	<0.01	[NT]		[NT]	[NT]
Molybdenum-Dissolved	mg/L	0.001	METALS-022	[NT]	5	0.014	[NT]		[NT]	[NT]
Nickel-Dissolved	mg/L	0.001	METALS-022	[NT]	5	<0.002	[NT]		[NT]	[NT]
Lead-Dissolved	mg/L	0.001	METALS-022	[NT]	5	<0.002	[NT]		[NT]	[NT]
Antimony-Dissolved	mg/L	0.001	METALS-022	[NT]	5	<0.002	[NT]		[NT]	[NT]
Selenium-Dissolved	mg/L	0.001	METALS-022	[NT]	5	<0.002	[NT]		[NT]	[NT]
Zinc-Dissolved	mg/L	0.001	METALS-022	[NT]	5	0.005	[NT]		[NT]	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: Dissolved Metals in Water				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	6	19/01/2021	19/01/2021		[NT]	[NT]
Date analysed	-			[NT]	6	19/01/2021	19/01/2021		[NT]	[NT]
Silicon - Dissolved	mg/L	0.1	METALS-020	[NT]	6	0.9	[NT]		[NT]	[NT]
Silver-Dissolved Ultra Low	mg/L	0.00005	METALS-022	[NT]	6	0.0002	0.0001	67	[NT]	[NT]
Aluminium-Dissolved	mg/L	0.01	METALS-022	[NT]	6	<0.02	<0.02	0	[NT]	[NT]
Arsenic-Dissolved	mg/L	0.001	METALS-022	[NT]	6	0.002	0.002	0	[NT]	[NT]
Cadmium-Dissolved	mg/L	0.0001	METALS-022	[NT]	6	<0.0002	<0.0002	0	[NT]	[NT]
Cobalt-Dissolved	mg/L	0.001	METALS-022	[NT]	6	<0.002	<0.002	0	[NT]	[NT]
Chromium-Dissolved	mg/L	0.001	METALS-022	[NT]	6	<0.002	<0.002	0	[NT]	[NT]
Copper-Dissolved	mg/L	0.001	METALS-022	[NT]	6	<0.002	<0.002	0	[NT]	[NT]
Iron-Dissolved	mg/L	0.01	METALS-022	[NT]	6	<0.02	<0.02	0	[NT]	[NT]
Mercury-Dissolved	mg/L	0.00005	METALS-021	[NT]	6	<0.00005	[NT]		[NT]	[NT]
Manganese-Dissolved	mg/L	0.005	METALS-022	[NT]	6	<0.01	<0.01	0	[NT]	[NT]
Molybdenum-Dissolved	mg/L	0.001	METALS-022	[NT]	6	0.014	0.013	7	[NT]	[NT]
Nickel-Dissolved	mg/L	0.001	METALS-022	[NT]	6	<0.002	<0.002	0	[NT]	[NT]
Lead-Dissolved	mg/L	0.001	METALS-022	[NT]	6	<0.002	<0.002	0	[NT]	[NT]
Antimony-Dissolved	mg/L	0.001	METALS-022	[NT]	6	<0.002	<0.002	0	[NT]	[NT]
Selenium-Dissolved	mg/L	0.001	METALS-022	[NT]	6	<0.002	<0.002	0	[NT]	[NT]
Zinc-Dissolved	mg/L	0.001	METALS-022	[NT]	6	0.003	0.007	80	[NT]	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: vTRH(C6-C10)/MBTEXN in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date analysed	-			14/01/2021	[NT]	[NT]	[NT]	[NT]	14/01/2021	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	99	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	99	[NT]
MTBE	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	101	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate toluene-d8	%		Org-023	96	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	97	[NT]	[NT]	[NT]	[NT]	95	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: svTRH(C10-C40) in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-2
Date extracted	-			14/01/2021	11	14/01/2021	14/01/2021		14/01/2021	14/01/2021
Date analysed	-			15/01/2021	11	15/01/2021	15/01/2021		15/01/2021	15/01/2021
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	50	Org-020	<50	11	<50	<50	0	111	111
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	100	Org-020	<100	11	<100	<100	0	107	110
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	100	Org-020	<100	11	<100	<100	0	106	108
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	50	Org-020	<50	11	<50	<50	0	112	114
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	100	Org-020	<100	11	<100	<100	0	110	113
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	100	Org-020	<100	11	<100	<100	0	110	110
Surrogate o-Terphenyl	%		Org-020	90	11	76	78	3	95	96

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: PAHs in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-9
Date extracted	-			14/01/2021	3	14/01/2021	14/01/2021		14/01/2021	14/01/2021
Date analysed	-			14/01/2021	3	14/01/2021	14/01/2021		14/01/2021	14/01/2021
Naphthalene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	81	97
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	87	98
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	86	99
Anthracene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	84	96
Pyrene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	81	93
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	87	98
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	3	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	88	98
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-D <sub>14</sub>	%		Org-022/025	75	3	96	105	9	89	101

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: Low Level OCP in water				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-9
Date extracted	-			14/01/2021	3	14/01/2021	14/01/2021		14/01/2021	14/01/2021
Date analysed	-			14/01/2021	3	14/01/2021	14/01/2021		14/01/2021	14/01/2021
Hexachlorobenzene (HCB)	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	[NT]	[NT]
a-BHC	µg/L	0.05	Org-022/025	<0.05	3	<0.05	<0.05	0	89	97
Lindane (g-BHC)	µg/L	0.05	Org-022/025	<0.05	3	<0.05	<0.05	0	[NT]	[NT]
b-BHC	µg/L	0.05	Org-022/025	<0.05	3	<0.05	<0.05	0	96	88
Heptachlor	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	85	96
d-BHC	µg/L	0.05	Org-022/025	<0.05	3	<0.05	<0.05	0	[NT]	[NT]
Aldrin	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	84	98
Heptachlor Epoxide	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	90	105
g-Chlordane	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	[NT]	[NT]
a-Chlordane	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	[NT]	[NT]
a-Endosulfan	µg/L	0.02	Org-022/025	<0.02	3	<0.02	<0.02	0	[NT]	[NT]
pp-DDE	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	88	97
Dieldrin	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	83	86
Endrin	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	[NT]	[NT]
pp-DDD	µg/L	0.01	Org-022/025	<0.01	3	<0.01	<0.01	0	84	95
b-Endosulfan	µg/L	0.02	Org-022/025	<0.02	3	<0.02	<0.02	0	[NT]	[NT]
pp-DDT	µg/L	0.006	Org-022/025	<0.006	3	<0.006	<0.006	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.02	Org-022/025	<0.02	3	<0.02	<0.02	0	86	93
Methoxychlor	µg/L	0.02	Org-022/025	<0.02	3	<0.02	<0.02	0	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022/025	69	3	93	104	11	80	101

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: PFAS in water TRACE Extended				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-2
Date prepared	-			20/01/2021	1	20/01/2021	20/01/2021		20/01/2021	20/01/2021
Date analysed	-			21/01/2021	1	21/01/2021	21/01/2021		21/01/2021	21/01/2021
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	<0.0004	1	<0.0004	<0.0004	0	97	116
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	105	107
Perfluorohexanesulfonic acid	µg/L	0.0002	Org-029	<0.0002	1	0.001	0.001	0	102	101
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	96	96
Perfluorooctanesulfonate PFOS	µg/L	0.0002	Org-029	<0.0002	1	0.0020	0.0020	0	101	104
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	78	74
Perfluorobutanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	98	103
Perfluoropentanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	106	125
Perfluorohexanoic acid	µg/L	0.0004	Org-029	<0.0004	1	0.0008	0.0009	12	95	88
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	<0.0004	1	0.0004	0.0004	0	99	114
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	1	0.0006	0.0005	18	97	103
Perfluorononanoic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	97	97
Perfluorodecanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	96	97
Perfluoroundecanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	96	95
Perfluorododecanoic acid	µg/L	0.005	Org-029	<0.005	1	<0.005	<0.005	0	89	91
Perfluorotridecanoic acid	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	64	90
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	101	88
4:2 FTS	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	107	120
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	1	<0.0004	<0.0004	0	103	113
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	1	<0.0004	<0.0004	0	98	101
10:2 FTS	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	82	99
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	99	102
N-Methyl perfluorooctane sulfonamide	µg/L	0.005	Org-029	<0.005	1	<0.005	<0.005	0	70	94
N-Ethyl perfluorooctanesulfon -amide	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	73	94
N-Me perfluorooctanesulfonamid -oethanol	µg/L	0.005	Org-029	<0.005	1	<0.005	<0.005	0	86	108
N-Et perfluorooctanesulfonamid -oethanol	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	88	102
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	90	97
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	88	94
Surrogate <sup>13</sup> C <sub>8</sub> PFOS	%		Org-029	100	1	97	104	7	101	102
Surrogate <sup>13</sup> C <sub>2</sub> PFOA	%		Org-029	96	1	100	99	1	100	100
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFBS	%		Org-029	97	1	86	83	4	106	83

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: PFAS in water TRACE Extended						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-2
Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS	%		Org-029	92	1	86	86	0	95	87
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS	%		Org-029	80	1	61	63	3	82	69
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFBA	%		Org-029	92	1	69	67	3	95	74
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFPeA	%		Org-029	99	1	80	78	3	100	81
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFHxA	%		Org-029	92	1	85	83	2	95	88
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFHpA	%		Org-029	94	1	81	81	0	96	83
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA	%		Org-029	89	1	78	78	0	88	80
Extracted ISTD <sup>13</sup> C <sub>5</sub> PFNA	%		Org-029	86	1	74	73	1	86	79
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDA	%		Org-029	75	1	59	62	5	76	72
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFUnDA	%		Org-029	58	1	46	46	0	56	53
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDoDA	%		Org-029	55	1	46	47	2	52	51
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFTeDA	%		Org-029	106	1	86	83	4	92	65
Extracted ISTD <sup>13</sup> C <sub>2</sub> 4:2FTS	%		Org-029	97	1	88	92	4	97	91
Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS	%		Org-029	103	1	90	94	4	99	87
Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS	%		Org-029	88	1	66	70	6	87	77
Extracted ISTD <sup>13</sup> C <sub>8</sub> FOSA	%		Org-029	66	1	42	41	2	63	52
Extracted ISTD d <sub>3</sub> N MeFOSA	%		Org-029	51	1	31	29	7	52	39
Extracted ISTD d <sub>5</sub> N EtFOSA	%		Org-029	47	1	33	31	6	46	42
Extracted ISTD d <sub>7</sub> N MeFOSE	%		Org-029	67	1	42	39	7	64	51
Extracted ISTD d <sub>9</sub> N EtFOSE	%		Org-029	66	1	46	45	2	67	54

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: PFAS in water TRACE Extended						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	255713-2
<i>Extracted ISTD d<sub>3</sub> N MeFOSAA</i>	%		Org-029	55	1	44	46	4	51	55
<i>Extracted ISTD d<sub>5</sub> N EtFOSAA</i>	%		Org-029	52	1	42	43	2	50	49

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: PFAS in water TRACE Extended				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	20/01/2021	20/01/2021		[NT]	[NT]
Date analysed	-			[NT]	11	21/01/2021	21/01/2021		[NT]	[NT]
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	[NT]	11	<0.0004	<0.0004	0	[NT]	[NT]
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Perfluorohexanesulfonic acid	µg/L	0.0002	Org-029	[NT]	11	<0.0002	<0.0002	0	[NT]	[NT]
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Perfluorooctanesulfonate PFOS	µg/L	0.0002	Org-029	[NT]	11	<0.0002	<0.0002	0	[NT]	[NT]
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	[NT]	11	<0.002	<0.002	0	[NT]	[NT]
Perfluorobutanoic acid	µg/L	0.002	Org-029	[NT]	11	<0.002	<0.002	0	[NT]	[NT]
Perfluoropentanoic acid	µg/L	0.002	Org-029	[NT]	11	<0.002	<0.002	0	[NT]	[NT]
Perfluorohexanoic acid	µg/L	0.0004	Org-029	[NT]	11	<0.0004	<0.0004	0	[NT]	[NT]
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	[NT]	11	<0.0004	<0.0004	0	[NT]	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	[NT]	11	0.0002	0.0002	0	[NT]	[NT]
Perfluorononanoic acid	µg/L	0.001	Org-029	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Perfluorodecanoic acid	µg/L	0.002	Org-029	[NT]	11	<0.002	<0.002	0	[NT]	[NT]
Perfluoroundecanoic acid	µg/L	0.002	Org-029	[NT]	11	<0.002	<0.002	0	[NT]	[NT]
Perfluorododecanoic acid	µg/L	0.005	Org-029	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
Perfluorotridecanoic acid	µg/L	0.01	Org-029	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	[NT]	11	<0.05	<0.05	0	[NT]	[NT]
4:2 FTS	µg/L	0.001	Org-029	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
6:2 FTS	µg/L	0.0004	Org-029	[NT]	11	<0.0004	<0.0004	0	[NT]	[NT]
8:2 FTS	µg/L	0.0004	Org-029	[NT]	11	<0.0004	<0.0004	0	[NT]	[NT]
10:2 FTS	µg/L	0.002	Org-029	[NT]	11	<0.002	<0.002	0	[NT]	[NT]
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
N-Methyl perfluorooctane sulfonamide	µg/L	0.005	Org-029	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
N-Ethyl perfluorooctanesulfon -amide	µg/L	0.01	Org-029	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
N-Me perfluorooctanesulfonamid -oethanol	µg/L	0.005	Org-029	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
N-Et perfluorooctanesulfonamid -oethanol	µg/L	0.05	Org-029	[NT]	11	<0.05	<0.05	0	[NT]	[NT]
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	[NT]	11	<0.002	<0.002	0	[NT]	[NT]
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	[NT]	11	<0.002	<0.002	0	[NT]	[NT]
Surrogate <sup>13</sup> C <sub>8</sub> PFOS	%		Org-029	[NT]	11	96	102	6	[NT]	[NT]
Surrogate <sup>13</sup> C <sub>2</sub> PFOA	%		Org-029	[NT]	11	100	95	5	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFBS	%		Org-029	[NT]	11	87	80	8	[NT]	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: PFAS in water TRACE Extended						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS	%		Org-029	[NT]	11	89	83	7	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS	%		Org-029	[NT]	11	73	67	9	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFBA	%		Org-029	[NT]	11	89	86	3	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>3</sub> PFPeA	%		Org-029	[NT]	11	88	86	2	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFHxA	%		Org-029	[NT]	11	92	89	3	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFHpA	%		Org-029	[NT]	11	88	83	6	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA	%		Org-029	[NT]	11	85	84	1	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>5</sub> PFNA	%		Org-029	[NT]	11	83	78	6	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDA	%		Org-029	[NT]	11	70	60	15	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFUnDA	%		Org-029	[NT]	11	52	42	21	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFDoDA	%		Org-029	[NT]	11	48	38	23	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>2</sub> PFTeDA	%		Org-029	[NT]	11	95	95	0	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>2</sub> 4:2FTS	%		Org-029	[NT]	11	90	92	2	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS	%		Org-029	[NT]	11	94	91	3	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS	%		Org-029	[NT]	11	79	77	3	[NT]	[NT]
Extracted ISTD <sup>13</sup> C <sub>8</sub> FOSA	%		Org-029	[NT]	11	57	52	9	[NT]	[NT]
Extracted ISTD d <sub>3</sub> N MeFOSA	%		Org-029	[NT]	11	47	41	14	[NT]	[NT]
Extracted ISTD d <sub>5</sub> N EtFOSA	%		Org-029	[NT]	11	51	42	19	[NT]	[NT]
Extracted ISTD d <sub>7</sub> N MeFOSE	%		Org-029	[NT]	11	61	48	24	[NT]	[NT]
Extracted ISTD d <sub>9</sub> N EtFOSE	%		Org-029	[NT]	11	66	57	15	[NT]	[NT]

Client Reference: EEC20078.004 - Fremantle Traffic Bridge

QUALITY CONTROL: PFAS in water TRACE Extended						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
<i>Extracted ISTD d<sub>3</sub> N MeFOSAA</i>	%		Org-029	[NT]	11	45	38	17	[NT]	[NT]
<i>Extracted ISTD d<sub>5</sub> N EtFOSAA</i>	%		Org-029	[NT]	11	47	37	24	[NT]	[NT]

**Result Definitions**

<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
<b>RPD</b>	Relative Percent Difference
<b>LCS</b>	Laboratory Control Sample
<b>NS</b>	Not specified
<b>NEPM</b>	National Environmental Protection Measure
<b>NR</b>	Not Reported

## Quality Control Definitions

<b>Blank</b>	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
<b>Matrix Spike</b>	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
<b>LCS (Laboratory Control Sample)</b>	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
<b>Surrogate Spike</b>	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

## Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

## Report Comments

# Low (or high) spike recovery was obtained for this sample. Sample matrix interference is suspected. However, an acceptable recovery was achieved for the LCS.

#1-10: TRHC6-C10/BTEX: PQL has been raised as the sample/s were foamy and required dilution.

Chlorophyll a and Phaeophytin a analysis conducted by Marine and Freshwater Research Laboratory. Report MPL21-3.

PFAS analysis conducted by Envirolab Services. Report 259528.

For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

EtFOSA Internal Standard is outside of global acceptance criteria (50-150%) for (LCS and/or MB) but within analyte specific acceptance criteria.



## DATA QUALITY ASSESSMENT SUMMARY

### Report Details

Envirolab Report Reference	<b>255713</b>
Client ID	RPS Australia West Pty Ltd
Project Reference	EEC20078.004 - Fremantle Traffic Bridge
Date Issued	02/02/2021

### QC DATA

All laboratory QC data was within the Envirolab Group's specifications except:

### QC Specification Exceptions

QC Type	Reference	Analysis	Comments
Precision (as %RPD)	255713-6	Zinc-Dissolved	80% RPD fails internal acceptance criteria
Spike Recovery %	255713-2	Aluminium-Total	Fails internal acceptance criteria

See Report 255713-[R01] for QA/QC details



## HOLDING TIME COMPLIANCE EVALUATION

All preservation / holding times (based on AS/ASPHA/ISO/NEPM/USEPA reference documents and standards) are compliant except:

Holding Time Exceedances					
Analysis	Sample No	Date Sampled	Date Extracted	Date Analysed	Accepted
<b>Chlorophyll a &amp; Phaeophytin a</b>					
Chlorophyll a	255713-1	13/01/2021			##
Phaeophytin a	255713-1	13/01/2021			##
Chlorophyll a	255713-2	13/01/2021			##
Phaeophytin a	255713-2	13/01/2021			##
Chlorophyll a	255713-3	13/01/2021			##
Phaeophytin a	255713-3	13/01/2021			##
Chlorophyll a	255713-4	13/01/2021			##
Phaeophytin a	255713-4	13/01/2021			##
Chlorophyll a	255713-5	13/01/2021			##
Phaeophytin a	255713-5	13/01/2021			##
Chlorophyll a	255713-6	13/01/2021			##
Phaeophytin a	255713-6	13/01/2021			##
Chlorophyll a	255713-7	13/01/2021			##
Phaeophytin a	255713-7	13/01/2021			##
Chlorophyll a	255713-8	13/01/2021			##
Phaeophytin a	255713-8	13/01/2021			##
Chlorophyll a	255713-9	13/01/2021			##
Phaeophytin a	255713-9	13/01/2021			##
Chlorophyll a	255713-10	13/01/2021			##
Phaeophytin a	255713-10	13/01/2021			##

## Holding Table Comments

## No Extract or Analysed Dates were provided. Holding Times cannot be calculated.

Certain analyses have had their recommended technical holding times elongated by filtering and/or freezing on receipt at the laboratory (e.g. BOD, chlorophyll/Phaeophytin, nutrients and acid sulphate soil tests).



### **COMPLIANCE TO QC FREQUENCY (NEPM)**

Internal laboratory QC rate complies with NEPM requirements (LCS/MB/MS 1 in 20, Duplicates 1 in 10 samples). Note, samples are batched together with other sample consignments in order to assign QC sample frequency.

<b>QC Evaluation</b>	
<b>Duplicate(s) was performed as per NEPM frequency</b>	✓
<b>Laboratory Control Sample(s) were analysed with the samples received</b>	✓
<b>A Method Blank was performed with the samples received</b>	✓
<b>Matrix spike(s) was performed as per NEPM frequency (Not Applicable for Air samples)</b>	✓

*Refer to Certificate of Analysis for all Quality Control data.*

# MEMO

Date: 3 February 2021  
Regarding: Surface Water Quality – Event #6 summary

## Appendix C

Surface water sampling logs











