

25 October 2019
Document Ref: NCA19R102873

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: **Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – October 2019 monitoring**

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the October 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring as part of the monthly monitoring requirements. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The October monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) including additional analytical parameters and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 15 October 2019. A summary of these results are presented in **Table 3.4**. The results suggest that since quarry operations began in August 2019 there has been no immediate change in trends as outlined in **Appendix B**.

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 calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following gauging, each of the HydraSleeves were removed and samples taken.

The October 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 13 wells), note that BH3 has now been decommissioned;
- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	0	0	1	1
Metals***	11	0	0	1	1
Iron (dissolved)	11	0	0	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc').

** TRH (C6 – C40), BTEXN (Silica Gel)

*** NEPM Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Selenium (Se), Vanadium (V), Zinc (Zn).

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOP)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOP)	Comment
BH1	8.64	6.427	2.213	8.28	Slightly cloudy brown, no odour
BH2	7.79	5.769	2.021	9.03	Dark brown, slight sulfur odour
BH3					Well Decommissioned
BH4	3.06	1.531	1.529	6.11	Clear, no odour
BH5	7.36	5.767	1.593	8.8	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH6	3.62	1.628	1.992	4.62	Slight brown colour, slight sulfur odour
BH7	2.98	1.514	1.466	4.61	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.233	1.647	6.28	Dark brown cloudy, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.586	3.044	5.39	Cloudy light brown, sulfur odour
BH12	8.67	6.881	1.789	8.2	No sample taken.
MW239S	3.04	1.248	1.792	4.06	Cloudy Brown, Sulfur odour.
MW239D	3.04	1.226	1.814	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	0.29	2.79	N/A	Natural tannin stained brown, sulfur odour
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	0.29	1.29	N/A	Water clear, no odour.
SW04*	N/A	0.35	2.35	N/A	Clear, no odour.

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

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1140	21.12	18	5.5	78
BH02	1115	20.76	48	4.83	223
BH04	1030	19.18	8	4.93	221
BH06	1530	21.09	110	5.05	-144
BH07	1350	21.79	183	4.89	-139
BH08	1415	20.44	224	4.89	-160
BH11	1205	19.93	124	4.83	-117
MW239S	1300	20.87	331	4.81	-132
SW01	1045	16.56	857	4.35	339
SW03	1230	18.77	313	4.36	315
SW04	0945	16.45	325	4.36	370

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the **Tables** Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Attachment B provides a graphical representation of trends in data acquired during field sampling and laboratory analysis. Data trends include; monthly rainfall totals versus mean rainfall totals, groundwater elevation (mAHD), field electrical conductivity ($\mu\text{s}/\text{cm}$), concentrations (mg/L) of chromium, copper, iron, nickel, zinc total nitrogen, total hardness, manganese, total phosphorus, total dissolved solids, sodium, calcium, magnesium, potassium, sulphate, chloride and fluoride. Where relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances recorded.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
Physical and Chemical Stressors	Sodium	1	11	10	124	No	Similar
	Sulphate	1	11	2	127	No	Slight decrease in concentrations across all sites
	Chloride	1	11	18	191	No	Similar
	Fluoride	0.1	11	<0.1	0.6	No	Similar
	Reactive ³ Phosphorous	0.01	0				
	Total Phosphorous ³	0.01	0				
	Nitrite ³	0.01	0				
	Nitrate ³	0.01	0				
	Ammonia ³	0.01	0				
	Total Nitrogen ³	0.1	0				
	Total Hardness	1	11	7.0	168	1 above NHMRC ADWG 6 aesthetics (SW1)	SW1 historically indicates concentrations exceeding or at criteria
	Total Dissolved Solids	1	11	55	528	No	SW1 indicates concentrations exceeding or at criteria
Dissolved Metals	pH	0.01	11	4.48	5.5	All outside ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
	As	0.001	11	<0.001	<0.001	No	Similar
	B	0.05	11	<0.005	0.07	No	Similar
	Ba	0.001	11	0.004	0.037	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	Cr	0.005-0.1	11	<0.001	0.003	4 above ANZECC 2000 Trigger Values ² (BH1, BH7, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.005	No	Similar
	Cu	0.001	11	<0.001	0.011	10 above ANZECC 2000 Trigger Values ² (BH1, BH2, BH4, BH7, BH9, BH11, MW238S, SW1, SW3 & SW4)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	11	0.31	4.32	All above NHMRC ADWG 6 aesthetics	General decrease in concentrations over time
	Mn	0.001	11	0.004	0.383	No	Similar
	Ni	0.001	11	<0.001	0.005	No	General decrease in concentrations following a spike in September 2019.
	Pb	0.005-0.1	11	<0.001	<0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	11	0.006	0.055	9 above ANZECC 2000 Trigger Values ² (BH1, BH4, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	General decrease in concentrations following a spike in September 2019.
TRH – Silica Clean up	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
	C ₆ -C ₁₀	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	11	<0.1	<0.1	No	Results compared to previous month have returned to Non-detect at all sample locations
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆ minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	7	<0.00001	<0.00001	No	Results compared to previous month have returned to Non-detect at all sample locations
	PFOA	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	7	<0.00001	<0.00001	No	Results compared to previous month have returned to Non-detect at all sample locations
	PFDS	0.00001-0.0001	7	<0.00001	<0.00001	No	Results compared to previous month have returned to Non-detect at all sample locations

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

¹Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

²ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

³Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was more rainfall in September than the mean leading up to the October monitoring event. October rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for October 2019 it is expected that surface and groundwater levels will continue to decrease.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0		
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0		
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0		
4th	0	0	0	0	20.8	0.4	5.2	0	0	0		
5th	0	0	0	0	0.2	25	1.8	0.2	0	0		
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8		
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0		
8th	0	0	0	0	0	0	1.6	0	0	0		
9th	0	6.6	0	0	0	0	0.4	0	0	0.8		
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4		
11th	0	0	0	0	0.6	0	0	0	2.8	4		
12th	3.0	0	0	0	0	0	0	0	0	23		
13th	0	0	0	0	1.4	0	0	0	0	8.8		
14th	0	0	0	0.2	0	0	0	0	0	0		
15th	0	0	0	1.4	0	0	0	0	0			
16th	0	0	4.8	3.6	0	0	0	0	0			
17th	0	0	59.4	1.4	0	0	0	0	16.8			
18th	0	0	2.6	0.2	0	17.8	0	0	39.4			
19th	0	0	2.2	0.2	0	0	0	0	7.2			
20th	2.4		0	2.0	0	0	0	0	0			
21st	1.0	1.4	0	0.2	0	0	0	0	0			
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0			
23rd	0	1.4	0	0	0	20	0	0				
24th	0	9.2	5.4	0	0	50.6	0	0	0			
25th	0	0	5.2	0	0	15.2	2.0	0	0			
26th	0	0	0	0	0	1.8	0	0	0			
27th	0	0	0	0	0	0.8	0	0	0			
28th	1.0	0	0	0	0.8	0	0	0	0			
29th	0		0	0	0	0	0	0	0			
30th	0		38.2	0	0	0	0.6	21.2	0			
31st	0		6.6		0		10	67.4				
Total	14.6	33.6	145.8	36.0	47.2	157.2	23.4	98.6	75.4	44.8		
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.3	73.2	60.6	73.9	82.3	78.6

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant

Contaminated Land Management

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

Figure 1

Data Tables

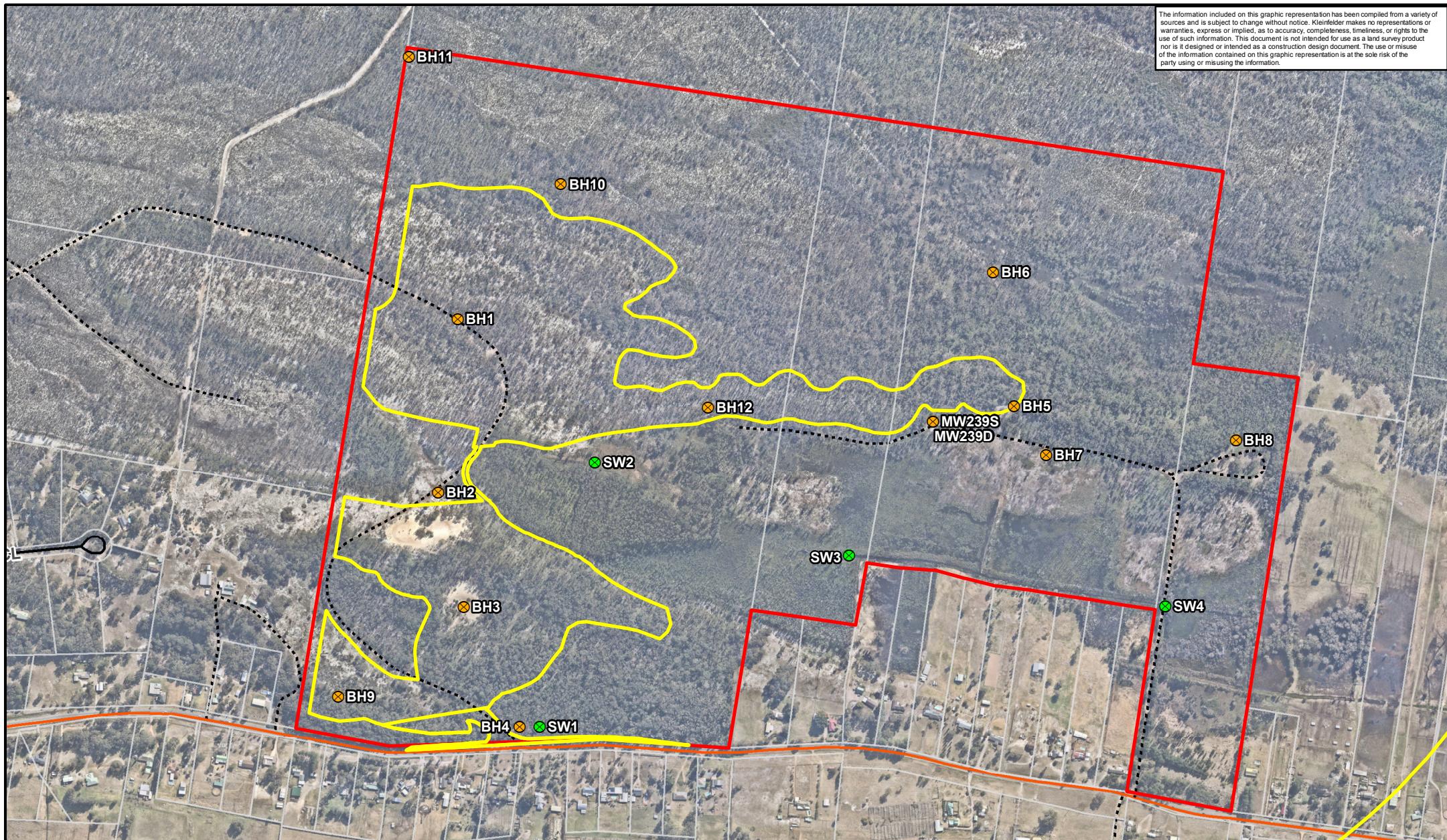
Attachment A – Laboratory reports

Attachment B – Data Trends

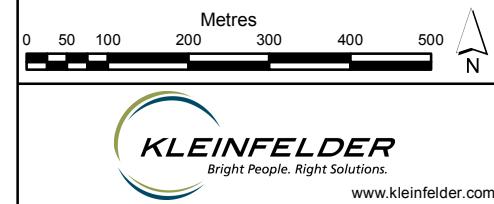


FIGURE 1

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the information contained on this graphic representation. This graphic representation is not a product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.



- Groundwater Sample Site
- Subject Land Boundary
- Surface Water Sample Site
- Quarry Project Area
- Arterial Road
- Local Road
- Track



PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce
DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations October 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1



DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamstown Sand Syndicate



Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate



Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate



Notes:

- - Not analysed

< - Less than laboratory limit of reporting

µg/L - Micrograms per litre

BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 1
Groundwater Analytical Data - BTEXN
Williamstown Sand Syndicate



Table 2
Groundwater Analytical Data - Metals
Williamtown 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
ANZECC 2000 Trigger Values	0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008	
NHMRC ADWG 6	0.01		0.06	4	0.002	0.05	-	-	2	0.3 ³	0.01	0.5	0.001	0.02	0.01	3 ³	
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 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	0.002	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	< 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	0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	0.116
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.96	< 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	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	0.006	4.32	< 0.001	0.007	< 0.0001	< 0.001	< 0.01	< 0.01	0.037
BH11	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
	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	0.97	< 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	0.001	< 0.001	< 0.001	0.79	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.012
BH2	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.004	0.74	< 0.001	0.006	< 0.0001	0.003	< 0.01	< 0.01	0.016
	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 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	< 0.05	< 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	0.004	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	0.001	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	0.004	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	0.008	0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	0.006
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.08	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH3	16-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.26	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.007
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	0.46	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
	23-Apr-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
BH4	15-Aug-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	< 0.05	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.007
	16-Sep-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.051	0.19	< 0.001	0.026	< 0.0001	0.002	< 0.01	< 0.01	0.005
	15-Oct-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.011	0.31	< 0.001	0.136	< 0.0001	0.002	< 0.01	< 0.01	0.014
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.002	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	0.001	0.014	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.027	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011	
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
BH5	15-Aug-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	<										

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



BH8	21-Feb-19	0.001 *	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 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	< 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	< 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	< 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	< 0.001	2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.006
	16-Jul-19	0.001	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.6	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	15-Aug-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.72	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	2.06	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	15-Oct-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.002	2.08	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.011
	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
MW239S	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.8	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.0	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.94	< 0.001	0.006	< 0.0001	0.006	< 0.01	< 0.01	0.032
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.003	0.68	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.011
SW1	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
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
SW4	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
	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

** 95% Level of protection in freshwater

1 value for CR VI

2 as inorganic

3 Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate



Notes:

-- Not analysed

< - Less than laboratory limit of reporting

$\mu\text{g/L}$ - Micrograms per litre

*** 99% Level of protection in freshwater

⁴ Recreation water

Table 3
Groundwater Analytical Data - PFAS
Williamstown Sand Syndicate



Table 3
Groundwater Analytical Data - PFAS
Williamstown Sand Syndicate



Table 4
Groundwater Analytical Data - Inorganics
Willawentoo Sead Synthesis

Analyte	Anions and Cations												Alkalinity												Inorganics			
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive Phosphorus as P	Inorganic 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 CaCO ₃	Carbonate Alkalinity as CaCO ₃	Total Alkalinity as CaCO ₃	Total Hardness as CaCO ₃	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH		
LOR	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		
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	meq/L	meq/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units		
ANZECC 2000 Trigger Values																												
Method Detection Limit	(mg/L)																											
Sample Name	Date																											
15-Mar-19	11	2.0	1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	9.0	< 1.0	9.0	9.0	104	68	129	5.67			
15-Mar-19	11	2.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	0.66	0.99	-	1.0	< 1.0	1.1	1.1	53	52	52	5.67			
16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-	1.0	< 1.0	10	8.0	105	68	164	5.82			
14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	0.66	0.94	-	1.0	< 1.0	10	8.0	99	64	72	5.52			
15-Jun-19	11	2.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	0.66	0.95	-	1.1	< 1.0	11	8.0	102	65	102	5.52			
15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	0.77	0.91	-	1.4	< 1.0	14	8.0	128	83	82	6.22			
16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76	-	1.84	< 1.0	8.0	8.0	102	66	88	5.44			
15-Oct-19	12	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	0.77	0.79	-	1.4	< 1.0	14	8.0	125	84	83	5.52			
21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	12	< 1.0	41	346	278	-	4.67		
15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	1.3	1.51	-	1.0	< 1.0	10	8.0	186	121	144	4.82			
15-Mar-19	25	< 1.0	2.0	< 1.0	2.0	53	< 0.1	-	-	-	-	-	-	-	1.3	1.50	-	1.0	< 1.0	10	8.0	186	120	144	4.82			
16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	1.0	< 1.0	16	188	216	4.91			
14-Jun-19	26	< 1.0	3.0	< 1.0	5.3	51	< 0.1	-	-	-	-	-	-	-	1.38	1.5	-	1.0	< 1.0	12	175	114	107	4.84				
15-Jun-19	27	< 1.0	3.0	< 1.0	5.0	47	< 0.1	-	-	-	-	-	-	-	1.46	1.41	-	1.0	< 1.0	12	175	115	107	4.84				
16-Sep-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	< 0.01	0.12	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4	-	1.0	< 1.0	12	195	127	140	4.66				
15-Aug-19	29	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	1.46	1.41	-	1.0	< 1.0	12	195	127	140	4.66				
22-Feb-19	12	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	0.26	0.26	0.26	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	1.0	< 1.0	13	91	128	-	4.67		
15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	0.75	0.79	-	1.0	< 1.0	10	8.0	101	66	90	4.71			
15-Mar-19	12	2.0	< 1.0	6.0	21	0.1	< 0.01	0.21	0.21	0.21	0.21	0.05	4.0	1.2	0.77	0.77	-	1.44	< 1.0	10	8.0	101	66	90	4.71			
16-May-19	12	2.0	2.0	< 1.0	7.0	21	< 0.1	< 0.01	0.26	0.26	0.26	0.05	4.0	1.2	0.75	0.76	-	1.44	< 1.0	10	8.0	101	66	90	4.71			
14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	0.69	0.75	-	1.0	< 1.0	11	91	59	51	4.76				
15-Jun-19	12	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	0.69	0.75	-	1.0	< 1.0	11	91	59	51	4.76				
15-Aug-19	12	1.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	0.74	0.73	-	1.0	< 1.0	11	110	72	61	5.21				
16-Sep-19	11	2.0	2.0	< 1.0	5.0	19	< 0.1	< 0.01	0.28	< 0.01	0.97	1.07	0.04	2.7	1.6	0.74	0.67	-	1.32	< 1.0	1.0	< 1.0	13	96	62	4.72		
15-Oct-19	12	1.0	2.0	< 1.0	5.0	19	< 0.1	< 0.01	0.28	< 0.01	0.97	1.07	0.04	2.7	1.6	0.74	0.67	-	1.32	< 1.0	1.0	< 1.0	13	102	66	4.72		
21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	19	< 0.1	< 0.01	2.76	0.78	0.78	0.3	5.1	0.46	9.0	14	0.46	9.0	14	0.46	9.0	14	63	438	-	5.55		
21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	0.35	0.35	0.04	6.3	0.56	7	1.15	6.0	1.0	< 1.0	1.0	1.0	1.0	1.0	73	96	-	5.4	
15-Mar-19	28	3.0	4.0	1.0	1.0	29	42	< 0.1	-	0.05	0.09	0.14	0.5	0.4	1.46	1.44	-	1.0	< 1.0	1.0	1.0	1.0	1.0	73	115	-	5.12	
15-Mar-19	23	4.0	1.0	1.0	1.0	29	42	< 0.1	-	0.05	0.09	0.14	0.5	0.4	1.46	1.44	-	1.0	< 1.0	1.0	1.0	1.0	1.0	73	115	-	5.12	
23-Apr-19	29	3.0	4.0	1.0	1.0	18	42	< 0.1	-	0.05	0.09	0.14	0.6	0.6	1.56	1.56	-	1.0	< 1.0	1.0	1.0	1.0	1.0	73	115	-	5.12	
16-May-19	23	3.0	4.0	1.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	0.14	0.6	1.5	1.64	-	2.04	< 1.0	1.0	< 1.0	1.0	1.0	73	115	-	5.12	
15-Jun-19	20	3.0	4.0	1.0	1.0	16	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	0.14	0.6	1.5	1.64	-	2.04	< 1.0	1.0	< 1.0	1.0	1.0	73	115	-	5.12	
16-Jul-19	23	2.0	4.0	1.0	1.0	20	35	< 0.1	-	0.05	0.09	0.14	0.6	0.6	1.46	1.44	-	1.0	< 1.0	1.0	1.0	1.0	1.0	73	115	-	5.12	
15-Aug-19	23	2.0	4.0	1.0	1.0	20	38	< 0.1	-	0.05	0.09	0.14	0.6	0.6	1.46	1.44	-	1.0	< 1.0	1.0	1.0	1.0	1.0	73	115	-	5.12	
15-Sep-19	22	2.0	4.0	1.0	1.0	21	39	< 0.1	-	0.05	0.09	0.14	0.6	0.6	1.46	1.44	-	1.0	< 1.0	1.0	1.0	1.0	1.0	73	115	-	5.12	
15-Oct-19	34	< 1.0	5.0	1.0	1.0	12	53	< 0.1	-	0.05	0.09	0.14	0.6	0.6	1.74	1.74	-	1.0	< 1.0	1.0	1.0	1.0	1.0	73	115	-	5.12	
21-Feb-19	52	< 1.0	6.0	1.0	1.0	90	< 0.1	-	0.05	0.09	0.14	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	1.0	< 1.0	1.0	1.0	25	352	258	4.46	
15-Mar-19	52	< 1.0	6.0	1.0	1.0	90	< 0.1	-	0.05	0.09	0.14	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	1.0	< 1.0	1.0	1.0	25	352	258	4.46	
15-Mar-19	53	< 1.0	6.0	1.0	1.0	90	< 0.1	-	0.05	0.09	0.14	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	1.0	< 1.0	1.0	1.0	25	352	258	4.46	
23-Apr-19	53	< 1.0	6.0	1.0	1.0	89	< 0.1	-	0.05	0.09	0.14	0.5	2.4	2.4	2.88	2.88	-	4.44	< 1.0	1.0	< 1.0	1.0	1.0	25	352	258	4.46	
16-May-19	47	< 1.0	6.0	1.0	1.0	81	< 0.1	-	0.05	0.09	0.14	0.5	2.37	2.43	4.86	4.96	-	4.06	<									

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



Analyte			BTEXN								$C_6 - C_9$
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type									
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE_05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE_08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20

Notes:

- - Not analysed

< - Less than laboratory limit of reporting

NC - Not calculated

µg/L - Micrograms per litre

BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate



Total Petroleum Hydrocarbons				Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable		
C ₁₀ - C ₁₄	C ₁₅ - C ₂₈	C ₂₉ - C ₃₆	C ₁₀ - C ₃₆ sum	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup	C ₂₉ -C ₃₆ - Silica Cleanup	C ₁₀ -C ₃₆ Sum - Silica Cleanup	C ₆ - C ₁₀	C ₆ - C ₁₀ minus BTEX (F1)	>C ₁₀ - C ₁₆
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	-	-	-	-	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
< 50	< 100	< 50	< 50	-	-	-	-	< 20	< 20	< 100
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
200	400	200	800	< 50	< 100	< 100	< 400	< 20	< 20	180
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate



Total Recoverable Hydrocarbons			Total Recoverable Hydrocarbons - Silica Clean up				
>C ₁₀ - C ₁₆ minus Naphthalene (F2) μg/L	>C ₁₆ - C ₃₄ μg/L	>C ₃₄ - C ₄₀ μg/L	>C ₁₀ -C ₁₆ - Silica Cleanup μg/L	F2 - Silica Cleanup μg/L	>C ₁₆ -C ₃₄ - Silica Cleanup μg/L	>C ₃₄ -C ₄₀ - Silica Cleanup μg/L	>C ₁₀ -C ₄₀ - Silica Cleanup μg/L
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
			-	-	-	-	-
			< 100	< 100	< 100	< 100	< 100
			< 100	< 100	< 100	< 100	< 100
			< 100	< 100	< 100	< 100	< 100
			NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 50	< 50	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 100	-	-	-	-	-
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
180	400	100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	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	
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	0%	NC	NC	0%	NC	0%	NC	0%	NC	40%	NC	100%	
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triuplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.0001	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	86%	NC	NC	9%	NC	0%	NC	40%	NC	18%	NC		
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	0%	NC	NC	40%	NC	33%	NC	5%	NC	0%	NC	25%	
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triuplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	-	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	0%	NC	NC	40%	NC	6%	NC	5%	NC	156%	NC	113%	
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
RINSATE05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
SW3_14062019	14-Jun-19	Primary	< 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
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	0%	NC	NC	40%	NC	3%	NC	3%	NC	0%	NC	21%	
SW3_14062019	14-Jun-19	Primary	< 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
TRIP05_140619	14-Jun-19	Triuplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	67%	NC	NC	5%	NC	NC	0%	NC	NC	46%	NC		
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
RINSATE07_15-Aug-19	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
RINSATE08_16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
SW4_16092019	16-Sep-19	Primary	< 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
DUP08_16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	0%	NC	NC	190%	8%	67%	8%	NC	140%	NC	NC	151%	
SW4_16092019	16-Sep-19	Primary	< 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
TRIP08_16092019	16-Sep-19	Triuplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	0%	NC	NC	190%	1%	67%	5%	NC	140%	NC	NC	151%	
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	
RINSATE15_15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005	

Notes:

- Not analysed
- < - Less than laboratory limit of reporting
- NC - Not calculated
- mg/L - Milligrams per litre

Half the laboratory limit of reporting used when calculating RPD

RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PPAS
Williamstown Sand Syndicate

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
---? - Measurement was likely



ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order	: ES1933705	Page	: 1 of 19
Amendment	: 1		
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: Williamtown Sand Syndicate	Date Samples Received	: 15-Oct-2019 15:37
Order number	: 20193820	Date Analysis Commenced	: 16-Oct-2019
C-O-C number	: 4787	Issue Date	: 23-Oct-2019 10:26
Sampler	: DANIEL KOUSBROEK		
Site	: Williamtown SS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 13		
No. of samples analysed	: 13		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. 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
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic 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 the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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 Contact 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.

- EG035: Poor matrix spike recovery was obtained for Mercury on sample ES1933475 #1. Confirmed by re-analysis.
- Amendment (23/10/2019): This report has been amended and re-released to allow the reporting of additional analytical data.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- 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.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		BH1	BH2	BH4	BH6	BH7
Compound	CAS Number	LOR	Unit	15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	---	0.01	pH Unit	5.50	5.06	4.93	5.17	4.95
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	98	102	85	202	252
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	---	1	mg/L	64	66	55	131	164
EA065: Total Hardness as CaCO₃								
Total Hardness as CaCO ₃	---	1	mg/L	8	13	7	21	20
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	4	<1	<1	<1	<1
Total Alkalinity as CaCO ₃	---	1	mg/L	4	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	2	5	4	13	12
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	21	20	18	41	53
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	2	1	2	<1
Magnesium	7439-95-4	1	mg/L	2	2	1	4	5
Sodium	7440-23-5	1	mg/L	13	12	10	25	34
Potassium	7440-09-7	1	mg/L	<1	<1	<1	1	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
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.005	0.004	0.010	0.026	0.009
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L	0.003	<0.001	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.011	<0.001	0.003
Manganese	7439-96-5	0.001	mg/L	0.007	0.011	0.136	0.009	0.018
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.002	<0.001	0.003
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		BH1	BH2	BH4	BH6	BH7
Compound	CAS Number	LOR	Unit	15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.037	0.007	0.014	0.006	0.011
Iron	7439-89-6	0.05	mg/L	4.32	0.46	0.31	1.95	1.32
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance								
ø Total Anions	---	0.01	meq/L	0.71	0.67	0.59	1.43	1.74
ø Total Cations	---	0.01	meq/L	0.73	0.79	0.57	1.54	1.94
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
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		BH1	BH2	BH4	BH6	BH7
Compound	CAS Number	LOR	Unit	15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
[^] Total Xylenes	---	2	µg/L	<2	<2	<2	<2	<2
[^] 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
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	---	---	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	---	---	<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
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	---	---	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDODA)	307-55-1	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	---	---	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	---	---	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	---	---	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		BH1	BH2	BH4	BH6	BH7
Compound	CAS Number	LOR	Unit	15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
				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
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	---	---	<0.05	<0.05	<0.05
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	---	---	<0.05	<0.05	<0.05
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	---	---	<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
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	---	---	<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
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	---	---	<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
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	---	---	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	---	0.01	µg/L	---	---	<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
Sum of PFAS (WA DER List)	---	0.01	µg/L	---	---	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	107	119	115	115	116
Toluene-D8	2037-26-5	2	%	105	98.7	101	108	97.5
4-Bromofluorobenzene	460-00-4	2	%	101	102	100	104	96.8
EP231S: PFAS Surrogate								
13C4-PFOS	---	0.02	%	---	---	114	112	112
13C8-PFOA	---	0.02	%	---	---	118	119	116

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		BH8	BH11	MW239S	---	---
Compound	CAS Number	LOR	Unit	15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	---	---
				Result	Result	Result	---	---
EA005P: pH by PC Titrator								
pH Value	---	0.01	pH Unit	5.02	4.92	4.86	---	---
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	303	194	404	---	---
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	---	1	mg/L	197	126	263	---	---
EA065: Total Hardness as CaCO₃								
Total Hardness as CaCO ₃	---	1	mg/L	16	12	25	---	---
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	---	---
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	---	---
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	<1	<1	<1	---	---
Total Alkalinity as CaCO ₃	---	1	mg/L	<1	<1	<1	---	---
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	4	3	8	---	---
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	70	44	108	---	---
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	---	---
Magnesium	7439-95-4	1	mg/L	4	3	6	---	---
Sodium	7440-23-5	1	mg/L	45	28	58	---	---
Potassium	7440-09-7	1	mg/L	<1	<1	<1	---	---
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	---	---
Barium	7440-39-3	0.001	mg/L	0.007	0.004	0.005	---	---
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	---	---
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Chromium	7440-47-3	0.001	mg/L	0.001	0.002	0.002	---	---
Copper	7440-50-8	0.001	mg/L	0.002	0.004	0.003	---	---
Manganese	7439-96-5	0.001	mg/L	0.009	0.006	0.004	---	---
Nickel	7440-02-0	0.001	mg/L	0.002	0.003	0.002	---	---
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		BH8	BH11	MW239S	---	---
		Client sampling date / time		15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	---	---
Compound	CAS Number	LOR	Unit	ES1933705-010	ES1933705-013	ES1933705-014	-----	-----
				Result	Result	Result	---	---
EG020F: Dissolved Metals by ICP-MS - Continued								
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---
Zinc	7440-66-6	0.005	mg/L	0.011	0.016	0.011	---	---
Iron	7439-89-6	0.05	mg/L	2.08	0.74	0.68	---	---
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	---	---
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	---	---
EN055: Ionic Balance								
ø Total Anions	---	0.01	meq/L	2.06	1.30	3.21	---	---
ø Total Cations	---	0.01	meq/L	2.29	1.46	3.02	---	---
ø Ionic Balance	---	0.01	%	---	---	3.15	---	---
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	---	50	µg/L	<50	<50	<50	---	---
C15 - C28 Fraction	---	100	µg/L	<100	<100	<100	---	---
C29 - C36 Fraction	---	50	µg/L	<50	<50	<50	---	---
^ C10 - C36 Fraction (sum)	---	50	µg/L	<50	<50	<50	---	---
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	---	100	µg/L	<100	<100	<100	---	---
>C16 - C34 Fraction	---	100	µg/L	<100	<100	<100	---	---
>C34 - C40 Fraction	---	100	µg/L	<100	<100	<100	---	---
^ >C10 - C40 Fraction (sum)	---	100	µg/L	<100	<100	<100	---	---
>C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L	<100	<100	<100	---	---
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	---	20	µg/L	<20	<20	<20	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	---	---
^ C6 - C10 Fraction minus BTEX	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	---	---

Analytical Results

Analytical Results

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	BH8	BH11	MW239S	---	---
			Client sampling date / time	15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	---	---
Compound	CAS Number	LOR	Unit	ES1933705-010	ES1933705-013	ES1933705-014	-----	-----
				Result	Result	Result	---	---
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	---	0.02	%	111	---	---	---	---
13C8-PFOA	---	0.02	%	116	---	---	---	---

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)		Client sample ID		SW1	SW3	SW4	---	---
Compound	CAS Number	LOR	Unit	15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	---	---
				Result	Result	Result	---	---
EA005P: pH by PC Titrator								
pH Value	---	0.01	pH Unit	5.32	4.75	4.48	---	---
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	1050	383	365	---	---
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	---	1	mg/L	682	249	237	---	---
EA065: Total Hardness as CaCO₃								
Total Hardness as CaCO ₃	---	1	mg/L	168	41	40	---	---
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	---	---
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	---	---
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	<1	<1	<1	---	---
Total Alkalinity as CaCO ₃	---	1	mg/L	<1	<1	<1	---	---
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	127	42	38	---	---
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	191	57	57	---	---
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	16	5	6	---	---
Magnesium	7439-95-4	1	mg/L	31	7	6	---	---
Sodium	7440-23-5	1	mg/L	124	40	44	---	---
Potassium	7440-09-7	1	mg/L	3	<1	<1	---	---
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Boron	7440-42-8	0.05	mg/L	0.07	<0.05	<0.05	---	---
Barium	7440-39-3	0.001	mg/L	0.036	0.034	0.037	---	---
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	---	---
Cobalt	7440-48-4	0.001	mg/L	0.005	0.005	0.002	---	---
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.004	---	---
Manganese	7439-96-5	0.001	mg/L	0.383	0.027	0.031	---	---
Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.003	---	---
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)		Client sample ID		SW1	SW3	SW4	---	---
		Client sampling date / time		15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	---	---
Compound	CAS Number	LOR	Unit	ES1933705-001	ES1933705-003	ES1933705-004	-----	-----
				Result	Result	Result	---	---
EG020F: Dissolved Metals by ICP-MS - Continued								
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---
Zinc	7440-66-6	0.005	mg/L	0.055	0.022	0.018	---	---
Iron	7439-89-6	0.05	mg/L	1.61	1.70	0.66	---	---
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	---	---
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.6	0.2	0.1	---	---
EN055: Ionic Balance								
ø Total Anions	---	0.01	meq/L	8.03	2.48	2.40	---	---
ø Total Cations	---	0.01	meq/L	8.82	2.56	2.71	---	---
ø Ionic Balance	---	0.01	%	4.68	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	---	50	µg/L	<50	<50	<50	---	---
C15 - C28 Fraction	---	100	µg/L	<100	<100	<100	---	---
C29 - C36 Fraction	---	50	µg/L	<50	<50	<50	---	---
^ C10 - C36 Fraction (sum)	---	50	µg/L	<50	<50	<50	---	---
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	---	100	µg/L	<100	<100	<100	---	---
>C16 - C34 Fraction	---	100	µg/L	<100	<100	<100	---	---
>C34 - C40 Fraction	---	100	µg/L	<100	<100	<100	---	---
^ >C10 - C40 Fraction (sum)	---	100	µg/L	<100	<100	<100	---	---
>C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L	<100	<100	<100	---	---
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	---	20	µg/L	<20	<20	<20	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	---	---
^ C6 - C10 Fraction minus BTEX	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	---	---

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Client sample ID	SW1	SW3	SW4	---	---
			Client sampling date / time	15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	---	---
Compound	CAS Number	LOR	Unit	ES1933705-001	ES1933705-003	ES1933705-004	-----	-----
				Result	Result	Result	---	---
EP080: BTEXN - Continued								
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	---	---
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	111	111	109	---	---
Toluene-D8	2037-26-5	2	%	108	97.4	101	---	---
4-Bromofluorobenzene	460-00-4	2	%	107	102	97.6	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	---	---	---
		Client sampling date / time		15-Oct-2019 14:29	15-Oct-2019 14:32	---	---	---
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	-----	-----	-----
				Result	Result	---	---	---
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	---	---	---
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	---	---	---
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	---	---	---
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	---	---	---
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	---	---	---
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	---	---	---
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	---	---	---
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	---	---	---
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	---	---	---
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	---	---	---
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	---	---	---
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	---	---	---
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	---	---	---
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	---	---	---
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	---	---	---
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	---	---	---
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	---	50	µg/L	<50	<50	---	---	---
C15 - C28 Fraction	---	100	µg/L	<100	<100	---	---	---
C29 - C36 Fraction	---	50	µg/L	<50	<50	---	---	---
^ C10 - C36 Fraction (sum)	---	50	µg/L	<50	<50	---	---	---
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	---	100	µg/L	<100	<100	---	---	---
>C16 - C34 Fraction	---	100	µg/L	<100	<100	---	---	---
>C34 - C40 Fraction	---	100	µg/L	<100	<100	---	---	---
^ >C10 - C40 Fraction (sum)	---	100	µg/L	<100	<100	---	---	---
>C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L	<100	<100	---	---	---
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	---	20	µg/L	<20	<20	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	---	---	---

Analytical Results

Client sample ID				Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	---	---	---
Client sampling date / time				15-Oct-2019 14:29	15-Oct-2019 14:32	---	---	---
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	-----	-----	-----
				Result	Result	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
[^] C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	---	---	---
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	---	---	---
Toluene	108-88-3	2	µg/L	<2	<2	---	---	---
Ethylbenzene	100-41-4	2	µg/L	<2	<2	---	---	---
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	---	---	---
ortho-Xylene	95-47-6	2	µg/L	<2	<2	---	---	---
[^] Total Xylenes	---	2	µg/L	<2	<2	---	---	---
[^] Sum of BTEX	---	1	µg/L	<1	<1	---	---	---
Naphthalene	91-20-3	5	µg/L	<5	<5	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBa)	375-22-4	0.1	µg/L	<0.1	<0.1	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	---	---	---
		Client sampling date / time		15-Oct-2019 14:29	15-Oct-2019 14:32	---	---	---
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	-----	-----	-----
				Result	Result	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	---	---	---
EP231C: Perfluoroalkyl Sulfonamides								
Perfluoroctane sulfonamide (FOUSA)	754-91-6	0.02	µg/L	<0.02	<0.02	---	---	---
N-Methyl perfluoroctane sulfonamide (MeFOUSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	---	---	---
N-Ethyl perfluoroctane sulfonamide (EtFOUSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	---	---	---
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	---	---	---
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	---	---	---
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	---	---	---
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<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	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	---	---	---
EP231P: PFAS Sums								
Sum of PFAS	---	0.01	µg/L	<0.01	<0.01	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	---	---	---

Analytical Results

Client sample ID				Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	---	---	---
Client sampling date / time				15-Oct-2019 14:29	15-Oct-2019 14:32	---	---	---
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	-----	-----	-----
				Result	Result	---	---	---
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	---	0.01	µg/L	<0.01	<0.01	---	---	---
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	120	116	---	---	---
Toluene-D8	2037-26-5	2	%	95.1	95.6	---	---	---
4-Bromofluorobenzene	460-00-4	2	%	96.5	94.5	---	---	---
EP231S: PFAS Surrogate								
13C4-PFOS	---	0.02	%	108	113	---	---	---
13C8-PFOA	---	0.02	%	117	119	---	---	---

Surrogate Control Limits

Sub-Matrix: GROUNDWATER

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

Sub-Matrix: SURFACE WATER

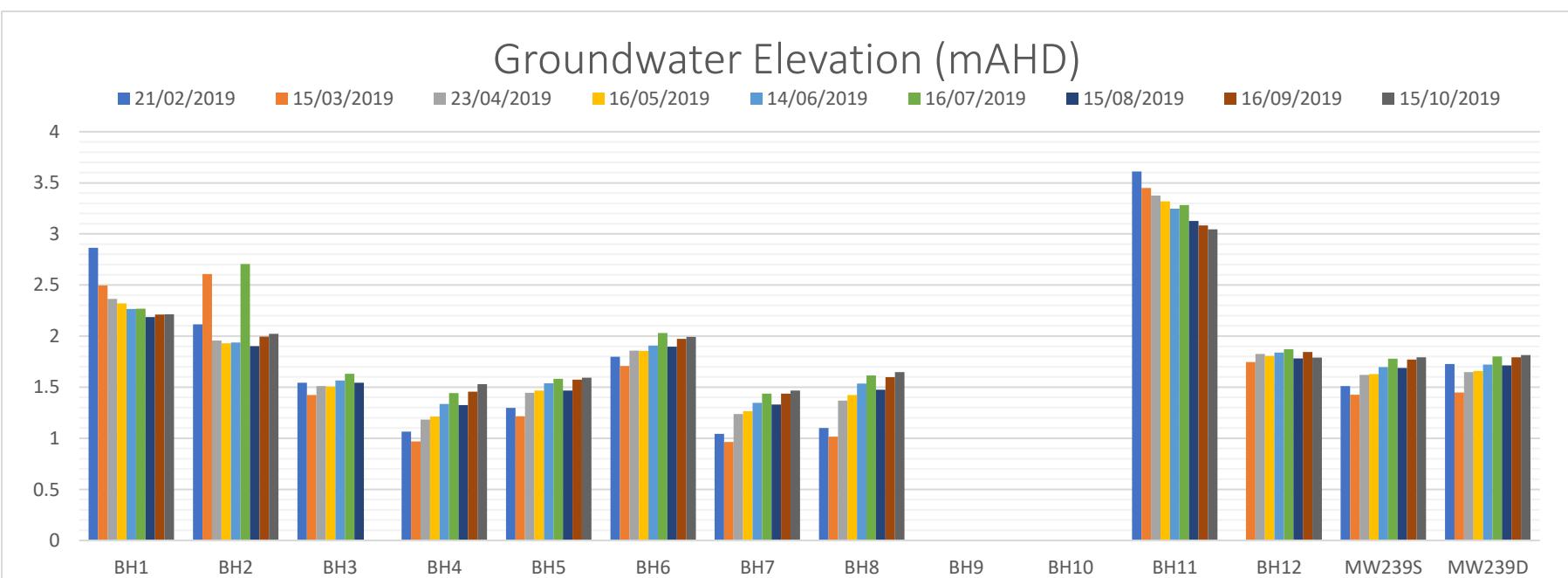
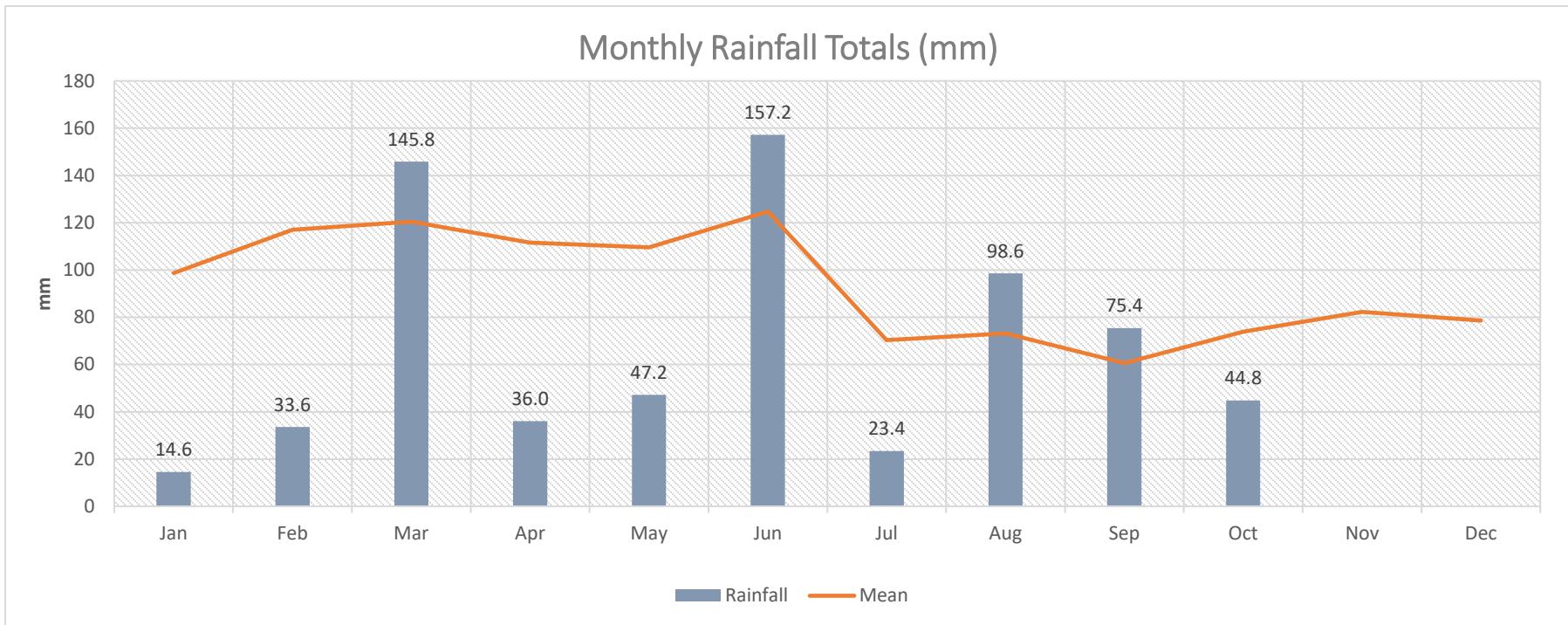
Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

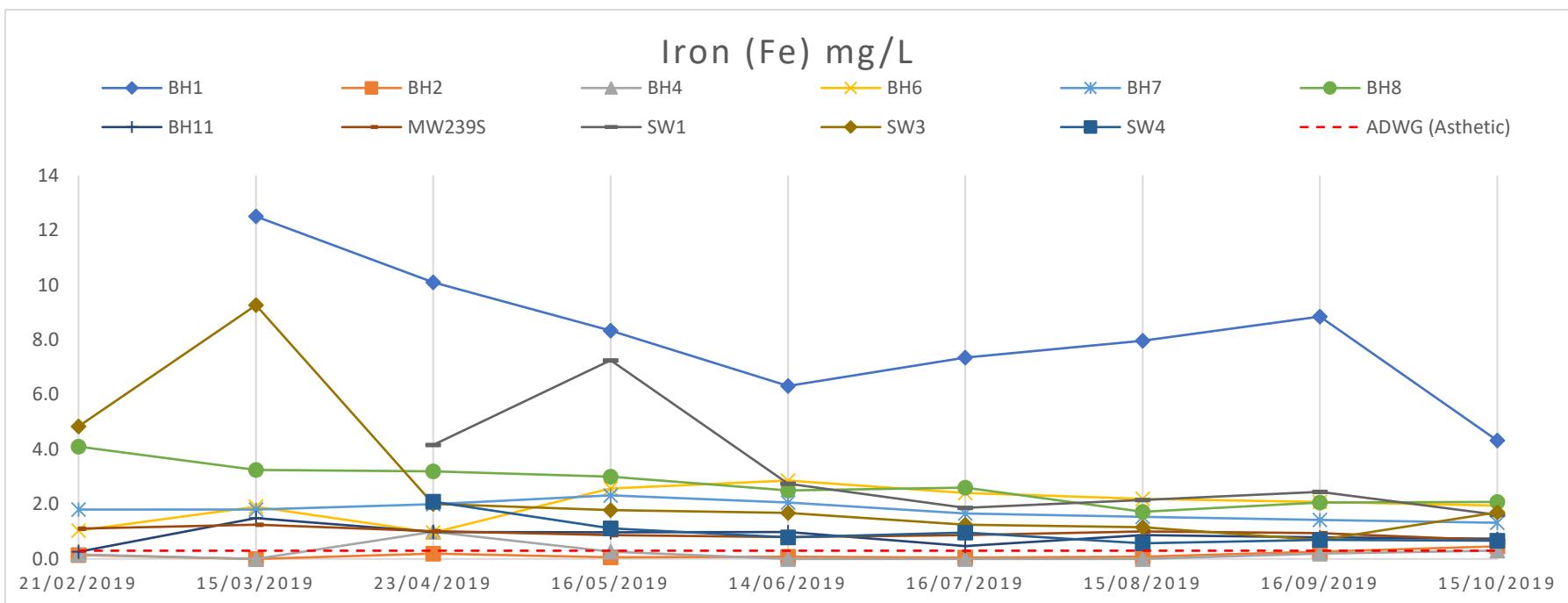
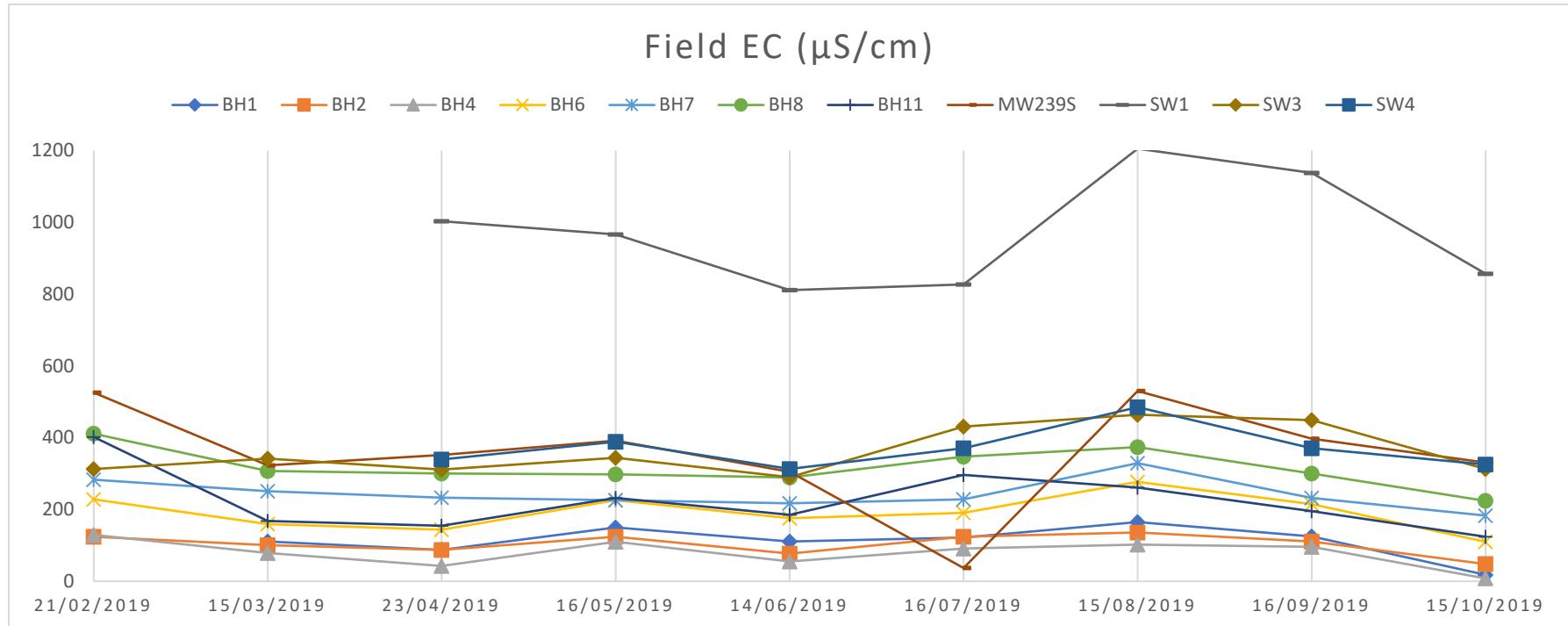
Sub-Matrix: WATER

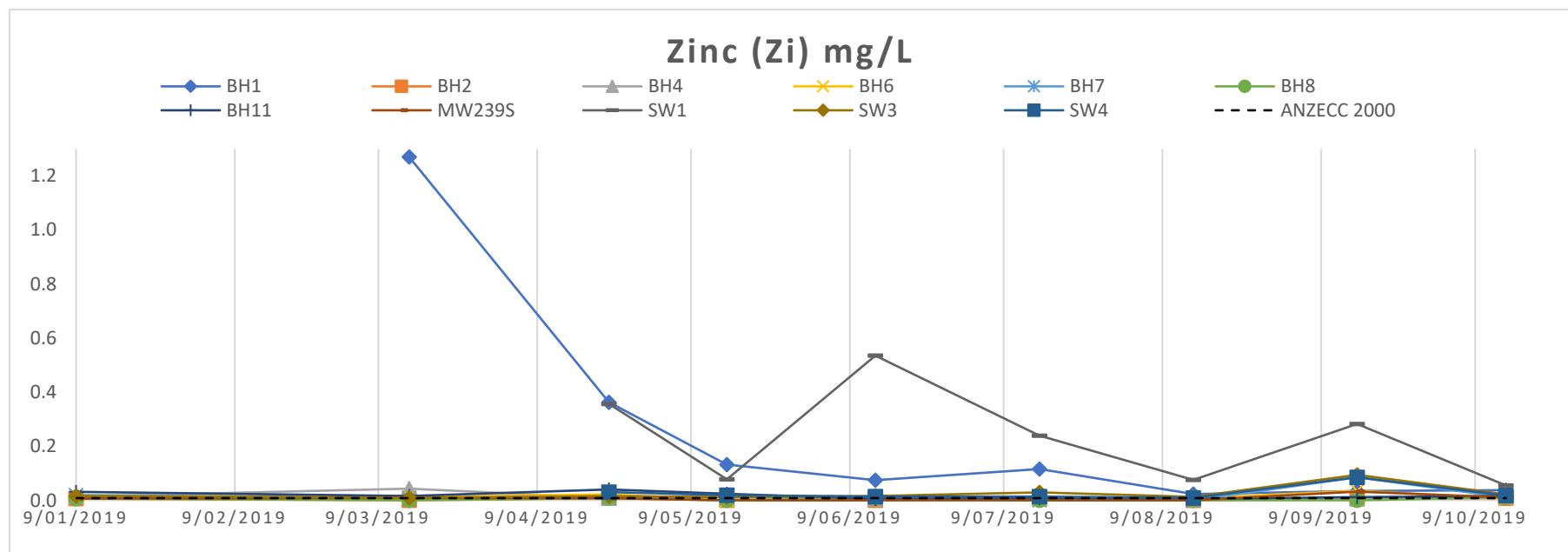
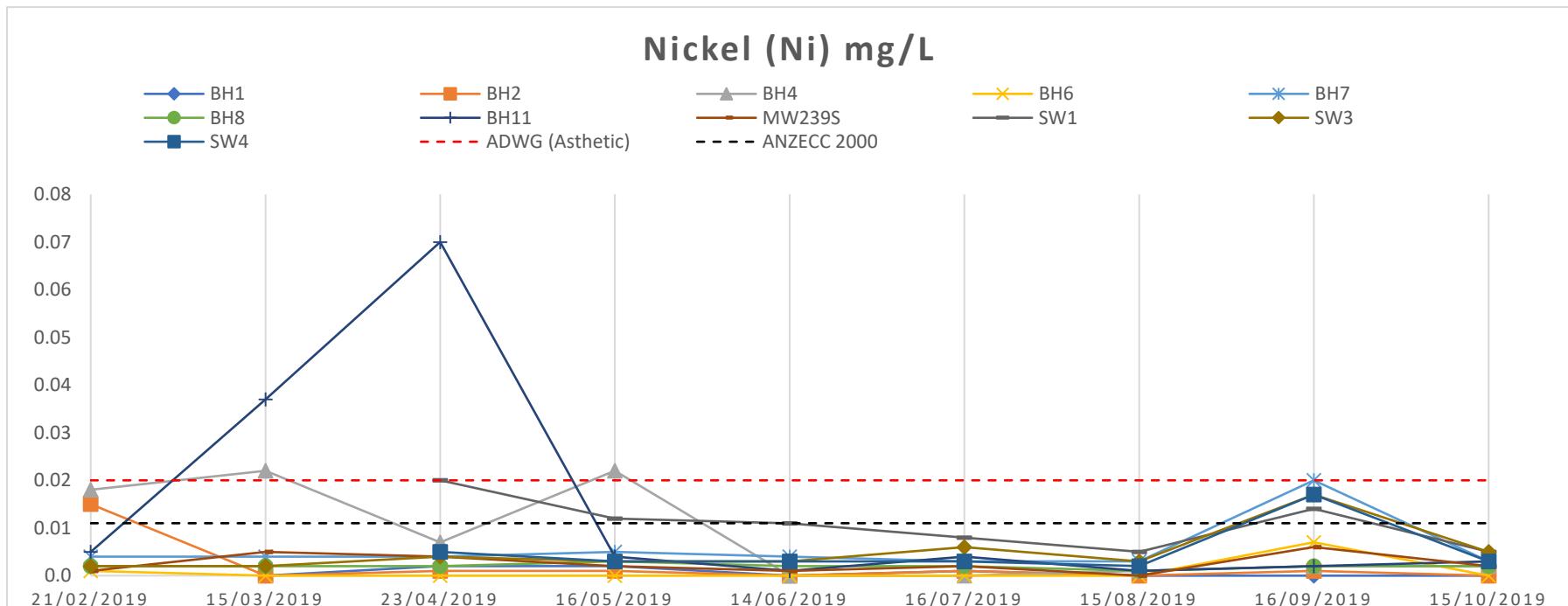
Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

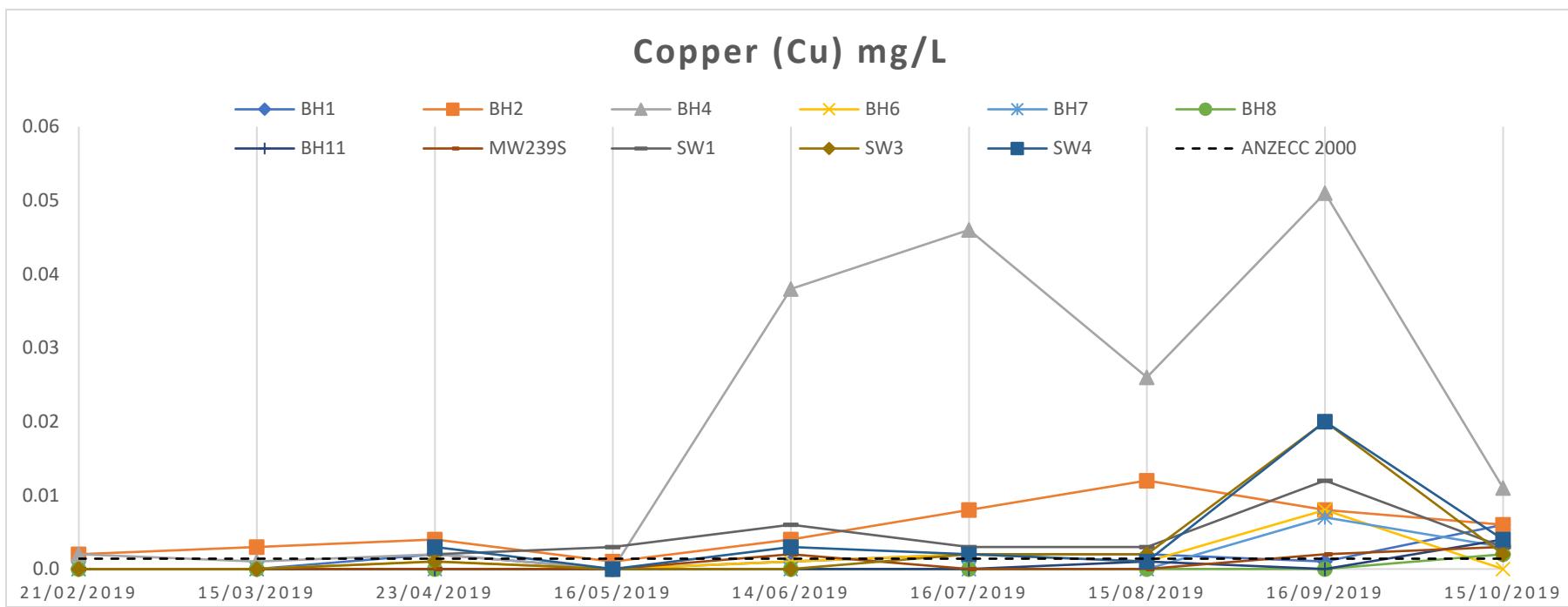
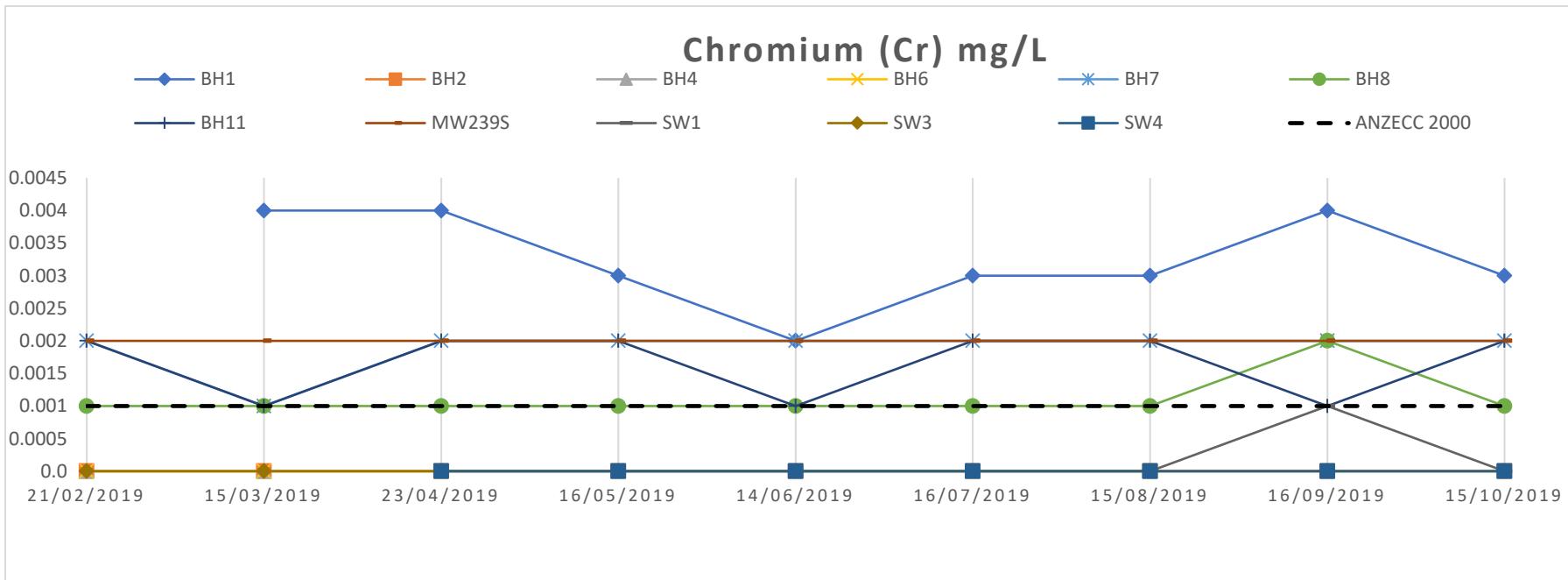


ATTACHMENT B: TREND DATA



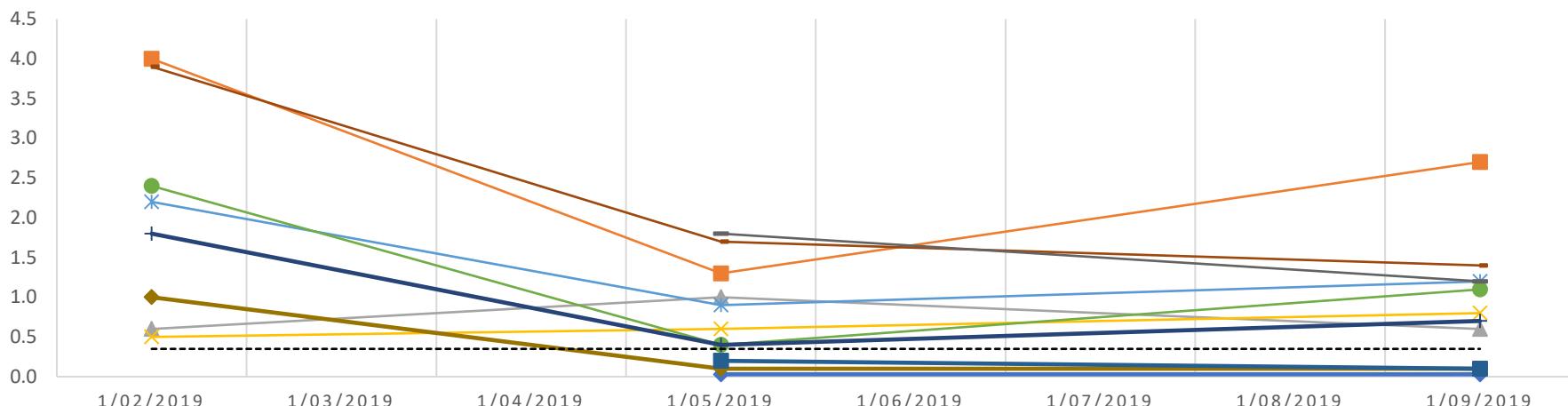






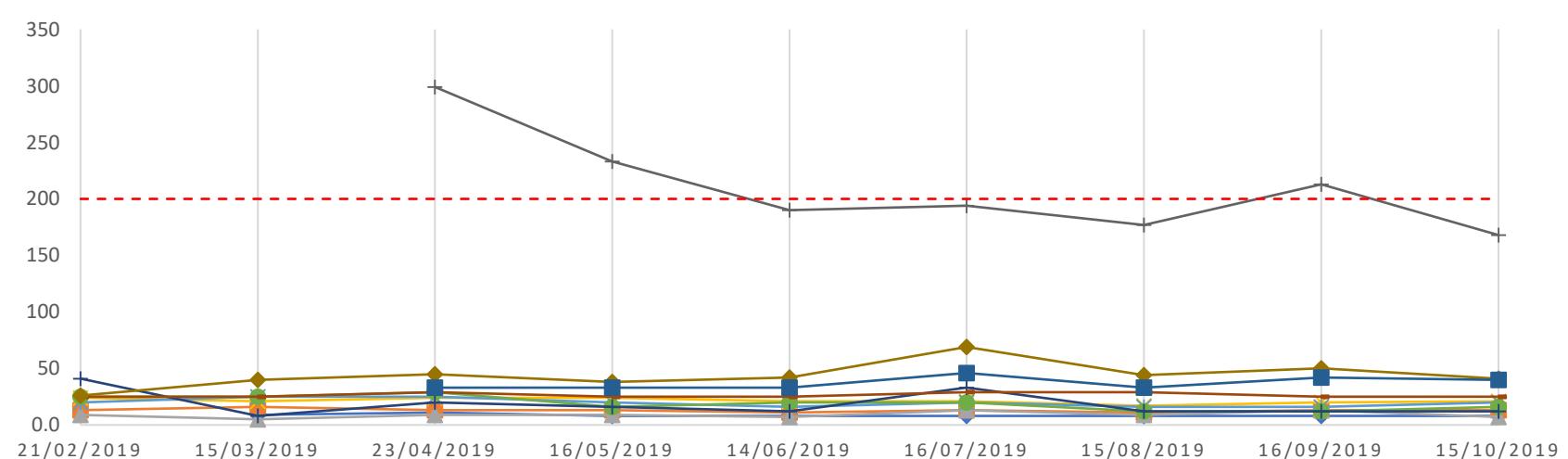
Total Nitrogen (N) mg/L

BH1 (blue diamond), BH2 (orange square), BH4 (grey triangle), BH6 (yellow asterisk), BH7 (light blue asterisk), BH8 (green circle),
 BH11 (dark blue line), MW239S (brown line), SW1 (grey line), SW3 (brown diamond), SW4 (dark blue square), ANZECC 20000 (dashed black line)



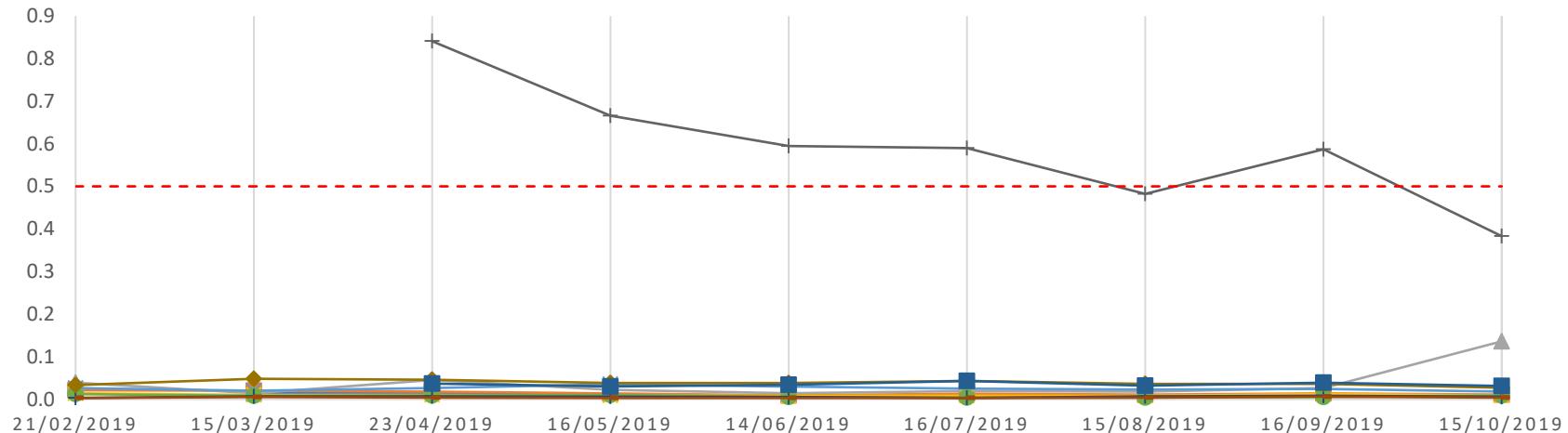
Total Hardness (CaCO₃) mg/L

BH1 (blue diamond), BH2 (orange square), BH4 (grey triangle), BH6 (yellow asterisk), BH7 (light blue asterisk), BH8 (green circle),
 BH11 (dark blue line), MW239S (brown line), SW1 (grey line), SW3 (brown diamond), SW4 (dark blue square), ADWG (Aesthetic) (red dashed line)



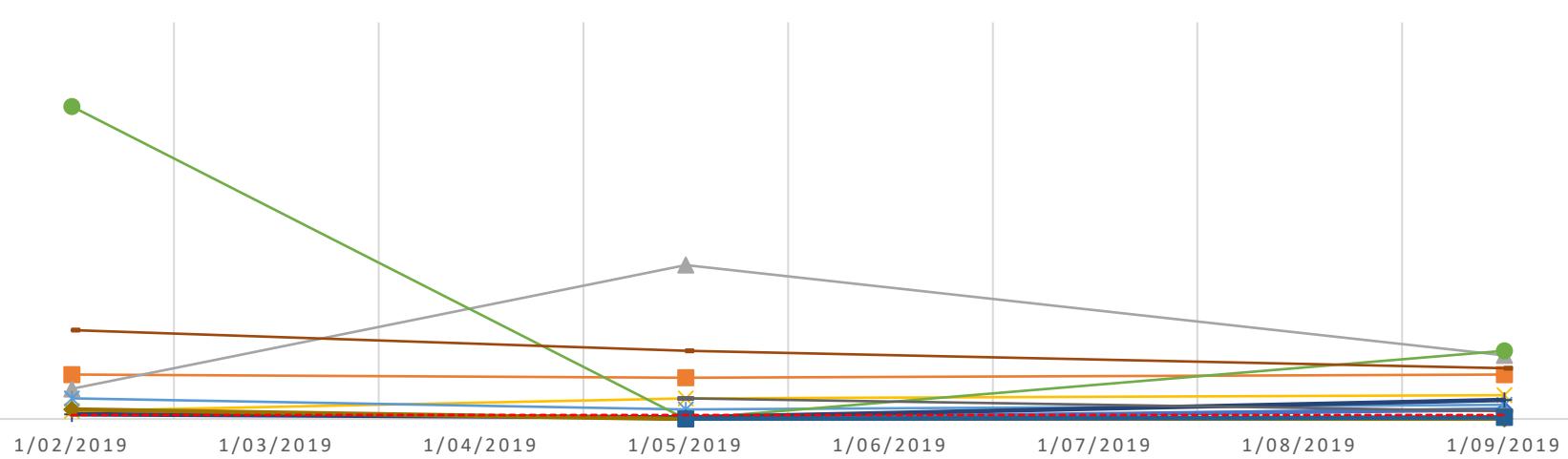
Manganese (Mn) mg/L

BH1 (blue diamond), BH2 (orange square), BH4 (grey triangle), BH6 (yellow cross), BH7 (light blue asterisk), BH8 (green circle),
 BH11 (dark blue line), MW239S (brown line), SW1 (black line with plus), SW3 (brown diamond), SW4 (dark blue square)

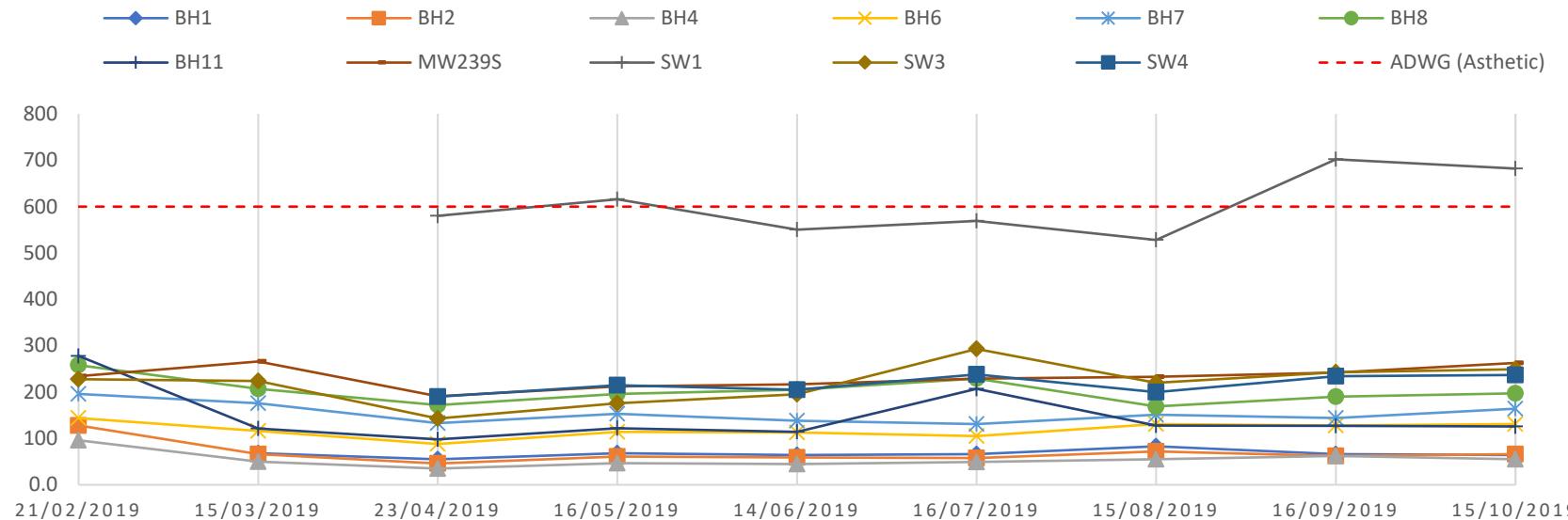


Total Phosphorus mg/L

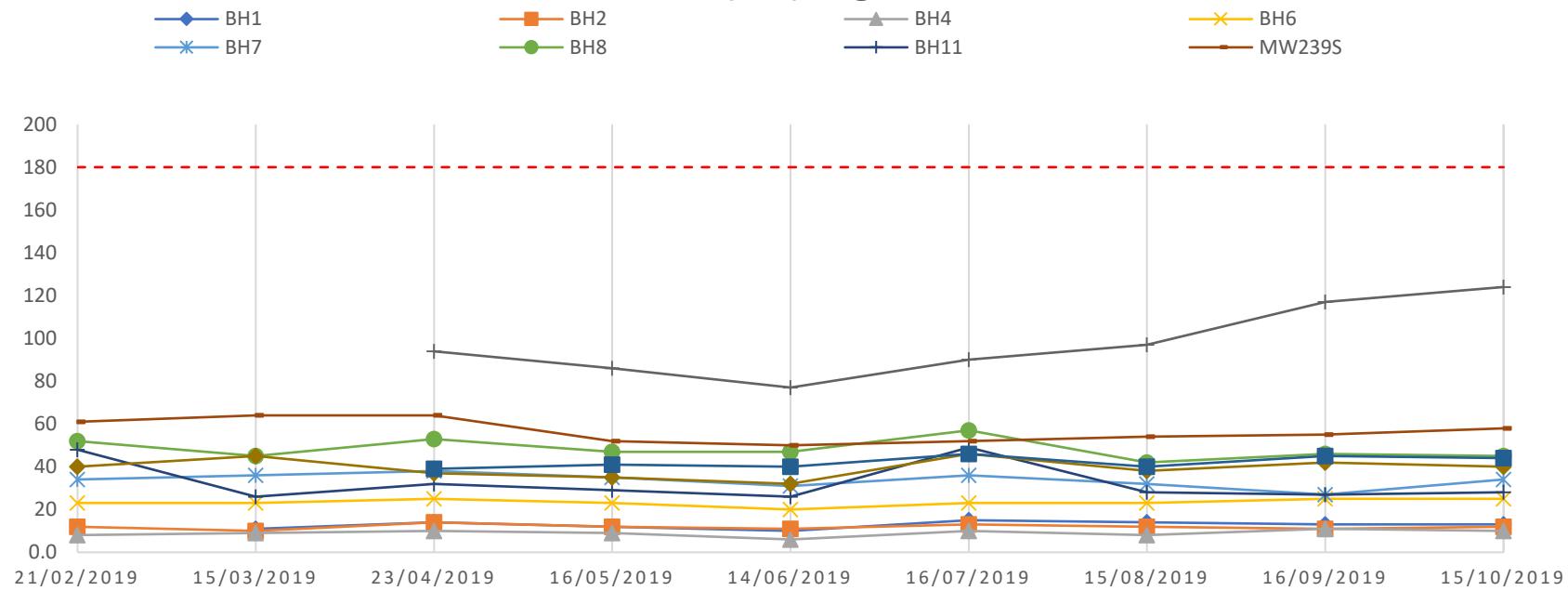
BH1 (blue diamond), BH2 (orange square), BH4 (grey triangle), BH6 (yellow cross), BH7 (light blue asterisk), BH8 (green circle),
 BH11 (dark blue line), MW239S (brown line), SW1 (black line with plus), SW3 (brown diamond), SW4 (dark blue square)



Total Dissolved Solids (TDS) mg/L

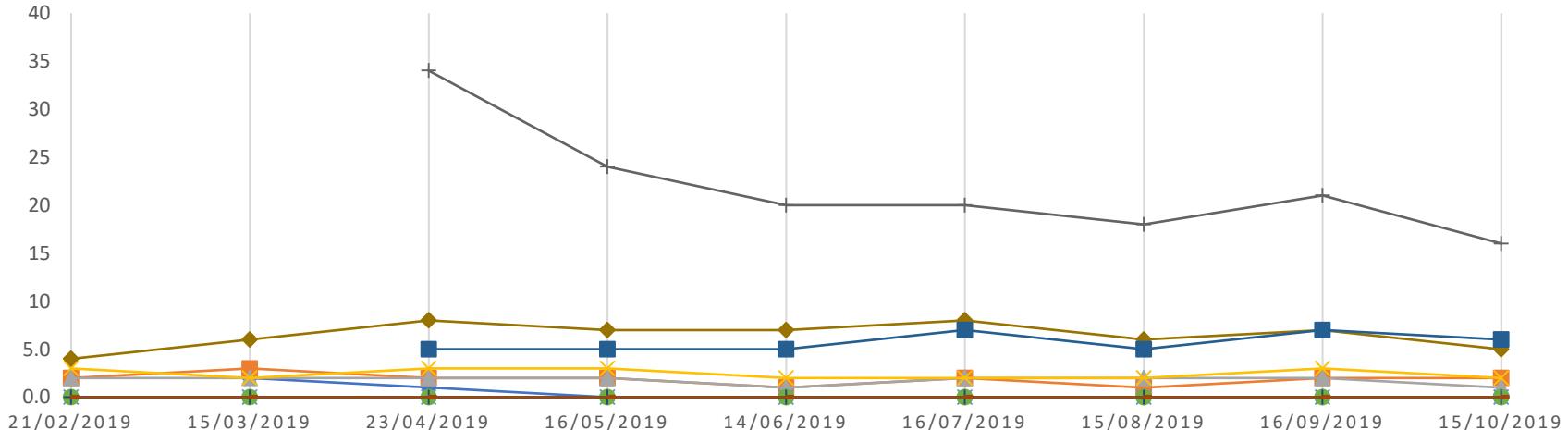


Sodium(Na) mg/L



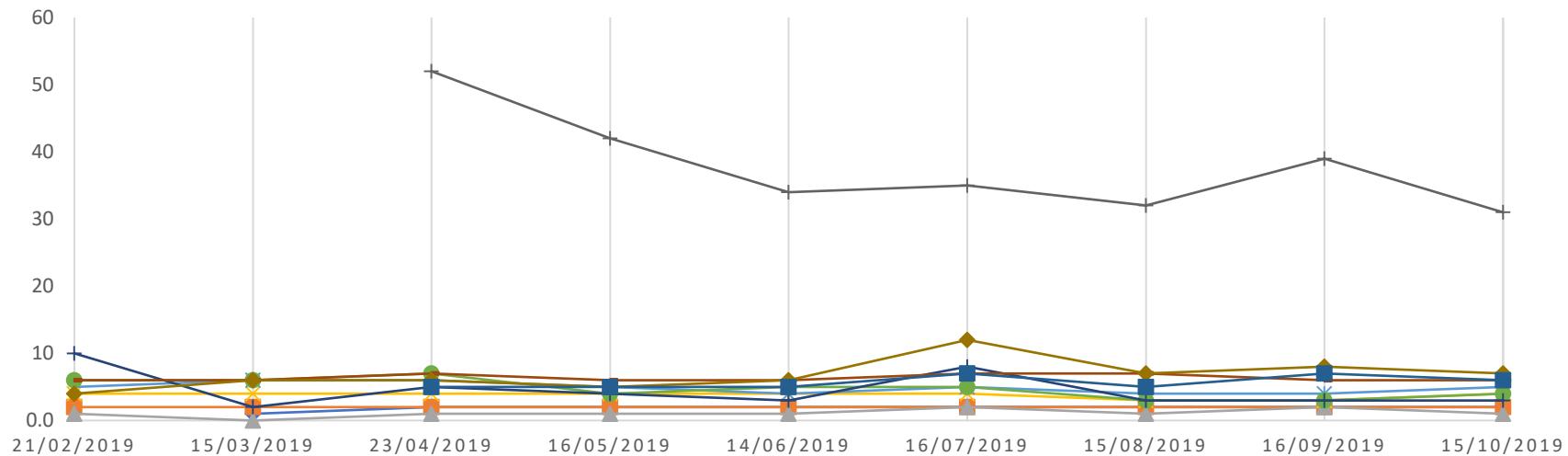
Calcium(Ca) mg/L

BH1 BH2 BH4 BH6 BH7 BH8 BH11 MW239S SW1 SW3 SW4

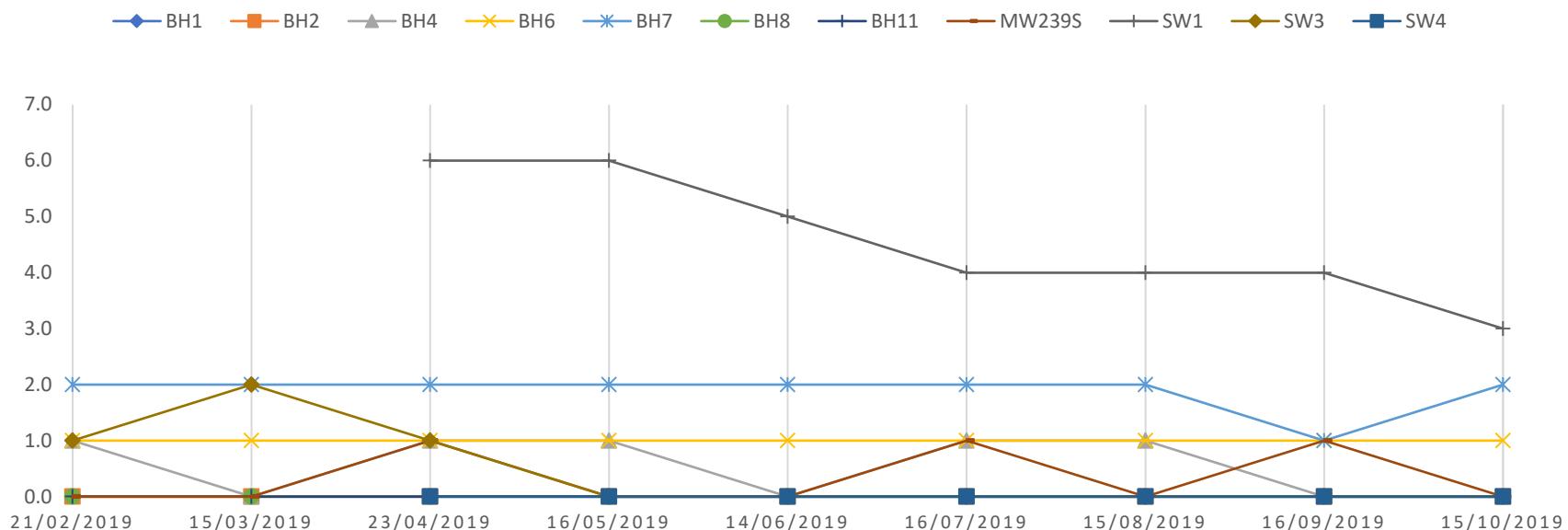


Magnesium(Mg) mg/L

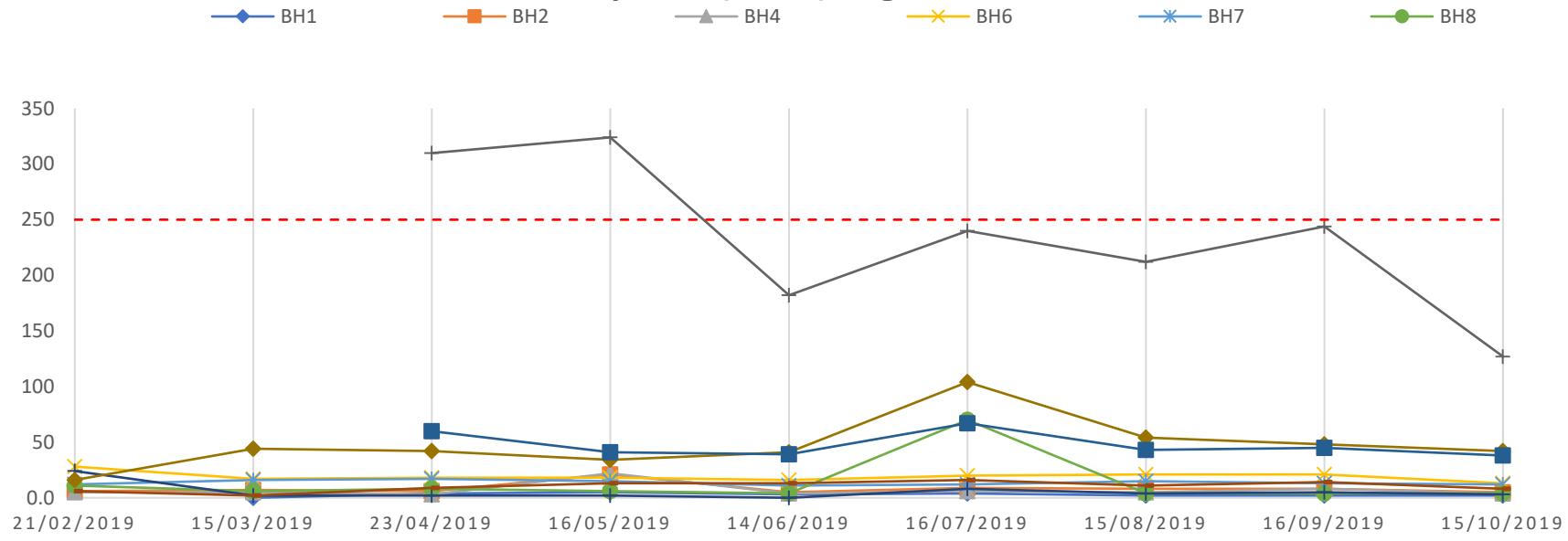
BH1 BH2 BH4 BH6 BH7 BH8 BH11 MW239S SW1 SW3 SW4



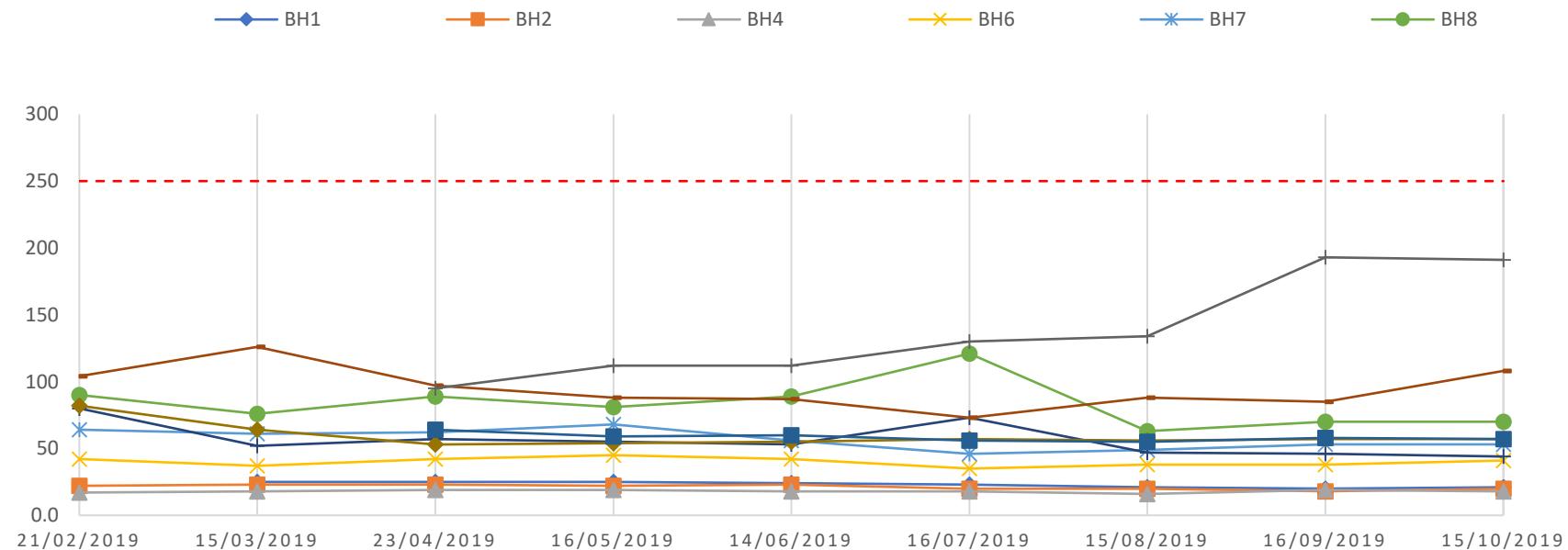
Potassium(K) mg/L



Sulphate(SO₄²⁻) mg/L



Chloride (Cl) mg/L



Fluoride (F⁻) mg/L

