

04 February 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 – January 2020 monitoring**

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the January 2020 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 January 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). All surface water locations at the time of the monitoring event were dry therefore no additional sampling and subsequent water quality analyses were conducted

## **2. SITE WORK**

The monthly monitoring round was conducted on 16 January 2020. 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 data 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 January 2020 monitoring round included:

- Gauging of all available monitoring wells (a total of 13 wells), note that BH3 is now 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 (All surface water monitoring points [SW1, SW2, SW3 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 Quarterly Water Quality Analysis**

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	8	0	0	0	0
Hydrocarbons**	8	0	0	1	1
Metals***	8	0	0	1	1
Iron (dissolved)	8	0	0	1	1
Total Dissolved Solids (TDS)	8	0	0	0	0
Total Suspended Solids (TSS)	8	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, Hardness & TDS (Calc')

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

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

### 3. SAMPLING RESULTS

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

**Table 3-2: Summary of gauging data**

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.701	1.939	8.28	Slight cloudy brown, no odour
BH2	7.79	6.153	1.637	9.03	Cloudy 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	2.252	0.808	6.11	Slight cloudy brown, no odour
BH5	7.36	6.315	1.045	8.8	No odour - No sample taken.
BH6	3.62	2.169	1.451	4.62	Brown, no odour
BH7	2.98	2.169	0.811	4.61	Light brown, slight sulfur odour.
BH8	3.88	2.969	0.911	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	3.962	2.668	5.39	Cloudy brown, sulfur odour
BH12	8.67	7.252	1.418	8.2	No sample taken.
MW239S	3.04	1.823	1.217	4.06	Dark brown, sulfur odour
MW239D	3.04	1.799	1.241	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	Location was dry.
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	1145	22.52	123	5.39	27.7
BH02	1130	24.49	94	4.84	186.5
BH04	1100	23.3	85	4.63	221
BH06	1320	24.62	190	4.39	92
BH07	1410	22.39	164	4.45	23.1
BH08	1440	21.99	284	4.08	45.6
BH11	1215	22.37	129	4.61	42
MW239S	1250	24.71	396	4.59	16.1

**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	8	13	67	No	Similar
	Sulphate	1	8	<1	15	No	Similar
	Chloride	1	8	17	120	No	Similar
	Fluoride	0.1	8	<0.1	0.2	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	8	12	33	No	Similar
	Total Dissolved Solids	1	8	55	275	No	Similar
	pH	0.01	8	5.02	6.23	All outside ANZECC 2000 Trigger range <sup>1</sup> and drinking water guidelines	Similar
Dissolved Metals	As	0.001	8	<0.001	<0.001	No	Similar
	B	0.05	8	<0.005	<0.005	No	Similar
	Ba	0.001	8	0.003	0.032	No	Similar
	Be	0.001	8	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	8	<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	8	<0.001	0.002	5 above ANZECC 2000 Trigger Values <sup>2</sup> (BH1, BH7, BH8, BH11 and MW239S)	Similar
	Co	0.001	8	<0.001	<0.001	No	Similar
	Cu	0.001	8	<0.001	0.006	3 above ANZECC 2000 Trigger Values <sup>2</sup> (BH1, BH2 and BH4)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	8	<0.05	4.43	7 above NHMRC ADWG 6 aesthetics (BH1, BH2, BH6, BH7, BH8, BH11 and MW239S)	Similar
	Mn	0.001	8	0.004	0.014	No	Similar
	Ni	0.001	8	<0.001	0.003	No	Similar
	Pb	0.005-0.1	8	<0.001	<0.001	No	Similar
	Se	0.005-0.1	8	<0.01	<0.01	No	Similar
	V	0.005-0.1	8	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	8	<0.005	0.044	4 above ANZECC 2000 Trigger Values <sup>2</sup> (BH1, BH2, BH4 and BH8)	Slight increase in concentrations at most locations.
	Hg	0.0001	8	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C <sub>6</sub> -C <sub>10</sub>	0.02	8	<0.02	<0.02	No	Similar
	>C <sub>10</sub> -C <sub>16</sub>	0.1	8	<0.1	<0.1	No	Similar
	>C <sub>16</sub> -C <sub>34</sub>	0.1	8	<0.1	<0.1	No	Similar
	>C <sub>34</sub> -C <sub>40</sub>	0.1	8	<0.1	<0.1	No	Similar
	Total >C <sub>10</sub> -C <sub>40</sub>	0.1	8	<0.1	<0.1	No	Similar
	C <sub>6</sub> -C <sub>10</sub> minus BTEX (F1)	0.02	8	<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	8	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	8	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Naphthalene	0.001	8	<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	<0.00001	No	No detection of PFOS/PFHxS in all samples taken
	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 the December/January period than the mean leading up to the January 2020 monitoring event. January 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 2019/20 Rainfall data**

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0	0	0	0
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0	0	0	0
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0	0	0	0
4th	0	0	0	0	20.8	0.4	5.2	0	0	0	17.6	0	0
5th	0	0	0	0	0.2	25	1.8	0.2	0	0	0.4	0	0
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8	0	0	0
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0	0	0	0
8th	0	0	0	0	0	0	1.6	0	0	0	0	0	0.2
9th	0	6.6	0	0	0	0	0.4	0	0	0.8	0	0	0.2
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4	0	0	0
11th	0	0	0	0	0.6	0	0	0	2.8	4	0	0	0.2
12th	3.0	0	0	0	0	0	0	0	0	23	0	0	1.4
13th	0	0	0	0	1.4	0	0	0	0	8.8	0	0	0.4
14th	0	0	0	0.2	0	0	0	0	0	0	0	0	0
15th	0	0	0	1.4	0	0	0	0	0	0	0	0	0
16th	0	0	4.8	3.6	0	0	0	0	0	0.2	0	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	0	
19th	0	0	2.2	0.2	0	0	0	0	7.2	0	0	0	
20th	2.4		0	2.0	0	0	0	0	0	0	0	0	
21st	1.0	1.4	0	0.2	0	0	0	0	0	0	0	0	
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0	0	0	0	
23rd	0	1.4	0	0	0	20	0	0		0	1	0.2	
24th	0	9.2	5.4	0	0	50.6	0	0	0	0	1.6	0.4	
25th	0	0	5.2	0	0	15.2	2.0	0	0	0	0	0	
26th	0	0	0	0	0	1.8	0	0	0	0	31.2	0.2	
27th	0	0	0	0	0	0.8	0	0	0	0	0	0	
28th	1.0	0	0	0	0.8	0	0	0	0	0	0	0	
29th	0		0	0	0	0	0	0	0	0	0	0	
30th	0		38.2	0	0	0	0.6	21.2	0	0	0	0	
31st	0		6.6		0		10	67.4				0	
<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>0.8</b>	<b>1.4</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>77.5</b>	<b>98.7</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**

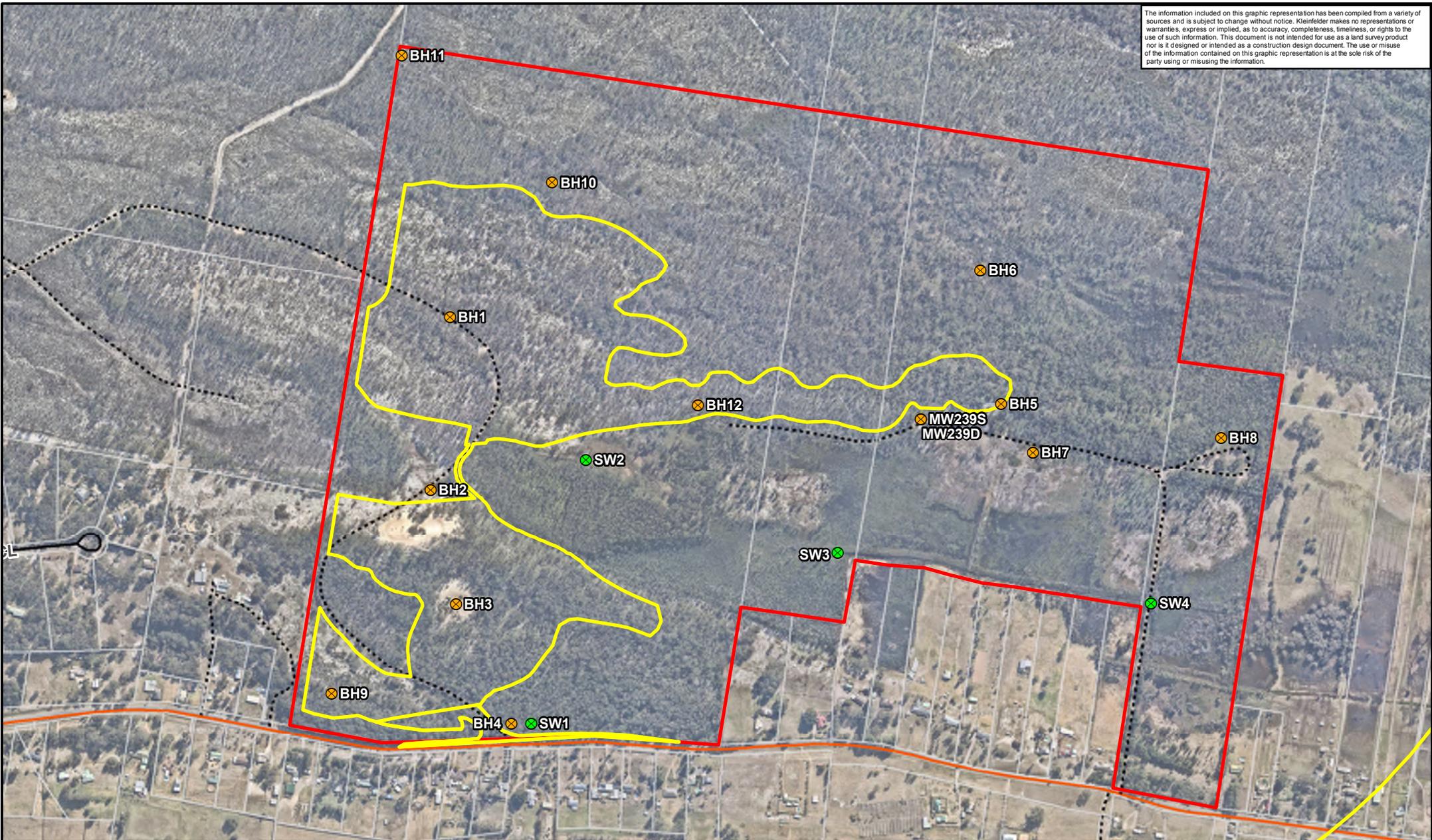
**Attachment A – Laboratory reports**

**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 locations January 2020 Monitoring

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	
LOR		0.01	
Units		µg/L	
NHMRC ADWG 6			
HEPA NEMP 2018***			
HEPA NEMP 2018 <sup>†</sup>			
Sample Name	Sample Date		
BH11	21-Feb-19	< 0.01	
BH2	22-Feb-19	< 0.01	
BH3	21-Feb-19	< 0.01	
BH4	21-Feb-19	< 0.01	
	15-Mar-19	< 0.01	
	23-Apr-19	< 0.01	
	16-May-19	< 0.01	
	14-Jun-19	< 0.01	
	16-Jul-19	< 0.01	
	15-Aug-19	< 0.01	
	16-Sep-19	<b>0.02</b>	
	25-Sep-19	<b>0.02</b>	
	15-Oct-19	< 0.01	
	18-Nov-19	< 0.01	
BH5	17-Dec-19	< 0.01	
	16-Jan-20	< 0.01	
	22-Feb-19	< 0.01	
	22-Feb-19	< 0.01	
	14-Mar-19	< 0.01	
	23-Apr-19	< 0.01	
	16-May-19	< 0.01	
	14-Jun-19	< 0.01	
	16-Jul-19	< 0.01	
	15-Aug-19	< 0.01	
	16-Sep-19	< 0.01	
BH6	15-Oct-19	< 0.01	
	18-Nov-19	< 0.01	
	17-Dec-19	<b>0.19</b>	
	16-Jan-20	< 0.01	
	22-Feb-19	< 0.01	
	14-Mar-19	< 0.01	
	23-Apr-19	< 0.01	
	16-May-19	< 0.01	
	14-Jun-19	< 0.01	
	16-Jul-19	< 0.01	
	15-Aug-19	< 0.01	
BH7	16-Sep-19	< 0.01	
	15-Oct-19	< 0.01	
	18-Nov-19	< 0.01	
	17-Dec-19	< 0.01	
	16-Jan-20	< 0.01	
	21-Feb-19	< 0.01	
	14-Mar-19	< 0.01	
	23-Apr-19	< 0.01	
	16-May-19	< 0.01	
	14-Jun-19	< 0.01	
	16-Jul-19	< 0.01	
BH8	15-Aug-19	< 0.01	
	16-Sep-19	< 0.01	
	15-Oct-19	< 0.01	
	18-Nov-19	< 0.01	
	17-Dec-19	< 0.01	
	16-Jan-20	< 0.01	
	MW239S	22-Feb-19	< 0.01
	SW1	16-May-19	< 0.01
		16-Sep-19	< 0.01
		18-Nov-19	< 0.01
	SW3	22-Feb-19	< 0.01
16-May-19		< 0.01	
16-Sep-19		< 0.01	
18-Nov-19		< 0.01	
SW4	16-May-19	< 0.01	
	16-Sep-19	<b>0.01</b>	
	25-Sep-19	<b>0.05</b>	
	18-Nov-19	< 0.01	

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



Table 4  
Groundwater Analytical Data - Inorganics  
Williamstown Sand Syndicate



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	
	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	0.01 pH units
-					200 <sup>3</sup>	125-2200	600 <sup>3</sup>		6.5 - 8.0*
-	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
-	22	<1	<1	22	12	112	72	-	6.23
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
-	2	<1	<1	2	12	168	109	-	5.09
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	13	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
-	6	<1	<1	6	13	102	66	-	5.61
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
-	4	<1	<1	4	13	85	55	-	5.5
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
-	7	<1	<1	7	24	218	142	-	5.51
3.16	<1.0	<1.0	<1.0	<1.0	20	213	196	-	4.76
-	<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	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
-	2.0	<1	<1	2.0	20	210	136	-	5.14
-	3	<1	<1	3	16	202	131	-	5.27

Table 4  
Groundwater Analytical Data - Inorganics  
Williamstown Sand Syndicate



Analyte	Anions and Cations																Total Cations	Total Anions	Ionic Balance	
	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					
LOR Units	1 mg/L	1 mg/L	1 mg/L	1 mg/L	1 mg/L	1 mg/L	0.1 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.1 mg/L	0.1 mg/L	0.01 meq/L	0.01 meq/L	%		
ANZECC 2000 Trigger Values	180 <sup>1</sup>				250 <sup>2</sup>	250 <sup>3</sup>	1.5	0.02*	0.025*	3	50		0.5 <sup>2</sup>	0.35*						
NHMRC ADWV 6																				
BHB	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		2.76	2.77	-	
	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	0.12	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	26	
	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	-	
	16-Jan-20	49	< 1	4	< 1	13	78	< 0.1	-	-	-	-	-	-	-		2.46	6.61	-	
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	1.43
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-		3.28	3.64	5.18	
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-		3.38	2.92	7.32	
	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	3.15	
	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	3.48
	17-Dec-19	65	< 1	8	< 1	6	127	< 0.1	-	-	-	-	-	-	-		3.48	3.75	3.62	
	16-Jan-20	67	< 1	8	< 1	7	120	< 0.1	-	-	-	-	-	-	-		3.57	3.57	0.03	
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-		10	9.13	5.6	
	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	5.13
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-		7.27	6.95	2.28	
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-		7.9	8.66	4.64	
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-		7.85	8.19	2.39	
	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	5.38
	15-Oct-19	124	16	31	3.0	127	191	0.6	-	-	-	-	-	-	-		8.82	8.03	4.68	
SW3	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	3.03
	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0		2.55	2.87	-
	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	0.1	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	5.38	
	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	13	
	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



Sodium Adsorption Ratio	Alkalinity				Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Inorganics		pH
	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3			Total Dissolved Solids	Total Dissolved Solids	
	1	1	1	1			1	10	
-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	0.01
						125-2200			pH units
					200 <sup>1</sup>		600 <sup>3</sup>		6.5 - 8.0*
4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
-	< 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
-	< 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
-	7	< 1	< 1	7	16	318	207	-	5.55
5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
-	< 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
-	< 1.0	< 1.0	< 1.0	< 1.0	25	404	263	-	4.86
5.38	< 1.0	< 1.0	< 1.0	< 1.0	25	419	272	-	4.76
-	2	< 1	< 1	2	33	439	285	-	5.01
-	2	< 1	< 1	2	33	423	275	-	5.02
-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42
-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	528	548	4.53
3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	702	689	4.32
-	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	-	5.32
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
-	< 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
-	< 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					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>	C <sub>10</sub> - C <sub>36</sub> sum	C <sub>10</sub> -C <sub>14</sub> - Silica Cleanup	C <sub>15</sub> -C <sub>28</sub> - Silica Cleanup
Sample Name	Sample Date	Sample Type	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	
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE01 21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH8 21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUPO1 21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	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	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP01 21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	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	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE02 140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH7 140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUPO2 140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 03	23-Apr-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 03	23-Apr-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK 04	16-May-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 04	16-May-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 05 14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW3 14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUPO5 14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	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	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP05 140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	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	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE06 16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-
TRIP BLANK 08 16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 08 16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW4 16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUPO8 16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	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	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP08 16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	200	400	200	800	< 50	< 100
Relative Percentage Difference			NC	NC	NC	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	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIPBLANK09 181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE09 181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW4 181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUPO9 181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	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	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP09 18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	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	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE10 171219	17-Dec-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK 13 2001333004	16-Jan-20	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 13 2001333004	16-Jan-20	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH6 2001333004	16-Jan-20	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
QW12 2001333012	16-Jan-20	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH6 2001333004	16-Jan-20	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
QW13 14392	16-Jan-20	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	250	300	100	650	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:  
 - - Not analysed  
 < - Less than laboratory limit of reporting  
 NC - Not calculated  
 µg/L - Micrograms per litre  
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 5  
Quality Control Sample Analysis - BTEXN  
Williamtown Sand Syndicate



bons - Silica Clean up		Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silica Clean up				
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	>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	>C <sub>34</sub> -C <sub>40</sub> - Silica Cleanup	>C <sub>10</sub> -C <sub>40</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
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	< 20	< 20	-	-	-	-	-	-	-	-	-
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	-	-	-	-	NC	NC	NC	NC	NC
-	-	< 20	< 20	-	-	-	-	-	-	-	-	-
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	< 20	< 20	-	-	-	-	-	-	-	-	-
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	< 20	< 20	< 100	< 100	< 100	< 100	-	-	-	-	-
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	180	180	400	100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	210	210	400	< 100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC



Table 7  
Quality Control Sample Analysis - PFAS  
Williamtown Sand Syndicate



Analyte			Perfluoroalkyl Sulfonic Acids									Perfluorooctanoic acid (PFOA)	
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)		Perfluoroheptanoic acid (PFHpA)
Units			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	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	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	< 0.02	< 0.02	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	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	< 0.02	< 0.02	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	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	< 0.02	< 0.02	< 0.01
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_03	23-Apr-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE_03	23-Apr-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK_04	16-May-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE_04	16-May-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
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	< 0.02	< 0.02	< 0.01
RINSATE_05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
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	< 0.02	< 0.02	< 0.01
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
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	< 0.02	< 0.02	< 0.01
RINSATE_08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC	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	< 0.02	< 0.02	< 0.01
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	100%	NC	NC	NC	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	< 0.02	< 0.02	< 0.01
RINSATE_09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	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	< 0.02	< 0.02	< 0.01
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	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	< 0.02	< 0.02	< 0.01
RINSATE10_171219	17-Dec-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK_13_2001333008	16-Jan-20	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE_13_2001333009	16-Jan-20	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH6_2001333004	16-Jan-20	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
QW12_2001333012	16-Jan-20	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH6_2001333004	16-Jan-20	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
QW13_14392	16-Jan-20	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

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





## **ATTACHMENT A: LABORATORY REPORTS**

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## CERTIFICATE OF ANALYSIS

<b>Work Order</b> : <b>ES2001333</b> <b>Amendment</b> : <b>1</b> <b>Client</b> : <b>KLEINFELDER AUSTRALIA PTY LTD</b> <b>Contact</b> : <b>DANIEL KOUSBROEK</b> <b>Address</b> : <b>95 MITCHELL ROAD</b> <b>CARDIFF NSW 2285</b> <b>Telephone</b> : <b>----</b> <b>Project</b> : <b>Williamtown SS</b> <b>Order number</b> : <b>20193820</b> <b>C-O-C number</b> : <b>7412</b> <b>Sampler</b> : <b>DANIEL KOUSBROEK</b> <b>Site</b> : <b>WSS</b> <b>Quote number</b> : <b>ME/114/19 ALS Compass</b> <b>No. of samples received</b> : <b>11</b> <b>No. of samples analysed</b> : <b>11</b>	<b>Page</b> : 1 of 17  <b>Laboratory</b> : Environmental Division Sydney <b>Contact</b> : Shirley LeCornu <b>Address</b> : 277-289 Woodpark Road Smithfield NSW Australia 2164  <b>Telephone</b> : +6138549 9630 <b>Date Samples Received</b> : 16-Jan-2020 19:36 <b>Date Analysis Commenced</b> : 17-Jan-2020 <b>Issue Date</b> : 29-Jan-2020 15:53
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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>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, 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.
- Amendment (29/01/2020): This report has been amended following changes to the analytical data reported. The quality system is being utilised to resolve this issue. The specific data affected include sample BH-4 and BH-11 TPH\_SG results.
- 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				16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11	
Compound	CAS Number	LOR	Unit	ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	6.23	5.61	5.50	5.51	5.27	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	112	102	85	218	202	
<b>EA016: Calculated TDS (from Electrical Conductivity)</b>									
Total Dissolved Solids (Calc.)	----	1	mg/L	73	66	55	142	131	
<b>EA065: Total Hardness as CaCO3</b>									
Total Hardness as CaCO3	----	1	mg/L	12	13	13	24	16	
<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	22	6	4	7	3	
Total Alkalinity as CaCO3	----	1	mg/L	22	6	4	7	3	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	6	6	15	13	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	25	17	18	50	46	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	<1	2	2	3	<1	
Magnesium	7439-95-4	1	mg/L	3	2	2	4	4	
Sodium	7440-23-5	1	mg/L	16	13	13	30	27	
Potassium	7440-09-7	1	mg/L	<1	<1	2	2	1	
<b>EG005(ED093)F: Dissolved Metals by ICP-AES</b>									
Iron	7439-89-6	0.05	mg/L	4.43	0.73	<0.05	2.15	0.93	
<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	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.003	0.004	0.014	0.032	0.010	
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	0.002	<0.001	<0.001	<0.001	0.002	
Copper	7440-50-8	0.001	mg/L	0.002	0.005	0.006	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.011	0.014	0.014	0.010	0.006	
Nickel	7440-02-0	0.001	mg/L	0.002	<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					16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit		ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
					Result	Result	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	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<b>0.044</b>	<b>0.010</b>	<b>0.009</b>	<0.005	<b>0.007</b>
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<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>0.2</b>	<b>0.2</b>
<b>EN055: Ionic Balance</b>									
∅ Total Anions	----	0.01	meq/L		<b>1.21</b>	<b>0.72</b>	<b>0.71</b>	<b>1.86</b>	<b>1.63</b>
∅ Total Cations	----	0.01	meq/L		<b>0.94</b>	<b>0.83</b>	<b>0.88</b>	<b>1.83</b>	<b>1.53</b>
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
<b>EP080: BTEXN</b>									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time					16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit	ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005	
				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					16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit	ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005	
				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	<0.05	<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	----	----	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	----	----	<0.05	<0.05	<0.05	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	----	----	<0.01	<0.01	<0.01	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	----	----	<0.01	<0.01	<0.01	
Sum of PFAS (WA DER List)	----	0.01	µg/L	----	----	<0.01	<0.01	<0.01	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	113	103	112	110	105	
Toluene-D8	2037-26-5	2	%	123	102	111	116	106	
4-Bromofluorobenzene	460-00-4	2	%	109	99.0	104	105	101	
<b>EP231S: PFAS Surrogate</b>									



**Analytical Results**

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

*Client sample ID*

				<b>BH-1</b>	<b>BH-2</b>	<b>BH-4</b>	<b>BH-6</b>	<b>BH-7</b>
<i>Client sampling date / time</i>				16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<b>ES2001333-001</b>	<b>ES2001333-002</b>	<b>ES2001333-003</b>	<b>ES2001333-004</b>	<b>ES2001333-005</b>
				Result	Result	Result	Result	Result
<b>EP231S: PFAS Surrogate - Continued</b>								
<b>13C4-PFOS</b>	----	0.02	%	----	----	<b>102</b>	<b>97.9</b>	<b>96.4</b>
<b>13C8-PFOA</b>	----	0.02	%	----	----	<b>101</b>	<b>104</b>	<b>93.4</b>



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
Client sampling date / time					16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit	ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----	----
				Result	Result	Result	Result	----	----
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	5.55	5.09	5.02	----	----	----
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	318	168	423	----	----	----
<b>EA016: Calculated TDS (from Electrical Conductivity)</b>									
Total Dissolved Solids (Calc.)	----	1	mg/L	207	109	275	----	----	----
<b>EA065: Total Hardness as CaCO3</b>									
Total Hardness as CaCO3	----	1	mg/L	16	12	33	----	----	----
<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	7	2	2	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	7	2	2	----	----	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	<1	7	----	----	----
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	78	46	120	----	----	----
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	<1	<1	<1	----	----	----
Magnesium	7439-95-4	1	mg/L	4	3	8	----	----	----
Sodium	7440-23-5	1	mg/L	49	25	67	----	----	----
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	2.94	1.08	1.31	2.18	----	----
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L	0.007	0.005	0.008	0.035	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.002	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L	0.011	0.007	0.004	0.009	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	0.003	0.002	0.001	----	----



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
Client sampling date / time					16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit		ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----
					Result	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	<0.001	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L		<b>0.011</b>	<b>0.005</b>	<b>0.007</b>	<0.005	----
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<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>2.61</b>	<b>1.34</b>	<b>3.57</b>	----	----
∅ Total Cations	----	0.01	meq/L		<b>2.46</b>	<b>1.33</b>	<b>3.57</b>	----	----
∅ Ionic Balance	----	0.01	%		----	----	<b>0.03</b>	----	----
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<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	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
<b>EP080: BTEXN</b>									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
Client sampling date / time					16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit		ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----
					Result	Result	Result	Result	----
<b>EP080: BTEXN - Continued</b>									
meta- & para-Xylene	108-38-3	106-42-3	2	µg/L	<2	<2	<2	<2	----
ortho-Xylene	95-47-6		2	µg/L	<2	<2	<2	<2	----
^ Total Xylenes		----	2	µg/L	<2	<2	<2	<2	----
^ Sum of BTEX		----	1	µg/L	<1	<1	<1	<1	----
Naphthalene	91-20-3		5	µg/L	<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	----
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	----
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>									



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
Client sampling date / time					16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit	ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----	----
				Result	Result	Result	Result	----	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</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	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	<0.01	----	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	<0.01	----	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	108	106	100	112	----	
Toluene-D8	2037-26-5	2	%	113	105	102	118	----	
4-Bromofluorobenzene	460-00-4	2	%	104	100	94.1	109	----	
<b>EP231S: PFAS Surrogate</b>									



**Analytical Results**

Sub-Matrix: GROUNDWATER  
 (Matrix: WATER)

				Client sample ID	BH-8	BH-11	MW239S	QW12	----
				Client sampling date / time	16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit		ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----
				Result	Result	Result	Result	Result	----
<b>EP231S: PFAS Surrogate - Continued</b>									
13C4-PFOS	----	0.02	%		100	----	----	98.9	----
13C8-PFOA	----	0.02	%		96.4	----	----	98.8	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip blank13	rinsate 13	----	----	----
Client sampling date / time				16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----	
Compound	CAS Number	LOR	Unit	ES2001333-008	ES2001333-009	-----	-----	-----	
				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	Trip blank13	rinsate 13	----	----	----
Client sampling date / time				16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----	
Compound	CAS Number	LOR	Unit	ES2001333-008	ES2001333-009	-----	-----	-----	
				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	Trip blank13	rinsate 13	----	----	----
Client sampling date / time				16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----	
Compound	CAS Number	LOR	Unit	ES2001333-008	ES2001333-009	-----	-----	-----	
				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	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----	



### Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip blank13	rinsate 13	----	----	----
Client sampling date / time				16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----	
Compound	CAS Number	LOR	Unit	ES2001333-008	ES2001333-009	-----	-----	-----	
				Result	Result	----	----	----	
<b>EP231P: PFAS Sums - Continued</b>									
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	101	98.3	----	----	----	
Toluene-D8	2037-26-5	2	%	96.5	94.0	----	----	----	
4-Bromofluorobenzene	460-00-4	2	%	95.4	92.0	----	----	----	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	93.8	101	----	----	----	
13C8-PFOA	----	0.02	%	94.0	98.2	----	----	----	



### 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>: ES2001333</b>	<b>Page</b>	: 1 of 12
<b>Amendment</b>	<b>: 1</b>		
<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 ROAD CARDIFF NSW 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>	: 16-Jan-2020
<b>Order number</b>	: 20193820	<b>Date Analysis Commenced</b>	: 17-Jan-2020
<b>C-O-C number</b>	: 7412	<b>Issue Date</b>	: 29-Jan-2020
<b>Sampler</b>	: DANIEL KOUSBROEK		
<b>Site</b>	: WSS		
<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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, 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: 2816943)</b>									
ES2001333-001	BH-1	EG005F: Iron	7439-89-6	0.05	mg/L	4.43	4.47	0.743	0% - 20%
ES2001333-004	BH-6	EG005F: Iron	7439-89-6	0.05	mg/L	2.15	2.13	1.15	0% - 20%
<b>EA005P: pH by PC Titrator (QC Lot: 2815284)</b>									
ES2001190-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.70	7.98	3.57	0% - 20%
ES2001333-006	BH-8	EA005-P: pH Value	----	0.01	pH Unit	5.55	5.10	8.45	0% - 20%
<b>EA010P: Conductivity by PC Titrator (QC Lot: 2815283)</b>									
ES2001308-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6980	6950	0.446	0% - 20%
ES2001190-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4400	4380	0.480	0% - 20%
<b>EA010P: Conductivity by PC Titrator (QC Lot: 2815286)</b>									
ES2001333-006	BH-8	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	318	317	0.337	0% - 20%
ES2001388-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3230	3240	0.326	0% - 20%
<b>ED037P: Alkalinity by PC Titrator (QC Lot: 2815285)</b>									
ES2001309-006	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	226	230	1.41	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	226	230	1.41	0% - 20%
ES2001308-003	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	691	670	3.06	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	691	670	3.06	0% - 20%
<b>ED037P: Alkalinity by PC Titrator (QC Lot: 2815288)</b>									
ES2001373-007	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	49	50	2.86	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>ED037P: Alkalinity by PC Titrator (QC Lot: 2815288) - continued</b>									
ES2001373-007	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	49	50	2.86	0% - 20%
ES2001333-006	BH-8	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	7	<1	150	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	7	<1	150	No Limit
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2816448)</b>									
ES2000539-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES2001308-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2320	2290	1.36	0% - 20%
<b>ED045G: Chloride by Discrete Analyser (QC Lot: 2816449)</b>									
ES2000539-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.00	No Limit
ES2001308-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1960	1980	1.04	0% - 20%
<b>ED093F: Dissolved Major Cations (QC Lot: 2816940)</b>									
ES2001309-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	133	132	0.787	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	294	295	0.340	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1200	1210	0.831	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	29	29	0.00	0% - 20%
ES2001333-004	BH-6	ED093F: Calcium	7440-70-2	1	mg/L	3	3	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	30	29	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
<b>EG020F: Dissolved Metals by ICP-MS (QC Lot: 2816942)</b>									
ES2001309-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	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	0.057	0.055	3.17	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	<0.001	<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	0.014	0.014	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.014	0.010	34.7	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.017	<0.005	111	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	3.45	3.70	7.06	0% - 20%
ES2001333-004	BH-6	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<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	0.032	0.032	0.00	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>EG020F: Dissolved Metals by ICP-MS (QC Lot: 2816942) - continued</b>										
ES2001333-004	BH-6	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	<0.001	<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	0.010	0.009	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	<0.005	<0.005	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	<0.05	0.00	No Limit	
<b>EG035F: Dissolved Mercury by FIMS (QC Lot: 2816941)</b>										
ES2001309-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit	
ES2001333-003	BH-4	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: 2815282)</b>										
ES2001094-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	<0.1	0.00	No Limit	
ES2001309-006	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.3	1.4	0.00	0% - 50%	
<b>EK040P: Fluoride by PC Titrator (QC Lot: 2815287)</b>										
ES2001373-007	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit	
ES2001333-006	BH-8	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: 2814107)</b>										
ES2001333-001	BH-1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit	
ES2001333-007	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: 2814107)</b>										
ES2001333-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
ES2001333-007	BH-11	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
<b>EP080: BTEXN (QC Lot: 2814107)</b>										
ES2001333-001	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	
ES2001333-007	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							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	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>EP080: BTEXN (QC Lot: 2814107) - continued</b>											
ES2001333-007	BH-11	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit		
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2813818)</b>											
EP2000293-004	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	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		
ES2001261-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.07	0.07	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	0.09	0.09	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		
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2813818)</b>											
EP2000293-004	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		
		ES2001261-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.00	No Limit
				EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.58	0.59	0.00	0% - 20%
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.02	µg/L	0.31	0.31	0.00	0% - 50%		
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.02	µg/L	0.09	0.08	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: 2813818)</b>											
EP2000293-004	Anonymous			EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	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: 2813818) - continued</b>									
EP2000293-004	Anonymous	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
ES2001261-001	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
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2813818)</b>									
EP2000293-004	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
ES2001261-001	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	0.27	0.30	7.72	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

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 Work Order : ES2001333 Amendment 1  
 Client : KLEINFELDER AUSTRALIA PTY LTD  
 Project : Williamtown SS



Sub-Matrix: **WATER**

				<i>Laboratory Duplicate (DUP) Report</i>					
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2813818) - continued</b>									
ES2001261-001	Anonymous	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: 2813818)</b>									
EP2000293-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.43	1.46	2.08	0% - 20%



## 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: 2816943)</b>									
EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	112	82.0	114	
<b>EA005P: pH by PC Titrator (QCLot: 2815284)</b>									
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.0	102	
				----	7 pH Unit	100	98.0	102	
<b>EA010P: Conductivity by PC Titrator (QCLot: 2815283)</b>									
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	97.7	95.0	113	
<b>EA010P: Conductivity by PC Titrator (QCLot: 2815286)</b>									
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	98.2	95.0	113	
<b>ED037P: Alkalinity by PC Titrator (QCLot: 2815285)</b>									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	88.1	81.0	111	
				----	50 mg/L	108	70.0	130	
<b>ED037P: Alkalinity by PC Titrator (QCLot: 2815288)</b>									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	81.7	81.0	111	
				----	50 mg/L	112	70.0	130	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2816448)</b>									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.2	82.0	122	
				<1	500 mg/L	91.3	82.0	122	
<b>ED045G: Chloride by Discrete Analyser (QCLot: 2816449)</b>									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.6	80.9	127	
				<1	1000 mg/L	109	80.9	127	
<b>ED093F: Dissolved Major Cations (QCLot: 2816940)</b>									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	111	80.0	114	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	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	98.5	85.0	113	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942)</b>									
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.2	85.0	114	
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.2	85.0	115	
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.7	82.0	110	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	88.0	84.0	110	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	85.0	111	
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.4	82.0	112	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	81.0	111	



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>EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942) - continued</b>									
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.4	83.0	111	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.1	82.0	110	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.0	82.0	112	
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.9	85.0	115	
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.0	83.0	109	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.0	81.0	117	
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.1	85.0	115	
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 2816941)</b>									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.2	83.0	105	
<b>EK040P: Fluoride by PC Titrator (QCLot: 2815282)</b>									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	116	82.0	116	
<b>EK040P: Fluoride by PC Titrator (QCLot: 2815287)</b>									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	92.0	82.0	116	
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2814393)</b>									
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	56.6	55.8	112	
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	102	71.6	113	
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	105	56.0	121	
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2814393)</b>									
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	82.8	57.9	119	
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	89.9	62.5	110	
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	70.5	61.5	121	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2814107)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	88.7	75.0	127	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2814107)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	87.7	75.0	127	
<b>EP080: BTEXN (QCLot: 2814107)</b>									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	101	70.0	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	99.5	69.0	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	100	70.0	120	
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	96.0	69.0	121	
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	96.8	72.0	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	102	70.0	120	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818)</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	90.6	71.0	127	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	82.0	68.0	131	



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>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818) - continued</b>									
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.4	69.0	134	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	93.6	65.0	140	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	88.4	53.0	142	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2813818)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.9	73.0	129	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	82.6	71.0	133	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	96.0	69.0	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.0	71.0	129	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	133	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	134	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.4	65.0	144	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	93.0	71.0	132	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2813818)</b>									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	98.8	67.0	137	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	89.4	70.0	130	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	93.8	70.0	130	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	94.0	70.0	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	97.6	70.0	130	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.4	65.0	136	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	98.0	61.0	135	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2813818)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.2	63.0	143	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	88.0	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	102	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	116	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**

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



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: 2816448)</b>								
ES2000539-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	116	70.0	130	
<b>ED045G: Chloride by Discrete Analyser (QCLot: 2816449)</b>								
ES2000539-003	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	106	70.0	130	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942)</b>								
ES2001309-004	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	105	70.0	130	
		EG020A-F: Beryllium	7440-41-7	1 mg/L	96.1	70.0	130	
		EG020A-F: Barium	7440-39-3	10 mg/L	110	70.0	130	
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.8	70.0	130	
		EG020A-F: Chromium	7440-47-3	1 mg/L	95.6	70.0	130	
		EG020A-F: Cobalt	7440-48-4	1 mg/L	102	70.0	130	
		EG020A-F: Copper	7440-50-8	1 mg/L	100.0	70.0	130	
		EG020A-F: Lead	7439-92-1	10 mg/L	100	70.0	130	
		EG020A-F: Manganese	7439-96-5	10 mg/L	97.4	70.0	130	
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.7	70.0	130	
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.1	70.0	130	
EG020A-F: Zinc	7440-66-6	1 mg/L	85.7	70.0	130			
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 2816941)</b>								
ES2001309-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	85.6	70.0	130	
<b>EK040P: Fluoride by PC Titrator (QCLot: 2815282)</b>								
ES2001094-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	97.6	70.0	130	
<b>EK040P: Fluoride by PC Titrator (QCLot: 2815287)</b>								
ES2001333-004	BH-6	EK040P: Fluoride	16984-48-8	5 mg/L	80.8	70.0	130	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2814107)</b>								
ES2001333-001	BH-1	EP080: C6 - C9 Fraction	----	325 µg/L	107	70.0	130	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2814107)</b>								
ES2001333-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	105	70.0	130	
<b>EP080: BTEXN (QCLot: 2814107)</b>								
ES2001333-001	BH-1	EP080: Benzene	71-43-2	25 µg/L	101	70.0	130	
		EP080: Toluene	108-88-3	25 µg/L	105	70.0	130	
		EP080: Ethylbenzene	100-41-4	25 µg/L	107	70.0	130	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	105	70.0	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	25 µg/L	104	70.0	130	
	EP080: Naphthalene	91-20-3	25 µg/L	97.4	70.0	130		
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818)</b>								
EP2000395-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	88.4	50.0	130	



Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818) - continued</b>							
EP2000395-001	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.2	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	94.4	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	99.4	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	102	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	98.0	50.0	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2813818)</b>							
EP2000395-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	101	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	111	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	107	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	91.0	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	111	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	104	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	109	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	112	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	112	50.0	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	104	50.0	150		
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2813818)</b>							
EP2000395-001	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	98.4	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	89.4	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	119	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	106	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	104	50.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	97.0	50.0	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2813818)</b>							
EP2000395-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	99.6	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.8	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	106	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	110	50.0	130

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

Work Order	: ES2001333	Page	: 1 of 10
Amendment	: 1		
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 16-Jan-2020
Site	: WSS	Issue Date	: 29-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.
- **NO** Matrix Spike outliers occur.
- 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 : 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-7, BH-11,	BH-2, BH-6, BH-8, MW239S	----	----	----	17-Jan-2020	16-Jan-2020	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	11	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	11	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	Sample Date	Extraction / Preparation			Analysis			
		Container / Client Sample ID(s)	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-7, BH-11,	16-Jan-2020	BH-2, BH-6, BH-8, MW239S	----	----	----	17-Jan-2020	16-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>EA010P: Conductivity by PC Titrator</b>							
<b>Clear Plastic Bottle - Natural (EA010-P)</b> BH-1, BH-4, BH-7, BH-11, BH-2, BH-6, BH-8, MW239S	16-Jan-2020	----	----	----	17-Jan-2020	13-Feb-2020	✓
<b>EA065: Total Hardness as CaCO3</b>							
<b>Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)</b> BH-1, BH-4, BH-7, BH-11, BH-2, BH-6, BH-8, MW239S	16-Jan-2020	----	----	----	21-Jan-2020	13-Feb-2020	✓
<b>ED037P: Alkalinity by PC Titrator</b>							
<b>Clear Plastic Bottle - Natural (ED037-P)</b> BH-1, BH-4, BH-7, BH-11, BH-2, BH-6, BH-8, MW239S	16-Jan-2020	----	----	----	17-Jan-2020	30-Jan-2020	✓
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>							
<b>Clear Plastic Bottle - Natural (ED041G)</b> BH-1, BH-4, BH-7, BH-11, BH-2, BH-6, BH-8, MW239S	16-Jan-2020	----	----	----	18-Jan-2020	13-Feb-2020	✓
<b>ED045G: Chloride by Discrete Analyser</b>							
<b>Clear Plastic Bottle - Natural (ED045G)</b> BH-1, BH-4, BH-7, BH-11, BH-2, BH-6, BH-8, MW239S	16-Jan-2020	----	----	----	18-Jan-2020	13-Feb-2020	✓
<b>ED093F: Dissolved Major Cations</b>							
<b>Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)</b> BH-1, BH-4, BH-7, BH-11, BH-2, BH-6, BH-8, MW239S	16-Jan-2020	----	----	----	21-Jan-2020	13-Feb-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>EG005(ED093)F: Dissolved Metals by ICP-AES</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG005F)</b> BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	----	----	----	20-Jan-2020	14-Jul-2020	✓
<b>EG020F: Dissolved Metals by ICP-MS</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)</b> BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	----	----	----	21-Jan-2020	14-Jul-2020	✓
<b>EG035F: Dissolved Mercury by FIMS</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)</b> BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	----	----	----	21-Jan-2020	13-Feb-2020	✓
<b>EK040P: Fluoride by PC Titrator</b>								
<b>Clear Plastic Bottle - Natural (EK040P)</b> BH-1, BH-4, BH-7, BH-11,	BH-2, BH-6, BH-8, MW239S	16-Jan-2020	----	----	----	17-Jan-2020	13-Feb-2020	✓
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>								
<b>Amber Glass Bottle - Unpreserved (EP071SG)</b> BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	17-Jan-2020	23-Jan-2020	✓	22-Jan-2020	26-Feb-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 Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>								
<b>Amber Glass Bottle - Unpreserved (EP071SG)</b>								
BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	17-Jan-2020	23-Jan-2020	✓	22-Jan-2020	26-Feb-2020	✓
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	21-Jan-2020	30-Jan-2020	✓	21-Jan-2020	30-Jan-2020	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	21-Jan-2020	30-Jan-2020	✓	21-Jan-2020	30-Jan-2020	✓
<b>EP080: BTEXN</b>								
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	21-Jan-2020	30-Jan-2020	✓	21-Jan-2020	30-Jan-2020	✓
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
<b>HDPE (no PTFE) (EP231X)</b>								
BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-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, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-2020	✓
<b>EP231C: Perfluoroalkyl Sulfonamides</b>								
<b>HDPE (no PTFE) (EP231X)</b> BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-2020	✓
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>								
<b>HDPE (no PTFE) (EP231X)</b> BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-2020	✓
<b>EP231P: PFAS Sums</b>								
<b>HDPE (no PTFE) (EP231X)</b> BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-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>Laboratory Duplicates (DUP)</b>							
Alkalinity by PC Titrator	ED037-P	4	40	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	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	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	4	40	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	13	15.38	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	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	11	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Alkalinity by PC Titrator	ED037-P	4	40	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	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	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	2	40	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	13	7.69	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	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	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	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	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	2	40	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	Reaular	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	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	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	20	5.00	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	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	11	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	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.



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

Environmental Division  
 Sydney  
 Work Order Reference  
**ES2001333**



Telephone : + 61-2-6784 9655

Project: WSS Client: Kleinfelder Project Manager: Tom Dutton

ALS Compass COC Reference: 7412 # Samples: 12 Sampler: Daniel Hoebroek

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

Turnaround Requirements: Standard 5 Days Urgent

Special Instructions:	Subport / Forward Lab / Split No	ALS Use Only
Lab / Analysis:	<u>EUROFINS</u>	Custody seal intact?
Organised By / Date:	<u>QW13</u>	Free <input checked="" type="checkbox"/> frozen ice bricks upon receipt?
Relinquished By / Date:		Random sample temperature on receipt? <u>-2.6 °C</u>
Comrole / Courier:		
W/O No:		

Custody:	Attached By PO / Internal Sheet:		
Relinquished by:	Received by:	Relinquished by:	Received by:
<u>D. Hoebroek</u>	<u>AE</u>		<u>ANDREW</u>
Date / Time: <u>16/1/20</u> <u>3:55</u>	Date / Time: <u>16/1/2020</u> <u>3:57pm</u>	Date / Time:	Date / Time: <u>16/1/2020</u> <u>7:30pm</u>

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

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: *JUSTIN*  
DATE TIME: 16/1/20 7:36pm

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: ME114/19 / 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: *6.4°C*  
 Other comments: *-2.6°C*

**SAMPLE DETAILS**

**ANALYSIS REQUIRED**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Disolved from 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/TEXX incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMA
001	BH-1		16/01/2020 11:49 AM	Water	ALS: 5 Non ALS: 0	No	X	X	X	X	X		
002	BH-2		16/01/2020 11:25 AM	Water	ALS: 5 Non ALS: 0	No	X	X	X	X	X		
003	BH-4		16/01/2020 11:01 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
004	BH-6		16/01/2020 01:23 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
005	BH-7		16/01/2020 02:11 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
006	BH-8		16/01/2020 02:33 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
007	BH-11		16/01/2020 12:16 PM	Water	ALS: 5 Non ALS: 0	No	X	X	X	X	X		
008	Top Blank 13		16/01/2020 02:49 PM	Water	ALS: 5 Non ALS: 0	No	X	X	X	X	X		
009	rinse 13		16/01/2020 02:52 PM	Water	ALS: 5 Non ALS: 0	No	X	X	X	X	X		

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

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EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

DATE TIME:

RECEIVED BY: JUSTIN  
 DATE TIME: 16/1/20

7:36pm

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: ME114/19 / 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: C

Other comments:

**SAMPLE DETAILS**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ANALYSIS REQUIRED				ADDITIONAL INFORMATION		
010	QW13	Please send to Eurofins as triplicate control	16/01/2020 01:20 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X			Sent to eurofins
011	MM239S		16/01/2020 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X			
012	QW12		16/01/2020 01:16 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X			

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

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:  
*SUSTIN*

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:  
 16/1/20

DATE TIME:

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: C

Other comments:

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 678

QUOTE NO: ME/14/19 / EM2019ALLENVENG010

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061199	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid: Filtered	80 mL	00120198038844	Red	Yes	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061212	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719020804	Orange	No	
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519029791	Green	No	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519078921	Green	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061202	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061144	Purple	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid: Filtered	80 mL	00120198038848	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719020798	Orange	No	
003	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519078939	Green	No	
003	BH-4	Clear Plastic Bottle - Nitric Acid: Filtered	80 mL	00120198038847	Red	Yes	
003	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061207	Purple	No	
003	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061222	Purple	No	
003	BH-4	HDPE (no PTFE)	80 mL	00350019045458	Grey	No	
003	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719020213	Orange	No	
004	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519028773	Green	No	
004	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400719020262	Orange	No	
004	BH-6	HDPE (no PTFE)	80 mL	00350019045554	Grey	No	
004	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061418	Purple	No	
004	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061312	Purple	No	
004	BH-6	Clear Plastic Bottle - Nitric Acid: Filtered	80 mL	00120198034289	Red	Yes	
005	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519029766	Green	No	
005	BH-7	Clear Plastic Bottle - Nitric Acid: Filtered	80 mL	00120198034285	Red	Yes	
005	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063033	Purple	No	
005	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063133	Purple	No	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

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:  
DATE TIME:  
TURNAROUND REQUIREMENTS: 5 Days  
Biohazard info:

RECEIVED BY: *SUSTIN*  
DATE TIME: 16/1/20 7:36 PM

RELINQUISHED BY:  
DATE TIME:

RECEIVED BY:  
DATE TIME:

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: C  
Other comments:

Item No	Description	Volume	Barcode	Color	Seal Intact?	Temp on Receipt?
005	BH-7 Amber Glass Bottle - Unpreserved	100 mL	00400719020175	Orange	No	
005	BH-7 HDPE (no PTFE)	60 mL	00350019045566	Grey	No	
006	BH-8 Clear Plastic Bottle - Natural	500 mL	00070519076941	Green	No	
006	BH-8 Amber Glass Bottle - Unpreserved	100 mL	00400719020136	Orange	No	
006	BH-8 HDPE (no PTFE)	60 mL	00350019045403	Grey	No	
006	BH-8 Amber VOC Vial - Sulfuric Acid	40 mL	00161019063008	Purple	No	
006	BH-8 Amber VOC Vial - Sulfuric Acid	40 mL	00161019063157	Purple	No	
006	BH-8 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034267	Red	Yes	
007	BH-11 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198038659	Red	Yes	
007	BH-11 Clear Plastic Bottle - Natural	500 mL	00070519029603	Green	No	
007	BH-11 Amber Glass Bottle - Unpreserved	100 mL	00400719020783	Orange	No	
007	BH-11 Amber VOC Vial - Sulfuric Acid	40 mL	00161019061180	Purple	No	
007	BH-11 Amber VOC Vial - Sulfuric Acid	40 mL	00161019061302	Purple	No	
008	Tip blank13 Amber Glass Bottle - Unpreserved	100 mL	00400719020196	Orange	No	
008	Tip blank13 Amber VOC Vial - Sulfuric Acid	40 mL	00161019063056	Purple	No	
008	Tip blank13 Amber VOC Vial - Sulfuric Acid	40 mL	00161019063184	Purple	No	
008	Tip blank13 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034279	Red	Yes	
008	Tip blank13 HDPE (no PTFE)	60 mL	00350019045430	Grey	No	
009	fnrsate 13 HDPE (no PTFE)	60 mL	00350019000564	Grey	No	
009	fnrsate 13 Amber Glass Bottle - Unpreserved	100 mL	00400719020821	Orange	No	
009	fnrsate 13 Amber VOC Vial - Sulfuric Acid	40 mL	00161019063165	Purple	No	
009	fnrsate 13 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034269	Red	Yes	
009	fnrsate 13 Amber VOC Vial - Sulfuric Acid	40 mL	00161019063205	Purple	No	
010	QW13 Amber Glass Bottle - Unpreserved	100 mL	00400719020273	Orange	No	
010	QW13 Amber VOC Vial - Sulfuric Acid	40 mL	00161019063142	Purple	No	
010	QW13 Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034150	Red	Yes	
010	QW13 Amber VOC Vial - Sulfuric Acid	40 mL	00161019061198	Purple	No	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

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EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY: JUSTIN

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME: 16/1/20

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free Ice / Frozen Ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 678

QUOTE NO: ME/14/19 / EM2019ALLENVENG010

ID	Container	Volume	Barcode	Color	Seal Intact?	Free Ice?	Temp (C)
010	HDPE (no PTFE)	60 mL	00350019045461	Grey	No		
011	Clear Plastic Bottle - Nitric Acid: Filtered	80 mL	00120198034271	Red	Yes		
011	Clear Plastic Bottle - Natural	500 mL	00070519076938	Green	No		
011	Amber Glass Bottle - Unpreserved	100 mL	00400719020023	Orange	No		
011	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061233	Purple	No		
011	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061297	Purple	No		
012	HDPE (no PTFE)	80 mL	00350019045327	Grey	No		
012	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120198034276	Red	Yes		
012	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061238	Purple	No		
012	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061225	Purple	No		
012	Amber Glass Bottle - Unpreserved	100 mL	00400719020245	Orange	No		

Total Bottle Count: ALS: 64, Non ALS: 0



# Environment Testing

## Australia

**Melbourne**  
 6 Monterey Road  
 Dandenong South VIC 3175  
 Phone : +61 3 8564 5000  
 NATA # 1261  
 Site # 1254 & 14271

**Sydney**  
 Unit F3, Building F  
 16 Mars Road  
 Lane Cove West NSW 2066  
 Phone : +61 2 9900 8400  
 NATA # 1261 Site # 18217

**Brisbane**  
 1/21 Smallwood Place  
 Murarrie QLD 4172  
 Phone : +61 7 3902 4600  
 NATA # 1261 Site # 20794

**Perth**  
 2/91 Leach Highway  
 Kewdale WA 6105  
 Phone : +61 8 9251 9600  
 NATA # 1261  
 Site # 23736

## New Zealand

**Auckland**  
 35 O'Rorke Road  
 Penrose, Auckland 1061  
 Phone : +64 9 526 45 51  
 IANZ # 1327

**Christchurch**  
 43 Detroit Drive  
 Rolleston, Christchurch 7675  
 Phone : 0800 856 450  
 IANZ # 1290

ABN – 50 005 085 521

web : www.eurofins.com.au

e.mail : EnviroSales@eurofins.com

**Company Name:** Kleinfelder Aust Pty Ltd (NEWCASTLE)  
**Address:** 95 Mitchell Rd  
 Cardiff  
 NSW 2285

**Project Name:** WILLIAMTOWN SS  
**Project ID:** 20193820

**Order No.:**  
**Report #:** 697336  
**Phone:** 02 4949 5200  
**Fax:**

**Received:** Jan 17, 2020 5:24 PM  
**Due:** Jan 24, 2020  
**Priority:** 5 Day  
**Contact Name:** Dan Kousbroek

**Eurofins Analytical Services Manager : Andrew Black**

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins   mgt Suite B1	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
<b>Melbourne Laboratory - NATA Site # 1254 &amp; 14271</b>										
<b>Sydney Laboratory - NATA Site # 18217</b>						X	X	X	X	
<b>Brisbane Laboratory - NATA Site # 20794</b>										X
<b>Perth Laboratory - NATA Site # 23736</b>										
<b>External Laboratory</b>										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	QW13	Jan 16, 2020		Water	S20-Ja14392	X	X	X	X	X
<b>Test Counts</b>						1	1	1	1	1

Kleinfelder Australia Pty Ltd (NEWC)  
95 Mitchell Rd  
Cardiff  
NSW 2285



NATA Accredited  
Accreditation Number 1261  
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing  
The results of the tests, calibrations and/or  
measurements included in this document are traceable  
to Australian/national standards.

Attention: **Dan Kousbroek**

Report **697336-W**  
Project name **WILLIAMTOWN SS**  
Project ID **20193820**  
Received Date **Jan 17, 2020**

Client Sample ID			<b>QW13</b>
Sample Matrix			<b>Water</b>
Eurofins Sample No.			<b>S20-Ja14392</b>
Date Sampled			<b>Jan 16, 2020</b>
Test/Reference	LOR	Unit	
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	0.25
TRH C15-C28	0.1	mg/L	0.3
TRH C29-C36	0.1	mg/L	0.1
TRH C10-C36 (Total)	0.1	mg/L	0.65
<b>BTEX</b>			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	89
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>			
Naphthalene <sup>N02</sup>	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	0.21
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	0.05	mg/L	0.21
TRH >C16-C34	0.1	mg/L	0.4
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.61
<b>TRH - 2013 NEPM Fractions (after silica gel clean-up)</b>			
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1
<b>TRH - 1999 NEPM Fractions (after silica gel clean-up)</b>			
TRH C10-C36 (Total) (after silica gel clean-up)	0.4	mg/L	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1
Chromium (hexavalent)	0.005	mg/L	< 0.005
Chromium (trivalent filtered)	0.005	mg/L	< 0.005

<b>Client Sample ID</b>			<b>QW13</b>
<b>Sample Matrix</b>			<b>Water</b>
<b>Eurofins Sample No.</b>			<b>S20-Ja14392</b>
<b>Date Sampled</b>			<b>Jan 16, 2020</b>
Test/Reference	LOR	Unit	
<b>Heavy Metals</b>			
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	0.03
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	0.004
Iron (filtered)	0.05	mg/L	1.6
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.009
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.012
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>			
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTTrDA) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	83
13C5-PFPeA (surr.)	1	%	97
13C5-PFHxA (surr.)	1	%	106
13C4-PFHpA (surr.)	1	%	102
13C8-PFOA (surr.)	1	%	108
13C5-PFNA (surr.)	1	%	112
13C6-PFDA (surr.)	1	%	72
13C2-PFUnDA (surr.)	1	%	45
13C2-PFDoDA (surr.)	1	%	28
13C2-PFTeDA (surr.)	1	%	73
<b>Perfluoroalkyl sulfonamido substances</b>			
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	53

<b>Client Sample ID</b>			<b>QW13</b>
<b>Sample Matrix</b>			<b>Water</b>
<b>Eurofins Sample No.</b>			<b>S20-Ja14392</b>
<b>Date Sampled</b>			<b>Jan 16, 2020</b>
Test/Reference	LOR	Unit	
<b>Perfluoroalkyl sulfonamido substances</b>			
D3-N-MeFOSA (surr.)	1	%	43
D5-N-EtFOSA (surr.)	1	%	33
D7-N-MeFOSE (surr.)	1	%	20
D9-N-EtFOSE (surr.)	1	%	19
D5-N-EtFOSAA (surr.)	1	%	INT
D3-N-MeFOSAA (surr.)	1	%	39
<b>Perfluoroalkyl sulfonic acids (PFASs)</b>			
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	118
18O2-PFHxS (surr.)	1	%	29
13C8-PFOS (surr.)	1	%	104
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>			
1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01
1H,1H,2H,2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N15</sup>	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	70
13C2-6:2 FTSA (surr.)	1	%	93
13C2-8:2 FTSA (surr.)	1	%	70
<b>PFASs Summations</b>			
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1

**Sample History**

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
<b>Eurofins   mgt Suite B1</b>			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	7 Days
TRH - 2013 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	7 Days
TRH - 1999 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	7 Days
<b>NEPM 1999 Metals : Metals M15 (Filtered)</b>			
Chromium (hexavalent) - Method: E057 Total Speciated Chromium	Sydney	Jan 17, 2020	28 Days
Chromium (trivalent filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 17, 2020	28 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 20, 2020	180 Days
Mobil Metals : Metals M15 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 17, 2020	28 Days
<b>Per- and Polyfluoroalkyl Substances (PFASs)</b>			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jan 21, 2020	14 Days
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jan 21, 2020	14 Days
Perfluoroalkyl sulfonic acids (PFASs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jan 21, 2020	14 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jan 21, 2020	14 Days

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**Address:** 95 Mitchell Rd  
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NSW 2285  
  
**Project Name:** WILLIAMTOWN SS  
**Project ID:** 20193820

**Order No.:**  
**Report #:** 697336  
**Phone:** 02 4949 5200  
**Fax:**

**Received:** Jan 17, 2020 5:24 PM  
**Due:** Jan 24, 2020  
**Priority:** 5 Day  
**Contact Name:** Dan Kousbroek

**Eurofins Analytical Services Manager : Andrew Black**

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins   mgt Suite B1	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
<b>Melbourne Laboratory - NATA Site # 1254 &amp; 14271</b>										
<b>Sydney Laboratory - NATA Site # 18217</b>						X	X	X	X	
<b>Brisbane Laboratory - NATA Site # 20794</b>										X
<b>Perth Laboratory - NATA Site # 23736</b>										
<b>External Laboratory</b>										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	QW13	Jan 16, 2020		Water	S20-Ja14392	X	X	X	X	X
<b>Test Counts</b>						1	1	1	1	1

## Internal Quality Control Review and Glossary

### General

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

### Holding Times

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

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

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

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

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

**\*\*NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per kilogram

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

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

### Terms

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
<b>TEQ</b>	Toxic Equivalency Quotient

### QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

### QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Method Blank</b>						
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	mg/L	< 0.02		0.02	Pass	
TRH C10-C14	mg/L	< 0.05		0.05	Pass	
TRH C15-C28	mg/L	< 0.1		0.1	Pass	
TRH C29-C36	mg/L	< 0.1		0.1	Pass	
<b>Method Blank</b>						
<b>BTEX</b>						
Benzene	mg/L	< 0.001		0.001	Pass	
Toluene	mg/L	< 0.001		0.001	Pass	
Ethylbenzene	mg/L	< 0.001		0.001	Pass	
m&p-Xylenes	mg/L	< 0.002		0.002	Pass	
o-Xylene	mg/L	< 0.001		0.001	Pass	
Xylenes - Total	mg/L	< 0.003		0.003	Pass	
<b>Method Blank</b>						
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene	mg/L	< 0.01		0.01	Pass	
TRH C6-C10	mg/L	< 0.02		0.02	Pass	
TRH >C10-C16	mg/L	< 0.05		0.05	Pass	
TRH >C16-C34	mg/L	< 0.1		0.1	Pass	
TRH >C34-C40	mg/L	< 0.1		0.1	Pass	
<b>Method Blank</b>						
<b>TRH - 2013 NEPM Fractions (after silica gel clean-up)</b>						
TRH >C10-C16 (after silica gel clean-up)	mg/L	< 0.05		0.05	Pass	
TRH >C16-C34 (after silica gel clean-up)	mg/L	< 0.1		0.1	Pass	
TRH >C34-C40 (after silica gel clean-up)	mg/L	< 0.1		0.1	Pass	
<b>Method Blank</b>						
<b>TRH - 1999 NEPM Fractions (after silica gel clean-up)</b>						
TRH C10-C14 (after silica gel clean-up)	mg/L	< 0.05		0.05	Pass	
TRH C15-C28 (after silica gel clean-up)	mg/L	< 0.1		0.1	Pass	
TRH C29-C36 (after silica gel clean-up)	mg/L	< 0.1		0.1	Pass	
<b>Method Blank</b>						
<b>Heavy Metals</b>						
Arsenic (filtered)	mg/L	< 0.001		0.001	Pass	
Barium (filtered)	mg/L	< 0.02		0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001		0.001	Pass	
Boron (filtered)	mg/L	< 0.05		0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002		0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001		0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001		0.001	Pass	
Copper (filtered)	mg/L	< 0.001		0.001	Pass	
Iron (filtered)	mg/L	< 0.05		0.05	Pass	
Lead (filtered)	mg/L	< 0.001		0.001	Pass	
Manganese (filtered)	mg/L	< 0.005		0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001		0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001		0.001	Pass	
Vanadium (filtered)	mg/L	< 0.005		0.005	Pass	
Zinc (filtered)	mg/L	< 0.005		0.005	Pass	
<b>Method Blank</b>						
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05		0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01		0.01	Pass	

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01		0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01		0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01		0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01		0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01		0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01		0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01		0.01	Pass	
<b>Method Blank</b>						
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05		0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05		0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05		0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05		0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05		0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05		0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05		0.05	Pass	
<b>Method Blank</b>						
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>						
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01		0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01		0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01		0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01		0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01		0.01	Pass	
<b>Method Blank</b>						
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05		0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01		0.01	Pass	
<b>LCS - % Recovery</b>						
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	%	90		70-130	Pass	
TRH C10-C14	%	72		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>BTEX</b>						
Benzene	%	89		70-130	Pass	
Toluene	%	90		70-130	Pass	
Ethylbenzene	%	90		70-130	Pass	
m&p-Xylenes	%	87		70-130	Pass	
o-Xylene	%	89		70-130	Pass	
Xylenes - Total	%	88		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene	%	86		70-130	Pass	
TRH C6-C10	%	93		70-130	Pass	
TRH >C10-C16	%	70		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>TRH - 2013 NEPM Fractions (after silica gel clean-up)</b>						
TRH >C10-C16 (after silica gel clean-up)	%	86		70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>LCS - % Recovery</b>							
<b>TRH - 1999 NEPM Fractions (after silica gel clean-up)</b>							
TRH C10-C14 (after silica gel clean-up)	%	88			70-130	Pass	
<b>LCS - % Recovery</b>							
<b>Heavy Metals</b>							
Arsenic (filtered)	%	95			70-130	Pass	
Barium (filtered)	%	96			70-130	Pass	
Beryllium (filtered)	%	121			70-130	Pass	
Boron (filtered)	%	80			70-130	Pass	
Cadmium (filtered)	%	91			70-130	Pass	
Chromium (filtered)	%	94			70-130	Pass	
Cobalt (filtered)	%	94			70-130	Pass	
Copper (filtered)	%	94			70-130	Pass	
Iron (filtered)	%	91			70-130	Pass	
Lead (filtered)	%	95			70-130	Pass	
Manganese (filtered)	%	91			70-130	Pass	
Mercury (filtered)	%	97			70-130	Pass	
Nickel (filtered)	%	95			70-130	Pass	
Vanadium (filtered)	%	95			70-130	Pass	
Zinc (filtered)	%	92			70-130	Pass	
<b>LCS - % Recovery</b>							
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>							
Perfluorobutanoic acid (PFBA)	%	67			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	67			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	65			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	62			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	64			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	60			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	60			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	65			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	65			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	101			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	60			50-150	Pass	
<b>LCS - % Recovery</b>							
<b>Perfluoroalkyl sulfonamido substances</b>							
Perfluorooctane sulfonamide (FOSA)	%	61			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	51			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	57			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	52			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	57			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	66			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	57			50-150	Pass	
<b>LCS - % Recovery</b>							
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>							
Perfluorobutanesulfonic acid (PFBS)	%	82			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	56			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	61			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	63			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	60			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	107			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	64			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	56			50-150	Pass	
<b>LCS - % Recovery</b>							
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSAAs)</b>							

Test				Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)				%	71		50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)				%	60		50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)				%	67		50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)				%	59		50-150	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>					Result 1				
TRH C6-C9	S20-Ja14168	NCP		%	98		70-130	Pass	
<b>Spike - % Recovery</b>									
<b>BTEX</b>					Result 1				
Benzene	S20-Ja14168	NCP		%	90		70-130	Pass	
Toluene	S20-Ja14168	NCP		%	95		70-130	Pass	
Ethylbenzene	S20-Ja14168	NCP		%	95		70-130	Pass	
m&p-Xylenes	S20-Ja14168	NCP		%	91		70-130	Pass	
o-Xylene	S20-Ja14168	NCP		%	95		70-130	Pass	
Xylenes - Total	S20-Ja14168	NCP		%	92		70-130	Pass	
<b>Spike - % Recovery</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>					Result 1				
Naphthalene	S20-Ja14168	NCP		%	95		70-130	Pass	
TRH C6-C10	S20-Ja14168	NCP		%	98		70-130	Pass	
<b>Spike - % Recovery</b>									
<b>Heavy Metals</b>					Result 1				
Arsenic (filtered)	S20-Ja14392	CP		%	97		70-130	Pass	
Barium (filtered)	S20-Ja14392	CP		%	92		70-130	Pass	
Beryllium (filtered)	S20-Ja14392	CP		%	107		70-130	Pass	
Boron (filtered)	S20-Ja14392	CP		%	90		70-130	Pass	
Cadmium (filtered)	S20-Ja14392	CP		%	92		70-130	Pass	
Chromium (filtered)	S20-Ja14392	CP		%	90		70-130	Pass	
Cobalt (filtered)	S20-Ja14392	CP		%	91		70-130	Pass	
Copper (filtered)	S20-Ja14392	CP		%	89		70-130	Pass	
Iron (filtered)	S20-Ja14392	CP		%	25		70-130	Fail	Q08
Lead (filtered)	S20-Ja14392	CP		%	90		70-130	Pass	
Manganese (filtered)	S20-Ja14392	CP		%	90		70-130	Pass	
Mercury (filtered)	S20-Ja14392	CP		%	48		70-130	Fail	Q08
Nickel (filtered)	S20-Ja14392	CP		%	90		70-130	Pass	
Vanadium (filtered)	S20-Ja14392	CP		%	96		70-130	Pass	
Zinc (filtered)	S20-Ja14392	CP		%	93		70-130	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>					Result 1				
Perfluorobutanoic acid (PFBA)	M20-Ja14783	NCP		%	101		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M20-Ja14783	NCP		%	97		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M20-Ja14783	NCP		%	96		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M20-Ja14783	NCP		%	93		50-150	Pass	
Perfluorooctanoic acid (PFOA)	M20-Ja14783	NCP		%	89		50-150	Pass	
Perfluorononanoic acid (PFNA)	M20-Ja14783	NCP		%	90		50-150	Pass	
Perfluorodecanoic acid (PFDA)	M20-Ja14783	NCP		%	90		50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M20-Ja14783	NCP		%	90		50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M20-Ja14783	NCP		%	99		50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M20-Ja14783	NCP		%	135		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M20-Ja14783	NCP		%	91		50-150	Pass	
<b>Spike - % Recovery</b>									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Perfluoroalkyl sulfonamido substances</b>				Result 1					
Perfluorooctane sulfonamide (FOSA)	M20-Ja14783	NCP	%	99			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M20-Ja14783	NCP	%	88			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M20-Ja14783	NCP	%	94			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M20-Ja14783	NCP	%	89			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M20-Ja14783	NCP	%	90			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M20-Ja14783	NCP	%	93			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M20-Ja14783	NCP	%	90			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M20-Ja14783	NCP	%	104			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M20-Ja14783	NCP	%	84			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M20-Ja14783	NCP	%	95			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M20-Ja14783	NCP	%	91			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M20-Ja14783	NCP	%	89			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M20-Ja14783	NCP	%	129			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M20-Ja14783	NCP	%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M20-Ja14783	NCP	%	59			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M20-Ja14783	NCP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M20-Ja14783	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M20-Ja14783	NCP	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M20-Ja14783	NCP	%	81			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C6-C9	S20-Ja14392	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
<b>Duplicate</b>									
<b>BTEX</b>				Result 1	Result 2	RPD			
Benzene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S20-Ja14392	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S20-Ja14392	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass	

<b>Duplicate</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD		
Naphthalene	S20-Ja14392	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
TRH C6-C10	S20-Ja14392	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass
<b>Duplicate</b>								
				Result 1	Result 2	RPD		
Chromium (hexavalent)	S20-Ja10862	NCP	mg/L	0.027	0.029	8.0	30%	Pass
<b>Duplicate</b>								
<b>Heavy Metals</b>				Result 1	Result 2	RPD		
Arsenic (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Barium (filtered)	S20-Ja13841	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Beryllium (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Boron (filtered)	S20-Ja13841	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Cadmium (filtered)	S20-Ja13841	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron (filtered)	S20-Ja13841	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Lead (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	S20-Ja13841	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Mercury (filtered)	S20-Ja13841	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Vanadium (filtered)	S20-Ja13841	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc (filtered)	S20-Ja13841	NCP	mg/L	0.035	0.037	6.0	30%	Pass
<b>Duplicate</b>								
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanoic acid (PFNA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTTrDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
<b>Duplicate</b>								
<b>Perfluoroalkyl sulfonamido substances</b>				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonic acids (PFSA)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

**Comments**
**Sample Integrity**

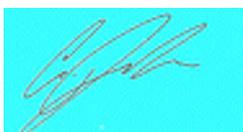
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted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

**Qualifier Codes/Comments**

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

**Authorised By**

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Sarah McCallion	Senior Analyst-PFAS (QLD)


**Glenn Jackson  
General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

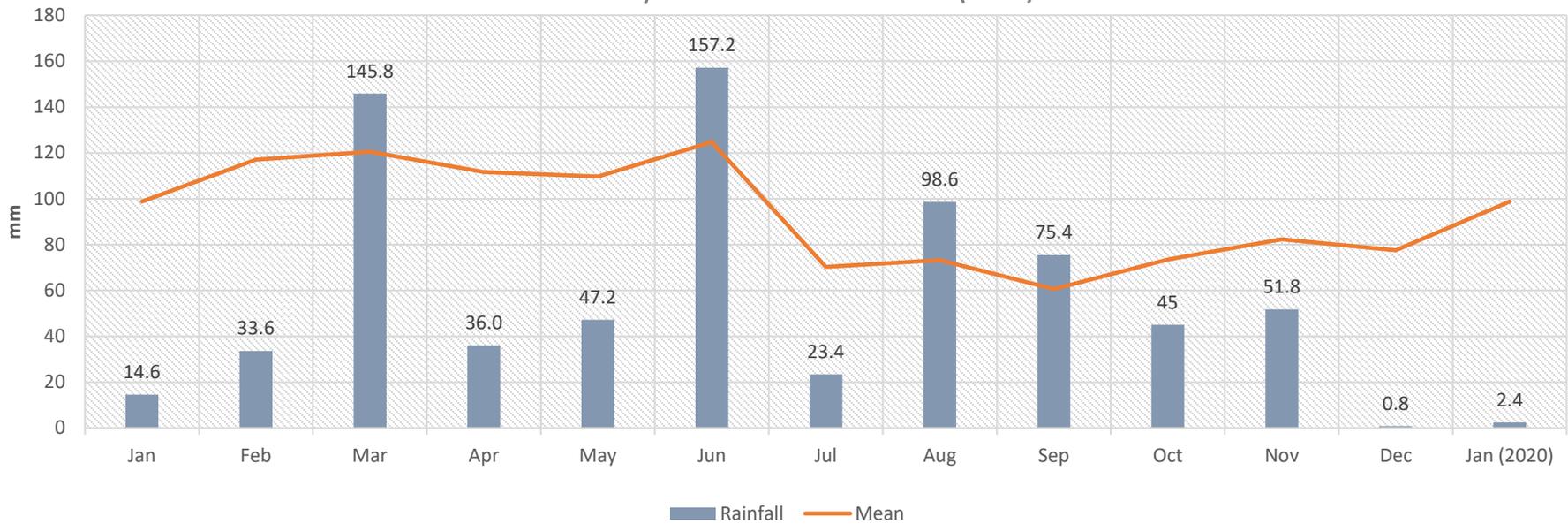
Measurement uncertainty of test data is available on request or please [click here](#).

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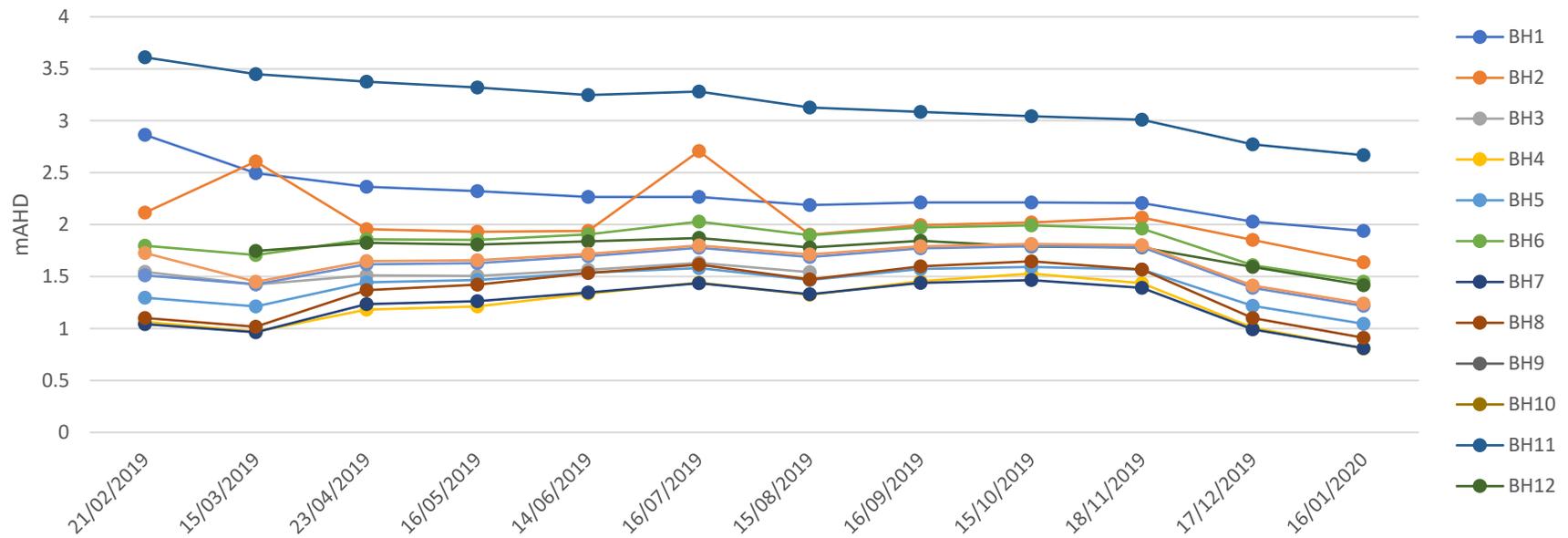
## **ATTACHMENT B: TREND DATA**

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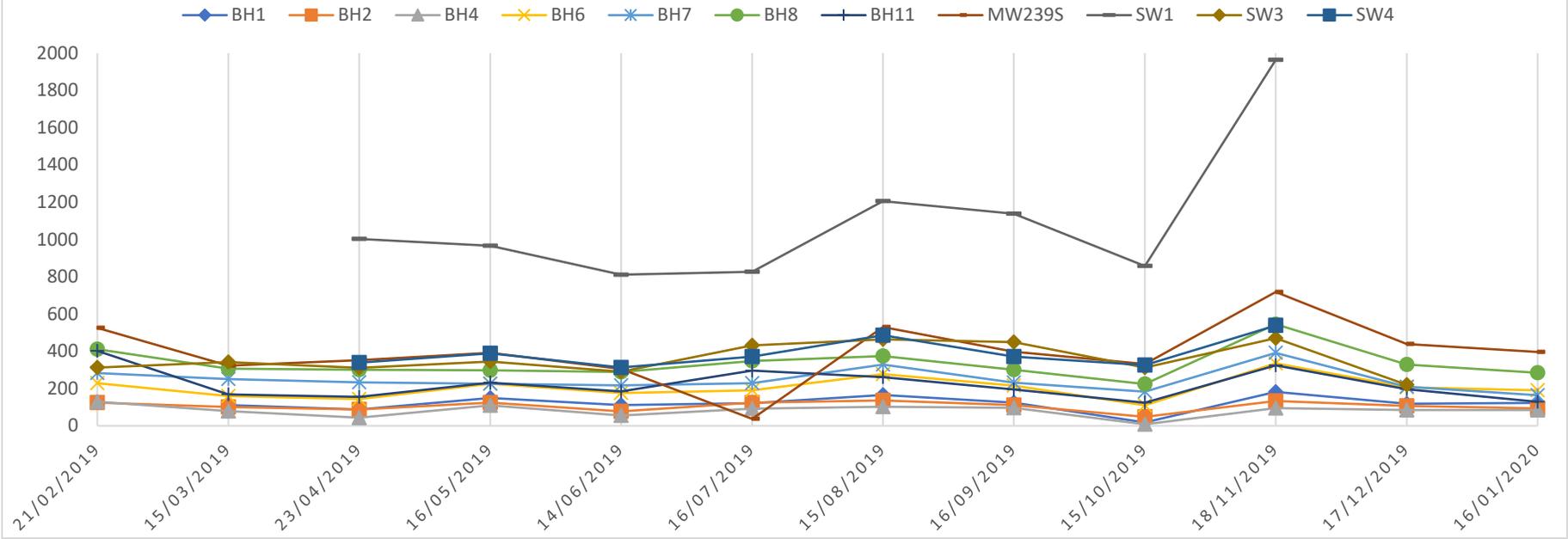
### Monthly Rainfall Totals 2019 (mm)



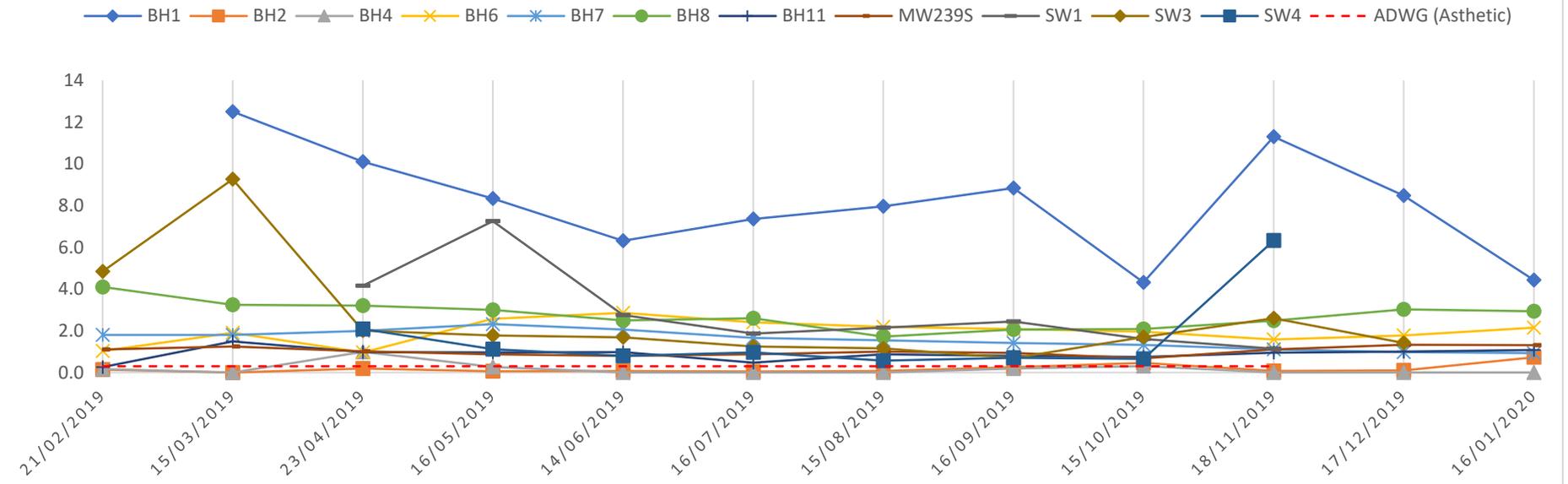
### Groundwater Elevation (mAHD)



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



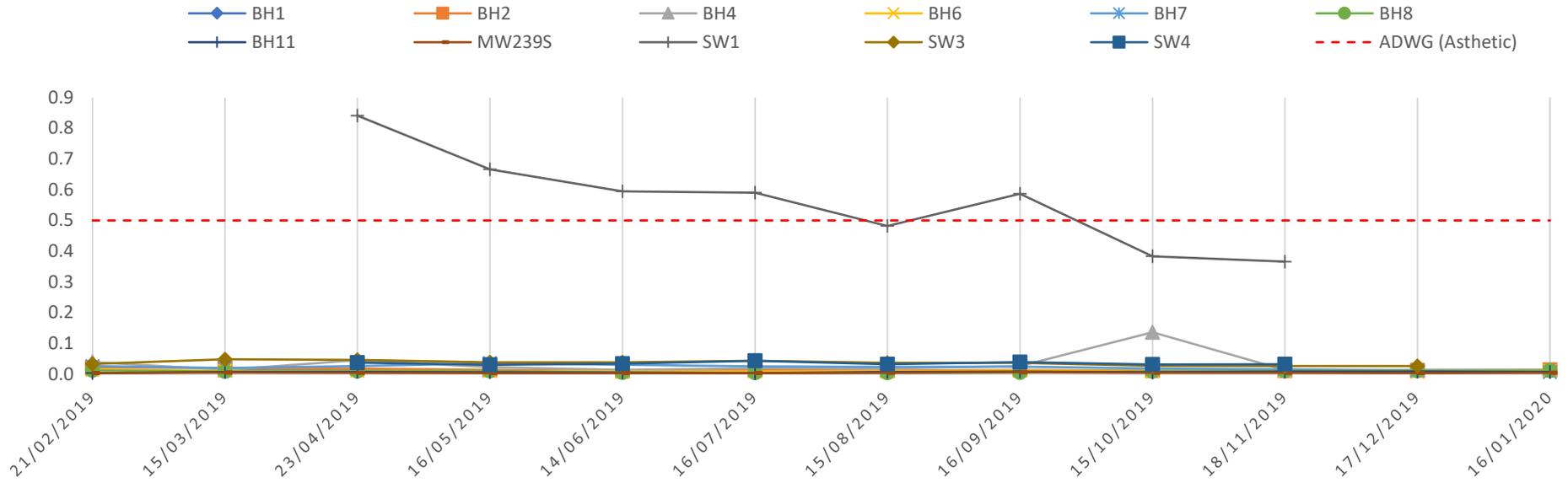
### Iron (Fe) mg/L



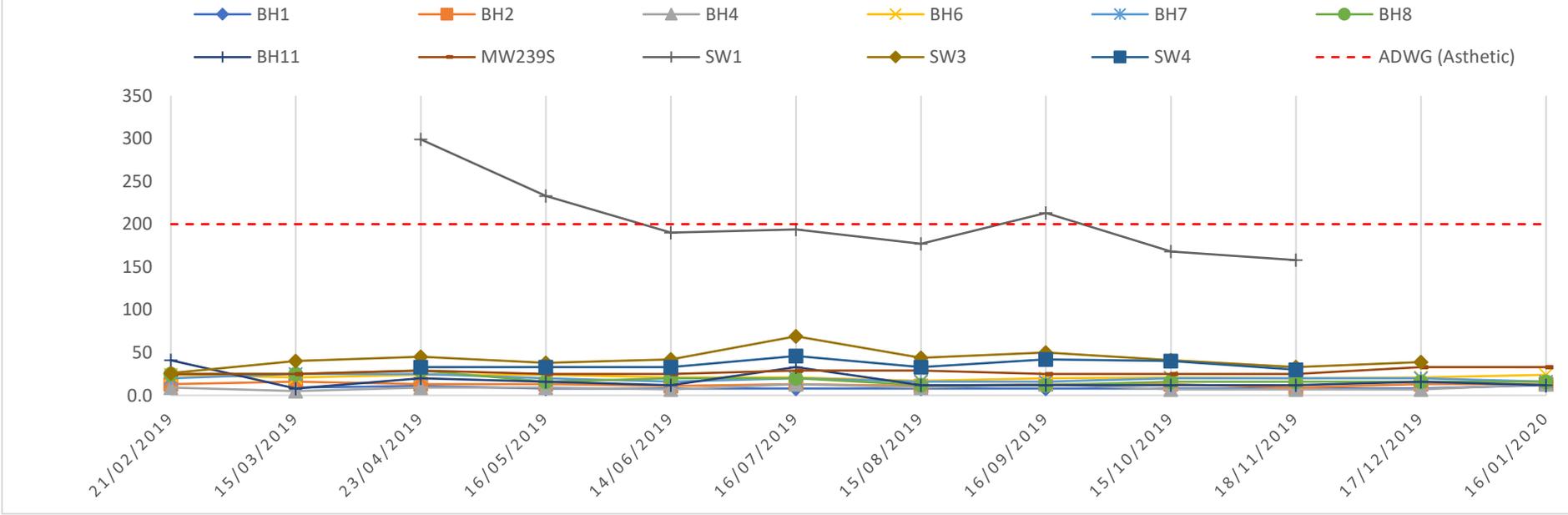




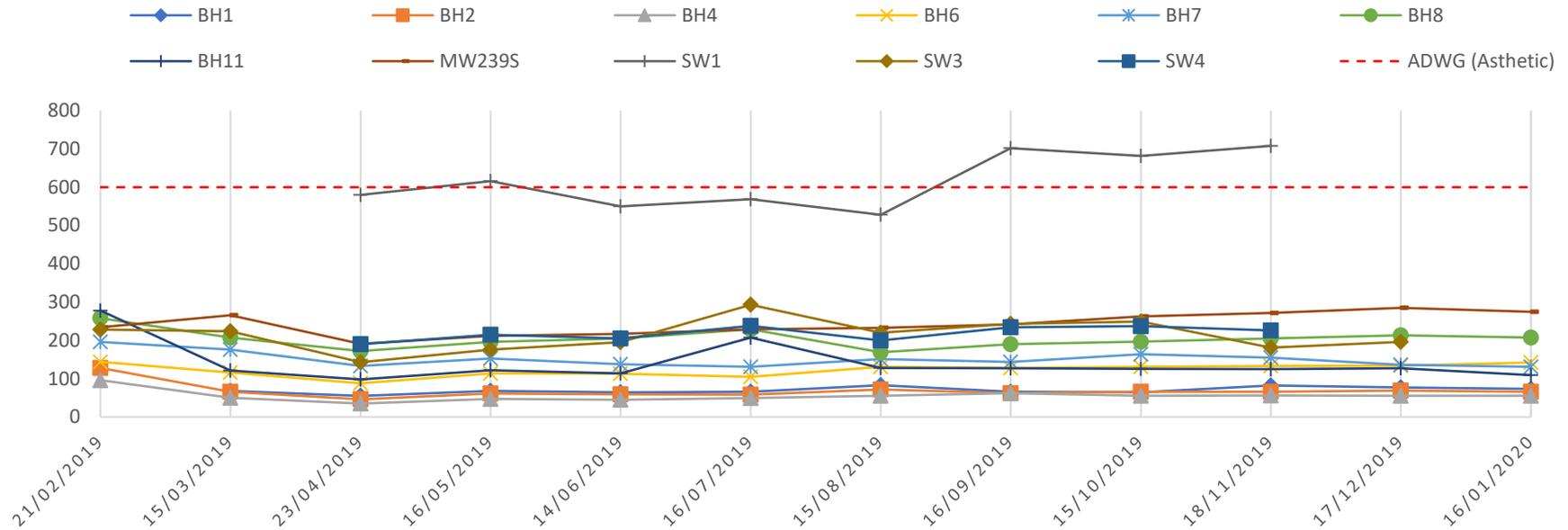
### Manganese (Mn) mg/L



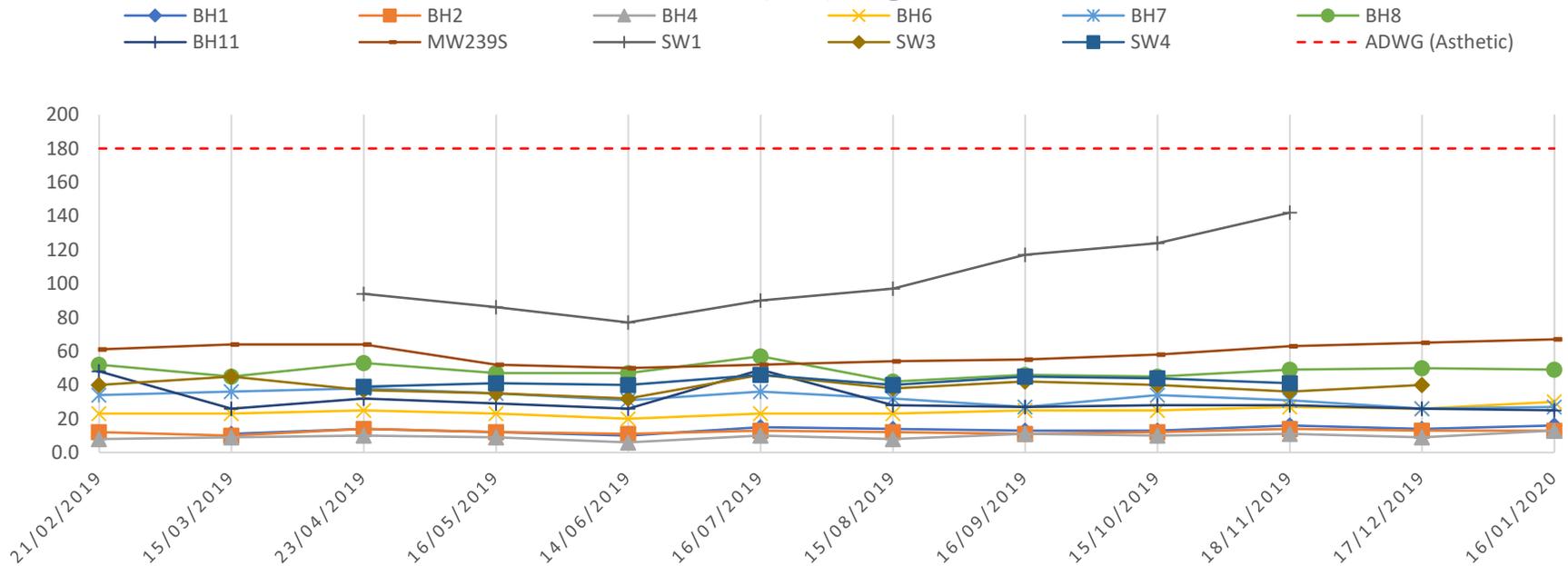
### Total Hardness (CaCO<sub>3</sub>) mg/L



## Total Dissolved Solids (TDS) mg/L

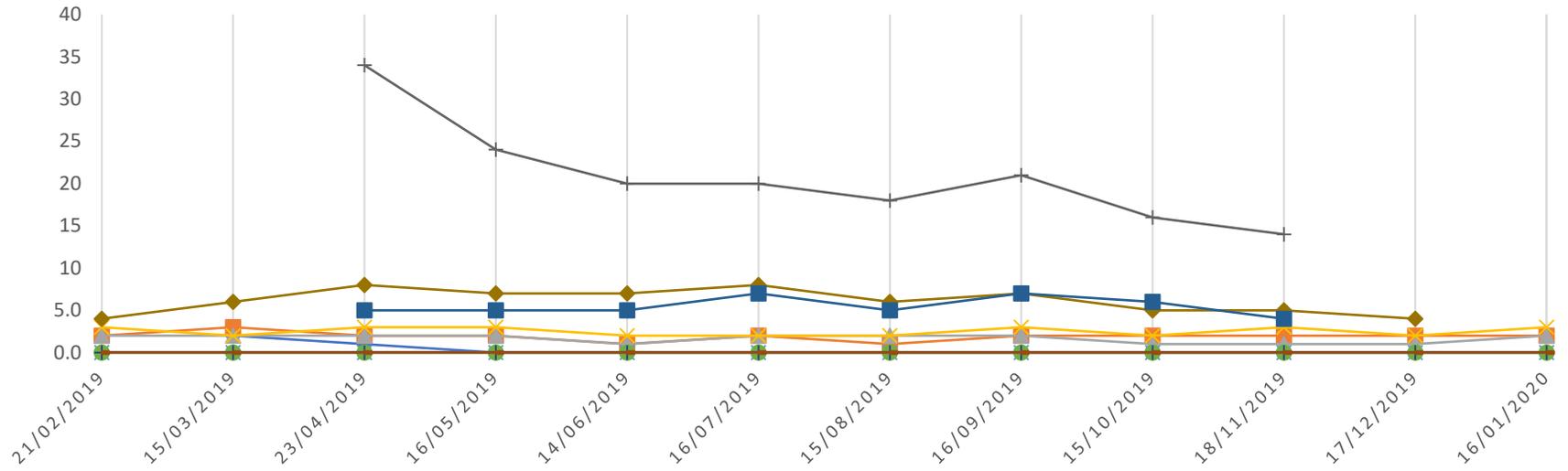


## Sodium (Na) mg/L



### Calcium(Ca) mg/L

BH1 BH2 BH4 BH6 BH7 BH8 BH11 MW239S SW1 SW3 SW4



### Magnesium(Mg) mg/L

BH1 BH2 BH4 BH6 BH7 BH8 BH11 MW239S SW1 SW3 SW4

