

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

March 2024 Annual Monitoring Event

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Attention: Kristen McMahon

Subject: Monthly Water Quality Monitoring Results, Cabbage Tree
Road Sand Quarry, NSW
March 2024 Annual Monitoring Event

1 INTRODUCTION

This report presents water quality monitoring results for the March 2024 monitoring event undertaken by Kleinfelder Australia Pty Ltd (Kleinfelder) at the Cabbage Tree Road Sand Quarry, NSW (herein referred to as the 'site'). This report summarises the required monitoring data under the NSW Environment Protection Authority (EPA) Environment Protection License (EPL) No. 21264, and the site-specific Soil and Water Management Plan (SWMP).

The scheduled monthly monitoring event was conducted on 12th March 2024 and included:

- Gauging the depth to water and total depth (relative to the top of the groundwater well casing) within 10 groundwater monitoring wells,
- Recording of field parameters (including pH, electrical conductivity, temperature, dissolved oxygen, turbidity, total dissolved solids, and redox potential) for groundwater,
- The collection of water samples from seven groundwater monitoring wells, and
- Collection of a Wash Plant Water (WPW) sample and Wash Plant Fines (WPF) sediment sample.

All investigations were undertaken in accordance with relevant Australian Standards and applicable guidance material (sampling and investigation methodologies available upon request).

Monitoring locations are illustrated by the site plan provided in **Attachment 1**.

The following sections present the results obtained for monitoring conducted in March 2024. Results have been colour-coded to identify exceedances of the adopted trigger values, with a discussion provided for long-term trends and results exceeding the trigger values, where required. Wash plant fines sampling was conducted during this monitoring event as it was unable to be completed as part of the previous February annual monitoring event due to maintenance being conducted at the time of sampling.

2 GROUNDWATER MONITORING

Groundwater monitoring is undertaken in accordance with National Environment Protection Council (2013), National Environment Protection (Assessment of Site Contamination) Measure (NEPM), and New South Wales Environment Protection Authority (2022), Contaminated Land Guidelines Sampling Design Part 1 – Application.



2.1 EPL Groundwater Monitoring Sites

Table 1 below details the monitoring results for March 2024, in accordance with the requirements of the EPL and the SWMP.

Table 1: Groundwater Monitoring Results – EPL Monitoring Sites

Monitoring Well (LDP number in parentheses)	Metals (mg/L)			Inorganics & Other			Gauging			
	Arsenic	Iron	Manganese	Field EC (µS/cm)	Field pH (pH units)	Field Turbidity (NTU)	Depth to Water (mbTOC)	GWE	Max inferred ¹	Difference between max inferred and GWE
	SWMP Trigger Values						Refer to Section 2.3, Table 3			
	0.003	4.1	0.136	500	4.2 – 6.5	N/A				
EPL Monitoring Sites										
BH2 (LDP001)	<0.001	0.22	0.005	81	4.93	103.5	5.750	2.040	3.8	1.760
BH4 (LDP002)	<0.001	0.08	0.012	88	6.68	4.4	1.837	1.223	3.0 ²	1.777
BH6 (LDP003)	<0.001	1.38	0.008	215.9	5.10	19.47	1.792	1.828	4.4	2.572
BH7 (LDP004)	<0.001	0.38	0.003	97.4	4.66	12.54	1.781	1.199	3.7	2.501
BH9A (LDP005)	<0.001	0.59	0.049	142	5.01	63.5	9.432	1.318	4.0 ²	2.682
BH11 (LDP006)	<0.001	0.9	0.004	149	4.93	7.63	3.298	3.332	5.5	2.168
MW239S (LDP007)	<0.001	1.13	0.002	134.2	4.68	71.,13	1.425	1.615	3.9 ³	2.285

Notes:

< – less than the laboratory limit of reporting

mg/L – milligrams per litre

µS/cm – micro siemens per centimetre

NTU – Nephelometric Turbidity Units

mbTOC – metres below top of casing

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

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

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



2.2 Non-EPL Groundwater Monitoring Sites

Table 2 below details the monitoring results for March 2024 from monitoring sites which are included in the SWMP but are not required under the EPL.

Table 2: Groundwater Results Non-EPL Monitoring Sites

Monitoring Well	Metals (mg/L)			Inorganics & Other			Gauging			
	Arsenic	Iron	Manganese	EC (µS/cm)	pH (pH units)	Turbidity (NTU)	Depth to Water (mbTOC)	GWE	Max Inferred ¹	Difference between Max inferred and GWE
	SWMP Trigger Values						Refer to Table 3			
	0.003	4.1	0.136	500	4.2 – 6.5	N/A				
Non-EPL Monitoring Sites										
BH1A	-	-	-	-	-	-	6.140	2.840	4.5 ²	1.660
BH12A	-	-	-	-	-	-	3.508	2.112	4.0 ³	1.888
WPW2	<0.001	0.29	0.059	271.4	7.97	466	-	-	-	-

Notes:

< – less than the laboratory limit of reporting

mg/L – milligrams per litre

µS/cm – micro siemens per centimetre

NTU – Nephelometric Turbidity Units

mbTOC – metres below top of casing

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 former adjacent well (BH12).



2.3 Trigger Values for Groundwater Depth

Table 3 presents the trigger values adopted for groundwater depth, as per Watershed HydroGeo (2019). The inferred maximum historical groundwater elevations are provided in Watershed HydroGeo (2019).

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.	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 at any on-site bore.	Weekly (or more frequent) monitoring (dipping) of groundwater levels until water level declines to below high frequency level bores.	Internal and environmental consultant. Include note in Annual Report.
2	Groundwater levels within 0.25 m of <i>inferred</i> maximum historical level 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.	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.

2.4 Groundwater Trends and Discussion

In accordance with the SWMP, an exceedance of the trigger value does not necessarily indicate that there is an unacceptable risk on site, but rather a trigger for further investigation or evaluation of management options, as monitoring results may naturally exceed trigger values. pH at BH4 (6.68 pH) exceeded the site-specific trigger value range (4.2 - 6.5 pH) during the March monitoring event. The pH exceedance at BH4 is unlikely to be related to quarrying activities and is within range of historical results.

The reported concentration of manganese at BH07 was found to be slightly elevated beyond historical data, albeit below the site-specific trigger value.

Gauging data and field measurements obtained during groundwater monitoring are provided in **Attachment 2**.



3 SURFACE WATER MONITORING

Surface water monitoring is undertaken in accordance with National Environment Protection Council (2013), National Environment Protection (Assessment of Site Contamination) Measure (NEPM), and New South Wales Environment Protection Authority (2022), Contaminated Land Guidelines Sampling Design Part 1 – Application.

3.1 Surface Water Monitoring Results

Surface water monitoring is completed on a quarterly basis as per the SWMP. Therefore, March 2024 monthly water quality monitoring event did not include surface water monitoring within the scope of works.

3.2 Surface Water Trends and Discussion

Surface water monitoring trends were not updated for the March 2024 monitoring event as surface water monitoring is not included in the scope of works for monthly monitoring.

4 PFAS MONITORING

In accordance with the SWMP, Per- and Polyfluoroalkyl Substances (PFAS) monitoring was undertaken at wash plant locations during the March 2024 monitoring event. Results of PFAS monitoring are provided in **Table 4**.



Table 4: PFAS Monitoring Results

Monitoring Point (LDP number in parentheses)	PFAS (µg/L) (water analysis)			PFAS (mg/kg) (Wash Plant Fines)		
	PFOA	Sum of PFOS + PFHxS	Other PFAS	PFOA	Sum of PFOS + PFHxS	Other PFAS
	SWMP Trigger Values					
	0.56	0.07	N/A	0.1	0.01	N/A
Wash Plant Water						
WPW2	<0.01	<0.01	<0.05	-	-	-
Wash Plant Fines						
WPF	-	-	-	< 0.002	0.0009	< 0.006

Notes: ug/L – micrograms per litre, mg/kg – milligrams per kilogram, < – less than the laboratory limit of reporting



5 METEOROLOGY

Rainfall data was obtained from the Bureau of Meteorology Williamtown RAAF AWS (Station No. 061078, [Williamtown, NSW - Daily Weather Observations \(bom.gov.au\)](http://www.bom.gov.au)) for the 12 months preceding the March 2024 monitoring event.

Since May 2023, the recorded monthly rainfall total has fallen below the historical average, except during the previous February 2024 event which reported an elevated albeit average rainfall. The rainfall total to date for March 2024 has fallen below the monthly mean and previous months total. Based on current rainfall data (mean and monthly totals) for February and March 2024, it is expected that groundwater elevations will stabilise during the subsequent months due to a lag in groundwater response, consistent with current groundwater trend data.

6 ATTACHMENTS

Attachment 1 Site Monitoring Locations
Attachment 2 Gauging Data and Field Records
Attachment 3 Long-term Results Tables
Attachment 4 NATA Accredited Laboratory reports and Chain of Custody (COC) Documentation
Attachment 5 Long-term Trends

Attachments available online via [Cabbage Tree Road Sand Quarry](#)

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