

Quarterly Water Quality Monitoring Results Cabbage Tree Road Sand Quarry, NSW

May 2022 Monitoring Event

NCA22R141727

5 July 2022



Williamtown Sand Syndicate (WSS)
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Subject: Quarterly Water Quality Monitoring Results Cabbage Tree
Road Sand Quarry, NSW
May 2022 Monitoring Event

Please find enclosed the quarterly water quality monitoring results for the May 2022 monitoring event undertaken by Kleinfelder at the Cabbage Tree Road Sand Quarry, NSW.

1 SCOPE OF WORK

The scope of work presented in this report includes the results from the monthly surface and groundwater monitoring event with the additional quarterly scope undertaken in accordance with the NSW Environment Protection Authority (EPA) and Department of Planning, Industry and Environment (DPIE) requirements for monthly water quality monitoring at the quarry. **Figure 1 (Attachment 1)** presents the surface water and groundwater sampling locations.

The scheduled May 2022 quarterly monitoring event included gauging of all available monitoring wells (a total of 14 wells), recording of field parameters for groundwater and surface water, and sampling from eight monitoring wells and four surface water locations. Furthermore, a wash plant fines and wash plant water sample were taken as part of the quarterly water monitoring program outlined in the Soil and Water Management Plan (SWMP, 2021).

2 SITE WORK

The quarterly monitoring round was conducted on 27 May 2022 and comprised:

- Gauging of 14 monitoring wells (BH1, BH2, BH4, BH5, BH6, BH7, BH8, BH9, BH9A, BH10, BH11, BH12, MW239S & MW239D).
- Groundwater sampling from eight monitoring wells (BH1, BH2, BH4, BH6, BH7, BH8, BH9, BH9A, BH11, BH12 & MW239S) as summarised in **Table 5** and detailed in **Attachment 2**.
- Surface water sampling from four locations (SW1, SW2, SW3 & SW4) as summarised in **Table 6** and detailed in **Attachment 2**.
- One wash plant fines sample (WPF) as summarised in **Table 7** and detailed in **Attachment 2**.
- One wash plant water sample (WPW) as summarised in **Table 8** and detailed in **Attachment 2**.

It should be noted that monitoring at BH11 was abandoned due to safety concerns on the day of sampling as a result of persistent rainfall flooding the track. Therefore, this location was gauged and sampled the following week on 3 June 2022.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well in order to determine potential sand/silt inundation and potential maintenance requirements. Following gauging, a HydraSleeve was placed into the well, ensuring the top of the sleeve was located below the water column to be sampled, and suspended in place while all remaining wells were gauged. Each HydraSleeve was then removed from the well and representative groundwater samples taken.

Surface and wash plant water samples were taken directly into laboratory supplied sample containers using a gloved hand. Where access was deemed unsafe, a telescopic sampling pole was used.

Wash Plant fines were collected directly into laboratory supplied sample containers. All samples collected were placed into an ice chilled esky and then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 1**.



Table 1: Summary of Quarterly Water Quality Analysis (May 2022)

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
Hydrocarbons*	12	1	1	1	1
Metals**	14 (8 x GW, 4 x SW, 1 x WPW & 1 x WPF)	1	1	1	1
PFAS (28 analytes, standard level)	14	2	2	1	1

* TRH (C6 – C40) (Silica Gel)

** Metals Suite (dissolved) –

- Groundwater (GW)- Arsenic (As), Barium (Ba), Chromium (Cr), Copper (Cu), Iron (Fe), Manganese (Mn), Nickel (Ni), Zinc (Zn).
- Surface Water (SW) – As, Ba, Boron (B), Cr, Cobalt (Co), Cu, Fe, Mn, Nickel Ni, Zn.
- Wash Plant Water (WPW) – As, Fe, Mn
- Wash Plant Fines (WPF) – As, Ba, Cr, Cu, Fe, Mn, Ni, Zn

Table 2 provides a summary of the gauging data. The full set of gauging data for each monitoring location is provided in **Table 14, Attachment 2**. Additionally, Watershed HydroGeo (2019) outlined a Trigger Action and Response Plan (TARP) to mitigate groundwater elevations that may potentially impact Cabbage Tree Road Sand Quarry operations (primarily sand excavation depths). Based on these recommendations, groundwater elevation has been shaded to correspond to triggers and actions outlined in **Table 3**.

Groundwater elevations triggered the Groundwater Level Monitoring TARP Rules at BH1, BH2 and BH11 as of 12 April 2022, and more recently BH10 as of 27 May 2022. As a result, weekly gauging has been carried out at the affected locations to closely monitor elevation changes. It is also recommended that the Minimum Extraction Level (MEL) be re-analysed and reviewed for BH10 and BH11, in accordance with the TARP Level 2 trigger response.

Table 2: Summary of Gauging Data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Ground-water Elevation (mAHD)	Well Total Depth Current (mBTOC)	Well Total Depth 2014 (mBTOC)	Inferred Max GW Elevation (mAHD) ¹	Difference Between Inferred Max and Measured GW Elevation (mAHD)	Comment
BH1	8.64	4.451	4.189	8.18	9.45	4.5	0.311	Gauge only – no sample taken
BH2	7.79	4.255	3.535	8.96	9.45	3.8	0.265	Clear, no odour / sheen, well in good condition
BH3	-	-	-	-	-	-	-	Well decommissioned
BH4	3.06	0.812	2.248	6.02	6.45	3.0	0.752	Clear, no odour / sheen, well in good condition
BH5	7.36	4.931	2.429	8.80	9.28	4.0	1.571	Gauge only – no sample taken

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Ground-water Elevation (mAHD)	Well Total Depth Current (mBTOC)	Well Total Depth 2014 (mBTOC)	Inferred Max GW Elevation (mAHD) ¹	Difference Between Inferred Max and Measured GW Elevation (mAHD)	Comment
BH6	3.62	0.708	2.912	4.55	4.95	4.4	1.488	Very light brown, strong sulphur odour, no sheen, well in good condition
BH7	2.98	0.890	2.09	4.51	4.95	3.7	1.61	Very light yellow, no odour / sheen, well in good condition
BH8	3.88	1.663	2.217	6.10	6.28	4.0	1.783	Light yellow, moderate sulphur odour, no sheen, well in good condition
BH9	17.75	15.286	2.464	16.29	18.8	3.0	0.536	Gauge only – no sample taken
BH9A	10.25	8.364	1.886	12.46	16.16	3.0 ²	1.114	Very light brown, slight sulphur odour, no sheen, well in good condition
BH10	6.69	2.030	4.66	3.43	5.45	4.9	0.24	Gauge only – no sample taken
BH11	6.63	1.205	5.425	5.25	5.95	5.5	0.075	Light yellow, strong sulphur odour, no sheen, well in good condition
BH12	8.67	5.644	3.026	8.24	8.39	4.0	0.974	Gauge only – no sample taken
MW239S	3.04	0.534	2.506	3.85	4.0	3.9	1.394	Medium brown, moderate sulphur odour, no sheen, well in good condition
MW239D	3.04	0.515	2.525	20.58	20.49	3.9 ³	1.375	Gauge only – no sample taken
SW01*	N/A	0.26	N/A	N/A	N/A	N/A	N/A	Natural tannin orange / brown, no odour / sheen
SW02*	N/A	0.45	N/A	N/A	N/A	N/A	N/A	Natural tannin orange /

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Ground-water Elevation (mAHD)	Well Total Depth Current (mBTOC)	Well Total Depth 2014 (mBTOC)	Inferred Max GW Elevation (mAHD) ¹	Difference Between Inferred Max and Measured GW Elevation (mAHD)	Comment
								brown, no odour / sheen
SW03*	N/A	0.3	N/A	N/A	N/A	N/A	N/A	Natural tannin brown, no odour / sheen
SW04*	N/A	0.2	N/A	N/A	N/A	N/A	N/A	Natural tannin orange / brown, no odour / sheen

* Surface water levels measured from measuring tape installed (when dry number is ground elevation AHD).

¹ – Sourced from Watershed HydroGeo ,2019, *Maximum Extraction Depth Management Plan, Cabbage Tree Road Sand Quarry*, May 2019.

² – Inferred Max Groundwater level based on adjacent wells (BH4 & BH9).

³ – Inferred Max Groundwater level based on adjacent well (MW239S).

N/A – Not applicable.

Table 3: Groundwater Level Monitoring TARP Rules (Watershed HydroGeo, 2019)

Level	Trigger	Action and Response	Report / Response Actions
0	Groundwater levels more than 0.5 m below <i>inferred</i> maximum historical level at BH1 and BH10. (Table 2).	Standard operations – monthly dipping of operational on-site monitoring bores.	n/a
1	Groundwater levels within 0.5 m below <i>inferred</i> maximum historical level (Table 2) at any on-site bore.	Weekly (or more frequent) monitoring (dipping) of groundwater levels until water level declines to below high frequency level bores listed in Table 2 .	Internal and environmental consultant. Include note in Annual Report.
2	Groundwater levels within 0.25 m of <i>inferred</i> maximum historical level (Table 2) at any on-site bore.	Weekly (or more frequent) monitoring (dipping) of groundwater levels. Re-analysis and review of Minimum Extraction Level (MEL).	WSS to issue letter to DPIE, documenting groundwater level and rainfall trends, review and make recommendations regarding MEL.
3	Groundwater levels within resource area rise above previously <i>inferred</i> maximum groundwater level (Table 2).	Analysis of recent data by hydrogeologist, including site data and data from local HWC wells and local Defence wells (if available). Revision of MEL. Remediation of earlier excavations to revised MEL if required by DPIE.	WSS to issue letter to DPIE, Dol Water and HWC, documenting groundwater level trends, and revision (if necessary) of MEL. Letter to outline remedial options, considering access, vegetation condition in previously rehabilitated areas. Re-grading of previously rehabilitated areas if required by DPIE.

Table 4 provides a summary of the field parameters taken during the May monitoring event. All field parameters for each monitoring location are detailed in the field sheets provided in **Attachment 2**.

Table 4: Summary of Field Measurements

Borehole	Turbidity (NTU)	Temp (°C)	DO (mg/L)	EC (µc/cm)	TDS (mg/L)	pH	Redox (mV)
BH1	ND	ND	ND	ND	ND	ND	ND



Borehole	Turbidity (NTU)	Temp (°C)	DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH	Redox (mV)
BH2	81.6	18.6	9.06	160	104	5.23	207.7
BH4	32.4	18.1	8.75	171	98	5.17	210.2
BH5	ND	ND	ND	ND	ND	ND	ND
BH6	61.4	19.1	9.15	208	135	5.19	-6.9
BH7	32.97	18.4	9.11	111.5	72	5.00	38.0
BH8	38.3	18.3	9.05	147	96	4.97	-16.8
BH9	ND	ND	ND	ND	ND	ND	ND
BH9A	68.7	18.1	9.02	170	111	4.81	68.3
BH10	ND	ND	ND	ND	ND	ND	ND
BH11	26	17.2	8.31	198	129	4.94	-60
BH12	ND	ND	ND	ND	ND	ND	ND
MW239S	105	17.3	9.16	182	118	4.85	18.2
MW239D	ND	ND	ND	ND	ND	ND	ND
SW1	3.76	14.3	9.93	155.9	101	5.13	186
SW2	2.66	15.9	9.58	90.2	59	4.56	77.0
SW3	2.13	13.9	9.99	222	145	4.86	5.9
SW4	96.1	13.4	9.84	200	130	5.93	93.6
WPW	59.05	17.6	9.48	245	160	5.55	179.4

ND: No Data – no sample taken

Table 5 and **Table 6** below present a summary of the water monitoring results for key analytes found to be elevated above the laboratory limit of reporting (LOR) for groundwater and surface water. **Table 7** and **Table 8** present a summary of the wash plant sampling results for PFAS analytes in both water and fines. Approved and updated groundwater and surface water criteria outlined in the SWMP (7 July 2021) have been applied to this quarterly report including a comment on comparison of results with previous data.

Non-detects for analytes BTEXN, TRH, TPH and PFAS were reported at all groundwater and surface water locations and are therefore not included in the below summary tables. Full results summary tables, including quality control sample analyses, are provided in **Tables 1 – 13, Attachment 2**. Full Laboratory certificates of analysis (COA), including copies of chain of custody (COC), are provided in **Attachment 3**.



Table 5: Groundwater Results and Screening Criteria

Analyte	Metals										Discussion of results relative to previous monitoring (details on specific data trends provided in Section 4 below)
	Arsenic	Barium	Chromium** ¹	Copper**	Cobalt	Iron	Manganese**	Nickel	Zinc**		
LOR	0.001	0.001	0.001	0.001	0.001	0.05	0.001	0.001	0.005		
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
Adopted Site Specific Trigger Values (SWMP 2021)	0.003	0.07	0.004	0.083	0.006	4.1 (8.84 for BH1)	0.136	0.02	0.085 (0.1 for BH1)		
Sample ID	Groundwater										
BH1	NS	NS	NS	NS	NS	NS	NS	NS	NS	Metals for BH1 were not analysed, no sample collected.	
BH2	<0.001	0.002	<0.001	0.004	NS	<0.05	NS	<0.001	0.005	Metal concentrations were generally consistent with historical results and remain below adopted criteria. BH2 is located marginally down hydraulic gradient from the current quarry operations footprint.	
BH4	<0.001	0.011	<0.001	0.097	NS	<0.05	NS	<0.001	<0.005	Metal concentrations were generally consistent with historical variations and remain below adopted criteria. Copper (0.097 mg/L) concentrations have increased since the previous February (<0.001 mg/L) GME and have now exceeded the adopted criteria (0.083 mg/L) for the first time since September 2021 (yet remains below the historical maximum). BH4 is located down hydraulic gradient (approximately 140 m) from current quarry operations and on the southernmost boundary of the site adjacent to Cabbage Tree Road.	
BH6	<0.001	0.007	<0.001	<0.001	NS	3.45	NS	<0.001	<0.005	Generally metal concentrations were consistent with historical results and remain below the adopted criteria. BH6 is considered up hydraulic gradient (approximately 570 m) from current quarry operations and the most north-eastern location at the Site.	
BH7	<0.001	0.003	0.003	<0.001	NS	0.52	NS	0.002	0.005	Metal concentrations were generally consistent with historical results and below adopted criteria. BH7 is	



Analyte	Metals										Discussion of results relative to previous monitoring (details on specific data trends provided in Section 4 below)
	Arsenic	Barium	Chromium** ¹	Copper**	Cobalt	Iron	Manganese**	Nickel	Zinc**		
LOR	0.001	0.001	0.001	0.001	0.001	0.05	0.001	0.001	0.005		
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
Adopted Site Specific Trigger Values (SWMP 2021)	0.003	0.07	0.004	0.083	0.006	4.1 (8.84 for BH1)	0.136	0.02	0.085 (0.1 for BH1)		
										located (approximately 630 m) east of the current quarry operations.	
BH8	0.001	0.004	0.002	<0.001	NS	1.10	NS	0.001	<0.005	Metal concentrations were consistent with historical results and below adopted criteria. Iron concentrations (1.10 mg/L) have further decreased since February 2022 (2.98 mg/L) when sampling last occurred, confirming a declining trend. BH8 is located (approximately 974m) east of the current quarry operations on Site.	
BH9	NS	NS	NS	NS	NS	NS	NS	NS	NS	Metals for BH9 were not analysed as no sample was collected.	
BH9A	<0.001	0.007	<0.001	<0.001	NS	0.35	NS	0.003	<0.005	Metal concentrations were generally consistent with historical results and below adopted criteria. BH9A is down gradient (approximately 50m) from current quarry operations and is on the southernmost boundary of the Site adjacent to Cabbage Tree Road.	
BH10	NS	NS	NS	NS	NS	NS	NS	NS	NS	Metals for BH10 were not analysed as no sample was collected.	
MW239S	<0.001	0.004	0.002	<0.001	NS	0.56	NS	0.001	0.009	Metal concentrations were generally consistent with historical results and below adopted criteria. MW239S is located approximately 426 m east and upgradient of the current quarry operations.	
										Metal concentrations were generally consistent with historical results and below adopted criteria. BH11 is	



Analyte	Metals										Discussion of results relative to previous monitoring (details on specific data trends provided in Section 4 below)
	Arsenic	Barium	Chromium**1	Copper**	Cobalt	Iron	Manganese**	Nickel	Zinc**		
LOR	0.001	0.001	0.001	0.001	0.001	0.05	0.001	0.001	0.005		
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
Adopted Site Specific Trigger Values (SWMP 2021)	0.003	0.07	0.004	0.083	0.006	4.1 (8.84 for BH1)	0.136	0.02	0.085 (0.1 for BH1)		
BH11	<0.001	0.004	0.002	<0.001	NS	1.27	NS	0.002	0.028	located approximately 450 m from current quarry operations and at the north-western most point of the Site.	
BH12	NS	NS	NS	NS	NS	NS	NS	NS	NS	Metals for BH12 were not analysed as no sample was collected.	

Notes:

< - Less than laboratory limit of reporting

NS – No Sample

NA – No Site specific trigger value assigned



Table 6: Surface Water Results and Screening Criteria

Analyte	Metals										Discussion of results relative to previous monitoring (details on specific data trends provided in Section 4 below)
	Arsenic	Barium	Chromium**1	Copper**	Cobalt	Iron	Manganese**	Nickel	Zinc**		
LOR	0.001	0.001	0.001	0.001	0.001	0.05	0.001	0.001	0.005		
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
Site Specific Trigger Values (SWMP 2021)	0.006	0.08	0.004	0.033	0.017	7.25 (32 for SW3 & SW4)	0.841	0.02	0.535		
Sample Name	Surface Water										
SW1	<0.001	0.010	0.003	<0.001	0.001	4.39	NS	0.002	0.047	Metal concentrations were generally in line with historical variations and below the Site Specific Trigger Values. SW1 is located on the southernmost boundary of the quarry adjacent to Cabbage Tree Road.	
SW2	<0.001	0.005	0.001	<0.001	0.001	1.70	NS	0.002	0.111	SW2 was previously dry during all sampling periods from 2019 – February 2021. Metal concentrations detected at SW2 during the November monitoring event were all below the Site Specific Trigger Values, consistent with the previous February 2022 GME. SW2 is the most northern located surface water monitoring point directly adjacent or central to current quarry operations.	
SW3	<0.001	0.010	0.001	<0.001	0.002	12.5	NS	0.002	<0.005	Metal concentrations were generally consistent with historical variations. SW3 is located within a drainage channel that travels from west to east along the south-eastern perimeter of the quarry. SW3 is approximately 476 m east of the current quarry operations.	
SW4	<0.001	0.021	<0.001	<0.001	0.001	0.68	NS	0.001	<0.005	Metal concentrations at SW4 appear to be stable across most analytes. SW4 is located downstream of SW3 on the eastern most perimeter of the quarry.	



Notes:

< - Less than laboratory limit of reporting

NS – No Sample



Table 7: Wash Plant Fines Sample Results and Screening Criteria

Analyte	PFAS		Discussion of results
	PFOA	Sum of PFOS + PFHxS	
LOR	0.0002	0.0002	
Units	mg/kg	mg/kg	
Site Specific Trigger Values (SWMP 2021)	0.1	0.01	
Sample Name	Sand Wash Plant		
WPF	<0.0002	0.0012	Non-detect for PFOA was reported at this location, in line with the previous February 2022 monitoring event. PFOS (0.0012 mg/kg) was reported for a fourth time during the May 2022 monitoring round at increased concentrations compared to the previous detection in February 2022 (0.0010 mg/kg). However, concentrations did not exceed the Site Specific Trigger Value (0.01 mg/kg) in both instances.

Notes:

< - Less than laboratory limit of reporting

Table 8: Wash Plant Water Sample Results and Screening Criteria

Analyte	PFAS		Discussion of results
	PFOA	Sum of PFOS + PFHxS	
LOR	0.01	0.01	
Units	µg/L	µg/L	
Site Specific Trigger Values (SWMP 2021)	0.56	0.07	
Sample Name	Sand Wash Plant		
WPW	<0.01	<0.01	PFOA and the Sum of PFOS + PFHxS were not detected at this location during the May 2022 GME, in line with the previous April 2022 monitoring event.

Notes:

< - Less than laboratory limit of reporting

3 RAINWATER DATA

Table 9 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m) for the period 2021/22. The total monthly rainfall for May 2022 exceeded the monthly mean by 105%, a slight decrease in comparison to the previous April 2022 rainfall data. Based on current rainfall data (mean and monthly totals) for May 2022, it is expected that surface and groundwater elevations will continue to increase which is consistent with groundwater trend data.



Table 9: 2021-2022 Rainfall data (12-month period)

Date	Jun (21)	July (21)	Aug (21)	Sep (21)	Oct (21)	Nov (21)	Dec (21)	Jan (22)	Feb (22)	Mar (22)	Apr (22)	May (22)
1st	0.2	2.6	0	0	0	0.2	0	0	0	18.2	13.6	2.0
2nd	0.2	1.6	0.8	0	5.4	0	0.2	0	7.6	25.2	1.4	0
3rd	0	0	1.6	0	0	0	0	0	13.0	32.2	0	0
4th	12.8	0.2	0	0	0	0	0.2	1.0	32.8	55.4	ND	0
5th	0.8	0	0	3.0	0	4.0	0	7.6	7.2	0.2	0.2	4.0
6th	0	0	0	0	0	0	0	2.2	4.4	11.6	0.2	ND
7th	0	0	0	0	0	0	2.8	1.0	1.4	5.4	0	0
8th	0	0.2	0	0	0	21.0	0.6	10.4	2.0	11.8	36.2	0
9th	7.6	1.4	2.4	0	0	0	10.0	9.2	0.6	68.0	1.2	0
10th	0	7.0	0	12.6	0	0.4	0.8	0	0	0.6	2.0	1.8
11th	2.0	24.8	0.2	0	23.6	20.2	0	0	0	3.8	0.2	15.8
12th	0	1.0	0	0	10.2	56.8	0	0	39.4	0.6	8.4	8.8
13th	0	0	0	0	19.8	0.2	0	0.4	1.0	0.2	15.8	5.8
14th	0	0.2	0	0	1.2	0	0	0	0	0	10.8	4.0
15th	0	0.4	0.2	0	3.0	0	0	0	0	0.8	1.2	0
16th	ND	1.2	0	0	0.2	0.2	0.2	5.4	0	0.8	0.2	0
17th	0.4	2.4	0	0	0	0	1.8	0.2	0	0.2	0	0
18th	0	0	0.6	0.4	0	0.6	0	0	8.6	0	0	0
19th	0.2	0	0	0	0	0	0	32.0	0.2	2.2	0	0
20th	26.0	0	0	2.2	3.4	0	0.6	13.2	0	0.4	0.2	2.6
21st	19.2	0	0.4	8.8	0.2	5.0	0.2	0.2	0	0	0	15.0
22nd	0.6	0	0	0.4	0.2	27.6	0	0	0	0	14.6	4.4
23rd	0.2	0.2	0.2	0	0	9.4	0	0	25.2	0	6.4	33.0
24th	0.8	0.2	22.2	0	5.4	0.6	0.4	6.8	3.2	35.6	10.0	8.0
25th	1.8	0	20.2	0	0.2	3.4	0	0	6.0	29.4	0.2	4.6
26th	0	0	0	0.6	0	31.2	0	0	6.0	14.4	0.2	0
27th	0	0	0	0	0	16.4	0	0	2.6	6.8	0.2	0
28th	0.4	0	0	0	0	15.8	2.4	0	0.2	0.8	0.6	0.2
29th	30.8		0	0	0	0.8	-	0	-	2.4	0.2	0
30th	0.6		0	0	0	0	0.2	0	-	12.2	0	0
31st	-		0	-	1.6	-	0	0	-	14.8	-	4.2
Total	104.6	43.4	48.8	28.0	74.4	213.8	20.4	89.6	161.4	354.0	124.0	114.2
Mean	124.6	72.6	72.8	60.6	75.9	81.9	78.6	99.5	118.3	125.2	109.5	108.6

Notes:

ND – no data retrieved.



4 DATA TRENDS

Data trends, taken from analyses undertaken throughout the duration of the sampling program (January 2019 – current), are provided as **Attachment 4**. Generally, the trends indicate a steady decrease in groundwater elevations from April 2021 to January 2022. This is likely due to a continuation of reduced rainfall following the March 2021 monitoring event. More recently, the groundwater elevations have shown a rapid increase since February 2022 as a result of above-average rainfall recorded over the past four months.

Groundwater elevations triggered the Groundwater Level Monitoring TARP Rules (**Table 3**) at BH1, BH2 and BH11 as of 12 April 2022, and more recently BH10 as of 27 May 2022. As a result, weekly gauging has been carried out at the affected locations to closely monitor elevation changes. It is also recommended that the Minimum Extraction Level (MEL) be re-analysed and reviewed for BH10 and BH11, in accordance with the TARP Level 2 trigger response.

Overall, groundwater levels for the current month generally appear to be increasing, in line with the recent above-average rainfall noted in **Section 3**. Based on these trends, groundwater elevations are likely to remain elevated across the quarry.

Notable changes in data trends were observed for the following analytes:

- Iron – Concentrations of iron at SW2 have remained below the adopted criteria since last sampled in March 2022, confirming that the exceedance reported in February 2022 was an isolated occurrence. Previously, iron concentrations exceeded both the Site Specific Trigger Value and historical maximum which had last occurred in November 2021.
- Copper – Concentrations of copper have remained stable or slightly increased across the quarry, including BH4 where concentrations have now risen above the Site Specific Trigger Value for the first time since September 2021 (yet remain below the historical maximum). Prior to this, BH4 had experienced a decreasing trend since January 2021. Historical variations beginning in 2019 show a seasonal trend where concentrations begin to rise in May, peak during August/September and fall back to stable levels by October 2021. These increased concentrations may be attributed to the decrease in rainfall associated with the winter months. Overall trends also show a long-term temporal increase, where the peak concentrations are increasing with each seasonal event. Notwithstanding, copper concentrations remain below the drinking water criteria.
- PFAS – The Sum of PFOS + PFHxS was reported in the WPF sample for the fourth time during the May 2022 monitoring round at slightly increased concentrations compared to the previous detection in February 2022. However, concentrations did not exceed the Site Specific Trigger Value in both instances. PFAS was not detected in the WPW sample during the current May 2022 sampling round, in line with the previous April monitoring event.

5 CLOSING

Overall, the results suggest that since quarry operations began in August 2019, there has been negligible change in analytical results across the sampled locations. Concentrations of copper at BH4 have historically shown elevated trends in concentrations, and exceeded the Site Specific Trigger Value during the May 2022 monitoring event. However, this increase is in line with the seasonal variations as described in **Section 4**. Close monitoring should continue to confirm a new increasing trend leading up to the winter months. An adjustment of the Site Specific Trigger Value at BH4 should also be considered provided that concentrations continue to follow this trend.

We trust that the above report meets with your requirements. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Megan Ferguson

Environmental Consultant
Contaminated Land Management
MFerguson@kleinfelder.com



Mobile: 0455 981 953

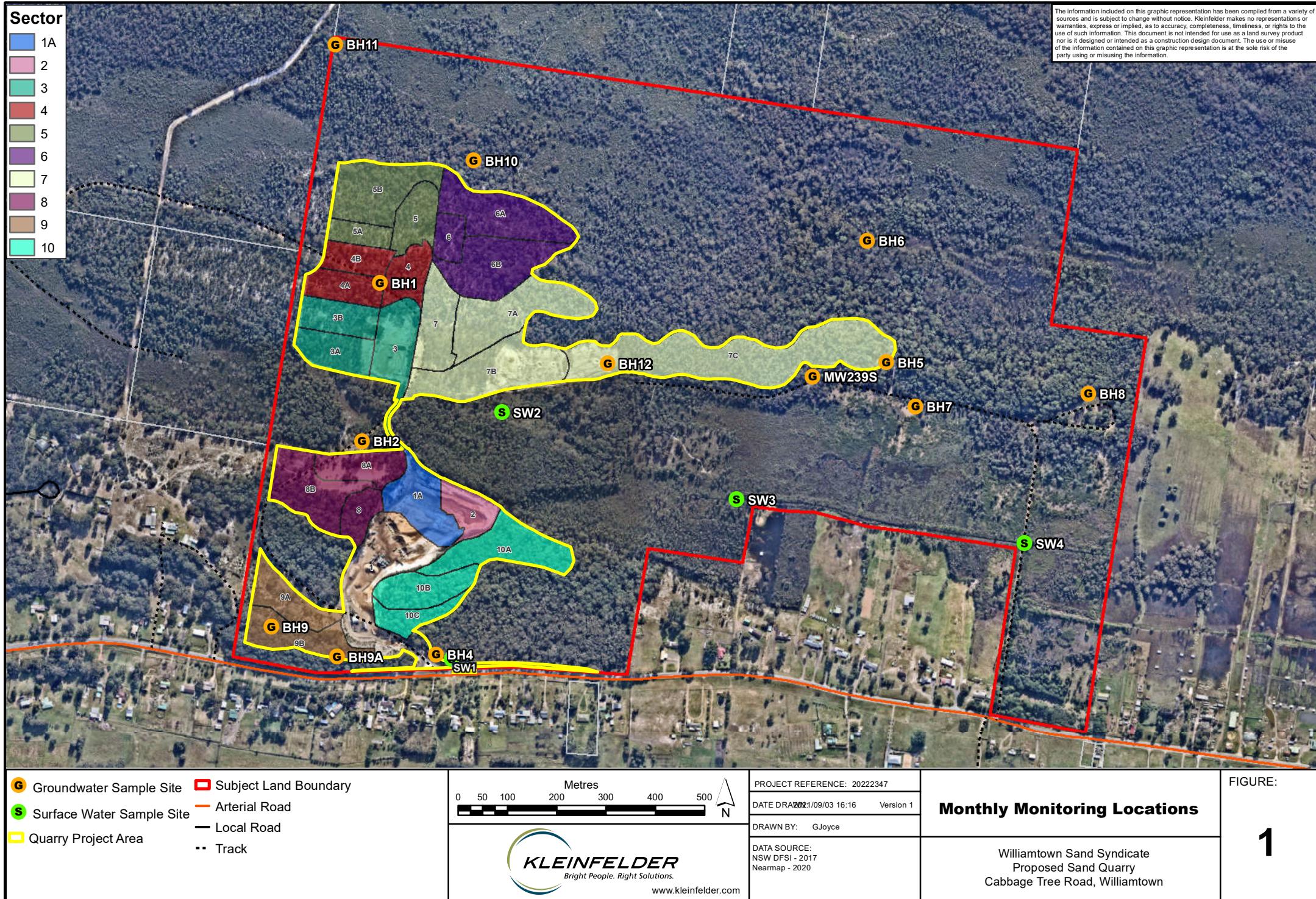
Attachments

- Attachment 1: Figures
- Attachment 2: Results tables and field records
- Attachment 3: Lab results
- Attachment 4: Data Trends



ATTACHMENT 1: FIGURES







ATTACHMENT 2: RESULTS TABLES AND FIELD RECORDS



HYDRASLEEVE™ SAMPLING LOG

Project Number	Site Address		Date:
2022-2347	27/5 Cabbage Tree Road, Williamstown.		
Site Name	Field Manager	Weather Observations	
WSS	MF	Clear	

Well ID	Sample Time	D/W (mb/°C)	Total Depth (mb/°C)	Field Measurements				Redox (mV)	Turbidity (NTU)	Description (Colour, Odour, Sheen)
				Sample Depth (mb/°C)	Temp (C)	DO (mg/L)	EC (µS/cm)			
BH1	-	4.451	8.18							Gauge only.
BH2	10:10	4.255	8.96	-	18.6	9.06	160	104	207.7	81.6 Clear, No /ns.
BH4	10:25	0.812	6.02	-	18.1	8.75	171	98	5.67	210.2 Clear, No /ns
BH5	-	4.931	8.80							Gauge only
BH6	11:30	0.708	4.55	-	19.1	9.15	208	135	5.19	-6.9 61.4 very slight brown, strong sulfur
BH7	12:00	0.890	4.51	-	18.4	9.11	111.5	72	5.90	38.0 32.97 very light yellow, no /ns.
BH8	12:25	1.663	6.10	-	18.3	9.05	147	96	4.97	-16.8 38.3 light yellow, red sulfur odour, ns.
BH9	-	15.186	16.29							Gauge only
BH9A	11:10	8.364	12.46	-	18.1	9.02	170	111	4.81	68.3 68.7 very light brown, slight sulfur odour, ns.
BH10	-	2.030	3.43							Gauge only
BH11	-									Gauge accessible - flooded track.
BH12	-	5.644	8.24							Gauge only
MW395	11:30	0.534	3.85	-	17.3	9.16	182	118	4.85	13.2 medium brown/mild sulfur, ns.
MW2390	-	0.515	20.58							Gauge only
SW1	10:45	-	0.26	-	14.3	9.73	155.9	101	5.13	186 3.76 natural tan/orange/brown, no /ns.
SW2	13:40	-	0.45	-	15.1	9.58	10.2	57	4.56	17.0 2.66 natural tan/orange/brown, no /ns.
SW3	13:15	-	0.3	-	13.9	9.49	222	145	4.86	5.7 2.13 natural tan/brown, no /ns.

Damaged wells (identify how damaged):

*Sample Depth is reported as bottom of hydrasleeve depth



HYDRASLEEVE™ SAMPLING LOG

Project Number:	20222347	Site Name:	W5
Date:	27/5	Site Address:	Cabbage Tree Road, Williamtown
Field Manager:	MF	Weather Observations:	Clear

Damaged wells (identify how damaged): _____

****Sample Depth** is reported as bottom of hydrasleeve depth



HYDRASLEEVE™ SAMPLING LOG

Project Number	Date	Site Address	Field Manager	Weather Observations
20222341	3/6/22	Williamtown Sand Quarry		
WSS			MF	Overcast

Damaged wells (identify how damaged): _____

*Sample Depth is reported as bottom of hydrasleeve depth



QA/QC SAMPLE REGISTER

Project Number: Site Name:

Situs Address

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Date: _____ Field Manager: _____

Field Manager:

COMMENTS:

Multi Parameter Water Meter

Instrument YSI Pro DSS
Serial No. 21K101475



Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. EC		2.76mS		377099	2.76mS
2. Temp		21.4°C		Testo	21.3°C
3. pH 4		pH 4.00		380327	pH 4.02
4. pH 7		pH 7.00		377339	pH 7.07
5. DO		0.00ppm		371864	-0.01ppm
6.Turbidity		50NTU		381916	49.3NTU
7. mV		236.9mV		380834/378285	236.9mV

Calibrated by:

Sarah Lian

Calibration date:

4/05/2022

Next calibration due:

3/06/2022

Table 1
Groundwater Analytical Data - BTEXN
Williamstown Sand Syndicate



Table 1
Groundwater Analytical Data - BTEXN
Williamstown Sand Syndicate



Table 1
Groundwater Analytical Data - BTEXN
Williamstown Sand Syndicate



Analyte	BTEXN									Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons Silica Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons Silica Clean up			
	Benzene**	Toluene	Ethylbenzene	meta & para Xylene	orthoXylene **	Total Xylenes	Naphthalene **	Sum of BTEX	C6 C9		C10C14 Silica Cleanup	C15C28 Silica Cleanup	C29C36 Silica Cleanup	C10C36 Sum Silica Cleanup	C6 C10	C6 C10 minus BTEX (F1)	>C10C16 Silica Cleanup	F2 Silica Cleanup	>C16C34 Silica Cleanup	>C34C40 Silica Cleanup
LOR Units	1 µg/L	2 µg/L	2 µg/L	2 µg/L	2 µg/L	2 µg/L	5 µg/L	1 µg/L	20 µg/L	Total Petroleum Hydrocarbons	50 µg/L	100 µg/L	50 µg/L	50 µg/L	20 µg/L	20 µg/L	100 µg/L	100 µg/L	100 µg/L	100 µg/L
Adopted Site Specific Trigger Values (SWMP 2021)											20	20	20	20	20	20	100	100	100	100
NHMRC ADWG 2018	1	800	300			350	600			Total Petroleum Hydrocarbons										
Sample Date																				
14-Aug-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
15-Sep-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
16-Oct-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
16-Nov-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
16-Dec-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
14-Jan-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
16-Feb-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
17-Mar-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
22-Apr-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
20-May-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
18-Jun-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
15-Jul-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
19-Aug-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
16-Nov-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
24-Feb-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
12-Apr-22																				
27-May-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

No Analysis

Notes:
 Not analysed
 < Less than laboratory detection limit
 µg/L Micrograms per liter
 BTEXN Benzene, Toluene, Ethylbenzene and Xylenes
 1 Soil and Water M
 2 Denotes duplicate
 3 Denotes triplicate
 ** 95% Level of precision

Table 1
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte	Metals															
	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** 1	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury***	Nickel**	Selenium**	Vanadium	Zinc**
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
Adopted Site Specific Trigger Values (SWMP 2021)*	0.003	0.07	0.002	0.1	0.0002	0.004	0.006	0.083	4.1 (8.84 for BH1)	0.001	0.136	0.0001	0.02	0.01	0.01	0.085 (0.1 for BH1)
NHMRC ADWG 2018	0.01									0.01	0.5	0.001	0.02	0.01		
Sample Name	Sampling Date															
BH1	21-Feb-19															
	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.074
	14-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	7.35	< 0.001	0.007	< 0.0001	< 0.001	< 0.01	< 0.01	0.051
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	7.06	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.023
	16-Sep-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	8.84	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.034
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	4.32	< 0.001	0.007	< 0.0001	< 0.001	< 0.01	< 0.01	0.037
	18-Nov-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	11	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.012
	17-Dec-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	8.48	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.028
	16-Jan-20	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	4.43	< 0.001	0.011	< 0.0001	0.002	< 0.01	< 0.01	0.044
	27-Feb-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	2.22	0.001	0.008	< 0.0001	0.004	< 0.01	< 0.01	0.078
	26-Mar-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.21	0.001	0.009	< 0.0001	0.006	< 0.01	< 0.01	0.068
	27-Apr-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.22	0.001	0.011	< 0.0001	0.002	< 0.01	< 0.01	0.035
	15-May-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.13	0.001	0.012	< 0.0001	0.006	< 0.01	< 0.01	0.065
	19-Jun-20	< 0.001							5.74	< 0.001	0.01	< 0.0001				0.06
	16-Jul-20	< 0.001							6.22	< 0.001	0.01	< 0.0001				0.08
	14-Aug-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	4.08	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.025
	16-Sep-20	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	5.48	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.016
	15-Oct-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	4.32	< 0.001	0.007	< 0.0001	< 0.001	< 0.01	< 0.01	0.037
	18-Nov-20	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	11	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.012
	17-Dec-20	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.01	0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.028
	16-Jan-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	4.43	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.044
	27-Feb-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	2.22	0.001	0.008	< 0.0001	0.004	< 0.01	< 0.01	0.078
	26-Mar-21	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.21	0.001	0.009	< 0.0001	0.005	< 0.01	< 0.01	0.068
	15-Jul-21	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.31	< 0.001	0.002	< 0.0001	< 0.001	< 0.01	< 0.01	0.037
	24-Feb-22	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	7.7	< 0.001	0.018	< 0.0001	< 0.001	< 0.01	< 0.01	0.106
	12-Apr-22															
BH2	27-May-22															
	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.003	0.014	0.031	< 0.0001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.003	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.19	0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.06	0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.009	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.025
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.017
	17-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.009
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.007
	18-Nov-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.011	< 0.0001	0.007	< 0.01	< 0.01	0.028
	17-Dec-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.006
	16-Jan-20	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.006
	16-Feb-20	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.006
	27-Mar-20	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.006
	14-Nov-20	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.006
	22-Dec-20	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.006
	14-Jan-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.006
	24-Feb-22	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.08	0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.006
	12-Apr-22	< 0.001														
BH3	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.01	0.014	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.16	0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.01	0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
	23-Apr-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.09	0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.										

Table 1
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte	Metals															
	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** 1	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury** 2	Nickel**	Selenium**	Vanadium	Zinc**
LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
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
Adopted Site Specific Trigger Values (SWMP 2021)*	0.003	0.07	0.002	0.1	0.0002	0.004	0.006	4.1 (8.84 for BH1)		0.001	0.136	0.0001	0.02	0.01	0.01	0.085 (0.1 for BH1)
NHMRC ADWG 2018	0.01			4	0.002	0.05		2								
Sample Name	Sampling Date															
BH7	17-Apr-21	< 0.001	0.058	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	1.39	< 0.001	0.012	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
	22-Apr-21	< 0.001	0.039	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	1.17	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.011
	20-May-21	< 0.001	0.039	< 0.001	< 0.05	0.0001	< 0.001	< 0.001	1.05	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.009
	18-Jun-21	< 0.001	0.033	< 0.001	< 0.05	0.0001	< 0.001	< 0.001	1.08	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	15-Jul-21	0.002	0.031	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	1.04	< 0.001	0.005	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	19-Aug-21	0.005	0.037	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.55	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	22-Sep-21	0.002	0.042	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.55	< 0.001	0.005	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	13-Oct-21	0.002	0.044	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.65	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Nov-21	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.83	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	15-Dec-21	< 0.001							0.66		0.002					
BH8	18-Jan-22	< 0.001							0.7		0.003					
	24-Feb-22	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.55	< 0.001	0.001	< 0.0001	< 0.001	< 0.01	< 0.01	0.031
	12-Apr-22	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	3.45	< 0.001	0.016	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	27-May-22	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	1.3	< 0.001	0.036	< 0.0001	0.004	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
	23-Apr-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	0.003	2.0	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.01
	16-May-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.003	2.32	< 0.001	0.035	< 0.0001	0.005	< 0.01	< 0.01	0.013
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	2.06	< 0.001	0.03	< 0.0001	0.004	< 0.01	< 0.01	0.006
	16-Jul-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	1.65	< 0.001	0.035	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
	13-Aug-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	1.54	< 0.001	0.033	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
BH9	16-Sep-19	< 0.001	0.016	< 0.001	0.006	< 0.0001	0.002	0.002	0.07	< 0.001	0.024	< 0.0001	0.002	< 0.01	< 0.01	0.085
	15-Oct-19	< 0.001	0.009	< 0.001	0.005	< 0.0001	0.002	0.002	1.42	< 0.001	0.018	< 0.0001	0.003	< 0.01	< 0.01	0.011
	18-Nov-19	< 0.001	0.016	< 0.001	0.005	< 0.0001	0.002	0.002	1.1	< 0.001	0.015	< 0.0001	0.013	< 0.01	< 0.01	0.053
	17-Dec-19	< 0.001	0.009	< 0.001	0.006	< 0.0001	0.001	0.001	0.98	< 0.001	0.011	< 0.0001	0.003	< 0.01	< 0.01	0.007
	16-Jan-20	< 0.001	0.01	< 0.001	0.005	< 0.0001	0.002	0.002	0.93	< 0.001	0.006	< 0.0001	0.003	< 0.01	< 0.01	0.007
	27-Feb-20	< 0.001	0.01	< 0.001	0.005	< 0.0001	0.001	0.001	1.18	< 0.001	0.008	< 0.0001	0.004	< 0.01	< 0.01	0.007
	26-Mar-20	< 0.001	0.01	< 0.001	0.005	< 0.0001	0.001	0.001	0.9	< 0.001	0.009	< 0.0001	0.005	< 0.01	< 0.01	0.064
	27-Apr-20	< 0.001							0.02	< 0.001	0.011	< 0.0001	0.001	< 0.01	< 0.01	0.033
	15-May-20	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.003	0.002	0.05	< 0.001	0.016	< 0.0001	0.007	< 0.01	< 0.01	0.045
	19-Jun-20	< 0.001							1.36	< 0.001	0.019	< 0.0001	0.001	< 0.01	< 0.01	0.043
BH10	16-Jul-21	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.04	< 0.001	0.024	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	21-Feb-19	0.001*	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	23-Apr-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	16-May-19	0.003	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	17-Jul-19	0.002	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	2.6	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	22-Aug-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	1.72	< 0.001	0.023	< 0.0001	0.004	< 0.01	< 0.01	0.008
	20-May-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	1.65	< 0.001	0.018	< 0.0001	0.005	< 0.01	< 0.01	< 0.005
	18-Jun-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	1.35	< 0.001	0.011	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
BH10	15-Jul-21	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.47	< 0.001	0.02	< 0.0001	0.002	< 0.01	< 0.01	0.006
	24-Feb-22	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.66	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	12-Apr-22	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.43	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	27-May-22	0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	1.1	< 0.001	0.007	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	14-Aug-20	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.03	< 0.001	0.014	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	16-Nov-20	< 0.001	0.028	< 0.001	< 0.05	< 0.0001	0.002	0.004	0.14	< 0.001	0.076	< 0.0001	0.002	< 0.01	< 0.01	0.02
	16-Oct-20	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.001	0.001	0.06	< 0.001	0.042	< 0.0001	0.003	< 0.01	< 0.01	0.016
	16-Nov-20	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.001	0.001	0.11	< 0.001	0.03	< 0.0001	0.002	< 0.01	< 0.01	0.011
	16-Dec-20	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.001	0.001	0.31	< 0.001	0.024	< 0.0001	0.002	< 0.01	< 0.01	0.006
	14-Jan-21	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.001	0.001	0.17	< 0.001	0.025	< 0.0001	0.004	< 0.01	< 0.01	0.011
BH10	15-Jul-21	< 0.001	0.003	< 0.001	< 0.05	< 0.										

Analyte	Metals																
	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ₁	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury** ₂	Nickel** ₂	Selenium**	Vanadium	Zinc**	
	LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005	
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	
Adopted Site Specific Trigger Values (SWMP 2021)*	0.003	0.07	0.002	0.1	0.0002	0.004	0.006	0.083	4.1 (8.84 for BH1)	0.001	0.136	0.0001	0.02	0.01	0.01	0.085 (0.1 for BH1)	
NHMRC ADWG 2018	0.01			0.06	4	0.0002	0.05	2		0.01	0.5	0.0001	0.02	0.01	0.01		
Sample Name	Sample Date																
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.57	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.007
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.007	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Sep-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.79	< 0.001	0.006	< 0.0001	0.002	< 0.01	< 0.01	0.012
	14-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.74	< 0.001	0.006	< 0.0001	0.003	< 0.01	< 0.01	0.016
	18-Nov-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.95	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	17-Dec-19	< 0.001	0.004	< 0.001	0.06	< 0.0001	0.002	< 0.001	1	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.006	
	16-Jan-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.08	< 0.001	0.007	< 0.0001	0.003	< 0.01	< 0.01	0.005
	27-Feb-20	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.6	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.027
	26-Mar-20	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.36	< 0.001	0.004	< 0.0001	0.006	< 0.01	< 0.01	0.038
	27-Apr-20	< 0.001								0.22	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.035
	15-May-20	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.78	< 0.001	0.01	< 0.0001	0.007	< 0.01	< 0.01	0.023
	19-Jun-20	< 0.001								0.72	< 0.001	0.007	< 0.0001	0.007	< 0.01	< 0.01	0.051
	16-Jul-20	< 0.001								1	< 0.001	0.007	< 0.0001				0.005
	14-Aug-20	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.75	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	0.017
	16-Sep-20	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.9	< 0.001	0.006	< 0.0001	0.001	< 0.01	< 0.01	0.009
	14-Oct-20	< 0.001	0.017	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.06	< 0.001	0.01	< 0.0001	0.002	< 0.01	< 0.01	0.01
	16-Nov-20	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.84	< 0.001	0.011	< 0.0001	0.002	< 0.01	< 0.01	0.016
	16-Dec-20	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.0	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	14-Jan-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.25	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.018
	16-Feb-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.18	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.018
	17-Mar-21	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.2	< 0.001	0.002	< 0.0001	0.003	< 0.01	< 0.01	0.014
	22-Apr-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.26	< 0.001	0.002	< 0.0001	0.006	< 0.01	< 0.01	0.006
	20-May-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.25	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.033
	18-Jun-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.25	< 0.001	0.002	< 0.0001	0.002	< 0.01	< 0.01	0.031
	16-Jul-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.41	< 0.001	0.002	< 0.0001	0.003	< 0.01	< 0.01	0.031
	19-Aug-21	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.62	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.047
	22-Sep-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.72	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.042
	14-Oct-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.69	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.037
	15-Dec-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.92	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.036
	16-Jan-22	< 0.001								0.93	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.028
	14-Aug-20	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.08	< 0.0001	0.008	< 0.0001	0.008	< 0.01	< 0.01	0.022
	16-Oct-20	< 0.001								0.51	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.006
	16-Nov-20	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.17	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.005
	16-Dec-20	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.33	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.005
	14-Jan-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.31	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.007
	17-Dec-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.31	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.019
	16-Jan-22	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.31	< 0.001	0.002	< 0.0001	0.003	< 0.01	< 0.01	0.032
	17-Apr-22	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.14	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.041
	15-May-20	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.17	< 0.001	0.004	< 0.0001	0.006	< 0.01	< 0.01	0.028
	19-Jun-20	< 0.001								0.9	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.057
	16-Jul-20	< 0															

Table 3
Groundwater Analytical Data - PNS
Williamson Sand Syncline

Analyte	Perfluoralkyl Sulfonic Acids												Perfluoralkyl Carboxylic Acids												(S-2) Fluorosulfone Sulfonic Acids				(S-2) Fluorosulfone sulfonic acid (S-2 PTS)				Sum of PFAS			
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPS)	Perfluorobutane sulfonic acid (PFHxS)	Perfluoropentane sulfonic acid (PFHxP)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobacemic acid (PFBA)	Perfluoropentafluoropropionic acid (PFPPA)	Perfluorooctanoic acid (PFOA)	Perfluorobutanoic acid (PFBA)	Perfluoropentafluorobutyric acid (PFPTBA)	Perfluorooctadecaacid (PFODA)	Perfluorobutadecaacid (PFODB)	Perfluorooctadecaacid (PFODA)	Perfluorobutadecaacid (PFODB)	NMethylperfluorooctane sulfonic acid (MeFOA)	NMethylperfluorooctane sulfonic acid (MeFOB)	NMethylperfluorooctane sulfonic acid (MeFOA)	NMethylperfluorooctane sulfonic acid (MeFOB)	NMethylperfluorooctane sulfonic acid (MeFOA)	NMethylperfluorooctane sulfonic acid (MeFOB)	NMethylperfluorooctane sulfonic acid (MeFOA)	NMethylperfluorooctane sulfonic acid (MeFOB)	4,2 Fluorosulfone sulfonic acid (4,2 PTS)	4,2 Fluorosulfone sulfonic acid (4,2 PTS)	Sum of PFHxs	Sum of PFOS	Sum of DER Lats	Sum of PFAS								
LDR Units	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Adapted Site Specific Trigger Values (20MP 2021)																																				
Sample Name	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
Sample Date	09/03/2021												09/03/2021												09/03/2021				09/03/2021				09/03/2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021				HWRNMP 2021			
	HWRNMP 2021												HWRNMP 2021												HWRNMP 2021				HWRNMP 2021							

Table 3
Groundwater Analytical Data - PFAS
 MLLs measured at each Groundwater Monitoring Well

Notes



Table 4
Groundwater Analytical Data - Inorganics
Willamette Sand Syndicate



Analyte	Anions and Cations															Alkalinity						Inorganics					
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	pH	Turbidity
LOR 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	meq/L	meq/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	pH units	NTU
Adopted Site Specific Trigger Values (SWMP 2021)*	77	5	11	2	70	148	0.2		2	3	50		0.5	5.9									500			4.26.5	
NHPCD ADP 2018																											
Sample Name / Sample Date																											
24-Feb-22	30	< 1.0	4.0	< 1.0	10	61	< 0.1	0.11	< 0.01	0.02	0.02	0.04	0.4	0.4	1.63	1.93		3.1	< 1.0	< 1.0	< 1.0	< 1.0	16	241	157	3.92	-
12-Apr-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33	-	
27-May-22	-	-	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 4
Groundwater Analytical Data - Inorganics
Willamette Sand Syndicate

Analyte	Anions and Cations															Alkalinity						Inorganics						
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	pH	Turbidity	
LOR Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units	NTU	
Adopted Site Specific Trigger Values (SWMP 2021*)	77	5	11	2	70	148	0.2			2						0.5	5.9							500		4.265		
Sample Name	Site Sample Date																											
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	3.16	< 1.0	< 1.0	< 1.0	20	213	196	4.76	-	
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1												< 1.0	< 1.0	< 1.0	25	271	212	4.73	-	
	15-Mar-19	38	< 1.0	5.0	2.0	17	62	0.1												< 1.0	< 1.0	< 1.0	25	265	185	4.51	-	
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	3.26	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87	
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1												< 1.0	< 1.0	< 1.0	16	213	138	145	4.91	
	15-Jun-19	34	< 1.0	4.0	2.0	12	56	0.1												< 1.0	< 1.0	< 1.0	20	223	151	164	5.0	
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1												8.0	< 1.0	< 1.0	16	232	151	168	5.53	
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1		0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86	2.79	5.0	< 1.0	< 1.0	16	222	144	181	5.07	
	17-Oct-19	34	< 1.0	5.0	2.0	12	64	0.2												< 1.0	< 1.0	< 1.0	20	223	154	4.93	-	
	18-Nov-19	31	< 1.0	5.0	1.0	15	56	0.1		0.02	< 0.01	< 0.01	< 0.01	0.17	0.5	0.5	1.78	1.89	2.89	< 1.0	< 1.0	< 1.0	20	239	155	4.97	-	
	17-Dec-19	26	< 1	5	1	15	44	< 0.1									1.57	1.59	2.0	< 1	< 1	< 1	20	210	136	5.27	-	
	18-Dec-19	27	< 1	5	1	15	45	0.2									1.53	1.52	2.0	< 1	< 1	< 1	16	202	131	5.27	-	
	27-Feb-20	23	< 1	4	1	11	42	< 0.1		0.06	< 0.01	< 0.01	< 0.01	0.22	0.8	0.8	1.36	1.41	2.38	< 1	< 1	< 1	16	194	126	4.77	-	
	26-Mar-20	25	< 1	4	1	18	44	< 0.1									1.44	1.24	2.14	< 1	< 1	< 1	16	199	129	4.92	-	
	17-Apr-20	28	< 1	2	2	12	52	0.1									1.43	1.35	4	< 1	< 1	< 1	4	227	154	5.15	-	
	15-May-20	27	< 1	3	2	5	47	< 0.1		0.03	0.01	0.01	0.01	0.26	1.1	1.1	1.47	1.51	3.18	4	< 1	< 1	4	12	244	159	5.17	-
	19-Jun-20	27	< 1	3	2	1	44	< 0.1									1.47	1.34	4	< 1	< 1	< 1	4	152	125	5.16	-	
	14-Aug-20	30	< 1	4	2	4	60	0.1		0.09	< 0.01	0.01	0.01	0.3	1.2	1.2	1.68	1.84	3.1	3	< 1	< 1	3	16	233	151	169	5.18
	16-Sep-20	33	< 1.0	5.0	2.0	12	62	0.2									1.9	2.0	2.0	< 1.0	< 1.0	< 1.0	20	248	163	149	4.81	
	17-Oct-20	34	< 1.0	5.0	2.0	12	64	0.2									1.94	1.99	2.0	< 1.0	< 1.0	< 1.0	20	243	155	4.87	-	
	16-Nov-20	30	< 1.0	5.0	2.0	9.0	54	0.1		0.01	< 0.01	< 0.01	< 0.01	0.3	0.6	0.6	1.77	1.71	2.79	< 1.0	< 1.0	< 1.0	20	245	159	168	4.57	
	15-Dec-20	30	< 1.0	5.0	2.0	10	59	0.1									1.93	1.87	2.0	< 1.0	< 1.0	< 1.0	20	245	155	168	4.57	
	14-Jan-21	31	< 1.0	5.0	2.0	10	63	0.1									1.81	1.98	2.0	< 1.0	< 1.0	< 1.0	20	267	174	4.62	-	
	16-Feb-21	34	< 1.0	6.0	2.0	12	64	< 0.1		0.01	< 0.01	< 0.01	< 0.01	0.3	0.6	0.6	2.02	2.06	2.9	< 1.0	< 1.0	< 1.0	25	270	176	161	4.54	
	17-Mar-21	35	< 1.0	6.0	2.0	10	69	0.1									1.9	1.9	2.15	< 1.0	< 1.0	< 1.0	25	279	203	171	4.59	
	22-Apr-21	39	< 1.0	8.0	2.0	11	78	0.2		0.04	< 0.01	0.01	0.01	0.21	0.5	0.5	2.4	2.43	3.12	< 1.0	< 1.0	< 1.0	33	318	227	222	4.43	
	19-May-21	42	< 1.0	8	2	17	77	0.2									2.64	2.63	3.12	< 1.0	< 1.0	< 1.0	33	341	222	189	4.89	
	16-Jun-21	29	< 1.0	6	2	15	59	0.2									1.89	1.95	2.05	< 1.0	< 1.0	< 1.0	25	252	152	182	4.84	
	15-Jul-21	28	< 1.0	4.0	1.0	15	59	0.2									1.89	1.95	2.05	< 1.0	< 1.0	< 1.0	16	187	152	140	4.92	
	19-Aug-21	30																										
	12-Sep-21	17	< 1.0	2.0	1.0	8.0	25	< 0.1		0.12	< 0.01	0.02	0.02	0.08	1.0	1.0	0.93	0.87	2.4	< 1.0	< 1.0	< 1.0	8.0	124	81	4.43	-	
	12-Apr-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33		
	27-May-22	-	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Table 4
Groundwater Analytical Data - Inorganics
Willamette Sand Syndicate



Analyte	Anions and Cations																		Alkalinity									
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	pH	Turbidity		
LOR Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	NTU		
Adopted Site Specific Trigger Values (SWMP 2021)*	77	5	11	2	70	148	0.2	-	-	2	-	-	-	-	0.5	5.9	-	-	-	-	-	-	-	500	-	4.265		
Sample Name, Start Date	-	-	-	-	-	-	-	-	-	3	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	0.5	2.4	2.4	-	-	4.44	< 1.0	< 1.0	< 1.0	25	352	258	-	-			
14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	-	-	2.45	2.27	< 1.0	< 1.0	25	319	253	4.77	-		
15-Mar-19	53	< 1.0	6.0	< 1.0	5.0	59	< 0.1	-	-	-	-	-	-	-	-	-	-	2.68	2.48	< 1.0	< 1.0	29	324	233	4.76	-		
16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	-	< 0.01	< 0.01	0.12	0.4	0.4	-	-	2.37	2.43	4.86	1.0	< 1.0	1.0	16	302	196	4.9	-	
14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	99	< 0.1	-	-	-	-	-	-	-	-	-	2.46	2.59	< 1.0	< 1.0	20	315	205	4.82	-			
15-Aug-19	57	< 1.0	6.0	< 1.0	70	121	< 0.1	-	-	-	-	-	-	-	-	-	2.69	2.87	26	-	-	-	-	323	236	4.73	-	
16-Sep-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	-	-	2.07	1.86	-	< 1.0	< 1.0	12	260	169	140	5.0		
14-Oct-19	46	< 1.0	3.0	< 1.0	4.0	70	< 0.1	< 0.01	0.43	< 0.01	< 0.01	0.13	1.1	1.1	-	-	2.25	2.06	5.43	< 1.0	< 1.0	< 1.0	12	293	190	206	4.85	
15-Nov-19	45	< 1.0	3.0	< 1.0	4.0	70	< 0.1	-	-	-	-	-	-	-	-	-	2.29	2.05	< 1.0	< 1.0	15	323	237	197	5.03			
16-Nov-19	49	< 1.0	4.0	< 1.0	8.0	80	< 0.1	< 0.01	0.58	< 0.01	< 0.01	0.01	0.17	1.3	-	-	2.46	2.42	5.06	< 1.0	< 1.0	< 1.0	16	316	205	5.12	-	
17-Dec-19	50	< 1	4	< 1	10	75	< 0.1	-	-	-	-	-	-	-	-	-	2.5	2.36	< 1	< 1	2	316	213	5.02	-			
18-Jan-20	49	< 1	4	< 1	10	75	< 0.1	-	-	-	-	-	-	-	-	-	2.5	2.36	< 1	< 1	7	318	207	5.03	-			
27-Feb-20	34	< 1	4	< 1	14	54	< 0.1	< 0.01	0.14	< 0.01	< 0.01	0.05	0.6	0.6	-	-	1.72	1.81	4.01	< 1.0	< 1.0	< 1.0	12	250	162	4.57	-	
26-Mar-20	30	< 1	3	< 1	16	50	< 0.1	-	-	-	-	-	-	-	-	-	1.55	1.74	-	< 1.0	< 1.0	14	221	144	4.76	-		
15-Apr-20	28	< 1	4	< 1	16	50	< 0.1	-	-	-	-	-	-	-	-	-	1.55	1.74	-	< 1	< 1	16	221	144	4.54	-		
15-May-20	32	< 1	4	< 1	14	59	< 0.1	< 0.01	0.18	< 0.01	< 0.01	0.02	0.6	0.8	-	-	1.72	2	3.31	< 1	< 1	< 1	2	16	250	162	4.93	-
19-Jun-20	48	< 1	5	< 1	9	74	< 0.1	-	-	-	-	-	-	-	-	-	2.5	2.28	< 1	< 1	1	20	318	207	4.89	-		
14-Jul-20	55	< 1	4	< 1	9	102	< 0.1	< 0.01	0.1	< 0.01	< 0.01	0.01	0.14	0.7	-	-	3.1	3.2	5.58	2	< 1	< 1	2	16	367	238	236	5.16
16-Aug-20	58	< 1	4.0	< 1.0	9.0	109	< 0.1	-	-	-	-	-	-	-	-	-	2.9	2.57	-	< 1.0	< 1.0	16	391	254	216	4.79		
17-Sep-20	43	< 1	4.0	< 1.0	10	76	< 0.1	< 0.01	0.14	< 0.01	< 0.01	0.13	0.6	0.6	-	-	2.58	2.35	4.1	< 1.0	< 1.0	< 1.0	25	341	222	212	4.75	
18-Oct-20	48	< 1	6.0	< 1.0	10	76	< 0.1	< 0.01	0.14	< 0.01	< 0.01	0.13	0.6	0.6	-	-	2.58	2.35	4.1	< 1.0	< 1.0	< 1.0	25	341	222	212	4.75	
19-Nov-20	45	< 1	6.0	< 1.0	14	59	< 0.1	-	-	-	-	-	-	-	-	-	2.5	2.36	4.1	< 1.0	< 1.0	< 1.0	16	326	205	205	4.76	
14-Dec-20	44	< 1	6.0	< 1.0	13	77	< 0.1	-	-	-	-	-	-	-	-	-	2.32	2.44	4.27	< 1.0	< 1.0	< 1.0	20	317	205	184	4.68	
15-Jan-21	24	< 1	3.0	< 1.0	9.0	106	< 0.1	< 0.01	0.14	< 0.01	< 0.01	0.12	0.6	0.6	-	-	1.37	1.52	4.27	< 1.0	< 1.0	< 1.0	15	196	127	142	4.96	
16-Jan-21	25	< 1	3.0	< 1.0	10	104	< 0.1	< 0.01	0.14	< 0.01	< 0.01	0.15	5.1	5.1	-	-	1.38	1.52	4.28	< 1.0	< 1.0	< 1.0	15	196	127	142	4.96	
22-Apr-21	22	< 1	3.0	< 1.0	12	65	< 0.1	< 0.01	0.14	< 0.01	< 0.01	0.11	0.8	0.8	-	-	2.02	1.86	4.03	< 1.0	< 1.0	< 1.0	16	278	193	163	4.71	
15-May-21	22	< 1	3.0	< 1.0	12	65	< 0.1	< 0.01	0.14	< 0.01	< 0.01	0.11	0.8	0.8	-	-	2.02	1.86	4.03	< 1.0	< 1.0	< 1.0	16	278	193	163	4.71	
27-Apr-21	55	< 1.0	5.0	< 1.0	54	70	< 0.1	< 0.01	0.3	< 0.01	< 0.01	0.08	0.6	0.6	-	-	2.02	1.75	4.0	< 1.0	< 1.0	< 1.0	26	225	146	5.3	-	
27-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
14-Aug-20	10	< 1.0	5.0	< 1.0	7	57	< 0.1	< 0.01	0.07	< 0.01	< 0.01	0.21	0.21	1.0	-	-	2.21	2.06	1.69	-	-	-	-	80	60	57	-	
15-Aug-20	35	< 1.0	5.0	< 1.0	41	38	< 0.1	< 0.01	0.07	< 0.01	< 0.01	0.21	1.0	1.0	-	-	2.21	2.06	1.69	-	-	-	-	80	60	57	-	
16-Oct-20	32	3.0	6.0	1.0	33	48	< 0.1	-	-	-	-	-	-	-	-	-	2.06	2.06	1.6	< 1.0	< 1.0	1.0	32	237	154	-		
16-Nov-20	23	3.0	6.0	1.0	32	49	< 0.1	< 0.01	0.11	< 0.01	< 0.01	0.23	2.8	2.8	-	-	2.16	2.0	1.6	< 1.0	< 1.0	1.0	21	195	142	-		
16-Dec-20	23	1.0	3.0	0.9	30	47	< 0.1	< 0.01	0.11	< 0.01	< 0.01	0.15	5.1	5.1	-	-	1.32	1.33	1.61	< 1.0	< 1.0	< 1.0	15	196	142	-		
16-Jan-21	24	1.0	3.0	0.9	15	43	< 0.1	< 0.01	0.11	< 0.01	< 0.01	0.15	5.1	5.1	-	-	1.37	1.52	1.61	< 1.0	< 1.0	< 1.0	15	196	142	-		
16-Feb-21	22	1.0	3.0	0.9	12	35	< 0.1	< 0.01	0.12	< 0.01	< 0.01	0.15	0.7	0.7	-	-	1.42	1.4	2.82	< 1.0	< 1.0	< 1.0	15	196	142	-		
16-Mar-21	22	1.0	3.0	0.9	12	35	< 0.1	< 0.01	0.12	< 0.01	< 0.01	0.15	0.7	0.7	-	-	1.42	1.4	2.82	< 1.0	< 1.0	< 1.0	15	196	142	-		
16-Apr-21	22	1.0	3.0	0.9	12	35	< 0.1	< 0.01	0.12	< 0.01	< 0.01	0.15	0.7	0.7	-	-	1.42	1.4	2.82	< 1.0	< 1.0	< 1.0	15	196	142	-		
16-May-21	26	< 1	2	1.0	2.0	52	< 0.1	< 0.01	0.03	< 0.01	< 0.01	0.06	0.6	0.6	-	-	1.67	1.68	1.6	< 1.0	< 1.0	< 1.0	16	186	144	4.82		
16-Jun-21	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	< 0.01	0.01	< 0.01	< 0.01	0.12	0.4	0.4	-	-	1.8	1.65	1.6	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99	
16-Jul-21	26	< 1	2	1	2	41	< 0.1	-	-	-	-	-	-	-	-	-	1.59	1.64	1.64	< 1.0	< 1.0	< 1.0	16	186	144	5.01		
16-Aug-21	29	< 1	2	1	2	41	< 0.1	-	-	-	-	-	-	-	-	-	1.69	1.64	1.64	< 1.0	< 1.0	< 1.0	16	186	144	5.01		
16-Sep-21	29	< 1	2	1	2	41	< 0.1	-	-	-	-	-																

Table 4
Groundwater Analytical Data - Inorganics
Willowtown Sand Syndicate



Analyte	Anions and Cations															Alkalinity						Inorganics				
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	pH	Turbidity
LOR Units	1 mg/L	1 mg/L	1 mg/L	1 mg/L	1 mg/L	0.1 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.1 mg/L	0.01 mg/L	0.01 meq/L	0.01 meq/L	%	0.01 mg/L	1 mg/L	1 mg/L	1 mg/L	1 mg/L	10 μS/cm	1 mg/L	0.01 pH units	0.1 NTU	
Adopted Site Specific Trigger Values (SWMP 2021)*	77	5	11	2	70	148	0.2		2					0.5	5.9								500		4.26.5	
Normal ADWG 2018										3	50															
Sample Name: Sample Date:																										

Bold indicates a c

* Soil and Water M

Table 5
Surface Water Analytical Data - BTEX
Williamtown Sand Syndicate



Table 5
Surface Water Analytical Data - BTEX
Williamtown Sand Syndicate



Notes:

Not analysed
< Less than lab
μg/L Microgram
BTEXN Benzene
1 Soil and Water
** 95% Level of

** 95% Level of

Table 6
Surface Water Analytical Data - Metals
Williamstown Sand Syndicate



Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ¹	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury** ²	Nickel**	Selenium**	Vanadium	Zinc**
LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
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
Adopted Site Specific Trigger Values (SWMP 2021) ³	0.006	0.08	0.002	0.1	0.0002	0.004	0.006	0.033	7.25 (32 for SW3 & SW4)	0.003	0.841	0.0001	0.02	0.01	0.01	0.535	
NHMRCC ADWG 2018	0.01		0.06	4	0.002	0.05		2		0.01	0.5	0.001	0.02	0.01			
Sample Name	Sample Date																
SW1	22-Feb-19								Dry								
	14-Mar-19																
	23-Apr-19	< 0.001	0.043	< 0.001	0.14	< 0.0001	< 0.001	0.017	0.002	4.16	< 0.001	0.841	< 0.0001	0.02	< 0.01	< 0.01	0.356
	16-May-19	< 0.001	0.029	< 0.001	0.1	< 0.0001	< 0.001	0.01	0.003	7.25	< 0.001	0.666	< 0.0001	0.012	< 0.01	< 0.01	0.077
	14-Jun-19	< 0.001	0.029	< 0.001	0.09	0.0002	< 0.001	0.009	0.006	2.75	< 0.001	0.595	< 0.0001	0.011	< 0.01	< 0.01	0.535
	16-Jul-19	< 0.001	0.032	< 0.001	0.08	0.0001	< 0.001	0.007	0.003	1.86	< 0.001	0.59	< 0.0001	0.008	< 0.01	< 0.01	0.239
	15-Aug-19	< 0.001	0.027	< 0.001	0.09	< 0.0001	< 0.001	0.005	0.003	2.15	< 0.001	0.482	< 0.0001	0.005	< 0.01	< 0.01	0.075
	16-Sep-19	< 0.001	0.056	< 0.001	0.09	0.0002	0.001	0.008	0.012	2.45	0.001	0.587	< 0.0001	0.014	< 0.01	< 0.01	0.282
	15-Oct-19	< 0.001	0.036	< 0.001	0.07	< 0.0001	< 0.001	0.005	0.003	1.61	< 0.001	0.383	< 0.0001	0.005	< 0.01	< 0.01	0.055
	18-Nov-19	< 0.001	0.042	< 0.001	0.11	< 0.0001	0.001	0.003	< 0.001	1.14	< 0.001	0.366	< 0.0001	0.003	< 0.01	< 0.01	0.026
	17-Dec-19																
	16-Jan-20																
	27-Feb-20	0.002	0.029	< 0.001	0.06	< 0.0001	0.006	0.002	0.026	1.67	0.002	0.211	< 0.0001	0.009	< 0.01	< 0.01	0.061
	26-Mar-20	0.002	0.013	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.011	0.1	0.001	0.018	< 0.0001	0.005	< 0.01	< 0.01	0.028
	27-Apr-20	< 0.001				< 0.0001	0.004		0.016	0.2	0.003	0.012	< 0.0001				0.041
	15-May-20	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.018	0.15	0.001	0.014	< 0.0001	0.005	< 0.01	< 0.01	0.031
	19-Jun-20	< 0.001				< 0.0001		0.01		0.17	0.001	0.011	< 0.0001				0.042
	16-Jul-20	< 0.001				< 0.0001		0.002	< 0.5	< 0.001	0.003	< 0.0001					< 0.005
	14-Aug-20	< 0.001	0.016	< 0.001	< 0.05	< 0.0001	< 0.001	0.006	0.18	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.01	0.063
	16-Sep-20	< 0.001	0.021	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.005	0.87	0.001	0.096	< 0.0001	0.002	< 0.01	< 0.01	0.061
	16-Oct-20	0.001	0.021	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	0.001	0.76	< 0.001	0.15	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Nov-20	< 0.001	0.02	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.005	0.18	< 0.001	0.017	< 0.0001	< 0.001	< 0.01	< 0.01	0.03
	16-Dec-20	< 0.001	0.015	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.18	< 0.001	0.058	< 0.0001	< 0.001	< 0.001	< 0.01	< 0.01	0.013
	14-Jan-21	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.02	0.35	< 0.001	0.04	< 0.0001	0.006	< 0.01	< 0.01	0.037
	16-Feb-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.12	< 0.001	0.028	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.01	0.024
	17-Mar-21	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.16	< 0.001	0.036	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.01	0.04
	22-Apr-21	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	6.38	< 0.001	0.078	< 0.0001	0.003	< 0.01	< 0.01	0.017
	20-May-21	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.001	0.001	< 0.001	3.59	< 0.001	0.07	< 0.0001	0.002	< 0.01	< 0.01	0.022
	18-Jun-21	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	1.51	< 0.001	0.052	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.01	0.068
	15-Jul-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.039	1.16	< 0.001	0.045	< 0.0001	0.001	< 0.01	< 0.01	0.041
	19-Aug-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.002	0.86				0.002			0.056
	16-Nov-21	< 0.001	0.006		< 0.05		< 0.0001	< 0.001	0.002	1.0				0.001			0.036
	24-Feb-22	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.12	< 0.001	0.025	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.01	0.014
	12-Apr-22								No Analyses								
	27-May-22	< 0.001	0.01		< 0.05		0.003	0.001	< 0.001	4.39				0.002			0.047
SW2	22-Feb-19																
	14-Mar-19																
	23-Apr-19																
	16-May-19																
	14-Jun-19																
	16-Jul-19																
	15-Aug-19																
	16-Sep-19																
	15-Oct-19																
	18-Nov-19																
	17-Dec-19																
	16-Jan-20																
	27-Feb-20																
	26-Mar-20																
	27-Apr-20																
	15-May-20																
	19-Jun-20																
	16-Jul-20																
	14-Aug-20																
	16-Sep-20																
	16-Oct-20																
	16-Nov-20																
	16-Dec-20																
	14-Jan-21																
	16-Feb-21																
	17-Mar-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	0.002	< 0.001	0.62	< 0.001	0.11	< 0.0001	0.004	< 0.01	< 0.01	0.097
	22-Apr-21	0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	4.45	< 0.001	0.061	< 0.0001	0.003	< 0.01	< 0.01	0.095
	20-May-21	0.001	0.002	< 0.001	< 0.05	< 0.0001	0.001	0.002	0.028	1.99	< 0.001	0.016	< 0.0001	0.003	< 0.01	< 0.01	0.038
	18-Jun-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.0001	0.0001	0.0001	1.58	< 0.001	0.017	< 0.0001	0.001	< 0.01	< 0.01	0.058
	15-Jul-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	0.002	< 0.001	0.39	< 0.001	0.041	< 0.0001	0.002	< 0.01	< 0.01	0.081
	19-Aug-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	0.001	0.001	0.55	< 0.001	0.045	< 0.0001	0.002	< 0.01	< 0.01	0.022
	22-Sep-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.11	< 0.001	0.087	< 0.0001	0.005	< 0.01	< 0.01	0.134
	13-Oct-21	< 0.001	0.004	&													

Table 6
Surface Water Analytical Data - Metals
Williamstown Sand Syndicate



Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ¹	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury** ²	Nickel**	Selenium**	Vanadium	Zinc**
LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
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
Adopted Site Specific Trigger Values (SWMP 2021) ³	0.006	0.08	0.002	0.1	0.0002	0.004	0.006	0.033	7.25 (32 for SW3 & SW4)	0.003	0.841	0.0001	0.02	0.01	0.01	0.535	
NHMRG ADWG 2018	0.01		0.06	4	0.002	0.05		2		0.01	0.5	0.001	0.02	0.02	0.01		
Sample Name	Sample Date																
SW3	22-Feb-19	0.003	0.075	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	4.84	< 0.001	0.033	< 0.0001	0.002	< 0.01	< 0.01	0.016
	14-Mar-19	0.006	0.08	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	9.26	< 0.001	0.048	< 0.0001	0.002	< 0.01	< 0.01	0.009
	23-Apr-19	< 0.001	0.043	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.001	2.01	< 0.001	0.046	< 0.0001	0.004	< 0.01	< 0.01	0.016
	16-May-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.78	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.012
	14-Jun-19	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	0.001 *	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
	16-Jul-19	< 0.001	0.055	< 0.001	< 0.05	< 0.0001	< 0.001	0.007	0.002	1.25	< 0.001	0.043	< 0.0001	0.006	< 0.01	< 0.01	0.029
	15-Aug-19	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.002	1.16	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.013
	16-Sep-19	< 0.001	0.045	< 0.001	< 0.05	< 0.0001	< 0.001	0.004	0.02	0.69	0.001	0.036	< 0.0001	0.017	< 0.01	< 0.01	0.094
	15-Oct-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.005	0.002	1.7	< 0.001	0.027	< 0.0001	0.005	< 0.01	< 0.01	0.022
	18-Nov-19	< 0.001	0.031	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.6	< 0.001	0.026	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	17-Dec-19	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.003	1.42	< 0.001	0.026	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Jan-20																
	27-Feb-20	0.002	0.051	< 0.001	< 0.05	< 0.0001	< 0.001	0.006	0.008	6	< 0.001	0.054	< 0.0001	0.01	< 0.01	< 0.01	0.049
	26-Mar-20	0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	0.013	4.01	< 0.001	0.035	< 0.0001	0.006	< 0.01	< 0.01	0.033
	27-Apr-20	0.001				< 0.0001	< 0.001			4.01	0.003	0.034	< 0.0001				0.031
	15-May-20	< 0.001	0.038	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	0.02	0.87	< 0.001	0.036	< 0.0001	0.007	< 0.01	< 0.01	0.037
	19-Jun-20	< 0.001						0.0001		0.015	2.9	0.001	0.04	< 0.0001			0.092
	16-Jul-20	< 0.001							0.001		0.006	1.6	< 0.001	0.036	< 0.0001		0.043
	14-Aug-20	< 0.001	0.024	< 0.001	< 0.05	< 0.0001	< 0.001	0.004	0.001	4.28	< 0.001	0.034	< 0.0001	0.005	< 0.01	< 0.01	0.025
	16-Sep-20	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.007	0.007	3.49	< 0.001	0.029	< 0.0001	0.007	< 0.01	< 0.01	0.031
	16-Oct-20	< 0.001	0.028	< 0.001	< 0.05	< 0.0001	< 0.001	0.004	0.003	7.09	< 0.001	0.027	< 0.0001	0.004	< 0.01	< 0.01	0.019
	16-Nov-20	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	0.009	0.002	4.79	< 0.001	0.032	< 0.0001	0.009	< 0.01	< 0.01	0.03
	16-Dec-20	0.002	0.015	< 0.001	< 0.05	< 0.0001	0.001	0.002	0.005	16	< 0.001	0.023	< 0.0001	0.004	< 0.01	< 0.01	0.054
	14-Jan-21	0.002	0.015	< 0.001	< 0.05	< 0.0001	0.004	0.02	8.28	< 0.001	0.026	< 0.0001	0.01	< 0.01	< 0.01	< 0.025	
	16-Feb-21	0.004	0.014	< 0.001	< 0.05	< 0.0001	0.002	0.003	11	< 0.001	0.015	< 0.0001	0.004	< 0.01	< 0.01	0.011	
	17-Mar-21	0.004	0.013	< 0.001	< 0.05	< 0.0001	0.001	0.002	< 0.001	12	< 0.001	0.016	< 0.0001	0.003	< 0.01	< 0.01	0.007
	22-Apr-21	0.006	0.008	< 0.001	< 0.05	< 0.0001	0.003	0.006	< 0.001	28	< 0.001	0.026	< 0.0001	0.006	< 0.01	< 0.01	0.01
	20-May-21	0.005	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	25.4	< 0.001	0.024	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	18-Jun-21	0.001	0.003	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	10.5	< 0.001	0.024	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	15-Jul-21	0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	12.6	< 0.001	0.028	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	19-Aug-21	0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	7.14				< 0.001			< 0.005
	16-Nov-21	0.001	0.006	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	4.89				< 0.001			< 0.005
	24-Feb-22	0.004	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	10.2	< 0.001	0.015	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	12-Apr-22																
	27-May-22	< 0.001	0.021	< 0.05		< 0.001	0.001	< 0.001	0.001	13			0.002				< 0.005
SW4	22-Feb-19																
	14-Mar-19																
	23-Apr-19	< 0.001	0.059	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.003	2.09	< 0.001	0.037	< 0.0001	0.005	< 0.01	< 0.01	0.03
	16-May-19	< 0.001	0.047	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.12	< 0.001	0.03	< 0.0001	0.003	< 0.01	< 0.01	0.019
	14-Jun-19	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.003	0.79	< 0.001	0.034	< 0.0001	0.003	< 0.01	< 0.01	0.014
	16-Jul-19	< 0.001	0.044	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.002	0.96	< 0.001	0.043	< 0.0001	0.003	< 0.01	< 0.01	0.014
	15-Aug-19	< 0.001	0.04	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	0.001	0.57	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	0.009
	16-Sep-19	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	< 0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
	15-Oct-19	< 0.001	0.037	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.004	0.66	< 0.001	0.031	< 0.0001	0.003	< 0.01	< 0.01	0.018
	18-Nov-19	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	17-Dec-19																
	16-Jan-20																
	27-Feb-20	< 0.001	0.054	< 0.001	< 0.05	< 0.0001	< 0.001	0.002 </td									

Table 8
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate

Analyte	Anions and Cations																Alkalinity						Inorganics			pH				
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids			
LOR	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	1	1	1	1	1	1	1	1	1	1	10	0.01		
U/I%	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	meq/L	meq/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units		
Adopted Site Specific Trigger Values (SWMP 2021)*	142	40	52	8	324	234	1.5		0.17		3	50		0.2	5.9										500		4.265			
NHMRC ADWG 2018																														
Sample Name	Sample Date																													
22-Feb-19																														
14-Mar-19																														
23-Apr-19	94	34	52	6.0	310	95	0.5		< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.53	5.5	2.45	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01		
14-May-19	86	24	42	6.0	324	12	0.5		< 0.01							7.27	6.95	2.26	< 1.0	< 1.0	< 1.0	< 1.0	176	847	550	512	4.45			
15-Jun-19	77	20	34	5.0	242	112	0.4									7.9	8.66	4.64	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42			
15-Jul-19	90	20	35	4.0	240	130	0.4									7.85	8.19	2.12	< 1.0	< 1.0	< 1.0	< 1.0	177	813	518	548	4.53			
15-Aug-19	97	18	32	4.0	212	134	0.4									8.82	8.03	4.68	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	532	4.32			
16-Sep-19	117	21	39	4.0	244	193	0.7		< 0.01	0.05	< 0.01	0.02	< 0.01	1.2	1.2	9.45	11	3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	702	689	4.32			
15-Oct-19	124	16	31	3.0	127	191	0.6									8.82	8.03	4.68	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	532	5.32			
18-Nov-19	142	14	30	4.0	165	234	0.5		< 0.01	0.02	< 0.01	< 0.01	< 0.01	1.1	1.1	9.45	10	4.91	< 1.0	< 1.0	< 1.0	< 1.0	158	1,090	708	506				
17-Dec-19																														
16-Jan-20																														
22-Feb-20	56	34	10	8.0	72	64	0.4		< 0.01	0.17	< 0.05	< 0.05	< 0.05	0.16	2.4	2.4	5.16	4.53	5.91	2.17	63	< 1.0	62	126	550	358	6.32			
26-Mar-20	27	7	2	4.0	6.0	11	0.1									2.44	2.45	5	54	< 1.0	< 1.0	51	77	234	152	7.09				
27-Apr-20	12	13	1	5.0	18	12	0.3									1.38	1.51	40	< 1.0	< 1.0	40	36	163	106	6.94					
15-May-20	9.0	18	1.0	3.0	29	8.0	< 0.1	0.05	0.17	0.02	0.33	0.35	0.07	1.4	1.0	1.45	1.63	0.56	40	49	178	116	7.06							
19-Jun-20	7.0	21	1.0	2.0	8.0	7.0	< 0.1									1.48	1.52	58	< 1.0	< 1.0	58	56	159	103	6.68					
16-Jul-20	7.0	16	1.0	2.0	6.0	7.0	< 0.1									1.24	1.34	51	< 1.0	< 1.0	51	44	133	86	6.89					
14-Aug-20	6.0	8.0	2.0	2.0	< 10	8.0	< 0.1		< 0.01	0.04	0.01	0.01	0.02	< 0.1	0.7	0.7	0.88	0.64	0.49	21	< 1	21	28	82	53	98	6.21			
16-Sep-20	9.0	16	3.0	3.0	< 1.0	1.0	0.1	0.1								1.51	1.1	55	< 1.0	< 1.0	55	52	137	89	152	6.5				
18-Oct-20	12	40	4.0	4.0	< 1.0	16	0.2									2.95	2.69	112	< 1.0	< 1.0	112	116	268	174	7.29					
16-Nov-20	8.0	15	2.0	3.0	< 1.0	10	0.1									1.24	0.9	54	< 1.0	< 1.0	42	42	137	82	95	6.5				
16-Dec-20	19	2.0	3.0	3.0	< 1.0	12	0.1									1.62	1.68	62	< 1.0	< 1.0	62	56	171	111	7.01					
14-Jan-21	10	18	2.0	3.0	< 1.0	13	0.1									1.57	1.46	55	< 1.0	< 1.0	55	53	154	100	6.71					
16-Feb-21	10	15	2.0	3.0	< 1.0	12	0.1		< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.5	0.5	1.42	1.36	0.64	51	< 1.0	< 1.0	51	46	141	92	115	6.93			
17-Mar-21	10	15	2.0	2.0	< 1.0	13	0.1									1.4	1.26	45	< 1.0	< 1.0	45	46	139	90	6.63					
22-Apr-21	37	7.0	4.0	2.0	< 10	65	0.1									2.34	1.83	< 1.0	< 1.0	< 1.0	34	280	182	4.72						
20-May-21	32	6	3	2	< 10	56	< 0.1		< 0.05	< 0.05	< 0.10	< 0.10	< 0.10	< 0.01	1.3	1.3	1.99	1.70	2.66	6	< 1.0	< 1.0	6	27	254	165	232	5.16		
18-Jun-21	31	7	3	2	< 1.0	56	< 0.1									2.00	2.22	32	< 1.0	< 1.0	32	30	213	138	236	5.76				
15-Jul-21	26	5.0	3.0	2.0	< 10	52	0.2									1.68	1.49	1.0	< 1.0	< 1.0	1.0	25	186	121	199	5.36				
16-Aug-21	3.0	2.0	2.0	2.0	< 1.0	10	< 0.1		0.11	< 0.01	< 0.01	< 0.01	0.02	1.0	1.0	0.92	0.8	0.47	26	< 1.0	< 1.0	26	31	89	58	6.38				
24-Apr-22	6.0	9.0	2.0	2.0	< 1.0	10	< 0.1		0.11	< 0.01	< 0.01	< 0.01	0.02	1.0	1.0	1.0	0.92	0.8	0.47	26	< 1.0	< 1.0	26	31	89	58	6.38			
13-Aug-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27-May-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	3.38	11	< 1.0	< 1.0	11	26	262	228	6.21				
14-May-19	45	6.0	6.0	2.0	44	64	< 0.1									2.8	2.8	4.0	< 1.0	< 1.0	4.0	45	344	224	279	5.42				
20-May-19	11	< 1.0	2.0	1.0	8	20	< 0.1		< 0.01	0.03	< 0.01	< 0.01	< 0.01	0.7	0.7	0.64	0.63	1	< 1.0	< 1.0	1.0	82	53	71	4.96					
16-Jun-19	11	< 1.0	2.0	1.0	8	20	< 0.1									0.65	0.68	1	< 1.0	< 1.0	1.0	8	58	54	45.1					
15-Jul-19	32	7.0	6.0	< 1.0	41	55	< 0.1		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.24	2.25	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24			
15-Aug-19	12	< 1.0	1.0	6.0	22	7.0	< 0.1		< 0.01	0.07	< 0.01	< 0.01	< 0.01	0.17	1.2	1.2	0.6	0.74	2.25	< 1.0	< 1.0	< 1.0	4.0	103	67	42.21				
13-Oct-21	10	< 1.0	1.0	6.0	18	18	< 0.1		< 0.01	0.03	< 0.01	0.02	< 0.01	0.6	0.6	0.52	0.63	1.88	< 1.0	< 1.0	< 1.0	4.0	77	50	4.7					
24-Feb-22	10	1.0	1.0	< 1.0	2.0	21	0.1		0.63	< 0.01	< 0.01	0.01	0.01	0.31	7.5	7.5	0.57	0.63	1.69	< 1.0	< 1.0	< 1.0	7.0	97	63	4.32				
2																														

Table 8
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate

Analyte	Anions and Cations																Alkalinity						Inorganics			pH	
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids
LOR	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.01	0.01	1	1	1	1	1	1	1	1	1	10	0.01
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	meq/L	meq/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
U/I/I																											
Adopted Site Specific Trigger Values (SWMP 2021) ¹ NHMRC ADWG 2018	142	40	52	8	324	234	1.5		0.17		3	50		0.2	5.9										500		4.265
Sample Name																											
19-Aug-21																											
24-Feb-22	27	< 1.0	2.0	< 1.0	8.0	53	< 0.1		0.03	< 0.01	< 0.01	< 0.01	0.02	0.9	0.9	1.34	1.7		3.81	2.0	< 1.0	< 1.0	2.0	8.0	183	119	4.59
12-Apr-22																											
27-May-22	-	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
22-Feb-19																											
14-Aug-19																											
23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1									2.36	3.05	13	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	398	4.08
14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1									2.4	2.5		< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31
16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2									2.93	2.97		< 1.0	< 1.0	< 1.0	< 1.0	46	367	238	207	4.46
15-Aug-19	40	5.0	5.0	< 1.0	43	55	0.1									2.4	2.45		< 1.0	< 1.0	< 1.0	< 1.0	33	308	200	160	4.48
16-Sep-19	45	7.0	6.0	< 1.0	45	58	0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.8	2.57	3.01	< 1.0	< 1.0	< 1.0	< 1.0	42	360	234	208	4.35
15-Oct-19	44	6.0	6.0	< 1.0	38	57	0.1									2.71	2.4		< 1.0	< 1.0	< 1.0	< 1.0	40	365	237	448	4.48
18-Nov-19	41	4.0	5.0	< 1.0	41	64	0.2	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	0.2	0.2	2.76	2.66	3.22	< 1.0	< 1.0	< 1.0	< 1.0	30	348	226	448	4.48
17-Dec-19																											
16-Jan-20																											
27-Feb-20	44	9.0	6.0	1.0	68	59	< 0.1	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	0.2	0.2	2.88	3.08	2.79	< 1.0	< 1.0	< 1.0	< 1.0	47	479	311	311	3.82
26-Mar-20	40	5.0	4.0	1.0	46	57	< 0.1									2.34	2.56		< 1.0	< 1.0	< 1.0	< 1.0	29	346	245	529	
27-Apr-20	38	5.0	4.0	1.0	38	51	0.1									2.26	2.29	3.0	< 1.0	< 1.0	< 1.0	< 1.0	29	336	218	554	
15-May-20	41	5.0	4.0	2.0	41	61	< 0.1	< 0.01	< 0.01	0.01	0.01	< 0.01	0.2	0.2	2.41	2.57	3.31	< 1.0	< 1.0	< 1.0	< 1.0	29	327	212	4.67		
19-Jun-20	59	12	9.0	1.0	84	69	0.3									3.93	3.7	3.1	< 1.0	< 1.0	< 1.0	< 1.0	67	464	302	4.5	
16-Jul-20	53	11	8.0	2.0	82	59	0.3									3.56	3.37	2.77	< 1.0	< 1.0	< 1.0	< 1.0	60	439	285	458	
14-Aug-20	47	10	10	2.0	82	70	0.3	< 0.01	< 0.01	0.02	0.02	0.01	0.4	0.4	3.42	3.68	3.72	2.51	< 1	< 1	< 1	< 1	66	450	292	266	4.24
16-Sep-20	45	6.0	7.0	< 1.0	36	59	0.1									2.63	2.87		< 1.0	< 1.0	< 1.0	< 1.0	44	424	274	228	4.16
16-Oct-20	43	5.0	5.0	< 1.0	40	67	0.1									2.53	2.72		< 1.0	< 1.0	< 1.0	< 1.0	33	355	231	354	
16-Nov-20	37	8.0	6.0	2.0	42	54	0.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.65	2.4	2.41	< 1.0	< 1.0	< 1.0	< 1.0	45	338	220	421		
16-Dec-20	43	4.0	4.0	2.0	24	70	0.2									2.45	2.79	16	< 1.0	< 1.0	< 1.0	< 1.0	26	323	210	196	6.15
14-Jan-21	36	16	4.0	2.0	15	58	0.8									2.74	2.69	37	< 1.0	< 1.0	< 1.0	< 1.0	56	316	205	638	
16-Feb-21	37	6.0	4.0	2.0	14	61	0.3	< 0.01	0.03	< 0.01	< 0.01	< 0.01	0.02	1.2	1.2	2.29	2.15	2.87	7.0	< 1.0	< 1.0	7.0	31	267	174	240	5.91
17-Mar-21	36	10	4.0	2.0	10	54	0.4									2.44	2.25		26	< 1.0	< 1.0	26	41	271	176	6.23	
22-Apr-21	32	4.0	4.0	2.0	< 10	56	0.2									1.97	2.04		23	< 1.0	< 1.0	23	26	276	179	5.54	
20-May-21	35	9	4	2	18	53	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	0.6	2.35	2.33	2.44	23	< 1.0	< 1.0	23	39	276	179	176		
18-Jun-21	34	4	4	1	23	57	0.2									2.03	2.09		< 1.0	< 1.0	< 1.0	< 1.0	26	250	162	145	4.84
15-Jul-21	33	5.0	4.0	1.0	20	58	0.2									2.04	2.09	2.0	< 1.0	< 1.0	< 1.0	< 1.0	29	226	147	143	5.48
19-Aug-21																											
24-Feb-22	35	3.0	4.0	< 1.0	27	63	< 0.1		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.3	2.0	2.34	3.11	< 1.0	< 1.0	< 1.0	< 1.0	24	275	179	3.96	
12-Apr-22																											
27-May-22	-	-	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Notes:

No analysis
< Less than laboratory limit of reporting
LOR: Laboratory limit of reporting
mg/L: Milligrams per litre

µS/cm: Microsiemens per centimeter

Bold indicates a detection above the laboratory limit of reporting

¹Soil and Water Management Plan, July 2021

Table 9
Wash Plant Sediment Analytical Data - PFAS
Williamstown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids						Perfluoroalkyl Sulfonamides						(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS			
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PPPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctadecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFPeA)	Perfluorooctanoic acid (PFHxA)	Perfluorooctanoic acid (PFPeA)	Perfluorooctanoic acid (PFOA)	Perfluorooctadecanoic acid (PFDoD)	Perfluorooctadecanoic acid (PFTrDA)	Perfluorooctadecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	NMethyl perfluorooctane sulfonamide (MeFOSA)	NEthyl perfluorooctane sulfonamide (EtFOSE)	NMethyl perfluorooctane sulfonamidoethanol (MeFOSAA)	NEthyl perfluorooctane sulfonamidoethanol (EtFOSEA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	
LOR Units		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.0002	
Adopted Site Specific Trigger Values (SWMP 2021) ¹		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HEPA NEMP 2020***																											0.01
Sample Name	Sample Date																										
WPF	19-Aug-21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0006	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0006	< 0.0006	< 0.0006	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0006	0.0006
WPF (Secondary)	27-Aug-21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0005	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	0.0043	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0002	< 0.0005	< 0.0005	< 0.0005	0.0005	0.0048
SAND1 (Secondary)	27-Aug-21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	
RFS	22-Sep-21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	
WASHED	22-Sep-21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	
WPF	22-Sep-21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	
WPF	19-Nov-21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0005	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0005	0.0005	
WPF	24-Feb-22	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.001	< 0.0002	< 0.0001	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.001	0.0012	0.0012
WPF	27-May-22	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0012	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0012	0.0012	0.0012

Notes:

Not analysed

< Less than laboratory limit of reporting

mg/kg Milligrams per kilogram

*** Soil Human Health Screening Criteria

¹ Soil and Water Management Plan July 2021

Table 2
Wash Plant Water Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte	Perfluoroalkyl Sulfonic Acids										Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides					(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS					
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFHpS)	Perfluorooctanoic acid (PFOS)	Perfluorododecanoic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorooctanoic acid (PFPeA)	Perfluorooctanoic acid (PFHxA)	Perfluorooctanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorooctanoic acid (PFNA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTeDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	NMethyl perfluorooctane sulfonamide (MeFOSA)	NEthyl perfluorooctane sulfonamide (EtFOSE)	NEthyl perfluorooctane sulfonamide (EtFOSE)	NEthyl perfluorooctane sulfonamide (EtFOSE)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS							
LOR Units	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.01 µg/L	0.02 µg/L	0.1 µg/L	0.02 µg/L	0.02 µg/L	0.01 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.02 µg/L	0.01 µg/L	0.01 µg/L	0.01 µg/L					
Adopted Site Specific							0.13																							0.07					
HEPA NEMP 2020***																																			
HEPA NEMP 2020 ¹																																0.7			
Sample Name	Sample Date																																		
INPUT	22-Sep-21	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01					
WPW	19-Aug-21	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01					
	22-Sep-21	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01					
	13-Oct-21	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	0.01	0.01					
	16-Nov-21	< 0.02	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01					
	15-Dec-21	< 0.02	< 0.02	< 0.01	< 0.02	0.03	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.03	0.03	0.03					
	18-Jan-22	< 0.02	< 0.02	< 0.01	< 0.02	0.03	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.03	0.03	0.03						
	24-Feb-22	< 0.02	< 0.02	0.01	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01						
	12-Apr-22	< 0.02	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01						
	27-May-22	< 0.02	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01						

Notes:

Not analysed

< Less than laboratory limit of reporting

µg/L Micrograms per litre

*** 95% Level of protection in freshwater slightly to moderately disturbed systems

¹ Soil and Water Management Plan July 2021

⁴ Recreation water

Table 11
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate



Table 11
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate



Table 3
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte	Metals															
	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
	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
Sample Name	Sample Date	Sample Type														
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.005
RINSATE01_21022019	21-Feb-19	Rinse	< 0.001	< 0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.005
BH_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.0001	< 0.05	< 0.0001	0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.005
DUP01_21022019	21-Feb-19	Duplicate	< 0.001	0.014	< 0.0001	< 0.05	< 0.0001	0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.015
Relative Percentage Difference																
BH_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.0001	< 0.05	< 0.0001	0.001	< 0.001	4.11	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.005
TRIP01_21022019	21-Feb-19	Triplicate	< 0.001	< 0.02	< 0.0001	< 0.05	< 0.0002	< 0.005	< 0.0001	4.5	< 0.001	0.012	< 0.0001	0.003	< 0.005	< 0.005
Relative Percentage Difference																
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
TRIP BLANK_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinse	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
BH_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.0001	< 0.05	< 0.0001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.0001	< 0.05	< 0.0001	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.007
Relative Percentage Difference																
BH_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.0001	< 0.05	< 0.0001	0.001	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.009
TRIP02_140319	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.0001	< 0.05	< 0.0002	< 0.005	< 0.0001	1.7	< 0.001	0.019	< 0.0001	< 0.001	< 0.005	< 0.005
Relative Percentage Difference																
TRIP BLANK_23-Apr-19	23-Apr-19	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE03_23-Apr-19	23-Apr-19	Rinse	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
TRIP BLANK_16-May-19	16-May-19	Trip Blank	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE04_16-May-19	16-May-19	Rinse	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE05_14062019	14-Jun-19	Rinse	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.026	< 0.0001	< 0.05	< 0.0002	< 0.001	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.013
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.026	< 0.0001	< 0.05	< 0.0002	< 0.001	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.013
Relative Percentage Difference																
SW3_14062019	14-Jun-19	Primary	< 0.001	0.026	< 0.0001	< 0.05	< 0.0002	< 0.001	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.013
TRIP05_14062019	14-Jun-19	Triplicate	< 0.001	0.026	< 0.0001	< 0.05	< 0.0002	< 0.001	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.013
Relative Percentage Difference																
TRIP BLANK_16-Jul-19	16-Jul-19	Trip Blank	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE06_16Jul19	16-Jul-19	Rinse	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE07_15-Aug-19	15-Aug-19	Rinse	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE08_16092019	16-Sep-19	Rinse	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
TRIP08_16092019	16-Sep-19	Primary	< 0.001	0.035	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.016
DUP08_16092019	16-Sep-19	Duplicate	< 0.001	0.035	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.016
Relative Percentage Difference																
SW4_16092019	16-Sep-19	Primary	< 0.001	0.035	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.016
TRIP09_16092019	16-Sep-19	Triplicate	< 0.001	0.035	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.016
Relative Percentage Difference																
TRIP BLANK_17-Dec-19	17-Dec-19	Trip Blank	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE09_171219	17-Dec-19	Rinse	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RIP BLANK_13_20013300	13-Jan-20	Trip Blank	< 0.001	0.001	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RHS_200133004	13-Jan-20	Primary	< 0.001	0.022	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	2.15	< 0.001	0.022	< 0.0001	0.001	< 0.01	< 0.005
QW12_200133004	13-Jan-20	Duplicate	< 0.001	0.023	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	2.18	< 0.001	0.023	< 0.0001	0.001	< 0.01	< 0.005
Relative Percentage Difference																
NC	9%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK(QW1)	19-Jun-20	Trip Blank	< 0.001	0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
RINSATE(QW19)	19-Jun-20	Rinse	< 0.001	0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.005
BH4_ES012045004	20-Jan-20	Primary	< 0.001	0.012	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	0.052	< 0.001	0.019	< 0.0001	0.004	< 0.01	< 0.007
DUP12_ES012045005	20-Jan-20	Duplicate	< 0.001	0.011	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	0.054	< 0.001	0.023	< 0.0001	0.001	< 0.01	< 0.008
Relative Percentage Difference																
BH4_ES016918003	20-Jan-20	Primary	< 0.001	0.012	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	0.052	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.007
QW13_S20-Ap4317	20-Jan-20	Triplicate	< 0.001	0.01	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	0.048	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.009
Relative Percentage Difference																
BH6_ES017042001	20-Jan-20	Primary	< 0.001	0.045	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	0.047	< 0.001	0.019	< 0.0001	0.005	< 0.01	< 0.007
QW22_ES202806-012	14-Aug-20	Primary	< 0.001	0.043	< 0.0001	< 0.05	< 0.0001	< 0.001	< 0.001	0.047	< 0.001	0.018	< 0.0001	0.005	< 0.01	< 0.007
QW22_ES202806-012</td																

Table 3
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate



QW39_140121	14-Jan-21	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
QW38_140121	14-Jan-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
SW4_140121	14-Jan-21	Primary	0.002	0.028	< 0.05	< 0.0001	0.002	0.003	0.026	20	< 0.001	0.171	< 0.0001	0.005	< 0.01	< 0.01	0.013		
QW34_140121	14-Jan-21	Duplicate	0.001	0.028	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	22	< 0.001	0.176	< 0.0001	0.002	< 0.01	< 0.01	< 0.005		
Relative Percentage Difference			67%	0%	NC	NC	NC	67%	0%	185%	11%	NC	3%	NC	86%	NC	89%		
SW4_140121	14-Jan-21	Primary	0.002	0.028	< 0.001	< 0.05	< 0.0001	0.002	0.003	0.026	20	< 0.001	0.171	< 0.0001	0.005	< 0.01	< 0.01	0.013	
QW35_140121	14-Jan-21	Triplicate	0.002	0.03	< 0.001	< 0.05	< 0.0002	0.002	0.004	< 0.001	25	< 0.001	0.19	< 0.0001	0.004	< 0.005	< 0.005		
Relative Percentage Difference			0%	7%	NC	NC	0%	29%	0%	23%	NC	11%	0%	22%	NC	89%			
QW38_160221	16-Feb-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
QW39_160221	16-Feb-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
SW4_160221	16-Feb-21	Primary	0.003	0.02	< 0.001	< 0.05	< 0.0001	0.003	0.001	27	< 0.001	0.054	< 0.0001	0.002	< 0.01	< 0.01	0.01		
QW34_160221	16-Feb-21	Duplicate	0.003	0.019	< 0.001	< 0.05	< 0.0001	0.004	0.001	< 0.001	27	< 0.001	0.054	< 0.0001	0.002	< 0.01	< 0.01	0.008	
Relative Percentage Difference			0%	5%	NC	NC	NC	29%	0%	0%	NC	0%	NC	0%	NC	22%			
SW4_160221	16-Feb-21	Primary	0.003	0.02	< 0.001	< 0.05	< 0.0000	0.003	0.001	< 0.001	27	< 0.001	0.054	< 0.0001	0.002	< 0.01	< 0.01	0.01	
QW35_160221	16-Feb-21	Triplicate	0.004	< 0.02	< 0.001	< 0.05	< 0.0000	0.003	0.002	32	< 0.001	0.065	< 0.0001	< 0.001	-	0.012	0.005		
Relative Percentage Difference			29%	0%	NC	NC	0%	67%	67%	17%	NC	18%	NC	67%	NC	18%	67%		
QW40_170321	17-Mar-21	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
QW41_170321	17-Mar-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
QW46_220421	22-Apr-21	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
QW47_220421	22-Apr-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
SW4_220421	22-Apr-21	Primary	0.006	0.02	< 0.001	< 0.05	< 0.0000	0.004	0.001	34	< 0.001	0.062	< 0.0001	0.003	< 0.01	< 0.01	< 0.005		
QW42_220421	22-Apr-21	Duplicate	0.005	0.02	< 0.001	< 0.05	< 0.0000	0.003	0.002	< 0.001	34	< 0.001	0.064	< 0.0001	0.003	< 0.01	< 0.01	< 0.005	
Relative Percentage Difference			18.18%	0%	NC	NC	NC	29%	0%	0%	NC	0%	NC	3%	NC	0%	NC	NC	
SW4_220421	22-Apr-21	Primary	0.006	0.02	< 0.001	< 0.05	< 0.0000	0.004	0.002	< 0.001	34	< 0.001	0.062	< 0.0001	0.003	< 0.01	< 0.01	< 0.005	
QW43_220421	22-Apr-21	Triplicate	0.006	0.02	< 0.001	0.07	< 0.0002	0.004	0.003	< 0.001	44	< 0.001	0.074	< 0.0001	0.002	-	0.005	< 0.005	
Relative Percentage Difference			0%	0%	NC	95%	NC	0%	40%	NC	26%	NC	18%	NC	40%	NC	NC		
TRIP BLANK MAY_200521	20-May-21	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
RINSATE MAY_200521	20-May-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
SW4_200521	20-May-21	Primary	0.002	0.015	< 0.001	< 0.05	< 0.0000	0.001	0.001	< 0.001	10.1	< 0.001	0.073	< 0.0001	0.001	< 0.01	< 0.01	< 0.005	
QW51_200521	20-May-21	Duplicate	0.001	0.016	< 0.001	< 0.05	< 0.0000	0.001	0.001	< 0.001	9.85	< 0.001	0.083	< 0.0001	0.001	< 0.01	< 0.01	< 0.005	
Relative Percentage Difference			67%	6%	NC	NC	NC	126%	NC	NC	NC	10%	NC	13%	NC	NC	NC		
SW4_200521	20-May-21	Primary	0.002	0.015	< 0.001	< 0.05	< 0.0000	0.001	0.001	< 0.001	10.1	< 0.001	0.073	< 0.0001	0.001	< 0.01	< 0.01	< 0.005	
QW48_200521	20-May-21	Triplicate	0.001	0.012	< 0.001	< 0.05	< 0.0000	0.002	0.001	< 0.001	2.1	< 0.001	0.069	< 0.0001	0.001	< 0.01	< 0.01	< 0.005	
Relative Percentage Difference			67%	40%	NC	126%	NC	NC	NC	NC	NC	10%	NC	7%	NC	NC	NC		
Trip Blank June_180621	18-Jun-21	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
Rinsate June_180621	18-Jun-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
SW3_180621	18-Jun-21	Primary	0.001	0.003	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.05	< 0.001	10.5	< 0.001	0.024	< 0.0001	0.001	< 0.01	< 0.005	
QW56_180621	18-Jun-21	Duplicate	< 0.001	0.004	< 0.001	< 0.05	< 0.0000	0.001	< 0.001	< 0.05	< 0.001	10.6	< 0.001	0.027	< 0.0001	0.001	< 0.01	< 0.005	
Relative Percentage Difference			67%	29%	NC	NC	NC	67%	NC	NC	NC	1%	NC	12%	NC	NC	NC		
SW3_180621	18-Jun-21	Primary	0.001	0.003	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.05	< 0.001	10.5	< 0.001	0.024	< 0.0001	0.001	< 0.01	< 0.005	
QW53_180621	18-Jun-21	Triplicate	0.002	< 0.02	< 0.001	< 0.05	< 0.0000	0.002	< 0.001	< 0.05	< 0.001	10	< 0.001	0.024	< 0.0001	0.001	-	0.02	0.006
Relative Percentage Difference			67%	108%	NC	NC	NC	120%	NC	NC	NC	10%	NC	67%	0%	NC	NC	120%	82%
TRIP BLANK JULY_150721	15-Jul-21	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
RINSATE JULY_150721	15-Jul-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
SW4_150721	15-Jul-21	Primary	< 0.001	0.019	< 0.001	< 0.05	< 0.0000	0.001	< 0.001	< 0.05	< 0.001	1.15	< 0.001	0.044	< 0.0001	0.001	< 0.01	< 0.007	
QW57_150721	15-Jul-21	Duplicate	< 0.001	0.022	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.05	< 0.001	1.13	< 0.001	0.045	< 0.0001	0.001	< 0.01	< 0.005	
Relative Percentage Difference			NC	15%	NC	NC	NC	0%	NC	0%	NC	2%	NC	0%	NC	NC	NC	35%	
SW4_150721	15-Jul-21	Primary	< 0.001	0.019	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.05	< 0.001	1.15	< 0.001	0.044	< 0.0001	0.001	< 0.01	< 0.007	
QW57_150721	15-Jul-21	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.05	< 0.001	0.83	< 0.001	0.043	< 0.0001	0.001	-	< 0.005	0.008
Relative Percentage Difference			NC	62%	NC	NC	NC	0%	NC	0%	NC	32%	NC	2%	NC	0%	NC	NC	13.30%
TRIP BLANK AUG_190821	19-Aug-21	Trip Blank	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
RINSATE AUG_190821	19-Aug-21	Rinsate	< 0.001	< 0.001	< 0.05	< 0.0000	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005		
SW4_190821	19-Aug-21	Primary	< 0.001	0.022	-	< 0.05	-	< 0.001	0.001	< 0.05	< 0.001	2.13	-	-	-	0.001	-	0.005	

Control Sample A
Williamtown Sand S

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

Table 5
Gauging Data and Field Parameters
Williamtown Sand Syndicate

Date	Borehole	Top of Casing (mAHD)	Depth to Water (mTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mTOC)	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Comment
Feb-19	BH1	8.64	5.776	2.864	8.89	-	-	-	-	-	No water sample taken due to top of well casing being melted.
Mar-19	BH1	8.64	6.145	2.495	8.12	8:30	18.93	111	5.49	81	Well recently reinstated. Strong acrylic odour when gauging. Light brown in colour.
Apr-19	BH1	8.64	6.277	2.363	8.12	13:15	21.41	87	5.48	91.9	Well in good condition, will require well end cap. Slightly cloudy, no apparent odour
May-19	BH1	8.64	6.319	2.321	8.12	12:20	20.57	150	5.42	25.6	Very light brown, no odour.
Jun-19	BH1	8.64	6.375	2.265	8.12	12:30	19.97	111	6.43	33.6	Clear, no odour.
Jul-19	BH1	8.64	6.373	2.267	8.12	11:45	18.4	122	5.42	51	Slightly cloudy, no apparent odour
Aug-19	BH1	8.64	6.453	2.187	8.12	11:45	19.69	165	5.47	103	Slightly cloudy, slight sulfur odour
Sep-19	BH1	8.64	6.428	2.212	8.28	11:30	21.02	125	5.43	101	Slightly cloudy brown, no odour
Oct-19	BH1	8.64	6.427	2.213	8.28	11:40	21.12	18	5.5	78	Slightly cloudy brown, no odour
Nov-19	BH1	8.64	6.432	2.208	8.28	13:50	21.56	182	5.43	67.3	Cloudy brown, sulfur odour
Dec-19	BH1	8.64	6.558	2.082	8.28	12:25	20.53	163	6.12	15.2	Slight cloudy brown, no odour
Jan-20	BH1	8.64	6.701	1.939	8.28	11:45	22.52	123	5.39	27.7	Slight cloudy brown, no odour
Feb-20	BH1	8.64	6.701	1.939	8.28	11:45	22.52	123	5.39	27.7	Slight cloudy brown, no odour
Mar-20	BH1	8.64	6.701	1.939	8.28	11:45	22.52	123	5.39	27.7	Slight cloudy brown, no odour
Apr-20	BH1	8.64	6.08	2.560	8.28	-	20	126.2	5.34	122.4	-
May-20	BH1	8.64	6.842	1.798	8.28	11:45	19.1	132.3	5.21	135.3	Slight cloudy brown, no odour
Jun-20	BH1	8.64	6.865	1.775	8.28	11:45	19.3	121.2	5.29	118.5	Clear, no odour
Jul-20	BH1	8.64	6.958	1.682	8.28	-	17.6	108	5.4	135	Clear, no odour
Aug-20	BH1	8.64	6.165	2.475	8.22	-	18.61	273.4	4.89	278.4	Clear, no odour
Sep-20	BH1	8.64	6.216	2.424	8.22	-	20.44	103	5	220	Clear, no odour
Oct-20	BH1	8.64	6.329	2.311	9.45	-	19.1	119.7	4.84	198.5	Clear, no odour
Nov-20	BH1	8.64	6.075	2.565	9.45	-	24.23	348	5.43	131.1	Clear, no odour
Dec-20	BH1	8.64	6.181	2.459	9.45	-	22.6	233	5.62	70.1	Clear, no odour
Jan-21	BH1	8.64	6.107	2.533	9.45	-	21.6	308	6.1	-65.1	Clear, sulphur odour
Feb-21	BH1	8.64	5.954	2.686	9.45	13:00	21.1	345	5.96	51.8	clear, sulfur odour
Mar-21	BH1	8.64	5.923	2.717	9.45	13:00	21	152	5.84	-18	Clear, no odour
Apr-21	BH1	8.64	4.628	4.012	8.25	9:15	20.32	51	4.88	225	Very light brown, no odour
May-21	BH1	8.64	4.844	3.796	8.25	13:30	19.6	141	5.36	144	Clear, no odour, well cap missing
Jun-21	BH1	8.64	5.021	3.619	8.25	13:00	19.2	132	5.42	35.2	Clear, no odour / sheen
Jul-21	BH1	8.64	5.113	3.527	8.212	12:58	18.9	62	4.48	297.7	Deep yellow / brown, no odour / sheen, well cap hinge broken
Aug-21	BH1	8.64	5.284	3.356	8.212	12:50	18.4	113.7	4.79	261	Deep orange / yellow, no odour / sheen, well cap hinge broken
Sep-21	BH1	8.64	5.359	3.281	8.2	-	18.4	104	5.07	234	Light brown, no odour / sheen, well cap hinge broken
Oct-21	BH1	8.64	5.429	3.211	8.18	12:53	18.5	113.1	5.03	180.6	Light yellow, no odour / sheen
Nov-21	BH1	8.64	5.4	3.240	8.19	14:45	20.4	110.9	4.78	224.2	Deep orange, no odour, no sheen
May-22	BH1	8.64	4.451	4.189	8.18	-	ND	ND	ND	ND	No sample taken, well in good condition
Feb-19	BH2	7.79	5.674	2.116	8.93	10:30	22.7	124.1	4.29	111	Slightly Cloudy, light brown, slight sulfur odour.
Mar-19	BH2	7.79	5.184	2.606	8.93	9:15	19.35	101	4.49	264	Dark brown – No Odour.
Apr-19	BH2	7.79	5.833	1.957	9.02	12:45	22.9	87	4.59	308	Dark brown to black, no odour
May-19	BH2	7.79	5.86	1.930	9.02	12:00	21.13	124	4.56	111	Dark brown, no odour
Jun-19	BH2	7.79	8.852	-1.062	9.02	12:15	20.84	77	6.41	255	Very cloudy, dark brown, no odour
Jul-19	BH2	7.79	5.093	2.707	9.02	11:30	18.3	124.5	4.76	88	Dark, cloudy, no odour
Aug-19	BH2	7.79	5.888	1.902	9.02	11:20	19.66	136	4.7	275	Silty Base, dark brown, no odour
Sep-19	BH2	7.79	5.796	1.994	9.08	11:00	21.61	111	4.7	263	Dark brown, slight sulfur odour
Oct-19	BH2	7.79	5.769	2.021	9.03	11:15	20.76	48	4.83	223	Dark brown, slight sulfur odour
Nov-19	BH2	7.79	5.721	2.069	9.03	13:30	21.76	133	4.61	230	Dark brown, slight sulfur odour
Dec-19	BH2	7.79	5.936	1.854	9.03	12:00	20.13	131	5.38	178	Dark brown, slight sulfur odour
Jan-20	BH2	7.79	6.153	1.637	9.03	11:30	24.49	94	4.84	186.5	Cloudy brown, slight sulfur odour
Feb-20	BH2	7.79	6.153	1.637	9.03	11:30	24.49	94	4.84	186.5	Cloudy brown, slight sulfur odour
Mar-20	BH2	7.79	6.153	1.637	9.03	11:30	24.49	94	4.84	186.5	Cloudy brown, slight sulfur odour
Apr-20	BH2	7.79	6.069	1.721	9.03	-	20.2	106.4	4.63	253.2	-
May-20	BH2	7.79	5.102	2.688	9.03	11:30	18.7	109.9	4.5	272.2	Cloudy brown, slight sulfur odour
Jun-20	BH2	7.79	5.978	1.812	9.03	11:30	19.8	102.2	4.68	218.7	Brown, no odour
Jul-20	BH2	7.79	6.035	1.755	9.03	-	17.6	70	4.63	340	Light brown, no odour
Aug-20	BH2	7.79	5.03	2.760	8.46	-	-	-	-	-	Dark brown, no odour
Sep-20	BH2	7.79	5.462	2.328	8.46	-	20.23	103	4.53	280	Dark brown, no odour
Oct-20	BH2	7.79	5.643	2.147	9.45	-	20.8	118.6	4.38	274.7	Dark brown, no odour
Nov-20	BH2	7.79	5.328	2.462	9.45	-	29.5	346	4.91	297.2	Dark brown, sulphur odour
Dec-20	BH2	7.79	5.498	2.292	9.45	-	21.78	293	4.87	201.9	Light brown, sulphur odour
Jan-21	BH2	7.79	5.36	2.430	9.45	-	23.5	229	5.69	232.1	Dark brown, sulphur odour
Feb-21	BH2	7.79	5.293	2.497	9.45	12:45	22.6	279	5.58	170.7	light brown, sulfur odour
Mar-21	BH2	7.79	5.244	2.546	9.45	12:40	21.4	114	5.62	140	very cloudy brown
Apr-21	BH2	7.79	4.326	3.464	8.97	8:45	20.66	59.57	4.73	250	Light brown, no odour
May-21	BH2	7.79	4.535	3.255	8.97	13:05	20	60.1	4.98	251.8	Very turbid brown, no odour, well in good condition
Jun-21	BH2	7.79	4.728	3.062	8.97	12:45	19.1	64.7	4.78	209	Slight cloudy brown, no odour / sheen, well in good condition
Jul-21	BH2	7.79	4.805	2.985	8.905	12:35	18.9	91	4.74	216.5	Medium brown, no odour / sheen, well in good condition
Aug-21	BH2	7.79	4.989	2.801	8.905	12:35	18.4	96.1	4.75	228	Light brown, no odour / sheen, well in good condition
Sep-21	BH2	7.79	4.99	2.800	8.85	12:25	18.9	96	4.75	224	Light brown, no odour / sheen, well in good condition
Oct-21	BH2	7.79	5.05	2.740	8.85	11:08	18.4	93	4.83	254	Dark brown, no odour / sheen
Nov-21	BH2	7.79	4.922	2.868	8.87	14:30	20.4	85.2	4.63	22.7	Clear, no odour, no sheen
Dec-21	BH2	7.79	4.861	2.929	8.93	12:10	21.9	83.4	4.87	169	light brown, no odour, no sheen
Jan-22	BH2	7.79	5.091	2.699	8.975	9:35	20.4	9	4.57	78.3	medium brown, no odour/sheen
May-22	BH2	7.79	4.255	3.535	8.96	10:10	18.6	160	5.23	207.7	Clear, no odour / sheen
Feb-19	BH3	7.57	6.026	1.544	8.94	14:40	22.1	82.4	4.54	94	Light Brown - No Odour.
Mar-19	BH3	7.57	6.146	1.424	8.75	-	-	-	-	-	No odour – No sample taken.
Apr-19	BH3	7.57	6.039	1.511	9.03	-	-	-	-	-	Data logger attached, Silty material at base. No sample taken.
May-19	BH3	7.57	6.064	1.506	9.03	-	-	-	-	-	Data logger downloaded.
Jun-19	BH3	7.57	6.005	1.565	9.03	-	-	-	-	-	Data logger attached, Silty material at base. No sample taken.
Jul-19	BH3	7.57	5.938	1.632	9.03	-	-	-	-	-	Data logger attached, Silty material at base. No sample taken.
Aug-19	BH3	7.57	6.027	1.543	9.03	-	-	-	-	-	Data logger attached, Silty material at base. No sample taken.
Sep-19	BH3	7.57	-	-	9.03	-	-	-	-	-	Well Decommissioned
Feb-21	BH4	3.06	1.994	1.066	5.92	14:20	20.4	129.2	3.85	135	light discolouration – Brown.
Mar-19	BH4	3.06	2.091	0.969	5.92	9:50	18.92	79	4.52	311	Light Brown – No Odour.
Apr-19	BH4	3.06	1.878	1.182	5.92	12:10	21.43	43	4.88	269.9	Cloudy, no odour.
May-19	BH4	3.06	1.847	1.213	5.92	11:45	20.14	110	4.65	98.5	Stained brown, no odour.
Jun-19	BH4	3.06	1.723	1.337	5.92	11:45	19.01	55	6.41	321.9	Mildly cloudy, no odour.
Jul-19	BH4	3.06	1.617	1.443	5.92	11:00	17.6	91.5	4.78	88	Cloudy, no odour.
Aug-19	BH4	3.06	1.736	1.324	5.92	11:00	17.96	102	4.76	266	Slightly Cloudy brown
Sep-19	BH4	3.06	1.604	1.456	6.11	12:45	20.53	96	4.27	251	Clear, no odour
Oct-19	BH4	3.06	1.531	1.529	6.11	10:30	19.18	8	4.93	221	Clear, no odour
Nov-19	BH4	3.06	1.624	1.436	6.11	10:10	21.07	95	4.53	290	Cloudy brown, slight sulfur odour
Dec-19	BH4	3.06	2.051	1.009	6.11	11:45	20.93	109	6.49	174	Slight cloudy brown, no odour
Jan-20	BH4	3.06	2.252	0.808	6.11	11:00	23.3	85	4.63	221	Slight cloudy brown, no odour
Feb-20	BH4	3.06	2.252	0.808	6.11	11:00	23.3	85	4.63	221	Slight cloudy brown, no odour
Mar-20	BH4	3.06	2.252	0.808	6.11	11:00	23.3	85	4.63	221	Slight cloudy brown, no odour
Apr-20	BH4	3.06	1.881	1.179	6.11	-	19	132.1	5.04	206.3	Slight cloudy brown, no odour
May-20	BH4	3.06	1.85	1.210	6.11	11:00	18.1	174.8	4.78	282.7	Slightly brown, no odour
Jun-20	BH4	3.06	1.494	1.566	6.11	1					

Table 5
Gauging Data and Field Parameters
Williantown Sand Syndicate

Date	Borehole	Top of Casing (mAHD)	Depth to Water (mTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mTOC)	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Comment
Dec-21	BH4	3.06	1.04	2.020	6.01	11:50	21.7	93.5	4.93	142	light brown, no odour, no sheen
Jan-22	BH4	3.06	1.294	1.766	6.035	10:00	20.1	9.1	4.74	170	medium brown, no odour/sheen
May-22	BH4	3.06	0.812	2.248	6.02	10:25	18.1	171	5.17	210.2	Clear, no odour / sheen
Feb-19	BH5	7.36	6.063	1.297	8.63	8:30	20.1	320	4.06	122	Roots evident. Brown slight sulfur odour.
Mar-19	BH5	7.36	6.146	1.214	8.63	-	-	-	-	-	Slight sulfur odour – No sample taken.
Apr-19	BH5	7.36	5.914	1.446	8.71	-	-	-	-	-	Slight sulfur odour – No sample taken.
May-19	BH5	7.36	5.894	1.466	8.71	-	-	-	-	-	No sample taken. Data logger downloaded.
Jun-19	BH5	7.36	5.823	1.537	8.71	-	-	-	-	-	No odour - No sample taken.
Jul-19	BH5	7.36	5.779	1.581	8.71	-	-	-	-	-	No odour - No sample taken.
Aug-19	BH5	7.36	5.894	1.466	8.71	-	-	-	-	-	No odour - No sample taken.
Sep-19	BH5	7.36	5.786	1.574	8.71	-	-	-	-	-	No odour - No sample taken.
Oct-19	BH5	7.36	5.767	1.593	8.8	-	-	-	-	-	No odour - No sample taken.
Nov-19	BH5	7.36	5.792	1.568	8.8	-	-	-	-	-	No odour - No sample taken.
Dec-19	BH5	7.36	6.143	1.217	8.8	-	-	-	-	-	No odour - No sample taken.
Jan-20	BH5	7.36	6.315	1.045	8.8	-	-	-	-	-	No odour - No sample taken.
Feb-20	BH5	7.36	6.315	1.045	8.8	-	-	-	-	-	No odour - No sample taken.
Mar-20	BH5	7.36	6.315	1.045	8.8	-	-	-	-	-	No odour - No sample taken.
Apr-20	BH5	7.36	6.061	1.299	8.8	-	-	-	-	-	No odour - No sample taken.
May-20	BH5	7.36	6.092	1.268	8.8	-	-	-	-	-	No odour - No sample taken.
Jun-20	BH5	7.36	5.732	1.628	8.8	-	-	-	-	-	No sample taken.
Jul-20	BH5	7.36	5.76	1.600	8.8	-	-	-	-	-	No sample taken.
Aug-20	BH5	7.36	5.339	2.021	8.75	-	16.93	171.91	4.35	299.4	Light brown, no odour
Sep-20	BH5	7.36	5.632	1.728	8.75	-	18.87	254.16	4.25	71	Light brown, no odour
Oct-20	BH5	7.36	5.824	1.536	9.28	-	18.4	329.4	4.14	15.8	Light brown, no odour
Nov-20	BH5	7.36	6.345	1.015	9.28	-	21.33	356	4.7	-29.8	Clear, sulphur odour
Dec-20	BH5	7.36	5.671	1.689	9.28	-	ND	ND	ND	ND	No sample taken
Jan-21	BH5	7.36	5.411	1.949	9.28	-	ND	ND	ND	ND	No sample taken
Feb-21	BH5	7.36	5.404	1.956	9.28	-	-	-	-	-	No sample taken
Mar-21	BH5	7.36	5.316	2.044	9.28	-	-	-	-	-	No sample taken
Apr-21	BH5	7.36	5.174	2.186	8.8	10:10	ND	ND	ND	ND	No sample taken
May-21	BH5	7.36	5.226	2.134	8.8	9:15	ND	ND	ND	ND	No sample taken, well in good condition
Jun-21	BH5	7.36	5.248	2.112	8.8	-	ND	ND	ND	ND	No sample taken, well in good condition
Jul-21	BH5	7.36	5.159	2.201	8.72	-	ND	ND	ND	ND	No sample taken, well in good condition
Aug-21	BH5	7.36	5.322	2.038	8.72	-	ND	ND	ND	ND	No sample taken, well in good condition
Nov-21	BH5	7.36	5.382	1.978	8.72	-	ND	ND	ND	ND	No sample taken, well in good condition
May-22	BH5	7.36	4.931	2.429	8.8	-	ND	ND	ND	ND	No sample taken, well in good condition
Feb-19	BH6	3.62	1.823	1.797	4.43	8:50	23.1	228	4.28	111	Clear to slightly cloudy, sulfur odour.
Mar-19	BH6	3.62	1.913	1.707	4.44	14:15	23.17	159	4.74	178	Brown – No Odour.
Apr-19	BH6	3.62	1.761	1.859	4.52	15:10	22.03	144	4.52	140.1	Cloudy with slight sulfur odour.
May-19	BH6	3.62	1.766	1.854	4.52	14:15	20.62	226	4.7	-5.2	Light brown, no odour.
Jun-19	BH6	3.62	1.713	1.907	4.52	14:10	19.73	176	5.45	-104.7	Cloudy, slight sulfur odour
Jul-19	BH6	3.62	1.591	2.029	4.52	13:30	17.2	191	4.54	101	Slightly cloudy, no odour
Aug-19	BH6	3.62	1.723	1.897	4.52	13:30	18.32	277	4.69	140	Slight brown colour, slight sulfur odour
Sep-19	BH6	3.62	1.647	1.973	4.62	15:15	18.66	215	4.61	57	Clear, slight odour
Oct-19	BH6	3.62	1.628	1.992	4.62	15:30	21.09	110	5.05	-144	Slight brown colour, slight sulfur odour
Nov-19	BH6	3.62	1.657	1.963	4.62	12:30	23.12	335	4.8	6.4	Cloudy brown, slight sulfur odour
Dec-19	BH6	3.62	2.009	1.611	4.62	13:45	21.96	256	5.52	-86.2	Mostly clear, slight sulfur odour
Jan-20	BH6	3.62	2.169	1.451	4.62	13:20	24.62	190	4.39	92	Brown, no odour
Feb-20	BH6	3.62	2.169	1.451	4.62	13:20	24.62	190	4.39	92	Brown, no odour
Mar-20	BH6	3.62	2.169	1.451	4.62	13:20	24.62	190	4.39	92	Brown, no odour
Apr-20	BH6	3.62	2.033	1.587	4.62	-	20.7	232.2	4.68	138.4	-
May-20	BH6	3.62	2.065	1.555	4.62	13:20	19.2	305.8	4.5	138.7	Brown, no odour
Jun-20	BH6	3.62	1.798	1.822	4.62	13:20	20.1	447.8	4.74	-33.3	Clear, no odour
Jul-20	BH6	3.62	1.728	1.892	4.62	-	15.7	204	4.68	-52.4	Light brown, no odour
Aug-20	BH6	3.62	1.225	2.395	4.5	-	15.17	350.62	4.66	-30.4	Clear, sulphur odour
Sep-20	BH6	3.62	1.544	2.076	4.5	-	20.02	269	4.48	62.5	Clear, sulphur odour
Oct-20	BH6	3.62	1.745	1.875	4.95	-	19.5	292.4	4.49	17.6	Clear, sulphur odour
Nov-20	BH6	3.62	0.259	3.361	4.95	-	24.95	226	4.07	5.5	Clear, sulphur odour
Dec-20	BH6	3.62	1.472	2.148	4.95	-	22.8	1036	4.76	-134	Clear, sulphur odour
Jan-21	BH6	3.62	1.29	2.330	4.95	-	24.2	859	4.96	-94.8	Clear, sulphur odour
Feb-21	BH6	3.62	1.171	2.449	4.95	14:10	2	1160	5.23	-167.9	Ants nest in Casing, clear, sulfur odour
Mar-21	BH6	3.62	0.977	2.643	4.95	-	22.9	495	5.23	-172	clear, slight sulfur odour
Apr-21	BH6	3.62	0.813	2.807	4.52	10:15	18.56	307	4.35	-3.8	Clear, strong sulphur odour
May-21	BH6	3.62	0.857	2.763	4.52	14:40	18	395	4.71	61.9	Light brown, strong sulphur odour, well in good condition
Jun-21	BH6	3.62	0.926	2.694	4.52	14:07	15.2	298	4.69	-71	Clear, strong sulphur odour, no sheen, well in good condition
Jul-21	BH6	3.62	0.823	2.797	4.52	14:45	15.3	134.1	4.79	-94.1	Light yellow, light - moderate sulphur odour, no sheen, well in good condition
Aug-21	BH6	3.62	1.038	2.582	4.52	14:10	15.7	384.8	4.87	-86.3	Clear, moderate sulphur odour, no sheen, well in good condition
Sep-21	BH6	3.62	0.88	2.740	4.5	9:55	15.2	318	5.15	-155	Clear, strong sulphur odour, no sheen, well in good condition
Oct-21	BH6	3.62	0.815	2.805	4.52	9:55	16.2	250	5.26	-72.2	Medium brown, moderate sulphur odour, no sheen
Nov-21	BH6	3.62	0.895	2.725	4.52	11:15	18.2	223.6	4.97	-116.1	Very light brown, moderate sulphur odour, no sheen
Dec-21	BH6	3.62	0.968	2.652	4.53	9:45	21.2	202	4.67	-86	very light brown, moderate sulphur odour, no sheen
Jan-22	BH6	3.62	1.276	2.344	4.54	8:45	22.3	20.8	4.58	-116	very light brown, moderate sulphur odour, no sheen
May-22	BH6	3.62	0.708	2.912	4.55	11:30	19.1	208	5.19	-6.9	Very slight brown, strong sulphur odour, no sheen
Feb-19	BH7	2.98	1.938	1.042	4.42	9:20	23.7	283	4.04	125	Slightly Cloudy, light brown, slight sulfur odour.
Mar-19	BH7	2.98	2.015	0.965	4.42	13:30	25	251	4.34	179	Slightly Cloudy, light brown, slight sulfur odour.
Apr-19	BH7	2.98	1.744	1.236	4.51	15:30	22.9	233	4.45	94.3	Slightly Cloudy, light brown, slight sulfur odour.
May-19	BH7	2.98	1.744	1.236	4.51	14:45	20.62	226	4.7	-5.2	Slightly Cloudy, light brown, slight sulfur odour.
Jun-19	BH7	2.98	1.634	1.346	4.51	14:30	19.56	217	5.47	-227.9	Slightly cloudy sulfur odour.
Jul-19	BH7	2.98	1.544	1.436	4.51	14:00	17.2	228	4.58	100	Slightly cloudy sulfur odour.
Aug-19	BH7	2.98	1.649	1.331	4.51	13:45	17.71	329	4.88	55	Cloudy brown, sulfur odour
Sep-19	BH7	2.98	1.542	1.438	4.61	14:15	18.34	232	4.73	-22	Light brown, sulfur odour
Oct-19	BH7	2.98	1.514	1.466	4.61	12:50	21.79	183	4.89	-139	Slightly Cloudy, light brown, slight sulfur odour.
Nov-19	BH7	2.98	1.588	1.392	4.61	12:10	21.79	391	4.6	13.1	Cloudy brown, slight sulfur odour.
Dec-19	BH7	2.98	1.989	0.991	4.61	14:00	21.87	292	5.93	-92.6	Cloudy brown, slight sulfur odour.
Jan-20	BH7	2.98	2.169	0.811	4.61	14:10	22.39	164	4.45	23.1	Light brown, slight sulfur odour.
Feb-20	BH7	2.98	2.169	0.811	4.61	14:10	22.39	164	4.45	23.1	Light brown, slight sulfur odour.
Mar-20	BH7	2.98	2.169	0.811	4.61	14:10	22.39	164	4.45	23.1	Light brown, slight sulfur odour.
Apr-20	BH7	2.98	1.813	1.167	4.61	-	20.8	190	4.88	-71.2	-
May-20	BH7	2.98	1.813	1.167	4.61	14:10	19	196.3	4.63	-34.4	Light brown, slight sulfur odour.
Jun-20	BH7	2.98	1.471	1.509	4.61	14:10	18.5	170	4.89	-70.3	Light brown, sulphur odour.
Jul-20	BH7	2.98	1.43	1.550	4.61	-	15.8	155	4.83	-102	Light brown, no odour.
Aug-20	BH7	2.98	1.217	1.763	4.49	-	15.24	237.95	4.72	-66	Light brown, sulphur odour.
Sep-20	BH7	2.98	1.427	1.543	4.49	-	21.64	253	4.57	21.9	Light brown, sulphur odour.
Oct-20	BH7	2.98	1.672	1.308	4.95	-	18.7	284.6	4.27	-29.1	Light brown, sulphur odour.
Nov-20	BH7	2.98	1.225	1.755	4.95	-	22.8	792	4.42	-104	clear, sulphur odour.
Dec-20	BH7	2.98	1.473	1.507	4.95	-	24.38	770	4.42	-75.5	Clear, sulphur odour.
Jan-21	BH7	2.98	1.234	1.746	4.95	-	24.3	810	4.76	-67.2	Light brown, sulphur odour.
Feb-21	BH7	2.98	1.235	1.745	4.95	14:35	24.1	892	5.02	-146.3	light brown, sulfur odour
Mar-21	BH7	2.98	1.174	1.806	4.95	-	22.8	350	5.1	-137	clear, sulfur odour
Apr-21	BH7	2.98	1.095	1.885	4.53	10:25	18.21	348	4.46	-35	Slight yellow, strong sulphur odour

Table 5
Gauging Data and Field Parameters
Williamtown Sand Syndicate

Date	Borehole	Top of Casing (mAHD)	Depth to Water (mTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mTOC)	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Comment
Jun-19	BH8	3.88	2.346	1.534	6.18	14:40	18.78	289	7.43	-340.8	Dark brown cloudy, sulfur odour
Jul-19	BH8	3.88	2.266	1.614	6.18	14:30	16.8	347	4.55	101	Cloudy brown, sulfur odour
Aug-19	BH8	3.88	2.406	1.474	6.18	14:15	18.2	374	4.66	27	Cloudy brown, sulfur odour
Sep-19	BH8	3.88	2.282	1.598	6.27	13:30	18.64	300	4.72	-10	Dark brown cloudy, sulfur odour
Oct-19	BH8	3.88	2.233	1.647	6.28	14:15	20.44	224	4.89	-160	Dark brown cloudy, sulfur odour
Nov-19	BH8	3.88	2.312	1.568	6.28	14:50	22.5	545	4.51	-28.8	Cloudy brown, sulfur odour
Dec-19	BH8	3.88	2.778	1.102	6.28	14:30	22.05	995	6.16	-96.8	Cloudy brown, sulfur odour
Jan-20	BH8	3.88	2.969	0.911	6.28	14:40	21.99	284	4.08	45.6	Cloudy brown, sulfur odour
Feb-20	BH8	3.88	2.969	0.911	6.28	14:40	21.99	284	4.08	45.6	Cloudy brown, sulfur odour
Mar-20	BH8	3.88	2.969	0.911	6.28	14:40	21.99	284	4.08	45.6	Cloudy brown, sulfur odour
Apr-20	BH8	3.88	2.549	1.331	6.28	-	19.8	218.7	4.65	-70.6	-
May-20	BH8	3.88	2.489	1.391	6.28	14:40	18.2	242.6	4.49	-42.2	Cloudy brown, sulfur odour
Jun-20	BH8	3.88	2.058	1.822	6.28	14:40	17	282.9	4.8	-50.9	Light brown, no odour
Jul-20	BH8	3.88	2.02	1.860	6.28	-	16	268	4.69	-90	Light brown, no odour
Aug-20	BH8	3.88	1.804	2.076	6.14	-	15.4	367.95	4.62	-63.2	Light brown, sulphur odour
Sep-20	BH8	3.88	1.156	2.724	6.14	-	19.41	379	4.46	1.5	Light brown, sulphur odour
Oct-20	BH8	3.88	2.442	1.438	6.28	-	17.7	314.1	4.3	-57.5	Light brown, sulphur odour
Nov-20	BH8	3.88	1.472	2.408	6.28	-	22.7	1053	4.64	-116.1	clear, sulphur odour
Dec-20	BH8	3.88	2.198	1.682	6.28	-	23.5	701	4.71	-124.6	Clear, sulphur odour
Jan-21	BH8	3.88	1.209	2.671	6.28	-	22.7	846	4.97	-114	Light brown, sulphur odour
Feb-21	BH8	3.88	1.9	1.980	6.28	15:00	20.7	1105	5.26	-167.6	-
Mar-21	BH8	3.88	1.801	2.079	6.28	-	21.3	366	5.002	-159	slight cloudy brown, sulfur odour
Apr-21	BH8	3.88	1.765	2.115	6.1	10:32	17.9	280	3.92	9.4	Slight yellow, strong sulphur odour
May-21	BH8	3.88	1.8	2.080	6.1	15:00	17.5	311	4.73	78	Light brown, strong sulphur odour, well in good condition
Jun-21	BH8	3.88	1.338	2.542	6.1	14:20	16.6	391	4.72	-53.9	Clear, strong sulphur odour, no sheen, well in good condition
Jul-21	BH8	3.88	1.751	2.129	6.04	15:30	16.3	159.3	4.71	72.2	Medium brown, slight sulphur odour, no sheen, well in good condition
Aug-21	BH8	3.88	1.954	1.926	6.04	14:45	16.6	389	4.68	-57.4	Light brown, moderate sulphur odour, no sheen, well in good condition
Nov-21	BH8	3.88	1.783	2.097	6.06	10:45	17.5	452.1	4.6	-103.6	Light brown, moderate sulphur odour, no sheen
May-22	BH8	3.88	1.663	2.217	6.1	12:25	18.3	147	4.97	-16.8	Light yellow, moderate sulphur odour, no sheen
Feb-19	BH9	17.75	Dry	-	15.82	-	-	-	-	-	Well was dry.
Mar-19	BH9	17.75	Dry	-	16.01	-	-	-	-	176	Well was dry.
Apr-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
May-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Jun-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Jul-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Aug-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Sep-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Oct-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Nov-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Dec-19	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Jan-20	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Feb-20	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Mar-20	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Apr-20	BH9	17.5	Dry	-	16.01	-	-	-	-	-	-
May-20	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Jun-20	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Jul-20	BH9	17.75	Dry	-	16.01	-	-	-	-	-	Well was dry.
Aug-20	BH9	17.75	15.723	2.027	16.2	-	18.43	84.33	4.79	317	Bailer used due to insufficient volume, clear, no odour
Sep-20	BH9	17.75	15.951	1.799	16.2	-	-	-	-	-	Insufficient volume to sample
Oct-20	BH9	17.75	Dry	-	18.8	-	-	-	-	-	Insufficient well volume for sampling
Aug-21	BH9	17.75	15.764	1.986	15.99	-	-	-	-	-	Insufficient well volume for sampling
Oct-21	BH9	17.75	15.702	2.048	15.98	7:45	-	-	-	-	Insufficient volume to sample
Nov-21	BH9	17.75	15.668	2.082	16.15	7:55	19.1	155.2	4.66	-10.1	Clear, no odour, no sheen
Dec-21	BH9	17.75	15.656	2.094	16.19	-	-	-	-	-	no sample taken
Jan-22	BH9	17.75	15.762	1.988	16.18	-	-	-	-	-	no sample taken
May-22	BH9	17.75	15.286	2.464	16.29	-	ND	ND	ND	ND	No sample taken, well in good condition
Sep-20	BH9A	10.25	8.903	1.347	16.16	-	19.85	266	4.97	317	Newly installed, Silty brown, no odour.
Oct-20	BH9A	10.25	9.163	1.087	16.16	-	20.2	279.8	4.77	274.7	Newly installed well
Nov-20	BH9A	10.25	8.76	1.490	16.16	-	24.6	686	5.73	304.3	Dark brown, no odour
Dec-20	BH9A	10.25	9.026	1.234	16.16	-	22.8	516	4.66	-120.6	Dark brown, no odour
Jan-21	BH9A	10.25	8.528	1.722	16.16	-	22	562	5.65	52.6	Dark brown, no odour
Feb-21	BH9A	10.25	8.761	1.489	16.16	12:00	22.5	609	5.46	-141.8	dark brown, sulfur odour
Mar-21	BH9A	10.25	8.713	1.537	16.16	12:15	20.4	214	5.72	-161	cloudy brown, sulfur odour
Apr-21	BH9A	10.25	8.389	1.861	12.44	8:24	18.45	182.2	4.79	234	Dark brown, sulphur odour
May-21	BH9A	10.25	8.523	1.727	12.44	12:40	18.9	204	4.95	248	Slight brown stain, odour, well in good condition
Jun-21	BH9A	10.25	8.613	1.637	12.44	12:30	18.3	173	4.7	-17.5	Moderate brown, sulphur odour, no sheen, well in good condition
Jul-21	BH9A	10.25	8.594	1.656	12.485	12:15	18.6	92.5	4.67	193	Moderate brown, slight sulphur odour, no sheen, well in good condition
Aug-21	BH9A	10.25	8.769	1.481	12.485	12:10	18.3	183.4	4.66	19.1	Light yellow, no odour / sheen, well in good condition
Sep-21	BH9A	10.25	8.675	1.575	8.675	12:00	18.8	166	4.8	40.7	Medium brown, slight sulphur odour, no sheen, well in good condition
Oct-21	BH9A	10.25	8.672	1.578	12.44	12:21	18.6	165	4.88	-9.9	Medium brown, slight sulphur odour, no sheen
Nov-21	BH9A	10.25	8.656	1.594	12.4	14:10	19.2	167.5	4.65	-6	Light brown, slight sulphur odour, no sheen
Dec-21	BH9A	10.25	8.749	1.501	12.54	11:25	21.7	162	4.77	-20.8	medium brown, very slight sulfur odour, no sheen
Jan-22	BH9A	10.25	8.87	1.380	12.49	10:15	20.9	16.3	4.54	-71	medium brown, light sulfur odour, no sheen
May-22	BH9A	10.25	8.364	1.886	12.46	11:10	18.1	170	4.81	68.3	Very light brown, slight sulphur odour, no sheen, well in good condition
Feb-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Mar-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Apr-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
May-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Jun-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Jul-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Aug-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Sep-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Oct-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Nov-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Dec-19	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Jan-20	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Feb-20	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Mar-20	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Apr-20	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
May-20	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Jun-20	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Jul-20	BH10	6.69	Dry	-	3.58	-	-	-	-	-	Well was dry.
Aug-20	BH10	6.69	Dry	-	3.68	-	-	-	-	-	Well was dry. Approximately 1.8m of sediment deposited since 2014.
Sep-20	BH10	6.69	Dry	-	3.68	-	-	-	-	-	Well was dry. Approximately 1.8m of sediment deposited since 2014
Oct-20	BH10	6.69	Dry	-	3.68	-	-	-	-	-	Well was dry.
Nov-20	BH10	6.69	Dry	-	3.68	-	-	-	-	-	Well was dry.
Dec-20	BH10	6.69	Dry	-	3.68	-	-	-	-	-	Well was dry.
Jan-21	BH10	6.69	Dry	-	3.68	-	-	-	-	-	Well was dry.
Feb-21	BH10	6.69	DRY	-	3.68	-	-	-	-	-	Well was dry.
Mar-21	BH10	6.69	DRY	-	3.68	-	-	-	-	-	Well was dry.
Apr-21	BH10	6.69	2.464	4.226	3.46	9:00	19.75	245.7	5.05	35.2	Light brown, sulphur odour
May-21	BH10	6.69	2.591	4.099	3.46	13:20	18.9	227	4.77	196	Clear, moderate sulphur odour, well in good condition
Jun-21	BH10	6.69	2.734	3.956	3.44	11:05	17.1	229	4.55	24.2	Clear, slight sulphur odour, no sheen, well in good condition
Jul-21	BH10	6.69	2.731	3.959	3.42	8:20	16	284.5	4.61	52	Clear, strong sulphur odour, no sheen, well in good condition
Aug-21	BH10	6.69	2.932	3.758	3.42	-	ND	ND	ND	ND	No sample taken
Nov-21	BH10	6.69	2.991	3.699	3.43	-	ND	ND	ND	ND	No sample taken
May-22	BH10	6.69	2.03	4.660	3.43	-	ND	ND	ND	ND	No sample taken
Feb-19	BH11										

Table 5
Gauging Data and Field Parameters
Williamtown Sand Syndicate

Date	Borehole	Top of Casing (mAHD)	Depth to Water (mTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mTOC)	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Comment
Sep-19	BH11	6.63	3.546	3.084	5.39	12:00	20.26	195	4.64	31.2	Cloudy light brown, sulfur odour
Oct-19	BH11	6.63	3.586	3.044	5.39	12:05	19.93	124	4.83	-117	Cloudy light brown, sulfur odour
Nov-19	BH11	6.63	3.621	3.009	5.39	-	-	324	-	-	Cloudy light brown, sulfur odour
Dec-19	BH11	6.63	3.859	2.771	5.39	13:00	20.55	239	5.42	-60.7	Cloudy brown, sulfur odour
Jan-20	BH11	6.63	3.962	2.668	5.39	12:15	22.37	129	4.61	42	Cloudy brown, sulfur odour
Feb-20	BH11	6.63	3.962	2.668	5.39	12:15	22.37	129	4.61	42	Cloudy brown, sulfur odour
Mar-20	BH11	6.63	3.962	2.668	5.39	12:15	22.37	129	4.61	42	Cloudy brown, sulfur odour
Apr-20	BH11	6.63	4.087	2.543	5.39	-	20	140.4	4.84	-39.7	-
May-20	BH11	6.63	4.241	2.389	5.39	12:15	18.2	147.4	4.69	-65.4	Cloudy brown, sulfur odour
Jun-20	BH11	6.63	4.343	2.287	5.39	12:15	18.2	146.2	4.71	-24.7	Brown, dirt odour, well blockage
Jul-20	BH11	6.63	4.484	2.146	5.39	-	15.8	121	4.6	124	Light Brown, no odour - bore blocked
Aug-20	BH11	6.63	3.621	3.009	5.82	-	17.28	172.83	4.71	270.4	Light Brown, no odour
Sep-20	BH11	6.63	3.658	2.972	5.82	-	20.02	220.49	4.52	115.4	Light Brown, no odour
Oct-20	BH11	6.63	3.725	2.905	5.95	-	19	255.1	4.3	111	Light Brown, no odour
Nov-20	BH11	6.63	3.405	3.225	5.95	-	23.4	541	4.77	6.6	clear, no odour
Dec-20	BH11	6.63	3.505	3.125	5.95	-	23.6	459	4.81	-95.6	Clear, sulphur odour
Jan-21	BH11	6.63	3.384	3.246	5.95	-	22.6	668	5.23	-73.3	Clear, sulphur odour
Feb-21	BH11	6.63	3.246	3.384	5.95	13:15	21.1	68	5.3	-107.4	light brown, slight odour
Mar-21	BH11	6.63	3.143	3.487	5.95	13:25	20.8	291	5.43	-95	Clear, no odour
Apr-21	BH11	6.63	1.839	4.791	5.29	9:27	18.87	160	4.47	224	Light yellow, slight sulphur odour
May-21	BH11	6.63	1.86	4.770	5.29	13:50	18.1	200	4.54	235	Light yellow, no odour, well in good condition
Jun-21	BH11	6.63	1.993	4.637	5.29	13:20	16.8	225	4.62	132	Light yellow / brown, slight sulphur odour, no sheen, well in good condition
Jul-21	BH11	6.63	1.889	4.741	5.298	13:42	16.9	178	4.54	162	Light yellow, no odour, no sheen, well in good condition
Aug-21	BH11	6.63	2.156	4.474	5.298	13:15	16.5	411.9	4.25	67.8	Very light brown, slight sulphur odour, no sheen
Sep-21	BH11	6.63	2.141	4.489	5.29	12:55	18	362	4.39	-4.8	Light yellow, very slight sulphur odour, no sheen
Oct-21	BH11	6.63	2.269	4.361	5.29	13:10	17	323	4.5	18.8	Light yellow, slight sulphur odour, no sheen
Nov-21	BH11	6.63	2.116	4.514	5.3	15:00	18	270	4.27	-32.1	Light yellow, slight sulphur odour, no sheen
Dec-21	BH11	6.63	2.055	4.575	5.31	12:20	21.1	224	4.68	-63	light yellow, slight sulfur odour, no sheen
Jan-22	BH11	6.63	2.37	4.260	5.31	8:06	20.8	27.3	4.44	-90	light yellow, moderate sulfur odour, no sheen
May-22	BH11	6.63	1.205	5.425	5.31	13:30	17.2	198	4.94	-60	Light yellow, strong sulfur odour; no sheen
Feb-19	BH12	8.67	-	6.17	-	-	-	-	-	-	Well was dry.
Mar-19	BH12	8.67	6.924	1.746	8.03	-	-	-	-	-	40mm inner tube installed. No odour - No sample taken
Apr-19	BH12	8.67	6.846	1.824	8.12	-	-	-	-	-	40mm inner tube installed. No odour - No sample taken
May-19	BH12	8.67	6.863	1.807	8.12	-	-	-	-	-	Acrylic odour. No sample taken.
Jun-19	BH12	8.67	6.832	1.838	8.12	-	-	-	-	-	Slight acrylic odour. No sample taken.
Jul-19	BH12	8.67	6.799	1.871	8.12	-	-	-	-	-	Slight acrylic odour. No sample taken.
Aug-19	BH12	8.67	6.889	1.781	8.12	-	-	-	-	-	Slight acrylic odour. No sample taken.
Sep-19	BH12	8.67	6.827	1.843	8.2	-	-	-	-	-	No sample taken.
Oct-19	BH12	8.67	6.881	1.789	8.2	-	-	-	-	-	No sample taken.
Nov-19	BH12	8.67	6.89	1.780	8.2	-	-	-	-	-	No sample taken.
Dec-19	BH12	8.67	7.076	1.594	8.2	-	-	-	-	-	No sample taken.
Jan-20	BH12	8.67	7.252	1.418	8.2	-	-	-	-	-	No sample taken.
Feb-20	BH12	8.67	7.252	1.418	8.2	-	-	-	-	-	No sample taken.
Mar-20	BH12	8.67	7.252	1.418	8.2	-	-	-	-	-	No sample taken.
Apr-20	BH12	8.67	7.149	1.521	8.2	-	-	-	-	-	-
May-20	BH12	8.67	7.156	1.514	8.2	-	-	-	-	-	No sample taken.
Jun-20	BH12	8.67	7.003	1.667	8.2	-	-	-	-	-	No sample taken.
Jul-20	BH12	8.67	7.057	1.613	8.2	-	-	-	-	-	No sample taken.
Aug-20	BH12	8.67	6.443	2.227	8.17	-	17.78	163.09	5.25	-48	Light Brown, no odour
Sep-20	BH12	8.67	6.629	2.041	8.17	-	21.85	206.44	4.66	134	Light Brown, no odour
Oct-20	BH12	8.67	6.799	1.871	8.39	-	-	-	-	-	No sample take, well too skinny
Nov-20	BH12	8.67	6.459	2.211	8.39	-	24.9	525	5.02	-34.6	Light brown, sulphur odour
Dec-20	BH12	8.67	6.632	2.038	8.39	-	22.43	532	5	203.3	Clear, no odour
Jan-21	BH12	8.67	6.502	2.168	8.39	-	21.9	282	5.53	43.7	Clear, no odour
Feb-21	BH12	8.67	6.441	2.229	8.39	13:35	21.5	534	5.73	-172.9	Well damaged, clear, sulfur odour
Mar-21	BH12	8.67	6.364	2.306	8.39	13:45	20.6	211	5.77	-186	Clear, no odour
Apr-21	BH12	8.67	5.82	2.850	8.22	9:45	20	201	5.65	196	Clear, no odour
May-21	BH12	8.67	5.938	2.732	8.22	14:15	19.4	249	5.62	62.6	Cloudy brown, slight sulphur odour; broken hinge on well casing
Jun-21	BH12	8.67	6.019	2.651	8.22	13:37	18.1	94.6	5.2	288	Clear, no odour / sheen, broken hinge on well casing
Jul-21	BH12	8.67	6.005	2.665	8.22	-	ND	ND	ND	ND	No sample taken, Hydrasleeve would not fit in 35mm inner PVC piping. Suggest removing inner tube
Aug-21	BH12	8.67	6.147	2.523	8.22	13:35	19.1	249.7	4.77	250.8	Clear, no odour / sheen, well in good condition
Sep-21	BH12	8.67	6.079	2.591	8.21	10:10	17.5	210	4.98	86.7	Light grey / brown, no odour / sheen, well in good condition
Oct-21	BH12	8.67	6.18	2.490	8.21	10:35	18.6	226.2	5.15	188.5	Dark brown, no odour / sheen
Nov-21	BH12	8.67	6.048	2.622	8.21	12:10	19.8	180.8	4.76	165.9	Light brown, no odour, no sheen
May-22	BH12	8.67	5.644	3.026	8.24	-	ND	ND	ND	ND	No sample taken
Feb-19	MW239D	3.04	1.312	1.728	20.21	-	-	-	-	-	-
Mar-19	MW239D	3.04	1.591	1.449	20.19	-	-	-	-	-	No odour - No sample taken
Apr-19	MW239D	3.04	1.392	1.648	20.2	-	-	-	-	-	No odour - No sample taken
May-19	MW239D	3.04	1.383	1.657	20.2	-	-	-	-	-	No odour - No sample taken
Jun-19	MW239D	3.04	1.32	1.720	20.2	-	-	-	-	-	No odour - No sample taken
Jul-19	MW239D	3.04	1.239	1.801	20.2	-	-	-	-	-	No odour - No sample taken
Aug-19	MW239D	3.04	1.327	1.713	20.2	-	-	-	-	-	Slight Sulfur odour, no sample taken
Sep-19	MW239D	3.04	1.248	1.792	20.2	-	-	-	-	-	Slight Sulfur odour, no sample taken
Oct-19	MW239D	3.04	1.226	1.814	20.32	-	-	-	-	-	Slight Sulfur odour, no sample taken
Nov-19	MW239D	3.04	1.238	1.802	20.32	-	-	-	-	-	Slight Sulfur odour, no sample taken
Dec-19	MW239D	3.04	1.626	1.414	20.32	-	-	-	-	-	Slight Sulfur odour, no sample taken
Jan-20	MW239D	3.04	1.799	1.241	20.32	-	-	-	-	-	Slight Sulfur odour, no sample taken
Feb-20	MW239D	3.04	1.799	1.241	20.32	-	-	-	-	-	Slight Sulfur odour, no sample taken
Mar-20	MW239D	3.04	1.799	1.241	20.32	-	-	-	-	-	Slight Sulfur odour, no sample taken
Apr-20	MW239D	3.04	-	-	20.32	-	-	-	-	-	Slight Sulfur odour, no sample taken
Jun-20	MW239D	3.04	1.328	1.712	20.32	-	-	-	-	-	No sample taken
Jul-20	MW239D	3.04	1.32	1.720	20.32	-	-	-	-	-	No sample taken
Aug-20	MW239D	3.04	0.955	2.085	20.49	-	-	-	-	-	No sample taken
Sep-20	MW239D	3.04	1.183	1.857	20.49	-	-	-	-	-	No sample taken
Oct-20	MW239D	3.04	1.331	1.709	20.49	-	-	-	-	-	No sample taken
Nov-20	MW239D	3.04	1.132	1.908	20.49	-	-	-	-	-	No sample taken
Dec-20	MW239D	3.04	1.172	1.868	20.49	-	-	-	-	-	No sample taken
Jan-21	MW239D	3.04	0.975	2.065	20.49	-	-	-	-	-	No sample taken
Feb-21	MW239D	3.04	0.984	2.056	20.49	-	-	-	-	-	-
Mar-21	MW239D	3.04	0.901	2.139	20.49	-	-	-	-	-	No sample
Apr-21	MW239D	3.04	0.739	2.301	20.57	10:00	ND	ND	ND	ND	No sample taken
May-21	MW239D	3.04	0.783	2.257	20.57	9:10	ND	ND	ND	ND	No sample taken, well in good condition
Jun-21	MW239D	3.04	0.794	2.246	20.57	-	ND	ND	ND	ND	No sample taken, well in good condition
Jul-21	MW239D	3.04	0.716	2.324	20.57	-	ND	ND	ND	ND	No sample taken, well in good condition
Aug-21	MW239D	3.04	0.85	2.190	20.57	-	ND	ND	ND	ND	No sample taken, well in good condition
Nov-21	MW239D	3.04	0.768	2.272	20.52	-	ND	ND	ND	ND	No sample taken, well in good condition
May-22	MW239D	3.04	0.515	2.252	20.58	-	ND	ND	ND	ND	No sample taken, well in good condition
Feb-19	MW239S	3.04	1.529	1.511	3.89	7:30	21.7	526	4.09	121	Light Brown - Slight Sulfur odour.
Mar-19	MW239S	3.04	1.615	1.425	3.89	14:45	23.1	323	4.43	-	Dark Brown - Slight Sulfur odour.
Apr-19	MW239S	3.04	1.421	1.619	3.89	14:45	21.43	352	4.72	45.3	Light Brown - Slight Sulfur odour
May-19	MW239S	3.04	1.412	1.628	3.89	13:45	19.49	392	4.64	-65.8	Data logger downloaded. Dark brown, sulfur odour.
Jun-19	MW239S	3.04	1.344	1.696	3.89	13:50	19.3	305	5.7	-117.9	Cloudy, sulfur odour.
Jul-19	MW239S	3.04	1.262	1.778	3.89	13:15	15.8				

Table 5
Gauging Data and Field Parameters
Williantown Sand Syndicate

Date	Borehole	Top of Casing (mAHD)	Depth to Water (mTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mTOC)	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Comment
Jul-20	MW239S	3.04	1.3	1.740	4.06	-	15.3	0.27	12.7	144	Brown, no odour
Aug-20	MW239S	3.04	0.981	2.059	3.9	-	15.74	431.08	4.72	2.3	Light Brown, sulphur odour
Sep-20	MW239S	3.04	1.116	1.924	3.9	-	18.87	337.89	4.42	79.8	Light Brown, sulphur odour
Oct-20	MW239S	3.04	1.364	1.676	4	-	19.6	522	4.27	28.7	Light Brown, sulphur odour
Nov-20	MW239S	3.04	0.998	2.042	4	-	22.4	1443	4.55	-83.8	Light Brown, sulphur odour
Dec-20	MW239S	3.04	1.2	1.840	4	-	23	1389	4.6	-126.1	Dark brown, sulphur odour
Jan-21	MW239S	3.04	0.998	2.042	4	-	23.6	1221	5.08	-127.7	Dark brown, sulphur odour
Feb-21	MW239S	3.04	0.998	2.042	4	13:50	22.8	1676	5.12	-155.7	dark brown, sulfur odour
Mar-21	MW239S	3.04	0.923	2.117	4	-	22.3	402	5.19	-158	slight cloudy brown, sulfur odour
Apr-21	MW239S	3.04	0.757	2.283	3.84	9:55	18.43	276	4.43	8.3	Dark brown/organic material, strong sulphur odour
May-21	MW239S	3.04	0.81	2.230	3.84	14:30	17.5	348	4.61	117	Dark brown/organic material, strong sulphur odour, well in good condition
Jun-21	MW239S	3.04	0.812	2.228	3.84	13:53	16.1	246	4.59	38	Slight cloudy yellow, moderate sulphur odour, no sheen, well in good condition
Jul-21	MW239S	3.04	0.736	2.304	3.86	14:09	15.3	146	4.58	50.9	Medium brown, slight - moderate sulphur odour, no sheen, well in good condition
Aug-21	MW239S	3.04	0.874	2.166	3.86	13:55	15.6	166.5	4.6	-28.4	Light brown, moderate sulphur odour, no sheen, well in good condition
Sep-21	MW239S	3.04	0.786	2.254	3.82	10:00	15.4	205	4.66	-142	Cloudy brown, slight sulphur odour, no sheen, well in good condition
Oct-21	MW239S	3.04	0.801	2.239	3.83	1:12	16.9	160.8	4.83	-34.8	Medium brown, slight sulphur odour, no sheen
Nov-21	MW239S	3.04	0.787	2.253	3.83	11:40	18.7	179.9	4.5	-74.9	Light brown, light sulphur odour, no sheen
Dec-21	MW239S	3.04	0.862	2.178	3.85	10:00	21	151.4	4.8	-91	light brown, moderate sulfur odour, no sheen
Jan-22	MW239S	3.04	1.078	1.962	3.87	9:20	21.5	20.4	4.38	-75	medium brown, slight sulfur odour, no sheen
May-22	MW239S	3.04	0.534	2.506	3.85	11:30	17.3	182	4.85	18.2	Medium brown, moderate sulphur odour, no sheen
Feb-19	SW1	2.5	Dry	-	N/A	-	-	-	-	-	Location was dry.
Mar-19	SW1	2.5	Dry	-	N/A	-	-	-	-	-	Location was dry.
Apr-19	SW1	2.5	2.49	0.010	N/A	12:00	23.16	1003	3.95	405.9	Small pool of surface water with stained brown water.
May-19	SW1	2.5	0.01	2.490	N/A	11:15	14.9	966	4.42	106.7	Small pool of surface water with stained brown water.
Jun-19	SW1	N/A	0.14	#VALUE!	N/A	11:40	14.5	811	6.4	298.4	Small pool of surface water with stained brown water.
Jul-19	SW1	N/A	0.2	#VALUE!	N/A	11:05	9.7	827	4.56	99	Dark brown, no odour, slight sheen
Aug-19	SW1	N/A	0.15	#VALUE!	N/A	10:45	9.52	1205	4.6	263	Natural tannin stained brown, sulfur odour
Sep-19	SW1	N/A	0.26	#VALUE!	N/A	13:00	16.59	1138	4.21	323	Natural tannin stained brown, sulfur odour
Oct-19	SW1	N/A	0.29	#VALUE!	N/A	10:45	16.56	857	4.35	339	Natural tannin stained brown, sulfur odour
Nov-19	SW1	N/A	0.02	#VALUE!	N/A	11:45	23.75	1964	4.53	230	Significant reduction in water level, tannins stained brown, sulfur odour
Dec-19	SW1	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Jan-20	SW1	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Feb-20	SW1	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Mar-20	SW1	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Apr-20	SW1	N/A	1.9	-	N/A	-	18.3	144.6	8.23	126.5	-
May-20	SW1	N/A	3	-	N/A	13:10	14	169.4	7.4	183.1	-
Jun-20	SW1	N/A	0.52	-	N/A	13:10	11.9	120.5	6.9	139.8	Light brown, no odour
Jul-20	SW1	N/A	0.54	-	N/A	-	12	98	7.4	226	Light brown, no odour
Aug-20	SW1	N/A	>0.6	-	N/A	-	14.21	83.65	6.38	229.4	Light brown, no odour
Sep-20	SW1	N/A	0.6	-	N/A	-	16.51	116	6.36	229.4	Light brown, no odour
Oct-20	SW1	N/A	0.6	N/A	N/A	-	18.2	313.3	6.68	131	Light brown, no odour
Nov-20	SW1	N/A	0.6	N/A	N/A	-	22.9	461	6.91	1140	Clear, no odour
Dec-20	SW1	N/A	0.6	N/A	N/A	-	26.4	658	6.61	49.8	Clear, no odour
Jan-21	SW1	N/A	0.6	N/A	N/A	-	25.1	594	6.77	67.2	Clear, no odour
Feb-21	SW1	N/A	-	-	N/A	11:00	22.58	608	6.68	65.1	Clear, no odour, very full
Mar-21	SW1	N/A	> 0.6	-	N/A	11:30	21.1	184	6.59	118	Slight brown/tan, odour
Apr-21	SW1	N/A	> 0.6	N/A	N/A	12:45	15.4	310.66	5.38	41.7	Slight brown stain, sulphur odour
May-21	SW1	N/A	1.5	N/A	N/A	12:00	11	265.5	5.43	186.5	Dark brown stain, no odour
Jun-19	SW1	N/A	1.4	N/A	N/A	11:49	10.1	219	5.77	202	Natural tannin brown, no odour / sheen
Jul-21	SW1	N/A	0.65	N/A	N/A	11:56	12.2	202.3	5.29	208.2	Deep yellow, no odour / sheen
Aug-21	SW1	N/A	0.6	N/A	N/A	11:52	12	187	6.05	194.6	Clear / slight yellow, no odour / sheen
Sep-21	SW1	N/A	N/A	N/A	N/A	-	10.8	145	6.04	139.4	Slight yellow, no odour / sheen
Oct-21	SW1	N/A	0.7	N/A	N/A	12:13	16.6	108	6.17	152	Dark tannin red / brown, no odour / sheen
Nov-21	SW1	N/A	-	N/A	N/A	13:30	17.8	92.2	5.72	153.7	Natural tannin orange / brown, no odour, no sheen
May-22	SW1	N/A	0.26	N/A	N/A	10:45	14.3	155.9	5.13	186	Natural tannin orange / brown, no odour, no sheen
Feb-19	SW2	3.3	Dry	-	N/A	-	-	-	-	-	Location was dry.
Mar-19	SW2	3.3	Dry	-	N/A	-	-	-	-	-	Location was dry.
Apr-19	SW2	3.3	Dry	-	N/A	-	-	-	-	-	Location was dry.
May-19	SW2	3.3	Dry	-	N/A	-	-	-	-	-	Location was dry.
Jun-19	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Jul-19	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Aug-19	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Sep-19	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Oct-19	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Nov-19	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Dec-19	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Jan-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Feb-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Mar-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Apr-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	-
May-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Jun-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Jul-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry - ground damp
Aug-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry - ground damp
Sep-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Oct-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Nov-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Dec-20	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Jan-21	SW2	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Mar-21	SW2	N/A	0.1	-	N/A	11:00	20.3	132	6.16	244	Slight brown/tan, sulfur odour
Apr-21	SW2	N/A	0.1	N/A	N/A	12:10	14.67	91.5	5.07	19	Slight brown stain, sulphur odour
May-21	SW2	N/A	0.25	N/A	N/A	11:10	11.1	89.1	4.99	166	Slight brown stain, no odour
Jun-21	SW2	N/A	0.25	N/A	N/A	10:40	12.8	105	4.69	64.2	Clear, no odour / sheen
Jul-21	SW2	N/A	0.25	N/A	N/A	10:33	12.2	96.4	4.43	87.4	Natural tannin brown, slight sulphur odour, no sheen
Aug-21	SW2	N/A	0.2	N/A	N/A	13:10	11	98.8	4.56	294	Natural tannin brown, slight sulphur odour, no sheen
Sep-21	SW2	N/A	0.6	N/A	N/A	-	13.4	103	4.57	346	Natural tannin orange, no odour / sheen
Oct-21	SW2	N/A	0.6	N/A	N/A	10:50	16.5	93.6	4.65	270.5	Dark tannin red / brown, no odour / sheen
Nov-21	SW2	N/A	-	N/A	N/A	-	17.1	89	4.96	156.8	Dark orange / brown / natural tannin, no odour, no sheen
May-22	SW2	N/A	0.45	N/A	N/A	13:40	15.9	90.2	4.56	77	Natural tannin orange / brown, no odour, no sheen
Feb-19	SW3	2.1	1.1	1.000	N/A	16:15	26	313	5.11	62	Water was at a low level and was not seen to be flowing.
Mar-19	SW3	2.1	1.1	1.000	N/A	15:15	25.87	342	6.08	-	Water was at a low level and was not seen to be flowing.
Apr-19	SW3	2.1	1.1	1.000	N/A	14:30	19.88	311	6.02	-12.8	Water clear, no odour.
May-19	SW3	2.1	0.1	2.000	N/A	13:15	14.54	344	5.54	71.6	Water clear, no odour.
Jun-19	SW3	N/A	0.15	1.100	N/A	13:30	16.36	290	6.41	52.4	Water clear, no odour.
Jul-19	SW3	N/A	0.215	1.215	N/A	12:45	14.6	431	4.27	116	Water clear, no odour.
Aug-19	SW3	N/A	0.195	1.195	N/A	12:45	11.96	464	4.67	152	Water clear, no odour.
Sep-19	SW3	N/A	0.24	1.240	N/A	14:45	17.05	449	5.02	86.7	Water clear, no odour.
Oct-19	SW3	N/A	0.29	1.290	N/A	12:30	18.77	313	4.36	315	Water clear, no odour.
Nov-19	SW3	N/A	0.02	1.020	N/A	9:45	19.54	470	5.04	97.7	Mostly clear (red algae present), no odour
Dec-19	SW3	N/A	Dry	-	N/A	10:00	20	440	5.69	29.3	Small amount of standing water.
Jan-20	SW3	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Feb-20	SW3	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Mar-20	SW3	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry.
Apr-20	SW3	N/A	0.76	-	N/A	-	17.5	276.9	4.24	235.6	-
May-20	SW3	N/A	0.85	-	N/A	13:30	14.3	286.6	4.72	304.7	-
Jun-20	SW3	N/A	0.24	-	N/A	13:30	14.5	468.6	4.18	220.9	Clear, no odour
Jul-20	SW3	N/A	0.3	-	N/A	-	14	395	4	381	Clear, no odour
Aug-20	SW3	N/A	0.56	-	N/A	-	13.56	477.36	3.77	4.08	Clear, no odour
Sep-20	SW3	N/A	0.39	-	N/A	-	16.99	399	3.79	4.08	Clear, no odour
Oct-20	SW3	N/A	0.39	N/A	N/A	-	18.3	375.4	3.74	318	Clear, no odour
Nov-20	SW3	N/A	0.39								

Table 5
Gauging Data and Field Parameters
Williamstown Sand Syndicate

Date	Borehole	Top of Casing (mAHD)	Depth to Water (mTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mTOC)	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Comment
Mar-21	SW3	N/A	> 0.6	-	-	10:30	20.6	291	6.54	1076	Slight brown/tan, sulfur odour
Apr-21	SW3	N/A	> 0.6	N/A	N/A	11:55	15.5	312.57	5.49	48.1	Slight brown stain, sulphur odour
May-21	SW3	N/A	1.5	N/A	N/A	11:00	10.2	276	5.7	36.1	Natural sheen (brown algae), no odour
Jun-21	SW3	N/A	1.4	N/A	N/A	10:24	10.2	220	4.84	-2.9	Clear, strong sulphur odour, no sheen
Jul-21	SW3	N/A	0.65	N/A	N/A	10:20	10.1	213	5.31	-41	Natural tannin brown, strong sulphur odour, no sheen
Aug-21	SW3	N/A	0.6	N/A	N/A	9:51	8.7	203	5.02	-12.7	Natural tannin brown, strong sulphur odour, no sheen
Nov-21	SW3	N/A	-	N/A	N/A	12:00	17.8	218.3	4.03	87.3	Natural tannin orange / brown, no odour, no sheen
May-22	SW3	N/A	0.3	N/A	N/A	13:15	13.9	222	4.86	5.7	Natural tannin brown, no odour, no sheen
Feb-19	SW4	2	Dry	-	N/A	-	-	-	-	-	Location was dry.
Mar-19	SW4	2	Dry	-	N/A	-	-	-	-	-	Location was dry.
Apr-19	SW4	2	1.9	1.900	N/A	11:15	17.57	339	3.69	430.5	Water clear, no odour.
May-19	SW4	2	0.135	2.135	N/A	10:30	12.03	389	3.69	211.4	Water clear, no odour.
Jun-19	SW4	N/A	0.175	2.135	N/A	10:45	13.34	313	6.44	377.3	Water clear, no odour.
Jul-19	SW4	N/A	0.281	2.281	N/A	9:30	9.9	371	4.23	116	Light brown, no odour.
Aug-19	SW4	N/A	0.18	2.180	N/A	9:50	8.07	485	4.17	294	Clear, no odour.
Sep-19	SW4	N/A	0.29	2.290	N/A	10:30	14.8	371	4.19	360	Clear, no odour.
Oct-19	SW4	N/A	0.35	2.350	N/A	9:45	16.45	325	4.36	370	Clear, no odour.
Nov-19	SW4	N/A	0.15	2.150	N/A	10:45	18.46	538	4.56	219	Clear, no odour.
Dec-19	SW4	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Jan-20	SW4	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Feb-20	SW4	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Mar-20	SW4	N/A	Dry	-	N/A	-	-	-	-	-	Location was dry
Apr-20	SW4	N/A	0.68	-	N/A	-	16.2	306.1	4.83	205.6	-
May-20	SW4	N/A	1.28	-	N/A	14:00	12.1	337.5	4.69	230.1	-
Jun-20	SW4	N/A	0.38	-	N/A	14:00	12.5	375	4.82	236.2	Clear, no odour
Jul-20	SW4	N/A	0.47	-	N/A	-	13	324	4.7	311	Clear, no odour
Aug-20	SW4	N/A	0.52	-	N/A	-	12.4	433.79	4.22	389	Clear, no odour
Sep-20	SW4	N/A	0.5	-	N/A	-	17.02	383	3.88	389	Clear, no odour
Oct-20	SW4	N/A	0.5	N/A	N/A	-	17.7	397.2	3.62	303	Clear, no odour
Nov-20	SW4	N/A	0.5	N/A	N/A	-	20.3	1239	5.66	256	Clear, slight odour
Dec-20	SW4	N/A	0.5	N/A	N/A	-	21	1397	6.72	-204.6	Natural sheen, no odour
Jan-21	SW4	N/A	0.5	N/A	N/A	-	21.7	1311	7.24	-226.5	Natural sheen, sulphur odour
Feb-21	SW4	N/A	-	-	-	9:45	20.6	1468	6.98	-140.4	Natural sheen, no odour, very full
Mar-21	SW4	N/A	> 0.6	-	-	10:00	19.5	529	7.34	-15.2	Brown/Tan, sulfur odour
Apr-21	SW4	N/A	> 0.6	N/A	N/A	11:21	16.14	257.88	6.18	-65	Brown stain, sulphur odour
May-21	SW4	N/A	1.5	N/A	N/A	10:15	10.4	322	6.26	-54	Natural sheen (brown algae), no odour, water flowing in E direction
Jun-21	SW4	N/A	1.2	N/A	N/A	10:00	10.4	277	4.79	260	Natural tannin brown, no odour / sheen
Jul-21	SW4	N/A	0.65	N/A	N/A	9:55	10.2	247	5.3	152	Natural tannin brown, no odour / sheen, flowing towards eastern boundary
Aug-21	SW4	N/A	0.6	N/A	N/A	9:27	9.4	269	5.13	104	Natural tannin brown (orange algae), no odour / sheen
Sep-21	SW4	N/A	0.6	N/A	N/A	-	12.1	236	5.8	149	Natural tannin orange / yellow, no odour / sheen
Oct-21	SW4	N/A	0.65	N/A	N/A	9:26	15.4	281	6.12	37.1	Dark tannin red / brown, no odour / sheen
Nov-21	SW4	N/A	-	N/A	N/A	10:30	15.9	247.3	5.9	-75.7	Natural tannin orange / brown, no odour, no sheen
May-22	SW4	N/A	0.2	N/A	N/A	12:55	13.4	200	5.93	93.6	Natural tannin orange / brown, no odour, no sheen
Sep-21	WPW	N/A	-	N/A	N/A	-	16.6	284	4.94	318	Dark brown
Oct-21	WPW	N/A	-	N/A	N/A	11:58	18	401.4	4.86	253	Dark brown, no odour / sheen
Nov-21	WPW	N/A	-	N/A	N/A	12:40	21.1	267	4.81	251	Very light brown, no odour, no sheen
Dec-21	WPW	N/A	-	N/A	-	10:30	26	273	6.25	-30	light brown, no odour, no sheen
Jan-22	WPW	N/A	-	N/A	-	9:50	25.7	26.2	4.7	179	dark brown, no odour/sheen
May-22	WPW	N/A	-	N/A	-	14:10	17.6	245	5.55	179.4	dark brown, no odour/sheen



ATTACHMENT 3: LAB RESULTS



CERTIFICATE OF ANALYSIS

Work Order	: ES2218583	Page	: 1 of 21
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: Megan Ferguson	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20222347 WSS - CABBAGE TREE RD WATER MONITORING MAY 2022	Date Samples Received	: 27-May-2022 15:10
Order number	: ----	Date Analysis Commenced	: 30-May-2022
C-O-C number	: ----	Issue Date	: 07-Jun-2022 09:51
Sampler	: Megan Ferguson		
Site	: ----		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 17		
No. of samples analysed	: 17		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)		Sample ID	WPF	---	---	---	---	---
Compound	CAS Number	LOR	Unit	Sampling date / time	27-May-2022 00:00	---	---	---
				Result	ES2218583-014	-----	-----	-----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	---	0.1	%	74.8	---	---	---	---
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	8	---	---	---	---
Barium	7440-39-3	10	mg/kg	10	---	---	---	---
Chromium	7440-47-3	2	mg/kg	73	---	---	---	---
Copper	7440-50-8	5	mg/kg	<5	---	---	---	---
Iron	7439-89-6	50	mg/kg	40000	---	---	---	---
Nickel	7440-02-0	2	mg/kg	5	---	---	---	---
Zinc	7440-66-6	5	mg/kg	13	---	---	---	---
Magnesium	7439-95-4	50	mg/kg	170	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0012	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	---	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluoroctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	---	---	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	---	---	---	---

Analytical Results

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	WPF	---	---	---	---	---
			Sampling date / time	27-May-2022 00:00	---	---	---	---	---
Compound			CAS Number	LOR	Unit	ES2218583-014	-----	-----	-----
EP231S: PFAS Surrogate - Continued									
13C4-PFOS	---	0.0002	%	117	---	---	---	---	---
13C8-PFOA	---	0.0002	%	102	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	BH2	BH4	BH6	BH7	BH8		
Compound	CAS Number	LOR	Unit	Sampling date / time	27-May-2022 00:00				
				Result	ES2218583-001	ES2218583-002	ES2218583-003	ES2218583-004	ES2218583-005
ED093F: Dissolved Major Cations									
Magnesium	7439-95-4	1	mg/L	1	2	4	2	2	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001	0.001
Barium	7440-39-3	0.001	mg/L	0.002	0.011	0.007	0.003	0.004	0.004
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.003	0.002	0.002
Copper	7440-50-8	0.001	mg/L	0.004	0.097	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	0.002	0.001	0.001
Zinc	7440-66-6	0.005	mg/L	0.005	<0.005	<0.005	0.005	0.005	<0.005
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	3.45	0.52	1.10	1.10
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	---	50	µg/L	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	µg/L	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction	---	50	µg/L	<50	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	---	50	µg/L	<50	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	---	100	µg/L	<100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	---	100	µg/L	<100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	---	100	µg/L	<100	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	---	100	µg/L	<100	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L	<100	<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	20	µg/L	<20	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	BH2	BH4	BH6	BH7	BH8	
Compound	CAS Number	LOR	Sampling date / time	27-May-2022 00:00				
			Unit	ES2218583-001	ES2218583-002	ES2218583-003	ES2218583-004	ES2218583-005
EP080: BTEXN - Continued								
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	BH2	BH4	BH6	BH7	BH8		
Compound	CAS Number	LOR	Unit	Sampling date / time	27-May-2022 00:00				
				Result	Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	104	107	106	104	109	
Toluene-D8	2037-26-5	2	%	102	105	105	98.8	107	
4-Bromofluorobenzene	460-00-4	2	%	103	106	107	100	103	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%	97.1	97.7	101	96.1	92.4	
13C8-PFOA	----	0.02	%	102	102	96.8	101	103	

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH9A	MW239S	SW1	SW2	SW3	
Compound	CAS Number	LOR	Unit	Sampling date / time	27-May-2022 00:00				
					ES2218583-006	ES2218583-008	ES2218583-009	ES2218583-010	ES2218583-011
ED093F: Dissolved Major Cations									
Magnesium	7439-95-4	1	mg/L		3	2	2	<1	3
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		0.007	0.004	0.010	0.005	0.010
Chromium	7440-47-3	0.001	mg/L		<0.001	0.002	0.003	0.001	0.001
Cobalt	7440-48-4	0.001	mg/L		----	----	0.001	0.001	0.002
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		0.003	0.001	0.002	0.002	0.002
Zinc	7440-66-6	0.005	mg/L		<0.005	0.009	0.047	0.111	<0.005
Boron	7440-42-8	0.05	mg/L		----	----	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		0.35	0.56	4.39	1.70	12.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2

Analytical Results

Analytical Results

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH9A	MW239S	SW1	SW2	SW3
			Sampling date / time	27-May-2022 00:00				
Compound	CAS Number	LOR	Unit	ES2218583-006	ES2218583-008	ES2218583-009	ES2218583-010	ES2218583-011
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	---	0.02	%	92.5	110	93.3	112	108
13C8-PFOA	---	0.02	%	95.6	99.7	106	96.4	98.9

Analytical Results

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	SW4	WPW	QW84	QW86	QC01	
Compound	CAS Number	LOR	Sampling date / time	27-May-2022 00:00				
			Unit	ES2218583-012	ES2218583-013	ES2218583-015	ES2218583-016	ES2218583-017
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	---	<20	---	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	---	<20	---	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	---	<1	---	<1
Toluene	108-88-3	2	µg/L	<2	---	<2	---	<2
Ethylbenzene	100-41-4	2	µg/L	<2	---	<2	---	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	---	<2	---	<2
ortho-Xylene	95-47-6	2	µg/L	<2	---	<2	---	<2
^ Total Xylenes	----	2	µg/L	<2	---	<2	---	<2
^ Sum of BTEX	----	1	µg/L	<1	---	<1	---	<1
Naphthalene	91-20-3	5	µg/L	<5	---	<5	---	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoronanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	SW4	WPW	QW84	QW86	QC01	
Compound	CAS Number	LOR	Sampling date / time	27-May-2022 00:00				
			Unit	ES2218583-012	ES2218583-013	ES2218583-015	ES2218583-016	ES2218583-017
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOUSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOUSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOUSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	WPW	QW84	QW86	QC01
			Sampling date / time	27-May-2022 00:00				
Compound	CAS Number	LOR	Unit	ES2218583-012	ES2218583-013	ES2218583-015	ES2218583-016	ES2218583-017
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	---	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	104	---	102	---	109
Toluene-D8	2037-26-5	2	%	101	---	96.0	---	106
4-Bromofluorobenzene	460-00-4	2	%	102	---	96.5	---	107
EP231S: PFAS Surrogate								
13C4-PFOS	---	0.02	%	96.8	89.9	93.9	107	102
13C8-PFOA	---	0.02	%	101	98.8	100	102	109

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	QC02	---	---	---	---	---	
Compound	CAS Number	LOR	Unit	Sampling date / time	27-May-2022 00:00	---	---	---	---
				ES2218583-018	Result	-----	-----	-----	-----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	---	---	---	---	---
Barium	7440-39-3	0.001	mg/L	<0.001	---	---	---	---	---
Beryllium	7440-41-7	0.001	mg/L	<0.001	---	---	---	---	---
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	---	---	---	---	---
Chromium	7440-47-3	0.001	mg/L	<0.001	---	---	---	---	---
Cobalt	7440-48-4	0.001	mg/L	<0.001	---	---	---	---	---
Copper	7440-50-8	0.001	mg/L	<0.001	---	---	---	---	---
Lead	7439-92-1	0.001	mg/L	<0.001	---	---	---	---	---
Selenium	7782-49-2	0.01	mg/L	<0.01	---	---	---	---	---
Vanadium	7440-62-2	0.01	mg/L	<0.01	---	---	---	---	---
Manganese	7439-96-5	0.001	mg/L	<0.001	---	---	---	---	---
Nickel	7440-02-0	0.001	mg/L	<0.001	---	---	---	---	---
Zinc	7440-66-6	0.005	mg/L	<0.005	---	---	---	---	---
Boron	7440-42-8	0.05	mg/L	<0.05	---	---	---	---	---
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	---	---	---	---	---
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	---	50	µg/L	<50	---	---	---	---	---
C15 - C28 Fraction	---	100	µg/L	<100	---	---	---	---	---
C29 - C36 Fraction	---	50	µg/L	<50	---	---	---	---	---
^ C10 - C36 Fraction (sum)	---	50	µg/L	<50	---	---	---	---	---
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	---	100	µg/L	<100	---	---	---	---	---
>C16 - C34 Fraction	---	100	µg/L	<100	---	---	---	---	---
>C34 - C40 Fraction	---	100	µg/L	<100	---	---	---	---	---
^ >C10 - C40 Fraction (sum)	---	100	µg/L	<100	---	---	---	---	---
>C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L	<100	---	---	---	---	---
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	20	µg/L	<20	---	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	---	---	---	---	---
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	20	µg/L	<20	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	QC02	---	---	---	---	---
Compound	CAS Number	LOR	Sampling date / time	27-May-2022 00:00	---	---	---	---
			Unit	ES2218583-018	-----	-----	-----	-----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	---	---	---	---
Toluene	108-88-3	2	µg/L	<2	---	---	---	---
Ethylbenzene	100-41-4	2	µg/L	<2	---	---	---	---
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	---	---	---	---
ortho-Xylene	95-47-6	2	µg/L	<2	---	---	---	---
^ Total Xylenes	----	2	µg/L	<2	---	---	---	---
^ Sum of BTEX	----	1	µg/L	<1	---	---	---	---
Naphthalene	91-20-3	5	µg/L	<5	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	---	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	---	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	---	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	---	---	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	QC02	---	---	---	---	---
Compound	CAS Number	LOR	Sampling date / time	27-May-2022 00:00	---	---	---	---
			Unit	ES2218583-018	-----	-----	-----	-----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides								
Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	---	---	---	---
N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	---	---	---	---
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	---	---	---	---
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	---	---	---	---
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	---	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	---	---	---	---
EP231P: PFAS Sums								
Sum of PFAS	---	0.01	µg/L	<0.01	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	---	---	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L	<0.01	---	---	---	---
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	111	---	---	---	---
Toluene-D8	2037-26-5	2	%	101	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC02	---	---	---	---	---
				Sampling date / time	27-May-2022 00:00	---	---	---	---	---
Compound				CAS Number	LOR	Unit	ES2218583-018	-----	-----	-----
Result										
EP080S: TPH(V)/BTEX Surrogates - Continued										
4-Bromofluorobenzene	460-00-4	2	%		103	---	---	---	---	---
EP231S: PFAS Surrogate										
13C4-PFOS	---	0.02	%		86.4	---	---	---	---	---
13C8-PFOA	---	0.02	%		103	---	---	---	---	---

Surrogate Control Limits

Sub-Matrix: SEDIMENT

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	---	60	120
13C8-PFOA	---	60	120

Sub-Matrix: WATER

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	---	60	120
13C8-PFOA	---	60	120

QUALITY CONTROL REPORT

Work Order	: ES2218583	Page	: 1 of 13
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: Megan Ferguson	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20222347 WSS - CABBAGE TREE RD WATER MONITORING MAY 2022	Date Samples Received	: 27-May-2022
Order number	: ----	Date Analysis Commenced	: 30-May-2022
C-O-C number	: ----	Issue Date	: 07-Jun-2022
Sampler	: Megan Ferguson		
Site	: ----		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 17		
No. of samples analysed	: 17		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : **Anonymous** = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL

Sub-Matrix: SOIL		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4375130) - continued									
EB2214328-002	Anonymous	EP231X: Perfluoropentanoic acid (PPPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2218670-001	Anonymous	EP231X: Perfluoropentanoic acid (PPPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4375130)									
EB2214328-002	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2218670-001	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: SOIL			Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4375130) - continued									
ES2218670-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4375130)									
EB2214328-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2218670-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
Sub-Matrix: WATER			Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4372365)									
ES2218583-001	BH2	ED093F: Magnesium	7439-95-4	1	mg/L	1	1	0.0	No Limit
ES2218583-012	SW4	ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4372363)									
ES2218066-014	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.264	0.268	1.7	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.004	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.001	0.001	0.0	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4372363) - continued									
ES2218066-014	Anonymous	EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.019	0.019	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.07	0.07	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
ES2218583-001	BH2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4372366)									
ES2218583-012	SW4	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.021	0.020	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.062	0.061	2.4	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.68	0.67	2.6	0% - 50%
ES2218623-012	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0016	0.0015	8.0	0% - 50%
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4372366) - continued									
ES2218623-012	Anonymous	EG020A-F: Barium	7440-39-3	0.001	mg/L	0.051	0.050	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.025	0.025	0.0	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.782	0.778	0.5	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.145	0.152	4.1	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.339	0.333	1.6	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.01	1.12	9.7	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 4372364)									
ES2218066-017	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2218067-017	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4374692)									
ES2218583-001	BH2	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.0	No Limit
ES2218583-012	SW4	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4374692)									
ES2218583-001	BH2	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
ES2218583-012	SW4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4374692)									
ES2218583-001	BH2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2218583-012	SW4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4374083)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	95.9	88.0	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	90.5 mg/kg	94.5	65.0	136
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	88.5	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	98.3	89.0	111
EG005T: Iron	7439-89-6	50	mg/kg	<50	31660 mg/kg	91.8	89.0	112
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	86.4	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	87.7	66.0	133
EG005T: Magnesium	7439-95-4	----	mg/kg	----	7894 mg/kg	95.5	87.0	113
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4375130)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	121	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4375130)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	104	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	118	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4375130)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	120	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	123	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	68.7	130

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4375130) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	122	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4375130)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	124	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	120	69.2	143
Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 4372365)								
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	90.0	116
EG020F: Dissolved Metals by ICP-MS (QCLot: 4372363)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.0	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	87.9	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.8	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.4	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.9	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.3	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.5	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.1	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.8	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.4	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.1	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.2	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	114	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	85.6	85.0	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	86.2	82.0	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 4372366)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.8	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.7	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.5	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.9	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.5	85.0	111

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
					LCS	Low	High	
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4372366) - continued								
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.2	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.4	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.3	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.4	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.8	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	85.9	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.3	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	86.2	85.0	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.5	82.0	112
EG035F: Dissolved Mercury by FIMS (QC Lot: 4372364)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	86.7	83.0	105
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 4367814)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	81.5	55.8	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	74.3	71.6	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	92.3	56.0	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 4367814)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	81.3	57.9	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	91.4	62.5	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	95.4	61.5	121
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4374692)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	79.4	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4374692)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	82.7	75.0	127
EP080: BTEXN (QC Lot: 4374692)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	86.6	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	89.5	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	94.1	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	92.2	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.2	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	88.4	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4372110)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	86.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	95.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	82.8	65.0	140

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4372110) - continued								
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	83.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4372110)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	80.1	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	87.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.8	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	94.6	72.0	130
EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	103	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	96.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	88.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	97.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	106	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	80.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4372110)								
EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	100	67.0	137
EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	91.9	68.0	141
EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	82.3	62.6	147
EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	97.8	66.0	145
EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	85.4	57.6	145
EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	94.6	65.0	136
EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	91.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4372110)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	89.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	87.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	89.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	101	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

Matrix Spike (MS) Report							
		Spike	Spike Recovery (%)	Acceptable Limits (%)			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High

Page : 11 of 13
Work Order : ES2218583
Client : KLEINFELDER AUSTRALIA PTY LTD
Project : 20222347 WSS - CABBAGE TREE RD WATER MONITORING MAY 2022



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike	Spike Recovery(%)	Acceptable Limits (%)	
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4374083)				Concentration	MS	Low	High
ES2217551-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	106	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	94.5	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	102	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	91.7	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	106	66.0	133
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4375130)							
EB2214328-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	110	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.0	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	112	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	114	70.0	132
		EP231X: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	116	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	116	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4375130)							
EB2214328-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	99.6	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	116	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	109	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	116	71.0	131
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	121	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	124	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	114	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	111	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	122	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	101	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	117	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4375130)							
EB2214328-002	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	128	67.0	137
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	110	71.6	129
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	107	69.8	131
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	114	68.7	130
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	115	65.1	134
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	117	63.0	144
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	101	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4375130)							

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4375130) - continued							
EB2214328-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	102	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	120	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	124	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	116	69.2	143
Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4372363)							
ES2218066-015	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	84.4	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	82.6	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	88.1	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	89.2	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	88.7	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	84.0	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	85.0	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	85.0	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	91.9	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	83.2	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	88.7	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	86.8	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4372366)							
ES2218583-011	SW3	EG020A-F: Arsenic	7440-38-2	1 mg/L	96.9	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	81.6	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	104	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	106	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	104	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	98.4	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	101	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	98.2	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	106	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	97.9	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	104	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	99.5	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4372364)							
ES2218066-016	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	83.0	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4374692)							
ES2218583-001	BH2	EP080: C6 - C9 Fraction	----	325 µg/L	81.8	70.0	130

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike	Spike Recovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4374692)							
ES2218583-001	BH2	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	81.6	70.0	130
EP080: BTEXN (QC Lot: 4374692)							
ES2218583-001	BH2	EP080: Benzene	71-43-2	25 µg/L	81.1	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	80.8	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	88.9	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	86.0	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	89.6	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	87.8	70.0	130



Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2218583	Page	: 1 of 10
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: Megan Ferguson	Telephone	: +6138549 9630
Project	: 20222347 WSS - CABBAGE TREE RD WATER MONITORING MAY 2022	Date Samples Received	: 27-May-2022
Site	: ----	Issue Date	: 07-Jun-2022
Sampler	: Megan Ferguson	No. of samples received	: 17
Order number	: ----	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

Matrix: SOIL

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Moisture Content	1	13	7.69	10.00	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	1	18	5.56	10.00	NEPM 2013 B3 & ALS QC Standard

Matrix: WATER

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: SOIL

Evaluation: ✘ = Holding time breach ; ✓ = Within holding time.

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)	WPF	27-May-2022	----	----	----	01-Jun-2022	10-Jun-2022	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)	WPF	27-May-2022	02-Jun-2022	23-Nov-2022	✓	02-Jun-2022	23-Nov-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)	WPF	27-May-2022	02-Jun-2022	23-Nov-2022	✓	02-Jun-2022	12-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)	WPF	27-May-2022	02-Jun-2022	23-Nov-2022	✓	02-Jun-2022	12-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)	WPF	27-May-2022	02-Jun-2022	23-Nov-2022	✓	02-Jun-2022	12-Jul-2022	✓

Matrix: SOIL

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) WPF		27-May-2022	02-Jun-2022	23-Nov-2022	✓	02-Jun-2022	12-Jul-2022	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) WPF		27-May-2022	02-Jun-2022	23-Nov-2022	✓	02-Jun-2022	12-Jul-2022	✓

Matrix: WATER

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2, BH6, BH8, MW239S, SW2, SW4,	BH4, BH7, BH9A, SW1, SW3, QW84	27-May-2022	----	----	----	01-Jun-2022	24-Jun-2022	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2, BH6, BH8, MW239S, SW2, SW4, QW84, QC02	BH4, BH7, BH9A, SW1, SW3, WPW, QC01	27-May-2022	----	----	----	01-Jun-2022	23-Nov-2022	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) QC01,	QC02	27-May-2022	----	----	----	02-Jun-2022	24-Jun-2022	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH2, BH6, BH8, MW239S, SW2, SW4, QC01,	BH4, BH7, BH9A, SW1, SW3, QW84, QC02	27-May-2022	03-Jun-2022	03-Jun-2022	✓	06-Jun-2022	13-Jul-2022	✓

Matrix: WATER		Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.						
Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)	BH2, BH6, BH8, MW239S, SW2, SW4, QC01,	BH4, BH7, BH9A, SW1, SW3, QW84, QC02	27-May-2022	03-Jun-2022	03-Jun-2022	✓	06-Jun-2022	13-Jul-2022
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)	BH2, BH6, BH8, MW239S, SW2, SW4, QC01,	BH4, BH7, BH9A, SW1, SW3, QW84, QC02	27-May-2022	03-Jun-2022	10-Jun-2022	✓	03-Jun-2022	10-Jun-2022
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)	BH2, BH6, BH8, MW239S, SW2, SW4, QC01,	BH4, BH7, BH9A, SW1, SW3, QW84, QC02	27-May-2022	03-Jun-2022	10-Jun-2022	✓	03-Jun-2022	10-Jun-2022
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)	BH2, BH6, BH8, MW239S, SW2, SW4, QC01,	BH4, BH7, BH9A, SW1, SW3, QW84, QC02	27-May-2022	03-Jun-2022	10-Jun-2022	✓	03-Jun-2022	10-Jun-2022

Matrix: WATER									Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.					
Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis								
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation						
EP231A: Perfluoroalkyl Sulfonic Acids														
HDPE (no PTFE) (EP231X)	BH2, BH6, BH8, MW239S, SW2, SW4, QW84, QC01,	BH4, BH7, BH9A, SW1, SW3, WPW, QW86, QC02	27-May-2022	01-Jun-2022	23-Nov-2022	✓	02-Jun-2022	23-Nov-2022	✓					
EP231B: Perfluoroalkyl Carboxylic Acids														
HDPE (no PTFE) (EP231X)	BH2, BH6, BH8, MW239S, SW2, SW4, QW84, QC01,	BH4, BH7, BH9A, SW1, SW3, WPW, QW86, QC02	27-May-2022	01-Jun-2022	23-Nov-2022	✓	02-Jun-2022	23-Nov-2022	✓					
EP231C: Perfluoroalkyl Sulfonamides														
HDPE (no PTFE) (EP231X)	BH2, BH6, BH8, MW239S, SW2, SW4, QW84, QC01,	BH4, BH7, BH9A, SW1, SW3, WPW, QW86, QC02	27-May-2022	01-Jun-2022	23-Nov-2022	✓	02-Jun-2022	23-Nov-2022	✓					
EP231D: (n:2) Fluorotelomer Sulfonic Acids														
HDPE (no PTFE) (EP231X)	BH2, BH6, BH8, MW239S, SW2, SW4, QW84, QC01,	BH4, BH7, BH9A, SW1, SW3, WPW, QW86, QC02	27-May-2022	01-Jun-2022	23-Nov-2022	✓	02-Jun-2022	23-Nov-2022	✓					

Matrix: WATER		Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.							
Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231P: PFAS Sums									
HDPE (no PTFE) (EP231X)	BH2, BH6, BH8, MW239S, SW2, SW4, QW84, QC01,	BH4, BH7, BH9A, SW1, SW3, WPW, QW86, QC02	27-May-2022	01-Jun-2022	23-Nov-2022	✓	02-Jun-2022	23-Nov-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: SOIL

Quality Control Sample Type	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Moisture Content		EA055	1	13	7.69	10.00	✗
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	2	11	18.18	10.00	✓
Total Metals by ICP-AES		EG005T	1	18	5.56	10.00	✗
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	11	9.09	5.00	✓
Total Metals by ICP-AES		EG005T	1	18	5.56	5.00	✓
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	11	9.09	5.00	✓
Total Metals by ICP-AES		EG005T	1	18	5.56	5.00	✓
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	11	9.09	5.00	✓
Total Metals by ICP-AES		EG005T	1	18	5.56	5.00	✓

Matrix: WATER

Quality Control Sample Type	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS		EG035F	2	20	10.00	10.00	✓
Dissolved Metals by ICP-MS - Suite A		EG020A-F	4	40	10.00	10.00	✓
Major Cations - Dissolved		ED093F	2	20	10.00	10.00	✓
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	0	19	0.00	10.00	✗
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup		EP071SG	0	14	0.00	10.00	✗
TRH Volatiles/BTEX		EP080	2	20	10.00	10.00	✓
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS		EG035F	1	20	5.00	5.00	✓
Dissolved Metals by ICP-MS - Suite A		EG020A-F	2	40	5.00	5.00	✓
Major Cations - Dissolved		ED093F	1	20	5.00	5.00	✓
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	19	5.26	5.00	✓
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup		EP071SG	1	14	7.14	5.00	✓
TRH Volatiles/BTEX		EP080	1	20	5.00	5.00	✓
Method Blanks (MB)							
Dissolved Mercury by FIMS		EG035F	1	20	5.00	5.00	✓
Dissolved Metals by ICP-MS - Suite A		EG020A-F	2	40	5.00	5.00	✓
Major Cations - Dissolved		ED093F	1	20	5.00	5.00	✓

Matrix: WATER Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	14	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM Schedule B(3).
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Analytical Methods			
	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	<p>In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation.</p> <p>Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.</p>
Preparation Methods			
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	<p>In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).</p>
QuECheRS Extraction of Solids	ORG71	SOIL	<p>In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.</p>
Separatory Funnel Extraction of Liquids	ORG14	WATER	<p>In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.</p>
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	<p>In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.</p>

Client: Kleinfelder Australia Pty Ltd Suite 3, 240-244 Pacific Hwy Charlestown, NSW 2290 Phone: 02 4949 5260		SITE, COC AND CONTACT DATA				Laboratory: ALS 5/535 Milland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4949 5260						
		Site Name: WSS - Cobbane Tree Rd Water Monitoring May 2022	Sample Name: Megan Ferguson	Contact Number: 0455 98 953	Contact e-mail: mferguson@kleinfelder.com							
QUOTE NUMBER: ME114/19		Job No.: 20222347	Required TAT: 24 hrs	48 hrs	3 days	5 days						
Data QA level: LAB minimum unless specified:-					7 days							
CHAIN OF CUSTODY												
Requisitioned by (print): (sign) <i>Megan Ferguson</i>		Received by (print): (sign) <i>J. Koenig</i>	Requisitioned by: (sign) <i>DB</i>	Received by: (sign)								
Date / Time: 27/5/22		Date / Time: 27/5/22	Date / Time: 27/5/22	Date / Time: 27/5/22								
Temp. (°C) 5.3° 15.0°		Temp. (°C) 5.3° 15.0°	Temp. (°C) 5.3° 15.0°	Temp. (°C) 5.3° 15.0°								
Notes: —		Notes: seals intact / no seal	Notes: ice present / no ice	Notes: ice present / no ice	Notes: intact / no seal							
Sample ID	Lab ID	Sample Point	Date	Start Depth	End Depth	Units	Organic Analytes			Metals	Other Analytes	Comments
							W-04 SG TRH SG/BTEX	TRH with silica gel / EP080 / EP071SG	W-03 Metals - NEPM 15			
1 BH2		Water	27/05/2022		6	X			X			
2 BH4		Water	27/05/2022		6	X			X			
3 BH6		Water	27/05/2022		6	X			X			
4 BH7		Water	27/05/2022		6	X			X			
5 BH8		Water	27/05/2022		6	X			X			
6 BH9A		Water	27/05/2022		6	X			X			
7 BH11 SNE SNL		Water	27/05/2022		6	X			X			
8 MW239S		Water	27/05/2022		6	X			X			
9 SW1 SNE		Water	27/05/2022		6	X			X			
10 SW2		Water	27/05/2022		6	X			X			
11 SW3		Water	27/05/2022		6	X			X			
12 SW4		Water	27/05/2022		6	X			X			
13 WPW		Water	27/05/2022		3							
14 WPF		Sediment	27/05/2022		2							

W-03 Metals (NEPM 15) - As, Ba, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, V, Zn
NT14 - Extended water suite B

LAB OF ORIGIN:
NEWCASTLE

MAILED

Environmental Division
Sydney
Work Order Reference
ES2218583



W-03 Metals (NEPM 15) - As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, V, Zn
NT14 - Extended water suite B

CERTIFICATE OF ANALYSIS

Work Order	ES2219539	Page	: 1 of 6
Client	KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	Megan Ferguson	Contact	: Graeme Jablonskas
Address	95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	----	Telephone	: +6138549 9609
Project	WSS May GME	Date Samples Received	: 03-Jun-2022 13:37
Order number	----	Date Analysis Commenced	: 07-Jun-2022
C-O-C number	----	Issue Date	: 10-Jun-2022 17:29
Sampler	Megan Ferguson		
Site	----		
Quote number	EN/222		
No. of samples received	1		
No. of samples analysed	1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	BH11	---	---	---	---	---
Compound	CAS Number	LOR	Sampling date / time	03-Jun-2022 00:00	---	---	---	---
			Unit	ES2219539-001	-----	-----	-----	-----
ED093F: Dissolved Major Cations								
Magnesium	7439-95-4	1	mg/L	3	---	---	---	---
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	---	---	---	---
Barium	7440-39-3	0.001	mg/L	0.004	---	---	---	---
Chromium	7440-47-3	0.001	mg/L	0.002	---	---	---	---
Copper	7440-50-8	0.001	mg/L	<0.001	---	---	---	---
Nickel	7440-02-0	0.001	mg/L	0.002	---	---	---	---
Zinc	7440-66-6	0.005	mg/L	0.028	---	---	---	---
Iron	7439-89-6	0.05	mg/L	1.27	---	---	---	---
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	---	50	µg/L	<50	---	---	---	---
C15 - C28 Fraction	---	100	µg/L	<100	---	---	---	---
C29 - C36 Fraction	---	50	µg/L	<50	---	---	---	---
^ C10 - C36 Fraction (sum)	---	50	µg/L	<50	---	---	---	---
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	---	100	µg/L	<100	---	---	---	---
>C16 - C34 Fraction	---	100	µg/L	<100	---	---	---	---
>C34 - C40 Fraction	---	100	µg/L	<100	---	---	---	---
^ >C10 - C40 Fraction (sum)	---	100	µg/L	<100	---	---	---	---
>C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L	<100	---	---	---	---
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	---	20	µg/L	<20	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	---	---	---	---
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	20	µg/L	<20	---	---	---	---
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	---	---	---	---
Toluene	108-88-3	2	µg/L	<2	---	---	---	---
Ethylbenzene	100-41-4	2	µg/L	<2	---	---	---	---
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	---	---	---	---
ortho-Xylene	95-47-6	2	µg/L	<2	---	---	---	---
^ Total Xylenes	---	2	µg/L	<2	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	BH11	---	---	---	---	---
Compound	CAS Number	LOR	Sampling date / time	03-Jun-2022 00:00	---	---	---	---
			Unit	ES2219539-001	-----	-----	-----	-----
EP080: BTEXN - Continued								
^ Sum of BTEX	---	1	µg/L	<1	---	---	---	---
Naphthalene	91-20-3	5	µg/L	<5	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	---	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	---	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	---	---	---	---
Perfluoroctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	---	---	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	---	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides								
Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	BH11	---	---	---	---	---
Compound	CAS Number	LOR	Sampling date / time	03-Jun-2022 00:00	---	---	---	---
			Unit	ES2219539-001	-----	-----	-----	-----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	---	---	---	---
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	---	---	---	---
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	---	---	---	---
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	---	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	---	---	---	---
EP231P: PFAS Sums								
Sum of PFAS	---	0.01	µg/L	<0.01	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	---	---	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L	<0.01	---	---	---	---
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	100	---	---	---	---
Toluene-D8	2037-26-5	2	%	92.2	---	---	---	---
4-Bromofluorobenzene	460-00-4	2	%	93.2	---	---	---	---
EP231S: PFAS Surrogate								
13C4-PFOS	---	0.02	%	96.6	---	---	---	---
13C8-PFOA	---	0.02	%	97.8	---	---	---	---

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

QUALITY CONTROL REPORT

Work Order	: ES2219539	Page	: 1 of 9
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: Megan Ferguson	Contact	: Graeme Jablonskas
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9609
Project	: WSS May GME	Date Samples Received	: 03-Jun-2022
Order number	: ----	Date Analysis Commenced	: 07-Jun-2022
C-O-C number	: ----	Issue Date	: 10-Jun-2022
Sampler	: Megan Ferguson		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER

Laboratory Duplicate (DUP) Report									
ED093F: Dissolved Major Cations (QC Lot: 4390589)									
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ES2219742-010	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	46	46	0.0	0% - 20%
ES2219467-001	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	214	213	0.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4390588)									
ES2219536-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.011	0.011	0.0	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.242	0.244	0.7	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.082	0.081	0.0	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.08	0.08	0.0	No Limit
ES2219467-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.015	0.017	14.2	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4383499)									
ES2219457-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.0	No Limit
ES2219552-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4383499)									
ES2219457-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
ES2219552-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 4383499)									
ES2219457-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2219552-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4387349)									
ES2217851-003	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2218762-022	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4387349)									
ES2217851-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
ES2218762-022	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4387349) - continued									
ES2218762-022	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4387349)									
ES2217851-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2218762-022	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4387349)									
ES2217851-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4387349) - continued									
ES2217851-003	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2218762-022	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4387349)									
ES2217851-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.08	0.08	0.0	No Limit
ES2218762-022	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
					LCS	Low	High	
ED093F: Dissolved Major Cations (QC Lot: 4390589)								
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.1	90.0	116
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4390588)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.2	85.0	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.8	82.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.8	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.7	81.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.0	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.9	81.0	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.4	82.0	112
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 4380739)								
EP071SG: C10 - C14 Fraction	---	50	µg/L	<50	400 µg/L	68.3	55.8	112
EP071SG: C15 - C28 Fraction	---	100	µg/L	<100	600 µg/L	75.6	71.6	113
EP071SG: C29 - C36 Fraction	---	50	µg/L	<50	400 µg/L	85.7	56.0	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 4380739)								
EP071SG: >C10 - C16 Fraction	---	100	µg/L	<100	500 µg/L	86.8	57.9	119
EP071SG: >C16 - C34 Fraction	---	100	µg/L	<100	700 µg/L	91.1	62.5	110
EP071SG: >C34 - C40 Fraction	---	100	µg/L	<100	300 µg/L	96.3	61.5	121
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4383499)								
EP080: C6 - C9 Fraction	---	20	µg/L	<20	260 µg/L	98.4	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4383499)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	108	75.0	127
EP080: BTEXN (QC Lot: 4383499)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	99.2	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	106	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	106	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	104	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	108	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	107	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4387349)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	90.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	94.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	89.8	68.0	131

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
					LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4387349) - continued								
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	99.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	95.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	101	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4387349)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	83.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	98.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	104	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	95.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	113	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	90.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4387349)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	102	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	91.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	80.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	91.3	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	99.7	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	104	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4387349)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	96.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	98.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	113	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER

Matrix Spike (MS) Report		
Spike	Spike Recovery (%)	Acceptable Limits (%)

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4390588)							
ES2219467-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	103	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	96.8	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	89.8	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	94.7	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	96.8	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	96.4	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4383499)							
ES2219457-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	83.7	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4383499)							
ES2219457-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	88.1	70.0	130
EP080: BTEXN (QCLot: 4383499)							
ES2219457-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	88.7	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	83.4	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	84.1	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	83.8	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	87.9	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	97.8	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4387349)							
ES2217851-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	83.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	87.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	88.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHps)	375-92-8	0.25 µg/L	93.8	69.0	134
		EP231X: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	86.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	105	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4387349)							
ES2217851-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	82.3	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	97.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	97.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.2	72.0	130
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.25 µg/L	107	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	112	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	109	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	95.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	102	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	113	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	93.2	71.0	132

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike	Spike Recovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4387349)							
ES2217851-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	104	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	92.7	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	96.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	85.0	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	102	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	106	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	94.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4387349)							
ES2217851-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	100	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	84.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	99.6	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	110	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2219539	Page	: 1 of 5
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: Megan Ferguson	Telephone	: +6138549 9609
Project	: WSS May GME	Date Samples Received	: 03-Jun-2022
Site	: ----	Issue Date	: 10-Jun-2022
Sampler	: Megan Ferguson	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

Matrix: WATER

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: WATER

Evaluation: ✘ = Holding time breach ; ✓ = Within holding time.

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)	BH11	03-Jun-2022	---	---	---	09-Jun-2022	01-Jul-2022	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	BH11	03-Jun-2022	---	---	---	09-Jun-2022	30-Nov-2022	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)	BH11	03-Jun-2022	08-Jun-2022	10-Jun-2022	✓	10-Jun-2022	18-Jul-2022	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)	BH11	03-Jun-2022	08-Jun-2022	10-Jun-2022	✓	10-Jun-2022	18-Jul-2022	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)	BH11	03-Jun-2022	08-Jun-2022	17-Jun-2022	✓	08-Jun-2022	17-Jun-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)	BH11	03-Jun-2022	08-Jun-2022	17-Jun-2022	✓	08-Jun-2022	17-Jun-2022	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)	BH11	03-Jun-2022	08-Jun-2022	17-Jun-2022	✓	08-Jun-2022	17-Jun-2022	✓

Matrix: WATER								Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.		
Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EP231A: Perfluoroalkyl Sulfonic Acids										
HDPE (no PTFE) (EP231X) BH11		03-Jun-2022	09-Jun-2022	30-Nov-2022	✓	09-Jun-2022	30-Nov-2022	✓		
EP231B: Perfluoroalkyl Carboxylic Acids										
HDPE (no PTFE) (EP231X) BH11		03-Jun-2022	09-Jun-2022	30-Nov-2022	✓	09-Jun-2022	30-Nov-2022	✓		
EP231C: Perfluoroalkyl Sulfonamides										
HDPE (no PTFE) (EP231X) BH11		03-Jun-2022	09-Jun-2022	30-Nov-2022	✓	09-Jun-2022	30-Nov-2022	✓		
EP231D: (n:2) Fluorotelomer Sulfonic Acids										
HDPE (no PTFE) (EP231X) BH11		03-Jun-2022	09-Jun-2022	30-Nov-2022	✓	09-Jun-2022	30-Nov-2022	✓		
EP231P: PFAS Sums										
HDPE (no PTFE) (EP231X) BH11		03-Jun-2022	09-Jun-2022	30-Nov-2022	✓	09-Jun-2022	30-Nov-2022	✓		

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: WATER

Evaluation: ✘ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Dissolved Metals by ICP-MS - Suite A		EG020A-F	2	17	11.76	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved		ED093F	2	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	2	16	12.50	10.00	✓ NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup		EP071SG	0	5	0.00	10.00	✗ NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	2	20	10.00	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Metals by ICP-MS - Suite A		EG020A-F	1	17	5.88	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved		ED093F	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	16	6.25	5.00	✓ NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup		EP071SG	1	5	20.00	5.00	✓ NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	1	20	5.00	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Metals by ICP-MS - Suite A		EG020A-F	1	17	5.88	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved		ED093F	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	16	6.25	5.00	✓ NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup		EP071SG	1	5	20.00	5.00	✓ NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	1	20	5.00	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Metals by ICP-MS - Suite A		EG020A-F	1	17	5.88	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	16	6.25	5.00	✓ NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup		EP071SG	0	5	0.00	5.00	✗ NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	1	20	5.00	5.00	✓ NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM Schedule B(3).
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



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CUSTODY**

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PR 02 0504 06:54 E kompas.vision@posteo.de

CLIENT:	Kleinfelder	
OFFICE:	(Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	
PROJECT:	WSS May Game	
ORDER NUMBER:		
PROJECT MANAGER:	Megan Ferguson	CONTACT PH: 0455 981 953
SAMPLER:	Megan Ferguson	SAMPLER MOBILE: 0455 981 953
COC emailed to ALS? (YES / NO)	YES	
Email Reports to (will default to PM if no other addresses are listed):	m.ferguson@kleinfelder.com	
Email Invoice to (will default to PM if no other addresses are listed):		
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:		
TURNAROUND REQUIREMENTS:		
<input type="checkbox"/> Standard TAT (list due date): <input type="checkbox"/> Non Standard or urgent TAT (list due date):		
ALS QUOTE NO.:		
FOR LABORATORY USE ONLY (Circle)		
Customer Seal intact? <input checked="" type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A Refrigerator frozen ice bricks present upon receipt? <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A Random Sample Temperature on Receipt: <input checked="" type="radio"/> 1-8 °C		
COC SEQUENCE NUMBER (Circle) COC: (9) 2 3 4 5 6 7 OF: (1) 2 3 4 5 6 7 Other comment:		
RELINQUISHED BY: M. Ferguson RECEIVED BY: J.B. DATE/TIME: 3/6/22 1:40pm		
RELINQUISHED BY: ✓ RECEIVED BY: P.P. DATE/TIME: 3/6/22 17.00 DATE/TIME: 3/6/22 1:40pm		

Water Container Codes: P = Unpreserved Plastic; N = Nutric Preserved Plastic; OHC = Nutric Preserved OHC; SH = Sodium Hydroxide Preserved; S = Sodium Hydroxide Preserved plastic; AG = Amber Glass; Unpreserved: AP = Autograft Unpreserved Plastic; V = VCA Vial HCl Preserved; VVA = VCA Vial Sodium Bisulfite Preserved; VS = VOA Van Sulfuric Preserves; AV = Airfright Unpreserved Vial SG = Sulfite Preserved Amber Glass; H = HCl Preserved Plastic; HFS = HCl preservative Special bottle; SP = Sulfite Preserved Plastic; F = Formaldehyde Preserved Glassware

Eurofins Environment Testing Australia Pty Ltd

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Phone : 0800 856 450	Phone : +64 9 526 45 51
IANZ # 1290	IANZ # 1327

Sample Receipt Advice

Company name: Kleinfelder Australia Pty Ltd (VIC)
Contact name: Megan Ferguson
Project name: WSS-CABBAGE TREE RD WATER MONITORING MAY 2022
Project ID: 20222347
Turnaround time: 5 Day
Date/Time received May 30, 2022 3:35 PM
Eurofins reference 894142

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ Sample Temperature of chilled sample on the batch as recorded by Eurofins Sample Receipt : 3.6 degrees Celsius.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A** Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Harry Bacalis on phone : or by email: HarryBacalis@eurofins.com

Results will be delivered electronically via email to Megan Ferguson - mferguson@kleinfelder.com.

Note: A copy of these results will also be delivered to the general Kleinfelder Australia Pty Ltd (VIC) email address.

Environment Testing

Kleinfelder Australia Pty Ltd (VIC)
Level 1, 95 Coventry St
South Melbourne
VIC 3205



NATA Accredited
 Accreditation Number 1261
 Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
 NATA is a signatory to the ILAC Mutual Recognition
 Arrangement for the mutual recognition of the
 equivalence of testing, medical testing, calibration,
 inspection, proficiency testing scheme providers and
 reference materials producers reports and certificates.

Attention: Megan Ferguson

Report 894142-W
Project name WSS-CABBAGE TREE RD WATER MONITORING MAY 2022
Project ID 20222347
Received Date May 30, 2022

Client Sample ID	LOR	Unit	QW85 Water S22-Jn0004810	QW87 Water S22-Jn0004811
Sample Matrix				
Eurofins Sample No.				
Date Sampled			May 27, 2022	May 27, 2022
Test/Reference				
Total Recoverable Hydrocarbons				
TRH C6-C9	0.02	mg/L	< 0.02	-
TRH C10-C14	0.05	mg/L	0.06	-
TRH C15-C28	0.1	mg/L	0.1	-
TRH C29-C36	0.1	mg/L	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	0.16	-
Naphthalene ^{N02}	0.01	mg/L	< 0.01	-
TRH C6-C10	0.02	mg/L	< 0.02	-
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	-
TRH >C10-C16	0.05	mg/L	0.07	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	0.07	-
TRH >C16-C34	0.1	mg/L	0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	0.17	-
TRH - 2013 NEPM Fractions (after silica gel clean-up)				
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05	-
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1	-
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1	-
TRH >C10-C40 (total) (after silica-gel clean up)*	0.1	mg/L	< 0.1	-
TRH - 1999 NEPM Fractions (after silica gel clean-up)				
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05	-
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1	-
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1	-
TRH C10-C36 (Total) (after silica gel clean-up)	0.1	mg/L	< 0.1	-
Alkali Metals				
Magnesium (filtered)	0.5	mg/L	4.6	-
Heavy Metals				
Arsenic (filtered)	0.001	mg/L	< 0.001	-
Barium (filtered)	0.02	mg/L	< 0.02	-
Boron (filtered)	0.05	mg/L	< 0.05	-
Chromium (filtered)	0.001	mg/L	< 0.001	-
Cobalt (filtered)	0.001	mg/L	0.002	-
Copper (filtered)	0.001	mg/L	0.001	-
Iron (filtered)	0.05	mg/L	0.55	-
Nickel (filtered)	0.001	mg/L	0.002	-
Zinc (filtered)	0.005	mg/L	0.007	-

Client Sample ID			QW85 Water S22-Jn0004810	QW87 Water S22-Jn0004811
Sample Matrix	LOR	Unit	May 27, 2022	May 27, 2022
Eurofins Sample No.				
Date Sampled				
Test/Reference				
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDODA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	67	108
13C5-PFPeA (surr.)	1	%	66	110
13C5-PFHxA (surr.)	1	%	86	111
13C4-PFHxA (surr.)	1	%	72	90
13C8-PFOA (surr.)	1	%	92	107
13C5-PFNA (surr.)	1	%	93	96
13C6-PFDA (surr.)	1	%	82	72
13C2-PFUnDA (surr.)	1	%	81	75
13C2-PFDODA (surr.)	1	%	57	63
13C2-PFTeDA (surr.)	1	%	52	61
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	91	94
D3-N-MeFOSA (surr.)	1	%	51	62
D5-N-EtFOSA (surr.)	1	%	50	64
D7-N-MeFOSE (surr.)	1	%	46	64
D9-N-EtFOSE (surr.)	1	%	60	83
D5-N-EtFOSAA (surr.)	1	%	73	59
D3-N-MeFOSAA (surr.)	1	%	79	62
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoronananesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorohexamenesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	106	113

Client Sample ID			QW85 Water S22-Jn0004810	QW87 Water S22-Jn0004811
Sample Matrix	LOR	Unit	May 27, 2022	May 27, 2022
Eurofins Sample No.				
Date Sampled				
Test/Reference				
Perfluoroalkyl sulfonic acids (PFASs)				
18O2-PFHxS (surr.)	1	%	103	116
13C8-PFOS (surr.)	1	%	100	98
n:2 Fluorotelomer sulfonic acids (n:2 FTASs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	69	98
13C2-6:2 FTSA (surr.)	1	%	108	127
13C2-8:2 FTSA (surr.)	1	%	86	82
13C2-10:2 FTSA (surr.)	1	%	62	64
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jun 08, 2022	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jun 08, 2022	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jun 08, 2022	7 Days
TRH - 2013 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jun 03, 2022	7 Days
TRH - 1999 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jun 03, 2022	7 Days
Alkali Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jun 03, 2022	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jun 03, 2022	180 Days
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jun 07, 2022	28 Days
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jun 07, 2022	28 Days
Perfluoroalkyl sulfonic acids (PFSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jun 07, 2022	28 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jun 07, 2022	28 Days



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IANZ # 1327	IANZ # 1290

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

µg/L: micrograms per litre

ppm: parts per million

ppb: parts per billion

%: Percentage

org/100 mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100 mL: Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH C15-C28 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH C29-C36 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
Method Blank							
Alkali Metals							
Magnesium (filtered)	mg/L	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluoroctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluoroctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluoroctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	82			70-130	Pass	
TRH C10-C14	%	81			70-130	Pass	
Naphthalene	%	88			70-130	Pass	
TRH C6-C10	%	82			70-130	Pass	
TRH >C10-C16	%	80			70-130	Pass	
LCS - % Recovery							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	%	88			70-130	Pass	
LCS - % Recovery							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	%	87			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Magnesium (filtered)	%	114			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	92			80-120	Pass	
Barium (filtered)	%	88			80-120	Pass	
Boron (filtered)	%	98			80-120	Pass	
Chromium (filtered)	%	88			80-120	Pass	
Cobalt (filtered)	%	86			80-120	Pass	
Copper (filtered)	%	83			80-120	Pass	
Iron (filtered)	%	84			80-120	Pass	
Nickel (filtered)	%	86			80-120	Pass	
Zinc (filtered)	%	87			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	102			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	102			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	112			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	81			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Perfluorooctanoic acid (PFOA)	%	80			50-150	Pass		
Perfluorononanoic acid (PFNA)	%	97			50-150	Pass		
Perfluorodecanoic acid (PFDA)	%	95			50-150	Pass		
Perfluoroundecanoic acid (PFUnDA)	%	99			50-150	Pass		
Perfluorododecanoic acid (PFDoDA)	%	111			50-150	Pass		
Perfluorotridecanoic acid (PFTrDA)	%	126			50-150	Pass		
Perfluorotetradecanoic acid (PFTeDA)	%	117			50-150	Pass		
LCS - % Recovery								
Perfluoroalkyl sulfonamido substances								
Perfluorooctane sulfonamide (FOSA)	%	72			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	96			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	84			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	114			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	58			50-150	Pass		
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	125			50-150	Pass		
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	110			50-150	Pass		
LCS - % Recovery								
Perfluoroalkyl sulfonic acids (PFSAs)								
Perfluorobutanesulfonic acid (PFBS)	%	101			50-150	Pass		
Perfluorononanesulfonic acid (PFNS)	%	100			50-150	Pass		
Perfluoropropanesulfonic acid (PFPrS)	%	109			50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)	%	87			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	%	105			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	%	88			50-150	Pass		
Perfluorooctanesulfonic acid (PFOS)	%	84			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	93			50-150	Pass		
LCS - % Recovery								
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	101			50-150	Pass		
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTSA)	%	106			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	127			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	102			50-150	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons				Result 1				
TRH C10-C14	S22-Jn0005182	NCP	%	127			70-130	Pass
TRH >C10-C16	S22-Jn0005182	NCP	%	127			70-130	Pass
Spike - % Recovery								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1				
Perfluorobutanoic acid (PFBA)	B22-Jn0008372	NCP	%	122			50-150	Pass
Perfluoropentanoic acid (PFPeA)	B22-Jn0008372	NCP	%	57			50-150	Pass
Perfluorohexanoic acid (PFHxA)	B22-Jn0008372	NCP	%	147			50-150	Pass
Perfluoroheptanoic acid (PFHpA)	B22-Jn0008372	NCP	%	91			50-150	Pass
Perfluorooctanoic acid (PFOA)	B22-Jn0008372	NCP	%	97			50-150	Pass
Perfluorononanoic acid (PFNA)	B22-Jn0008372	NCP	%	103			50-150	Pass
Perfluorodecanoic acid (PFDA)	B22-Jn0008372	NCP	%	105			50-150	Pass
Perfluoroundecanoic acid (PFUnDA)	B22-Jn0008372	NCP	%	108			50-150	Pass
Perfluorododecanoic acid (PFDoDA)	B22-Jn0008372	NCP	%	127			50-150	Pass
Perfluorotridecanoic acid (PFTrDA)	B22-Jn0008372	NCP	%	124			50-150	Pass
Perfluorotetradecanoic acid (PFTeDA)	B22-Jn0008372	NCP	%	126			50-150	Pass
Spike - % Recovery								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	B22-Jn0008372	NCP	%	82			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B22-Jn0008372	NCP	%	114			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B22-Jn0008372	NCP	%	107			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B22-Jn0008372	NCP	%	136			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B22-Jn0008372	NCP	%	88			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B22-Jn0008372	NCP	%	124			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B22-Jn0008372	NCP	%	118			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)					Result 1				
Perfluorobutanesulfonic acid (PFBS)	B22-Jn0008372	NCP	%	114			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	B22-Jn0008372	NCP	%	94			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B22-Jn0008372	NCP	%	106			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B22-Jn0008372	NCP	%	103			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B22-Jn0008372	NCP	%	111			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHps)	B22-Jn0008372	NCP	%	91			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B22-Jn0008372	NCP	%	94			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B22-Jn0008372	NCP	%	98			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					Result 1				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B22-Jn0008372	NCP	%	115			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B22-Jn0008372	NCP	%	114			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B22-Jn0008372	NCP	%	138			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B22-Jn0008372	NCP	%	109			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons					Result 1	Result 2	RPD		
TRH C6-C9	S22-Jn0012423	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	R22-Jn0001793	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	R22-Jn0001793	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	R22-Jn0001793	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Naphthalene	S22-Jn0012423	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S22-Jn0012423	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	R22-Jn0001793	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	R22-Jn0001793	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	R22-Jn0001793	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Magnesium (filtered)	S22-Jn0004810	CP	mg/L	4.6	4.4	5.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic (filtered)	S22-Jn0004810	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Barium (filtered)	S22-Jn0004810	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Boron (filtered)	S22-Jn0004810	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Chromium (filtered)	S22-Jn0004810	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	S22-Jn0004810	CP	mg/L	0.002	0.002	10	30%	Pass
Copper (filtered)	S22-Jn0004810	CP	mg/L	0.001	< 0.001	6.0	30%	Pass
Iron (filtered)	S22-Jn0004810	CP	mg/L	0.55	0.53	5.0	30%	Pass
Nickel (filtered)	S22-Jn0004810	CP	mg/L	0.002	0.002	22	30%	Pass
Zinc (filtered)	S22-Jn0004810	CP	mg/L	0.007	0.006	8.0	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanoic acid (PFNA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexamenesulfonic acid (PFHxS)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)					Result 1	Result 2	RPD	
Perfluoroheptanesulfonic acid (PFHpS)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)					Result 1	Result 2	RPD	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S22-Jn0004810	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S22-Jn0004810	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1	Result 2	RPD	
Perfluorobutanoic acid (PFBA)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanoic acid (PFNA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances					Result 1	Result 2	RPD	
Perfluorooctane sulfonamide (FOSA)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroctanesulfonic acid (PFOS)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTsAs)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTSA)	S22-Jn0004811	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S22-Jn0004811	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments**Sample Integrity**

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

Savini Suduweli	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal
Jonathon Angell	Senior Analyst-PFAS
Roopesh Rangarajan	Senior Analyst-Organic



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

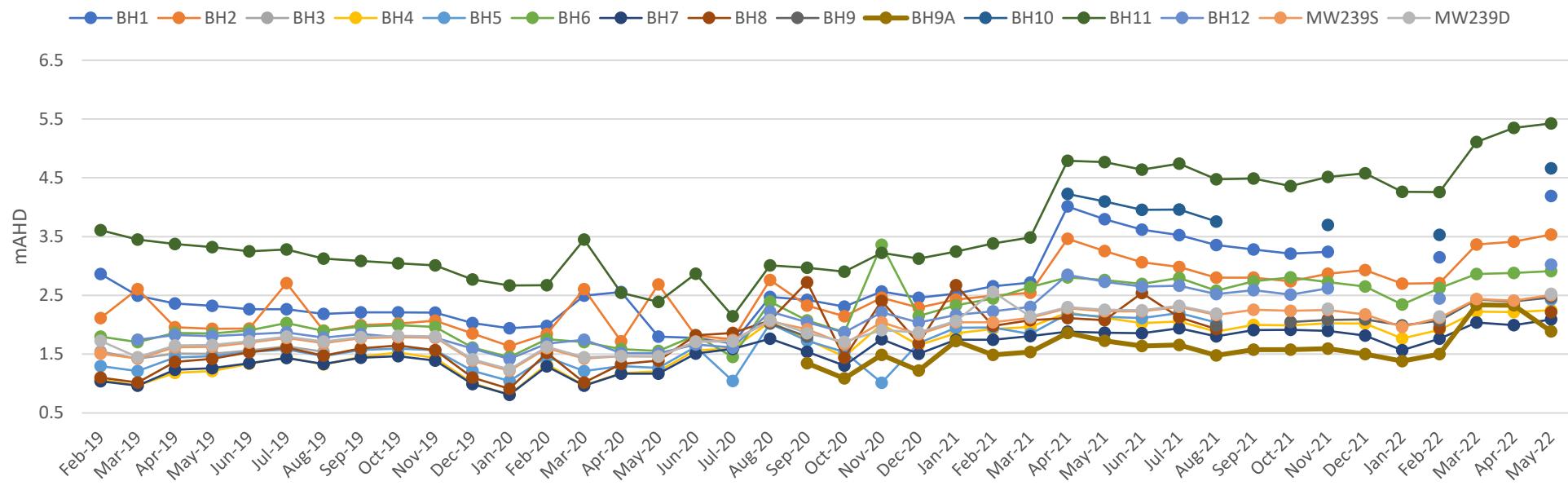
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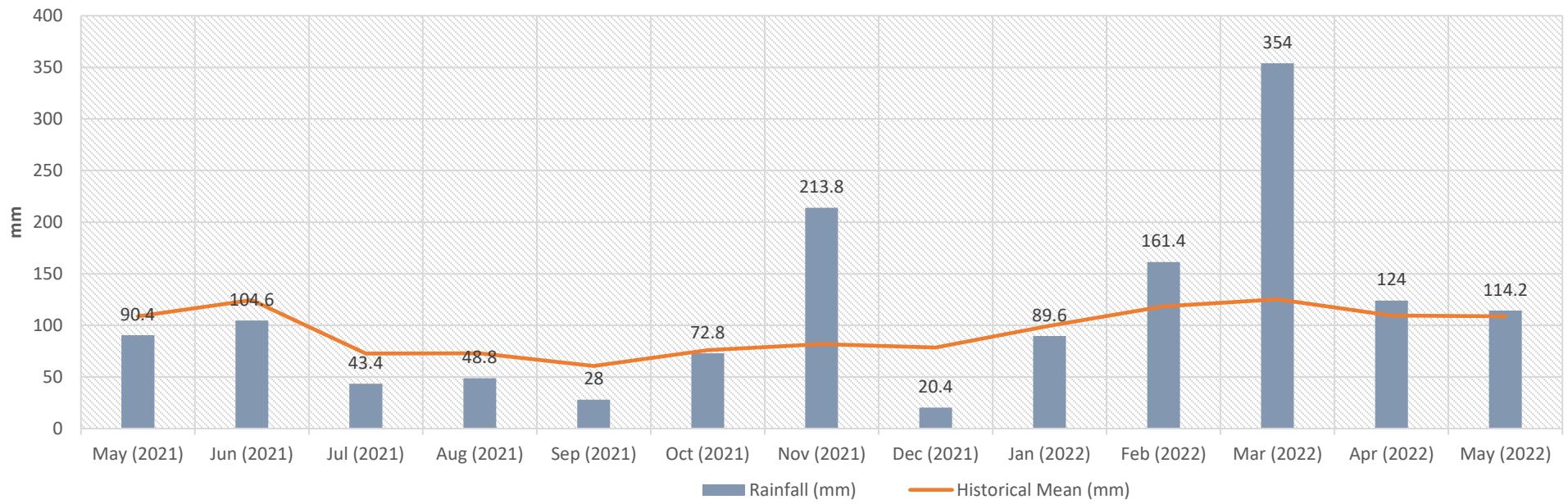
ATTACHMENT 4: DATA TRENDS

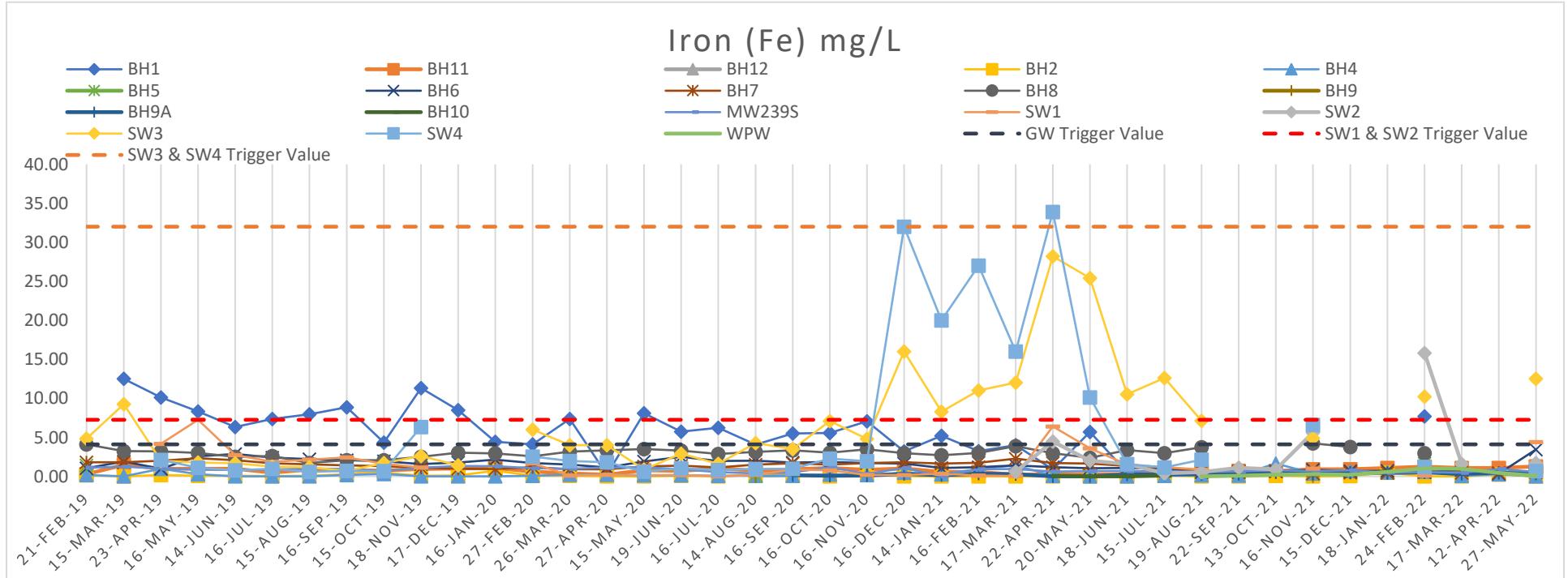
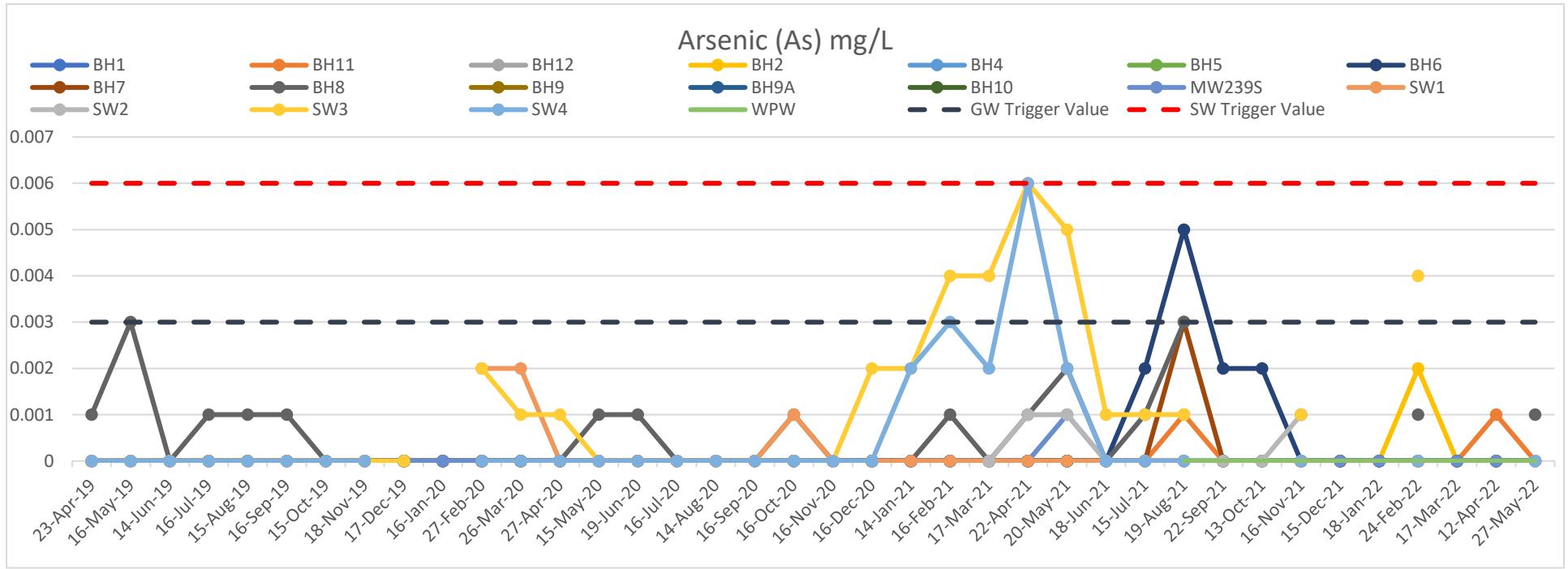


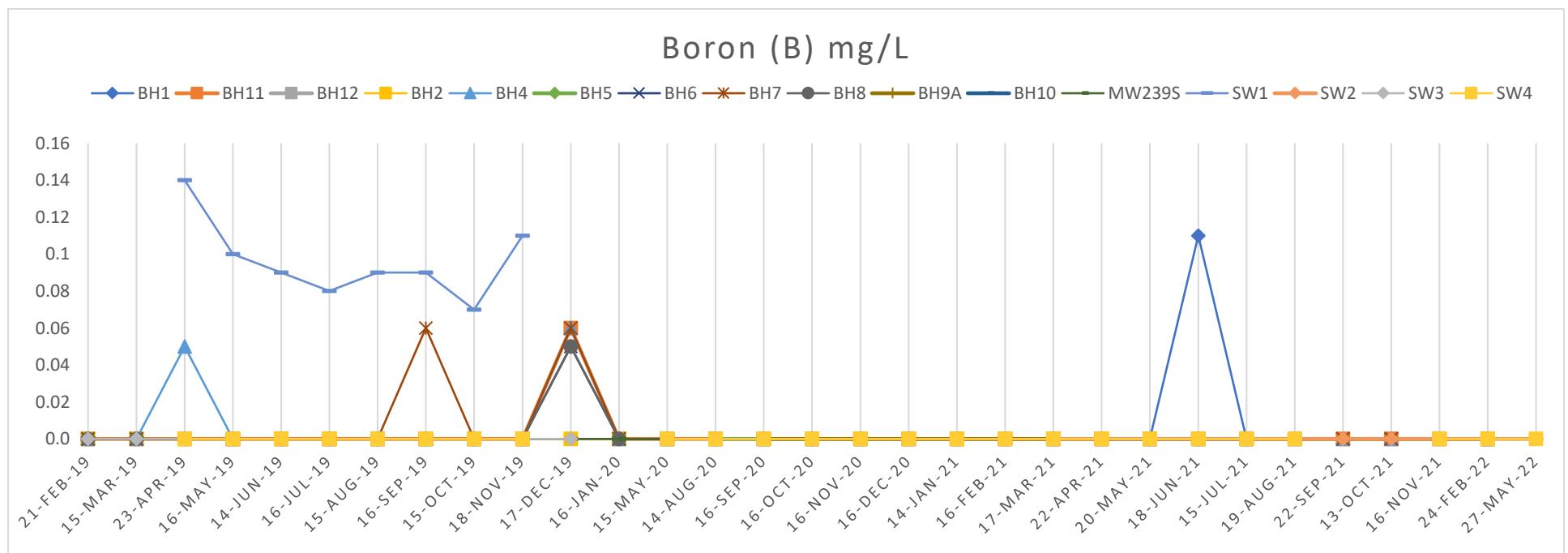
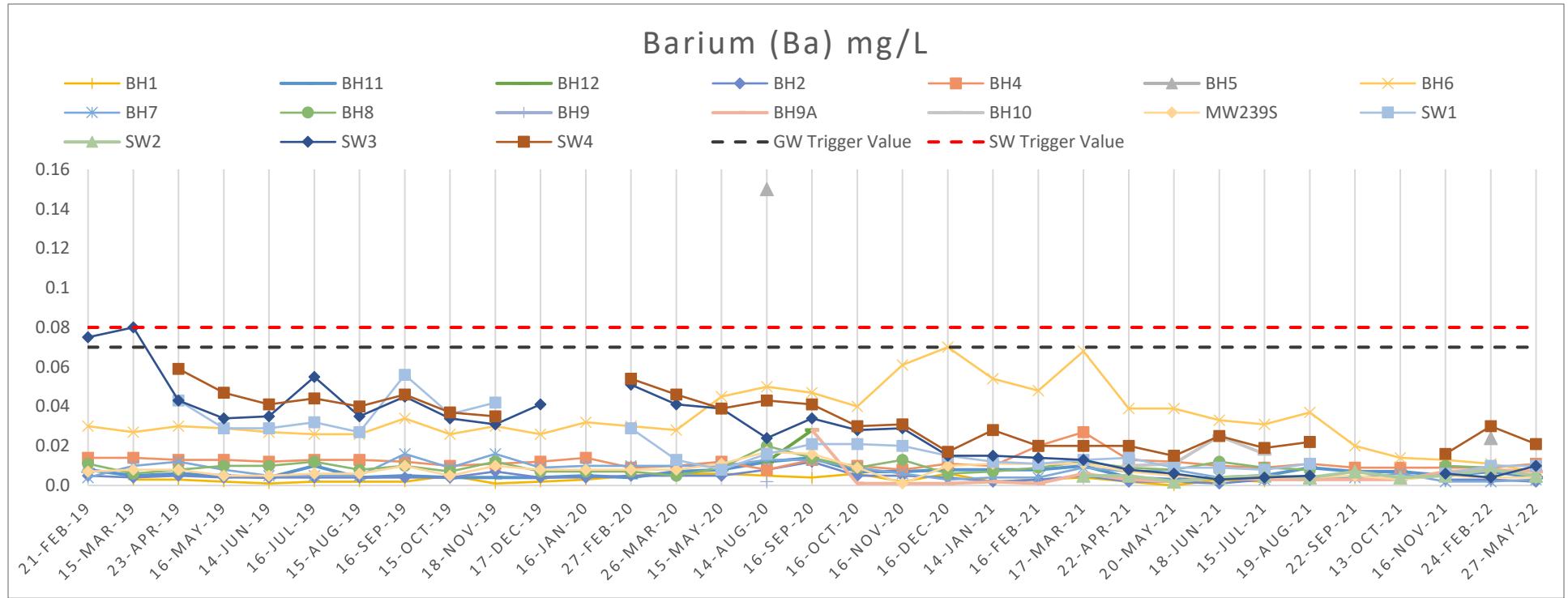
Groundwater Elevation (mAHD)

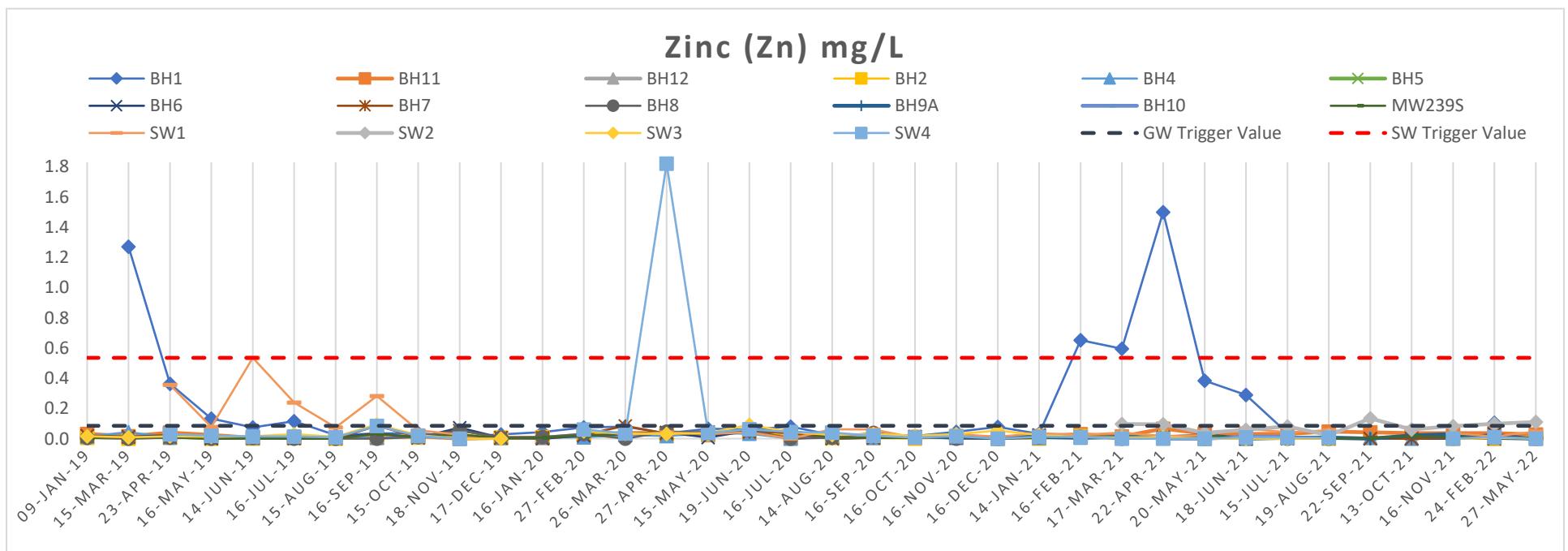
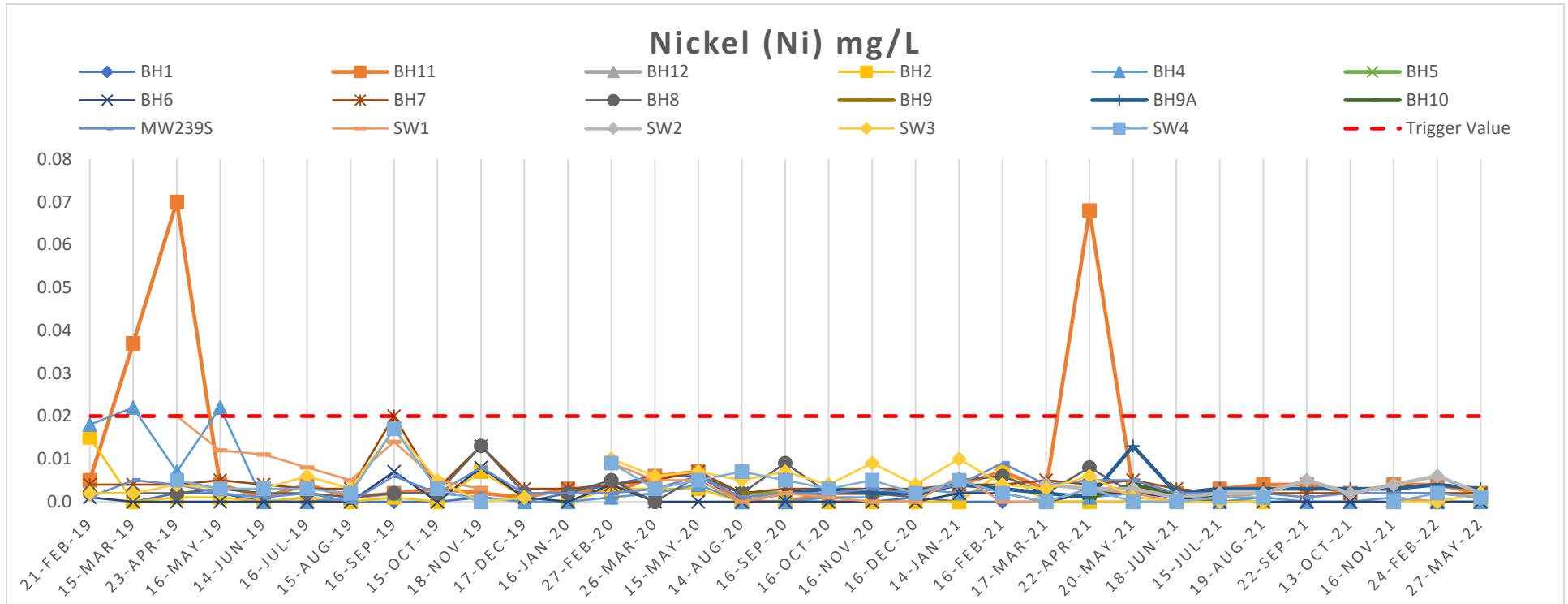


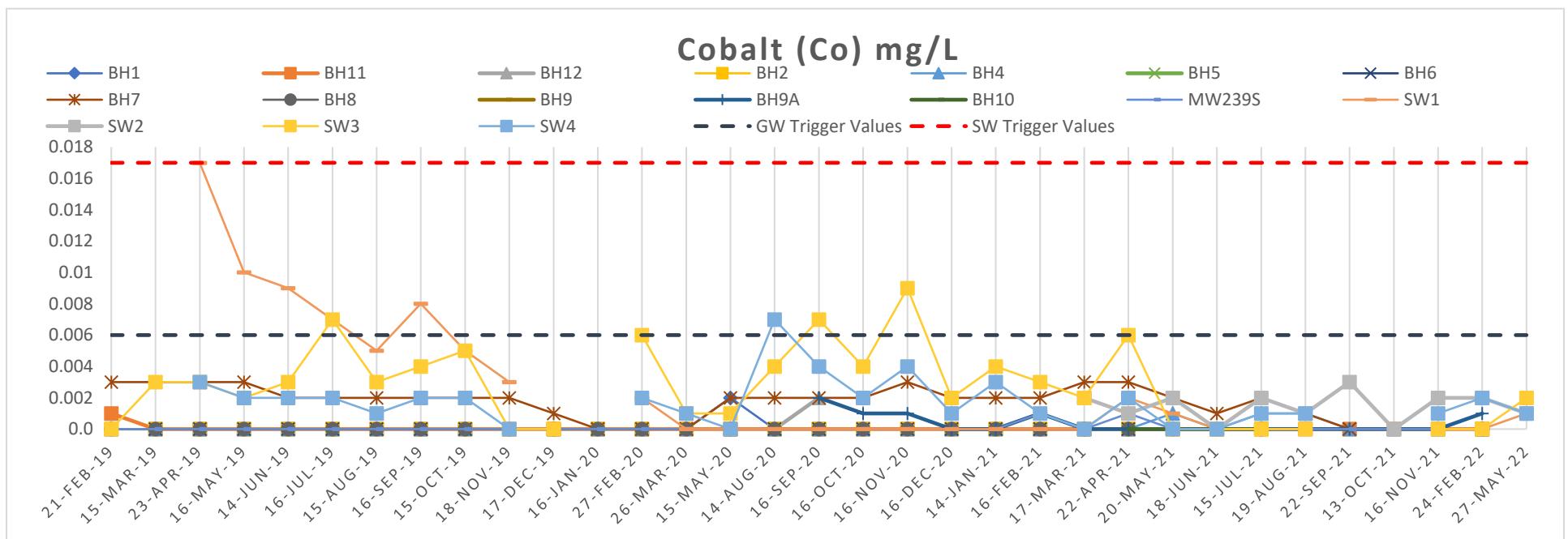
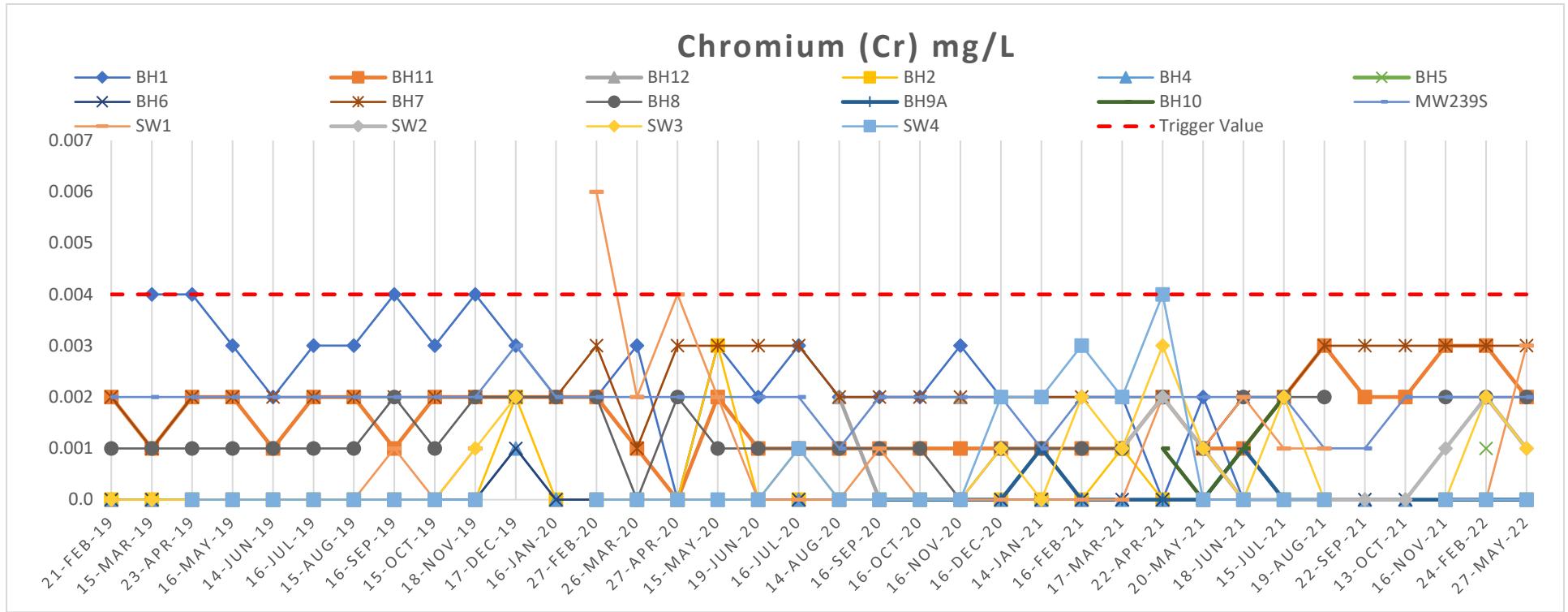
Monthly Rainfall Totals 2021-2022 (mm)



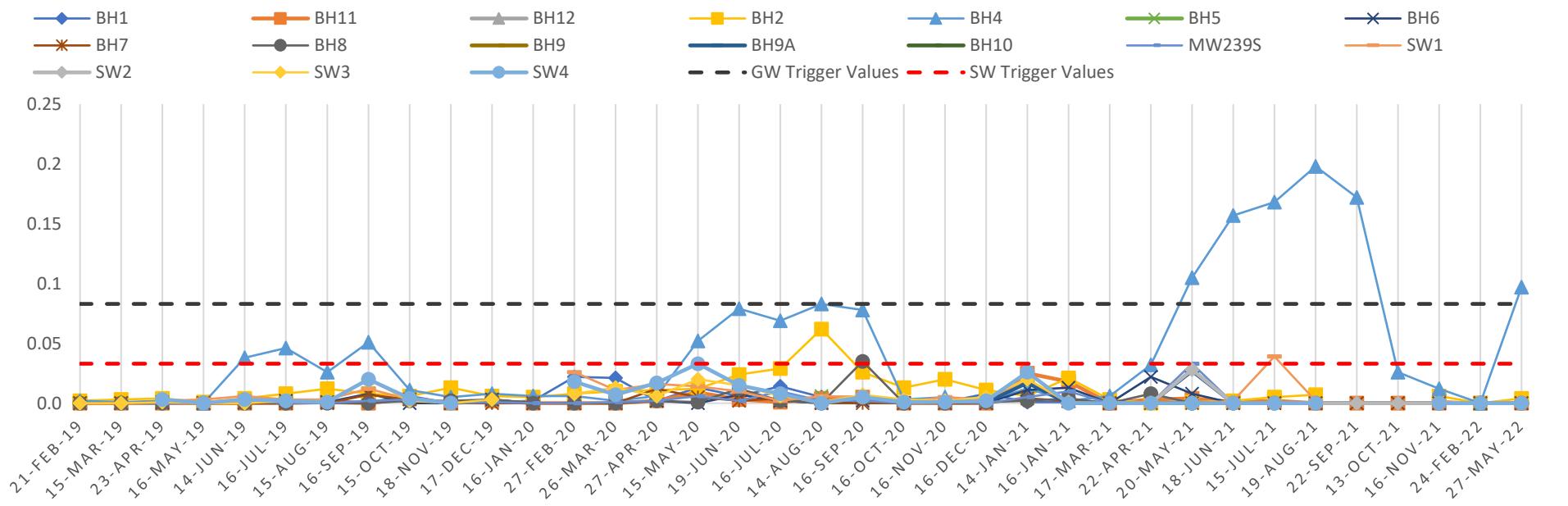








Copper (Cu) mg/L



pH (Field)

