

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

July 2022 Monitoring Event

NCA22R144160

22 August 2022



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

Attention: Darren Williams

Subject: Monthly Water Quality Monitoring Results Cabbage Tree Road Sand Quarry, NSW July 2022 Monitoring Event

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

1 SCOPE OF WORK

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

The scheduled July 2022 monthly monitoring event included gauging of ten monitoring wells, recording of field parameters for groundwater, and sampling from seven monitoring wells and one wash plant water sample as outlined in the Soil and Water Management Plan (SWMP, 2021).

2 SITE WORK

The monthly monitoring round was conducted on the 27th of July 2022 and comprised:

- Gauging of nine monitoring wells (BH1, BH2, BH4, BH6, BH7, BH9, BH9A, BH11 & MW239S). BH12 was decommissioned during clearing works for the expansion of Area 7, therefore, was not gauged during the July monitoring event. This location will be removed from the scope of works for subsequent rounds.
- Groundwater sampling from seven monitoring wells (BH2, BH4, BH6, BH7, BH9A, BH11 & MW239S) as summarised in **Table 5** and detailed in **Attachment 2**.
- One wash plant water sample (WPW) as summarised in **Table 6** and detailed in **Attachment 2**.

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

The wash plant water samples were taken directly into laboratory supplied sample containers using a gloved hand.

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

Table 1: Summary of Monthly Water Quality Analysis (July 2022)

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
Metals*	7	1	1	1	1
PFAS (28 analytes, standard level)	1	1	1	1	1

* Metals (dissolved) - Arsenic (As), Iron (Fe), Manganese (Mn).



Table 2 provides a summary of the gauging data. The full set of gauging data for each monitoring location is provided in **Table 5, Attachment 2**. Additionally, Watershed HydroGeo (2019) outlined a Trigger Action and Response Plan (TARP) to mitigate groundwater elevations that may potentially impact Cabbage Tree Road Sand Quarry operations (primarily sand excavation depths). Based on these recommendations, groundwater elevation has been shaded to correspond to triggers and actions outlined in **Table 3**.

As monitoring wells BH1, BH2, BH9, BH9A and BH11 have triggered TARP rules outlined in **Table 3**, weekly monitoring of groundwater levels is required at these locations until water levels decline to below high frequency level bores listed in **Table 2**. WSS have taken over the weekly gauging of the affected wells as of 17 June 2022, therefore, groundwater elevation data is being collected by WSS directly following the June GME. It is also recommended that the Minimum Extraction Level (MEL) be re-analysed and reviewed for BH1, BH2 and BH11, in accordance with the TARP Level 3 trigger response.

Table 2: Summary of Gauging Data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Ground-water Elevation (mAHD)	Well Total Depth Current (mBTOC)	Well Total Depth 2014 (mBTOC)	Inferred Max GW Elevation (mAHD) ¹	Difference Between Inferred Max and Measured GW Elevation (mAHD)	Comment
BH1	8.64	3.836	4.804	8.21	9.45	4.5	-0.304	Well gauged only. Well cap found missing and casing lid broken
BH2	7.79	3.893	3.897	8.94	9.45	3.8	-0.097	Clear, no odour / sheen, well in good condition
BH3	-	-	-	-	-	-	-	Well decommissioned
BH4	3.06	0.764	2.296	5.98	6.45	3.0	0.704	Clear, no odour / sheen, well in good condition
BH5	7.36	-	-	-	9.28	4.0	-	No sample taken
BH6	3.62	0.706	2.914	4.51	4.95	4.4	1.486	Clear, moderate sulfur odour, no sheen, well in good condition
BH7	2.98	0.906	2.074	4.50	4.95	3.7	1.626	Light yellow, low sulfur odour, no sheen, well in good condition
BH8	3.88	-	-	-	6.28	4.0	-	No sample taken
BH9	17.75	15.041	2.709	16.19	18.8	3.0	0.291	Gauge only, well in good condition
BH9A	10.75	8.202	2.548	12.44	16.16	3.0 ²	0.452	Clear, slight sulfur odour, no sheen, well



Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Ground-water Elevation (mAHD)	Well Total Depth Current (mBTOC)	Well Total Depth 2014 (mBTOC)	Inferred Max GW Elevation (mAHD) ¹	Difference Between Inferred Max and Measured GW Elevation (mAHD)	Comment
								in good condition
BH10	6.69	-	-	-	5.45	4.9	-	No sample taken
BH11	6.63	0.793	5.837	5.28	5.95	5.5	-0.337	Light yellow, strong sulfur odour, no sheen, well in good condition
BH12	8.67	-	-	-	8.39	4.0	-	Well lost
MW239S	3.04	0.530	2.51	3.80	4.0	3.9	1.39	Light yellow, strong sulfur odour, no sheen, well in good condition
MW239D	3.04	-	-	-	20.49	3.9 ³	-	No sample taken
SW01*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No sample taken
SW02*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No sample taken
SW03*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No sample taken
SW04*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No sample taken

* Surface water levels representing depth of water as read at time of sampling from an installed measuring tape (when dry number is ground elevation AHD).

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

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

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

N/A – Not applicable

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

Level	Trigger	Action and Response	Report / Response Actions
0	Groundwater levels more than 0.5 m below inferred maximum historical level at BH1 and BH10. (Table 2).	Standard operations – monthly dipping of operational on-site monitoring bores.	N/A
1	Groundwater levels within 0.5 m below inferred maximum historical level (Table 2) at any on-site bore.	Weekly (or more frequent) monitoring (dipping) of groundwater levels until water level declines to below high frequency level bores listed in Table 2 .	Internal and environmental consultant. Include note in Annual Report.
2	Groundwater levels within 0.25 m of inferred maximum historical level (Table 2) at any on-site bore.	Weekly (or more frequent) monitoring (dipping) of groundwater levels.	WSS to issue letter to DPIE, documenting groundwater level and rainfall trends, review and make recommendations regarding MEL.



		Re-analysis and review of Minimum Extraction Level (MEL).	
3	Groundwater levels within resource area rise above previously <i>inferred</i> maximum groundwater level (Table 2).	<p>Analysis of recent data by hydrogeologist, including site data and data from local HWC wells and local Defence wells (if available).</p> <p>Revision of MEL.</p> <p>Remediation of earlier excavations to revised MEL if required by DPIE.</p>	<p>WSS to issue letter to DPIE, DoI Water and HWC, documenting groundwater level trends, and revision (if necessary) of MEL.</p> <p>Letter to outline remedial options, considering access, vegetation condition in previously rehabilitated areas. Re-grading of previously rehabilitated areas if required by DPIE.</p>

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

Table 4: Summary of Field Measurements

Borehole	Turbidity (NTU)	Temp (°C)	DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH	Redox (mV)
BH1	ND	ND	ND	ND	ND	ND	ND
BH2	131	15.6	5.85	87.6	57	4.13	223
BH4	121	14.1	3.00	90.2	59	4.60	190.7
BH5	ND	ND	ND	ND	ND	ND	ND
BH6	16.8	14.2	4.75	225	146	4.76	-104
BH7	489	14.3	4.21	117	76	4.43	26
BH8	ND	ND	ND	ND	ND	ND	ND
BH9	ND	ND	ND	ND	ND	ND	ND
BH9A	52	16.6	4.93	182.8	119	4.11	208.5
BH10	ND	ND	ND	ND	ND	ND	ND
BH11	9.7	14.0	4.74	158	103	4.20	-39
BH12	ND	ND	ND	ND	ND	ND	ND
MW239S	175	14.2	4.00	125	82	4.32	-71
MW239D	ND	ND	ND	ND	ND	ND	ND
WPW	9938	14.3	12.99	240	156	4.58	169

ND: No Data – no sample taken

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

Full results summary tables, including quality control sample analyses, are provided in **Tables 1 – 4, Attachment 2**. Based on a review of the QA/QC Compliance Assessment provided by ALS, the overall data quality is considered acceptable for interpretive use. Copies of the final NATA endorsed laboratory reports, including internal QA/QC results and chain-of-custody documentation for both laboratories are provided in **Attachment 3**.

Table 5: Groundwater Results and Screening Criteria

Analyte	Metals			Discussion of results relative to previous monitoring (details on specific data trends provided in Section 4 below)
	Arsenic	Iron	Manganese	
LOR	0.001	0.05	0.001	
Units	mg/L	mg/L	mg/L	
Adopted Site Specific Trigger Values (SWMP 2021)	0.003	4.1 (8.84 for BH1)	0.136	
Sample ID	Groundwater			
BH1	NS	NS	NS	Metals for BH1 were not analysed - no sample collected.
BH2	<0.001	<0.05	0.008	Metal concentrations were generally consistent with historical results and remain below adopted criteria. BH2 is located marginally down hydraulic gradient from the current quarry operations footprint.
BH4	<0.001	0.09	0.014	Metal concentrations were generally consistent with historical variations and remain below adopted criteria. BH4 is located down hydraulic gradient (approximately 140 m) from current quarry operations and on the southernmost boundary of the site adjacent to Cabbage Tree Road.
BH6	<0.001	2.38	0.001	Iron and Manganese have decreased from previous June GME. Metal concentrations are generally consistent with historical results and remain below adopted criteria. BH6 is considered up hydraulic gradient (approximately 570 m) from current quarry operations and the most north-eastern location at the Site.
BH7	<0.001	0.51	0.004	Metal concentrations were generally consistent with historical results and below adopted criteria. BH7 is located (approximately 630 m) east of the current quarry operations.
BH8	NS	NS	NS	Metals for BH8 were not analysed - no sample collected.
BH9	NS	NS	NS	Metals for BH9 were not analysed - no sample collected.
BH9A	<0.001	0.16	0.019	Metal concentrations were generally consistent with historical results and below adopted criteria. BH9A is down gradient (approximately 50m) from current quarry operations and is on the southernmost boundary of the Site adjacent to Cabbage Tree Road.
BH10	NS	NS	NS	Metals for BH10 were not analysed - no sample collected.
MW239S	<0.001	0.43	0.004	Metal concentrations were generally consistent with historical results and below adopted criteria. MW239S is located approximately 426 m east and upgradient of the current quarry operations.
BH11	<0.001	1.03	0.004	Metal concentrations were generally consistent with historical results and below adopted criteria. BH11 is located approximately 450 m from current quarry operations and at the north-western most point of the Site.
BH12	NS	NS	NS	Metals for BH12 were not analysed - no sample collected.



Table 6: Wash Plant Water Sample Results and Screening Criteria

Analyte	PFAS				Discussion of results
	PFOA	PFOS	PFHxS	Sum of PFOS + PFHxS	
LOR	0.01	0.01	0.01	0.01	
Units	µg/L	µg/L	µg/L	µg/L	
Site Specific Trigger Values (SWMP 2021)	0.56	N/A	N/A	0.07	
Sample Name	Sand Wash Plant				
WPW	<0.01	0.02	0.01	0.03	PFOS, PFHxS, and Sum of PFOS + PFHxS concentrations were recorded above the Limit of Reporting (LOR) for the July 2022 monitoring event but however below adopted site specific criteria.

Notes:

< - Less than laboratory limit of reporting

3 RAINWATER DATA

Table 7 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m) for the period 2021/22. The total monthly rainfall for July 2022 reached four times the monthly mean, a rapid increase in comparison to the previous June 2022 rainfall data. Based on current rainfall data (mean and monthly totals) for July 2022, it is expected that groundwater elevations will begin to increase which is consistent with groundwater trend data.

Table 7: 2021-2022 Rainfall data (12-month period)

Date	Aug (21)	Sep (21)	Oct (21)	Nov (21)	Dec (21)	Jan (22)	Feb (22)	Mar (22)	Apr (22)	May (22)	Jun (22)	Jul (22)
1st	0	0	0	0.2	0	0	0	18.2	13.6	2.0	0	0
2nd	0.8	0	5.4	0	0.2	0	7.6	25.2	1.4	0	0	14.6
3rd	1.6	0	0	0	0	0	13.0	32.2	0	0	0	42.0
4th	0	0	0	0	0.2	1.0	32.8	55.4	ND	0	1.6	59.8
5th	0	3.0	0	4.0	0	7.6	7.2	0.2	0.2	4.0	0	49.8
6th	0	0	0	0	0	2.2	4.4	11.6	0.2	ND	0	36.6
7th	0	0	0	0	2.8	1.0	1.4	5.4	0	0	0	37.0
8th	0	0	0	21.0	0.6	10.4	2.0	11.8	36.2	0	0	0
9th	2.4	0	0	0	10.0	9.2	0.6	68.0	1.2	0	0	0
10th	0	12.6	0	0.4	0.8	0	0	0.6	2.0	1.8	0	3.2
11th	0.2	0	23.6	20.2	0	0	0	3.8	0.2	15.8	0	44.2
12th	0	0	10.2	56.8	0	0	39.4	0.6	8.4	8.8	0	0.2
13th	0	0	19.8	0.2	0	0.4	1.0	0.2	15.8	5.8	0	0
14th	0	0	1.2	0	0	0	0	0	10.8	4.0	0	12.4



Date	Aug (21)	Sep (21)	Oct (21)	Nov (21)	Dec (21)	Jan (22)	Feb (22)	Mar (22)	Apr (22)	May (22)	Jun (22)	Jul (22)
15th	0.2	0	3.0	0	0	0	0	0.8	1.2	0	0	12.0
16th	0	0	0.2	0.2	0.2	5.4	0	0.8	0.2	0	0	0
17th	0	0	0	0	1.8	0.2	0	0.2	0	0	0	0
18th	0.6	0.4	0	0.6	0	0	8.6	0	0	0	1.0	0
19th	0	0	0	0	0	32.0	0.2	2.2	0	0	18.4	0.2
20th	0	2.2	3.4	0	0.6	13.2	0	0.4	0.2	2.6	7.4	7.8
21st	0.4	8.8	0.2	5.0	0.2	0.2	0	0	0	15.0	0.2	0.4
22nd	0	0.4	0.2	27.6	0	0	0	0	14.6	4.4	0	2.0
23rd	0.2	0	0	9.4	0	0	25.2	0	6.4	33.0	0	0
24th	22.2	0	5.4	0.6	0.4	6.8	3.2	35.6	10.0	8.0	0	1.8
25th	20.2	0	0.2	3.4	0	0	6.0	29.4	0.2	4.6	0	1.4
26th	0	0.6	0	31.2	0	0	6.0	14.4	0.2	0	0	1.2
27th	0	0	0	16.4	0	0	2.6	6.8	0.2	0	0	0.6
28th	0	0	0	15.8	2.4	0	0.2	0.8	0.6	0.2	0	0
29th	0	0	0	0.8	-	0	-	2.4	0.2	0	0	0
30th	0	0	0	0	0.2	0	-	12.2	0	0	0	0.2
31st	0	-	1.6	-	0	0	-	14.8	-	4.2	-	0
Total	48.8	28.0	74.4	213.8	20.4	89.6	161.4	354.0	124.0	114.2	28.6	327.4
Historical Mean	72.8	60.6	75.9	81.9	78.6	99.5	118.3	125.2	109.5	108.6	124.6	72.6

Notes:

ND – no data retrieved.

4 DATA TRENDS

Data trends, taken from analyses undertaken throughout the duration of the sampling program (January 2019 – current), are provided as **Attachment 4**. Generally, the trends indicate a steady decrease in groundwater elevations from April 2021 to January 2022. This is likely due to a continuation of reduced rainfall following the March 2021 monitoring event. More recently, the groundwater elevations have shown a rapid increase since February 2022 as a result of above-average rainfall recorded over the past four months. Groundwater elevations across all locations also follow this, with an increase in groundwater elevation for July 2022 most likely due to the above-average rainfall for July described in **Section 3**. Based on these trends, groundwater elevations are likely to continue to increase across the quarry.

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

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

- Copper – Concentrations of copper have decreased at BH4 to levels now below the Site Specific Trigger Value following the spike reported in May 2022. However, it is expected that concentrations will remain elevated over the winter months as observed in the historical trend data. Historical variations beginning in 2019 show a seasonal trend where concentrations begin to rise in May, peak during August/September and



fall back to stable levels by October 2021. These increased concentrations may be attributed to the decrease in rainfall associated with the winter months. Overall trends also show a long-term temporal increase, where the peak concentrations are increasing with each seasonal event. Notwithstanding, copper concentrations remain below the drinking water criteria.

- Arsenic – No notable changes were observed for Arsenic across locations during the current July 2022 sampling event, in line with the previous June 2022 monitoring event.
- Iron – Iron concentrations were consistent with the previous June 2022 monitoring event, with concentrations recorded below adopted criteria across the locations
- Manganese – Manganese concentrations were consistent with the previous monitoring event, with concentrations recorded below adopted criteria across the locations.
- PFAS – PFAS was detected in the WPW sample during the current July 2022 sampling round, specifically PFOS and PFHxS, but were recorded below adopted criteria.

5 CLOSING

Overall, the results suggest that since quarry operations began in August 2019, there has been negligible change in analytical results across the sampled locations.

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

Sincerely,

Kleinfelder Australia Pty Ltd

Jai Roby

Graduate Environmental Scientist

Contaminated Land Management

JRoby@kleinfelder.com

Mobile: 0401 499 275

Attachments

Attachment 1: Figures

Attachment 2: Results tables and field records

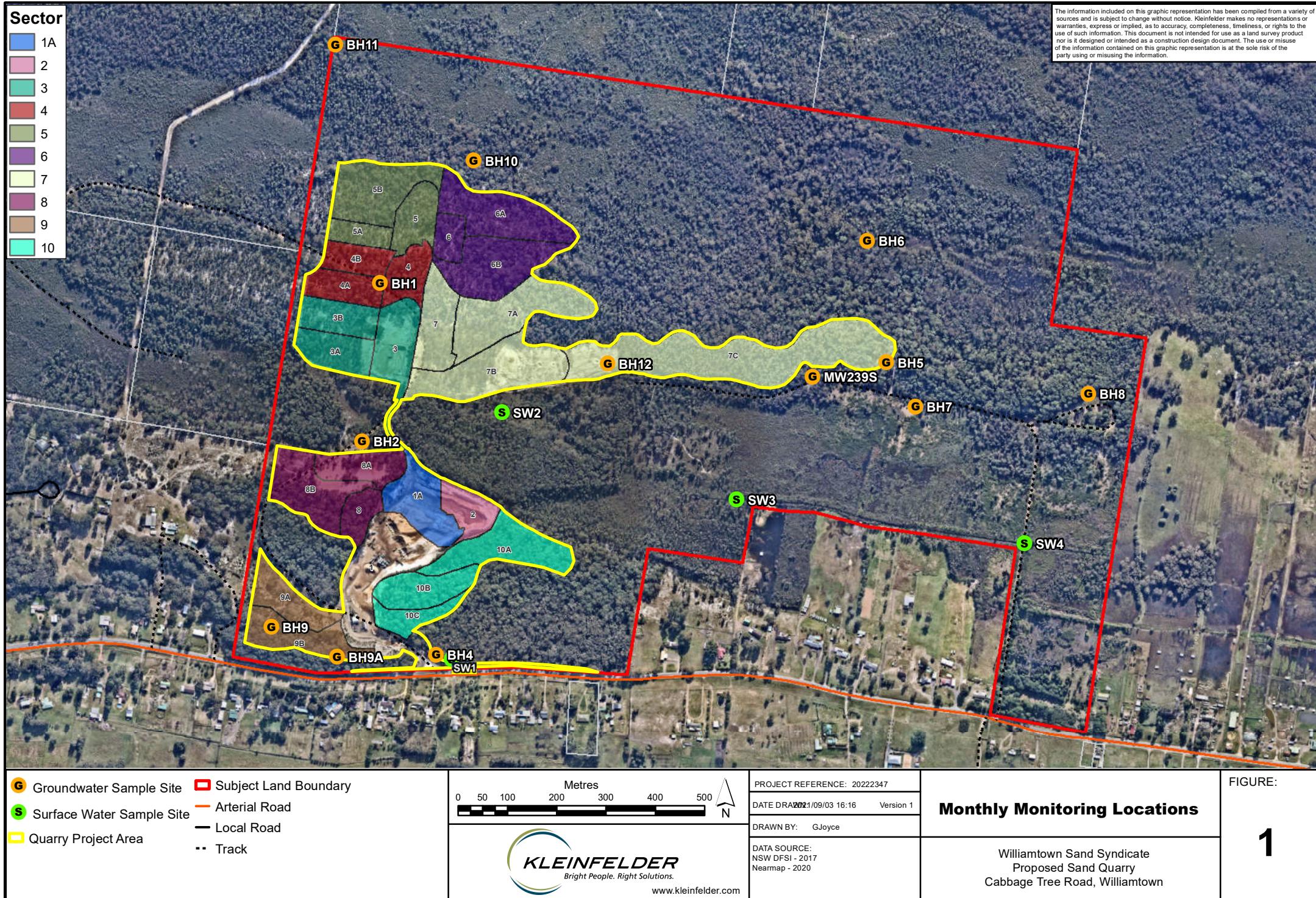
Attachment 3: Lab results

Attachment 4: Data Trends



ATTACHMENT 1: FIGURES







ATTACHMENT 2: RESULTS TABLES AND FIELD RECORDS



Analyte		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Adopted Site Specific Trigger Values (SWMP 2021) ³		0.003	0.07	0.002	0.1	0.0002	0.004	0.006	0.083
NHMRC ADWG 2018		0.01		0.06	4.0	0.002	0.05	--	2.0
Sample Name	Sample Date								
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002
	16-Sep-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.001
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.006
	18-Nov-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001
	16-Sep-20	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.005
	16-Oct-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001
	16-Nov-20	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.001
	16-Dec-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.008
	14-Jan-21	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001
	16-Feb-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001
	17-Mar-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	24-Feb-22	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
BH11	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001
	16-Sep-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.004
	18-Nov-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	16-Sep-20	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.005
	16-Oct-20	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	16-Nov-20	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	16-Dec-20	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	14-Jan-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.025
	16-Feb-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.018
	17-Mar-21	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	19-Aug-21	0.001	0.009	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001
	22-Sep-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	13-Oct-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	16-Nov-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001
	15-Dec-21	< 0.001	-	-	-	-	-	-	-
	18-Jan-22	< 0.001	-	-	-	-	-	-	-
	24-Feb-22	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001
	06-Mar-22	< 0.001	0.004	-	-	-	0.002	-	< 0.001
	12-Apr-22	< 0.001	-	-	-	-	-	-	-
	17-Jun-22	< 0.001	-	-	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-
BH12	16-Nov-20	< 0.001	-	-	-	< 0.0001	0.002	-	0.002
	24-Feb-22	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004
	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012
	16-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006
	18-Nov-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.013
	16-Sep-20	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026
	16-Oct-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.013
	16-Nov-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.02
	16-Dec-20	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.011
	14-Jan-21	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006
	16-Feb-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.021
	17-Mar-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.003
	19-Aug-21	< 0.001	0.003	-	-	-	< 0.001	-	0.007
	22-Sep-21	< 0.001	-	-	-	-	-	-	-
	13-Oct-21	< 0.001	-	-	-	-	-	-	-
	16-Nov-21	< 0.001	0.003	-	-	-	< 0.001	-	0.006
	15-Dec-21	< 0.001	-	-	-	-	-	-	-
	18-Jan-22	< 0.001	-	-	-	-	-	-	-
	24-Feb-22	0.002	0.003	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001
	12-Apr-22	0.001	-	-	-	-	-	-	-
	27-May-22	< 0.001	0.002	-	-	-	< 0.001	-	0.004
	17-Jun-22	< 0.001	-	-	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-
BH3	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001

BH8	15-Aug-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	16-Sep-19	0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	15-Oct-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.002
	18-Nov-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002
	16-Sep-20	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.035
	16-Oct-20	0.001	0.009	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	16-Nov-20	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001
	16-Dec-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.001
	14-Jan-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.002
	16-Feb-21	0.001	0.009	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.004
	17-Mar-21	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	19-Aug-21	0.003	0.008	-	-	-	0.002	-	< 0.001
	16-Nov-21	0.001	0.01	-	-	-	0.002	-	< 0.001
	16-Dec-21	-	-	-	-	-	-	-	-
	24-Feb-22	0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	27-May-22	0.001	0.004	-	-	-	0.002	-	< 0.001
BH9	16-Nov-21	< 0.001	-	-	-	-	-	-	-
BH9A	16-Sep-20	< 0.001	0.028	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.004
	16-Oct-20	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	0.001
	16-Nov-20	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	0.001
	16-Dec-20	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001
	14-Jan-21	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.017
	16-Feb-21	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	< 0.001
	17-Mar-21	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001
	19-Aug-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001
	22-Sep-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001
	13-Oct-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001
	16-Nov-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	< 0.001
	15-Dec-21	< 0.001	-	-	-	-	-	-	-
	18-Jan-22	< 0.001	-	-	-	-	-	-	-
	24-Feb-22	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	< 0.001
	12-Apr-22	< 0.001	-	-	-	-	-	-	-
	27-May-22	< 0.001	0.007	-	-	-	< 0.001	-	< 0.001
	17-Jun-22	< 0.001	-	-	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-
MW239S	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002
	16-Jul-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	15-Aug-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	16-Sep-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.003
	18-Nov-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	16-Sep-20	< 0.001	0.016	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002
	16-Oct-20	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	16-Nov-20	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001
	16-Dec-20	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	14-Jan-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.005
	16-Feb-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.01
	17-Mar-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	19-Aug-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	22-Sep-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001
	13-Oct-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	16-Nov-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	15-Dec-21	< 0.001	-	-	-	-	-	-	-
	18-Jan-22	< 0.001	-	-	-	-	-	-	-
	24-Feb-22	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001
	12-Apr-22	< 0.001	-	-	-	-	-	-	-
	27-May-22	< 0.001	0.004	-	-	-	0.002	-	< 0.001
	17-Jun-22	< 0.001	-	-	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-
WPW	19-Aug-21	< 0.001	-	-	-	-	-	-	-
	22-Sep-21	< 0.001	-	-	-	-	-	-	-
	13-Oct-21	< 0.001	-	-	-	-	-	-	-
	16-Nov-21	< 0.001	-	-	-	-	-	-	-
	15-Dec-21	< 0.001	-	-	-	-	-	-	-
	18-Jan-22	< 0.001	-	-	-	-	-	-	-
	24-Feb-22	< 0.001	-	-	-	-	-	-	-
	12-Apr-22	< 0.001	-	-	-	-	-	-	-
	27-May-22	< 0.001	-	-	-	-	-	-	-
	17-Jun-22	< 0.001	-	-	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-

Notes:

- - Not analysed

< - Less than laboratory limit of reporting

mg/L - Milligrams per litre

Bold indicates a detection above the laboratory limit of reporting

" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%

Highlighting indicates an exceedance of the corresponding criteria (highlighting corresponds to the guideline with the highest criteria value where analytical result exceeds more than one guideline)

RPD - Relative Percentage Difference

Criteria:

Metals							
Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
4.1 (8.84 for BH1)	0.001	0.136	0.0001	0.02	0.01	0.01	0.085 (0.1 for BH1)
	0.01	0.5	0.001	0.02	0.01	--	
13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.132
6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.074
7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	0.116
7.96	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.023
8.84	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.034
-	< 0.001	0.007	< 0.0001	< 0.001	< 0.01	< 0.01	0.037
11	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.012
5.48	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.016
5.55	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.017
7.05	< 0.001	0.012	< 0.0001	< 0.001	< 0.01	< 0.01	0.045
3.21	< 0.001	0.011	< 0.0001	0.001	< 0.01	< 0.01	0.077
5.21	< 0.001	0.013	< 0.0001	< 0.001	< 0.01	< 0.01	0.032
3.24	< 0.001	0.015	< 0.0001	< 0.001	< 0.01	< 0.01	0.652
4.0	< 0.001	0.027	< 0.0001	< 0.001	< 0.01	< 0.01	0.596
7.7	< 0.001	0.018	< 0.0001	< 0.001	< 0.01	< 0.01	0.106
0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.024
0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	0.005
0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.007
0.87	< 0.001	0.007	< 0.0001	0.001	< 0.01	< 0.01	0.005
0.79	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.012
-	< 0.001	0.006	< 0.0001	0.003	< 0.01	< 0.01	0.016
0.95	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
0.9	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.009
1.06	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.01
0.84	< 0.001	0.011	< 0.0001	0.002	< 0.01	< 0.01	0.016
1.0	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
0.56	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.018
0.59	< 0.001	0.008	< 0.0001	0.007	< 0.01	< 0.01	0.03
0.2	< 0.001	0.002	< 0.0001	0.003	< 0.01	< 0.01	0.014
0.62	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.047
0.72	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.042
0.69	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.037
0.92	< 0.001	0.002	< 0.0001	0.004	< 0.01	< 0.01	0.036
0.92	-	0.003	-	-	-	-	-
1.06	-	0.003	-	-	-	-	-
1.25	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.036
1.27	-	-	-	0.002	-	-	0.028
1.06	-	0.004	-	-	-	-	-
1.24	-	0.004	-	-	-	-	-
1.03	-	0.004	-	-	-	-	-
-	< 0.001	-	< 0.0001	0.002	-	-	0.017
0.33	< 0.001	0.006	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	0.006
0.08	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.26	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.007
-	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
0.08	< 0.001	0.011	< 0.0001	0.007	< 0.01	< 0.01	0.028
0.07	< 0.001	0.016	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
< 0.05	< 0.001	0.015	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.36	< 0.001	0.015	< 0.0001	< 0.001	< 0.01	< 0.01	0.018
< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
< 0.05	< 0.001	0.016	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
< 0.05	< 0.001	0.009	< 0.0001	0.007	< 0.01	< 0.01	0.017
< 0.05	< 0.001	0.016	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
< 0.05	-	0.015	-	< 0.001	-	-	< 0.005
< 0.05	-	0.013	-	-	-	-	-
0.08	-	0.012	-	-	-	-	-
< 0.05	-	0.012	-	< 0.001	-	-	< 0.005
0.05	-	0.008	-	-	-	-	-
0.49	-	0.012	-	-	-	-	-
< 0.05	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.25	-	0.009	-	-	-	-	-
< 0.05	-	0.006	-	< 0.001	-	-	0.005
< 0.05	-	0.007	-	-	-	-	-
< 0.05	-	0.008	-	-	-	-	-
0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043

0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
< 0.05	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.007
0.19	< 0.001	0.026	< 0.0001	0.002	< 0.01	< 0.01	0.005
-	< 0.001	0.136	< 0.0001	0.002	< 0.01	< 0.01	0.014
< 0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
0.06	< 0.001	0.012	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
0.25	< 0.001	0.021	< 0.0001	0.001	< 0.01	< 0.01	0.018
0.18	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.005
0.46	< 0.001	0.027	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
0.27	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
0.94	< 0.001	0.023	< 0.0001	0.003	< 0.01	< 0.01	0.008
1.39	< 0.001	0.029	< 0.0001	0.002	< 0.01	< 0.01	0.019
0.14	< 0.001	0.022	< 0.0001	0.001	< 0.01	< 0.01	0.013
0.1	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
1.65	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.38	< 0.001	0.021	< 0.0001	0.001	< 0.01	< 0.01	0.006
0.69	-	0.016	-	-	-	-	-
0.52	-	0.018	-	-	-	-	-
0.62	< 0.001	0.017	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
0.27	-	0.017	-	-	-	-	-
< 0.05	-	0.015	-	< 0.001	-	-	< 0.005
< 0.05	-	0.014	-	-	-	-	-
0.09	-	0.014	-	-	-	-	-
1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
1.64	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
2.86	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
2.41	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
2.19	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
2.08	< 0.001	0.012	< 0.0001	0.007	< 0.01	< 0.01	0.035
-	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
1.58	< 0.001	0.009	< 0.0001	0.008	< 0.01	< 0.01	0.073
1.78	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
1.84	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
1.72	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.01
1.64	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
1.06	< 0.001	0.014	< 0.0001	0.002	< 0.01	< 0.01	0.025
1.18	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.012
1.39	< 0.001	0.012	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
0.55	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.55	< 0.001	0.005	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.65	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.83	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.66	-	0.002	-	-	-	-	-
0.7	-	0.003	-	-	-	-	-
0.55	< 0.001	0.001	< 0.0001	< 0.001	< 0.01	< 0.01	0.031
3.24	-	0.016	-	-	-	-	-
3.45	-	0.008	-	< 0.001	-	-	< 0.005
2.7	-	0.005	-	-	-	-	-
2.38	-	0.001	-	-	-	-	-
1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.019
1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
2.0	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.01
2.32	< 0.001	0.035	< 0.0001	0.005	< 0.01	< 0.01	0.013
2.06	< 0.001	0.03	< 0.0001	0.004	< 0.01	< 0.01	0.006
1.66	< 0.001	0.025	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
1.54	< 0.001	0.023	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
1.42	0.001	0.024	< 0.0001	0.02	< 0.01	< 0.01	0.085
-	< 0.001	0.018	< 0.0001	0.003	< 0.01	< 0.01	0.011
1.1	< 0.001	0.015	< 0.0001	0.013	< 0.01	< 0.01	0.053
1.67	< 0.001	0.021	< 0.0001	0.003	< 0.01	< 0.01	0.006
1.49	< 0.001	0.015	< 0.0001	0.003	< 0.01	< 0.01	0.015
1.72	< 0.001	0.023	< 0.0001	0.003	< 0.01	< 0.01	0.006
1.79	< 0.001	0.024	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
1.65	< 0.001	0.025	< 0.0001	0.004	< 0.01	< 0.01	0.017
1.74	< 0.001	0.025	< 0.0001	0.004	< 0.01	< 0.01	0.013
2.28	< 0.001	0.028	< 0.0001	0.005	< 0.01	< 0.01	< 0.005
0.79	< 0.001	0.006	< 0.0001	0.002	< 0.01	< 0.01	0.006
0.62	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
0.69	0.002	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
0.39	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.007
0.47	-	0.002	-	-	-	-	-
0.45	-	0.002	-	-	-	-	-
0.66	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
0.43	-	0.004	-	-	-	-	-
0.52	-	0.004	-	0.002	-	-	0.005
0.56	-	0.004	-	-	-	-	-
0.51	-	0.004	-	-	-	-	-
4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.006
2.6	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	< 0.005

1.72	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
2.06	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
-	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.011
2.49	< 0.001	0.01	< 0.0001	0.013	< 0.01	< 0.01	0.053
3.35	0.001	0.009	< 0.0001	0.009	< 0.01	< 0.01	0.039
3.03	< 0.001	0.007	< 0.0001	0.002	< 0.01	< 0.01	0.012
3.48	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
2.98	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
2.71	< 0.001	0.01	< 0.0001	0.005	< 0.01	< 0.01	0.009
2.99	< 0.001	0.01	< 0.0001	0.006	< 0.01	< 0.01	0.013
3.86	< 0.001	0.01	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
3.72	-	-	-	0.002	-	-	< 0.005
4.23	-	-	-	0.002	-	-	< 0.005
3.78	-	-	-	-	-	-	-
2.98	< 0.001	0.007	< 0.0001	0.002	< 0.01	< 0.01	0.012
1.1	-	-	-	0.001	-	-	< 0.005
< 0.05	-	0.014	-	-	-	-	-
0.14	< 0.001	0.076	< 0.0001	0.002	< 0.01	< 0.01	0.02
0.06	< 0.001	0.042	< 0.0001	0.003	< 0.01	< 0.01	0.016
0.11	< 0.001	0.03	< 0.0001	0.002	< 0.01	< 0.01	0.011
0.31	< 0.001	0.024	< 0.0001	0.002	< 0.01	< 0.01	0.006
0.14	< 0.001	0.025	< 0.0001	0.004	< 0.01	< 0.01	0.011
0.35	< 0.001	0.024	< 0.0001	0.003	< 0.01	< 0.01	0.006
0.27	< 0.001	0.024	< 0.0001	0.002	< 0.01	< 0.01	0.01
0.26	< 0.001	0.03	< 0.0001	0.003	< 0.01	< 0.01	0.006
0.32	< 0.001	0.027	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
0.51	< 0.001	0.033	< 0.0001	0.003	< 0.01	< 0.01	0.021
0.33	< 0.001	0.025	< 0.0001	0.003	< 0.01	< 0.01	0.031
0.48	-	0.025	-	-	-	-	-
0.44	-	0.03	-	-	-	-	-
0.5	< 0.001	0.042	< 0.0001	0.004	< 0.01	< 0.01	0.006
0.48	-	0.038	-	-	-	-	-
0.35	-	0.034	-	0.003	-	-	< 0.005
0.42	-	0.032	-	-	-	-	-
0.16	-	0.019	-	-	-	-	-
1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
0.8	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
1.0	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
0.94	< 0.001	0.006	< 0.0001	0.006	< 0.01	< 0.01	0.032
-	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.011
1.1	< 0.001	0.004	< 0.0001	0.008	< 0.01	< 0.01	0.03
0.51	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.006
1.17	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.005
0.3	< 0.001	0.011	< 0.0001	0.003	< 0.01	< 0.01	0.021
1.06	< 0.001	0.011	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
0.77	< 0.001	0.012	< 0.0001	0.004	< 0.01	< 0.01	0.011
0.92	< 0.001	0.012	< 0.0001	0.009	< 0.01	< 0.01	0.014
0.95	< 0.001	0.01	< 0.0001	0.004	< 0.01	< 0.01	0.009
0.53	< 0.001	0.006	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
0.65	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.01	0.005
0.79	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.016
0.68	< 0.001	0.006	< 0.0001	0.002	< 0.01	< 0.01	0.01
0.77	-	0.005	-	-	-	-	-
0.48	-	0.003	-	-	-	-	-
0.55	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.006
0.93	-	0.007	-	-	-	-	-
0.56	-	0.005	-	0.001	-	-	0.009
0.36	-	0.004	-	-	-	-	-
0.43	-	0.004	-	-	-	-	-
< 0.05	-	0.062	-	-	-	-	-
0.08	-	0.051	-	-	-	-	-
0.22	-	0.079	-	-	-	-	-
0.29	-	0.045	-	-	-	-	-
0.2	-	0.078	-	-	-	-	-
0.56	-	0.038	-	-	-	-	-
1.02	-	0.084	-	-	-	-	-
0.44	-	0.042	-	-	-	-	-
0.07	-	0.038	-	-	-	-	-
0.94	-	0.061	-	-	-	-	-
1.3 *	-	0.038	-	-	-	-	-

BH9A	16-Dec-20	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	14-Jan-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	16-Feb-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	17-Mar-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	19-Aug-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	22-Sep-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	13-Oct-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	16-Nov-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	24-Feb-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	27-May-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	22-Feb-19	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	16-Sep-20	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
MW239S	16-Oct-20	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	16-Nov-20	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	16-Dec-20	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	14-Jan-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	16-Feb-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	17-Mar-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	22-Sep-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	13-Oct-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	16-Nov-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	24-Feb-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	27-May-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	19-Aug-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	22-Sep-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	13-Oct-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	16-Nov-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	15-Dec-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
WPW	18-Jan-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	24-Feb-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	12-Apr-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	27-May-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	17-Jun-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02
	27-Jul-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02

Notes:

- Not analysed

< - Less than laboratory limit of reporting

µg/L - Micrograms per litre

Bold indicates a detection above the laboratory limit of reporting

Highlighting indicates an exceedance of the corresponding criteria (highlighting corresponds to the guideline with the highest criteria value where analytical result exceeds more than one guideline)

Criteria:

Analyte			Metals		
			Arsenic	Iron	Manganese
Units			mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type			
QC02_27072022	27-Jul-22	Trip Blank	< 0.001	< 0.05	< 0.001
QC01_27072022	27-Jul-22	Rinsate	< 0.001	< 0.05	< 0.001
WPW_27072022	27-Jul-22	Primary	< 0.001	0.27	0.038
QW90_27072022	27-Jul-22	Duplicate	< 0.001	0.29	0.038
Relative Percentage Difference			NC	7%	0%
WPW_27072022	27-Jul-22	Primary	< 0.001	0.27	0.038
QW91_07272022	27-Jul-22	Triplicate	< 0.001	1.3	0.038
Relative Percentage Difference			NC	131%	0%

Notes:

< - Less than laboratory limit of reporting

NC - Not calculated

mg/L - Milligrams per litre

Criteria:

Analyte			Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	Perfluorobutanoic acid (PFBA)
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type								
QC02_27072022	27-Jul-22	Trip Blank	< 0.00002	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00002	< 0.00002	< 0.0001
QC01_27072022	27-Jul-22	Rinsate	< 0.00002	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00002	< 0.00002	< 0.0001
WPW_27072022	27-Jul-22	Primary	< 0.00002	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00002	< 0.00002	< 0.0001
QW90_27072022	27-Jul-22	Duplicate	< 0.00002	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00002	< 0.00002	< 0.0001
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
WPW_27072022	27-Jul-22	Primary	< 0.00002	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00002	< 0.00002	< 0.0001
QW91_07272022	27-Jul-22	Triplicate	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC

Notes:

- - Not analysed

< - Less than laboratory limit of reporting

EPA - Environment Protection Authority

NC - Not calculated

mg/L - Milligrams per litre

RPD - Relative Percentage Difference

Criteria:

Perfluorobutanesulfonic acid (PFBS)	Perfluorononane sulfonate (PFNS)	Perfluoropropanesulfonic acid (PFPs)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)
mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
< 0.00002	-	-	< 0.00002	< 0.00001	< 0.00002	< 0.00001	< 0.00002	< 0.00005	< 0.00005
< 0.00002	-	-	< 0.00002	< 0.00001	< 0.00002	< 0.00001	< 0.00002	< 0.00005	< 0.00005
< 0.00002	-	-	< 0.00002	0.00001	< 0.00002	0.00002	< 0.00002	< 0.00005	< 0.00005
< 0.00002	-	-	< 0.00002	< 0.00001	< 0.00002	< 0.00001	< 0.00002	< 0.00005	< 0.00005
NC	NC	NC	NC	0%	NC	67%	NC	NC	NC
< 0.00002	-	-	< 0.00002	0.00001	< 0.00002	0.00002	< 0.00002	< 0.00005	< 0.00005
< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00001	< 0.00001	0.00002	< 0.00001	< 0.00001	< 0.00005
NC	NC	NC	NC	0%	NC	0%	NC	NC	NC

8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Sum of PFAS (WA DER List)	Sum of PFAS
mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
< 0.00005	< 0.00005	< 0.00001	-	-	< 0.00001	< 0.00001
< 0.00005	< 0.00005	< 0.00001	-	-	< 0.00001	< 0.00001
< 0.00005	< 0.00005	0.00003	-	-	0.00003	0.00003
< 0.00005	< 0.00005	< 0.00001	-	-	< 0.00001	< 0.00001
NC	NC	100%	NC	NC	100%	100%
< 0.00005	< 0.00005	0.00003	-	-	0.00003	0.00003
< 0.00001	< 0.00001	0.00003	0.00002	0.00003	< 0.00005	< 0.0001
NC	NC	0%	NC	NC	50%	108%

		param_code param_unit	DO mg/L	ORP mV	PH pH units	SC mS/cm
Sample Name	order	measurement_date	param_value	param_value	param_value	param_value
BH11-072722	BH11	27/07/2022	4.74	-39	4.2	0.158
BH2-072722	BH2	27/07/2022	5.85	223	4.13	0.0876
BH4-072722	BH4	27/07/2022	3	190.7	4.6	0.0902
BH6-072722	BH6	27/07/2022	4.75	-104	4.76	0.225
BH7-072722	BH7	27/07/2022	4.21	26	4.43	0.117
BH9A-072722	BH9A	27/07/2022	4.93	208.5	4.11	0.1828
MW239S-072722	MW239S	27/07/2022	4	-71	4.32	0.125
WPW-072722	WPW	27/07/2022	12.99	169	4.58	0.240

TEMP deg C	TURB NTU
param_value	param_value
14	9.7
15.6	131
14.1	121
14.2	16.8
14.3	489
16.6	52
14.2	175
14.3	9938

sys_loc_code	measurement_date	Well Depth (m)	TOC (mAHD)	Water Table Elevatic	DTW (mBTOC)	Dry Indicator (Y/N)
BH1	27/07/2022	8.21	--	--	3.836	N
BH11	27/07/2022	5.28	--	--	0.793	N
BH2	27/07/2022	8.94	--	--	3.893	N
BH4	27/07/2022	5.98	--	--	0.764	N
BH6	27/07/2022	4.51	--	--	0.706	N
BH7	27/07/2022	4.5	--	--	0.906	N
BH9	27/07/2022	16.19	--	--	15.041	N
BH9A	27/07/2022	12.44	--	--	8.202	N
MW239S	27/07/2022	3.8	--	--	0.53	N
WPW	27/07/2022	--	--	--	--	--

DNAPL (mBTOC)	DNAPL Thickness (m)	LNAPL (mBTOC)	LNAPL Thickness (m)	remark	technician
ND	0	ND	ND		M Ferguson
ND	0	ND	ND	Strong Odor, Light yellow	M Ferguson
ND	0	ND	ND	Clear	M Ferguson
ND	0	ND	ND	Clear	M Ferguson
ND	0	ND	ND	Odor, Clear	M Ferguson
ND	0	ND	ND	Weak Odor, Light yellow	M Ferguson
ND	0	ND	ND		M Ferguson
ND	0	ND	ND	Weak Odor, Clear	M Ferguson
ND	0	ND	ND	Strong Odor, Light yellow	M Ferguson
ND	ND	ND	ND	Dark cloudy brown	M Ferguson

PERMIT TO WORK



DETAILS PTW

Work Location	WSS - across site.	Date: 27/7/22	Permit Ref No:
		Time Start: 7:30	Finish:
Details Description of Work	Scope of the work:	Groundwater monitoring / sampling.	
	Equipment to be worked on:		
	Expected duration and other relevant information:		

TYPE OF WORK REQUESTED (all applicable)

		<u>Permit Status</u>	THE JOB IS BEING DONE BY:
<input type="checkbox"/> Energy Isolation	→	<input type="checkbox"/> LIVE <input type="checkbox"/> Closed	<input type="checkbox"/> Newcastle Sand
<input type="checkbox"/> Hot Work	→	<input type="checkbox"/> LIVE <input type="checkbox"/> Closed	<input checked="" type="checkbox"/> Contractor – Company name: <u>Kleinfelder</u>
<input type="checkbox"/> Work at Heights	→	<input type="checkbox"/> LIVE <input type="checkbox"/> Closed	
<input type="checkbox"/> Excavation	→	<input type="checkbox"/> LIVE <input type="checkbox"/> Closed	
<input type="checkbox"/> Confined Space	→	<input type="checkbox"/> LIVE <input type="checkbox"/> Closed	
<input checked="" type="checkbox"/> OTHER: groundwater sampling.			Permit Authoriser must sign with his initials, verifying that: <ul style="list-style-type: none"> • A SWMS is attached (or suitable SWP) • The SWMS (or suitable SWP) covers all types of work requested on the left; and • The SWMS (or suitable SWP) was reviewed by the workers



WHEN A WORK PERMIT REQUIRES AN ADDITIONAL DOCUMENTATION, IT MUST BE ATTACHED AS PART OF THE PTW AUTHORISATION.

E.g. for work on High Voltage equipment, work above water, other.

The PERMIT AUTHORISER signs with their initials, VERIFYING that the required additional HRW(s) is ATTACHED, together with the relevant SWMS / SWP.

AUTHORISATION TO PROCEED

PERMIT HOLDER - Signs acknowledging that they are responsible for the work described in this PTW and has ensured that:

Risk controls described throughout this PTW (including following pages) and attached SWMS/SWP have been implemented.

Date: 27/7/22 Time: 7:30am

Signed: Megan Ferguson

Name: Megan Ferguson

PERMIT AUTHORISER - Signs authorising the work to proceed after having:

Inspected the work area; and

Verified that risk controls indicated throughout this PTW (including following pages) and attached SWMS/SWP have been implemented.

Date: 27/7/22 Time: 7:30am

Signed: Elliott Lawer

Name: Elliott Lawer

EQUIPMENT CERTIFICATION REPORT

PGN9003871 WATER QUALITY METER – MULTIFUNCTION (YSI)

Plant Number: 1090142

SENSOR	CONCENTRATION	SPAN 1	SPAN 2	TRACEABILITY	PASS
pH	pH 4	pH 4		380832	<input checked="" type="checkbox"/>
pH	pH 7	pH 7		384901	<input checked="" type="checkbox"/>
Conductivity	1288 mS/cm	1288 mS/cm		381242	<input checked="" type="checkbox"/>
Dissolved Oxygen	Sodium Sulphite / Air	0.0ppm in Sodium Sulphite	101 ppm Saturation in Air	12110	<input checked="" type="checkbox"/>
ORP	240mV	240mV	Zobell Part A	375760	<input checked="" type="checkbox"/>
Turbidity	0 NTU	0 NTU	Zobell Part B	394424	<input checked="" type="checkbox"/>
Turbidity	90 NTU	90 NTU		386474	<input checked="" type="checkbox"/>

Battery Status <u>82</u> (%)	Temperature <u>16.5</u> °C
Electrical Test & Tag (AS/NZS 3760)	Electrodes Cleaned and Checked

Note: Calibration solution traceability information is available upon request.

Please clean/decontaminate instrument and accessories before returning. A minimum 'Cleaning Fee' \$55.00 (Inc GST) may apply if instrument is returned contaminated.

Checked By: BEN Atwell Date: 20/07/22 Signed: [Signature]

Accessories List:

User's Manual	pH and ORP Storage Solution	Transit Case



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HYDRASLEEVE™ SAMPLING LOG

Project Number:	Date:	Site Address:
20222347	27/7	Cabbage Tree Rd, Williamsrun.
Site Name:	Field Manager:	Weather Observations:
WSS	M F	Clear, windy

* QW90 & QW91 = WPLW

$\neq Q(0) = \text{rinsatz}$

CO_2 = trip blank.



ATTACHMENT 3: LAB RESULTS



CERTIFICATE OF ANALYSIS

Work Order	: ES2226511	Page	: 1 of 8
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: Megan Ferguson	Contact	: Graeme Jablonskas
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9609
Project	: 20222347	Date Samples Received	: 27-Jul-2022 14:25
Order number	: ----	Date Analysis Commenced	: 28-Jul-2022
C-O-C number	: ----	Issue Date	: 03-Aug-2022 15:11
Sampler	: Megan Ferguson		
Site	: WSS - Cabbage Tree Rd water Monitoring July 2022		
Quote number	: EN/222		
No. of samples received	: 11		
No. of samples analysed	: 11		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

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



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

General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

∅ = 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.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH2	BH4	BH6	BH7	BH9A	
Compound	CAS Number	LOR	Unit	Sampling date / time	27-Jul-2022 00:00				
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.008	0.014	0.001	0.004	0.019	
Iron	7439-89-6	0.05	mg/L	<0.05	0.09	2.38	0.51	0.16	

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH11	MW239S	WPW	QW90	QC01	
Compound	CAS Number	LOR	Unit	Sampling date / time	27-Jul-2022 00:00				
					ES2226511-006	ES2226511-007	ES2226511-008	ES2226511-009	ES2226511-011
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.038	0.038	<0.001	
Iron	7439-89-6	0.05	mg/L	1.03	0.43	0.27	0.29	<0.05	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	---	---	0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	---	---	0.02	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	---	---	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	---	---	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDaDA)	307-55-1	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	---	---	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	---	---	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	BH11	MW239S	WPW	QW90	QC01	
Compound	CAS Number	LOR	Sampling date / time	27-Jul-2022 00:00				
			Unit	ES2226511-006	ES2226511-007	ES2226511-008	ES2226511-009	ES2226511-011
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	---	---	<0.05	<0.05	<0.05
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	---	---	<0.05	<0.05	<0.05
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	---	---	<0.05	<0.05	<0.05
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	---	---	<0.05	<0.05	<0.05
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	---	---	<0.02	<0.02	<0.02
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	---	---	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	---	---	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	---	---	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	---	---	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	---	---	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	---	0.01	µg/L	---	---	0.03	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	---	---	0.03	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L	---	---	0.03	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	---	0.02	%	---	---	101	98.4	98.2
13C8-PFOA	---	0.02	%	---	---	90.7	95.0	96.7

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	QC02	---	---	---	---	---	
Compound	CAS Number	LOR	Unit	Sampling date / time	27-Jul-2022 00:00	---	---	---	---
				Result	ES2226511-012	-----	-----	-----	-----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	---	---	---	---	---
Manganese	7439-96-5	0.001	mg/L	<0.001	---	---	---	---	---
Iron	7439-89-6	0.05	mg/L	<0.05	---	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	---	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	---	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	---	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	---	---	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	---	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorododecanoic acid (PFDaDA)	307-55-1	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	---	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID	QC02	---	---	---	---	---
Compound	CAS Number	LOR	Sampling date / time	27-Jul-2022 00:00	---	---	---	---
			Unit	ES2226511-012	-----	-----	-----	-----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	---	---	---	---
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	---	---	---	---
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	---	---	---	---
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	---	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	---	---	---	---
EP231P: PFAS Sums								
Sum of PFAS	---	0.01	µg/L	<0.01	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	---	---	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L	<0.01	---	---	---	---
EP231S: PFAS Surrogate								
13C4-PFOS	---	0.02	%	106	---	---	---	---
13C8-PFOA	---	0.02	%	98.0	---	---	---	---

Surrogate Control Limits

Sub-Matrix: WATER

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

QUALITY CONTROL REPORT

Work Order	: ES2226511	Page	: 1 of 7
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: Megan Ferguson	Contact	: Graeme Jablonskas
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9609
Project	: 20222347	Date Samples Received	: 27-Jul-2022
Order number	: ----	Date Analysis Commenced	: 28-Jul-2022
C-O-C number	: ----	Issue Date	: 03-Aug-2022
Sampler	: Megan Ferguson		
Site	: WSS - Cabbage Tree Rd water Monitoring July 2022		
Quote number	: EN/222		
No. of samples received	: 11		
No. of samples analysed	: 11		

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

This Quality Control Report contains the following information:

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

Signatories

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

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



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

General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4491983)									
ES2226472-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.018	0.017	0.0	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.07	0.06	0.0	No Limit
ES2226773-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.15	0.15	0.0	0% - 50%
EG020T: Total Metals by ICP-MS (QC Lot: 4492001)									
ES2226574-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.16	0.17	0.0	No Limit
ES2226726-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4493914)									
EP2209384-006	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2226349-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4493914) - continued									
ES2226349-001	Anonymous	EP231X: Perfluoroheptane sulfonic acid (PFHps)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4493914)									
EP2209384-006	Anonymous	EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PPPeA)	2706-90-3	0.02	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.08	0.08	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2226349-001	Anonymous	EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PPPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4493914)									
EP2209384-006	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2226349-001	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4493914) - continued									
ES2226349-001	Anonymous	EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4493914)									
EP2209384-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.05	0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2226349-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4493914)									
EP2209384-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.22	0.22	0.0	0% - 20%
ES2226349-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

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

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

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
EG020F: Dissolved Metals by ICP-MS (QCLot: 4491983)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.3	85.0	114
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.9	82.0	110
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	90.6	82.0	112
EG020T: Total Metals by ICP-MS (QCLot: 4492001)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.2	82.0	114
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.5	85.0	113
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.4	85.0	117
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4493914)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	109	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	95.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	93.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	102	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4493914)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	96.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	107	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	112	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	91.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4493914)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	119	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	92.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	86.4	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	97.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	93.0	57.6	145

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
					LCS	Low	High	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4493914) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	95.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4493914)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	92.2	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	82.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	112	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	81.4	71.4	144

Matrix Spike (MS) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	Spike Recovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4491983)							
ES2226472-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	91.3	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	92.4	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4492001)							
ES2226461-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	96.8	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	100	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4493914)							
ES2226349-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	100	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	91.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	103	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	92.8	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	93.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	91.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4493914)							
ES2226349-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	92.0	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	98.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	103	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	100	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	109	71.0	129

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike	Spike Recovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4493914) - continued							
ES2226349-002	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	102	69.0	133
		EP231X: Perfluorododecanoic acid (PFDaDA)	307-55-1	0.25 µg/L	107	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	89.6	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	100	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4493914)							
ES2226349-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	118	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	103	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	90.4	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	88.1	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	99.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	98.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	91.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4493914)							
ES2226349-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	92.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	72.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	110	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	82.6	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2226511	Page	: 1 of 4
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: Megan Ferguson	Telephone	: +6138549 9609
Project	: 20222347	Date Samples Received	: 27-Jul-2022
Site	: WSS - Cabbage Tree Rd water Monitoring July 2022	Issue Date	: 03-Aug-2022
Sampler	: Megan Ferguson	No. of samples received	: 11
Order number	: ----	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

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

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2, BH6, BH9A, MW239S, QW90,	BH4, BH7, BH11, WPW, QC01	27-Jul-2022	----	----	---	02-Aug-2022	23-Jan-2023	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) QC02		27-Jul-2022	02-Aug-2022	23-Jan-2023	✓	02-Aug-2022	23-Jan-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) WPW, QC01,	QW90, QC02	27-Jul-2022	03-Aug-2022	23-Jan-2023	✓	03-Aug-2022	23-Jan-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) WPW, QC01,	QW90, QC02	27-Jul-2022	03-Aug-2022	23-Jan-2023	✓	03-Aug-2022	23-Jan-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) WPW, QC01,	QW90, QC02	27-Jul-2022	03-Aug-2022	23-Jan-2023	✓	03-Aug-2022	23-Jan-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) WPW, QC01,	QW90, QC02	27-Jul-2022	03-Aug-2022	23-Jan-2023	✓	03-Aug-2022	23-Jan-2023	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) WPW, QC01,	QW90, QC02	27-Jul-2022	03-Aug-2022	23-Jan-2023	✓	03-Aug-2022	23-Jan-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: WATER

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

Quality Control Sample Type	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Dissolved Metals by ICP-MS - Suite A		EG020A-F	2	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
Total Metals by ICP-MS - Suite A		EG020A-T	2	18	11.11	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Metals by ICP-MS - Suite A		EG020A-F	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
Total Metals by ICP-MS - Suite A		EG020A-T	1	18	5.56	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Metals by ICP-MS - Suite A		EG020A-F	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
Total Metals by ICP-MS - Suite A		EG020A-T	1	18	5.56	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Metals by ICP-MS - Suite A		EG020A-F	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
Total Metals by ICP-MS - Suite A		EG020A-T	1	18	5.56	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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. 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.
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.

<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
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.



web: www.eurofins.com.au

email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road Dandenong South VIC 3175	19/8 Lewalan Street Grovedale VIC 3216	179 Magowar Road Girraween NSW 2145	Unit 1,2 Dacre Street Mitchell ACT 2911	1/21 Smallwood Place Murarrie QLD 4172	4/52 Industrial Drive Mayfield East NSW 2304 PO Box 60 Wickham 2293
Tel: +61 3 8564 5000 NATA# 1261 Site# 1254	Tel: +61 3 8564 5000 NATA# 1261 Site# 1254	Tel: +61 2 9900 8400 NATA# 1261 Site# 1254	Tel: +61 2 6113 8091 NATA# 1261 Site# 18217	Tel: +61 7 3902 4600 NATA# 1261 Site# 20794	Tel: +61 2 4968 8448 NATA# 1261 Site# 25079

Eurofins ARL Pty Ltd

ABN: 91 05 0159 898

Perth	Auckland	Christchurch
46-48 Banksia Road Welshpool WA 6106	35 O'Rorke Road Penrose, Auckland 1061	43 Detroit Drive Rolleston, Christchurch 7675
Tel: +61 8 6253 4444 IANZ# 1327	Tel: +61 2 4968 8448 NATA# 2377 Site# 2370	Tel: 0800 856 450 IANZ# 1290

Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

Auckland	Christchurch
35 O'Rorke Road Penrose, Auckland 1061	43 Detroit Drive Rolleston, Christchurch 7675
Tel: +64 9 526 45 51 IANZ# 1327	Tel: 0800 856 450 IANZ# 1290

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)**Address:** Suite 3, 240-244 Pacific Hwy
Charlestown
NSW 2290**Project Name:** WSS - CABBAGE TREE RD WATER MONITORING JULY 2022
Project ID: 20222347**Order No.:****Report #:** 910012
Phone: 02 4949 5200
Fax:**Received:** Jul 28, 2022 3:51 PM
Due: Aug 4, 2022
Priority: 5 Day
Contact Name: M Ferguson

Eurofins Analytical Services Manager : Andrew Black

Arsenic (filtered)	Iron (filtered)	Manganese (filtered)
---------------------------	------------------------	-----------------------------

Sample Detail**Sydney Laboratory - NATA # 1261 Site # 18217****External Laboratory**

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	QW91	Jul 27, 2022		Water	S22-JI0061156	X	X	X
						1	1	1

Test Counts

Environment Testing

Kleinfelder Australia Pty Ltd (NEWC)
 Suite 3, 240-244 Pacific Hwy
 Charlestown
 NSW 2290



NATA Accredited
 Accreditation Number 1261
 Site Number 20794

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

Attention: M Ferguson

Report 910012-W
 Project name WSS - CABBAGE TREE RD WATER MONITORING JULY 2022
 Project ID 20222347
 Received Date Jul 28, 2022

Client Sample ID			QW91
Sample Matrix			Water
Eurofins Sample No.			S22-JI0061156
Date Sampled			Jul 27, 2022
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	1.3
Manganese (filtered)	0.005	mg/L	0.038
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	112
13C5-PFPeA (surr.)	1	%	129
13C5-PFHxA (surr.)	1	%	128
13C4-PFHpA (surr.)	1	%	101
13C8-PFOA (surr.)	1	%	113
13C5-PFNA (surr.)	1	%	120
13C6-PFDA (surr.)	1	%	79
13C2-PFUnDA (surr.)	1	%	96
13C2-PFDoDA (surr.)	1	%	52
13C2-PFTeDA (surr.)	1	%	36
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05

Client Sample ID			QW91
Sample Matrix			Water
Eurofins Sample No.			S22-JI0061156
Date Sampled			Jul 27, 2022
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	60
D3-N-MeFOSA (surr.)	1	%	33
D5-N-EtFOSA (surr.)	1	%	31
D7-N-MeFOSE (surr.)	1	%	45
D9-N-EtFOSE (surr.)	1	%	34
D5-N-EtFOSAA (surr.)	1	%	41
D3-N-MeFOSAA (surr.)	1	%	70
Perfluoroalkyl sulfonic acids (PFASs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	^{N09} 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	0.02
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	115
18O2-PFHxS (surr.)	1	%	116
13C8-PFOS (surr.)	1	%	107
n:2 Fluorotelomer sulfonic acids (n:2 FTAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	94
13C2-6:2 FTSA (surr.)	1	%	135
13C2-8:2 FTSA (surr.)	1	%	118
13C2-10:2 FTSA (surr.)	1	%	58
PFASs Summations			
Sum (PFHxS + PFOS)*	0.01	ug/L	0.03
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.02
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.03
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 is reported.

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals (filtered)	Sydney	Aug 03, 2022	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Aug 02, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Aug 02, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Aug 02, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Aug 02, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			



web: www.eurofins.com.au

email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road Dandenong South VIC 3175	19/8 Lewalan Street Grovedale VIC 3216	179 Magowar Road Girraween NSW 2145	Unit 1,2 Dacre Street Mitchell ACT 2911	1/21 Smallwood Place Murarrie QLD 4172	4/52 Industrial Drive Mayfield East NSW 2304 PO Box 60 Wickham 2293
Tel: +61 3 8564 5000 NATA# 1261 Site# 1254	Tel: +61 3 8564 5000 NATA# 1261 Site# 1254	Tel: +61 2 9900 8400 NATA# 1261 Site# 1254	Tel: +61 2 6113 8091 NATA# 1261 Site# 18217	Tel: +61 7 3902 4600 NATA# 1261 Site# 20794	Tel: +61 2 4968 8448 NATA# 1261 Site# 25079

Eurofins ARL Pty Ltd

ABN: 91 05 0159 898

Perth	Auckland	Christchurch
46-48 Banksia Road Welshpool WA 6106	35 O'Rorke Road Penrose, Auckland 1061	43 Detroit Drive Rolleston, Christchurch 7675
Tel: +61 8 6253 4444 IANZ# 1327	Tel: +61 2 4968 8448 NATA# 2377 Site# 2370	Tel: 0800 856 450 IANZ# 1290

Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

Auckland	Christchurch
35 O'Rorke Road Penrose, Auckland 1061	43 Detroit Drive Rolleston, Christchurch 7675
Tel: +64 9 526 45 51 IANZ# 1327	Tel: 0800 856 450 IANZ# 1290

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)**Address:** Suite 3, 240-244 Pacific Hwy
Charlestown
NSW 2290**Project Name:** WSS - CABBAGE TREE RD WATER MONITORING JULY 2022**Project ID:** 20222347**Order No.:****Report #:** 910012
Phone: 02 4949 5200
Fax:**Received:** Jul 28, 2022 3:51 PM
Due: Aug 4, 2022
Priority: 5 Day
Contact Name: M Ferguson

Eurofins Analytical Services Manager : Andrew Black

Sample Detail

Arsenic (filtered)	Iron (filtered)	Manganese (filtered)
--------------------	-----------------	----------------------

Sydney Laboratory - NATA # 1261 Site # 18217**External Laboratory**

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	Arsenic (filtered)	Iron (filtered)	Manganese (filtered)
1	QW91	Jul 27, 2022		Water	S22-JI0061156	X	X	X
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

µg/L: micrograms per litre

ppm: parts per million

ppb: parts per billion

%: Percentage

org/100 mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

QC - Acceptance Criteria

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

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

Results <10 times the LOR: No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluoroctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluoroctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
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-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluoronananesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluoroctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTsAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	90			80-120	Pass	
Iron (filtered)	%	94			80-120	Pass	
Manganese (filtered)	%	85			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	124			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Perfluoropentanoic acid (PFPeA)	%	98			50-150	Pass		
Perfluorohexanoic acid (PFHxA)	%	91			50-150	Pass		
Perfluoroheptanoic acid (PFHpA)	%	94			50-150	Pass		
Perfluorooctanoic acid (PFOA)	%	78			50-150	Pass		
Perfluorononanoic acid (PFNA)	%	85			50-150	Pass		
Perfluorodecanoic acid (PFDA)	%	84			50-150	Pass		
Perfluoroundecanoic acid (PFUnDA)	%	96			50-150	Pass		
Perfluorododecanoic acid (PFDODA)	%	100			50-150	Pass		
Perfluorotridecanoic acid (PFTrDA)	%	125			50-150	Pass		
Perfluorotetradecanoic acid (PFTeDA)	%	111			50-150	Pass		
LCS - % Recovery								
Perfluoroalkyl sulfonamido substances								
Perfluorooctane sulfonamide (FOSA)	%	81			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	94			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	88			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	80			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	96			50-150	Pass		
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	79			50-150	Pass		
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	89			50-150	Pass		
LCS - % Recovery								
Perfluoroalkyl sulfonic acids (PFSAs)								
Perfluorobutanesulfonic acid (PFBS)	%	77			50-150	Pass		
Perfluorononanesulfonic acid (PFNS)	%	83			50-150	Pass		
Perfluoropropanesulfonic acid (PPPrS)	%	110			50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)	%	131			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	%	88			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	%	103			50-150	Pass		
Perfluorooctanesulfonic acid (PFOS)	%	90			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	58			50-150	Pass		
LCS - % Recovery								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	86			50-150	Pass		
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	83			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	89			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	92			50-150	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Heavy Metals				Result 1				
Arsenic (filtered)	S22-JI0027948	NCP	%	84			75-125	Pass
Iron (filtered)	S22-JI0026248	NCP	%	84			75-125	Pass
Manganese (filtered)	S22-JI0026248	NCP	%	88			75-125	Pass
Spike - % Recovery								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1				
Perfluorobutanoic acid (PFBA)	S22-JI0061156	CP	%	129			50-150	Pass
Perfluoropentanoic acid (PFPeA)	S22-JI0061156	CP	%	85			50-150	Pass
Perfluorohexanoic acid (PFHxA)	S22-JI0061156	CP	%	95			50-150	Pass
Perfluoroheptanoic acid (PFHpA)	S22-JI0061156	CP	%	94			50-150	Pass
Perfluorooctanoic acid (PFOA)	S22-JI0061156	CP	%	84			50-150	Pass
Perfluorononanoic acid (PFNA)	S22-JI0061156	CP	%	88			50-150	Pass
Perfluorodecanoic acid (PFDA)	S22-JI0061156	CP	%	97			50-150	Pass
Perfluoroundecanoic acid (PFUnDA)	S22-JI0061156	CP	%	95			50-150	Pass
Perfluorododecanoic acid (PFDODA)	S22-JI0061156	CP	%	89			50-150	Pass

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorotridecanoic acid (PFTDA)	S22-JI0061156	CP	%	112			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S22-JI0061156	CP	%	85			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances					Result 1				
Perfluoroctane sulfonamide (FOSA)	S22-JI0061156	CP	%	68			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S22-JI0061156	CP	%	78			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S22-JI0061156	CP	%	65			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S22-JI0061156	CP	%	50			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S22-JI0061156	CP	%	82			50-150	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	S22-JI0061156	CP	%	73			50-150	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	S22-JI0061156	CP	%	72			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)					Result 1				
Perfluorobutanesulfonic acid (PFBS)	S22-JI0061156	CP	%	73			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S22-JI0061156	CP	%	93			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S22-JI0061156	CP	%	91			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S22-JI0061156	CP	%	120			50-150	Pass	
Perfluorohexamersulfonic acid (PFHxS)	S22-JI0061156	CP	%	90			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S22-JI0061156	CP	%	101			50-150	Pass	
Perfluoroctanesulfonic acid (PFOS)	S22-JI0061156	CP	%	89			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S22-JI0061156	CP	%	52			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					Result 1				
1H.1H.2H.2H-perfluorohexamersulfonic acid (4:2 FTSA)	S22-JI0061156	CP	%	92			50-150	Pass	
1H.1H.2H.2H-perfluoroctanesulfonic acid(6:2 FTSA)	S22-JI0061156	CP	%	90			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S22-JI0061156	CP	%	92			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S22-JI0061156	CP	%	75			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals					Result 1	Result 2	RPD		
Arsenic (filtered)	S22-JI0057945	NCP	mg/L	0.003	0.003	6.7	30%	Pass	
Iron (filtered)	S22-JI0061156	CP	mg/L	1.3	1.3	4.3	30%	Pass	
Manganese (filtered)	S22-JI0061156	CP	mg/L	0.038	0.040	4.1	30%	Pass	

Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	S22-Au0000285	NCP	ug/L	0.02	0.02	2.9	30%	Pass
Perfluorononanoic acid (PFNA)	S22-Au0000285	NCP	ug/L	0.06	0.06	5.7	30%	Pass
Perfluorodecanoic acid (PFDA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDsDA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTsDA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTsDA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	S22-Au0000285	NCP	ug/L	0.12	0.12	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	S22-Au0000285	NCP	ug/L	0.03	0.03	3.4	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	S22-JI0057945	NCP	ug/L	0.20	0.20	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTsAs)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	S22-Au0000285	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S22-Au0000285	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S22-Au0000285	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
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

Quinn Raw	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal
Jonathon Angell	Senior Analyst-PFAS



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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ATTACHMENT 4: DATA TRENDS

