

Monthly Water Monitoring Results, Cabbage Tree Road Sand Quarry, NSW January 2023 Monitoring Event

NCA23R149782
09 February 2023



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

Attention: Darren Williams

Subject: Monthly Water Monitoring Results, Cabbage Tree
Road Sand Quarry, NSW
January 2023 Monitoring Event

Please find enclosed the monthly water quality monitoring results for the January 2023 monitoring event undertaken by Kleinfelder at the Cabbage Tree Road Sand Quarry, NSW (herein referred to as the 'site').

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 January 2023 monitoring event included gauging of 10 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) for the quarry.

2 SITE WORK

The monthly monitoring round was conducted on the 17th of January 2023 and comprised:

- Gauging of 10 monitoring wells (BH1A, BH2, BH4, BH6, BH7, BH9, BH9A, BH11, BH12A & MW239S).
- 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 sample was collected directly into laboratory supplied sample containers using a nitrile-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 (January 2023)

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
Metals*	8	1	1	1	1
PFAS (28 analytes, standard level)	1	1	1	1	1

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

Table 2 provides a summary of the gauging data for January 2023. 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 well BH1A has triggered the TARP rules outlined below in **Table 3**, weekly monitoring of groundwater levels is required at this location until water levels decline to >0.5m below the inferred maximum historical level listed in **Table 2**. WSS personnel currently undertake any additional weekly gauging outside of the prescribed monthly compliance monitoring requirements.

Table 2: Summary of Gauging Data (January 2023)

Well ID	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
BH1A	8.98	4.838	4.142	12.181	N/A	4.5 ²	0.358	Gauge only
BH2	7.79	4.873	2.917	8.93	9.45	3.8	0.883	Brown, no odour / sheen, well in good condition
BH4	3.06	1.299	1.761	6.006	6.45	3.0 ³	1.239	Clear, no odour / sheen, well in good condition
BH5	7.36	-	-	-	9.28	4.0	-	N/A
BH6	3.62	1.239	2.381	4.52	4.95	4.4	2.019	Yellow, moderate sulphur odour, no sheen, well in good condition
BH7	2.98	1.396	1.584	4.51	4.95	3.7	2.116	Light yellow, moderate sulphur odour, no sheen, well in good condition
BH8	3.88	-	-	-	6.28	4.0	-	N/A
BH9	17.75	15.855	1.895	16.24	18.8	3.0 ³	1.105	Gauge only
BH9A	10.75	8.869	1.881	12.264	16.16	3.0 ³	1.119	Light brown, moderate sulphur odour, no sheen, well in good condition
BH10	6.69	-	-	-	5.45	4.9	-	N/A



BH11	6.63	1.794	4.836	5.3	5.95	5.5	0.664	Light brown, moderate sulphur odour, no sheen, well in good condition
BH12A	5.62	2.713	2.907	7.327	NA	4.0 ⁵	1.093	Gauge only
MW239S	3.04	1.032	2.008	3.618	4.0	3.9 ⁴	1.892	Light brown, strong sulphur odour, no sheen, well in good condition
MW239D	3.04	-	-	-	20.49	3.9 ³	-	N/A
SW01*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW02*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW03*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW04*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

* 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 former adjacent well (BH1).

³ – Inferred Max Groundwater level based on adjacent wells (BH4 & BH9).

⁴ – Inferred Max Groundwater level based on adjacent well (MW239S).

⁵ – Inferred Max Groundwater level based on former adjacent well (BH12).

N/A – Not applicable/gauging & sampling not required.



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

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



Table 4 provides a summary of the field parameters taken during the January 2023 monitoring event. All field parameters for each monitoring location are detailed in the field sheets provided in **Attachment 2**. The measured field pH for BH6 (3.82) was outside the site-specific trigger value range (4.2-6.5) outlined in the SWMP (July 2021). BH6 is considered upgradient from current site operations, therefore, the results are indicative of natural background fluctuations.

Table 4: Summary of Field Measurements

Borehole	Turbidity (NTU)	Temp (°C)	DO (mg/L)	EC (µc/cm)	TDS (mg/L)	pH	Redox (mV)
BH1A	ND	ND	ND	ND	ND	ND	ND
BH2	240.6	21.7	3.88	75.6	49.14	4.69	211.3
BH4	8	20.9	1.89	128.8	91	5.31	159.5
BH6	34.06	24.5	2.46	245.5	162	3.82	-7
BH7	15.49	22	2.98	74.1	51	4.49	38
BH9	ND	ND	ND	ND	ND	ND	ND
BH9A	32.2	21.4	1.94	107.4	75	4.73	111.5
BH11	5.8	23.9	2.16	133.5	89	4.31	-80.5
BH12A	ND	ND	ND	ND	ND	ND	ND
MW239S	105.4	23.6	2.61	100.2	67	4.52	-9.4
WPW	415	26.5	8.24	264.1	167	4.69	195.3

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 sample results for PFAS analytes in water. The site-specific groundwater criteria outlined in the SWMP (7 July 2021) has been applied to this monthly report including a comparison of results with previous data.

Full results summary tables, including quality assurance/quality control (QA/QC) sample analyses, are provided in **Tables 1 – 5, Attachment 2**. Field QA/QC samples collected by Kleinfelder did not detect any analyte above the laboratory LOR. 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 (January 2023)

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 BH1A)	0.136	
Samples				
BH1A	NS	NS	NS	Metals for BH1A were not analysed - gauge only.
BH2	<0.001	0.12	0.005	Metal concentrations were generally consistent with historical results and remain below the adopted criteria. BH2 is located marginally down hydraulic gradient from the current quarry operations footprint.
BH4	<0.001	0.12	0.022	Metal concentrations were generally consistent with historical variations and remain below the adopted criteria. BH4 is located down hydraulic gradient (approximately 700 m) from current quarry operations and on the southernmost boundary of the site adjacent to Cabbage Tree Road.
BH6	<0.001	3.61	0.014	Metal concentrations are generally consistent with historical results and remain below the adopted criteria. BH6 is considered up hydraulic gradient (approximately 860 m) from current quarry operations and the most north-eastern location at the site.
BH7	<0.001	0.29	0.002	Metal concentrations were generally consistent with historical results and are below the adopted criteria. BH7 is located (approximately 960 m) east of the current quarry operations.
BH8	NS	NS	NS	BH8 was not included in the scope for this round.
BH9	NS	NS	NS	Metals for BH9 were not analysed - gauge only.
BH9A	<0.001	0.49	0.035	Metal concentrations were generally consistent with historical results and below the adopted criteria. BH9A is down gradient (approximately 700m) from current quarry operations and is on the southern-most boundary of the site adjacent to Cabbage Tree Road.
BH10	NS	NS	NS	BH10 was not included in the scope for this round.



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 BH1A)	0.136	
BH11	<0.001	0.86	0.003	Metal concentrations were generally consistent with historical results and below the adopted criteria. BH11 is located approximately 460 m from current quarry operations and at the most north-western point of the site.
BH12A	NS	NS	NS	Metals for BH12A were not analysed - gauge only.
MW239S	<0.001	0.20	0.003	Metal concentrations were generally consistent with historical results and below the adopted criteria. MW239S is located approximately 800 m east of the current quarry operations.

Notes:

< - Less than laboratory limit of reporting



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	0.01	0.01	0.02	PFOS and PFHxS were detected at this location at concentrations below the adopted criteria during this reporting period. The findings are generally consistent with historical results.

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 2022/23. The total monthly rainfall for January 2023 was recorded to be slightly above the monthly mean and has increased in comparison to the previous month. Based on current rainfall data (mean and monthly totals) for January 2023, it is expected that groundwater elevations will stabilise or continue to steadily decrease in subsequent months due to higher evapotranspiration rates during the warmer months, consistent with groundwater trend data.

Table 7: 2022-2023 Rainfall data (12-month period)

Date	Feb (22)	Mar (22)	Apr (22)	May (22)	Jun (22)	Jul (22)	Aug (22)	Sep (22)	Oct (22)	Nov (22)	Dec (22)	Jan (23)
1st	0	18.2	13.6	2.0	0	0	0	2.0	4.4	9	0	0
2nd	7.6	25.2	1.4	0	0	14.6	0.2	0	0	0	0	0
3rd	13.0	32.2	0	0	0	42.0	0	28.0	0	0	0	0
4th	32.8	55.4	ND	0	1.6	59.8	0	4.2	0	0.4	0	0
5th	7.2	0.2	0.2	4.0	0	49.8	12.0	0.4	0	0	0	13.8
6th	4.4	11.6	0.2	ND	0	36.6	0	0	23.4	0	0.4	5.6
7th	1.4	5.4	0	0	0	37.0	0	0.2	0.2	0	0	21.2
8th	2.0	11.8	36.2	0	0	0	0	0	6.6	0	0	4.8
9th	0.6	68.0	1.2	0	0	0	1.4	0.2	32.6	0	0	-
10th	0	0.6	2.0	1.8	0	3.2	18.4	2.2	0	0	0	0
11th	0	3.8	0.2	15.8	0	44.2	0.2	0	1.2	0	0	0
12th	39.4	0.6	8.4	8.8	0	0.2	0	0	0.2	0	0	0
13th	1.0	0.2	15.8	5.8	0	0	5.2	0	0	2.8	5.6	0
14th	0	0	10.8	4.0	0	12.4	0.2	0.6	0.2	24.2	0	0
15th	0	0.8	1.2	0	0	12.0	0	0.2	0.2	-	0	-
16th	0	0.8	0.2	0	0	0	0	5.4	0	-	0.2	0
17th	0	0.2	0	0	0	0	0	0	0.4	0	4.2	0
18th	8.6	0	0	0	1.0	0	0	0	0	0	2.8	0
19th	0.2	2.2	0	0	18.4	0.2	0	0	0	0	3	0.2
20th	0	0.4	0.2	2.6	7.4	7.8	0	0	1.6	0	0	21.4
21st	0	0	0	15.0	0.2	0.4	0	0	4	0	2	0.8
22nd	0	0	14.6	4.4	0	2.0	0	7.2	3.4	0	0	9.0
23rd	25.2	0	6.4	33.0	0	0	0	5.4	2.2	0	0.2	4.4
24th	3.2	35.6	10.0	8.0	0	1.8	0.6	0.4	3.4	0	0.8	0
25th	6.0	29.4	0.2	4.6	0	1.4	0	4.6	5.6	0	0	0
26th	6.0	14.4	0.2	0	0	1.2	0	0.2	0.4	1.6	0	0
27th	2.6	6.8	0.2	0	0	0.6	0	0	0	0	0	3.6
28th	0.2	0.8	0.6	0.2	0	0	0.2	0.2	0.8	12	0	0
29th	-	2.4	0.2	0	0	0	0	0	0	0	0	0



30th	-	12.2	0	0	0	0.2	0	13.0	0	0	0	3.4
31st	-	14.8	-	4.2	-	0	0	-	0	-	0	18.0
Total	161.4	354.0	124.0	114.2	28.6	327.4	38.4	74.4	90.8	50.0	19.2	106.2
Historical Mean	118.3	125.2	109.5	108.6	124.6	72.6	72.8	60.6	75.9	82.9	77.8	99.5

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, groundwater elevations have been steadily increasing over the last four years with a notable spike in elevation following the March 2021 and February 2022 water monitoring events. A general increase in groundwater elevations across the site during 2022 are predominantly due to the above average rainfall recorded for most months during the year. Since the October 2022 water monitoring event, a decreasing trend in groundwater elevation has been observed, likely attributed to below average rainfall recorded during the preceding months.

A trigger of the Groundwater Level Monitoring TARP Rules (**Table 3**) requires regular weekly gauging events. During the current month, BH1A has recorded groundwater elevations that trigger the Level 1 TARP Rules. It is recommended that continued weekly monitoring of groundwater levels be undertaken at BH1A until water levels decline to >0.5m below the inferred maximum historical level.

Overall, groundwater levels for the current month generally appear to be decreasing following the previous monitoring event, despite an increase in rainfall noted in **Section 3**. This may be due to a lag in groundwater response following below-average rainfall during December 2022. Based on these trends, groundwater elevations are likely to stabilise across the quarry.

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

- pH – The measured field pH at BH6 (3.82) was found to be marginally outside the lower limit of the adopted site-specific range (4.2-6.5) for the fourth consecutive month. This is the second occurrence within the last 12 months, the first being in February and March 2022 where pH was measured to be 3.68 and 3.49, respectively. Since the well is located 860 m upgradient of current quarrying activities, this fluctuation is more indicative of natural environmental conditions rather than site activities.
- PFAS – PFOS and PFHxS were detected in the WPW sample during the current January 2023 sampling round. These analytes were within the range expected based on historical results and all found below the site-specific trigger values.

5 CLOSING

As monitoring well BH1A has triggered Level 1 of the TARP rules, it is recommended that weekly monitoring of groundwater levels be undertaken at this location until water levels decline to >0.5m below the inferred maximum historical level, in accordance with the TARP response. BH1A has triggered the TARP at levels 1-3 in all five monitoring events since it was installed in August 2022. The former monitoring point (BH1) that was replaced by BH1A also exceeded the TARP Level 3 prior to decommissioning in August. It is suggested that the inferred maximum groundwater elevation for BH1A be re-assessed to formulate a specific value for this location in order to appropriately interpret the TARP trigger levels.

The exceedance of pH at BH6 over the last four months is most likely related to background environmental conditions rather than current quarrying activities. The distance (860 m) and upgradient location of this borehole means that the results are more indicative of natural background fluctuations resulting from a reducing environment that decreases pH and increases the available dissolved iron concentrations. As stated in the SWMP below, it is suggested that the trigger value does not account for seasonal changes and should be reviewed when updating the management plan:

Where two consecutive samples are:



a. ABOVE the adopted trigger value, BUT LESS than previous data, this may suggest an incorrectly set trigger value that does not fully account for seasonal changes.

Consider updating trigger value at next management plan update.

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 your requirements. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Megan Ferguson

Environmental Scientist

Contaminated Land Management

MFerguson@kleinfelder.com

Mobile: 0455 981 953

Attachments

Attachment 1: Figures

Attachment 2: Results tables and field records

Attachment 3: Lab results

Attachment 4: Data Trends

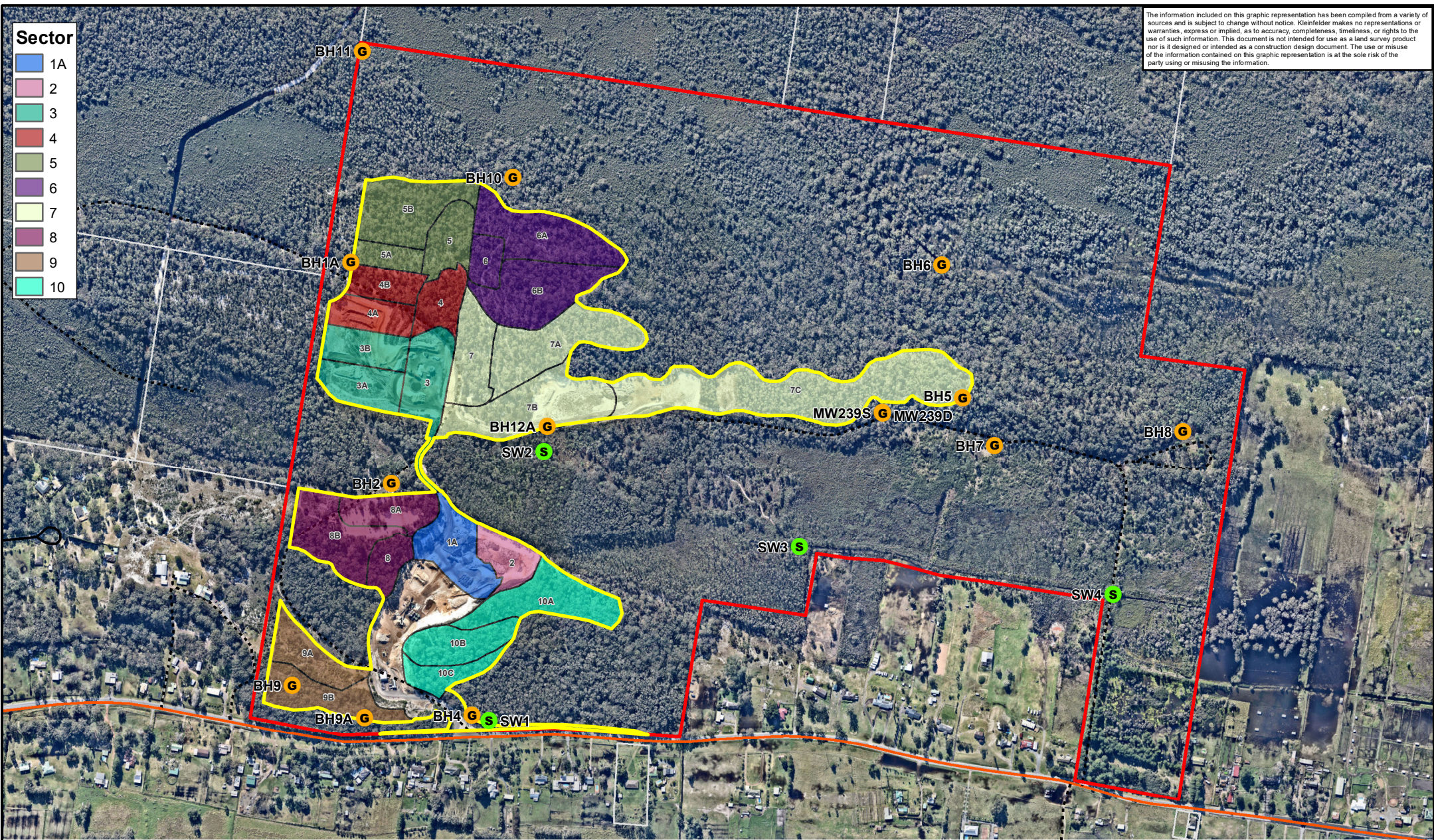


ATTACHMENT 1: FIGURES



- Sector**
- 1A
 - 2
 - 3
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 - 9
 - 10

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



Legend ● Groundwater Sample Site ● Surface Water Sample Site Quarry Project Area Subject Land Boundary Arterial Road Local Road Track	Metres 0 50 100 200 300 400 500 KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com	PROJECT REFERENCE: 20232071 DATE DRAWN: 7/10/2022 14:16 Version 1 DRAWN BY: CMiskell DATA SOURCE: NSW DFSI - 2017 Nearmap - 2022	Monthly Monitoring Locations Williamtown Sand Syndicate Proposed Sand Quarry 398 Cabbage Tree Road, Williamtown	FIGURE: 1
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ATTACHMENT 2: RESULTS TABLES AND FIELD RECORDS



HYDRASLEEVE™ SAMPLING LOG

Project Number:	Date:	Site Address:
20232071	17/1/23	Cabbage Tree Rd. Williamstown
Site Name:	Field Manager:	Weather Observations:
WSS	AK	clear, sunny

Field Measurements												
Well ID	Sample Time	DTW (mbTOC)	Total Depth (mbTOC)	Sample Depth (mbTOC)	Temp (°C)	DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH	Redox (mV)	Turbidity (NTU)	Description (Odour, Colour, Sheen)
BH1A	11:50	4.838	12.181		20.2							Gauge only
BH2	9:32	4.873	8.43		21.7	3.88	75.6	228.72	4.69	211.3	240.6	Brown, No odor No s
BH4	8:05	1.299	6.006	4.5m	20.9	1.89	128.8	91	5.31	159.5	8.00	n/a, n/s, clear
BH6	11:10	1.239	4.52		24.4	2.46	245.5	162	3.82	-7	34.06	Mod HS, odor it yellow
BH7	8:48	1.916	4.510		22.1	2.98	24.1	51	4.49	38.0	13.49	Mod odor HS no sheen it yellow
BH9	9:19	15.855	16.24									Gauge only almost dry?
BH1A	8:40	8.869	12.264	10m	21.4	1.94	107.4	75	4.73	111.5	32.2	mod. b., light brown, n/s.
BH11	12:15	1.794	4.500		23.9	2.16	133.5	89	4.31	-80.5	5.80	
BH12A	10:30	2.713	7.327									Gauge only
MW239S	10:50	1.032	3.618		23.6	2.61	106.2	67	4.52	-9.4	105.40	St HS odor No sheen brownish brown
WPW												

Damaged wells (identify how damaged):

*Sample Depth is reported as bottom of hydrasleeve depth

QA/QC SAMPLE REGISTER

Project Number:	Site Name:	Site Address:
20232071	WSS	Cabbage Tree Road.

Date:	Field Manager:
17/1/23	Aaron King

[illegible]

COMMENTS:

PERMIT TO WORK

DETAILS PTW

Work Location	WSS Site	Date: 17-1-23	Permit Ref No:
		Time Start: 0730	Finish:
Details Description of Work	Scope of the work: Water Gauging and Sampling from Groundwater wells		
	Equipment to be worked on: Gauging and Sampling equipment.		
	Expected duration and other relevant information: 8 hours		

TYPE OF WORK REQUESTED (☒ all applicable)

☐ Energy Isolation → ☐ Hot Work → ☐ Work at Heights → ☐ Excavation → ☐ Confined Space → ☐ OTHER: _____		Permit Status ☐ LIVE ☐ Closed ☐ LIVE ☐ Closed ☐ LIVE ☐ Closed ☐ LIVE ☐ Closed ☐ LIVE ☐ Closed	THE JOB IS BEING DONE BY: ☐ Newcastle Sand ☒ Contractor – Company name: <u>Kleinfelder</u> Permit Authoriser must sign with his initials, verifying that: - 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	AK AK
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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: 17-1-23	Time: 0730	Signed: <u>A. King</u>	Name: <u>Aaron King</u>
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: <u>17-1-23</u> <u>E. Iwen</u>	Time: <u>7:40am</u>	Signed: <u>[Signature]</u>	Name: <u>E. Iwen</u>

EQUIPMENT CERTIFICATION REPORT

PGN9003871 WATER QUALITY METER – MULTIFUNCTION (YSI)

Plant Number: 1090143

SENSOR	CONCENTRATION	SPAN 1	SPAN 2	TRACEABILITY	PASS
pH	pH 4	pH 4		# 371300	☒
	pH 7	pH 7		# 384001	☒
Conductivity	12.88 mS/cm	12.88 mS/cm		# 381242	☒
Dissolved Oxygen	Sodium Sulphite / Air	0.0ppm in Sodium Sulphite	ppm Saturation in Air	# 11897	☒
ORP	240mV	240mV	Zobell Part A	# 375760	☒
			Zobell Part B	# 374424	
Turbidity	90 NTU	90 NTU		# 398152	☒

Battery Status <u>100</u> (%)	Temperature <u>19.4</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: Jacob Arnott Date: 11 / 01 / 23 Signed: [Signature]

Accessories List:

User's Manual	pH and ORP Storage Solution	Transit Case



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Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, total xylenes, naphthalene
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:
 SWMP 2021 - Soil and Water Management Plan, July 2021

Table 2
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate
398 Cabbage Tree Road, Williamstown



Analyte		Anions and Cations															Alkalinity					Inorganics								
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C	Total Dissolved Solids	Total suspended solids	pH	Turbidity	
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units	NTU	
Adopted Site Specific Trigger Values (SWMP 2021)		77	5.0	11	2.0	70	148	0.2	--	2.0	--	--	--	0.5	5.9	--	--	--	--	--	--	--	--	--	500	--	--	4.2-6.5	--	
Sample Name	Sample Date																													
BH1	15-Mar-19	11	2.0	1.0	<1.0	<1.0	25	<0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	9.0	<1.0	<1.0	9.0	9.0	104	68	78	5.67	-	
	23-Apr-19	14	1.0	2.0	<1.0	4.0	25	<0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	10	<1.0	<1.0	10	11	84	97	248	5.83	-	
	16-May-19	12	<1.0	2.0	<1.0	5.0	25	<0.1	0.03	<0.01	<0.01	<0.01	<0.01	0.11	0.3	0.3	0.69	1.01	1.7	10	<1.0	<1.0	10	8.0	105	164	80	5.82	-	
	14-Jun-19	10	<1.0	2.0	<1.0	3.0	24	<0.1	-	-	-	-	-	-	-	-	0.6	0.94	-	10	<1.0	<1.0	10	8.0	99	72	39	5.52	-	
	16-Jul-19	15	<1.0	2.0	<1.0	4.0	23	<0.1	-	-	-	-	-	-	-	-	0.82	0.95	-	11	<1.0	<1.0	11	8.0	102	84	26	5.62	-	
	15-Aug-19	14	<1.0	2.0	<1.0	2.0	21	<0.1	-	-	-	-	-	-	-	-	0.77	0.91	-	14	<1.0	<1.0	14	8.0	128	82	181	6.22	-	
	16-Sep-19	13	<1.0	2.0	<1.0	2.0	20	<0.1	<0.01	0.06	<0.01	<0.01	<0.01	0.12	0.3	0.3	0.73	0.76	1.84	8.0	<1.0	<1.0	8.0	8.0	102	88	108	5.44	-	
	15-Oct-19	13	<1.0	2.0	<1.0	2.0	21	<0.1	-	-	-	-	-	-	-	-	0.73	0.71	-	4.0	<1.0	<1.0	4.0	8.0	98	64	-	5.5	-	
	18-Nov-19	16	<1.0	2.0	<1.0	3.0	23	0.1	<0.01	<0.01	<0.01	-	0.01	0.13	0.3	0.3	0.86	1.19	2.26	24	<1.0	<1.0	24	8.0	126	82	-	6.29	-	
	16-Sep-20	13	<1.0	2.0	<1.0	2.0	21	<0.1	-	-	-	-	-	-	-	-	0.73	0.81	-	9.0	<1.0	<1.0	9.0	8.0	95	81	58	5.87	-	
	16-Oct-20	14	<1.0	2.0	<1.0	4.0	21	<0.1	-	-	-	-	-	-	-	-	0.77	0.84	-	8.0	<1.0	<1.0	8.0	8.0	88	57	-	5.7	-	
	16-Nov-20	11	<1.0	2.0	<1.0	5.0	18	<0.1	<0.01	0.02	<0.01	<0.01	<0.01	0.07	0.2	0.2	1.02	1.05	1.55	22	<1.0	<1.0	22	8.0	120	78	41	5.98	-	
	16-Dec-20	13	<1.0	2.0	1.0	6.0	22	<0.1	-	-	-	-	-	-	-	-	0.93	1.16	-	21	<1.0	<1.0	21	8.0	134	87	-	5.76	-	
	14-Jan-21	12	<1.0	2.0	<1.0	5.0	23	<0.1	-	-	-	-	-	-	-	-	0.96	1.07	-	16	<1.0	<1.0	16	8.0	124	81	-	5.63	-	
	16-Feb-21	14	<1.0	2.0	1.0	5.0	25	<0.1	<0.01	<0.01	<0.01	0.02	0.02	0.05	<0.1	<0.1	0.8	1.05	1.98	12	<1.0	<1.0	12	8.0	116	75	20	5.57	-	
	17-Mar-21	14	1.0	2.0	<1.0	4.0	23	<0.1	-	-	-	-	-	-	-	-	0.82	0.95	-	11	<1.0	<1.0	11	11	111	72	-	6.02	-	
	13-Oct-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.66	98
	24-Feb-22	14	1.0	3.0	<1.0	10	23	<0.1	-	<0.01	-	-	0.02	0.11	0.2	0.2	0.9	1.18	-	-	<1.0	<1.0	<1.0	16	15	127	82	-	5.95	-
	BH2	22-Feb-19	12	2.0	2.0	<1.0	6.0	22	0.1	<0.01	0.28	<0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	1.44	<1.0	<1.0	<1.0	<1.0	13	91	128	376	4.87	-
		15-Mar-19	10	3.0	2.0	<1.0	7.0	23	<0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	<1.0	<1.0	<1.0	<1.0	16	101	66	352	4.71
23-Apr-19		14	2.0	2.0	<1.0	6.0	23	<0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	<1.0	<1.0	<1.0	<1.0	13	70	84	575	4.82	-
16-May-19		12	2.0	2.0	<1.0	21	22	<0.1	<0.01	0.26	<0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	1.44	<1.0	<1.0	<1.0	<1.0	13	94	144	111	4.85	-	
14-Jun-19		11	1.0	2.0	<1.0	5.0	23	<0.1	-	-	-	-	-	-	-	-	0.69	0.75	-	-	<1.0	<1.0	<1.0	<1.0	11	91	51	215	4.76	-
16-Jul-19		13	2.0	2.0	<1.0	9.0	20	<0.1	-	-	-	-	-	-	-	-	0.83	0.75	-	-	<1.0	<1.0	<1.0	<1.0	13	90	63	92	4.84	-
15-Aug-19		12	1.0	2.0	<1.0	8.0	20	<0.1	-	-	-	-	-	-	-	-	0.74	0.73	-	-	<1.0	<1.0	<1.0	<1.0	11	110	61	310	5.2	-
16-Sep-19		11	2.0	2.0	<1.0	8.0	18	<0.1	<0.01	0.28	<0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	1.32	<1.0	<1.0	<1.0	<1.0	13	96	60	216	4.72	-	
15-Oct-19		12	2.0	2.0	<1.0	5.0	20	<0.1	-	-	-	-	-	-	-	-	0.79	0.67	-	-	<1.0	<1.0	<1.0	<1.0	13	102	66	-	5.06	-
18-Nov-19		14	2.0	1.0	<1.0	7.0	19	<0.1	<0.01	0.21	<0.01	-	1.01	0.05	2.1	1.1	0.79	0.68	2.02	<1.0	<1.0	<1.0	<1.0	9.0	102	66	-	5.47	-	
16-Sep-20		11	2.0	2.0	<1.0	7.0	17	<0.1	-	-	-	-	-	-	-	-	0.74	0.62	-	-	<1.0	<1.0	<1.0	<1.0	13	99	76	356	4.85	-
16-Oct-20		11	2.0	2.0	<1.0	6.0	16	<0.1	-	-	-	-	-	-	-	-	0.74	0.58	-	-	<1.0	<1.0	<1.0	<1.0	13	90	58	-	5.07	-
16-Nov-20		11	2.0	2.0	<1.0	9.0	16	<0.1	<0.01	0.48	<0.01	2.88	2.88	<0.01	4.8	1.9	0.74	0.7	1.32	3.0	<1.0	<1.0	<1.0	3.0	13	119	77	952	5.09	-
16-Dec-20		11	2.0	2.0	<1.0	7.0	15	<0.1	-	-	-	-	-	-	-	-	0.74	0.57	-	-	<1.0	<1.0	<1.0	<1.0						



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Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 LOR - Laboratory limit of reporting
 mg/L - Milligrams per litre
 µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting
 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:
 SWMP 2021 - Soil and Water Management Plan, July 2021

Table 3
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Analyte		Metals															
		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Adopted Site Specific Trigger Values (SWMP 2021)		0.003	0.07	0.002	0.1	0.0002	0.004	0.006	0.083	4.1 (8.84 for BH1)	0.001	0.136	0.0001	0.02	0.01	0.01	0.085 (0.1 for BH1)
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	0.116
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.96	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.023
	16-Sep-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.001	8.84	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.034
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.006	-	< 0.001	0.007	< 0.0001	< 0.001	< 0.01	< 0.01	0.037
	18-Nov-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	11	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.012
	16-Sep-20	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.005	5.48	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.016
	16-Oct-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	5.55	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.017
	16-Nov-20	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.001	7.05	< 0.001	0.012	< 0.0001	< 0.001	< 0.01	< 0.01	0.045
	16-Dec-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.008	3.21	< 0.001	0.011	< 0.0001	0.001	< 0.01	< 0.01	0.077
	14-Jan-21	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	5.21	< 0.001	0.013	< 0.0001	< 0.001	< 0.01	< 0.01	0.032
	16-Feb-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	3.24	< 0.001	0.015	< 0.0001	< 0.001	< 0.01	< 0.01	0.652
17-Mar-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	4.0	< 0.001	0.027	< 0.0001	< 0.001	< 0.01	< 0.01	0.596	
24-Feb-22	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	7.7	< 0.001	0.018	< 0.0001	< 0.001	< 0.01	< 0.01	0.106	
BH2	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	0.006
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.08	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.26	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.007
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	-	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	18-Nov-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.013	0.08	< 0.001	0.011	< 0.0001	0.007	< 0.01	< 0.01	0.028
	16-Sep-20	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	0.07	< 0.001	0.016	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
	16-Oct-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.013	< 0.05	< 0.001	0.015	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Nov-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.02	0.36	< 0.001	0.015	< 0.0001	< 0.001	< 0.01	< 0.01	0.018
	16-Dec-20	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.011	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jan-21	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	< 0.05	< 0.001	0.016	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Feb-21	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.021	< 0.05	< 0.001	0.009	< 0.0001	0.007	< 0.01	< 0.01	0.017
	17-Mar-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.003	< 0.05	< 0.001	0.016	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
	19-Aug-21	< 0.001	0.003	-	-	-	< 0.001	-	0.007	< 0.05	-	0.015	-	< 0.001	-	-	< 0.005
	22-Sep-21	< 0.001	-	-	-	-	-	-	-	< 0.05	-	0.013	-	-	-	-	-
	13-Oct-21	< 0.001	-	-	-	-	-	-	-	0.08	-	0.012	-	-	-	-	-
	16-Nov-21	< 0.001	0.003	-	-	-	< 0.001	-	0.006	< 0.05	-	-	-	< 0.001	-	-	< 0.005
	15-Dec-21	< 0.001	-	-	-	-	-	-	-	0.05	-	0.008	-	-	-	-	-
	18-Jan-22	< 0.001	-	-	-	-	-	-	-	0.49	-	0.					

Table 3
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



BH4	15-Aug-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	< 0.05	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.007
	16-Sep-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.051	0.19	< 0.001	0.026	< 0.0001	0.002	< 0.01	< 0.01	0.005
	15-Oct-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.011	-	< 0.001	0.136	< 0.0001	0.002	< 0.01	< 0.01	0.014
	18-Nov-19	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.005	< 0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Sep-20	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.078	0.06	< 0.001	0.012	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
	16-Oct-20	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	0.25	< 0.001	0.021	< 0.0001	0.001	< 0.01	< 0.01	0.018
	16-Nov-20	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.005	0.18	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Dec-20	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.46	< 0.001	0.027	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
	14-Jan-21	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.27	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
	16-Feb-21	< 0.001	0.02	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.94	< 0.001	0.023	< 0.0001	0.003	< 0.01	< 0.01	0.008
	17-Mar-21	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	1.39	< 0.001	0.029	< 0.0001	0.002	< 0.01	< 0.01	0.019
	19-Aug-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	0.198	0.14	< 0.001	0.022	< 0.0001	0.001	< 0.01	< 0.01	0.013
	22-Sep-21	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.172	0.1	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
	13-Oct-21	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	1.65	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Nov-21	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.38	< 0.001	0.021	< 0.0001	0.001	< 0.01	< 0.01	0.006
	15-Dec-21	< 0.001	-	-	-	-	-	-	-	0.69	-	0.016	-	-	-	-	-
	18-Jan-22	< 0.001	-	-	-	-	-	-	-	0.52	-	0.018	-	-	-	-	-
	24-Feb-22	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.62	< 0.001	0.017	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
	12-Apr-22	< 0.001	-	-	-	-	-	-	-	0.27	-	0.017	-	-	-	-	-
	27-May-22	< 0.001	0.011	-	-	-	< 0.001	-	0.097	< 0.05	-	-	-	< 0.001	-	-	< 0.005
	17-Jun-22	< 0.001	-	-	-	-	-	-	0.082	< 0.05	-	0.014	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-	0.09	-	0.014	-	-	-	-	-
	12-Aug-22	< 0.001	0.013	-	-	-	< 0.001	-	0.05	< 0.05	-	0.013	-	< 0.001	-	-	0.013
	16-Sep-22	< 0.001	-	-	-	-	-	-	-	0.11	-	0.014	-	-	-	-	-
	24-Oct-22	< 0.001	-	-	-	-	-	-	-	0.19	-	0.016	-	-	-	-	-
	18-Nov-22	< 0.001	0.012	-	-	-	< 0.001	< 0.001	0.006	0.13	-	0.016	-	< 0.001	-	-	0.011
	14-Dec-22	< 0.001	-	-	-	-	-	-	-	0.14	-	0.015	-	-	-	-	-
	17-Jan-23	< 0.001	-	-	-	-	-	-	-	0.12	-	0.022	-	-	-	-	-
BH5	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
	24-Feb-22	< 0.001	0.024	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.64	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
BH6	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.86	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
	16-Jul-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	2.41	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	15-Aug-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.19	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	16-Sep-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	2.08	< 0.001	0.012	< 0.0001	0.007	< 0.01	< 0.01	0.035
	15-Oct-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
	18-Nov-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.58	< 0.001	0.009	< 0.0001	0.008	< 0.01	< 0.01	0.073
	16-Sep-20	< 0.001	0.047	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	1.78	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
	16-Oct-20	< 0.001	0.04	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.84	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	16-Nov-20	< 0.001	0.061	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.72	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	&	

Table 3
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



BH7	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	2.06	< 0.001	0.03	< 0.0001	0.004	< 0.01	< 0.01	0.006	
	16-Jul-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.66	< 0.001	0.025	< 0.0001	0.003	< 0.01	< 0.01	< 0.005	
	15-Aug-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.54	< 0.001	0.023	< 0.0001	0.003	< 0.01	< 0.01	< 0.005	
	16-Sep-19	< 0.001	0.016	< 0.001	0.06	< 0.0001	0.002	0.002	0.007	1.42	0.001	0.024	< 0.0001	0.02	< 0.01	< 0.01	0.085	
	15-Oct-19	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	0.002	0.003	-	< 0.001	0.018	< 0.0001	0.003	< 0.01	< 0.01	0.011	
	18-Nov-19	< 0.001	0.016	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.1	< 0.001	0.015	< 0.0001	0.013	< 0.01	< 0.01	0.053	
	16-Sep-20	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.67	< 0.001	0.021	< 0.0001	0.003	< 0.01	< 0.01	0.006	
	16-Oct-20	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.49	< 0.001	0.015	< 0.0001	0.003	< 0.01	< 0.01	0.015	
	16-Nov-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.72	< 0.001	0.023	< 0.0001	0.003	< 0.01	< 0.01	0.006	
	16-Dec-20	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.79	< 0.001	0.024	< 0.0001	0.003	< 0.01	< 0.01	< 0.005	
	14-Jan-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.002	0.004	1.65	< 0.001	0.025	< 0.0001	0.004	< 0.01	< 0.01	0.017	
	16-Feb-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.002	0.002	1.74	< 0.001	0.025	< 0.0001	0.004	< 0.01	< 0.01	0.013	
	17-Mar-21	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.28	< 0.001	0.028	< 0.0001	0.005	< 0.01	< 0.01	< 0.005	
	19-Aug-21	0.003	0.004	< 0.001	< 0.05	< 0.0001	0.003	0.001	< 0.001	0.79	< 0.001	0.006	< 0.0001	0.002	< 0.01	< 0.01	0.006	
	22-Sep-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.62	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005	
	13-Oct-21	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.69	0.002	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005	
	16-Nov-21	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.39	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	0.007	
	15-Dec-21	< 0.001	-	-	-	-	-	-	-	0.47	-	0.002	-	-	-	-	-	
	18-Jan-22	< 0.001	-	-	-	-	-	-	-	0.45	-	0.002	-	-	-	-	-	
	24-Feb-22	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.66	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005	
	12-Apr-22	< 0.001	-	-	-	-	-	-	-	0.43	-	0.004	-	-	-	-	-	
	27-May-22	< 0.001	0.003	-	-	-	-	0.003	-	< 0.001	0.52	-	-	-	0.002	-	-	0.005
	17-Jun-22	< 0.001	-	-	-	-	-	-	-	-	0.56	-	0.004	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-	-	0.51	-	0.004	-	-	-	-	-
	12-Aug-22	< 0.001	0.003	-	-	-	-	0.002	-	0.003	0.56	-	0.004	-	0.002	-	-	< 0.005
	16-Sep-22	0.001	-	-	-	-	-	-	-	-	0.54	-	0.004	-	-	-	-	-
	24-Oct-22	< 0.001	-	-	-	-	-	-	-	-	0.5	-	0.003	-	-	-	-	-
	18-Nov-22	0.001	0.002	-	-	-	-	0.002	< 0.001	< 0.001	0.43	-	0.001	-	0.001	-	-	0.009
	14-Dec-22	< 0.001	-	-	-	-	-	-	-	-	0.32	-	0.002	-	-	-	-	-
	17-Jan-23	< 0.001	-	-	-	-	-	-	-	-	0.29	-	0.002	-	-	-	-	-
BH8	21-Feb-19	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005	
	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005	
	23-Apr-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008	
	16-May-19	0.003	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.01	< 0.005	
	14-Jun-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.006	
	16-Jul-19	0.001	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.6	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	< 0.005	
	15-Aug-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.72	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.01	< 0.005	
	16-Sep-19	0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	2.06	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005	
	15-Oct-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.002	-	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.011	
	18-Nov-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	2.49	< 0.001	0.01	< 0.0001	0.013	< 0.01	< 0.01	0.053	
	16-Sep-20	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.035	3.35	0.001	0.009	< 0.0001	0.009	< 0.01	< 0.01	0.039	
	16-Oct-20	0.001	0.009	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.03	< 0.001	0.007	< 0.0001	0.002	< 0.01	< 0.01	0.012	
	16-Nov-20	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	3.48	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005	
	16-Dec-20	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	&										

Table 3
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



	24-Feb-22	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	< 0.001	0.5	< 0.001	0.042	< 0.0001	0.004	< 0.01	< 0.01	0.006
	12-Apr-22	< 0.001	-	-	-	-	-	-	-	0.48	-	0.038	-	-	-	-	-
	27-May-22	< 0.001	0.007	-	-	-	< 0.001	-	< 0.001	0.35	-	-	-	0.003	-	-	< 0.005
	17-Jun-22	< 0.001	-	-	-	-	-	-	-	0.42	-	0.032	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-	0.16	-	0.019	-	-	-	-	-
	12-Aug-22	< 0.001	0.009	-	-	-	< 0.001	-	0.004	0.53	-	0.025	-	0.004	-	-	0.008
	16-Sep-22	< 0.001	-	-	-	-	-	-	-	0.54	-	0.031	-	-	-	-	-
	24-Oct-22	< 0.001	-	-	-	-	-	-	-	0.27	-	0.022	-	-	-	-	-
	18-Nov-22	< 0.001	0.007	-	-	-	< 0.001	< 0.001	< 0.001	0.56	-	0.034	-	0.002	-	-	0.012
	14-Dec-22	< 0.001	-	-	-	-	-	-	-	0.18	-	0.023	-	-	-	-	-
	17-Jan-23	< 0.001	-	-	-	-	-	-	-	0.49	-	0.035	-	-	-	-	-
BH11	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.007
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.87	< 0.001	0.007	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Sep-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.79	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.012
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.004	-	< 0.001	0.006	< 0.0001	0.003	< 0.01	< 0.01	0.016
	18-Nov-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.95	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	16-Sep-20	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.005	0.9	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.009
	16-Oct-20	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.06	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.01
	16-Nov-20	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.84	< 0.001	0.011	< 0.0001	0.002	< 0.01	< 0.01	0.016
	16-Dec-20	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.0	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	14-Jan-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.025	0.56	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.018
	16-Feb-21	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.018	0.59	< 0.001	0.008	< 0.0001	0.007	< 0.01	< 0.01	0.03
	17-Mar-21	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.2	< 0.001	0.002	< 0.0001	0.003	< 0.01	< 0.01	0.014
	19-Aug-21	0.001	0.009	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.62	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.047
	22-Sep-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.72	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.042
	13-Oct-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.69	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.037
	16-Nov-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	0.92	< 0.001	0.002	< 0.0001	0.004	< 0.01	< 0.01	0.036
	15-Dec-21	< 0.001	-	-	-	-	-	-	-	0.92	-	0.003	-	-	-	-	-
	18-Jan-22	< 0.001	-	-	-	-	-	-	-	1.06	-	0.003	-	-	-	-	-
	24-Feb-22	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	1.25	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.036
	06-Mar-22	< 0.001	0.004	-	-	-	0.002	-	< 0.001	1.27	-	-	-	0.002	-	-	0.028
	12-Apr-22	< 0.001	-	-	-	-	-	-	-	1.06	-	0.004	-	-	-	-	-
	17-Jun-22	< 0.001	-	-	-	-	-	-	-	1.24	-	0.004	-	-	-	-	-
	27-Jul-22	< 0.001	-	-	-	-	-	-	-	1.03	-	0.004	-	-	-	-	-
	16-Sep-22	< 0.001	-	-	-	-	-	-	-	1.14	-	0.004	-	-	-	-	-
	24-Oct-22	< 0.001	-	-	-	-	-	-	-	1.14	-	0.003	-	-	-	-	-
	18-Nov-22	< 0.001	0.002	-	-	-	0.003	< 0.001	< 0.001	1.06	-	0.003	-	0.003	-	-	0.042
	14-Dec-22	< 0.001	-	-	-	-	-	-	-	0.96	-	0.003	-	-	-	-	-
	17-Jan-23	< 0.001	-	-	-	-	-	-	-	0.86	-	0.003	-	-	-	-	-
BH12	16-Nov-20	< 0.001	-	-	-	< 0.0001	0.002	-	0.002	-	< 0.001	-	< 0.0001	0.002	-	-	0.017
	24-Feb-22	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.33	< 0.001	0.006	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
MW239S	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.8	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.0	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.94	< 0.001	0.006	< 0.0001	0.006	< 0.01	< 0.01	0.032
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.003	-	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.011
	18-Nov-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.1	< 0.001	0.004	< 0.0001	0.008	< 0.01	< 0.01	0.03
	16-Sep-20	< 0.001	0.016	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.51	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.006
	16-Oct-20	< 0.001	0.009	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.17	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.005
	16-Nov-20	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.3	< 0.001	0.011	< 0.0001	0.003	< 0.01	< 0.01	0.021
	16-Dec-20	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.06	< 0.001	0.011	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	14-Jan-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.005	0.77	< 0.001	0.012	< 0.0001	0.004	< 0.01	< 0.01	0.011

Table 3
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



18-Jan-22	< 0.001	-	-	-	-	-	-	-	0.48	-	0.003	-	-	-	-	-
24-Feb-22	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.55	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.006
12-Apr-22	< 0.001	-	-	-	-	-	-	-	0.93	-	0.007	-	-	-	-	-
27-May-22	< 0.001	0.004	-	-	-	0.002	-	< 0.001	0.56	-	-	-	0.001	-	-	0.009
17-Jun-22	< 0.001	-	-	-	-	-	-	-	0.36	-	0.004	-	-	-	-	-
27-Jul-22	< 0.001	-	-	-	-	-	-	-	0.43	-	0.004	-	-	-	-	-
12-Aug-22	< 0.001	0.002	-	-	-	0.002	-	< 0.001	0.4	-	0.005	-	0.001	-	-	< 0.005
16-Sep-22	< 0.001	-	-	-	-	-	-	-	0.44	-	0.006	-	-	-	-	-
24-Oct-22	< 0.001	-	-	-	-	-	-	-	0.38	-	0.004	-	-	-	-	-
18-Nov-22	< 0.001	0.003	-	-	-	0.001	< 0.001	< 0.001	0.28	-	0.002	-	0.002	-	-	0.006
14-Dec-22	< 0.001	-	-	-	-	-	-	-	0.26	-	0.003	-	-	-	-	-
17-Jan-23	< 0.001	-	-	-	-	-	-	-	0.2	-	0.003	-	-	-	-	-

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams 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:
SWMP 2021 - Soil and Water Management Plan, July 2021

Table 4
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown

[illegible]

Table 4
Groundwater Analytical Data - PFAS
Williamstown Sand Syndicate
198 Cabbage Tree Road, Williamstown

[illegible]

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
Bold indicates a detection above the laboratory limit of reporting

Criteria:
 SWMP 2021 - Soil and Water Management Plan, July 2021

Table 5
Surface Water Analytical Data - TRH / BTEXM
Williamstown Sand Syndicate
398 Cabbage Tree Road, Williamstown



Analyte		BTEXN								Total Petroleum Hydrocarbons								Total Petroleum Hydrocarbons - Silica Clean-up				Total Recoverable Hydrocarbons										Total Recoverable Hydrocarbons - Silica Clean-up			
		Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ - C ₉	C ₁₀ - C ₁₄	C ₁₅ - C ₂₈	C ₂₉ - C ₃₆	C ₁₀ - C ₃₆ Sum	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup	C ₂₉ -C ₃₆ - Silica Cleanup	C ₁₀ -C ₃₆ Sum - Silica Cleanup	C ₄ - C ₁₀	C ₆ - C ₁₀ minus BTEX (F1)	>C ₁₀ - C ₁₆	>C ₁₀ - C ₁₆ minus Naphthalene (F2)	>C ₁₆ - C ₃₄	>C ₃₄ - C ₄₀	>C ₁₀ - C ₄₀ (sum)	>C ₁₀ -C ₁₆ - Silica Cleanup	F2 - Silica Cleanup	>C ₁₆ -C ₃₄ - Silica Cleanup	>C ₃₄ -C ₄₀ - Silica Cleanup	>C ₁₀ -C ₄₀ - Silica Cleanup					
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L				
Adopted Site Specific Trigger Values (SWMP 2021)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	20	100	--	100	--	100	--	--	--	--	--	--				
Sample Name		Sample Date																																	
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	-	-	-				
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	-	-	-				
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	-	-	-				
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	16-Sep-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	16-Oct-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	16-Nov-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	16-Dec-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	14-Jan-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	16-Feb-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	17-Mar-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	19-Aug-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	16-Nov-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	24-Feb-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	27-May-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	12-Aug-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
18-Nov-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
17-Mar-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
19-Aug-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
22-Sep-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
13-Oct-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
16-Nov-21	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
24-Feb-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
27-May-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
12-Aug-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
18-Nov-22	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
SW2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	-	-	-	-	-				
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	-	-	-	-	-				
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100			
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	-	-	-	-	-				
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.																													

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, total xylenes, naphthalene
Bold indicates a detection above the laboratory limit of reporting

Criteria:
SWMP 2021 - Soil and Water Management Plan, July 2021

Table 6
Surface Water Analytical Data - Inorganics
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Analyte		Anions and Cations																	Alkalinity					Inorganics							
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C	Total Dissolved Solids	Total suspended solids	pH	Turbidity		
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units	NTU		
Adopted Site Specific Trigger Values (SWMP 2021)		142	40	52	8.0	324	234	0.8	--	0.17	--	--	--	0.2	5.9	--	--	--	--	--	--	--	--	--	500	--	--	4.2-6.5	--		
Sample Name	Sample Date																														
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	10	9.13	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	707	32	4.01	-			
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	715	59	4.6	-		
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	512	26	4.5	-		
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	-	7.9	8.66	-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	568	17	4.42	-		
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	-	7.85	8.19	-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	548	5.0	4.53	-		
	16-Sep-19	117	21	39	4.0	244	193	0.7	< 0.01	0.05	< 0.01	0.02	0.02	< 0.01	1.2	1.2	9.45	11	3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	689	15	4.32	-		
	15-Oct-19	124	16	31	3.0	127	191	0.6	-	-	-	-	-	-	-	-	8.82	8.03	-	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	-	5.32	-		
	18-Nov-19	142	14	30	4.0	165	234	0.5	< 0.01	0.02	< 0.01	-	< 0.01	0.03	1.1	1.1	9.45	10	4.91	< 1.0	< 1.0	< 1.0	< 1.0	158	1,090	708	-	5.06	-		
	16-Sep-20	9.0	16	3.0	3.0	< 1.0	< 1.0	0.1	-	-	-	-	< 0.01	-	-	-	1.51	1.1	-	55	< 1.0	< 1.0	< 1.0	55	52	137	152	8.0	6.5	-	
	16-Oct-20	12	40	4.0	4.0	< 1.0	16	0.2	-	-	-	-	-	-	-	-	2.95	2.69	-	112	< 1.0	< 1.0	< 1.0	112	116	268	174	7.29	-		
	16-Nov-20	8.0	13	2.0	3.0	< 1.0	10	< 0.1	< 0.01	0.03	< 0.01	0.04	0.04	< 0.01	0.6	0.6	1.24	1.12	0.54	42	< 1.0	< 1.0	< 1.0	42	41	127	82	< 5.0	6.5	-	
	16-Dec-20	10	19	2.0	3.0	5.0	12	0.1	-	-	-	-	-	-	-	-	1.62	1.68	-	62	< 1.0	< 1.0	< 1.0	62	56	171	111	-	7.01	-	
	14-Jan-21	10	18	2.0	3.0	< 1.0	13	0.1	-	-	-	-	-	-	-	-	1.57	1.46	-	55	< 1.0	< 1.0	< 1.0	55	53	154	100	-	6.71	-	
	16-Feb-21	10	15	2.0	3.0	< 1.0	12	0.1	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.5	0.5	1.42	1.36	0.64	51	< 1.0	< 1.0	< 1.0	51	46	141	92	6.0	6.93	-	
	17-Mar-21	10	15	2.0	2.0	< 1.0	13	0.1	-	-	-	-	-	-	-	-	1.4	1.26	-	45	< 1.0	< 1.0	< 1.0	45	46	139	90	-	6.63	-	
	19-Aug-21	-	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	13-Oct-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.82	3.3	
	16-Nov-21	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	24-Feb-22	6.0	9.0	2.0	2.0	< 1.0	10	< 0.1	-	0.11	-	-	< 0.01	0.02	1.0	1.0	0.92	0.8	-	-	< 1.0	< 1.0	26	31	89	58	-	6.38	-		
	27-May-22	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12-Aug-22	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18-Nov-22	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW2	17-Mar-21	12	2.0	2.0	< 1.0	6.0	16	0.2	-	-	-	-	-	-	-	-	0.79	0.58	-	< 1.0	< 1.0	< 1.0	< 1.0	13	83	54	-	5.08	-		
	19-Aug-21	12	< 1.0	1.0	< 1.0	6.0	22	< 0.1	< 0.01	0.07	< 0.01	< 0.01	< 0.01	0.17	1.2	1.2	0.6	0.74	2.25	< 1.0	< 1.0	< 1.0	< 1.0	4.0	103	67	-	4.21	-		
	22-Sep-21	14	2.0	2.0	2.0	16	30	0.1	< 0.01	0.08	< 0.01	1.77	1.77	< 0.01	3.0	1.2	0.92	1.18	1.67	< 1.0	< 1.0	< 1.0	< 1.0	13	235	153	-	3.55	-		
	13-Oct-21	10	< 1.0	1.0	< 1.0	6.0	18	< 0.1	< 0.01	0.03	< 0.01	0.02	0.02	< 0.01	0.6	0.6	0.52	0.63	1.88	< 1.0	< 1.0	< 1.0	< 1.0	4.0	77	50	-	4.58	4.7		
	16-Nov-21	10	2.0	2.0	< 1.0	7.0	16	0.1	< 0.01	0.09	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	0.7	0.6	1.2	< 1.0	< 1.0	< 1.0	< 1.0	-	93	60	-	4.39	-		
	24-Feb-22	10	1.0	1.0	< 1.0	2.0	21	0.1	-	0.63	-	-	< 0.01	0.31	7.5	7.5	0.57	0.63	-	-	< 1.0	< 1.0	< 1.0	7.0	97	63	-	4.32	-		
	27-May-22	-	-	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12-Aug-22	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	18-Nov-22	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	3.38	11	< 1.0	< 1.0	< 1.0	11	26	262	228	58	6.21	-
		14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	4.0	< 1.0	< 1.0	< 1.0	4.0	40	344	224	34	5.42	-
		23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	190	9.0	5.2	-	
16-May-19		35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	2.47	1.0	< 1.0	< 1.0	< 1.0	1.0	38	271	300	14	5.24	-		
14-Jun-19		32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	170	12	4.58	-		
16-Jul-19		46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	-	3.39	3.77	-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	246	7.0	4.47	-		
15-Aug-19		38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	-	2.53	2.7	-	< 1.0	< 1.0	< 1.0	< 1.0	44	338	192	< 5.0	4.47	-		
16-Sep-19		42	7.0	8.0	< 1.0	48	57	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.1	0.1	2.83	2.61	2.57	< 1.0	< 1.0	< 1.0	< 1.0	50	374	201	7.0	4.3	-		
15-Oct-19		40	5.0	7.0	< 1.0																										

Table 7
Surface Water Analytical Data - Metals
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Analyte		Metals															
		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Adopted Site Specific Trigger Values (SWMP 2021)		0.006	0.08	0.002	0.1	0.0002	0.004	0.006	0.033	7.25 (32 for SW3 & SW4)	0.003	0.841	0.0001	0.02	0.01	0.01	0.535
Sample Name	Sample Date																
SW1	23-Apr-19	< 0.001	0.043	< 0.001	0.14	< 0.0001	< 0.001	0.017	0.002	4.16	< 0.001	0.841	< 0.0001	0.02	< 0.01	< 0.01	0.356
	16-May-19	< 0.001	0.029	< 0.001	0.1	< 0.0001	< 0.001	0.01	0.003	7.25	< 0.001	0.666	< 0.0001	0.012	< 0.01	< 0.01	0.077
	14-Jun-19	< 0.001	0.029	< 0.001	0.09	0.0002	< 0.001	0.009	0.006	2.75	< 0.001	0.595	< 0.0001	0.011	< 0.01	< 0.01	0.535
	16-Jul-19	< 0.001	0.032	< 0.001	0.08	0.0001	< 0.001	0.007	0.003	1.86	< 0.001	0.59	< 0.0001	0.008	< 0.01	< 0.01	0.239
	15-Aug-19	< 0.001	0.027	< 0.001	0.09	< 0.0001	< 0.001	0.005	0.003	2.15	< 0.001	0.482	< 0.0001	0.005	< 0.01	< 0.01	0.075
	16-Sep-19	< 0.001	0.056	< 0.001	0.09	0.0002	0.001	0.008	0.012	2.45	0.001	0.587	< 0.0001	0.014	< 0.01	< 0.01	0.282
	15-Oct-19	< 0.001	0.036	< 0.001	0.07	< 0.0001	< 0.001	0.005	0.003	-	< 0.001	0.383	< 0.0001	0.005	< 0.01	< 0.01	0.055
	18-Nov-19	< 0.001	0.042	< 0.001	0.11	< 0.0001	0.001	0.003	< 0.001	1.14	< 0.001	0.366	< 0.0001	0.003	< 0.01	< 0.01	0.026
	16-Sep-20	< 0.001	0.021	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.005	0.87	0.001	0.096	< 0.0001	0.002	< 0.01	< 0.01	0.061
	16-Oct-20	0.001	0.021	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.76	< 0.001	0.15	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Nov-20	< 0.001	0.02	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.005	0.18	< 0.001	0.017	< 0.0001	< 0.001	< 0.01	< 0.01	0.03
	16-Dec-20	< 0.001	0.015	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	0.18	< 0.001	0.058	< 0.0001	< 0.001	< 0.01	< 0.01	0.013
	14-Jan-21	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.02	0.35	< 0.001	0.04	< 0.0001	0.006	< 0.01	< 0.01	0.037
	16-Feb-21	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.12	< 0.001	0.028	< 0.0001	< 0.001	< 0.01	< 0.01	0.024
	17-Mar-21	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.16	< 0.001	0.036	< 0.0001	< 0.001	< 0.01	< 0.01	0.04
	19-Aug-21	< 0.001	0.011	-	< 0.05	-	0.001	< 0.001	0.002	0.86	-	-	-	0.002	-	-	0.056
	16-Nov-21	< 0.001	0.006	-	< 0.05	-	< 0.001	< 0.001	0.002	1.0	-	-	-	0.001	-	-	0.036
	24-Feb-22	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.12	< 0.001	0.025	< 0.0001	< 0.001	< 0.01	< 0.01	0.014
27-May-22	< 0.001	0.01	-	< 0.05	-	0.003	0.001	< 0.001	4.39	-	-	-	0.002	-	-	0.047	
12-Aug-22	< 0.001	0.007	-	< 0.05	-	0.003	< 0.001	0.001	2.92	-	0.057	-	0.002	-	-	0.019	
18-Nov-22	< 0.001	0.01	-	< 0.05	-	< 0.001	0.001	< 0.001	2.89	-	0.038	-	< 0.001	-	-	0.022	
SW2	17-Mar-21	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	0.002	< 0.001	0.62	< 0.001	0.11	< 0.0001	0.004	< 0.01	< 0.01	0.097
	19-Aug-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	< 0.001	0.55	< 0.001	0.045	< 0.0001	0.002	< 0.01	< 0.01	0.022
	22-Sep-21	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.11	< 0.001	0.087	< 0.0001	0.005	< 0.01	< 0.01	0.134
	13-Oct-21	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.88	< 0.001	0.049	< 0.0001	0.002	< 0.01	< 0.01	0.06
	16-Nov-21	0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	0.002	< 0.001	5.59	< 0.001	0.064	< 0.0001	0.004	< 0.01	< 0.01	0.083
	24-Feb-22	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	16	< 0.001	0.032	< 0.0001	0.006	< 0.01	< 0.01	0.099
	27-May-22	< 0.001	0.005	-	< 0.05	-	0.001	0.001	< 0.001	1.7	-	-	-	0.002	-	-	0.111
	12-Aug-22	< 0.001	0.005	-	< 0.05	-	0.001	< 0.001	< 0.001	2.79	-	0.03	-	0.001	-	-	0.09
18-Nov-22	< 0.001	0.004	-	< 0.05	-	< 0.001	< 0.001	< 0.001	0.45	-	0.011	-	< 0.001	-	-	0.031	
SW3	22-Feb-19	0.003	0.075	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	4.84	< 0.001	0.033	< 0.0001	0.002	< 0.01	< 0.01	0.016
	14-Mar-19	0.006	0.08	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	9.26	< 0.001	0.048	< 0.0001	0.002	< 0.01	< 0.01	0.009
	23-Apr-19	< 0.001	0.043	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.001	2.01	< 0.001	0.046	< 0.0001	0.004	< 0.01	< 0.01	0.016
	16-May-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.78	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.012
	14-Jun-19	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
	16-Jul-19	< 0.001	0.055	< 0.001	< 0.05	< 0.0001	< 0.001	0.007	0.002	1.25	< 0.001	0.043	< 0.0001	0.006	< 0.01	< 0.01	0.029
	15-Aug-19	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.002	1.16	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.013
	16-Sep-19	< 0.001	0.045	< 0.001	< 0.05	< 0.0001	< 0.001	0.004	0.02	0.69	0.001	0.036	< 0.0001	0.017	< 0.01	< 0.01	0.094
	15-Oct-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.005	0.002	-	< 0.001	0.027	< 0.0001	0.005	< 0.01	< 0.01	0.022
	18-Nov-19	< 0.001	0.031	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.6	< 0.001	0.026	< 0.0001	< 0.001			



SW4	16-Sep-19	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
	15-Oct-19	< 0.001	0.037	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.004	-	< 0.001	0.031	< 0.0001	0.003	< 0.01	< 0.01	0.018
	18-Nov-19	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	16-Sep-20	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	0.004	0.005	0.97	< 0.001	0.053	< 0.0001	0.005	< 0.01	< 0.01	0.02
	16-Oct-20	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.001	2.26	< 0.001	0.042	< 0.0001	0.003	< 0.01	< 0.01	0.007
	16-Nov-20	< 0.001	0.031	< 0.001	< 0.05	< 0.0001	< 0.001	0.004	0.001	1.93	< 0.001	0.074	< 0.0001	0.005	< 0.01	< 0.01	0.016
	16-Dec-20	< 0.001	0.017	< 0.001	< 0.05	< 0.0001	0.002	0.001	0.002	32	< 0.001	0.035	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	14-Jan-21	0.002	0.028	< 0.001	< 0.05	< 0.0001	0.002	0.003	0.026	20	< 0.001	0.171	< 0.0001	0.005	< 0.01	< 0.01	0.013
	16-Feb-21	0.003	0.02	< 0.001	< 0.05	< 0.0001	0.003	0.001	< 0.001	27	< 0.001	0.054	< 0.0001	0.002	< 0.01	< 0.01	0.01
	17-Mar-21	0.002	0.02	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	16	< 0.001	0.057	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	19-Aug-21	< 0.001	0.022	-	< 0.05	-	< 0.001	0.001	< 0.001	2.13	-	-	-	0.001	-	-	0.005
	16-Nov-21	< 0.001	0.016	-	< 0.05	-	< 0.001	0.001	< 0.001	6.59	-	-	-	< 0.001	-	-	< 0.005
	24-Feb-22	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.19	< 0.001	0.034	< 0.0001	0.002	< 0.01	< 0.01	0.011
	27-May-22	< 0.001	0.021	-	< 0.05	-	< 0.001	0.001	< 0.001	0.68	-	-	-	0.001	-	-	< 0.005
	12-Aug-22	< 0.001	0.022	-	< 0.05	-	0.002	0.003	< 0.001	0.39	-	0.044	-	0.004	-	-	0.011
	18-Nov-22	0.002	0.013	-	< 0.05	-	0.002	0.001	0.003	20	-	0.084	-	0.001	-	-	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams 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:
SWMP 2021 - Soil and Water Management Plan, July 2021

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
Bold indicates a detection above the laboratory limit of reporting

Criteria:
 SWMP 2021 - Soil and Water Management Plan, July 2021

Table 9
Wash Plant Water Analytical Data - Metals
Williamstown Sand Syndicate
398 Cabbage Tree Road, Williamstown



Analyte		Metals		
		Arsenic	Iron	Manganese
Units		mg/L	mg/L	mg/L
Sample Name	Sample Date			
WPW	19-Aug-21	< 0.001	< 0.05	0.062
	22-Sep-21	< 0.001	0.08	0.051
	13-Oct-21	< 0.001	0.22	0.079
	16-Nov-21	< 0.001	0.29	0.045
	15-Dec-21	< 0.001	0.2	0.078
	18-Jan-22	< 0.001	0.56	0.038
	24-Feb-22	< 0.001	1.02	0.084
	12-Apr-22	< 0.001	0.44	0.042
	27-May-22	< 0.001	0.07	0.038
	17-Jun-22	< 0.001	0.94	0.061
	27-Jul-22	< 0.001	0.27	0.038
	12-Aug-22	< 0.001	0.17	0.026
	16-Sep-22	< 0.001	0.58	0.069
	24-Oct-22	0.002	2.22	0.118
	18-Nov-22	< 0.001	0.56	0.066
	14-Dec-22	< 0.001	0.42	0.062
	17-Jan-23	< 0.001	0.36	0.05

Notes:

< - Less than laboratory limit of reporting

mg/L - Milligrams per litre

Bold indicates a detection above the laboratory limit of reporting

Table 10
Wash Plant Water Analytical Data - PFAS
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Analyte		PFAS Compounds																								Sum of PFAS									
		Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl-perfluorooctane sulfonamide (EtFOSA)	N-Methyl-perfluorooctane sulfonamidoethano I (MeFOSE)	N-Ethyl-perfluorooctane sulfonamidoethano I (EtFOSE)	N-Ethyl-perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Methyl-perfluorooctane sulfonamidoacetic acid (MeFOSAA)	Perfluorobutanoic acid (PFBA)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluorooheptanoic acid (PFHpA)	Perfluorooctanoate (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorooctanesulfonate (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorodecansulfonic acid (PFDS)	4:2 Fluorotelomer Sulfonate (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonate (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS			
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L			
Sample Name	Sample Date																																		
INPUT	22-Sep-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	19-Aug-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01		
	22-Sep-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01		
	13-Oct-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	16-Nov-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	15-Dec-21	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.03	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.03	< 0.03	< 0.03	
	18-Jan-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.03	< 0.03	< 0.03
	24-Feb-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	12-Apr-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	27-May-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	17-Jun-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	27-Jul-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	12-Aug-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	16-Sep-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	
	24-Oct-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.03	< 0.03	< 0.03	
	18-Nov-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04	< 0.05	< 0.05	
14-Dec-22	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.03	< 0.04	< 0.04	
17-Jan-23	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.02	

Notes:
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
Bold indicates a detection above the laboratory limit of reporting

Table 11
Sediment Analytical Data - Metals
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Analyte		Metals							
		Arsenic	Barium	Chromium	Copper	Iron	Manganese	Nickel	Zinc
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sample Name	Sample Date								
WPF	19-Aug-21	10	20	83	9.0	57,700	-	6.0	28
	24-Feb-22	< 1.0	-	-	-	19,100	< 10	-	-
	27-May-22	8.0	10	73	< 5.0	40,000	-	5.0	13
	12-Aug-22	6.0	< 10	64	5.0	42,100	-	6.0	24
	18-Nov-22	< 5.0	< 10	< 2.0	< 5.0	970	-	< 2.0	< 5.0

Notes:

- - Not analysed

< - Less than laboratory limit of reporting

mg/kg - Milligrams per kilogram

Bold indicates a detection above the laboratory limit of reporting

Table 12
Sediment Analytical Data - PFAS
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Analyte		PFAS Compounds																								Sum of PFAS								
		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)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoate (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorotridecanoic acid (PFTeDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptanesulfonate (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	4:2 Fluorotelomer Sulfonate (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonate (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS		
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
Sample Name	Sample Date																																	
RFS	22-Sep-21	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.0002	
WASHED	22-Sep-21	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.0002	
	19-Aug-21	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	0.0006	0.0006	
WPF	22-Sep-21	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.0002	
	24-Feb-22	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.001	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0012	0.0012	
	27-May-22	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0012	0.0012	0.0012	
	12-Aug-22	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0006	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0006	0.0006	0.0006
		18-Nov-22	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	< 0.0002	< 0.0002

Notes:
< - Less than laboratory limit of reporting
mg/kg - Milligrams per kilogram
Bold indicates a detection above the laboratory limit of reporting

Table 13
Quality Control Data Analysis - Metals
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Analyte			Metals		
			Arsenic	Iron	Manganese
Units			mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type			
TB_17012023_17012023	17-Jan-23	Trip Blank	< 0.001	< 0.05	< 0.001
RB01_17012023	17-Jan-23	Rinsate	< 0.001	< 0.05	< 0.001
BH7_17012023	17-Jan-23	Primary	< 0.001	0.29	0.002
QC01_17012023	17-Jan-23	Duplicate	< 0.001	0.28	0.002
Relative Percentage Difference			NC	4%	0%
BH7_17012023	17-Jan-23	Primary	< 0.001	0.29	0.002
QC01A_17012023	17-Jan-23	Triplicate	< 0.001	0.33	< 0.005
Relative Percentage Difference			NC	13%	86%

Notes:

< - Less than laboratory limit of reporting

NC - Not calculated

mg/L - Milligrams per litre

Bold indicates a detection above the laboratory limit of reporting

Orange highlighting indicates an RPD in excess of 50%

RPD - Relative Percentage Difference

Table 14
Quality Control Data Analysis - PFAS
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Analyte			PFAS Compounds																								Sum of PFAS						
			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)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoate (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorotridecanoic acid (PFTeDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptanesulfonate (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	4:2 Fluorotelomer Sulfonate (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonate (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
Sample Name	Sample Date	Sample Type																															
TB_17012023_17012023	17-Jan-23	Trip Blank	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RB01_17012023	17-Jan-23	Rinsate	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
EPA - Environment Protection Authority
µg/L - Micrograms per litre

Table 15
Water Level Gauging Data
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Location	Date	TOC (mAHD)	DTW (mBTOC)	Well Depth (m)	Water Table Elevation (mAHD)	Remark	Technician
BH1	27-Jul-22	8.64	3.836	8.21	4.804		M Ferguson
	12-Aug-22	8.64	--	--	--		M Ferguson
BH1A	16-Sep-22	8.98	3.95	12.4	5.03		J Roby
	24-Oct-22	8.98	3.946	12.266	5.034		J Roby
	18-Nov-22	8.98	4.17	12.29	4.81	Gauge only	J. Roby
	14-Dec-22	8.98	4.467	12.163	4.513	Gauge only	M Ferguson
	17-Jan-22	8.98	4.838	12.181	4.142	Gauge only	A King
BH2	27-Jul-22	7.79	3.893	8.94	3.897	Clear	M Ferguson
	12-Aug-22	7.79	4.055	8	3.735	Clear	M Ferguson
	16-Sep-22	7.79	4.119	8.997	3.671	Dark brown	J Roby
	24-Oct-22	7.79	4.182	9.952	3.608	Clear	J Roby
	18-Nov-22	7.79	4.38	9.45	3.41	Light brown, NO, NS	J. Roby
	14-Dec-22	7.79	4.587	8.879	3.203	Very light brown	M Ferguson
	17-Jan-22	7.79	4.873	8.93	2.917	Brown, no odour / sheen	A King
BH4	27-Jul-22	3.06	0.764	5.98	2.296	Clear	M Ferguson
	12-Aug-22	3.06	0.799	5	2.261	Clear	M Ferguson
	16-Sep-22	3.06	0.826	5.99	2.234	Light brown	J Roby
	24-Oct-22	3.06	0.821	6.05	2.239	Clear	J Roby
	18-Nov-22	3.06	0.95	6.01	2.11	Clear, NO/NS	J. Roby
	14-Dec-22	3.06	1.119	6.025	1.941	Clear	M Ferguson
	17-Jan-22	3.06	1.299	6.006	1.761	Clear, no odour / sheen	A King
BH5	12-Aug-22	7.36	5.04	0	2.32		M Ferguson
	18-Nov-22	7.36	5.191	8.82	2.169	Gauge only	J. Roby
BH6	27-Jul-22	3.62	0.706	4.51	2.914	Odor, Clear	M Ferguson
	12-Aug-22	3.62	0.711	4	2.909	Odor, Clear	M Ferguson
	16-Sep-22	3.62	0.716	4.58	2.904	Odor, Clear	J Roby
	24-Oct-22	3.62	0.75	4.554	2.87	Odor, Clear	J Roby
	18-Nov-22	3.62	0.805	4.54	2.815	Cloudy, low sulfur odour, NS	J. Roby
	14-Dec-22	3.62	1.024	4.53	2.596	Odor, Light yellow	M Ferguson
	17-Jan-22	3.62	1.239	4.52	2.381	Yellow, moderate sulfur odour, NS	A King
BH7	27-Jul-22	2.98	0.906	4.5	2.074	Weak Odor, Light yellow	M Ferguson
	12-Aug-22	2.98	0.945	4	2.035	Light yellow	M Ferguson
	16-Sep-22	2.98	0.953	4.499	2.027	Yello	J Roby
	24-Oct-22	2.98	0.94	4.53	2.04	Odor, Brown	J Roby
	18-Nov-22	2.98	1.09	5.5	1.89	Light brown, low sulfur odour, NS	J. Roby
	14-Dec-22	2.98	1.278	4.52	1.702	Odor, Light yellow	M Ferguson
	17-Jan-22	2.98	1.396	4.51	1.584	Light yellow, moderate sulfur odour, NS	A King
BH8	12-Aug-22	3.88	1.689	0	2.191	Strong Odor, Milky white	M Ferguson
	18-Nov-22	3.88	1.825	6.04	2.055	Cloudy, low sulfur odour, NS	J. Roby
BH9	27-Jul-22	17.75	15.041	16.19	2.709		M Ferguson
	12-Aug-22	17.75	15.15	16	2.6		M Ferguson
	16-Sep-22	17.75	15.256	16.145	2.494		J Roby
	24-Oct-22	17.75	15.279	16	2.471		J Roby
	18-Nov-22	17.75	15.459	16.32	2.291	Gauge only	J. Roby
	14-Dec-22	17.75	15.659	16.11	2.091	Gauge only	M Ferguson
	17-Jan-22	17.75	15.855	16.24	1.895	Gauge only	A King
BH9A	27-Jul-22	10.75	8.202	12.44	2.548	Weak Odor, Clear	M Ferguson
	12-Aug-22	10.75	8.295	12	2.455	Light yellow	M Ferguson
	16-Sep-22	10.75	8.355	12.283	2.395	Odor, Light brown	J Roby
	24-Oct-22	10.75	8.366	12.42	2.384	Clear	J Roby
	18-Nov-22	10.75	8.521	12.43	2.229	Brown, NO/NS	J. Roby
	14-Dec-22	10.75	8.697	12.295	2.053	Light yellow	M Ferguson
	17-Jan-22	10.75	8.869	12.264	1.881	Light brown, moderate sulfur odour, NS	A King
BH10	12-Aug-22	6.69	1.699	0	4.991	Gauge only	M Ferguson
	18-Nov-22	6.69	2.09	3.48	4.6	Gauge only	J. Roby
BH11	27-Jul-22	6.63	0.793	5.28	5.837	Strong Odor, Light yellow	M Ferguson
	16-Sep-22	6.63	0.847	5.304	5.783	Odor, Yellow	J Roby
	24-Oct-22	6.63	0.87	4.315	5.76	Odor, Yellow	J Roby
	18-Nov-22	6.63	1.18	5.29	5.45	Yellow, moderate sulfur odour, NS	J. Roby
	14-Dec-22	6.63	1.456	5.302	5.174	Odor, Light yellow	M Ferguson
	17-Jan-22	6.63	1.794	5.3	4.836	Light brown, moderate sulfur odour, NS	A King
BH12A	16-Sep-22	5.62	2.298	7.337	3.322		J Roby
	24-Oct-22	5.62	2.291	7.34	3.329	Light brown	J Roby
	18-Nov-22	5.62	2.43	7.39	3.19	Gauge only	J. Roby
	14-Dec-22	5.62	2.587	7.37	3.033	Gauge only	M Ferguson
	17-Jan-22	5.62	2.713	7.327	2.907	Gauge only	A King
MW239D	18-Nov-22	3.04	0.74	20.49	2.3	Gauge only	J. Roby
MW239S	27-Jul-22	3.04	0.53	3.8	2.51	Strong Odor, Light yellow	M Ferguson
	12-Aug-22	3.04	0.595	3	2.445	Odor, Cloudy yellow	M Ferguson
	16-Sep-22	3.04	0.62	3.82	2.42	Odor, Yellow	J Roby
	24-Oct-22	3.04	0.61	3.62	2.43	Odor, Clear	J Roby
	18-Nov-22	3.04	0.76	3.82	2.28	Cloudy, low sulfur odour, NS	J. Roby
	14-Dec-22	3.04	0.911	3.81	2.129	Odor, Light brown	M Ferguson
	17-Jan-22	3.04	1.032	3.618	2.008	Light brown, strong sulfur odour, NS	A King
WPW	27-Jul-22	--	--	--	--	Dark cloudy brown	M Ferguson
	12-Aug-22	--	--	--	--	Light brown	M Ferguson
	16-Sep-22	--	--	--	--	Brown	J Roby
	24-Oct-22	--	--	--	--	Dark brown	J Roby
	14-Dec-22	--	--	--	--	Brown, turbid, NO/NS	M Ferguson
	17-Jan-22	--	--	--	--	Brown, turbid, NO/NS	A King

Notes:

DTW = Depth to water
mBTOC = Metres below top of casing
m = Metres
ND = Not detected

Table 16
Field Parameters
Williamtown Sand Syndicate
398 Cabbage Tree Road, Williamtown



Location	Date	DO mg/L	ORP mV	PH pH units	SC uS/cm	TDS mg/L	TEMP deg C	TURB NTU
BH2	27-Jul-22	5.85	223	4.13	87.6		15.6	131
	12-Aug-22	4.34	269.7	4.52	53		16.7	15.58
	16-Sep-22	3.28	262.7	4.76	80.7	60	18.1	710.34
	24-Oct-22	4.55	218.8	4.71	73.6	55	18.5	33.87
	18-Nov-22	1.9	213.9	4.7	73.2	54	19	52.26
	14-Dec-22	4.14	229.7	4.79	78.6	51	19.3	27.86
	17-Jan-23	3.88	211.3	4.69	75.6	228.72	21.7	240.6
BH4	27-Jul-22	3	190.7	4.6	90.2		14.1	121
	12-Aug-22	3.25	236	4.86	77		15.5	10.2
	16-Sep-22	5.35	163.8	5.29	75.2	60	15.4	34.07
	24-Oct-22	3.52	162.3	5.45		57	17.8	45.42
	18-Nov-22	3.57	170.6	5.32	80.2	62	16.8	20.29
	14-Dec-22	3.95	119.8	5.59	92.5	60	18.1	16.36
	17-Jan-23	1.89	159.5	5.31	128.8	91	20.9	8
BH6	27-Jul-22	4.75	-104	4.76	225		14.2	16.8
	12-Aug-22	3.94	-80	5.1	217		14.2	156
	16-Sep-22	2.64	-112.5	5.18	229.4	71	18.1	101.53
	24-Oct-22	1.75	-66.8	4.01	84.3	171	18.3	65.7
	18-Nov-22	2.29	-85.2	4.14	224.4	156	21.7	73.96
	14-Dec-22	1.72	-45.6	4.11	232.3	151	21.1	35
	17-Jan-23	2.46	-7	3.82	245.5	162	24.5	34.06
BH7	27-Jul-22	4.21	26	4.43	117		14.3	489
	12-Aug-22	3.98	11	4.84	110		14.9	110.4
	16-Sep-22	2.92	65.6	4.78	94.1	71	17.6	101.6
	24-Oct-22	3.52	-93.2	4.72	81.9	62	17.7	68.09
	18-Nov-22	3.35	-92.5	4.75	78.4	54	22.1	22.45
	14-Dec-22	3.82	-72.2	4.74	70.1	46	21.6	35.8
	17-Jan-23	2.98	38	4.49	74.1	51	22	15.49
BH8	12-Aug-22	4.2	-67.9	4.81	135		14.7	782
	18-Nov-22	3.4	-97.2	4.66	98.5	69	20.7	128.9
BH9A	27-Jul-22	4.93	208.5	4.11	182.8		16.6	52
	12-Aug-22	3.96	249	4.46	186		17.6	41.5
	16-Sep-22	3.65	241.4	4.69	132	99	18	45.22
	24-Oct-22	2.84	196.2	4.76	118	87	19	36.09
	18-Nov-22	2.04	86.3	4.79	112	84	18.1	466.51
	14-Dec-22	2.32	166	4.75	107.7	70	18.7	61
	17-Jan-23	1.94	111.5	4.73	107.4	75	21.4	32.2
BH11	27-Jul-22	4.74	-39	4.2	158		14	9.7
	16-Sep-22	2.46	-63.9	4.54	118.4	89	18	26.3
	24-Oct-22	2.12	-92.9	4.37	120.3	90	18.1	23.72
	18-Nov-22	2.01	-100.5	4.47	120.7	89	18.8	14.15
	14-Dec-22	3.19	-86	4.48	130.2	85	19.1	73
	17-Jan-23	2.16	-80.5	4.31	133.5	89	23.9	5.8
BH12A	24-Oct-22	2.94	141.5	4.95	120.8	89	18.8	146
MW239S	27-Jul-22	4	-71	4.32	125		14.2	175
	12-Aug-22	2.73	-69	4.6	115		15.2	310
	16-Sep-22	3.65	-79.71	4.83	102.4	77	17.9	129.37
	24-Oct-22	2.33	-117.7	4.72	86.5	65	18	83.71
	18-Nov-22	1.93	-113	4.74	97.3	67	22	52.37
	14-Dec-22	3.05	-62	4.62	115.4	75	21.5	239
	17-Jan-23	2.61	-9.4	4.52	100.2	67	23.6	105.4
SW1	12-Aug-22	2.97	182	5.18	140		12.6	4.3
	18-Nov-22	0.89	154.6	5.45	99.5	78	15.9	6.2
SW2	12-Aug-22	1.11	-40	4.95	88.2		12.9	23
	18-Nov-22	2.49	122	4.62	82.5	61	18.4	13.67
SW3	12-Aug-22	1.4	41.1	3.99	259.8		11.9	2.8
	18-Nov-22	3.09	80.4	5.62	227.1	164	19.5	17.11
SW4	12-Aug-22	3.75	224	4.57	214		11.3	1.34
	18-Nov-22	3.5	130.2	4.43	217.9	149	22.4	3.96
WPW	12-Aug-22	10.09	210	5.06	255		14.7	205
	16-Sep-22	9.42	174.5	4.7	208.2	149	20	1000.34
	24-Oct-22	9.11	145.4	4.73	199.4	143	20.2	4120.3
	18-Nov-22	8.57	209.5	4.77	253.6	167	24.3	23.44
	14-Dec-22	8.64	189.5	4.97	267.8	174	22.1	3055.6
	17-Jan-23	8.24	195.3	4.69	264.1	167	26.5	415



ATTACHMENT 3: LAB RESULTS



Client:				SITE, COC AND CONTACT DATA				Laboratory:				
Kleinfelder Australia Pty Ltd Suite 3, 240 - 244 Pacific Highway Charlestown NSW 2290 Phone: 02 4949 5200				Site Name: WSS Cabbage Tree Road January 2023 QUOTE NUMBER: 20232071 Job No.: 24 hrs Required TAT: 48 hrs Data QA level: LAB minimum unless specified.				Sampler Name: Aaron King Contact Number: (+61) 457 426 013 Contact e-mail: Aaron@kleinfelder.com DKousbroek@kleinfelder.com KLF-ETWEDD				
Relinquished by (print): A. King (sign)				Received by (print): (sign)				Relinquished by (print): (sign)				
Date / Time: 17/1/23				Date / Time: 17-1-23 2pm				Date / Time: 17-1-23 3pm				
Notes: Temp: (°C) 2.0°C ice present / no ice seals intact / no seal				Notes: Temp: (°C) 17.1°C ice present / no ice seals intact / no seal				Notes: Temp: (°C) 17.1°C ice present / no ice seals intact / no seal				
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analyses	Metals	PFAS (28 analytes standard Level)	Other Analyses
BH2			Water	17/01/2023				1		X		
BH4			Water	17/01/2023				1		X		
BH6			Water	17/01/2023				1		X		
BH7			Water	17/01/2023				1		X		
BH9A			Water	17/01/2023				1		X		
BH11			Water	17/01/2023				1		X		
MW239S			Water	17/01/2023				1		X		
WPW			Water	17/01/2023				3		X		
QC01			Water	17/01/2023				3		X		
QC01A			Water	17/01/2023				3		X		
RB01			Water	17/01/2023				3		X		
TB_17012023			Water	17/01/2023				3		X		

Organised by: Date: 17/1/23

Relinquished By / Date: 17/1/23

Comnote / Courier: 68230421

WO No: 68230421

Attached By PO / Internal Sheet:

LAB OF ORIGIN:
NEWCASTLE

Please Send to Eurofins

Environmental Division
Sydney
Work Order Reference
ES2301421

Telephone : + 61-2-8784 8565

Send Results to:
mferguson@kleinfelder.com, dkousbroek@kleinfelder.com,
aking@kleinfelder.com, mmattews@kleinfelder.com
Suite 3, 240-244 Pacific Highway
Charlestown, NSW 2290
Phone: 02 4949 5200

CERTIFICATE OF ANALYSIS

Work Order : **ES2301421**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : **AARON KING**
Address : **95 MITCHELL ROAD**
CARDIFF NSW 2285
Telephone : **----**
Project : **20232071 WSS Cabbage Tree Road January 2023**
Order number : **----**
C-O-C number : **----**
Sampler : **AARON KING**
Site : **----**
Quote number : **EN/222**
No. of samples received : **11**
No. of samples analysed : **11**

Page : 1 of 8
Laboratory : Environmental Division Sydney
Contact : Graeme Jablonskas
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9609
Date Samples Received : 17-Jan-2023 14:03
Date Analysis Commenced : 18-Jan-2023
Issue Date : 24-Jan-2023 12:25



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: Results for samples #8 and #9 confirmed by re-extraction and re-analysis.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

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

Sample ID

				BH2	BH4	BH6	BH7	BH9A
Sampling date / time				17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301421-001	ES2301421-002	ES2301421-003	ES2301421-004	ES2301421-005
				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
Manganese	7439-96-5	0.001	mg/L	0.005	0.022	0.014	0.002	0.035
Iron	7439-89-6	0.05	mg/L	0.12	0.12	3.61	0.29	0.49



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH11	MW239S	WPW	QC01	RB01
Sampling date / time				17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301421-006	ES2301421-007	ES2301421-008	ES2301421-009	ES2301421-010
				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
Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.050	0.002	<0.001
Iron	7439-89-6	0.05	mg/L	0.86	0.20	0.36	0.28	<0.05
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	----	----	0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	----	----	0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	----	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	----	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	----	----	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH11	MW239S	WPW	QC01	RB01
Sampling date / time				17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00	17-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301421-006	ES2301421-007	ES2301421-008	ES2301421-009	ES2301421-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	----	----	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	----	----	<0.02	<0.02	<0.02
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	----	----	0.02	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	----	----	0.02	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	----	----	0.02	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	95.7	93.1	97.1
13C8-PFOA	----	0.02	%	----	----	86.8	84.2	91.3



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

TB_17012023

Sampling date / time				17-Jan-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2301421-011	-----	-----	-----	-----
Result				Result	----	----	----	----
EG020F: Dissolved 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 (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	TB_17012023	----	----	----	----
				Sampling date / time	17-Jan-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2301421-011	-----	-----	-----	-----
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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	%		98.1	----	----	----	----
13C8-PFOA	----	0.02	%		91.3	----	----	----	----



Surrogate Control Limits

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

QUALITY CONTROL REPORT

Work Order : **ES2301421**

Page : 1 of 7

Client : **KLEINFELDER AUSTRALIA PTY LTD**

Contact : **AARON KING**

Address : **95 MITCHELL ROAD
CARDIFF NSW 2285**

Telephone : ----

Project : **20232071 WSS Cabbage Tree Road January 2023**

Order number : ----

C-O-C number : ----

Sampler : **AARON KING**

Site : ----

Quote number : **EN/222**

No. of samples received : **11**

No. of samples analysed : **11**

Laboratory : **Environmental Division Sydney**

Contact : **Graeme Jablonskas**

Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**

Telephone : **+6138549 9609**

Date Samples Received : **17-Jan-2023**

Date Analysis Commenced : **18-Jan-2023**

Issue Date : **24-Jan-2023**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

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

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

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

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

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: 4825533)									
ES2301421-009	QC01	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	0.002	0.002	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.28	0.28	0.0	No Limit
ES2301392-001	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	0.053	0.053	0.0	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4823039)									
ES2301388-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.20	0.21	0.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.58	0.65	10.9	0% - 20%
		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
ES2301635-002	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	0.05	0.04	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4823039)									
ES2301388-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.07	0.07	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.27	0.30	9.6	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.26	0.28	7.8	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.13	0.14	10.2	No Limit



Sub-Matrix: **WATER**

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 (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4823039) - continued									
ES2301388-001	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
ES2301635-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4823039)									
ES2301388-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2301635-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: **WATER**

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: 4823039) - continued									
ES2301635-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4823039)									
ES2301388-001	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	0.24	0.24	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.20	0.23	11.1	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
ES2301635-002	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: 4823039)									
ES2301388-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.98	2.15	8.2	0% - 20%
ES2301635-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.05	0.04	22.2	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**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 4825533)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.5	85.0	114
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	87.8	82.0	110
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	90.3	82.0	112
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4823039)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	82.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	84.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	80.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	84.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	80.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	78.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4823039)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	85.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	80.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	85.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	84.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	83.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	82.2	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	83.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4823039)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	83.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	80.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	84.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	83.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	84.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	94.2	61.0	135



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
				Method: Compound		CAS Number	LOR	Unit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4823039)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	81.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	88.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	88.2	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	81.8	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**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4825533)							
ES2301421-001	BH2	EG020A-F: Arsenic	7440-38-2	1 mg/L	105	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	106	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4823039)							
ES2301635-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	83.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	87.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	78.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	81.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	73.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	75.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4823039)							
ES2301635-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	80.6	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	85.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	95.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	81.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	80.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	84.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	80.0	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	76.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	77.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.25 µg/L	87.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	100	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4823039)							
ES2301635-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	77.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	84.9	68.0	141



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4823039) - continued							
ES2301635-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	83.7	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	80.0	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	81.1	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	78.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	83.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4823039)							
ES2301635-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	85.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	78.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	83.6	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	76.8	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2301421	Page	: 1 of 4
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: AARON KING	Telephone	: +6138549 9609
Project	: 20232071 WSS Cabbage Tree Road January 2023	Date Samples Received	: 17-Jan-2023
Site	: ----	Issue Date	: 24-Jan-2023
Sampler	: AARON KING	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	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		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, BH4, BH6, BH7, BH9A, BH11, MW239S, WPW, QC01, RB01, TB_17012023	17-Jan-2023	----	----	----	20-Jan-2023	16-Jul-2023	✓	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) WPW, QC01, RB01, TB_17012023	17-Jan-2023	19-Jan-2023	16-Jul-2023	✓	20-Jan-2023	16-Jul-2023	✓	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) WPW, QC01, RB01, TB_17012023	17-Jan-2023	19-Jan-2023	16-Jul-2023	✓	20-Jan-2023	16-Jul-2023	✓	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) WPW, QC01, RB01, TB_17012023	17-Jan-2023	19-Jan-2023	16-Jul-2023	✓	20-Jan-2023	16-Jul-2023	✓	
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) WPW, QC01, RB01, TB_17012023	17-Jan-2023	19-Jan-2023	16-Jul-2023	✓	20-Jan-2023	16-Jul-2023	✓	
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) WPW, QC01, RB01, TB_17012023	17-Jan-2023	19-Jan-2023	16-Jul-2023	✓	20-Jan-2023	16-Jul-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		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
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.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



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Charlestown
NSW 2290

Project Name: WSS CABBAGE TREE ROAD JANUARY 2023

Project ID: 20232071

Order No.:

Report #: 956689

Phone: 02 4949 5200

Fax:

Received:

Jan 18, 2023 4:00 PM

Due:

Jan 25, 2023

Priority:

5 Day

Contact Name:

AARON KING

Eurofins Analytical Services Manager : Andrew Black

Sample Detail

Arsenic (filtered)

Iron (filtered)

Manganese (filtered)

Per- and Polyfluoroalkyl Substances (PFASs)

Sydney Laboratory - NATA # 1261 Site # 18217

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	QC01A	Jan 17, 2023		Water	S23-Ja0023017	X	X	X	X

Test Counts

1 1 1 1

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



NATA Accredited
Accreditation Number 1261
Site Number 18217

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: **AARON KING**

Report **956689-W**
Project name **WSS CABBAGE TREE ROAD JANUARY 2023**
Project ID **20232071**
Received Date **Jan 18, 2023**

Client Sample ID			QC01A
Sample Matrix			Water
Eurofins Sample No.			S23-Ja0023017
Date Sampled			Jan 17, 2023
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	0.33
Manganese (filtered)	0.005	mg/L	< 0.005
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	%	109
13C5-PFPeA (surr.)	1	%	112
13C5-PFHxA (surr.)	1	%	125
13C4-PFHpA (surr.)	1	%	115
13C8-PFOA (surr.)	1	%	126
13C5-PFNA (surr.)	1	%	112
13C6-PFDA (surr.)	1	%	138
13C2-PFUnDA (surr.)	1	%	142
13C2-PFDoDA (surr.)	1	%	139
13C2-PFTeDA (surr.)	1	%	138
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			QC01A
Sample Matrix			Water
Eurofins Sample No.			S23-Ja0023017
Date Sampled			Jan 17, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	116
D3-N-MeFOSA (surr.)	1	%	107
D5-N-EtFOSA (surr.)	1	%	113
D7-N-MeFOSE (surr.)	1	%	119
D9-N-EtFOSE (surr.)	1	%	113
D5-N-EtFOSAA (surr.)	1	%	104
D3-N-MeFOSAA (surr.)	1	%	122
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	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	136
18O2-PFHxS (surr.)	1	%	125
13C8-PFOS (surr.)	1	%	131
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
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	%	128
13C2-6:2 FTSA (surr.)	1	%	113
13C2-8:2 FTSA (surr.)	1	%	120
13C2-10:2 FTSA (surr.)	1	%	101
PFASs Summations			
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction 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	Jan 19, 2023	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Sydney	Jan 19, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Sydney	Jan 19, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Sydney	Jan 19, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Sydney	Jan 19, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Sydney	Jan 19, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)

Address: Suite 3, 240-244 Pacific Hwy
Charlestown
NSW 2290

Project Name: WSS CABBAGE TREE ROAD JANUARY 2023

Project ID: 20232071

Order No.:

Report #: 956689

Phone: 02 4949 5200

Fax:

Received:

Jan 18, 2023 4:00 PM

Due:

Jan 25, 2023

Priority:

5 Day

Contact Name:

AARON KING

Eurofins Analytical Services Manager : Andrew Black

Sample Detail

Arsenic (filtered)

Iron (filtered)

Manganese (filtered)

Per- and Polyfluoroalkyl Substances (PFASs)

Sydney Laboratory - NATA # 1261 Site # 18217

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	QC01A	Jan 17, 2023		Water	S23-Ja0023017	X	X	X	X

Test Counts

1 1 1 1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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
CFU: Colony forming unit		

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

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
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	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
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)	%	102			80-120	Pass	
Iron (filtered)	%	101			80-120	Pass	
Manganese (filtered)	%	101			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	R23-Ja0017279	NCP	%	92			75-125	Pass	
Iron (filtered)	R23-Ja0017279	NCP	%	92			75-125	Pass	
Manganese (filtered)	R23-Ja0017279	NCP	%	91			75-125	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S23-Ja0023017	CP	%	110			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S23-Ja0023017	CP	%	106			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S23-Ja0023017	CP	%	109			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S23-Ja0023017	CP	%	109			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S23-Ja0023017	CP	%	107			50-150	Pass	
Perfluorononanoic acid (PFNA)	S23-Ja0023017	CP	%	107			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S23-Ja0023017	CP	%	109			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S23-Ja0023017	CP	%	107			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S23-Ja0023017	CP	%	106			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	S23-Ja0023017	CP	%	110			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S23-Ja0023017	CP	%	111			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S23-Ja0023017	CP	%	100			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S23-Ja0023017	CP	%	99			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S23-Ja0023017	CP	%	98			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S23-Ja0023017	CP	%	97			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S23-Ja0023017	CP	%	94			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S23-Ja0023017	CP	%	96			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S23-Ja0023017	CP	%	109			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S23-Ja0023017	CP	%	112			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S23-Ja0023017	CP	%	115			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S23-Ja0023017	CP	%	103			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S23-Ja0023017	CP	%	108			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S23-Ja0023017	CP	%	110			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S23-Ja0023017	CP	%	108			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTSA)	S23-Ja0023017	CP	%	113			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	S23-Ja0023017	CP	%	123			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S23-Ja0023017	CP	%	110			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S23-Ja0023017	CP	%	113			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)	S23-Ja0023017	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	S23-Ja0023017	CP	mg/L	0.33	0.33	1.7	30%	Pass	
Manganese (filtered)	S23-Ja0023017	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	S23-Ja0025852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S23-Ja0025852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S23-Ja0025852	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	N/A
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
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).
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Andrew Black	Analytical Services Manager
Fang Yee Tan	Senior Analyst-Metal



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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Sample Receipt Advice

Company name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Contact name: AARON KING
Project name: WSS CABBAGE TREE ROAD JANUARY 2023
Project ID: 20232071
Turnaround time: 5 Day
Date/Time received: Jan 18, 2023 4:00 PM
Eurofins reference: 956689

Sample Information

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

Notes

Contact

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

Andrew Black on phone : (+61) 2 9900 8490 or by email: AndrewBlack@eurofins.com

Results will be delivered electronically via email to AARON KING - aking@kleinfelder.com.

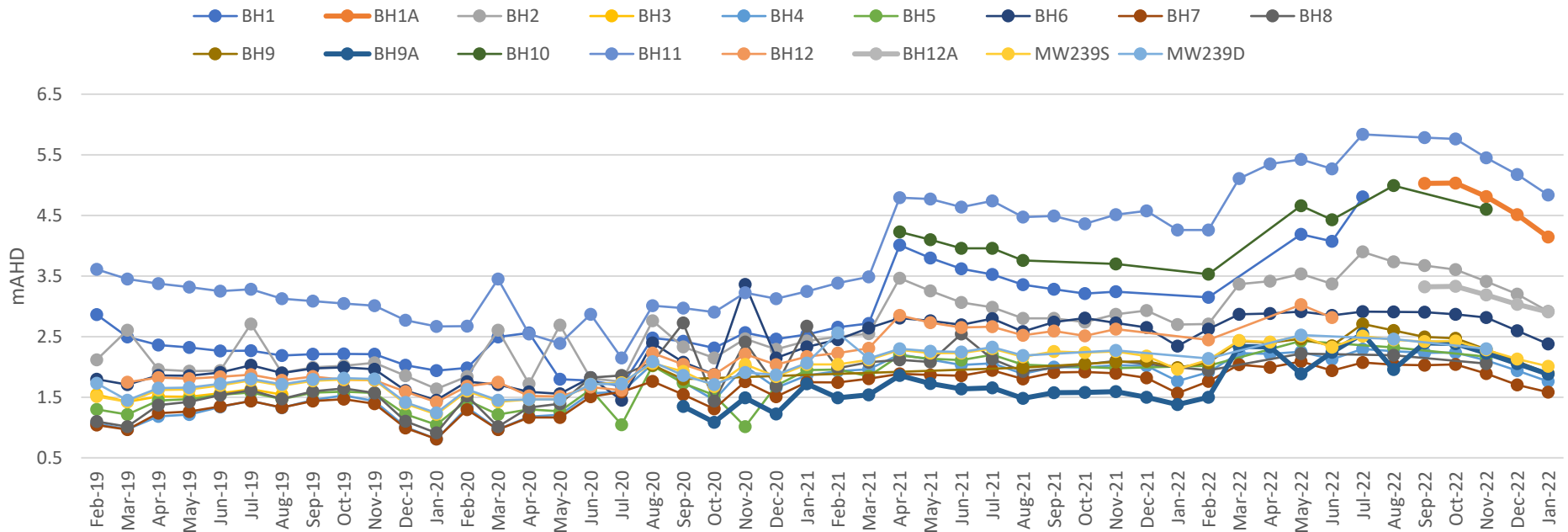
Note: A copy of these results will also be delivered to the general Kleinfelder Aust Pty Ltd (NEWCASTLE) email address.



ATTACHMENT 4: DATA TRENDS



Groundwater Elevation (mAHD)



Monthly Rainfall Totals 2022-2023 (mm)

