

MEMO

Date: 30 October 2020
 To: Andrew Grime (Arup Senior Engineer)
 From: Zak Langtry
 Pages: 8 inc. this page (excluding attachments)
 Regarding: Surface water quality – Event 3 summary

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Fremantle Swan River Crossing – Surface Water Quality Monitoring Event #3

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. The sampling program is initially scoped to be undertaken monthly for five months. This memo provides details on the surface water monitoring Event #3, completed in October 2020.

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. Background location WS-5 was sampled during Event #3.

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

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.

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 – this round
Event - 4	WS1-WS5	November 2020	-	TBC
Event - 5	WS1-WS5	December 2020	-	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.
- 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 (SO₄²⁻), chloride (Cl⁻), fluoride (F⁻), alkalinity (hydroxide OH⁻, carbonate CO₃²⁻, bicarbonate HCO₃⁻).
- Major cations: sodium, potassium, calcium, magnesium.
- Nutrients: total and reactive phosphorus, total nitrogen, total Kjeldahl nitrogen (TKN), total ammonia (NH₄-N + NH₃-N), nitrates and nitrites (NO_x-N).
- Sulfide (S²⁻)
- 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.

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 level¹
 - Recreational Water
- Treatment and management of soil and water in acid sulfate soil landscapes (DER, June 2015b).

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

- Guideline levels for ASS surface water quality (ASS)

Site conditions

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

Table 3: Site conditions

Items	Commentary
Weather conditions (during sampling event)	Overcast, with south-west winds 10-20 km/h, maximum temperature of 23°C.
Rainfall (noted during the previous week)	A total of 5.2 mm of rain was measured at the Perth Station (Number: 9225) in the week prior to sampling
Tide condition and direction	<ul style="list-style-type: none"> • Incoming tide. • Closest peak: <ul style="list-style-type: none"> – Low tide (9:41 am / 0.60 m) – High tide (11:39 pm / 0.99 m)
Fremantle Port and Swan River vessel activities	<ul style="list-style-type: none"> • WS1: Low general harbour / river traffic during sampling. • WS2: Low general harbour / river traffic during sampling. • WS3: Low general harbour / river traffic during sampling. • WS4: Two tugboats located adjacent to sampling location on small craft jetty. Large cargo ships being escorted out of the port during sampling. A rescue boat was dumping water on opposite side of jetty during sampling. Low general river traffic during sampling. • WS5: Low general boat traffic. A total of seven private boats were moored adjacent to the sampling location.

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	17.6	8.25	52,200	134.2	106
WS1-D	3.00	17.5	8.29	53,399	131.4	104
WS2-S	1.00	17.4	8.16	49,541	93.9	102
WS2-D	3.50	17.3	8.23	50,511	97.4	100
WS3-S	0.15	18.1	8.29	52,289	131.8	115
WS4-S	1.00	17.2	7.82	49,672	55.0	95
WS4-D	3.00	17.2	8.04	50,044	63.2	98
WS5-S	1.00	17.6	8.24	49,470	118.4	108
WS5-D	6.50	17.4	8.30	52,146	117.4	109

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:
 - pH and redox marginally increased with depth at all locations except redox at WS1 and WS5 that were profiled.
- Guideline exceedances:
 - DO percentage saturation (% sat) exceeded the MWG (90-110 %sat) in one of the nine samples collected WS3-S (115 % sat).

Acid sulfate soil parameters

Acid sulfate soil (ASS) parameters observed during Event #3 can be summarised as follows:

- Total acidity was significantly below the ASS guideline (>40 mg/L) in all samples and ranged from 6 mg/L at WS2-S to 8 mg/L (WS4-S and WS4-D). Concentrations were consistent with previous events.
- Sulfide concentrations marginally exceeded the ASS guideline (>0.5 mg/L) in all samples except for two samples (WS4-D and WS5-S) with a mean of 0.6 and a maximum of 0.9 mg/L (WS5-D). These concentrations are comparable to Event #1 and marginally higher than Event #2 and are considered consistent with baseline water quality at the mouth of the Swan River.
- Sulfate concentrations exceeded the recreational water guideline (500 mg/L) in all locations with a mean of 2,378 mg/L and a maximum of 2,500 mg/L (WS1-D). 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 120 mg/L observed. All results were consistent with previous events.

Solids

- TDS concentrations ranged from 34,000 mg/L (WS2-S) to 37,000 mg/L (WS1-S, WS1-D and WS3-S). All results were consistent with previous events.
- TSS was below LOR (<5 mg/L) in all locations except for WS3-S (33 mg/L). The relatively high TSS at WS3-S was likely caused by sediment disturbance during sampling.
- With exception of WS3-S, turbidity results were relatively consistent over the remaining eight locations and ranged from 0.3 to 0.6 NTU². WS3-S turbidity concentration was higher (1.6 NTU) and potentially due to sediment disturbance during sample collection. All results however were consistent with previous events.

Nutrients

Nutrient analytical results observed during Event #3 can be summarised as follows:

- Total phosphorus (TP) concentrations marginally exceeded the MWG (0.03 mg/L) in five of the nine samples collected during Event #3. Concentrations ranged from 0.03 mg/L (WS1-S, WS4-S, WS4-D and WS5-D) to 0.05 mg/L (WS3-S) with a mean of 0.037 mg/L observed across all locations. These results are marginally higher than Event #2.
- Reactive phosphorus (RP) marginally exceeded the MWG (0.005 mg/L) in three of the nine samples collected; WS1-S (0.007 mg/L), WS3-S (0.006 mg/L) and WS5-D (0.006 mg/L). The remaining samples were equal to (WS1-D) or below the LOR (0.005 mg/L). All results were consistent with previous events.

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

- All other nitrogen and phosphorus species were below relevant MWG and RWG assessment criteria.

Chlorophyll

All Chlorophyll "A" sample results were significantly below the MWG (0.003 mg/L) with a concentration range of 0.0008 mg/L (WS1-D) to 0.0019 mg/L (WS2-S and WS3-S) observed.

Low concentrations of Phaeophytin "A" were detected within all surface water samples with concentrations ranging from 0.0004 mg/L (WS1-D) to 0.0009 mg/L (WS3-S).

Results were generally consistent with previous events.

Metals and metalloids

Metal analytical results observed during Event #3 can be summarised as follows:

- Dissolved metals:
 - Concentrations of copper marginally exceeded the MWG (0.0013 mg/L) at two locations; WS2-S (0.002 mg/L) and WS5-S (0.002 mg/L).
 - With the exception of arsenic, molybdenum, silicon, zinc and to a lesser extent silver, all analysed dissolved metals were below their relevant LOR and relevant guidelines
 - All results were relatively consistent with previous events.
- Total metals:
 - Total aluminium concentrations were below the LOR (0.02 mg/L) in all samples except for two locations: WS1-D and WS3-S (both 0.02 mg/L).
 - Total iron concentrations were below the LOR (0.02 mg/L) in all samples except two: WS1-D (0.02 mg/L) and WS3-S (0.2 mg/L). The total iron concentration at WS3-S was higher than the concentration during Event #2 (0.08 mg/L) however it is still significantly below the MWG (1 mg/L).
 - All results were relatively consistent with previous events.

Hydrocarbons

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

Pesticides

All organochlorine pesticides results were below their relevant LOR in all samples analysed.

PFAS

PFAS analytical results observed during Event #3 can be summarised as follows:

- Perfluorooctanesulfonate (PFOS) exceeded the 99% species protection MWG (0.00023 µg/L) in all samples, ranging from 0.0020 µg/L (WS1-D) to 0.0038 µg/L (WS2-S) with a mean of 0.0029 µg/L. The mean in Event #3 was consistent with the Event #2 mean (0.0028 µg/L). However, all concentrations were still significantly below the 95% species protection guideline (0.13 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.

- Total PFAS were relatively consistent between all locations and ranged from 0.0041 µg/L (WS1-D) to 0.0095 µg/L (WS2-S) with a mean of 0.0071 µg/L observed. These results are consistent with the Event #2 mean (0.0070 mg/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 108 of the 118 (92%) 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.
- Six of the 11 duplicate RPD failures are 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.
- The remaining five exceedances were considered significant as the concentration of either the primary or duplicate sample was greater than 5 x LOR. The discrepancies may have been caused by minor variations in the surface water composition caused by sediment disturbance during sampling. Of the five exceedances RPS considered significant, four had duplicate sample concentrations higher than the primary sample. RPS has adopted a conservative approach and has used the higher concentration in our assessment of water quality. In addition, it is noted that all results are significantly below relevant guidelines and as such the RPD failures are not considered to have affected the validation assessment.
- Concentrations for all analytes in the rinsate, field and trip blanks were below their respective LORs.
- All internal laboratory QAQC procedures (method blanks, matrix spikes, laboratory control standards, internal duplicates) were within acceptable limits.
- All samples were analysed within the recommended holding time for each analyte with the exception of Chlorophyll "A" and Phaeophytin "A" which states that no extract or analysis dates were 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 #3 was completed on 7 October 2020. Samples were collected from all five of the sampling locations (Figure A). With the exception of WS3, a shallow and deep sample were collected at each sampling point utilising the defined Niskin flask methodology. 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 the field and ASS parameters assessment criteria were noted (DO and sulfide), however, these conditions are consistent with the marine environment present at the mouth of the Swan River.

Copper concentrations marginally exceeded the MWG in two samples: WS1-D and WS3-S, during Event #3. All other metal, hydrocarbon and OCP concentrations were below adopted guidelines, with concentrations predominantly below their relevant LORs.

Minor exceedances of phosphorus (RP and TP) MWG were observed in seven of nine locations: WS1-S (RP), WS1-D (TP), WS2-S (TP), WS2-D (TP), WS3-S (RP and TP), WS5-S (TP) and WS5-D (RP) during Event #3. All nitrogen species were below relevant guidelines. All nutrient results were consistent with Event #2.

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 consistent with Event #2.

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



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Enc. Tables
 Figure A - Water quality sampling locations
 Appendix A – DBCA approval
 Appendix A – Laboratory reports
 Appendix B – 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), * value for hexavalent chromium, # duplicate value used due to RPD (%) failure

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 (milli 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

b) Values based on the sample having a pH ~8.2 (ANZECC/ARMCANZ 2000)

c) Values based on Australian 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-NH₃-N)

Denotes less than LOR

Sample ID	Date	Trigger	Field Parameters				Acid Sulfate Soil Parameters								ASS Ratios		Cations				Nutrients					Miscellaneous						
			pH	EC	Redox	DO	Total Acidity (CaCO ₃)	Total Alkalinity (CaCO ₃)	TDS	TSS	Turbidity	Sulfide	Sulfate	Chloride	Flouride	Acidity: Alkalinity	Sulfate: Chloride	Calcium	Magnesium	Potassium	Sodium	Total P	Reactive P	Total N	TKN ^e	NH ₃ -N	NO _x -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 ^a	0.005 ^a	0.75 ^a	-	0.62 ^b	0.045 ^a	-	0.003 ^a	-
WS1 - S	10/09/2020		8.18	50,919	80.4	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	134.2	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 - D	10/09/2020		8.20	50,935	90.9	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	131.4	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		
WS2-S	7/08/2020		8.70	50,710	181.4	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	93.9	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-D	7/08/2020		8.19	50,966	179.4	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	78.6	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	97.4	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		
WS3-S	10/09/2020		8.25	50,920	108.7	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	131.8	115	7	120	37,000	33 [#]	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		
WS4-S	7/08/2020		8.27	50,809	106.3	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	41.9	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-D	7/08/2020		8.27	50,996	108.4	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	63.2	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		
WS5-S	7/10/2020		8.24	49,470	118.4	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-D	7/10/2020		8.30	52,146	117.4	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		

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 used due to RPD (%) failure

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	Cobalt	Chromium	Copper	Iron	Mercury	Manganese	Molybdenum	Nickel	Lead	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	-	0.0001 ^a	-	-	-	0.0044	-	-	0.0014	-	-	1 ^b
		RWG	-	0.003 ^b	0.007 ^b	0.002 ^b	-	0.05 ^b	2 ^b	-	0.001 ^b	0.5 ^b	-	0.02 ^b	0.01 ^b	0.01 ^b	-	-	-	-	-
		ASS	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		LOR	0.01	0.002	0.001	0.0001	0.002	0.001	0.002	0.05	0.00005	0.001	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	<0.00005	<0.005	0.012	<0.001	<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	<0.00005	<0.005	0.012	<0.001	<0.001	<0.001	<0.5	0.00005	0.003	<0.02	0.02
WS1 - D	10/09/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	0.012	<0.001	<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	<0.00005	<0.005	0.012	<0.001	<0.001	<0.001	<0.5	<0.00005	0.002	0.02	<0.02
WS2-S	7/08/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.00005	<0.01	0.012	<0.002	<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	<0.00005	<0.005	0.012	<0.001	<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	0.002	<0.01	<0.00005	<0.005	0.011	<0.001	<0.001	<0.001	0.7	<0.00005	0.003	<0.02	<0.02
WS2-D	7/08/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.00005	<0.01	0.012	<0.002	<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	<0.00005	<0.005	0.012	<0.001	<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	<0.00005	<0.005	0.012	<0.001	<0.001	<0.001	0.7	<0.00005	0.003	<0.02	<0.02
WS3-S	10/09/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	0.012	<0.001	<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	<0.01	<0.00005	<0.005	0.013	<0.001	<0.001	<0.001	<0.5	<0.00005	0.003	0.02	0.2
WS4-S	7/08/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.00005	<0.01	0.012	<0.002	<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	<0.01	<0.00005	<0.005	0.012	<0.001	<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	<0.01	<0.00005	<0.005	0.012	<0.001	<0.001	<0.001	0.6	<0.00005	0.003	<0.02	<0.02
WS4-D	7/08/2020		<0.02	<0.002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.02	<0.00005	<0.01	0.012	<0.002	<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	<0.01	<0.00005	<0.005	0.012	<0.001	<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	<0.01	<0.00005	<0.005	0.012	<0.001	<0.001	<0.001	0.6	<0.00005	0.003	<0.02	<0.02
WS5-S	7/10/2020		<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	0.002	<0.01	<0.00005	<0.005	0.024	<0.001	<0.001	<0.001	0.8	<0.00005	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	<0.01	<0.00005	<0.005	0.012	<0.001	<0.001	<0.001	<0.5	<0.00005	0.002	<0.02	<0.02

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										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 perfluorooctane sulfonamide	N-Me perfluorooctanesulfonamid- oethanol	N-Et perfluorooctanesulfonamid- oethanol	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 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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WS1 - S	10/09/2020		0.0004	<0.001	0.0020	<0.001	0.0030	<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	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	0.005	0.0036	0.0074	
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	<0.002	<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	0.0041	0.0026	0.0054	
WS1 - D	10/09/2020		<0.0004	<0.001	0.0020	<0.001	0.0026	<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	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<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	<0.002	0.0007	<0.0004	0.0004	<0.001	<0.002	<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	0.003	0.0024	0.0041	
WS2-S	7/08/2020		<0.0004	<0.001	0.0004	<0.001	0.0006	<0.002	<0.002	<0.002	<0.0004	<0.0004	0.0002	<0.001	<0.002	<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	0.001	0.0008	0.001	
WS2-S	10/09/2020		<0.0004	<0.001	0.0020	<0.001	0.0024	<0.002	<0.002	<0.002	0.001	0.0004	0.0005	<0.001	<0.002	<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	0.0044	0.0029	0.0063	
WS2-S	7/10/2020		0.0006	<0.001	0.0027	<0.001	0.0038	<0.002	<0.002	<0.002	0.001	0.0006	0.0008	<0.001	<0.002	<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	0.0065	0.0046	0.0095	
WS2-D	7/08/2020		<0.0004	<0.001	0.0005	<0.001	0.0005	<0.002	<0.002	<0.002	<0.0004	<0.0004	0.0002	<0.001	<0.002	<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	0.001	0.0007	0.001	
WS2-D	10/09/2020		<0.0004	<0.001	0.0020	<0.001	0.0022	<0.002	<0.002	<0.002	0.001	0.0005	0.0006	<0.001	<0.002	<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	0.0042	0.0028	0.0063	
WS2-D	7/10/2020		0.0004	<0.001	0.0024	<0.001	0.0035	<0.002	<0.002	<0.002	0.001	0.0006	0.0008	<0.001	<0.002	<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	0.0059	0.0043	0.0087	
WS3-S	10/09/2020		0.0005	<0.001	0.0030	<0.001	0.0044	<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	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<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	<0.002	0.0007	<0.0004	0.0005	<0.001	<0.002	<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	0.0048 [#]	0.0026	0.0061 [#]	
WS4-S	7/08/2020		<0.0004	<0.001	0.0004	<0.001	0.0006	<0.002	<0.002	<0.002	<0.0004	<0.0004	0.0002	<0.001	<0.002	<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	0.001	0.0008	0.001	
WS4-S	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	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	0.0045	0.0031	0.0065	
WS4-S	7/10/2020		0.0005	<0.001	0.0025	<0.001	0.0037	<0.002	<0.002	<0.002	0.001	0.0006	0.0008	<0.001	<0.002	<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	0.0062	0.0045	0.0091	
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	<0.0002	<0.001	<0.002	<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	0.0006	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	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<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	<0.01	<0.005	<0.01	<0.005	<0.05	<0.002	<0.002	<0.001	<0.0004	<0.0004	<0.002	0.006	0.0042	0.0087	
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	<0.002	<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	0.006	0.0042	0.0086	
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	<0.002	<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	0.0042	0.0027	0.0055	

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 ₃ -N	NO _x -N	Dissolved Organic Carbon (DOC)	Chlorophyll "a"	Phaeophytin "a"	Silicon
				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	mg/L
LOR	1	1	10	5	0.1	0.1	1	1	0.1	1	1	1	1	0.01	0.01	0.1	0.1	0.01	0.01	1	0.0001	0.0002	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	0.093	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	0.091	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	0.191	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	0.192	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	0.182	0.018	0.043	1	0.0019	0.0009	<5
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	0.095	<0.005	<0.005	1	0.0011	0.0008	<5
RPD %				0	8	0	122	56	13	0	0	0	2	0	3	0	0	18	67	63	113	158	0	53	12	0

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	Cobalt	Chromium	Copper	Iron	Mercury	Manganese	Molybdenum	Nickel	Lead	Selenium	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
			LOR	0.01	0.001	0.001	0.0001	0.002	0.001	0.02	0.05	0.00005	0.001	0.001	0.001	0.001	0.01	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	<0.02	<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	<0.02	<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	8	0	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	<0.01	<0.00005	<0.005	0.012	<0.001	<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	<0.01	<0.00005	<0.005	0.013	<0.001	<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	
WS3-S	Primary	10/09/2020	---	<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.00005	<0.005	0.013	<0.001	<0.001	<0.001	<0.00005	0.003	0.02	0.04
WZ1	Duplicate		---	<0.01	<0.001	0.002	<0.0001	<0.001	<0.001	0.001	<0.01	<0.00005	<0.005	0.012	<0.001	<0.001	<0.001	<0.00005	0.004	<0.02	0.2
RPD %			---	0	0	0	0	0	0	0	0	0	0	8	0	0	0	29	0	133	

Table J
Surface Water QAQC Results (RPD Assessment): Per- and Poly-Fluoroalkyl Substances

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	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	Perfluorodecanesulfonic 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- eoethanol	N-Et perfluorooctanesulfonamide- eoethanol	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 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
			LOR	0.0004	0.001	0.0002	0.001	0.0002	0.002	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	0.002	0.002	0.001	0.0004	0.0004	0.002	0.002	0.0002	0.0002	0.0002
WS2-S	Primary	7/08/2020		<0.0004	<0.001	0.0005	<0.001	0.0005	<0.002	<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	0.001	0.0007	0.001
WZ1	Duplicate			<0.0004	<0.001	0.0004	<0.001	0.0006	<0.002	<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	0.001	0.0008	0.001
	RPD %			0	0	22	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0
WS1-S	Primary	10/09/2020		0.0004	<0.001	0.002	<0.001	0.003	<0.002	<0.002	<0.002	0.001	0.0004	0.0006	<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	0.005	0.0036	0.0074
WZ1	Duplicate			<0.0004	<0.001	0.002	<0.001	0.0026	<0.002	<0.002	<0.002	0.001	<0.0004	0.0005	<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	0.0046	0.0031	0.0061
	RPD %			0	0	0	0	14	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	15	19		
WS1-S	Primary	10/09/2020		<0.0004	<0.001	0.001	<0.001	0.0021	<0.002	<0.002	<0.002	0.0007	<0.0004	0.0005	<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	0.0031	0.0026	0.0043
WZ1	Duplicate			<0.0004	<0.001	0.002	<0.001	0.0028	<0.002	<0.002	<0.002	0.0009	<0.0004	0.0004	<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	0.0048	0.0032	0.0061
	RPD %			0	0	67	0	29	0	0	25	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	21	35			

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	Cobalt	Chromium	Copper	Iron	Mercury	Manganese	Molybdenum	Nickel	Lead	Selenium	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
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	0.00005	0.001	0.01	0.01	0.01	0.1			
Rinsates																							
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	7/09/2020		<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	<0.02	<0.1	
Field Blank																							
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	

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	α-BHC	β-BHC	δ-BHC	γ-BHC (Lindane)	α-Chlordane	γ-Chlordane	DDD	DDE	DDT	DDD + DDE + DDT	Dieldrin	α-Endosulfan	β-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	mg/L
			LOR	0.00001	0.00005	0.00005	0.00005	0.00005	0.00001	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
Rinsates																								
WR1	Water	7/08/2020	---	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<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	<0.00001	<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	<0.00001	<0.00006	<0.00003	<0.00001	<0.00002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002
Field Blank																								
WB1	Water	7/08/2020	---	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<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	<0.00001	<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	<0.00001	<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	Perfluorodecenesulfonic 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 perfluorooctanesulfonamid- oethanol	N-Et perfluorooctanesulfonamid- oethanol	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 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
Rinsates																																		
WR1	Water	7/08/2020	---	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<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	<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	
Field Blank																																		
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	
Trip-Blank																																		
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	

FIGURE

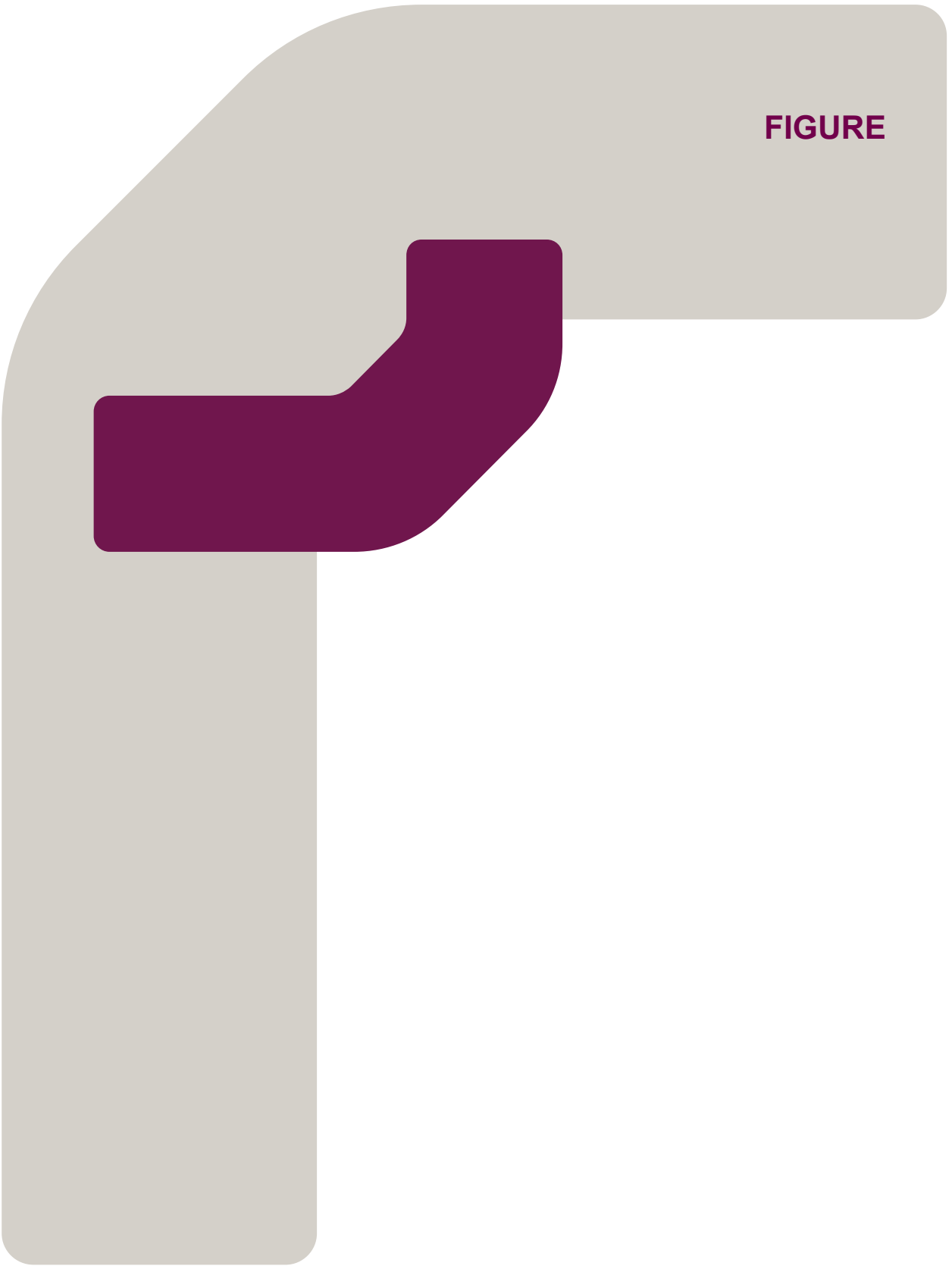
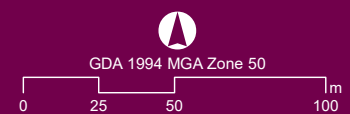





Figure A
Swan River crossing
Water quality sampling locations

Document Path: G:\Jobs\C_Jobs\C20078 - MRWA SR Bridge\Figures C20078-004\C20078-004_G_001_Fig A Proposed WQ Sampling_200629.mxd



Job Number: C20078-004
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 Date: 29.06.20
 Scale: 1:2,500 @ A3
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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: Authorised works, acts or activities: Location of works, acts or activities: Approval date: Expiry date: **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.



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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.
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;
 - 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



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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. 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

Appendix B
Laboratory reports



CERTIFICATE OF ANALYSIS 251294

Client Details

Client	RPS Australia West Pty Ltd
Attention	Zac Langtry
Address	Level 2, 27-31 Troode St, WEST PERTH, WA, 6005

Sample Details

Your Reference	<u>EEC20078.004 - Fremantle Traffic Bridge</u>
Number of Samples	13 Water
Date samples received	07/10/2020
Date completed instructions received	08/10/2020

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

Date results requested by 22/10/2020

Date of Issue 20/10/2020

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

Heram Halim, Operations Manager
Michael Kubiak, Laboratory Manager
Travis Carey, Organics - Team Leader

Authorised By

Michael Kubiak, Laboratory Manager

Miscellaneous Inorganics							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Date analysed	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Total Dissolved Solids (grav)	mg/L	5	37,000	37,000	34,000	35,000	37,000
Total Suspended Solids	mg/L	5	<5	<5	<5	<5	8
Turbidity	NTU	0.1	0.4	0.5	0.6	0.5	1.6
Dissolved Organic Carbon	mg/L	1	2	2	2	2	1
Acidity as CaCO ₃	mg/L	5	7	7	6	7	7
Sulphide in water*	mg/L	0.5	0.6	0.6	0.7	0.6	0.8
Fluoride	mg/L	0.1	<5	<5	<5	<5	<5

Miscellaneous Inorganics							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Date analysed	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Total Dissolved Solids (grav)	mg/L	5	36,000	35,000	35,000	36,000	37,000
Total Suspended Solids	mg/L	5	<5	<5	<5	<5	33
Turbidity	NTU	0.1	0.3	0.4	0.3	0.4	0.9
Dissolved Organic Carbon	mg/L	1	2	2	2	2	1
Acidity as CaCO ₃	mg/L	5	8	8	7	7	7
Sulphide in water*	mg/L	0.5	0.8	<0.5	<0.5	0.9	0.7
Fluoride	mg/L	0.1	<5	<5	<5	<5	<5

Miscellaneous Inorganics				
Our Reference			251294-11	251294-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			07/10/2020	07/10/2020
Type of sample			Water	Water
Date prepared	-		08/10/2020	08/10/2020
Date analysed	-		08/10/2020	08/10/2020
Turbidity	NTU	0.1	<0.1	<0.1

Chlorophyll a & Phaeophytin a							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Chlorophyll a	µg/L	0.1	0.9	0.8	1.9	1.7	1.9
Phaeophytin a	µg/L	0.2	0.5	0.4	0.6	0.6	0.9

Chlorophyll a & Phaeophytin a							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Chlorophyll a	µg/L	0.1	1.6	1.5	1.6	1.1	1.1
Phaeophytin a	µg/L	0.2	0.7	0.6	0.5	0.6	0.8

Ionic Balance							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Date analysed	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Calcium - Dissolved	mg/L	0.5	400	420	380	400	420
Potassium - Dissolved	mg/L	0.5	380	400	360	380	400
Magnesium - Dissolved	mg/L	0.5	1,300	1,300	1,200	1,200	1,300
Sodium - Dissolved	mg/L	0.5	10,000	11,000	9,700	10,000	11,000
Bicarbonate HCO ₃ as CaCO ₃	mg/L	5	120	120	120	120	120
Carbonate CO ₃ ²⁻ as CaCO ₃	mg/L	5	<5	<5	<5	<5	<5
Hydroxide OH ⁻ as CaCO ₃	mg/L	5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	5	120	120	120	120	120
Chloride	mg/L	1	17,000	18,000	17,000	17,000	18,000
Sulphate	mg/L	1	2,300	2,500	2,300	2,400	2,400
Ionic Balance	%		4.0	4.1	2.6	2.6	4.8
Hardness as CaCO ₃	mg/L	3	6,200	6,500	5,800	6,100	6,400

Ionic Balance							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Date analysed	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Calcium - Dissolved	mg/L	0.5	390	410	410	420	410
Potassium - Dissolved	mg/L	0.5	370	390	390	400	390
Magnesium - Dissolved	mg/L	0.5	1,200	1,300	1,300	1,300	1,300
Sodium - Dissolved	mg/L	0.5	10,000	10,000	10,000	11,000	11,000
Bicarbonate HCO ₃ as CaCO ₃	mg/L	5	120	120	120	120	130
Carbonate CO ₃ ²⁻ as CaCO ₃	mg/L	5	<5	<5	<5	<5	<5
Hydroxide OH ⁻ as CaCO ₃	mg/L	5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	5	120	120	120	120	130
Chloride	mg/L	1	17,000	18,000	18,000	17,000	18,000
Sulphate	mg/L	1	2,300	2,400	2,400	2,400	2,400
Ionic Balance	%		2.6	3.1	3.5	6.5	4.8
Hardness as CaCO ₃	mg/L	3	6,000	6,300	6,300	6,500	6,400

Nutrients in Water							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Date analysed	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Total Nitrogen	mg/L	0.1	0.2	0.1	0.2	0.3	0.2
NOx as N	mg/L	0.005	<0.005	0.007	0.017	0.022	0.043
Ammonia as N	mg/L	0.005	<0.005	0.006	<0.005	<0.005	0.018
Total Phosphorus	mg/L	0.01	0.03	0.04	0.04	0.04	0.05
Phosphate as P	mg/L	0.005	0.007	0.005	<0.005	<0.005	0.006

Nutrients in Water							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Date analysed	-		08/10/2020	08/10/2020	08/10/2020	08/10/2020	08/10/2020
Total Nitrogen	mg/L	0.1	0.2	0.1	0.2	0.1	0.1
NOx as N	mg/L	0.005	0.007	0.010	0.015	<0.005	<0.005
Ammonia as N	mg/L	0.005	0.006	0.006	<0.005	0.006	<0.005
Total Phosphorus	mg/L	0.01	0.03	0.03	0.04	0.03	0.05
Phosphate as P	mg/L	0.005	<0.005	<0.005	<0.005	0.006	0.005

Total Metals in water							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date digested	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Aluminium-Total	mg/L	0.01	<0.02	0.02	<0.02	<0.02	0.02
Iron-Total	mg/L	0.01	0.02	<0.02	<0.02	<0.02	0.04

Total Metals in water							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date digested	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Aluminium-Total	mg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02
Iron-Total	mg/L	0.01	<0.02	<0.02	0.02	<0.02	0.20

Total Metals in water				
Our Reference			251294-11	251294-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			07/10/2020	07/10/2020
Type of sample			Water	Water
Date digested	-		09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020
Aluminium-Total	mg/L	0.01	<0.01	<0.01
Iron-Total	mg/L	0.01	<0.02	<0.02

Dissolved Metals in Water							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Silver-Dissolved Ultra Low	mg/L	0.00005	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Aluminium-Dissolved	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic-Dissolved	mg/L	0.001	0.002	0.002	0.001	0.002	0.002
Cadmium-Dissolved	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper-Dissolved	mg/L	0.001	0.001	<0.001	0.002	0.001	<0.001
Iron-Dissolved	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury-Dissolved	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Manganese-Dissolved	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum-Dissolved	mg/L	0.001	0.012	0.012	0.011	0.012	0.013
Nickel-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc-Dissolved	mg/L	0.001	0.003	0.002	0.003	0.003	0.003
Silicon - Dissolved	mg/L	0.1	<0.5	<0.5	0.7	0.7	<0.5

Dissolved Metals in Water							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Silver-Dissolved Ultra Low	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Aluminium-Dissolved	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic-Dissolved	mg/L	0.001	0.001	0.001	0.002	0.002	0.002
Cadmium-Dissolved	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper-Dissolved	mg/L	0.001	0.001	0.001	0.002	<0.001	0.001
Iron-Dissolved	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury-Dissolved	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Manganese-Dissolved	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum-Dissolved	mg/L	0.001	0.012	0.012	0.024	0.012	0.012
Nickel-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc-Dissolved	mg/L	0.001	0.003	0.003	0.004	0.002	0.004
Silicon - Dissolved	mg/L	0.1	0.6	0.6	0.8	<0.5	<0.5

Dissolved Metals in Water				
Our Reference			251294-11	251294-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			07/10/2020	07/10/2020
Type of sample			Water	Water
Date prepared	-		09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020
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			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
TRH C ₆ - C ₉	µg/L	10	<50	<50	<50	<50	<50
TRH C ₆ - C ₁₀	µg/L	10	<50	<50	<50	<50	<50
TRH C ₆ -C ₁₀ 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	%		97	96	96	95	98
Surrogate toluene-d8	%		96	97	96	96	97
Surrogate 4-BFB	%		95	94	93	94	95

vTRH(C6-C10)/MBTEXN in water							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
TRH C ₆ - C ₉	µg/L	10	<50	<50	<50	<50	<50
TRH C ₆ - C ₁₀	µg/L	10	<50	<50	<50	<50	<50
TRH C ₆ -C ₁₀ 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	%		98	95	96	93	96
Surrogate toluene-d8	%		97	95	98	97	98
Surrogate 4-BFB	%		95	94	94	93	92

vTRH(C6-C10)/MBTEXN in water					
Our Reference			251294-11	251294-12	251294-13
Your Reference	UNITS	PQL	WR1	WB1	WTB1
Date Sampled			07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water
Date analysed	-		09/10/2020	09/10/2020	09/10/2020
TRH C ₆ - C ₉	µg/L	10	<10	<10	<10
TRH C ₆ - C ₁₀	µg/L	10	<10	<10	<10
TRH C ₆ -C ₁₀ 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	%		96	96	92
Surrogate toluene-d8	%		96	97	97
Surrogate 4-BFB	%		96	95	96

svTRH(C10-C40) in water							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		13/10/2020	13/10/2020	13/10/2020	13/10/2020	13/10/2020
TRH C ₁₀ - C ₁₄	µg/L	50	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	100	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	100	<100	<100	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	50	<50	<50	<50	<50	<50
TRH >C ₁₀ -C ₁₆ less N (F2)	µg/L	50	<50	<50	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	100	<100	<100	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	100	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%		104	86	93	96	90

svTRH(C10-C40) in water							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		13/10/2020	13/10/2020	13/10/2020	13/10/2020	13/10/2020
TRH C ₁₀ - C ₁₄	µg/L	50	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	100	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	100	<100	<100	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	50	<50	<50	<50	<50	<50
TRH >C ₁₀ -C ₁₆ less N (F2)	µg/L	50	<50	<50	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	100	<100	<100	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	100	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%		90	92	86	88	90

svTRH(C10-C40) in water				
Our Reference			251294-11	251294-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			07/10/2020	07/10/2020
Type of sample			Water	Water
Date extracted	-		09/10/2020	09/10/2020
Date analysed	-		13/10/2020	13/10/2020
TRH C ₁₀ - C ₁₄	µg/L	50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	50	<50	<50
TRH >C ₁₀ -C ₁₆ less N (F2)	µg/L	50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	100	<100	<100
Surrogate o-Terphenyl	%		88	80

PAHs in Water							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
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 ₁₄	%		86	87	93	90	87

PAHs in Water							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
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 ₁₄	%		87	82	89	82	78

PAHs in Water				
Our Reference			251294-11	251294-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			07/10/2020	07/10/2020
Type of sample			Water	Water
Date extracted	-		09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020
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 ₁₄	%		90	81

Low Level OCP in water							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
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	%		85	85	88	84	81

Low Level OCP in water							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date extracted	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020	09/10/2020	09/10/2020	09/10/2020
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	%		81	78	84	80	69

Low Level OCP in water				
Our Reference			251294-11	251294-12
Your Reference	UNITS	PQL	WR1	WB1
Date Sampled			07/10/2020	07/10/2020
Type of sample			Water	Water
Date extracted	-		09/10/2020	09/10/2020
Date analysed	-		09/10/2020	09/10/2020
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	%		90	81

PFAS in water TRACE Extended							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		13/10/2020	13/10/2020	13/10/2020	13/10/2020	13/10/2020
Date analysed	-		13/10/2020	13/10/2020	13/10/2020	13/10/2020	13/10/2020
Perfluorobutanesulfonic acid	µg/L	0.0004	<0.0004	<0.0004	0.0006	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	0.001	0.0027	0.0024	0.001
Perfluoroheptanesulfonic acid	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonate PFOS	µg/L	0.0002	0.0021	0.0020	0.0038	0.0035	0.0021
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	0.0007	0.001	0.001	0.0007
Perfluoroheptanoic acid	µg/L	0.0004	<0.0004	<0.0004	0.0006	0.0006	<0.0004
Perfluorooctanoic acid PFOA	µg/L	0.0002	0.0005	0.0004	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	0.001	<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 ¹³ C ₈ PFOS	%		101	98	94	98	95
Surrogate ¹³ C ₂ PFOA	%		86	89	86	89	87
Extracted ISTD ¹³ C ₃ PFBS	%		94	80	78	90	79
Extracted ISTD ¹⁸ O ₂ PFHxS	%		107	87	88	100	88
Extracted ISTD ¹³ C ₄ PFOS	%		87	67	65	84	77
Extracted ISTD ¹³ C ₄ PFBA	%		80	73	73	79	67

PFAS in water TRACE Extended							
Our Reference			251294-1	251294-2	251294-3	251294-4	251294-5
Your Reference	UNITS	PQL	WS1-S	WS1-D	WS2-S	WS2-D	WS3-S
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Extracted ISTD ¹³ C ₃ PFPeA	%		81	70	65	75	67
Extracted ISTD ¹³ C ₂ PFHxA	%		110	94	90	104	93
Extracted ISTD ¹³ C ₄ PFHpA	%		105	86	88	101	88
Extracted ISTD ¹³ C ₄ PFOA	%		116	96	97	106	96
Extracted ISTD ¹³ C ₅ PFNA	%		100	81	80	94	84
Extracted ISTD ¹³ C ₂ PFDA	%		92	66	63	84	73
Extracted ISTD ¹³ C ₂ PFUnDA	%		84	57	53	78	71
Extracted ISTD ¹³ C ₂ PFDoDA	%		87	60	56	86	80
Extracted ISTD ¹³ C ₂ PFTeDA	%		76	48	70	89	75
Extracted ISTD ¹³ C ₂ 4:2FTS	%		169	137	151	170	130
Extracted ISTD ¹³ C ₂ 6:2FTS	%		#	154	173	#	153
Extracted ISTD ¹³ C ₂ 8:2FTS	%		169	120	113	152	136
Extracted ISTD ¹³ C ₈ FOSA	%		85	60	56	76	66
Extracted ISTD d ₃ N MeFOSA	%		81	51	44	84	81
Extracted ISTD d ₅ N EtFOSA	%		89	58	54	102	89
Extracted ISTD d ₇ N MeFOSE	%		89	60	56	82	76
Extracted ISTD d ₉ N EtFOSE	%		92	62	60	92	80
Extracted ISTD d ₃ N MeFOSAA	%		105	70	69	98	89
Extracted ISTD d ₅ N EtFOSAA	%		100	67	64	87	84
Total Positive PFHxS & PFOS	µg/L	0.0002	0.0041	0.0030	0.0065	0.0059	0.0031
Total Positive PFOS & PFOA	µg/L	0.0002	0.0026	0.0024	0.0046	0.0043	0.0026
Total Positive PFAS	µg/L	0.0002	0.0054	0.0041	0.0095	0.0087	0.0043

PFAS in water TRACE Extended							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Date prepared	-		13/10/2020	13/10/2020	13/10/2020	13/10/2020	13/10/2020
Date analysed	-		13/10/2020	13/10/2020	13/10/2020	13/10/2020	13/10/2020
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	0.0025	0.0026	0.0025	0.0020	0.0020
Perfluoroheptanesulfonic acid	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonate PFOS	µg/L	0.0002	0.0037	0.0034	0.0035	0.0022	0.0028
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	0.001	0.0008	0.0009
Perfluoroheptanoic acid	µg/L	0.0004	0.0006	0.0005	0.0005	<0.0004	<0.0004
Perfluorooctanoic acid PFOA	µg/L	0.0002	0.0008	0.0008	0.0007	0.0005	0.0004
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	0.001	<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 ¹³ C ₈ PFOS	%		94	101	96	94	100
Surrogate ¹³ C ₂ PFOA	%		86	85	86	86	86
Extracted ISTD ¹³ C ₃ PFBS	%		79	93	79	75	79
Extracted ISTD ¹⁸ O ₂ PFHxS	%		87	99	82	85	90
Extracted ISTD ¹³ C ₄ PFOS	%		68	81	65	69	65
Extracted ISTD ¹³ C ₄ PFBA	%		73	77	64	68	70

PFAS in water TRACE Extended							
Our Reference			251294-6	251294-7	251294-8	251294-9	251294-10
Your Reference	UNITS	PQL	WS4-S	WS4-D	WS5-S	WS5-D	WZ1
Date Sampled			07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water	Water	Water
Extracted ISTD ¹³ C ₃ PFPeA	%		67	76	64	66	69
Extracted ISTD ¹³ C ₂ PFHxA	%		92	106	88	91	93
Extracted ISTD ¹³ C ₄ PFHpA	%		88	103	85	87	90
Extracted ISTD ¹³ C ₄ PFOA	%		95	111	94	95	99
Extracted ISTD ¹³ C ₅ PFNA	%		82	94	79	81	81
Extracted ISTD ¹³ C ₂ PFDA	%		67	82	67	70	65
Extracted ISTD ¹³ C ₂ PFUnDA	%		60	81	59	62	58
Extracted ISTD ¹³ C ₂ PFDoDA	%		67	90	64	68	62
Extracted ISTD ¹³ C ₂ PFTeDA	%		69	85	62	66	62
Extracted ISTD ¹³ C ₂ 4:2FTS	%		154	171	135	133	143
Extracted ISTD ¹³ C ₂ 6:2FTS	%		176	198	152	148	156
Extracted ISTD ¹³ C ₂ 8:2FTS	%		113	169	103	118	111
Extracted ISTD ¹³ C ₈ FOSA	%		62	80	58	50	58
Extracted ISTD d ₃ N MeFOSA	%		67	90	58	48	55
Extracted ISTD d ₅ N EtFOSA	%		72	103	60	53	60
Extracted ISTD d ₇ N MeFOSE	%		69	90	65	53	63
Extracted ISTD d ₉ N EtFOSE	%		69	95	64	55	65
Extracted ISTD d ₃ N MeFOSAA	%		76	102	75	77	72
Extracted ISTD d ₅ N EtFOSAA	%		67	95	69	66	66
Total Positive PFHxS & PFOS	µg/L	0.0002	0.0062	0.0060	0.0060	0.0042	0.0048
Total Positive PFOS & PFOA	µg/L	0.0002	0.0045	0.0042	0.0042	0.0027	0.0032
Total Positive PFAS	µg/L	0.0002	0.0091	0.0087	0.0086	0.0055	0.0061

PFAS in water TRACE Extended					
Our Reference			251294-11	251294-12	251294-13
Your Reference	UNITS	PQL	WR1	WB1	WTB1
Date Sampled			07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water
Date prepared	-		13/10/2020	13/10/2020	13/10/2020
Date analysed	-		13/10/2020	13/10/2020	13/10/2020
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	0.001	<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 ¹³ C ₈ PFOS	%		97	97	92
Surrogate ¹³ C ₂ PFOA	%		87	82	87
Extracted ISTD ¹³ C ₃ PFBS	%		77	78	81
Extracted ISTD ¹⁸ O ₂ PFHxS	%		86	86	89
Extracted ISTD ¹³ C ₄ PFOS	%		88	81	90
Extracted ISTD ¹³ C ₄ PFBA	%		93	91	94

PFAS in water TRACE Extended					
Our Reference			251294-11	251294-12	251294-13
Your Reference	UNITS	PQL	WR1	WB1	WTB1
Date Sampled			07/10/2020	07/10/2020	07/10/2020
Type of sample			Water	Water	Water
Extracted ISTD ¹³ C ₃ PFPeA	%		75	72	75
Extracted ISTD ¹³ C ₂ PFHxA	%		98	99	101
Extracted ISTD ¹³ C ₄ PFHpA	%		89	89	91
Extracted ISTD ¹³ C ₄ PFOA	%		102	102	102
Extracted ISTD ¹³ C ₅ PFNA	%		90	87	93
Extracted ISTD ¹³ C ₂ PFDA	%		87	79	89
Extracted ISTD ¹³ C ₂ PFUnDA	%		85	74	81
Extracted ISTD ¹³ C ₂ PFDoDA	%		80	78	81
Extracted ISTD ¹³ C ₂ PFTeDA	%		66	47	58
Extracted ISTD ¹³ C ₂ 4:2FTS	%		112	108	112
Extracted ISTD ¹³ C ₂ 6:2FTS	%		135	141	140
Extracted ISTD ¹³ C ₂ 8:2FTS	%		145	135	153
Extracted ISTD ¹³ C ₈ FOSA	%		72	69	75
Extracted ISTD d ₃ N MeFOSA	%		78	76	76
Extracted ISTD d ₅ N EtFOSA	%		86	86	84
Extracted ISTD d ₇ N MeFOSE	%		79	80	83
Extracted ISTD d ₉ N EtFOSE	%		82	81	83
Extracted ISTD d ₃ N MeFOSAA	%		89	86	86
Extracted ISTD d ₅ N EtFOSAA	%		79	78	76
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

Method ID	Methodology Summary
Ext-058	Analysed by The Marine and Freshwater Research Laboratory, accreditation number 10603
INORG-005	Acidity - determined by titration based on APHA latest edition, Method 2310 B. Soils reported from a 1:5 water extract unless otherwise specified.
INORG-006	Alkalinity - determined titrimetrically based on APHA latest edition, Method 2320-B. Soils reported from a 1:5 water extract unless otherwise specified.
INORG-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±10°C
INORG-019	Suspended Solids - determined gravimetrically by filtration of the sample. The solids are dried at 104±5°C
INORG-022	Turbidity - measured nephelometrically using a turbidimeter, in accordance with APHA latest edition, 2130 B.
INORG-040	Ion Balance Calculation: Cations in water by ICP-OES; Anions in water by IC; Alkalinity in water by Titration using APHA methods.
INORG-051	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.
INORG-055	NOx - determined colourimetrically. Soils are analysed from a water extract.
INORG-057	Ammonia by colourimetric analysis based on APHA latest edition 4500-NH3 F.
INORG-060	Phosphate- determined colourimetrically. Soils are analysed from a water extract.
INORG-060	Total Phosphorus by colourimetric analysis based on APHA latest edition 4500-P J.
INORG-081	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).
INORG-110	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
METALS-008	Hardness calculated from Calcium and Magnesium as per APHA latest edition 2340B.
METALS-020	Determination of various metals by ICP-AES.
METALS-021	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).
METALS-022	Determination of various metals by ICP-MS.
Org-020	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.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	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
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	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.
Org-023	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.
Org-029	<p>Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated after SPE. 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	[NT]
Date prepared	-			08/10/2020	1	08/10/2020	08/10/2020		08/10/2020	[NT]
Date analysed	-			08/10/2020	1	08/10/2020	08/10/2020		08/10/2020	[NT]
Total Dissolved Solids (grav)	mg/L	5	INORG-018	<5	1	37000	36000	3	101	[NT]
Total Suspended Solids	mg/L	5	INORG-019	<5	1	<5	<5	0	105	[NT]
Turbidity	NTU	0.1	INORG-022	<0.1	1	0.4	0.4	0	111	[NT]
Dissolved Organic Carbon	mg/L	1	INORG-110	<1	1	2	2	0	101	[NT]
Acidity as CaCO ₃	mg/L	5	INORG-005	<5	1	7	7	0	104	[NT]
Sulphide in water*	mg/L	0.5	INORG-051	<0.5	1	0.6	[NT]		80	[NT]
Fluoride	mg/L	0.1	INORG-081	<0.1	1	<5	<5	0	97	[NT]

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	08/10/2020	09/10/2020		[NT]	[NT]
Date analysed	-			[NT]	11	08/10/2020	09/10/2020		[NT]	[NT]
Turbidity	NTU	0.1	INORG-022	[NT]	11	<0.1	<0.1	0	[NT]	[NT]

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QUALITY CONTROL: Ionic Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			08/10/2020	1	08/10/2020	08/10/2020		08/10/2020	[NT]
Date analysed	-			08/10/2020	1	08/10/2020	08/10/2020		08/10/2020	[NT]
Calcium - Dissolved	mg/L	0.5	METALS-020	<0.5	1	400	400	0	98	[NT]
Potassium - Dissolved	mg/L	0.5	METALS-020	<0.5	1	380	380	0	99	[NT]
Magnesium - Dissolved	mg/L	0.5	METALS-020	<0.5	1	1300	1200	8	99	[NT]
Sodium - Dissolved	mg/L	0.5	METALS-020	<0.5	1	10000	10000	0	99	[NT]
Bicarbonate HCO ₃ as CaCO ₃	mg/L	5	INORG-006	<5	1	120	120	0	98	[NT]
Carbonate CO ₃ ²⁻ as CaCO ₃	mg/L	5	INORG-006	<5	1	<5	<5	0	98	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	INORG-006	<5	1	120	120	0	98	[NT]
Chloride	mg/L	1	INORG-081	<1	1	17000	18000	6	90	[NT]
Sulphate	mg/L	1	INORG-081	<1	1	2300	2500	8	89	[NT]
Hardness as CaCO ₃	mg/L	3	METALS-008	<3	1	6200	6100	2	[NT]	[NT]

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QUALITY CONTROL: Nutrients in Water				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	251294-2
Date prepared	-			08/10/2020	1	08/10/2020	08/10/2020		08/10/2020	08/10/2020
Date analysed	-			08/10/2020	1	08/10/2020	08/10/2020		08/10/2020	08/10/2020
Total Nitrogen	mg/L	0.1	INORG-110	<0.1	1	0.2	0.2	0	101	98
NOx as N	mg/L	0.005	INORG-055	<0.005	1	<0.005	<0.005	0	101	98
Ammonia as N	mg/L	0.005	INORG-057	<0.005	1	<0.005	<0.005	0	99	118
Total Phosphorus	mg/L	0.01	INORG-060	<0.01	1	0.03	0.04	29	109	120
Phosphate as P	mg/L	0.005	INORG-060	<0.005	1	0.007	0.005	33	113	121

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QUALITY CONTROL: Total Metals in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	251294-2
Date digested	-			09/10/2020	1	09/10/2020	09/10/2020		09/10/2020	09/10/2020
Date analysed	-			09/10/2020	1	09/10/2020	09/10/2020		09/10/2020	09/10/2020
Aluminium-Total	mg/L	0.01	METALS-022	<0.01	1	<0.02	<0.02	0	95	108
Iron-Total	mg/L	0.01	METALS-022	<0.01	1	0.02	0.02	0	118	113

QUALITY CONTROL: Total Metals in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date digested	-			[NT]	11	09/10/2020	09/10/2020		[NT]	[NT]
Date analysed	-			[NT]	11	09/10/2020	09/10/2020		[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	<0.02	<0.02	0	[NT]	[NT]

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QUALITY CONTROL: Dissolved Metals in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	251294-2
Date prepared	-			09/10/2020	1	09/10/2020	09/10/2020		09/10/2020	09/10/2020
Date analysed	-			09/10/2020	1	09/10/2020	09/10/2020		09/10/2020	09/10/2020
Silver-Dissolved Ultra Low	mg/L	0.00005	METALS-022	<0.00005	1	0.00005	<0.00005	0	95	93
Aluminium-Dissolved	mg/L	0.01	METALS-022	<0.01	1	<0.01	<0.01	0	103	108
Arsenic-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.002	0.002	0	98	104
Cadmium-Dissolved	mg/L	0.0001	METALS-022	<0.0001	1	<0.0001	<0.0001	0	98	98
Cobalt-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	101	98
Chromium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	98	102
Copper-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.001	0.001	0	96	89
Iron-Dissolved	mg/L	0.01	METALS-022	<0.01	1	<0.01	<0.01	0	110	109
Mercury-Dissolved	mg/L	0.00005	METALS-021	<0.00005	1	<0.00005	<0.00005	0	99	86
Manganese-Dissolved	mg/L	0.005	METALS-022	<0.005	1	<0.005	<0.005	0	97	97
Molybdenum-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.012	0.012	0	99	116
Nickel-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	96	90
Lead-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	99	88
Antimony-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	105	107
Selenium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	98	103
Zinc-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.003	0.003	0	95	93
Silicon - Dissolved	mg/L	0.1	METALS-020	<0.1	1	<0.5	<0.5	0	103	[NT]

QUALITY CONTROL: Dissolved Metals in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	09/10/2020	09/10/2020		[NT]	[NT]
Date analysed	-			[NT]	11	09/10/2020	09/10/2020		[NT]	[NT]
Silver-Dissolved Ultra Low	mg/L	0.00005	METALS-022	[NT]	11	<0.00005	<0.00005	0	[NT]	[NT]
Aluminium-Dissolved	mg/L	0.01	METALS-022	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
Arsenic-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Cadmium-Dissolved	mg/L	0.0001	METALS-022	[NT]	11	<0.0001	<0.0001	0	[NT]	[NT]
Cobalt-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Chromium-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Copper-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Iron-Dissolved	mg/L	0.01	METALS-022	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
Mercury-Dissolved	mg/L	0.00005	METALS-021	[NT]	11	<0.00005	<0.00005	0	[NT]	[NT]
Manganese-Dissolved	mg/L	0.005	METALS-022	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
Molybdenum-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Nickel-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Lead-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Antimony-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Selenium-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]
Zinc-Dissolved	mg/L	0.001	METALS-022	[NT]	11	<0.001	<0.001	0	[NT]	[NT]

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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	-			09/10/2020	[NT]	[NT]	[NT]	[NT]	09/10/2020	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	104	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	104	[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]	107	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	102	[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	95	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate toluene-d8	%		Org-023	95	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	96	[NT]	[NT]	[NT]	[NT]	99	[NT]

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QUALITY CONTROL: svTRH(C10-C40) in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	251294-2
Date extracted	-			09/10/2020	1	09/10/2020	09/10/2020		09/10/2020	09/10/2020
Date analysed	-			13/10/2020	1	13/10/2020	13/10/2020		13/10/2020	13/10/2020
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	<50	1	<50	<50	0	96	85
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	<100	1	<100	<100	0	99	86
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	<100	1	<100	<100	0	101	87
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	<50	1	<50	<50	0	100	88
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	<100	1	<100	<100	0	98	86
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	<100	1	<100	<100	0	102	87
Surrogate o-Terphenyl	%		Org-020	118	1	104	96	8	84	75

QUALITY CONTROL: svTRH(C10-C40) in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	09/10/2020	09/10/2020		[NT]	[NT]
Date analysed	-			[NT]	11	13/10/2020	13/10/2020		[NT]	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	[NT]	11	<50	<50	0	[NT]	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	[NT]	11	<100	<100	0	[NT]	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	[NT]	11	<50	<50	0	[NT]	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	[NT]	11	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	11	88	82	7	[NT]	[NT]

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QUALITY CONTROL: PAHs in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			09/10/2020	[NT]	[NT]	[NT]	[NT]	09/10/2020	[NT]
Date analysed	-			09/10/2020	[NT]	[NT]	[NT]	[NT]	09/10/2020	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-D ₁₄	%		Org-022/025	90	[NT]	[NT]	[NT]	[NT]	85	[NT]

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QUALITY CONTROL: Low Level OCP in water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			09/10/2020	[NT]	[NT]	[NT]	[NT]	09/10/2020	[NT]
Date analysed	-			09/10/2020	[NT]	[NT]	[NT]	[NT]	09/10/2020	[NT]
Hexachlorobenzene (HCB)	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	83	[NT]
Lindane (g-BHC)	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
b-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	83	[NT]
Heptachlor	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	88	[NT]
d-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	83	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	82	[NT]
g-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Endosulfan	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	86	[NT]
Dieldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	92	[NT]
Endrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	83	[NT]
b-Endosulfan	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.006	Org-022/025	<0.006	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	71	[NT]
Methoxychlor	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022/025	82	[NT]	[NT]	[NT]	[NT]	89	[NT]

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QUALITY CONTROL: PFAS in water TRACE Extended					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	251294-2
Date prepared	-			13/10/2020	1	13/10/2020	13/10/2020		13/10/2020	13/10/2020
Date analysed	-			13/10/2020	1	13/10/2020	13/10/2020		13/10/2020	13/10/2020
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	<0.0004	1	<0.0004	<0.0004	0	108	113
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	105	109
Perfluorohexanesulfonic acid	µg/L	0.0002	Org-029	<0.0002	1	0.0020	0.0020	0	104	119
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	105	123
Perfluorooctanesulfonate PFOS	µg/L	0.0002	Org-029	<0.0002	1	0.0021	0.0020	5	102	112
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	99	110
Perfluorobutanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	96	97
Perfluoropentanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	108	116
Perfluorohexanoic acid	µg/L	0.0004	Org-029	<0.0004	1	0.0008	0.0008	0	99	107
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	<0.0004	1	<0.0004	<0.0004	0	103	107
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	1	0.0005	0.0005	0	100	105
Perfluorononanoic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	102	112
Perfluorodecanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	108	115
Perfluoroundecanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	106	126
Perfluorododecanoic acid	µg/L	0.005	Org-029	<0.005	1	<0.005	<0.005	0	97	131
Perfluorotridecanoic acid	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	100	114
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	109	120
4:2 FTS	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	98	105
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	1	<0.0004	<0.0004	0	109	111
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	1	<0.0004	<0.0004	0	113	125
10:2 FTS	µg/L	0.001	Org-029	<0.001	1	<0.002	<0.002	0	93	108
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	109	120
N-Methyl perfluorooctane sulfonamide	µg/L	0.005	Org-029	<0.005	1	<0.005	<0.005	0	107	143
N-Ethyl perfluorooctanesulfon -amide	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	110	153
N-Me perfluorooctanesulfonamid -oethanol	µg/L	0.005	Org-029	<0.005	1	<0.005	<0.005	0	100	126
N-Et perfluorooctanesulfonamid -oethanol	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	99	122
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	101	115
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	106	136
Surrogate ¹³ C ₈ PFOS	%		Org-029	102	1	101	98	3	95	94
Surrogate ¹³ C ₂ PFOA	%		Org-029	95	1	86	86	0	93	88
Extracted ISTD ¹³ C ₃ PFBS	%		Org-029	72	1	94	79	17	79	89

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	251294-2
Extracted ISTD ¹⁸ O ₂ PFHxS	%		Org-029	86	1	107	92	15	91	98
Extracted ISTD ¹³ C ₄ PFOS	%		Org-029	72	1	87	77	12	82	84
Extracted ISTD ¹³ C ₄ PFBA	%		Org-029	90	1	80	71	12	97	80
Extracted ISTD ¹³ C ₃ PFPeA	%		Org-029	73	1	81	69	16	78	77
Extracted ISTD ¹³ C ₂ PFHxA	%		Org-029	93	1	110	95	15	101	107
Extracted ISTD ¹³ C ₄ PFHpA	%		Org-029	82	1	105	90	15	91	101
Extracted ISTD ¹³ C ₄ PFOA	%		Org-029	93	1	116	99	16	99	113
Extracted ISTD ¹³ C ₅ PFNA	%		Org-029	85	1	100	86	15	84	97
Extracted ISTD ¹³ C ₂ PFDA	%		Org-029	73	1	92	77	18	77	85
Extracted ISTD ¹³ C ₂ PFUnDA	%		Org-029	69	1	84	70	18	81	72
Extracted ISTD ¹³ C ₂ PFDoDA	%		Org-029	71	1	87	77	12	86	71
Extracted ISTD ¹³ C ₂ PFTeDA	%		Org-029	42	1	76	70	8	100	78
Extracted ISTD ¹³ C ₂ 4:2FTS	%		Org-029	104	1	169	139	19	112	151
Extracted ISTD ¹³ C ₂ 6:2FTS	%		Org-029	116	1	#	157		111	169
Extracted ISTD ¹³ C ₂ 8:2FTS	%		Org-029	105	1	169	137	21	116	153
Extracted ISTD ¹³ C ₈ FOSA	%		Org-029	60	1	85	72	17	65	71
Extracted ISTD d ₃ N MeFOSA	%		Org-029	44	1	81	67	19	54	56
Extracted ISTD d ₅ N EtFOSA	%		Org-029	44	1	89	70	24	56	67
Extracted ISTD d ₇ N MeFOSE	%		Org-029	60	1	89	77	14	73	71
Extracted ISTD d ₉ N EtFOSE	%		Org-029	62	1	92	77	18	73	78

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	251294-2
<i>Extracted ISTD d₃ N MeFOSAA</i>	%		Org-029	73	1	105	89	16	88	83
<i>Extracted ISTD d₅ N EtFOSAA</i>	%		Org-029	69	1	100	79	23	77	72

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]	10	13/10/2020	13/10/2020		[NT]	[NT]
Date analysed	-			[NT]	10	13/10/2020	13/10/2020		[NT]	[NT]
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	[NT]	10	<0.0004	<0.0004	0	[NT]	[NT]
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	[NT]	10	<0.001	<0.001	0	[NT]	[NT]
Perfluorohexanesulfonic acid	µg/L	0.0002	Org-029	[NT]	10	0.0020	0.0020	0	[NT]	[NT]
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	[NT]	10	<0.001	<0.001	0	[NT]	[NT]
Perfluorooctanesulfonate PFOS	µg/L	0.0002	Org-029	[NT]	10	0.0028	0.0028	0	[NT]	[NT]
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	[NT]	10	<0.002	<0.002	0	[NT]	[NT]
Perfluorobutanoic acid	µg/L	0.002	Org-029	[NT]	10	<0.002	<0.002	0	[NT]	[NT]
Perfluoropentanoic acid	µg/L	0.002	Org-029	[NT]	10	<0.002	<0.002	0	[NT]	[NT]
Perfluorohexanoic acid	µg/L	0.0004	Org-029	[NT]	10	0.0009	0.0009	0	[NT]	[NT]
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	[NT]	10	<0.0004	<0.0004	0	[NT]	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	[NT]	10	0.0004	0.0005	22	[NT]	[NT]
Perfluorononanoic acid	µg/L	0.001	Org-029	[NT]	10	<0.001	<0.001	0	[NT]	[NT]
Perfluorodecanoic acid	µg/L	0.002	Org-029	[NT]	10	<0.002	<0.002	0	[NT]	[NT]
Perfluoroundecanoic acid	µg/L	0.002	Org-029	[NT]	10	<0.002	<0.002	0	[NT]	[NT]
Perfluorododecanoic acid	µg/L	0.005	Org-029	[NT]	10	<0.005	<0.005	0	[NT]	[NT]
Perfluorotridecanoic acid	µg/L	0.01	Org-029	[NT]	10	<0.01	<0.01	0	[NT]	[NT]
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	[NT]	10	<0.05	<0.05	0	[NT]	[NT]
4:2 FTS	µg/L	0.001	Org-029	[NT]	10	<0.001	<0.001	0	[NT]	[NT]
6:2 FTS	µg/L	0.0004	Org-029	[NT]	10	<0.0004	<0.0004	0	[NT]	[NT]
8:2 FTS	µg/L	0.0004	Org-029	[NT]	10	<0.0004	<0.0004	0	[NT]	[NT]
10:2 FTS	µg/L	0.001	Org-029	[NT]	10	<0.002	<0.002	0	[NT]	[NT]
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	[NT]	10	<0.01	<0.01	0	[NT]	[NT]
N-Methyl perfluorooctane sulfonamide	µg/L	0.005	Org-029	[NT]	10	<0.005	<0.005	0	[NT]	[NT]
N-Ethyl perfluorooctanesulfon -amide	µg/L	0.01	Org-029	[NT]	10	<0.01	<0.01	0	[NT]	[NT]
N-Me perfluorooctanesulfonamid -oethanol	µg/L	0.005	Org-029	[NT]	10	<0.005	<0.005	0	[NT]	[NT]
N-Et perfluorooctanesulfonamid -oethanol	µg/L	0.05	Org-029	[NT]	10	<0.05	<0.05	0	[NT]	[NT]
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	[NT]	10	<0.002	<0.002	0	[NT]	[NT]
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	[NT]	10	<0.002	<0.002	0	[NT]	[NT]
Surrogate ¹³ C ₈ PFOS	%		Org-029	[NT]	10	100	95	5	[NT]	[NT]
Surrogate ¹³ C ₂ PFOA	%		Org-029	[NT]	10	86	88	2	[NT]	[NT]
Extracted ISTD ¹³ C ₃ PFBS	%		Org-029	[NT]	10	79	92	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]
Extracted ISTD ¹⁸ O ₂ PFHxS	%		Org-029	[NT]	10	90	101	12	[NT]	[NT]
Extracted ISTD ¹³ C ₄ PFOS	%		Org-029	[NT]	10	65	76	16	[NT]	[NT]
Extracted ISTD ¹³ C ₄ PFBA	%		Org-029	[NT]	10	70	86	21	[NT]	[NT]
Extracted ISTD ¹³ C ₃ PFPeA	%		Org-029	[NT]	10	69	79	14	[NT]	[NT]
Extracted ISTD ¹³ C ₂ PFHxA	%		Org-029	[NT]	10	93	106	13	[NT]	[NT]
Extracted ISTD ¹³ C ₄ PFHpA	%		Org-029	[NT]	10	90	103	13	[NT]	[NT]
Extracted ISTD ¹³ C ₄ PFOA	%		Org-029	[NT]	10	99	114	14	[NT]	[NT]
Extracted ISTD ¹³ C ₅ PFNA	%		Org-029	[NT]	10	81	92	13	[NT]	[NT]
Extracted ISTD ¹³ C ₂ PFDA	%		Org-029	[NT]	10	65	78	18	[NT]	[NT]
Extracted ISTD ¹³ C ₂ PFUnDA	%		Org-029	[NT]	10	58	72	22	[NT]	[NT]
Extracted ISTD ¹³ C ₂ PFDoDA	%		Org-029	[NT]	10	62	75	19	[NT]	[NT]
Extracted ISTD ¹³ C ₂ PFTeDA	%		Org-029	[NT]	10	62	68	9	[NT]	[NT]
Extracted ISTD ¹³ C ₂ 4:2FTS	%		Org-029	[NT]	10	143	168	16	[NT]	[NT]
Extracted ISTD ¹³ C ₂ 6:2FTS	%		Org-029	[NT]	10	156	188	19	[NT]	[NT]
Extracted ISTD ¹³ C ₂ 8:2FTS	%		Org-029	[NT]	10	111	138	22	[NT]	[NT]
Extracted ISTD ¹³ C ₈ FOSA	%		Org-029	[NT]	10	58	67	14	[NT]	[NT]
Extracted ISTD d ₃ N MeFOSA	%		Org-029	[NT]	10	55	62	12	[NT]	[NT]
Extracted ISTD d ₅ N EtFOSA	%		Org-029	[NT]	10	60	70	15	[NT]	[NT]
Extracted ISTD d ₇ N MeFOSE	%		Org-029	[NT]	10	63	73	15	[NT]	[NT]
Extracted ISTD d ₉ N EtFOSE	%		Org-029	[NT]	10	65	74	13	[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 d₃ N MeFOSAA</i>	%		Org-029	[NT]	10	72	84	15	[NT]	[NT]
<i>Extracted ISTD d₅ N EtFOSAA</i>	%		Org-029	[NT]	10	66	76	14	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

Blank	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.
Duplicate	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.
Matrix Spike	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.
LCS (Laboratory Control Sample)	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.
Surrogate Spike	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

Note: Some results have raised pqls. In these cases the sample's high TDS required the sample to be diluted prior to analysis.

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

PFAS Analysis conducted by Envirolab Sydney Report 253061

PFAS_W_EXT1_TR: Matrix spike recoveries for 253061-2 for Me-FOSA and Et-FOSA are outside global acceptance criteria (60-140%), however acceptable recoveries were obtained for the LCS.

PFAS_W_EXT1_TR: Me-FOSA, EtFOSA and PFTeDA Extracted Internal Standards are outside of global acceptance criteria (50-150%) for MB but within analyte specific acceptance criteri

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).

Chlorophyll a and Phaeophytin a analysis conducted by Marine and Freshwater Research Laboratory. Report MPL20-20.



DATA QUALITY ASSESSMENT SUMMARY

Report Details

Envirolab Report Reference	251294
Client ID	RPS Australia West Pty Ltd
Project Reference	EEC20078.004 - Fremantle Traffic Bridge
Date Issued	20/10/2020

QC DATA

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

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
Chlorophyll a & Phaeophytin a					
Chlorophyll a	251294-1	07/10/2020			##
Phaeophytin a	251294-1	07/10/2020			##
Chlorophyll a	251294-2	07/10/2020			##
Phaeophytin a	251294-2	07/10/2020			##
Chlorophyll a	251294-3	07/10/2020			##
Phaeophytin a	251294-3	07/10/2020			##
Chlorophyll a	251294-4	07/10/2020			##
Phaeophytin a	251294-4	07/10/2020			##
Chlorophyll a	251294-5	07/10/2020			##
Phaeophytin a	251294-5	07/10/2020			##
Chlorophyll a	251294-6	07/10/2020			##
Phaeophytin a	251294-6	07/10/2020			##
Chlorophyll a	251294-7	07/10/2020			##
Phaeophytin a	251294-7	07/10/2020			##
Chlorophyll a	251294-8	07/10/2020			##
Phaeophytin a	251294-8	07/10/2020			##
Chlorophyll a	251294-9	07/10/2020			##
Phaeophytin a	251294-9	07/10/2020			##
Chlorophyll a	251294-10	07/10/2020			##
Phaeophytin a	251294-10	07/10/2020			##

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/Pheophytin, 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.

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

Refer to Certificate of Analysis for all Quality Control data.

MEMO

Appendix C
Surface water sampling logs

