

26 January 2020  
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Williamtown Sand Syndicate  
PO Box 898  
Newcastle, NSW 2300

**Attention: Darren Williams**

Delivered by email: [darren@arbus.com.au](mailto:darren@arbus.com.au)

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

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the December 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 December monitoring round was a monthly monitoring event and included gauging of all available monitoring wells (a total of 13 wells) and sampling from 8 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled and BH9 and BH10 were dry) including additional analytical parameters and sampling at one surface water location (all other surface water locations were dry).

## **2. SITE WORK**

The monthly monitoring round was conducted on 17 December 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 December 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 1 location (SW1, SW2 and SW4 were 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 Monthly Water Quality Analysis**

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	9	0	0	0	0
Hydrocarbons**	9	0	0	1	1
Metals***	9	0	0	1	1
Iron (dissolved)	9	0	0	1	1
Total Dissolved Solids (TDS)	9	0	0	0	0
Total Suspended Solids (TSS)	9	0	0	0	0
PFAS (28 analytes, standard level)	4	0	0	1	1

\* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO<sub>4</sub>, Alkalinity, Fluoride, Hardness & TDS (Calc)

\*\* TRH (C6 – C40), BTEXN (Silica Gel)

\*\*\* 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

### 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 (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.558	2.028	8.28	Slight cloudy brown, no odour
BH2	7.79	5.936	1.854	9.03	Dark brown, slight sulfur odour
BH3	-	-	-	-	Well Decommissioned

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH4	3.06	2.051	1.009	6.11	Slight cloudy brown, no odour
BH5	7.36	6.143	1.217	8.8	No odour - No sample taken.
BH6	3.62	2.009	1.611	4.62	Mostly clear, slight sulfur odour
BH7	2.98	1.989	0.991	4.61	Cloudy brown, slight sulfur odour.
BH8	3.88	2.778	1.102	6.28	Cloudy brown, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.859	2.771	5.39	Cloudy brown, sulfur odour
BH12	8.67	7.076	1.594	8.2	No sample taken.
MW239S	3.04	1.648	1.392	4.06	Cloudy brown, sulfur odour
MW239D	3.04	1.626	1.414	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	Dry		N/A	Location was dry
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	Dry		N/A	Small amount of standing water
SW04*	N/A	Dry		N/A	Location was dry

\* 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	1225	20.53	163	6.12	15.2
BH02	1200	20.13	131	5.38	178
BH04	1145	20.93	109	6.49	174
BH06	1345	21.96	256	5.52	-86.2
BH07	1400	21.87	292	5.93	-92.6
BH08	1430	22.05	995	6.16	-96.8
BH11	1300	20.55	239	5.42	-60.7
MW239S	1315	20.33	523	5.64	-104.7
SW03	1000	20.00	440	5.69	29.3

**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	9	9	65	No	Similar
	Sulphate	1	9	5	25	No	Similar
	Chloride	1	9	16	127	No	Similar
	Fluoride	0.1	9	<0.1	<0.1	No	Similar
	Reactive <sup>3</sup> Phosphorous	0.01	0	-	-	-	-
	Total Phosphorous <sup>3</sup>	0.01	0	-	-	-	-
	Nitrite <sup>3</sup>	0.01	0	-	-	-	-
	Nitrate <sup>3</sup>	0.01	0	-	-	-	-
	Ammonia <sup>3</sup>	0.01	0	-	-	-	-
	Total Nitrogen <sup>3</sup>	0.1	0	-	-	-	-
	Total Hardness	1	9	7.0	39	No	Similar
	Total Dissolved Solids	1	9	55	285	No	Similar
	pH	0.01	9	5.01	6.05	All outside ANZECC 2000 Trigger range <sup>1</sup> and drinking water guidelines	Similar
Dissolved Metals	As	0.001	9	<0.001	<0.001	No	Similar
	B	0.05	9	<0.005	0.06	No	Similar
	Ba	0.001	9	0.001	0.041	No	Similar
	Be	0.001	9	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	9	<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	9	<0.001	0.003	7 above ANZECC 2000 Trigger Values <sup>2</sup> (BH1, BH2, BH7, BH8, BH11, MW239S and SW3)	Similar
	Co	0.001	9	<0.001	0.001	No	Similar
	Cu	0.001	9	<0.001	0.008	5 above ANZECC 2000 Trigger Values <sup>2</sup> (BH2, BH4, BH6, BH8 & BH11)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	9	<0.05	8.48	7 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S & SW3)	Similar
	Mn	0.001	9	0.001	0.026	No	Similar
	Ni	0.001	9	<0.001	0.003	No	General decrease at groundwater locations.
	Pb	0.005-0.1	9	<0.001	<0.001	No	Similar
	Se	0.005-0.1	9	<0.01	<0.01	No	Similar
	V	0.005-0.1	9	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	9	0.006	0.028	1 above ANZECC 2000 Trigger Values <sup>2</sup> (BH1)	General decrease at most groundwater locations.
	Hg	0.0001	9	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C <sub>6</sub> -C <sub>10</sub>	0.02	9	<0.02	<0.02	No	Similar
	>C <sub>10</sub> -C <sub>16</sub>	0.1	9	<0.1	<0.1	No	Similar
	>C <sub>16</sub> -C <sub>34</sub>	0.1	9	<0.1	<0.1	No	Similar
	>C <sub>34</sub> -C <sub>40</sub>	0.1	9	<0.1	<0.1	No	Similar
	Total >C <sub>10</sub> -C <sub>40</sub>	0.1	9	<0.1	<0.1	No	Similar
	C <sub>6</sub> -C <sub>10</sub> minus BTEX (F1)	0.02	9	<0.02	<0.02	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 <sub>10</sub> -C <sub>16</sub> minus Naphthalene (F2)	0.1	9	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	9	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Naphthalene	0.001	9	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	0.00019	No	6:2 Fluorotelomer sulfonic acid reported in BH 6 for first time
	PFDS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar

\* 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.

<sup>1</sup>Australian 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)

<sup>2</sup>ANZECC 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

<sup>3</sup>Analysis 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 less rainfall in November than the mean leading up to the December monitoring event. December rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for December 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	0	0
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0	0	0
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0	0	0
4th	0	0	0	0	20.8	0.4	5.2	0	0	0	17.6	0
5th	0	0	0	0	0.2	25	1.8	0.2	0	0	0.4	0
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8	0	0
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0	0	0
8th	0	0	0	0	0	0	1.6	0	0	0	0	0
9th	0	6.6	0	0	0	0	0.4	0	0	0.8	0	0
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4	0	0
11th	0	0	0	0	0.6	0	0	0	2.8	4	0	0
12th	3.0	0	0	0	0	0	0	0	0	23	0	0
13th	0	0	0	0	1.4	0	0	0	0	8.8	0	0
14th	0	0	0	0.2	0	0	0	0	0	0	0	0
15th	0	0	0	1.4	0	0	0	0	0	0	0	0
16th	0	0	4.8	3.6	0	0	0	0	0	0.2	0	0
17th	0	0	59.4	1.4	0	0	0	0	16.8	0	0	0
18th	0	0	2.6	0.2	0	17.8	0	0	39.4	0	0	
19th	0	0	2.2	0.2	0	0	0	0	7.2	0	0	
20th	2.4		0	2.0	0	0	0	0	0	0	0	
21st	1.0	1.4	0	0.2	0	0	0	0	0	0	0	
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0	0	0	
23rd	0	1.4	0	0	0	20	0	0		0	1	
24th	0	9.2	5.4	0	0	50.6	0	0	0	0	1.6	
25th	0	0	5.2	0	0	15.2	2.0	0	0	0	0	
26th	0	0	0	0	0	1.8	0	0	0	0	31.2	
27th	0	0	0	0	0	0.8	0	0	0	0	0	
28th	1.0	0	0	0	0.8	0	0	0	0	0	0	
29th	0		0	0	0	0	0	0	0	0	0	
30th	0		38.2	0	0	0	0.6	21.2	0	0	0	
31st	0		6.6		0		10	67.4				
<b>Total</b>	<b>14.6</b>	<b>33.6</b>	<b>145.8</b>	<b>36.0</b>	<b>47.2</b>	<b>157.2</b>	<b>23.4</b>	<b>98.6</b>	<b>75.4</b>	<b>44.8</b>	<b>51.8</b>	
<b>Mean</b>	<b>98.7</b>	<b>117.0</b>	<b>120.5</b>	<b>111.6</b>	<b>109.6</b>	<b>124.7</b>	<b>70.3</b>	<b>73.2</b>	<b>60.6</b>	<b>73.5</b>	<b>82.3</b>	<b>78.6</b>

## 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**

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Mobile: 0458 197 676

### Attached:

**Figure 1**

**Data Tables**

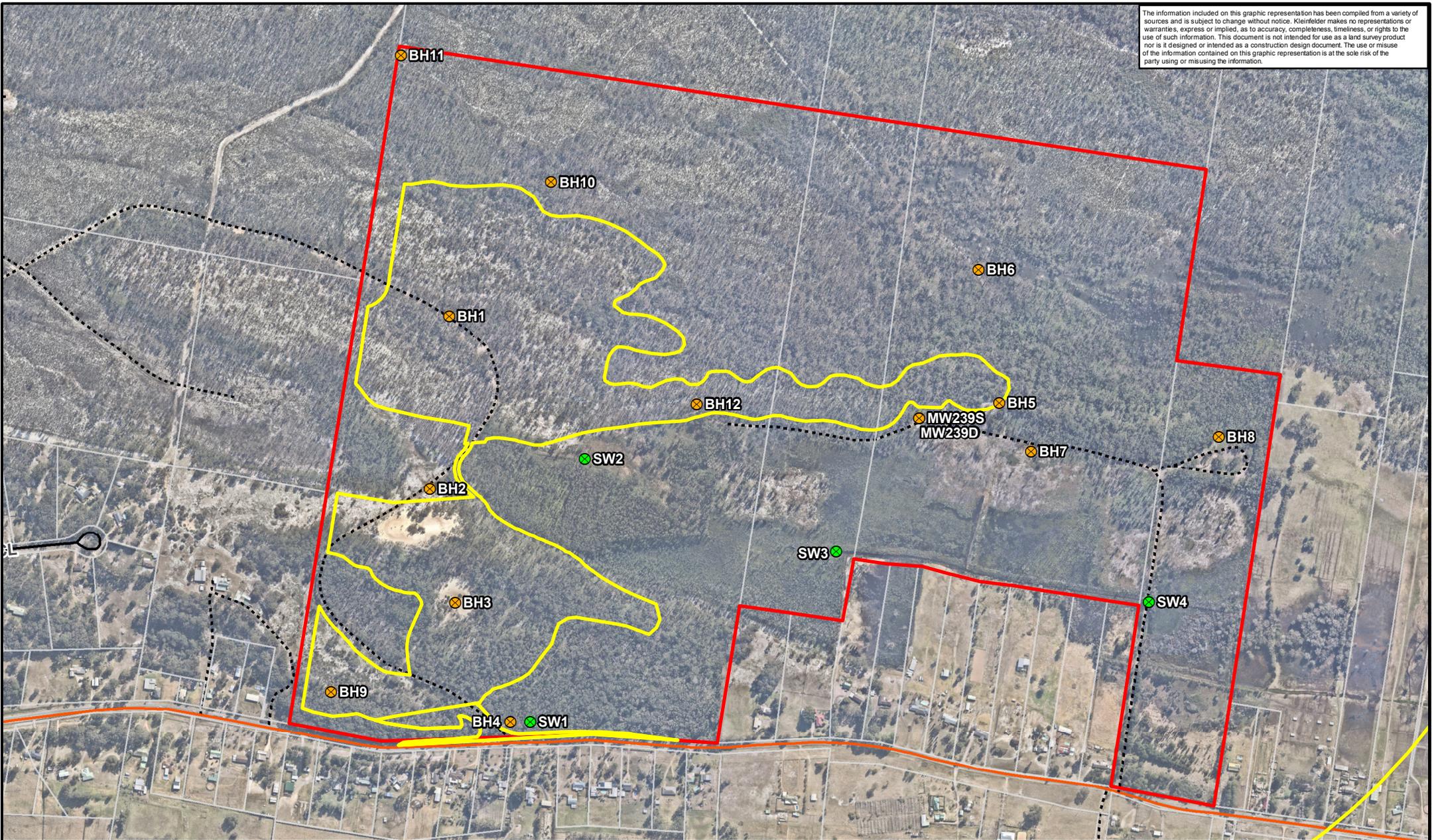
**Attachment A – Laboratory reports**

**Attachment B – Data Trends**

## **FIGURE 1**

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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 use of such information. This document is not intended for use as a land survey 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
- ✕ Surface Water Sample Site
- Subject Land Boundary
- 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 Plan

Williamtown Sand Syndicate  
 Proposed Sand Quarry  
 Cabbage Tree Road, Williamtown

FIGURE:

**1**

## **DATA TABLES**

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Table 3  
Groundwater Analytical Data - PFAS  
Williamstown Sand Syndicate



Analyte	Sum of PFAS			
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	
LOR	0.01	0.01	0.01	
Units	µg/L	µg/L	µg/L	
NHMRC ADWG 6	0.07			
HEPA NEMP 2018***				
HEPA NEMP 2018 <sup>4</sup>	0.7			
Sample Name	Sample Date			
BH11	21-Feb-19	< 0.01	< 0.01	< 0.01
BH2	22-Feb-19	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.01	< 0.01	< 0.01
	15-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	0.02
	25-Sep-19	< 0.01	< 0.01	0.02
	15-Oct-19	< 0.01	< 0.01	< 0.01
BH5	19-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.01	< 0.01	< 0.01
	22-Feb-19	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	15-Oct-19	< 0.01	< 0.01	< 0.01
BH7	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
	22-Feb-19	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
BH8	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
	22-Feb-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
MW239S	22-Feb-19	< 0.01	< 0.01	< 0.01
SW1	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
SW4	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	0.03 *	0.01	0.01
	25-Sep-19	0.05	0.05	0.05
	18-Nov-19	< 0.01	< 0.01	< 0.01

Notes:  
 -- Not analysed  
 < - Less than laboratory limit of report  
 µg/L - Micrograms per litre  
 \*\*\* 99% Level of protection in freshwa  
<sup>4</sup> Recreation water

Table 4  
Groundwater Analytical Data - Inorganics  
Williamstown Sand Syndicate



Analyte	Anions and Cations																Total Cations	Total Anions
	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			
	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1			
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			
ANZECC 2000 Trigger Values								0.02*	0.025*				0.9**	0.35*				
NHMRC ADWG 6	180 <sup>3</sup>				250 <sup>3</sup>	250 <sup>3</sup>	1.5			3	50		0.5 <sup>3</sup>					
Sample Name	Sample Date																	
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	0.66	0.88	
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	0.82	0.99	
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	0.6	0.94	
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	0.82	0.95	
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	0.77	0.91	
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	0.73	0.71	
	18-Nov-19	16	< 1.0	2.0	< 1.0	3.0	23	0.1	< 0.01	< 0.01	< 0.01	0.01	0.01	0.13	0.3	0.3	0.86	1.19
	17-Dec-19	14	< 1	2	< 1	5	23	< 0.1	-	-	-	-	-	-	-	0.77	1.05	
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	1.3	1.51	
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	1.8	1.65	
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	1.38	1.5	
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	2.79	2.22	
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	1.46	1.41	
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	1.46	1.3	
	18-Nov-19	28	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	< 0.01	2.11	< 0.01	0.06	0.06	0.18	5.9	5.8	1.46	1.5
17-Dec-19	26	< 1	4	< 1	< 1	48	< 0.1	-	-	-	-	-	-	-	1.46	1.39		
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	0.75	0.79	
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	0.87	0.77	
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	0.69	0.75	
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	0.83	0.75	
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	0.74	0.73	
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67
	15-Oct-19	12	2.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	0.79	0.67	
	18-Nov-19	14	2.0	1.0	< 1.0	7.0	19	< 0.1	< 0.01	0.21	< 0.01	1.01	1.01	0.05	2.1	1.1	0.79	0.68
17-Dec-19	13	2	2	< 1	8	17	< 0.1	-	-	-	-	-	-	-	0.83	0.69		
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54
	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	0.49	0.61	
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	0.64	0.6	
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	0.39	0.59	
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	0.72	0.63	
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	0.56	0.56	
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7
	15-Oct-19	10	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	0.57	0.59	
18-Nov-19	11	1.0	1.0	< 1.0	6.0	18	< 0.1	< 0.01	0.08	< 0.01	0.29	0.29	< 0.01	0.3	< 0.1	0.61	0.63	
17-Dec-19	9	1	1	1	6	16	< 0.1	-	-	-	-	-	-	-	0.55	0.64		
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34
	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	1.46	1.44	
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	1.59	1.56	
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	1.32	1.52	
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	1.46	1.4	
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	1.37	1.51	
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55
	15-Oct-19	25	2.0	4.0	1.0	13	41	< 0.1	-	-	-	-	-	-	-	1.54	1.43	
18-Nov-19	27	3.0	3.0	1.0	18	45	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.23	0.4	0.4	1.6	1.64	
17-Dec-19	26	2	4	1	16	42	< 0.1	-	-	-	-	-	-	-	1.58	1.62		
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
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	2.11	2.05	
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	2.1	2.1	
	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
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	1.73	1.81	
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	2.03	1.55	
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	1.77	1.85	
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1	< 0.01	0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86
	15-Oct-19	34	< 1.0	5.0	2.0	12	53	< 0.1	-	-	-	-	-	-	-	1.94	1.74	
	18-Nov-19	31	< 1.0	5.0	1.0	15	56	0.1	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.17	0.5	0.5	1.78	1.89
17-Dec-19	26	< 1	5	1	15	44	< 0.1	-	-	-	-	-	-	-	1.57	1.59		
21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	

Table 4  
Groundwater Analytical Data - Inorganics  
Williamstown Sand Syndicate



Ionic Balance	Sodium Adsorption Ratio	Alkalinity					Electrical Conductivity @ 25°C*	Inorganics		pH
		Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3		Total Dissolved Solids	Total Dissolved Solids	
%	0.01	1	1	1	1	1	1	10	0.01	
	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
						200 <sup>3</sup>	125-2200	600 <sup>3</sup>		6.5 - 8.0*
										6.5-8.5 <sup>3</sup>
-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
-	1.7	10	< 1.0	< 1.0	10	8.0	105	68	164	5.82
-	-	10	< 1.0	< 1.0	10	8.0	99	64	72	5.52
-	-	11	< 1.0	< 1.0	11	8.0	102	66	84	5.62
-	-	14	< 1.0	< 1.0	14	8.0	128	83	82	6.22
-	1.84	8.0	< 1.0	< 1.0	8.0	8.0	102	66	88	5.44
-	-	4.0	< 1.0	< 1.0	4.0	8.0	98	64	-	5.5
-	2.26	24	< 1.0	< 1.0	24	8.0	126	82	-	6.29
-	-	15	< 1	< 1	15	8	118	77	-	6.05
-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	175	114	107	4.84
-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	318	207	192	4.68
-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	197	128	135	4.88
-	3.18	< 1.0	< 1.0	< 1.0	< 1.0	12	195	127	140	4.66
-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	194	126	-	4.92
-	3.3	< 1.0	< 1.0	< 1.0	< 1.0	12	193	125	-	5.12
-	-	2	< 1	< 1	2	16	196	127	-	5.03
-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	51	4.76
-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	90	58	63	4.84
-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	110	72	61	5.2
-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	96	62	60	4.72
-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	102	66	-	5.06
-	2.02	< 1.0	< 1.0	< 1.0	< 1.0	9.0	102	66	-	5.47
-	-	2	< 1	< 1	2	13	106	69	-	5.43
-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	69	45	36	4.84
-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	75	49	42	4.96
-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	85	55	49	5.01
-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	95	62	58	4.83
-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	85	55	-	4.93
-	1.86	< 1.0	< 1.0	< 1.0	< 1.0	7.0	86	56	-	5.34
-	-	3	< 1	< 1	3	7	85	55	-	5.44
-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	174	113	90	4.82
-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	161	105	82	4.73
-	-	< 1.0	< 1.0	< 1.0	< 1.0	17	201	131	104	4.87
-	2.44	2.0	< 1.0	< 1.0	2.0	20	197	128	124	4.68
-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	202	131	-	5.17
-	2.64	< 1.0	< 1.0	< 1.0	< 1.0	20	204	133	-	5.32
-	-	5	< 1	< 1	5	21	207	134	-	5.58
-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	213	138	145	4.91
-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	202	131	164	5.0
-	8.0	< 1.0	< 1.0	< 1.0	8.0	16	232	151	168	5.53
-	2.79	5.0	< 1.0	< 1.0	5.0	16	222	144	181	5.07
-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	252	164	-	4.95
-	2.89	< 1.0	< 1.0	< 1.0	< 1.0	20	239	155	-	4.97
-	-	2	< 1	< 1	2	20	210	136	-	5.14
-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46

Table 4  
Groundwater Analytical Data - Inorganics  
Williamstown Sand Syndicate



Analyte	Anions and Cations																Total Cations	Total Anions	
	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				
	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1				
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		
ANZECC 2000 Trigger Values								0.02*	0.025*		0.7**		0.9**	0.35*					
NHMRC ADWG 6	180 <sup>3</sup>				250 <sup>3</sup>	250 <sup>3</sup>	1.5			3	50		5 <sup>3</sup>						
BH8	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	
	16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	-	2.46	2.59	
	16-Jul-19	57	< 1.0	5.0	< 1.0	7.0	121	0.1	-	-	-	-	-	-	-	-	2.89	4.87	
	15-Aug-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	-	2.07	1.86	
	16-Sep-19	46	< 1.0	3.0	< 1.0	4.0	70	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.13	1.1	1.1	2.25	2.06	
	15-Oct-19	45	< 1.0	4.0	< 1.0	4.0	70	< 0.1	-	-	-	-	-	-	-	-	2.29	2.06	
	18-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	1.3	2.46	2.42	
	17-Dec-19	50	< 1	4	< 1	10	75	< 0.1	-	-	-	-	-	-	-	-	2.5	2.36	
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	-	2.67	2.86	
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	-	2.86	2.39	
	15-Aug-19	54	< 1.0	7.0	< 1.0	11	88	< 0.1	-	-	-	-	-	-	-	-	2.92	2.71	
	16-Sep-19	55	< 1.0	6.0	1.0	14	85	< 0.1	< 0.01	0.32	< 0.01	< 0.01	< 0.01	0.1	1.4	1.4	2.91	2.69	
	15-Oct-19	58	< 1.0	6.0	< 1.0	8.0	108	< 0.1	-	-	-	-	-	-	-	-	3.02	3.21	
	18-Nov-19	63	< 1.0	6.0	1.0	8.0	118	< 0.1	< 0.01	0.23	< 0.01	< 0.01	< 0.01	0.17	1.2	1.2	3.26	3.5	
17-Dec-19	65	< 1	8	< 1	6	127	< 0.1	-	-	-	-	-	-	-	-	3.48	3.75		
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	-	7.9	8.66	
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	-	7.85	8.19	
	16-Sep-19	117	21	39	4.0	244	193	0.7	< 0.01	0.05	< 0.01	0.02	0.02	< 0.01	1.2	1.2	9.45	11	
	15-Oct-19	124	16	31	3.0	127	191	0.6	-	-	-	-	-	-	-	-	8.82	8.03	
	18-Nov-19	142	14	30	4.0	165	234	0.5	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.03	1.1	1.1	9.45	10	
	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	
23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37		
16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25		
14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4		
16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	-	3.39	3.77		
15-Aug-19	38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	-	2.53	2.7		
16-Sep-19	42	7.0	8.0	< 1.0	48	57	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.1	0.1	2.83	2.61		
15-Oct-19	40	5.0	7.0	< 1.0	42	57	0.2	-	-	-	-	-	-	-	-	2.56	2.48		
18-Nov-19	36	5.0	5.0	< 1.0	29	56	< 0.1	< 0.01	0.04	< 0.01	0.01	0.01	0.03	0.6	0.6	2.23	2.18		
17-Dec-19	40	4	7	1	25	57	< 0.1	-	-	-	-	-	-	-	-	2.54	2.25		
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	
	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	
	14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1	-	-	-	-	-	-	-	-	2.4	2.5	
	16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2	-	-	-	-	-	-	-	-	2.93	2.97	
	15-Aug-19	40	5.0	5.0	< 1.0	43	55	0.1	-	-	-	-	-	-	-	-	2.4	2.45	
	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	
	15-Oct-19	44	6.0	6.0	< 1.0	38	57	0.1	-	-	-	-	-	-	-	-	2.71	2.4	
	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	

**Notes:**  
 - - Not analysed  
 < - 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

\* 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)  
 \*\* 95% Level of protection in freshwater  
<sup>3</sup> Aesthetic

Table 4  
Groundwater Analytical Data - Inorganics  
Williamstown Sand Syndicate



Ionic Balance	Sodium Adsorption Ratio	Alkalinity					Electrical Conductivity @ 25°C*	Inorganics		pH
		Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3		Total Dissolved Solids	Total Dissolved Solids	
		1	1	1	1	1		1	10	
%	0.01	1	1	1	1	1	1	10	0.01	
	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
						200 <sup>3</sup>	125-2200	600 <sup>3</sup>		6.5 - 8.5*
-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
26	-	< 1.0	< 1.0	< 1.0	< 1.0	20	353	229	226	4.78
-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	260	169	140	5.0
-	5.43	< 1.0	< 1.0	< 1.0	< 1.0	12	293	190	206	4.85
-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	303	197	-	5.02
-	5.06	< 1.0	< 1.0	< 1.0	< 1.0	16	316	205	-	5.12
		2	<1	<1	2	16	328	213	-	5.02
1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
-	-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	353	229	188	4.85
-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	359	233	195	4.83
-	4.7	< 1.0	< 1.0	< 1.0	< 1.0	25	373	242	224	4.66
3.15	-	< 1.0	< 1.0	< 1.0	< 1.0	25	404	263	-	4.86
3.48	5.38	< 1.0	< 1.0	< 1.0	< 1.0	25	419	272	-	4.76
3.62	-	2	<1	<1	2	33	439	285	-	5.01
5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
4.64	-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42
2.12	-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	528	548	4.53
5.38	3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	702	689	4.32
4.68	-	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	-	5.32
3.03	4.91	< 1.0	< 1.0	< 1.0	< 1.0	158	1,090	708	-	5.06
-	3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
-	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
5.38	-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	293	246	4.47
-	-	< 1.0	< 1.0	< 1.0	< 1.0	44	338	220	192	4.47
-	2.57	< 1.0	< 1.0	< 1.0	< 1.0	50	374	243	201	4.3
-	-	< 1.0	< 1.0	< 1.0	< 1.0	41	383	249	-	4.75
-	2.72	< 1.0	< 1.0	< 1.0	< 1.0	33	278	181	-	5.39
		6	<1	<1	6	39	301	196	-	5.75
13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
-	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08
-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31
-	-	< 1.0	< 1.0	< 1.0	< 1.0	46	367	238	207	4.46
-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	308	200	160	4.48
-	3.01	< 1.0	< 1.0	< 1.0	< 1.0	42	360	234	208	4.35
-	-	< 1.0	< 1.0	< 1.0	< 1.0	40	365	237	-	4.48
-	3.22	< 1.0	< 1.0	< 1.0	< 1.0	30	348	226	-	4.48

Table 5  
Quality Control Sample Analysis - BTEXN  
Williamstown Sand Syndicate



Analyte			BTEXN								Total Petroleum Hydrocarbons			
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C <sub>6</sub> - C <sub>9</sub>	C <sub>10</sub> - C <sub>14</sub>	C <sub>15</sub> - C <sub>28</sub>	C <sub>29</sub> - C <sub>36</sub>
Units			µg/L	µg/L	µg/L	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	< 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	< 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	< 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	< 2.0	< 5.0	< 1.0	< 20	-	-
Relative Percentage Difference			NC	NC	NC	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	< 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	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	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	< 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	< 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	< 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	< 2.0	< 5.0	< 1.0	< 20	-	-
Relative Percentage Difference			NC	NC	NC	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	< 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	< 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	< 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	< 2.0	< 5.0	< 1.0	< 20	-	-
Relative Percentage Difference			NC	NC	NC	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	< 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	NC	NC	NC
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 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	< 2.0	< 5.0	< 1.0	< 20	-	-
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 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	< 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	< 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	< 2.0	< 5.0	< 1.0	< 20	-	-
Relative Percentage Difference			NC	NC	NC	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	< 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	200	400	200
Relative Percentage Difference			NC	NC	NC	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	< 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	< 2.0	< 5.0	< 1.0	< 20	-	-
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-
RINSATE09_181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-
DUP09_181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 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	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-
TRIP09_18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-
RINSATE10_171219	17-Dec-19	Rinsate	< 1.0	< 2.0	< 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  
Williamstown Sand Syndicate



C <sub>10</sub> - C <sub>36</sub> sum	Total Petroleum Hydrocarbons - Silica Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons -		
	C <sub>10</sub> -C <sub>14</sub> - Silica Cleanup	C <sub>15</sub> -C <sub>28</sub> - Silica Cleanup	C <sub>29</sub> -C <sub>36</sub> - Silica Cleanup	C <sub>10</sub> -C <sub>36</sub> Sum - Silica Cleanup	C <sub>6</sub> - C <sub>10</sub>	C <sub>6</sub> - C <sub>10</sub> minus BTEX (F1)	>C <sub>10</sub> - C <sub>16</sub>	>C <sub>10</sub> - C <sub>16</sub> minus Naphthalene (F2)	>C <sub>16</sub> - C <sub>34</sub>	>C <sub>34</sub> - C <sub>40</sub>	>C <sub>10</sub> -C <sub>16</sub> - Silica Cleanup	F2 - Silica Cleanup	>C <sub>16</sub> -C <sub>34</sub> - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	-	< 20	< 20	-	-	-	-	-	-	-
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 50	< 50	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 50	-	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	-	-	-
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 100	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100

Table 5  
 Quality Control Sample Analysis - BTEXN  
 Williamtown Sand Syndicate



Silica Clean up	
>C <sub>34</sub> -C <sub>40</sub> - Silica Cleanup	>C <sub>10</sub> -C <sub>40</sub> - Silica Cleanup
µg/L	µg/L
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
-	-
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
-	-
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	-
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	-
NC	NC
< 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
Sample Name	Sample Date	Sample Type	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	
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	< 0.001	< 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	< 0.001	< 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	NC	0%	NC	NC	0%	NC	NC	0%	NC	40%	NC	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	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 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	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
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	< 0.001	< 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	< 0.001	< 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	< 0.001	< 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	NC	0%	40%	NC	NC	33%	NC	5%	NC	NC	NC	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	Triplicate	< 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	NC	0%	40%	NC	NC	6%	NC	5%	NC	156%	NC	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	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 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	< 0.001	< 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	NC	NC	0%	NC	NC	3%	NC	3%	NC	0%	NC	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	Triplicate	< 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	NC	67%	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
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	< 0.001	< 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	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 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	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08 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	< 0.001	< 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	NC	NC	0%	190%	8%	67%	8%	NC	140%	NC	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	Triplicate	< 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	NC	NC	NC	0%	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	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIPBLANK09 181119	18-Nov-19	Trip Blank	< 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
RINSATE09 181119	18-Nov-19	Rinsate	< 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
SW4 181119	18-Nov-19	Primary	< 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
DUP09 181119	18-Nov-19	Duplicate	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	5.9	< 0.001	0.036	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	NC	NC	7%	NC	12%	NC	0%	NC	NC	NC
SW4 181119	18-Nov-19	Primary	< 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
TRIP09 18112019	18-Nov-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	< 0.001	0.01	6.32	< 0.001	0.035	< 0.0001	0.007	-	< 0.005	0.033
Relative Percentage Difference			NC	13%	NC	NC	NC	NC	NC	NC	NC	181%	NC	9%	NC	111%	NC	NC	172%
TRIPBLANK10 171219	17-Dec-19	Trip Blank	< 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
RINSATE10 171219	17-Dec-19	Rinsate	< 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

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 - PFAS  
Williamstown Sand Syndicate



Analyte			Perfluoroalkyl Sulfonic Acids						Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)		
Units			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	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE_05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE_08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	100%	NC	NC	NC
TRIP BLANK_09_1931069	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE_09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE10_171219	17-Dec-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02

**Notes:**

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





Table 7  
 Quality Control Sample Analysis - PFAS  
 Williamtown Sand Syndicate



Sum of PFAS	
Sum of PFAS (WA DER List)	Sum of PFAS
µg/L	µg/L
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
0.01	0.01
0.01	0.01
0%	0%
0.01	0.01
< 0.05	< 0.1
<b>86%</b>	<b>133%</b>
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01

## **ATTACHMENT A: LABORATORY REPORTS**

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## CERTIFICATE OF ANALYSIS

**Work Order** : **ES1941879**  
**Client** : **KLEINFELDER AUSTRALIA PTY LTD**  
**Contact** : DANIEL KOUSBROEK  
**Address** : 95 Mitchell Rd  
                   Cardiff 2285  
**Telephone** : ----  
**Project** : Williamtown SS  
**Order number** : 20193820  
**C-O-C number** : 6900  
**Sampler** : DANIEL KOUSBROEK  
**Site** : Williamtown SS  
**Quote number** : ME/114/19 ALS Compass  
**No. of samples received** : 11  
**No. of samples analysed** : 11

**Page** : 1 of 19  
**Laboratory** : Environmental Division Sydney  
**Contact** : Shirley LeCornu  
**Address** : 277-289 Woodpark Road Smithfield NSW Australia 2164  
**Telephone** : +6138549 9630  
**Date Samples Received** : 17-Dec-2019 12:26  
**Date Analysis Commenced** : 18-Dec-2019  
**Issue Date** : 02-Jan-2020 15:46



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. 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



## 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.

- 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.
- EP231X: Positive result for analyte 6:2 Fluorotelomer sulfonic acid (6:2 FTS) on sample ES1941879\_006 has been confirmed by re-extraction and re-analysis.
- 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.
- 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, PFTrDA 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: GROUNDWATER (Matrix: WATER)				Client sample ID				
				BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit	ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
				Result	Result	Result	Result	Result
<b>EA005P: pH by PC Titrator</b>								
pH Value	----	0.01	pH Unit	6.05	5.43	5.44	5.58	5.14
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	118	106	85	207	210
<b>EA016: Calculated TDS (from Electrical Conductivity)</b>								
Total Dissolved Solids (Calc.)	----	1	mg/L	77	69	55	134	136
<b>EA065: Total Hardness as CaCO3</b>								
Total Hardness as CaCO3	----	1	mg/L	8	13	7	21	20
<b>ED037P: Alkalinity by PC Titrator</b>								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	15	2	3	5	2
Total Alkalinity as CaCO3	----	1	mg/L	15	2	3	5	2
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	8	6	16	15
<b>ED045G: Chloride by Discrete Analyser</b>								
Chloride	16887-00-6	1	mg/L	23	17	16	42	44
<b>ED093F: Dissolved Major Cations</b>								
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	14	13	9	26	26
Potassium	7440-09-7	1	mg/L	<1	<1	1	1	1
<b>EG005(ED093)F: Dissolved Metals by ICP-AES</b>								
Iron	7439-89-6	0.05	mg/L	8.48	0.10	<0.05	1.78	0.98
<b>EG020F: Dissolved Metals by ICP-MS</b>								
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	0.06	0.05	0.06
Barium	7440-39-3	0.001	mg/L	0.002	0.004	0.012	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	0.001
Chromium	7440-47-3	0.001	mg/L	0.003	0.002	0.001	0.001	0.002
Copper	7440-50-8	0.001	mg/L	0.001	0.006	0.008	0.003	<0.001
Manganese	7439-96-5	0.001	mg/L	0.009	0.012	0.014	0.007	0.011
Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	<0.001	0.001	0.003





## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time					17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit		ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
					Result	Result	Result	Result	Result
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ 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
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
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
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
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
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: GROUNDWATER  
 (Matrix: WATER)

Client sample ID

				BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit	ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
				Result	Result	Result	Result	Result
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	----	----	<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
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	----	----	<0.02	<0.02	<0.02
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>								
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	<b>0.19</b>	<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
<b>EP231P: PFAS Sums</b>								
Sum of PFAS	----	0.01	µg/L	----	----	<0.01	<b>0.19</b>	<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	<b>0.19</b>	<0.01
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	2	%	<b>125</b>	<b>121</b>	<b>128</b>	<b>125</b>	<b>117</b>
Toluene-D8	2037-26-5	2	%	<b>109</b>	<b>111</b>	<b>115</b>	<b>119</b>	<b>112</b>
4-Bromofluorobenzene	460-00-4	2	%	<b>103</b>	<b>104</b>	<b>106</b>	<b>110</b>	<b>105</b>
<b>EP231S: PFAS Surrogate</b>								



### Analytical Results

Sub-Matrix: **GROUNDWATER**  
 (Matrix: **WATER**)

Client sample ID

				BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit	ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
				Result	Result	Result	Result	Result
<b>EP231S: PFAS Surrogate - Continued</b>								
13C4-PFOS	----	0.02	%	----	----	96.2	106	104
13C8-PFOA	----	0.02	%	----	----	99.9	116	103



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID		BH-8	MW239S	BH-11	----	----	
Client sampling date / time				17-Dec-2019 14:15		17-Dec-2019 13:18		17-Dec-2019 12:56		----	----
Compound	CAS Number	LOR	Unit	ES1941879-008	ES1941879-010	ES1941879-011	-----	-----	-----	-----	
				Result	Result	Result	----	----	----	----	
<b>EA005P: pH by PC Titrator</b>											
pH Value	----	0.01	pH Unit	5.02	5.01	5.03	----	----	----	----	
<b>EA010P: Conductivity by PC Titrator</b>											
Electrical Conductivity @ 25°C	----	1	µS/cm	328	439	196	----	----	----	----	
<b>EA016: Calculated TDS (from Electrical Conductivity)</b>											
Total Dissolved Solids (Calc.)	----	1	mg/L	213	285	127	----	----	----	----	
<b>EA065: Total Hardness as CaCO3</b>											
Total Hardness as CaCO3	----	1	mg/L	16	33	16	----	----	----	----	
<b>ED037P: Alkalinity by PC Titrator</b>											
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	2	2	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	2	2	2	----	----	----	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>											
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	10	6	<1	----	----	----	----	
<b>ED045G: Chloride by Discrete Analyser</b>											
Chloride	16887-00-6	1	mg/L	75	127	48	----	----	----	----	
<b>ED093F: Dissolved Major Cations</b>											
Calcium	7440-70-2	1	mg/L	<1	<1	<1	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	4	8	4	----	----	----	----	
Sodium	7440-23-5	1	mg/L	50	65	26	----	----	----	----	
Potassium	7440-09-7	1	mg/L	<1	<1	<1	----	----	----	----	
<b>EG005(ED093)F: Dissolved Metals by ICP-AES</b>											
Iron	7439-89-6	0.05	mg/L	3.02	1.33	1.00	----	----	----	----	
<b>EG020F: Dissolved Metals by ICP-MS</b>											
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	0.06	----	----	----	----	
Barium	7440-39-3	0.001	mg/L	0.007	0.008	0.004	----	----	----	----	
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	0.002	0.003	0.002	----	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.003	0.001	0.002	----	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.011	0.003	0.008	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.001	----	----	----	----	



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	MW239S	BH-11	----	----
Client sampling date / time					17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit		ES1941879-008	ES1941879-010	ES1941879-011	-----	-----
					Result	Result	Result	----	----
<b>EG020F: Dissolved Metals by ICP-MS - Continued</b>									
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	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		<b>0.007</b>	<0.005	<b>0.006</b>	----	----
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
<b>EK040P: Fluoride by PC Titrator</b>									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	----	----
<b>EN055: Ionic Balance</b>									
∅ Total Anions	----	0.01	meq/L		<b>2.36</b>	<b>3.75</b>	<b>1.39</b>	----	----
∅ Total Cations	----	0.01	meq/L		<b>2.50</b>	<b>3.48</b>	<b>1.46</b>	----	----
∅ Ionic Balance	----	0.01	%		----	<b>3.62</b>	----	----	----
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>									
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	----	----
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>									
>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	----	----
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
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	----	----
<b>EP080: BTEXN</b>									
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	----	----



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	MW239S	BH-11	----	----
Client sampling date / time					17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit		ES1941879-008	ES1941879-010	ES1941879-011	-----	-----
					Result	Result	Result	----	----
<b>EP080: BTEXN - Continued</b>									
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	----	----
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
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		0.02	µg/L	<0.02	----	----	----	----
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	----	----	----	----
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
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	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		0.05	µg/L	<0.05	----	----	----	----
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: GROUNDWATER  
 (Matrix: WATER)

Client sample ID

				BH-8	MW239S	BH-11	----	----
Client sampling date / time				17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit	ES1941879-008	ES1941879-010	ES1941879-011	-----	-----
				Result	Result	Result	----	----
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>								
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	----	----	----	----
<b>EP231P: PFAS Sums</b>								
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	----	----	----	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	2	%	116	117	116	----	----
Toluene-D8	2037-26-5	2	%	111	110	106	----	----
4-Bromofluorobenzene	460-00-4	2	%	108	105	100	----	----
<b>EP231S: PFAS Surrogate</b>								



**Analytical Results**

Sub-Matrix: **GROUNDWATER**  
 (Matrix: **WATER**)

				Client sample ID	BH-8	MW239S	BH-11	----	----
				Client sampling date / time	17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit		ES1941879-008	ES1941879-010	ES1941879-011	-----	-----
				Result	Result	Result	----	----	
<b>EP231S: PFAS Surrogate - Continued</b>									
<b>13C4-PFOS</b>	----	0.02	%		<b>94.0</b>	----	----	----	----
<b>13C8-PFOA</b>	----	0.02	%		<b>99.2</b>	----	----	----	----



## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)		Client sample ID		SW3	----	----	----	----
Client sampling date / time		17-Dec-2019 10:17		----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-005	-----	-----	-----	-----
				Result	----	----	----	----
<b>EA005P: pH by PC Titrator</b>								
pH Value	----	0.01	pH Unit	5.75	----	----	----	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	301	----	----	----	----
<b>EA016: Calculated TDS (from Electrical Conductivity)</b>								
Total Dissolved Solids (Calc.)	----	1	mg/L	196	----	----	----	----
<b>EA065: Total Hardness as CaCO3</b>								
Total Hardness as CaCO3	----	1	mg/L	39	----	----	----	----
<b>ED037P: Alkalinity by PC Titrator</b>								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	6	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	6	----	----	----	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	25	----	----	----	----
<b>ED045G: Chloride by Discrete Analyser</b>								
Chloride	16887-00-6	1	mg/L	57	----	----	----	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	4	----	----	----	----
Magnesium	7439-95-4	1	mg/L	7	----	----	----	----
Sodium	7440-23-5	1	mg/L	40	----	----	----	----
Potassium	7440-09-7	1	mg/L	1	----	----	----	----
<b>EG005(ED093)F: Dissolved Metals by ICP-AES</b>								
Iron	7439-89-6	0.05	mg/L	1.42	----	----	----	----
<b>EG020F: Dissolved Metals by ICP-MS</b>								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L	0.041	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	0.002	----	----	----	----
Copper	7440-50-8	0.001	mg/L	0.003	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.026	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.001	----	----	----	----



## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
Client sampling date / time				17-Dec-2019 10:17	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-005	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
<b>EG020F: Dissolved Metals by ICP-MS - Continued</b>									
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	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----	----
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	----
<b>EK040P: Fluoride by PC Titrator</b>									
Fluoride	16984-48-8	0.1	mg/L	<0.1	----	----	----	----	----
<b>EN055: Ionic Balance</b>									
∅ Total Anions	----	0.01	meq/L	<b>2.25</b>	----	----	----	----	----
∅ Total Cations	----	0.01	meq/L	<b>2.54</b>	----	----	----	----	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID			QW10 Rinsate glove	Trip Blank 10	----	----	----
Client sampling date / time				17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----	----	----	
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	-----	-----	-----	-----	-----	
				Result	Result	---	---	---	---	---	
<b>EG005(ED093)F: Dissolved Metals by ICP-AES</b>											
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----	----	----	
<b>EG020F: Dissolved Metals by ICP-MS</b>											
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	----	----	----	----	----	
<b>EG035F: Dissolved Mercury by FIMS</b>											
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----	----	----	
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>											
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	----	----	----	----	----	
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>											
>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	----	----	----	----	----	
<b>EP080/071: Total Petroleum Hydrocarbons</b>											
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----	----	----	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>											
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----	----	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QW10 Rinsate glove	Trip Blank 10	----	----	----
Client sampling date / time				17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----	
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	-----	-----	-----	
				Result	Result	---	---	---	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued</b>									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----	
<b>EP080: BTEXN</b>									
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	----	----	----	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
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	----	----	----	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
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	QW10 Rinsate glove	Trip Blank 10	----	----	----
Client sampling date / time				17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----	
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	-----	-----	-----	
				Result	Result	---	---	---	
<b>EP231B: Perfluoroalkyl Carboxylic Acids - Continued</b>									
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	----	----	----	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	----	----	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
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	----	----	----	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	----	----	----	
Sum of PFHxS and PFOS	355-46-4/1763-23-	0.01	µg/L	<0.01	<0.01	----	----	----	



### Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QW10 Rinsate glove	Trip Blank 10	----	----	----
Client sampling date / time				17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----	
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	-----	-----	-----	
				Result	Result	---	---	---	
<b>EP231P: PFAS Sums - Continued</b>									
<b>Sum of PFAS (WA DER List)</b>	----	0.01	µg/L	<0.01	<0.01	----	----	----	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	110	113	----	----	----	
Toluene-D8	2037-26-5	2	%	95.2	103	----	----	----	
4-Bromofluorobenzene	460-00-4	2	%	94.8	98.1	----	----	----	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	110	80.1	----	----	----	
13C8-PFOA	----	0.02	%	105	85.6	----	----	----	



## Surrogate Control Limits

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

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

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>ES1941879</b>	<b>Page</b>	: 1 of 11
<b>Client</b>	: <b>KLEINFELDER AUSTRALIA PTY LTD</b>	<b>Laboratory</b>	: Environmental Division Sydney
<b>Contact</b>	: DANIEL KOUSBROEK	<b>Contact</b>	: Shirley LeCornu
<b>Address</b>	: 95 Mitchell Rd Cardiff 2285	<b>Address</b>	: 277-289 Woodpark Road Smithfield NSW Australia 2164
<b>Telephone</b>	: ----	<b>Telephone</b>	: +6138549 9630
<b>Project</b>	: Williamtown SS	<b>Date Samples Received</b>	: 17-Dec-2019
<b>Order number</b>	: 20193820	<b>Date Analysis Commenced</b>	: 18-Dec-2019
<b>C-O-C number</b>	: 6900	<b>Issue Date</b>	: 02-Jan-2020
<b>Sampler</b>	: DANIEL KOUSBROEK		
<b>Site</b>	: Williamtown SS		
<b>Quote number</b>	: ME/114/19 ALS Compass		
<b>No. of samples received</b>	: 11		
<b>No. of samples analysed</b>	: 11		



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 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	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



## 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

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					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EG005(ED093)F: Dissolved Metals by ICP-AES (QC Lot: 2777503)</b>									
ES1941879-013	Trip Blank 10	EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1941879-006	BH-6	EG005F: Iron	7439-89-6	0.05	mg/L	1.78	1.82	2.04	0% - 20%
<b>EA005P: pH by PC Titrator (QC Lot: 2773602)</b>									
ES1941631-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.66	7.67	0.130	0% - 20%
ES1941879-007	BH-7	EA005-P: pH Value	----	0.01	pH Unit	5.14	4.99	2.96	0% - 20%
<b>EA010P: Conductivity by PC Titrator (QC Lot: 2773603)</b>									
ES1941631-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	379	379	0.00	0% - 20%
ES1941879-007	BH-7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	210	213	1.02	0% - 20%
<b>ED037P: Alkalinity by PC Titrator (QC Lot: 2773604)</b>									
ES1941631-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	178	176	0.814	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	178	176	0.814	0% - 20%
ES1941879-007	BH-7	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	2	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	2	2	0.00	No Limit
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2780396)</b>									
ES1940975-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2450	2410	1.34	0% - 20%
ES1941806-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.00	No Limit
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2780398)</b>									
ES1942356-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13500	14000	3.58	0% - 20%
<b>ED045G: Chloride by Discrete Analyser (QC Lot: 2780397)</b>									
ES1940975-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3740	3760	0.306	0% - 20%



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>ED045G: Chloride by Discrete Analyser (QC Lot: 2780397) - continued</b>									
ES1941806-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	14	14	0.00	0% - 50%
<b>ED093F: Dissolved Major Cations (QC Lot: 2777502)</b>									
ES1941796-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	134	135	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	195	197	0.923	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	430	436	1.28	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.00	0% - 50%
ES1941879-006	BH-6	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	26	27	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
<b>EG020F: Dissolved Metals by ICP-MS (QC Lot: 2777500)</b>									
ES1941796-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.023	0.023	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.006	0.005	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.906	0.927	2.25	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	<0.005	89.6	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.17	0.16	0.00	No Limit
		ES1941879-006	BH-6	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001
EG020A-F: Arsenic	7440-38-2			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Beryllium	7440-41-7			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Barium	7440-39-3			0.001	mg/L	0.026	0.026	0.00	0% - 20%
EG020A-F: Chromium	7440-47-3			0.001	mg/L	0.001	0.001	0.00	No Limit
EG020A-F: Cobalt	7440-48-4			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Copper	7440-50-8			0.001	mg/L	0.003	0.003	0.00	No Limit
EG020A-F: Lead	7439-92-1			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Manganese	7439-96-5			0.001	mg/L	0.007	0.007	0.00	No Limit
EG020A-F: Nickel	7440-02-0			0.001	mg/L	0.001	0.001	0.00	No Limit
EG020A-F: Zinc	7440-66-6			0.005	mg/L	0.006	0.006	0.00	No Limit
EG020A-F: Selenium	7782-49-2			0.01	mg/L	<0.01	<0.01	0.00	No Limit
EG020A-F: Vanadium	7440-62-2			0.01	mg/L	<0.01	<0.01	0.00	No Limit
EG020A-F: Boron	7440-42-8			0.05	mg/L	0.05	0.06	0.00	No Limit
<b>EG035F: Dissolved Mercury by FIMS (QC Lot: 2777499)</b>									



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
<b>EG035F: Dissolved Mercury by FIMS (QC Lot: 2777499) - continued</b>										
ES1941796-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit	
ES1941879-006	BH-6	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit	
<b>EK040P: Fluoride by PC Titrator (QC Lot: 2773601)</b>										
ES1941631-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit	
ES1941879-007	BH-7	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit	
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2776755)</b>										
ES1941879-001	BH-1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit	
ES1941879-011	BH-11	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2776755)</b>										
ES1941879-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
ES1941879-011	BH-11	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
<b>EP080: BTEXN (QC Lot: 2776755)</b>										
ES1941879-001	BH-1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit	
ES1941879-011	BH-11	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit	
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit	
			106-42-3							
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2786563)	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.03	0.00	No Limit	
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.02	0.00	No Limit	
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.05	0.05	0.00	No Limit	
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
EP1913504-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.03	0.00	No Limit	
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit	



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2786563)</b>									
EM1921659-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.10	0.09	11.8	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.16	0.14	16.1	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.07	0.06	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP1913504-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2786563)</b>									
EM1921659-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1913504-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2786563) - continued</b>									
EP1913504-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2786563)</b>									
EM1921659-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1913504-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231P: PFAS Sums (QC Lot: 2786563)</b>									
EM1921659-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.49	0.44	10.8	0% - 20%
EP1913504-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.03	0.03	0.00	No Limit



## Method Blank (MB) and Laboratory Control Spike (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 Spike (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	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EG005(ED093)F: Dissolved Metals by ICP-AES (QCLot: 2777503)</b>									
EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	82.0	114	
<b>EA005P: pH by PC Titrator (QCLot: 2773602)</b>									
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102	
				----	7 pH Unit	99.7	98.0	102	
<b>EA010P: Conductivity by PC Titrator (QCLot: 2773603)</b>									
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	108	95.0	113	
<b>ED037P: Alkalinity by PC Titrator (QCLot: 2773604)</b>									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	83.4	81.0	111	
				----	50 mg/L	96.2	70.0	130	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780396)</b>									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.5	82.0	122	
				<1	500 mg/L	96.2	82.0	122	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780398)</b>									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.5	82.0	122	
				<1	500 mg/L	97.2	82.0	122	
<b>ED045G: Chloride by Discrete Analyser (QCLot: 2780397)</b>									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	80.9	127	
				<1	1000 mg/L	96.9	80.9	127	
<b>ED093F: Dissolved Major Cations (QCLot: 2777502)</b>									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	80.0	114	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	90.0	116	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82.0	120	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.2	85.0	113	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500)</b>									
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.6	85.0	114	
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.6	85.0	115	
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.7	82.0	110	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.5	84.0	110	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.7	85.0	111	
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.4	82.0	112	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.3	81.0	111	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.4	83.0	111	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.0	82.0	110	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500) - continued</b>									
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.5	82.0	112	
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	87.7	85.0	115	
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.1	83.0	109	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	87.5	81.0	117	
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	103	85.0	115	
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 2777499)</b>									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	104	83.0	105	
<b>EK040P: Fluoride by PC Titrator (QCLot: 2773601)</b>									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	105	82.0	116	
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2772290)</b>									
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	58.3	55.8	112	
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	89.0	71.6	113	
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	71.9	56.0	121	
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2772290)</b>									
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	64.1	57.9	119	
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	75.8	62.5	110	
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	81.8	61.5	121	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2776755)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	94.8	75.0	127	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2776755)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	97.6	75.0	127	
<b>EP080: BTEXN (QCLot: 2776755)</b>									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.6	70.0	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	93.0	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	2	µg/L	<2	10 µg/L	92.9	69.0	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	95.9	72.0	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.6	70.0	120	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	71.0	127	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	88.0	68.0	131	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	93.4	69.0	134	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.2	65.0	140	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.2	53.0	142	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563)</b>									



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563) - continued</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	88.7	73.0	129	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.8	72.0	129	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	91.0	72.0	129	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	81.6	71.0	133	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	93.8	71.0	129	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	91.6	69.0	133	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	84.8	72.0	134	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.0	65.0	144	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	75.1	71.0	132	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2786563)</b>									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.2	67.0	137	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	90.8	70.0	130	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.0	70.0	130	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	97.8	70.0	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	87.9	70.0	130	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	99.6	65.0	136	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	88.8	61.0	135	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2786563)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	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	83.4	67.0	140	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	98.8	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	110	70.0	130	

### 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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780396)</b>							
ES1940975-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780398)</b>							
ES1942356-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0	130
<b>ED045G: Chloride by Discrete Analyser (QCLot: 2780397)</b>							
ES1940975-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70.0	130
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500)</b>							
ES1941796-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	109	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	95.2	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	100	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	104	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.3	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	94.0	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	91.3	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	83.2	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	83.2	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	100	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	93.3	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	102	70.0	130
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 2777499)</b>							
ES1941796-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	78.1	70.0	130
<b>EK040P: Fluoride by PC Titrator (QCLot: 2773601)</b>							
ES1941481-029	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.8	70.0	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2776755)</b>							
ES1941879-001	BH-1	EP080: C6 - C9 Fraction	----	325 µg/L	92.7	70.0	130
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2776755)</b>							
ES1941879-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	96.2	70.0	130
<b>EP080: BTEXN (QCLot: 2776755)</b>							
ES1941879-001	BH-1	EP080: Benzene	71-43-2	25 µg/L	81.7	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	94.8	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	103	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	102	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	105	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70.0	130
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563)</b>							
EM1921659-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	79.2	50.0	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563) - continued</b>							
EM1921659-002	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	100	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	91.2	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	105	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	85.6	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.2	50.0	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563)</b>							
EM1921659-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	98.0	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	106	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	100	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	114	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	86.6	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	103	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	108	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	91.2	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	83.4	50.0	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	86.5	50.0	150		
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2786563)</b>							
EM1921659-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	94.3	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.6	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	85.9	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	105	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	105	50.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.4	50.0	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2786563)</b>							
EM1921659-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	95.2	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.6	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	89.2	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	109	50.0	130

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: <b>ES1941879</b>	Page	: 1 of 10
Client	: <b>KLEINFELDER AUSTRALIA PTY LTD</b>	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 17-Dec-2019
Site	: Williamtown SS	Issue Date	: 02-Jan-2020
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 11
Order number	: 20193820	No. of samples analysed	: 11

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.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

#### Outliers : Frequency of Quality Control Samples

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



### Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Matrix Spike (MS) Recoveries</b>							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1940975--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1942356--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	ES1940975--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

### Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
<b>EA005P: pH by PC Titrator</b>							
<b>Clear Plastic Bottle - Natural</b>							
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	----	----	----	18-Dec-2019	17-Dec-2019	1

### Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
<b>Laboratory Duplicates (DUP)</b>					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	10	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>					
Dissolved Metals by ICP-AES	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	10	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	
<b>EA005P: pH by PC Titrator</b>								
<b>Clear Plastic Bottle - Natural (EA005-P)</b> BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	18-Dec-2019	17-Dec-2019	*
<b>EA010P: Conductivity by PC Titrator</b>								
<b>Clear Plastic Bottle - Natural (EA010-P)</b> BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	18-Dec-2019	14-Jan-2020	✓
<b>EA065: Total Hardness as CaCO3</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)</b> BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	20-Dec-2019	14-Jan-2020	✓
<b>ED037P: Alkalinity by PC Titrator</b>								
<b>Clear Plastic Bottle - Natural (ED037-P)</b> BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	18-Dec-2019	31-Dec-2019	✓
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
<b>Clear Plastic Bottle - Natural (ED041G)</b> BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	21-Dec-2019	14-Jan-2020	✓
<b>ED045G: Chloride by Discrete Analyser</b>								
<b>Clear Plastic Bottle - Natural (ED045G)</b> BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	21-Dec-2019	14-Jan-2020	✓



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	
<b>ED093F: Dissolved Major Cations</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)</b> BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	20-Dec-2019	14-Jan-2020	✓
<b>EG005(ED093)F: Dissolved Metals by ICP-AES</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG005F)</b> BH-1, BH-4, BH-6, BH-8, BH-11, Trip Blank 10	BH-2, SW3, BH-7, MW239S, QW10 - Rinsate glove,	17-Dec-2019	----	----	----	20-Dec-2019	14-Jun-2020	✓
<b>EG020F: Dissolved Metals by ICP-MS</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)</b> BH-1, BH-4, BH-6, BH-8, BH-11, Trip Blank 10	BH-2, SW3, BH-7, MW239S, QW10 - Rinsate glove,	17-Dec-2019	----	----	----	20-Dec-2019	14-Jun-2020	✓
<b>EG035F: Dissolved Mercury by FIMS</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)</b> BH-1, BH-4, BH-6, BH-8, BH-11, Trip Blank 10	BH-2, SW3, BH-7, MW239S, QW10 - Rinsate glove,	17-Dec-2019	----	----	----	21-Dec-2019	14-Jan-2020	✓
<b>EK040P: Fluoride by PC Titrator</b>								
<b>Clear Plastic Bottle - Natural (EK040P)</b> BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	18-Dec-2019	14-Jan-2020	✓



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	
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>								
<b>Amber Glass Bottle - Unpreserved (EP071SG)</b>								
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10	17-Dec-2019	19-Dec-2019	24-Dec-2019	✓	23-Dec-2019	28-Jan-2020	✓
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>								
<b>Amber Glass Bottle - Unpreserved (EP071SG)</b>								
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10	17-Dec-2019	19-Dec-2019	24-Dec-2019	✓	23-Dec-2019	28-Jan-2020	✓
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10	17-Dec-2019	21-Dec-2019	31-Dec-2019	✓	21-Dec-2019	31-Dec-2019	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10	17-Dec-2019	21-Dec-2019	31-Dec-2019	✓	21-Dec-2019	31-Dec-2019	✓
<b>EP080: BTEXN</b>								
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10	17-Dec-2019	21-Dec-2019	31-Dec-2019	✓	21-Dec-2019	31-Dec-2019	✓
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
<b>HDPE (no PTFE) (EP231X)</b>								
BH-4, BH-7, QW10 - Rinsate glove,	BH-6, BH-8, Trip Blank 10	17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓



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
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>							
<b>HDPE (no PTFE) (EP231X)</b> BH-4, BH-7, QW10 - Rinsate glove, BH-6, BH-8, Trip Blank 10	17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓
<b>EP231C: Perfluoroalkyl Sulfonamides</b>							
<b>HDPE (no PTFE) (EP231X)</b> BH-4, BH-7, QW10 - Rinsate glove, BH-6, BH-8, Trip Blank 10	17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>							
<b>HDPE (no PTFE) (EP231X)</b> BH-4, BH-7, QW10 - Rinsate glove, BH-6, BH-8, Trip Blank 10	17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓
<b>EP231P: PFAS Sums</b>							
<b>HDPE (no PTFE) (EP231X)</b> BH-4, BH-7, QW10 - Rinsate glove, BH-6, BH-8, Trip Blank 10	17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓



## 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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	2	11	18.18	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	27	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	10	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
<b>Laboratory Control Samples (LCS)</b>							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	27	14.81	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Method Blanks (MB) - Continued</b>							
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	7.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	0	11	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	7.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	10	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
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO <sub>4</sub> <sup>2-</sup> by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO <sub>4</sub> . Dissolved sulfate is determined in a 0.45µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO <sub>4</sub> suspension is measured by a photometer and the SO <sub>4</sub> <sup>2-</sup> concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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 (2013) 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 (2013) Schedule B(3)  Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-AES	EG005F	WATER	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. The ICPAES technique ionises the 0.45µm filtered samples, emitting a characteristic spectrum which is compared against matrix matched standards. This method is compliant with NEPM (2013) 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.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl <sub>2</sub> )(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 <sub>2</sub> which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B 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 (2013) 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 - 3510B 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 (2013) 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 sparging.
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.

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek  
 PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676  
 QUOTE NO: ME/114/19

SAMPLER MOBILE: 0458 197 676  
 / EM2019ALLENVENG010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com  
 EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:  
 DATE TIME:

RECEIVED BY: *[Signature]*  
 DATE TIME: 17/12/19

RELINQUISHED BY:  
 DATE TIME:

RECEIVED BY:  
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days  
 Biohazard info:

LABORATORY USE ONLY (Circle)  
 Custody Seal Intact? Yes No N/A  
 Freeze / frozen ice bricks present upon receipt? Yes No N/A  
 Random Sample Temperature on Receipt: 2.6 °C  
 Other comments:

**SAMPLE DETAILS**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ANALYSIS REQUIRED				ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION		
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X							
002	BH-2		17/12/2019 12:09 PM	Water	ALS: 5 Non ALS: 0	No	X							
003	SW-1	Dry		Water	ALS: 0 Non ALS: 0	No	X							
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X							
005	SW-3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X							
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X							
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X							
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X							
009	SW-4	Dry		Water	ALS: 0 Non ALS: 0	No	X							



Environmental Division  
 Sydney  
 Work Order Reference  
**ES1941879**

Telephone : + 61-2-8794 8555

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:  
DATE TIME:

RECEIVED BY:  
DATE TIME: 17/12/19 1930

RELINQUISHED BY:  
DATE TIME:

RECEIVED BY:  
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A  
 Yes No N/A  
 26 C

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME/14/19 / EM2019ALLENVENG0010

**SAMPLE DETAILS**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ANALYSIS REQUIRED					ADDITIONAL INFORMATION		
010	MMW239S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X			
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X			
012	CW10	Rinsate glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X				
013	Trip Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X		X	X				

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:  
 DATE TIME: 17/12/19 19:30

RELINQUISHED BY:

RECEIVED BY:  
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Biohazard info:

Custom Seal intact?  Yes  No  N/A  
 Free ice/frozen ice bricks present upon receipt?  Yes  No  N/A

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME/14/19 / EM2019ALLENVENG010

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519076917	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051306	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719056628	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219051061	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076918	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051286	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719056832	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719056513	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076944	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056648	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00350719008145	Grey	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043098	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519076930	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028931	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028966	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056649	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00350719008135	Grey	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022939	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056683	Red	Yes	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

CONTACT PH: 0458 197 676

QUOTE NO: ME/14/19

SAMPLER MOBILE: 0458 197 676 / EM2019ALLENVENG0010

RELINQUISHED BY:

RECEIVED BY:  
 DATE TIME: 17/12/19 1930

RELINQUISHED BY:

RECEIVED BY:  
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice/frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A  
 Yes No N/A  
 2.56 °C

Item No	Sample Description	Volume	Barcode	Color	Preserved	Yes	No
006	BH-6 Clear Plastic Bottle - Natural	500 mL	00070519076919	Green	No		
007	BH-7 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056660	Red	Yes		
007	BH-7 Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No		
007	BH-7 Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No		
007	BH-7 Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No		
007	BH-7 Amber Glass Bottle - Unpreserved	100 mL	00400719051289	Orange	No		
007	BH-7 HDPE (no PTFE)	60 mL	00350719008431	Grey	No		
008	BH-8 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056601	Red	Yes		
008	BH-8 Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No		
008	BH-8 HDPE (no PTFE)	60 mL	00350719008291	Grey	No		
008	BH-8 Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No		
008	BH-8 Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No		
008	BH-8 Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No		
010	MW239S Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No		
010	MW239S Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No		
010	MW239S Amber VOC Vial - Sulfuric Acid	40 mL	00160719028948	Purple	No		
010	MW239S Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No		
010	MW239S Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056585	Red	Yes		
011	BH-11 Clear Plastic Bottle - Natural	500 mL	00070519076927	Green	No		
011	BH-11 Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No		
011	BH-11 Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No		
011	BH-11 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056632	Red	Yes		
011	BH-11 Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No		
012	QW10 Amber VOC Vial - Sulfuric Acid	40 mL	00160719028971	Purple	No		
012	QW10 HDPE (no PTFE)	60 mL	00350719008314	Grey	No		
012	QW10 Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No		
012	QW10 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056577	Red	Yes		

**CHAIN OF CUSTODY**

ALS COC#: 6900 AL3 Laboratory: ES Sydney

CLIENT: ALLENWENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:  
*So S. Jones*  
 DATE TIME: 17/12/19 1930

RELINQUISHED BY:

RECEIVED BY:  
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No  N/A  
 Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 28 °C  
 Other comments:

ALS ID	Material	Volume	ALS ID	Color	Seal Intact?	Free Ice?	Temp
013	Trip Blank 10	60 mL	00350719008097	Gray	No		
013	Trip Blank 10	60 mL	00120219056562	Red	Yes		
013	Trip Blank 10	40 mL	00160719064797	Purple	No		
013	Trip Blank 10	100 mL	00400219022908	Orange	No		

Total Bottle Count: ALS: 57, Non ALS: 0

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

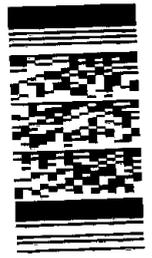
EMAIL INVOICES TO: dkousbroek@kleinfelder.com

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676  
 QUOTE NO: ME/14/19 / EM2019ALLENVENG0010

RELINQUISHED BY:	RECEIVED BY: <i>SS 19/12/19</i>	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19	DATE TIME:	DATE TIME:
TURNAROUND REQUIREMENTS: 5 Days	1930		

LABORATORY USE ONLY (Circle)  
 Custody Seal intact? Yes No N/A  
 Free Tie / frozen ice bricks present upon receipt? Yes No N/A  
 Random Sample Temperature on Receipt: 2.6 °C  
 Other comments:

SAMPLE DETAILS						ANALYSIS REQUIRED							
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Disolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
002	BH-2		17/12/2019 12:09 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
003	SW1	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
005	SW3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
009	SW4	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		



Environmental Division  
 Sydney  
 Work Order Reference  
**ES1941879**

Telephone : + 61-2-8794 8555

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:  
DATE TIME:

RECEIVED BY: *Scotty*  
DATE TIME: 17/12/19 19:30

RELINQUISHED BY:  
DATE TIME:

RECEIVED BY:  
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME/14/19 / EM/2019ALLENVENG0010

**LABORATORY USE ONLY (Circle)**

Custody Seal intact? Yes No N/A  
 Free ice / frozen ice bricks present upon receipt? Yes No N/A  
 Random Sample Temperature on Receipt: 25 °C  
 Other comments:

**SAMPLE DETAILS**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ANALYSIS REQUIRED				ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION	
010	MW239S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
012	QW10	Rinsate glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		
013	Trip Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toventon@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676  
 QUOTE NO: ME/14/19 / EM2019ALLENVENG0010

RELINQUISHED BY:  
 DATE TIME:

RECEIVED BY:  
 DATE TIME: 17/12/19 1930

RELINQUISHED BY:  
 DATE TIME:

RECEIVED BY:  
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Customer Seal intact? Yes No  N/A  
 Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C  
 Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519076817	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051306	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058628	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219051061	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076818	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051296	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058832	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058513	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076844	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219058648	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00350719008145	Grey	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043098	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519076830	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028831	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028866	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056649	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00350719008135	Grey	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022839	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056683	Red	Yes	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

CONTACT PH: 0458 197 676

QUOTE NO: ME/14/19

SAMPLER MOBILE: 0458 197 676 / EM2019ALLENVENG0010

RELINQUISHED BY:

RECEIVED BY:  
*[Signature]*

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME: 17/12/19 1930

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)  
Custody Seal intact?  Yes  No  
Free Ice/Frozen ice bricks present upon receipt?  Yes  No  
Random Sample Temperature on Receipt: 25.6 °C  
Other comments:

Yes No N/A

Item ID	Description	Volume	Barcode	Color	Seal Intact?	Temp on Receipt	Other Comments
006	BH-6 Clear Plastic Bottle - Natural	500 mL	00070519076919	Green	No		
007	BH-7 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056660	Red	Yes		
007	BH-7 Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No		
007	BH-7 Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No		
007	BH-7 Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No		
007	BH-7 Amber Glass Bottle - Unpreserved	100 mL	00400719051289	Orange	No		
007	BH-7 HDPE (no PTFE)	60 mL	00350719008431	Grey	No		
008	BH-8 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056601	Red	Yes		
008	BH-8 Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No		
008	BH-8 HDPE (no PTFE)	60 mL	00350719008291	Grey	No		
008	BH-8 Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No		
008	BH-8 Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No		
008	BH-8 Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No		
010	MW239S Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No		
010	MW239S Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No		
010	MW239S Amber VOC Vial - Sulfuric Acid	40 mL	00160719028848	Purple	No		
010	MW239S Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No		
010	MW239S Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056585	Red	Yes		
011	BH-1 Amber Glass Bottle - Natural	100 mL	00070519076927	Green	No		
011	BH-1 Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No		
011	BH-1 Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No		
011	BH-1 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056632	Red	Yes		
011	BH-1 Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No		
012	QW10 Amber VOC Vial - Sulfuric Acid	40 mL	00160719028971	Purple	No		
012	QW10 HDPE (no PTFE)	60 mL	00350719008314	Grey	No		
012	QW10 Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No		
012	QW10 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056577	Red	Yes		

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:  
 30/12/19  
 17/12/19

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME: 17/12/19 1930

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676  
 QUOTE NO: ME/14/19 / EM2019ALLENVENG0010

LABORATORY USE ONLY (Circle)

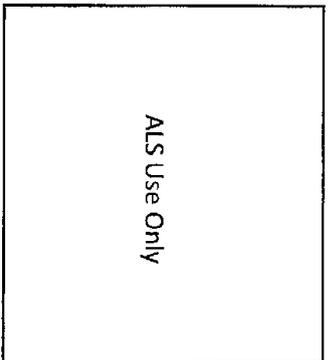
Custody Seal intact?  Yes  No  N/A  
 Free ice / frozen ice bricks present upon receipt?  Yes  No  N/A  
 Random Sample Temperature on Receipt: 28 °C  
 Other comments:

	HDPE (no PTFE)	60 mL	00350719008097	Grey	No	
013	Trip Blank 10	60 mL	00350719008097	Grey	No	
013	Trip Blank 10	60 mL	00120219056562	Red	Yes	
013	Trip Blank 10	40 mL	00160719064797	Purple	No	
013	Trip Blank 10	100 mL	00400219022908	Orange	No	

Total Bottle Count: ALS: 57, Non ALS: 0



**Custody Document for Submissions via ALS Compass App**



Project: WSS Client: Alienfelder Project Manager: Tom Overton

Phone:

ALS Compass COC Reference: 6900 # Samples: 13 Sampler: Daniel Housbroek

Phone:

(0458197676)

Turnaround Requirements: Standard  Urgent

Special Instructions:	ALS Use Only
	Custody seal intact? YES NO <input checked="" type="radio"/> N/A
	Freezer frozen ice bricks upon receipt? <input checked="" type="radio"/> YES NO N/A
	Random sample temperature on receipt? <u>2.5</u> °C

Custody:

Relinquished by: <u>Daniel Housbroek</u>	Received by: <u>AH</u>	Relinquished by:	Received by: <u>AJ</u>
Date / Time: <u>17/12/19 1535</u>	Date / Time: <u>17-12-19 3:37pm</u>	Date / Time:	Date / Time: <u>17.12.19 7:25pm</u>

**EMAILED**

LAB OF ORIGIN:  
NEWCASTLE

**CHAIN OF CUSTODY**  
 ALS COQC# 6900 ALS Laboratory: ES Sydney

CLIENT: ALLENWENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek  
 PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676  
 QUOTE NO: ME/114/19 / EM2019ALLENWENG010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com  
 EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:  
 DATE TIME:

RECEIVED BY: *SS*  
 DATE TIME: 17/12/19

RELINQUISHED BY:  
 DATE TIME:

RECEIVED BY:  
 DATE TIME:

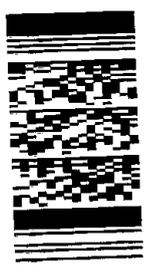
TURNAROUND REQUIREMENTS: 5 Days  
 Biohazard info:

LABORATORY USE ONLY (Circle)  
 Custody Seal Intact? Yes No N/A  
 Free Ice / frozen ice bricks present upon receipt? Yes No N/A  
 Random Sample Temperature on Receipt: 2.6 °C  
 Other comments:

**SAMPLE DETAILS**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ANALYSIS REQUIRED				ADDITIONAL INFORMATION			
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X							
002	BH-2		17/12/2019 12:09 PM	Water	ALS: 5 Non ALS: 0	No	X							
003	SW-1	Dry		Water	ALS: 0 Non ALS: 0	No	X							
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X							
005	SW-3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X							
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X							
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X							
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X							
009	SW-4	Dry		Water	ALS: 0 Non ALS: 0	No	X							

Environmental Division  
 Sydney  
 Work Order Reference  
**ES1941879**



Telephone : + 61-2-8794 8556

**CHAIN OF CUSTODY**  
 ALS COC#: 6900 ALS Laboratory: ES Sydney

CLIENT: ALLENWENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676  
 QUOTE NO: ME/14/19 / EM2019ALLENWENG0 010

RELINQUISHED BY:  
DATE TIME:

RECEIVED BY:  
DATE TIME: 7/12/19 1930

RELINQUISHED BY:  
DATE TIME:

RECEIVED BY:  
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days  
 Biohazard info:

LABORATORY USE ONLY (Circle)  
 Custody Seal intact? Yes No  N/A  
 Free ice / frozen ice bricks present upon receipt? Yes No N/A  
 Random Sample Temperature on Receipt: 2.5 °C  
 Other comments:

**SAMPLE DETAILS**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ANALYSIS REQUIRED				ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION	
010	MW239S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
012	GW10	Rinsate glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		
013	Trip Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:  
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

RECEIVED BY:  
 DATE TIME: 17/12/19 1930

RELINQUISHED BY:  
 DATE TIME:

RECEIVED BY:  
 DATE TIME:

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676  
 QUOTE NO: ME/114/19 / EM2019ALLENVENG010

LABORATORY USE ONLY (Circle)  
 Custody Seal intact?  Yes  No  N/A  
 Free (ice) frozen ice bricks present upon receipt?  Yes  No  N/A  
 Random Sample Temperature on Receipt: 2.6 °C  
 Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519076917	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051306	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058828	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219051061	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076918	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051296	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058832	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058513	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076944	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056646	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00350719008145	Grey	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043098	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519076930	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028931	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028966	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056649	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00350719008135	Grey	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022939	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056683	Red	Yes	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:  
 20/12/19  
 17/12/19 1930

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676  
 QUOTE NO: ME/14/19 / EM2019ALLENVENG0010

LABORATORY USE ONLY (Circle)  
 Custody Seal intact? Yes No N/A  
 Free Ice / Frozen Ice bricks present upon receipt? Yes No N/A  
 Random Sample Temperature on Receipt: 25 C  
 Other comments:

Item No	Description	Volume	Barcode	Color	Seal Intact?	Temp on Receipt
006	BH-6 Clear Plastic Bottle - Natural	500 mL	00070519076919	Green	No	
007	BH-7 Clear Plastic Bottle - Nitric Acid, Filled	60 mL	00120219056660	Red	Yes	
007	BH-7 Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No	
007	BH-7 Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No	
007	BH-7 Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No	
007	BH-7 Amber Glass Bottle - Unpreserved	100 mL	00400719051289	Orange	No	
007	BH-7 HDPE (no PTFE)	60 mL	00350719008431	Grey	No	
008	BH-8 Clear Plastic Bottle - Nitric Acid, Filled	60 mL	00120219056601	Red	Yes	
008	BH-8 Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No	
008	BH-8 HDPE (no PTFE)	60 mL	00350719008291	Grey	No	
008	BH-8 Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No	
008	BH-8 Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No	
008	BH-8 Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No	
010	MW239S Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No	
010	MW239S Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No	
010	MW239S Amber VOC Vial - Sulfuric Acid	40 mL	00160719028948	Purple	No	
010	MW239S Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No	
010	MW239S Clear Plastic Bottle - Nitric Acid, Filled	60 mL	00120219056685	Red	Yes	
011	BH-11 Clear Plastic Bottle - Natural	500 mL	00070519076927	Green	No	
011	BH-11 Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No	
011	BH-11 Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No	
011	BH-11 Clear Plastic Bottle - Nitric Acid, Filled	60 mL	00120219056632	Red	Yes	
011	BH-11 Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No	
012	QW10 Amber VOC Vial - Sulfuric Acid	40 mL	00160719028971	Purple	No	
012	QW10 HDPE (no PTFE)	60 mL	00350719008314	Grey	No	
012	QW10 Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No	
012	QW10 Clear Plastic Bottle - Nitric Acid, Filled	60 mL	00120219056577	Red	Yes	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:  
*Sos*  
 DATE TIME: 17/12/19 1930

RELINQUISHED BY:

RECEIVED BY:  
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No  N/A

Yes No N/A

25°C

	HDPE (no PTFE)	60 mL	00350719008097	Grey	No	
013	Trip Blank 10					
013	Trip Blank 10	Clear Plastic Bottle - Nitric Acid: Filtered	00120219056562	Red	Yes	
013	Trip Blank 10	Amber VOC Vial - Sulfuric Acid	00160719064797	Purple	No	
013	Trip Blank 10	Amber Glass Bottle - Unpreserved	00400219022908	Orange	No	

Total Bottle Count: ALS: 57, Non ALS: 0



**Custody Document for Submissions via ALS Compass App**

ALS Use Only

Project: WSS Client: Alienfelder Project Manager: Tom Overton

Phone: \_\_\_\_\_

ALS Compass COC Reference: 6900 # Samples: 13 Sampler: Daniel Housbroek

Phone: (0458157876)

Turnaround Requirements: Standard  Urgent \_\_\_\_\_

Special Instructions:	ALS Use Only
	Custody seal intact? YES NO <input checked="" type="radio"/> N/A
	Freezer frozen ice bricks upon receipt? YES NO N/A
	Random sample temperature on receipt? 2.0 °C

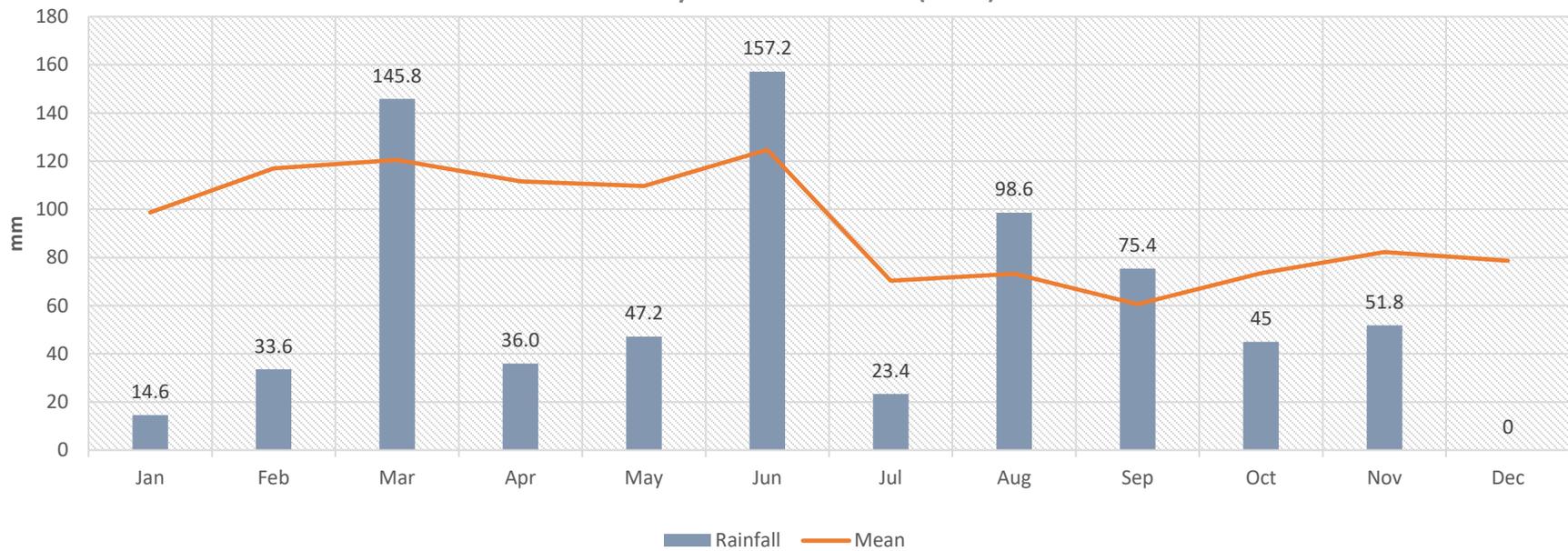
Custody:	Relinquished by:	Received by:	Relinquished by:	Received by:
	<u>Daniel Housbroek</u>	<u>AT</u>		<u>HS</u>
Date / Time:		Date / Time:	Date / Time:	Date / Time:
<u>17/12/19</u>	<u>1535</u>	<u>17.12.19</u>	<u>3:37pm</u>	<u>17.12.19</u>

**EMAILED**  
LAB OF ORIGIN:  
NEWCASTLE  
2:25pm

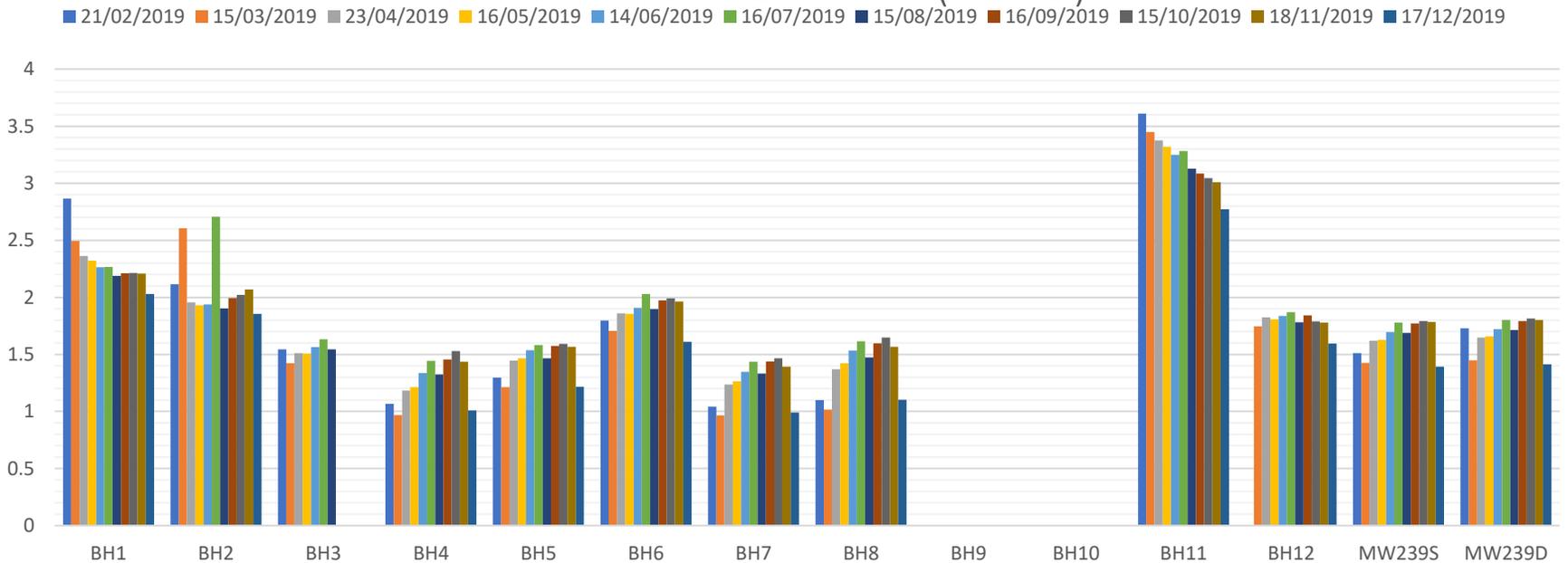
## **ATTACHMENT B: TREND DATA**

---

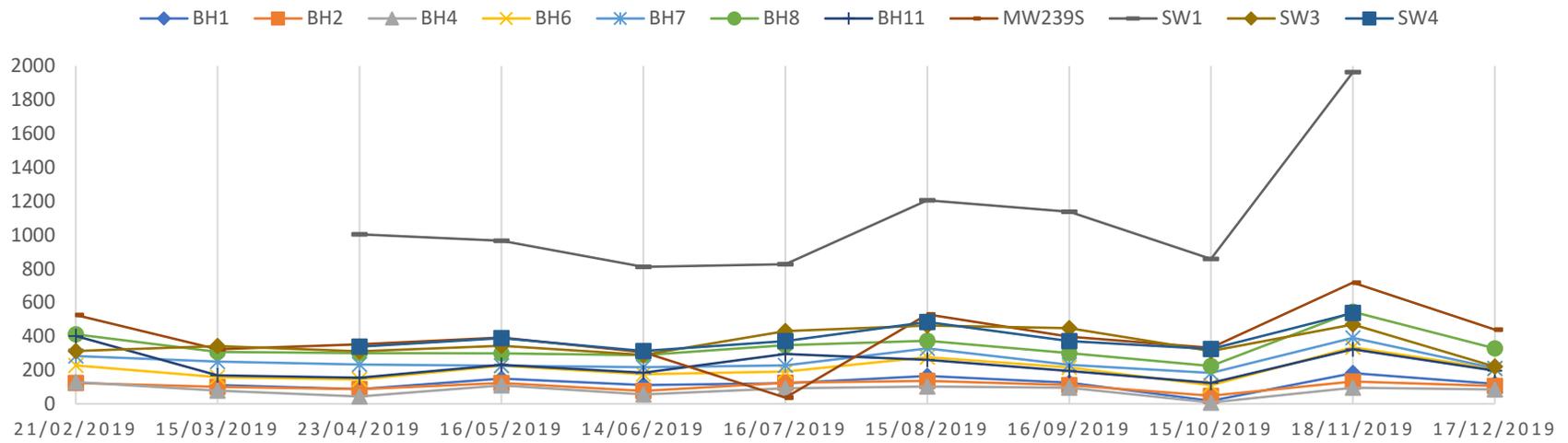
### Monthly Rainfall Totals (mm)



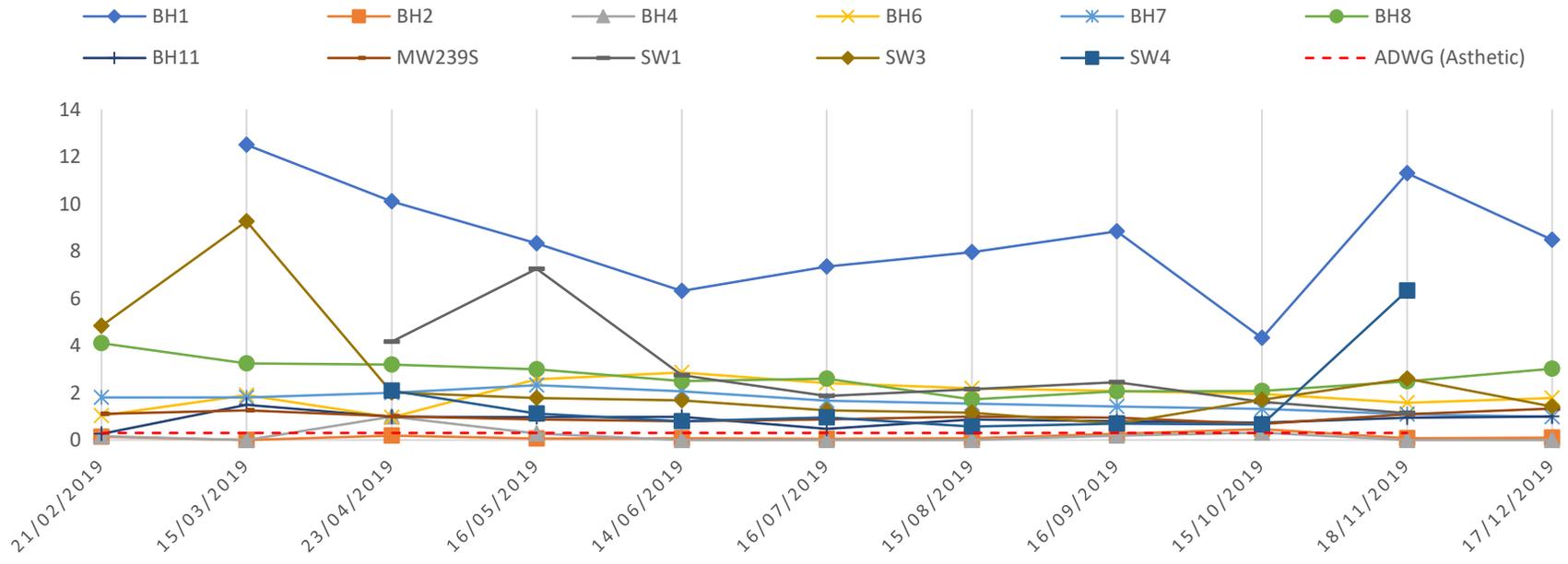
### Groundwater Elevation (mAHD)



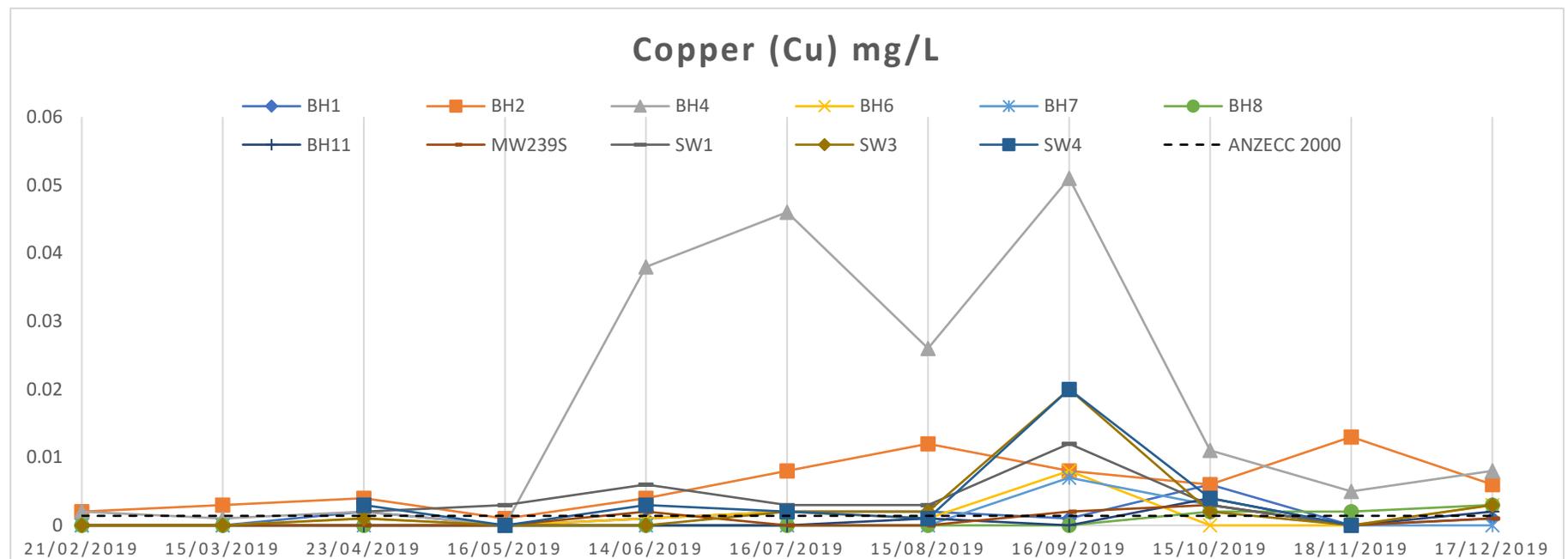
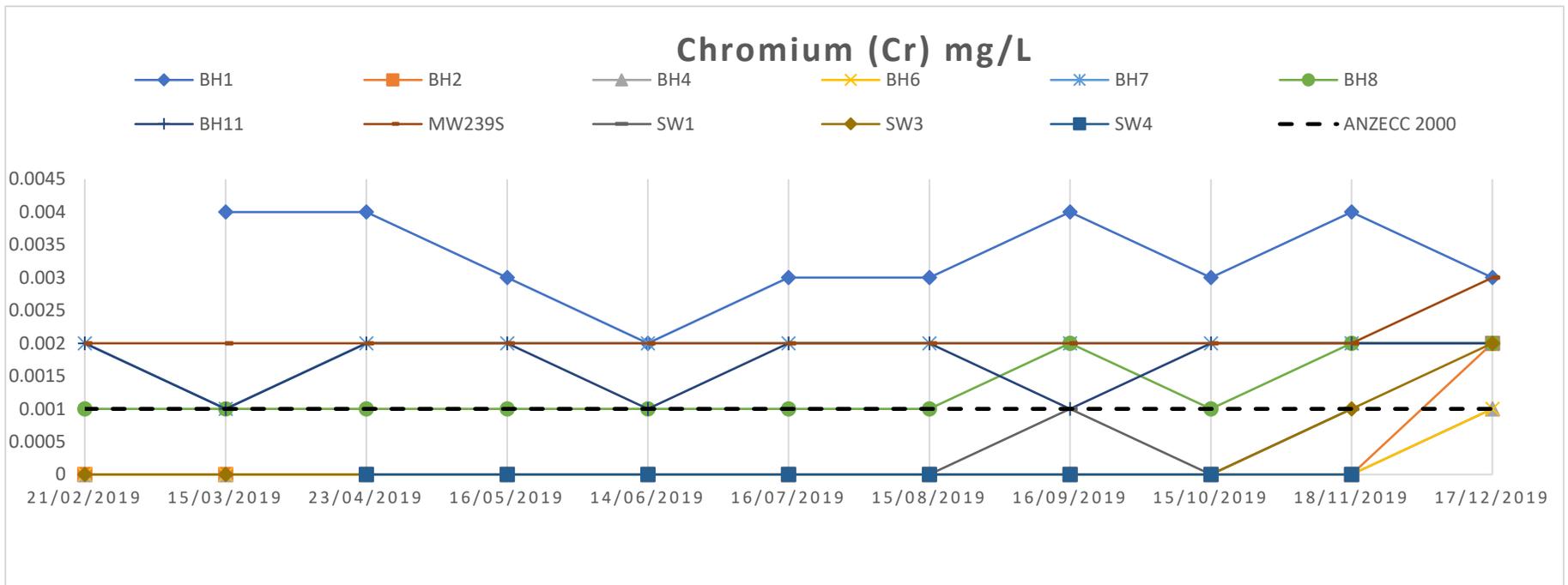
### Field EC ( $\mu\text{S}/\text{cm}$ )



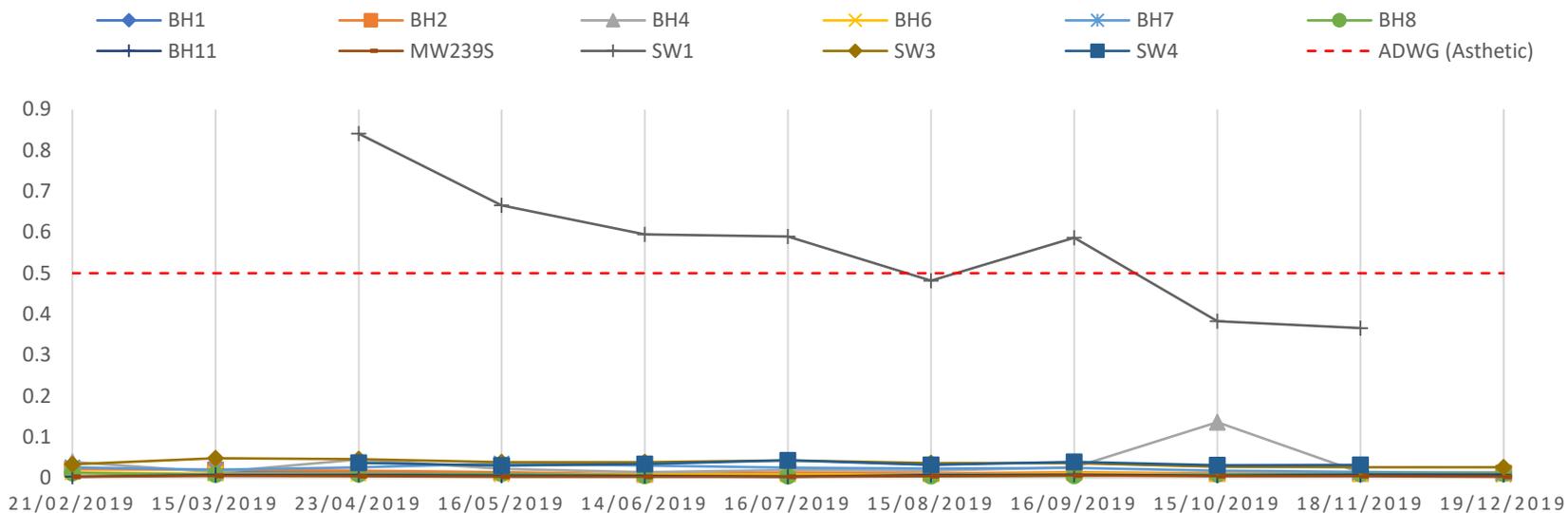
### Iron (Fe) mg/L



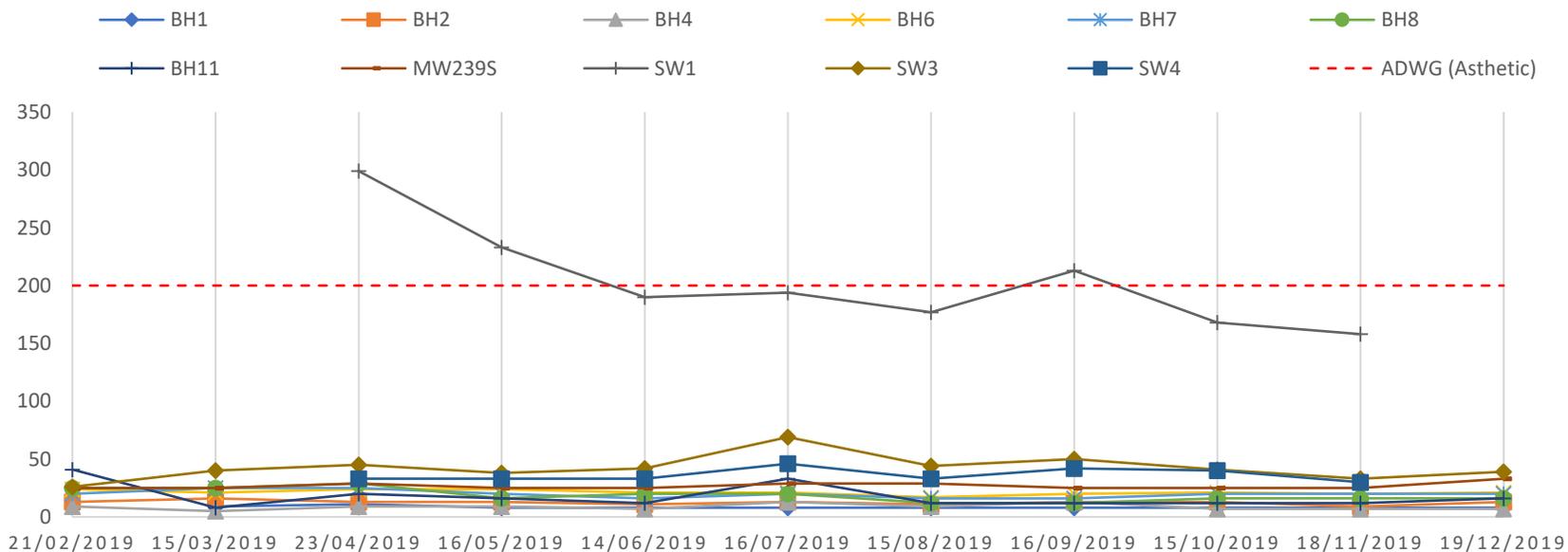




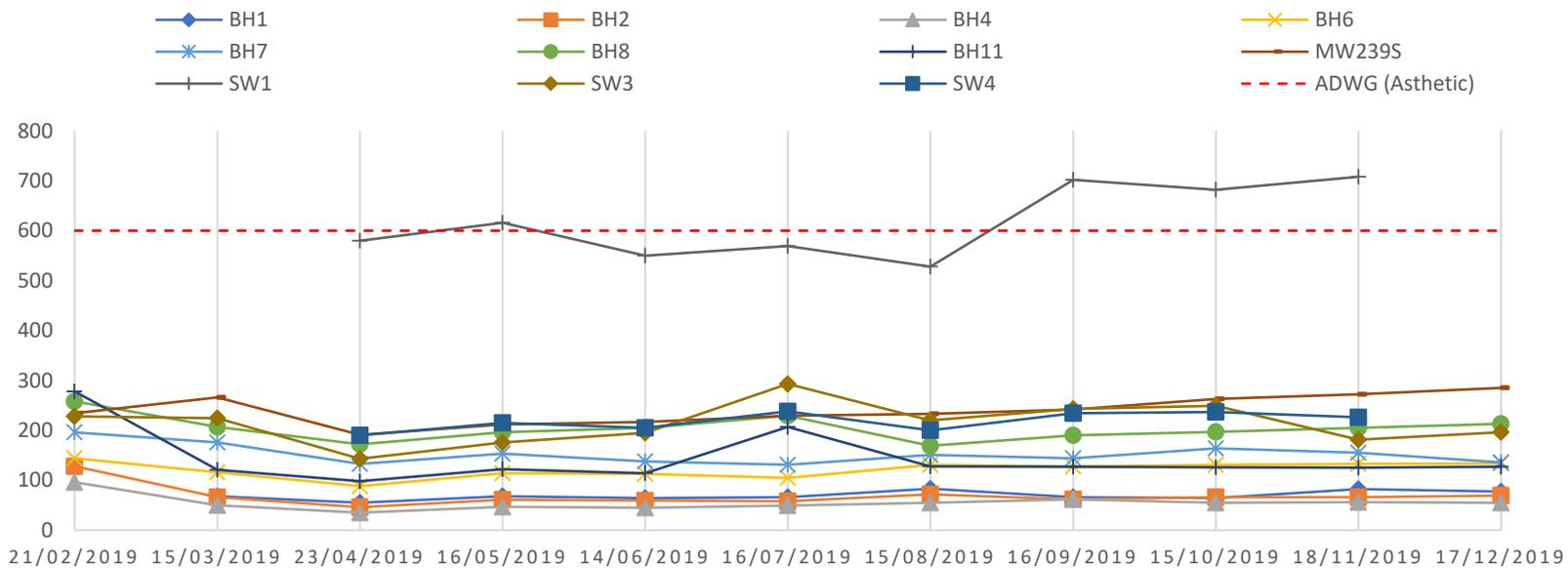
### Manganese (Mn) mg/L



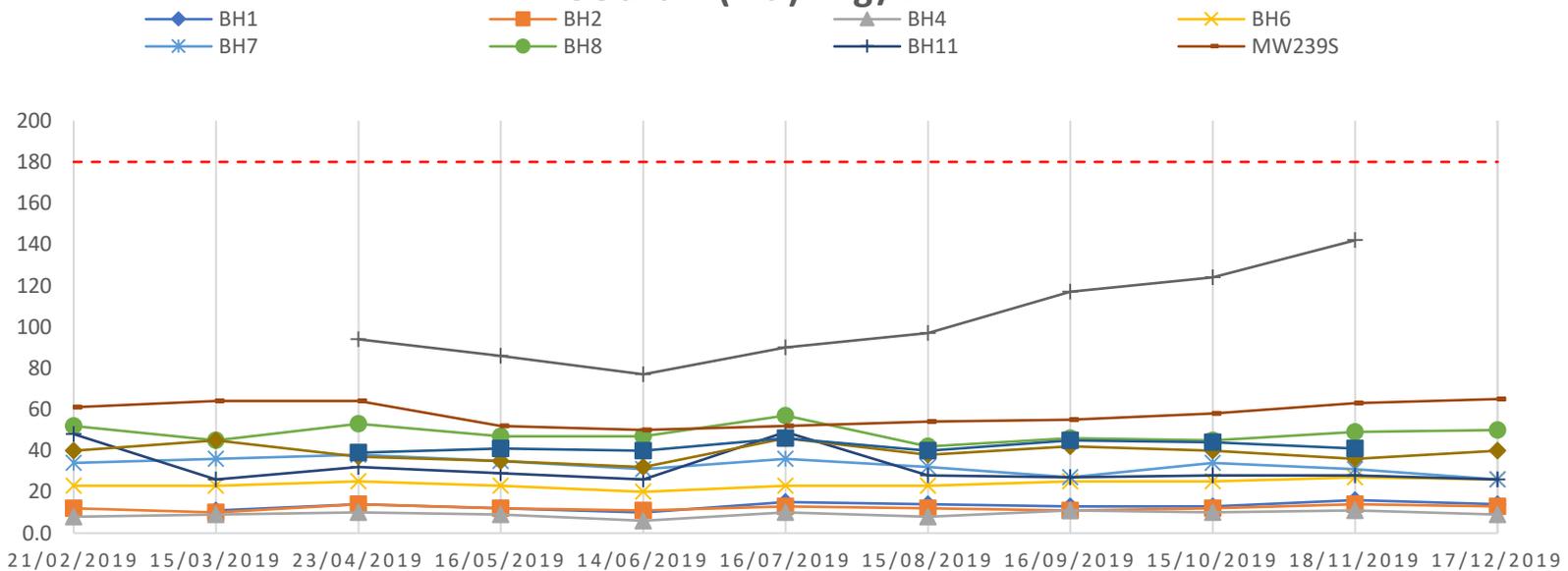
### Total Hardness (CaCO<sub>3</sub>) mg/L



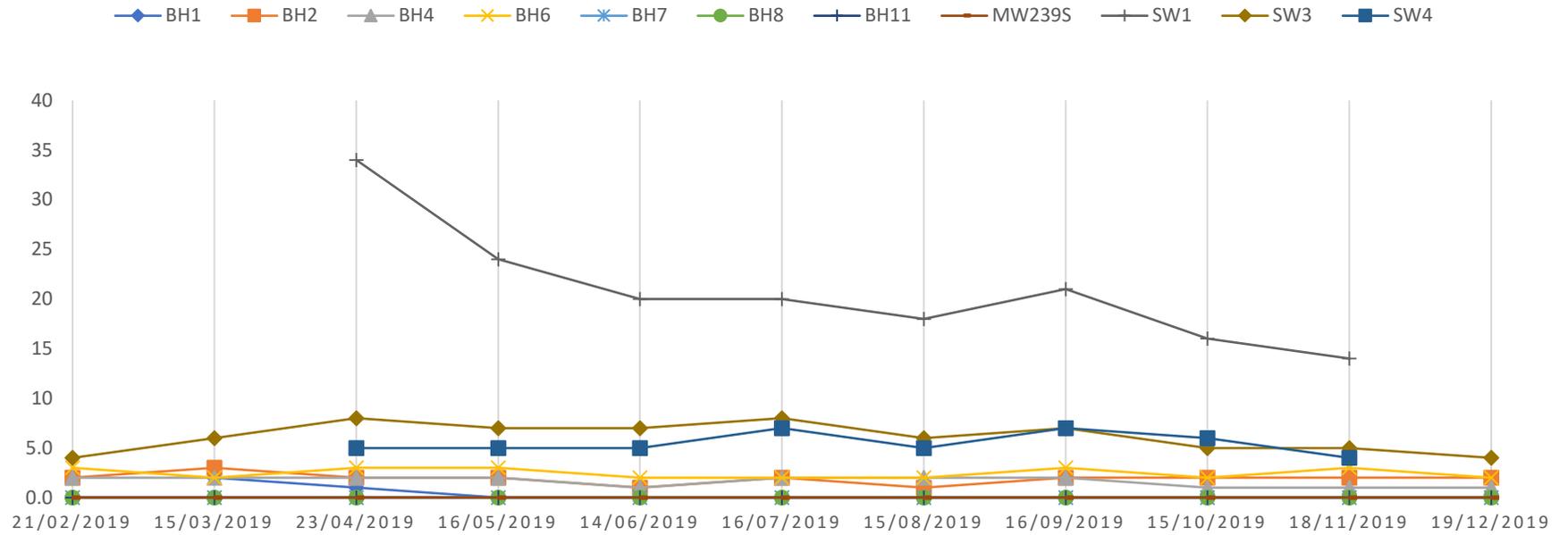
### Total Dissolved Solids (TDS) mg/L



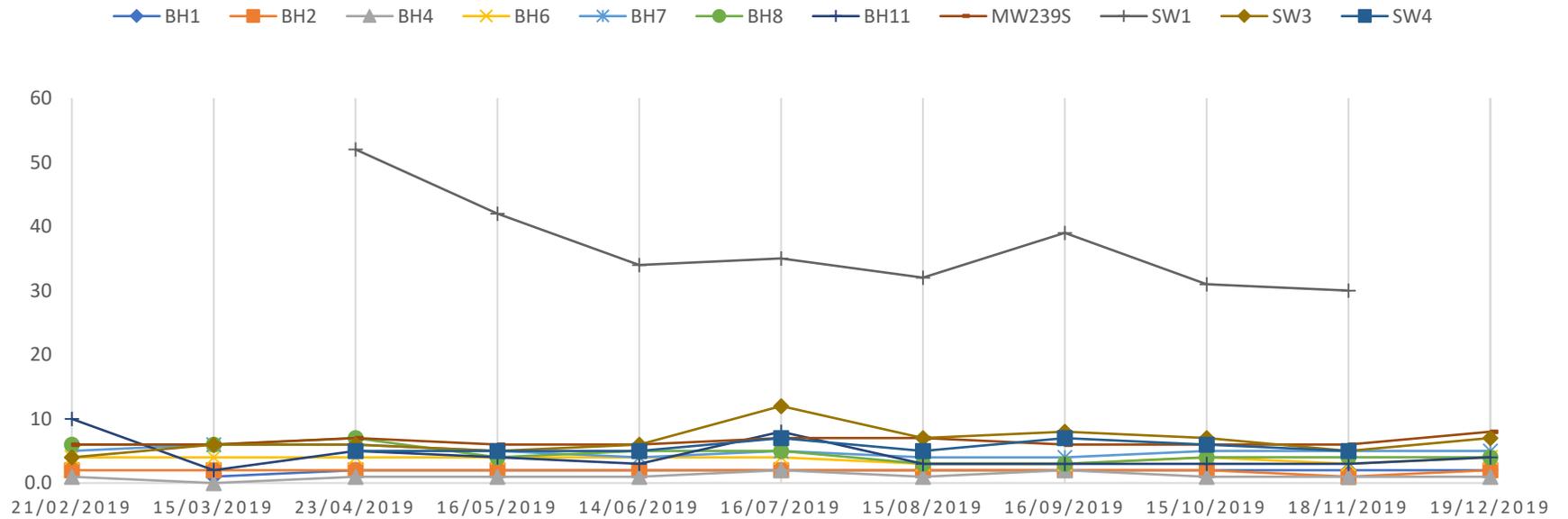
### Sodium (Na) mg/L



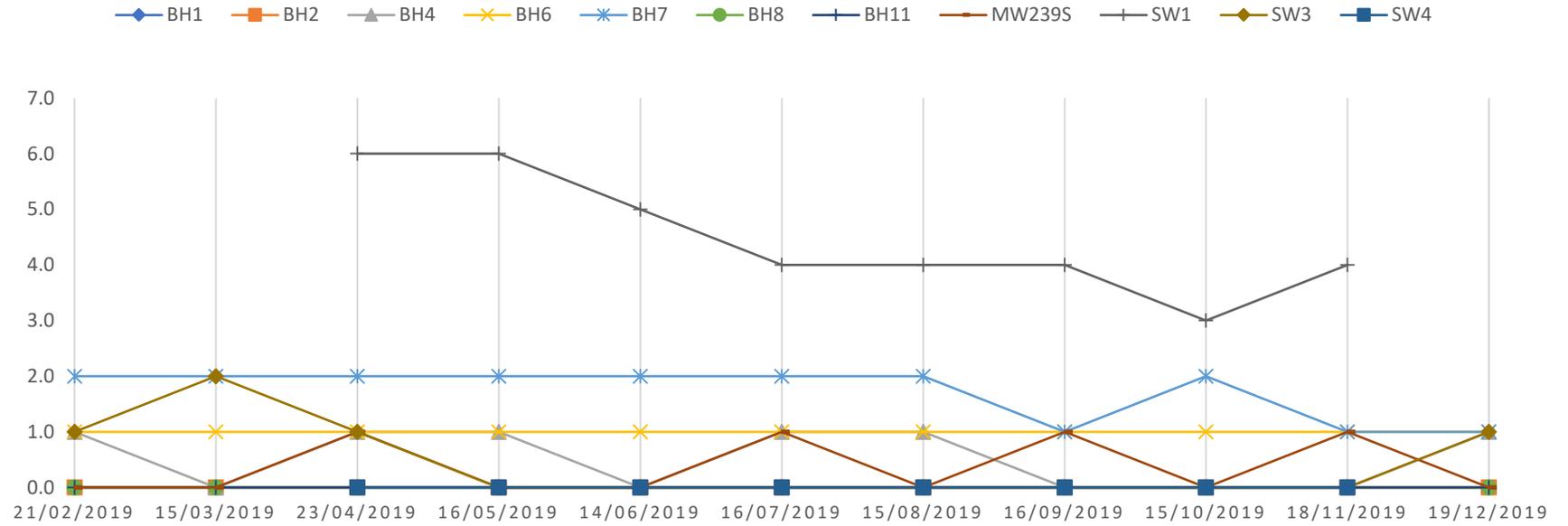
### Calcium(Ca) mg/L



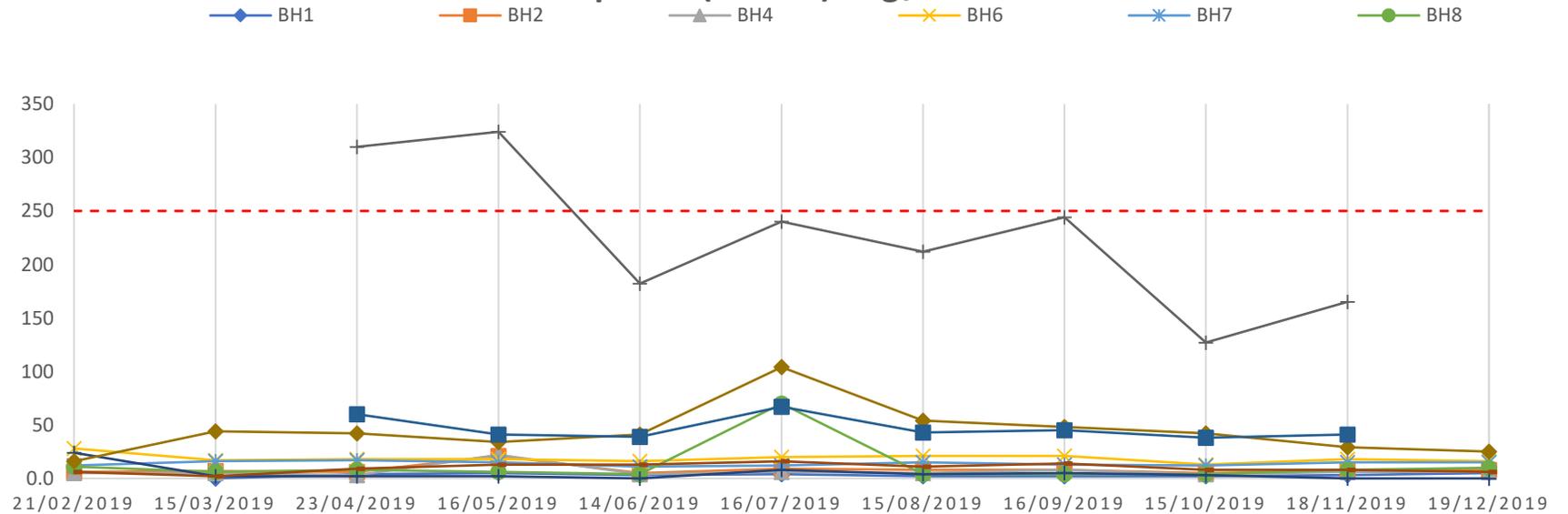
### Magnesium(Mg) mg/L



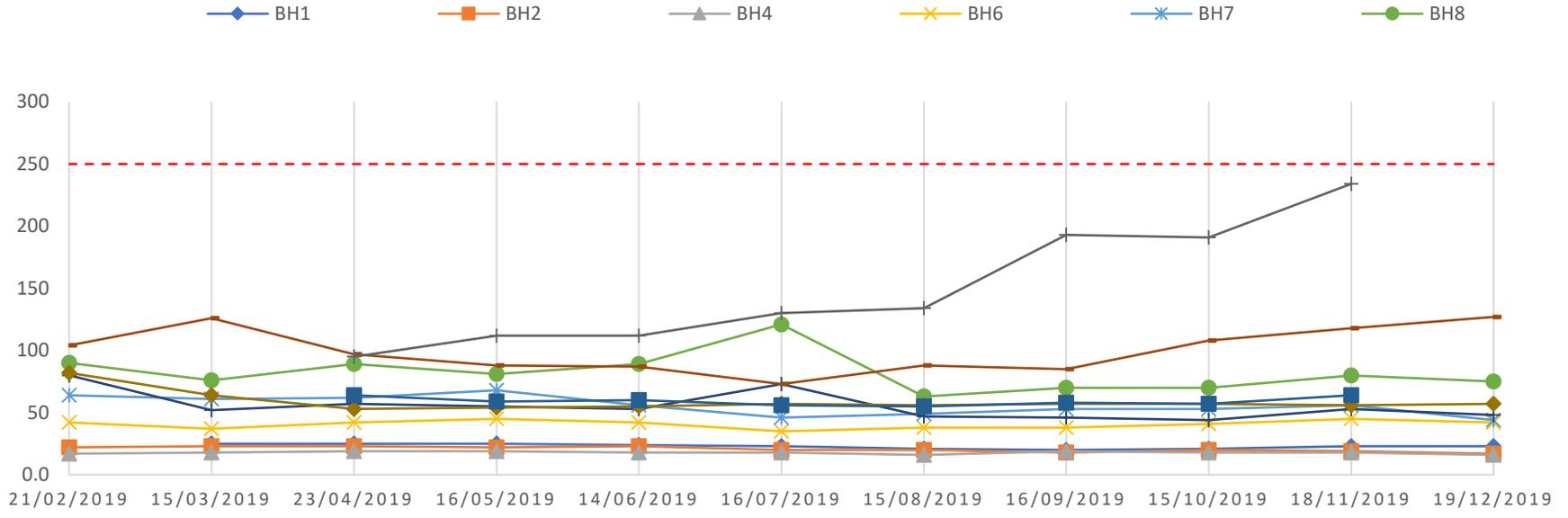
### Potassium(K) mg/L



### Sulphate(SO<sub>4</sub><sup>2-</sup>) mg/L



### Chloride (Cl) mg/L



### Fluoride (F<sup>-</sup>) mg/L

