



Vickery Extension Project Groundwater Monitoring Report

Quarterly Review February 2024 – April 2024

Whitehaven Coal Ltd

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Prepared by:

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1.0	5 July 2024	Joy Xie/Sharon Hulbert	Sharon Hulbert	Brian Rask

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Whitehaven Coal Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Table of Contents

Basis of Report	ii
Acronyms and Abbreviations	v
1.0 Introduction	1
1.1 Background	1
1.2 Trigger Action Response Plan	2
1.3 Report Objective.....	2
2.0 Monitoring Results	3
2.1 Climate Data	3
2.2 Groundwater Monitoring Network.....	3
2.3 Data Availability.....	5
2.4 Groundwater Levels	5
2.4.1 Groundwater Level Data Summary	5
2.4.2 TARP Trigger Level Summary.....	10
2.5 Groundwater Quality and Exceedance Summary	10
3.0 Action and Response	13
4.0 Recommendations	14
5.0 References	16

Tables in Text

Table 1: Monthly Rainfall vs Long-Term Average Rainfall.....	3
Table 2: Groundwater Levels in Alluvial Aquifer.....	5
Table 3: Groundwater Levels in Permian Aquifer.....	6
Table 4: Summary of Logger Data Available	8
Table 5: Summary of GW Interim Trigger Values Compared to Initial Results	10
Table 6: Summary and Status of Recommendations to Date.....	14

Figures in Text

Figure 1: VCM Groundwater Monitoring Network.....	4
Figure 2: Alluvial Bores Hydrograph (Manual Dips)	6
Figure 3: Permian Bores Hydrograph (Manual Dips).....	7
Figure 4: Logger Hydrograph – VKY036C	9



Appendices

- Appendix A Trigger Action Response Plan**
- Appendix B Groundwater Level Results**
- Appendix C Groundwater Quality Results**
- Appendix D Quality Trigger Level Analysis**



Acronyms and Abbreviations

CMA	Corrective Management Actions
EC	Electronic Conductivities
EP&A Act	Environmental Planning and Assessment Act, 1979
GWMP	Groundwater Management Plan
mbgl	meter below ground level
mbtoc	meters below top of casing
pH	potential of Hydrogen
TARP	Trigger Action Response Plan
VCPL	Vickery Coal Pty Ltd
VEP	Vickery Extension Project
WMP	Water Management Plan



1.0 Introduction

1.1 Background

SLR Consulting Australia Pty Ltd (SLR) was engaged by Whitehaven Coal Pty Ltd (Whitehaven) to undertake a review of groundwater data for the Vickery Extension Project (VEP) between 1st February 2024 through 30th April 2024.

The VEP Development Consent (SSD-7480) was granted to Vickery Coal Pty Ltd. (VCPL) on 12 August 2020 by the NSW Independent Planning Commission as a delegate of the NSW Minister for Planning under Section 75J of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

Pertinent to the groundwater monitoring and subsequent reporting, is Condition 8, that states:

8. In Addition to the Groundwater Management Plan monitoring requirements specified in condition B53 of the State Development Consent, the approval holder must:

a. Establish and maintain a network of groundwater monitoring bores designed to detect changes in groundwater levels and include bores that are co-located or paired with surface water monitoring sites to allow monitoring and analysis of groundwater – surface water interactions. These monitoring bores must be installed prior to the commencement of mining operations.

b. Monitor groundwater levels in each bore (required under condition 8.a) at least once every 3 months, starting within one week of the commencement of mining operations for the life of this approval.

c. Publish on the website all groundwater monitoring data from the bore network, updated at least once every three months to include the most recent readings available and to maintain the data on the website for the life of this approval. The monitoring data must include hydrographs for the bore network and explain what the data means in relation to the groundwater performance measures specified in the State Development Consent.

This quarterly report has been compiled for Vickery Coal Mine (VCM) to comply with Condition 8(c) of EPBC 2016/7649. Groundwater monitoring commenced in October 2023 aligning with the commencement of mining in October 2023 and in accordance with Condition 8(b). Reporting to date includes:

1. Initial Quarterly Report (August 2023 through October 2023), published January 2024.
2. 2023 Annual Review (1st January 2023 through 31st December 2023), to be published on the website following approval from NSW Department of Planning, Housing and Infrastructure (DPHI).
3. Second Quarterly Report (November 2023 through January 2024), published April 2024.

Mining operations have commenced on site, with coal extraction occurring. To date, no indication of groundwater incursion is present. Minor water has been removed from the pit, attributable to collection of rainfall and surface runoff.



1.2 Trigger Action Response Plan

A Trigger Action Response Plan (TARP) was established in the Groundwater Management Plan (GWMP), as a means of providing specific suitable action where exceedances of the groundwater performance criteria are observed. The aim of the TARPs is to evaluate potential adverse changes to existing groundwater sources, confirm if they are due to the development, and provide a means to repair, mitigate and/or offset any adverse groundwater impacts (Whitehaven 2023). The groundwater level and quality TARP for the open cut activities at VEP is shown in **Appendix A**.

The GWMP states the procedure for the review, as follows. The confirmed exceedances will prompt an investigation, carried out by suitably qualified personnel, to assess the reasons for trigger exceedance, which could include but not be limited to climatic conditions, agriculture abstraction, and or mining activities. In the case exceedances are attributed to mining activities, the changes in groundwater conditions, such as a decrease in water level or changes in groundwater quality, will be compared to performance measures (discussed in Section 8.1 of GWMP) to evaluate the significance of any impacts manifested on the groundwater systems.

The results of the trigger investigations will be reported in each annual review. WHC will use the annual review following each reporting period to analyse the data and revise the trigger thresholds in response to additional baseline data as it becomes available. When this occurs the GWMP will be updated.

1.3 Report Objective

This report assesses the VEP groundwater monitoring data against the trigger levels for all required parameters (as per the TARP in the site GWMP) for the reporting period from 1st February 2024 through 30th April 2024.

This report includes:

- A summary of TARP exceedances, if any, during the reporting period;
- A summary of trigger exceedances, if any, over time including the identification of breaches of triggers that remain within normal condition in this reporting period;
- A high-level outline of potential influence factors for exceedances (a detailed analysis of exceedances is not discussed in this report) during the reporting period; and
- Recommendation of relevant actions and responses to be undertaken, in alignment with the TARPs.

The information in this monitoring report will be included in the ongoing quarterly monitoring reports for VEP and summarised in the 2024 Annual Review.



2.0 Monitoring Results

This section summarises the climate information, groundwater monitoring network, and monitoring results available to the conclusion of the reporting period.

2.1 Climate Data

Local climate data was obtained from the Canyon MET station, approximately 7km from VEP. Collection of meteorological data at VEP commenced in September 2023 and will be utilised as more data becomes available. In order to understand long-term rainfall trends, the SILO climate record for the location 0.05° x 0.05° tile centred on a location within proximity of VEP (latitude: -30.75, longitude: 150.15) has been utilised (Queensland Government 2024). Comparison of the data sets show analogous trends, indicating the SILO data is a suitable representation of long-term trends.

Rainfall over the past 12 months, in comparison to the long-term average (i.e., January 1900 – present) is shown in **Table 1**. The quarterly reporting period showed notably lower rainfall than long-term averages in February and March. April 2024 rainfall was above long-term average.

Table 1: Monthly Rainfall vs Long-Term Average Rainfall

	2023								2024			
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
SILO 2023-2024 monthly rainfall (mm)	7.6	30.5	11.5	8.2	5	20.3	93.3	71.7	52.7	20.7	17.5	68.7
SILO Long-term average rainfall (mm)	39.0	40.3	38.5	35.0	37.3	49.1	58.0	60.9	69.6	57.8	46.0	33.2
On-site Rainfall (mm)	0	31.6	9.6	10.6	4.2	27.6	123.8	87.4	29.4	40.8	25.8	101.8

2.2 Groundwater Monitoring Network

Based on the GWMP, the existing groundwater monitoring network consists of 51 monitoring sites, including

- 24 monitoring locations in Alluvial aquifer; and
- 25 monitoring locations in Permian aquifer.
- Two sites (WR1 and WR2) positioned to monitor the potential for seepage from the spoil dump (installed January 2024).

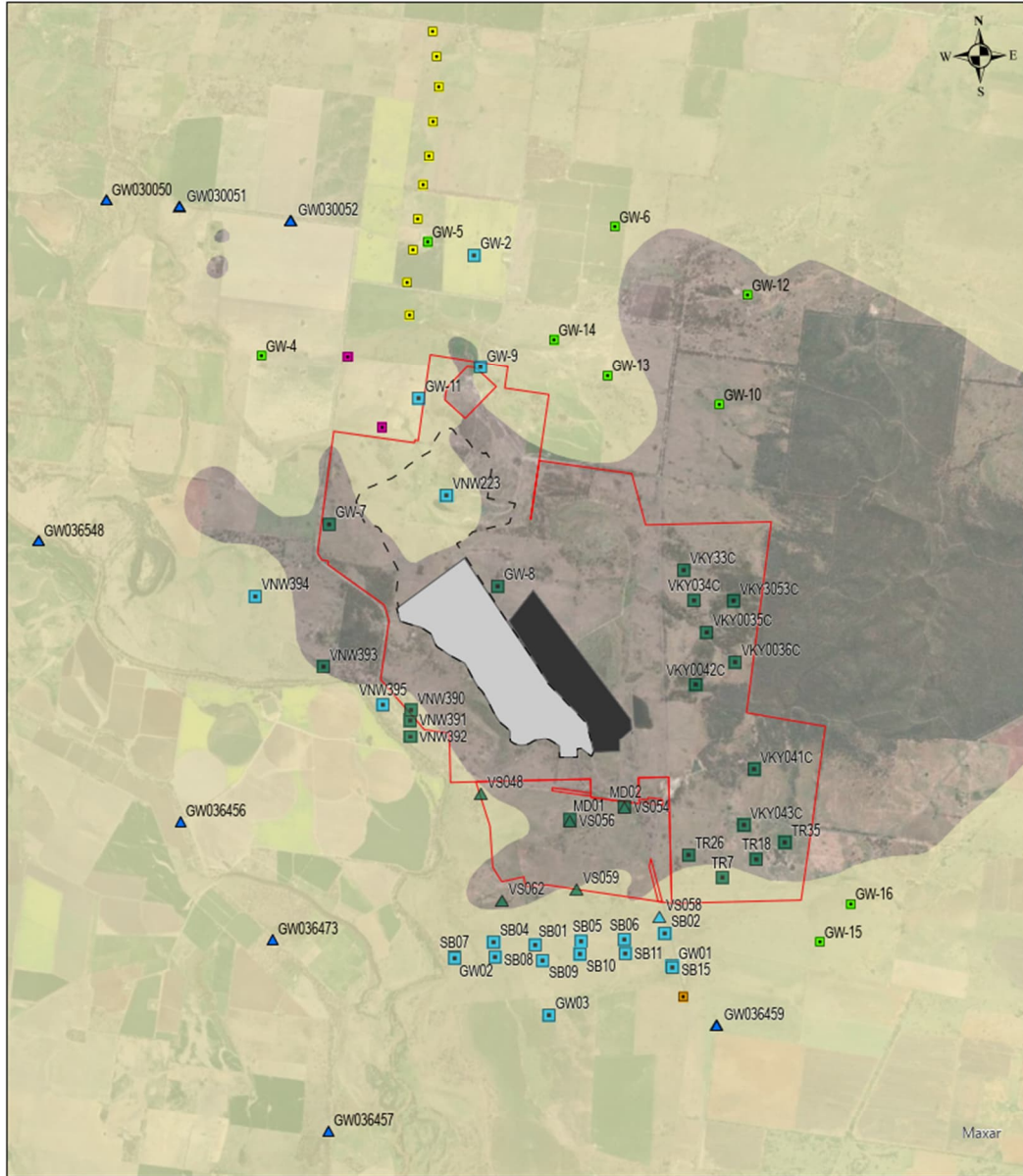
VEP will incorporate an additional nine monitoring locations in the next reporting period, including:

- Two locations screening the alluvium to the southeast of the mine, situated outside the 1 metre predicted drawdown impact zone of the mine;
- Five locations screening the alluvium to the north of the mine in proximity of the proposed VEP bore field; and
- Two locations screening the Permian aquifer to the north of the mine.

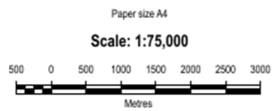
The groundwater network is presented on **Figure 1**, and full details provided in the GWMP.



Figure 1: VCM Groundwater Monitoring Network



WHITEHAVEN COAL PTY LTD
 Name of Map: **Vickery Coal Mine**



Spatial Reference
 Name: GDA 1994 MGA Zone 56
 Datum: GDA 1994
 Projection: Transverse Mercator
 Date Exported: 17/05/2023 1:25 PM

Legend

- ▲ Government monitoring wells
 - ▲ Alluvial with data logger
 - Vickery northern borefield (proposed)
 - ▲ Permian with data logger
 - Approved southern bore
 - Mining Pit
 - Vickery proposed monitoring locations
 - Yr 2 overburden emplacement
 - Seepage monitoring
 - Year 5 overburden emplacement
 - Mine Lease
- VEP Monitoring locations**
- Geological Unit
- Alluvial
 - Permian
- Geology**
- Qx - Alluvial



2.3 Data Availability

In line with the VCM GWMP, the full suite of bores was monitored during the reporting period, excluding the following monitoring sites:

- GW030051 – No access – NSW Water locked bore,
- GW030052 – No access – NSW Water locked bore,
- GW036459 – No access – NSW Water locked bore.
- VNW223 – was reported blocked at 1.3 m below top of casing (btoc) and was unable to be sampled.

The small number of unavailable bores is not believed to impact the overall ability of the network to monitor for adverse impacts to the groundwater system via on-site operations at this stage. There are bores monitoring the same strata at locations suitable to capture potential impacts (i.e. closer to the extraction site), captured in the monitored data.

2.4 Groundwater Levels

Groundwater levels are measured via both manual dip and continuous loggers. The data available in the 2023 year is presented in this section, and shown in **Appendix B**.

2.4.1 Groundwater Level Data Summary

A summary of the groundwater level data available to date is presented below.

2.4.1.1 Alluvial Groundwater Bores

The groundwater levels in the alluvial monitoring bores are summarised in **Table 2**, and presented in **Figure 2**.

Table 2: Groundwater Levels in Alluvial Aquifer

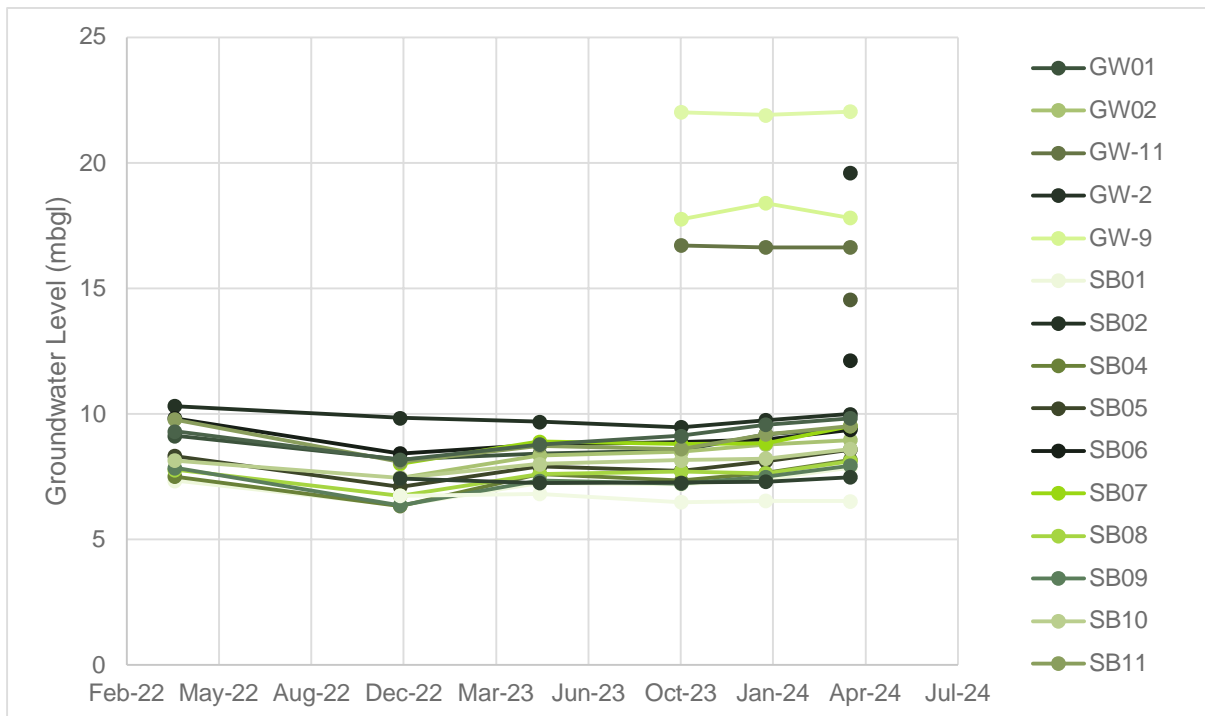
Sample Location	Depth to Water (mbgl*)					
	Apr-22	Dec-22	May-23	Oct-23	Jan-24	Apr-24
GW01	9.12	8.2	8.40	8.53	9.19	9.45
GW02	-	7.45	8.34	8.48	8.78	8.96
GW-11	-	-	-	16.70	16.64	16.64
GW-2	-	-	-	-	-	19.59
GW-9	-	-	-	17.76	18.4	17.8
SB01	7.34	6.37	7.23	7.19	7.38	7.86
SB02	10.3	9.84	9.68	9.46	9.74	9.99
SB04	7.5	6.34	7.59	7.33	7.64	8.18
SB05	8.32	7.1	7.90	7.73	8.11	8.59
SB06	9.82	8.43	8.77	8.87	8.98	9.36
SB07	-	8.01	8.89	8.79	8.83	9.53
SB08	7.77	6.73	7.60	7.70	7.63	8.12
SB09	7.85	6.36	7.33	7.22	7.49	7.95
SB10	8.14	7.45	8.00	8.15	8.21	8.6



Sample Location	Depth to Water (mbgl*)					
	Apr-22	Dec-22	May-23	Oct-23	Jan-24	Apr-24
SB11	9.78	8.1	8.72	8.6	9.19	9.51
SB15	9.3	8.18	8.77	9.12	9.57	9.82
VNW223	-	-	-	22.01	21.9	22.05
VNW394	-	6.73	6.83	6.49	6.53	6.52
VNW395	-	7.43	7.25	7.26	7.3	7.48
WR1	-	-	-	-	-	14.55
WR2	-	-	-	-	-	12.13

* mbgl = metres below ground level

Figure 2: Alluvial Bores Hydrograph (Manual Dips)



2.4.1.2 Permian Groundwater Bores

The groundwater levels in the Permian monitoring bores are summarised in **Table 3**, and presented in **Figure 3**.

Table 3: Groundwater Levels in Permian Aquifer

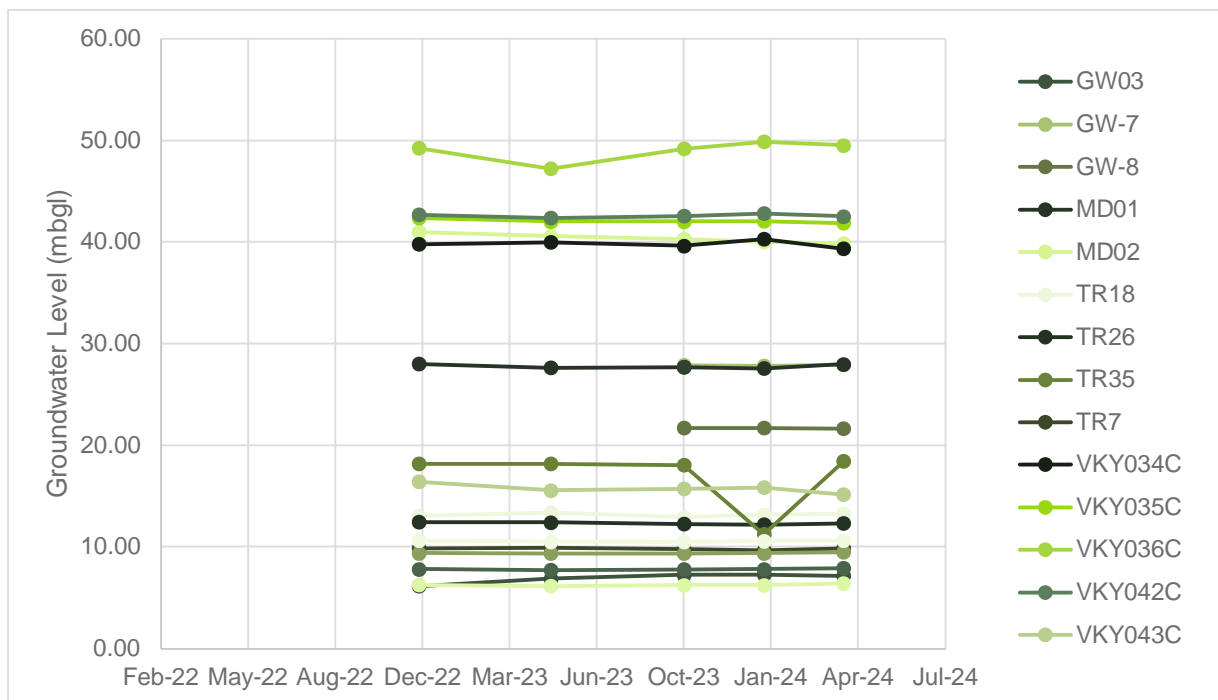
Sample Location	Depth to Water (mbgl*)					
	Apr-22	Dec-22	May-23	Oct-23	Jan-24	Apr-24
GW03	-	6.12	6.85	7.23	7.27	7.13
GW-7	-	-	-	27.86	27.80	27.92
GW-8	-	-	-	21.74	21.69	21.63
MD01	-	28.02	27.63	27.68	27.57	27.96



Sample Location	Depth to Water (mbgl*)					
	Apr-22	Dec-22	May-23	Oct-23	Jan-24	Apr-24
MD02	-	40.98	40.57	40.30	40.03	39.88
TR18	-	13.04	13.38	12.92	13.17	13.26
TR26	-	12.44	12.39	12.24	12.21	12.31
TR35	-	18.16	18.17	18.04	11.23	18.43
TR7	-	9.85	9.93	9.75	9.69	9.84
VKY034C	-	39.79	39.97	39.61	40.27	39.37
VKY035C	-	42.37	42.03	42.01	42.04	41.89
VKY036C	-	49.23	47.24	49.17	49.88	49.53
VKY042C	-	42.68	42.40	42.56	42.80	42.53
VKY043C	-	16.41	15.56	15.70	15.82	15.15
VNW390	-	9.38	9.33	9.36	9.37	9.46
VNW391	-	7.80	7.75	7.76	7.79	7.94
VNW392	-	6.25	6.14	6.21	6.24	6.4
VNW393	-	10.64	10.50	10.48	10.57	10.6

* Metres below ground level

Figure 3: Permian Bores Hydrograph (Manual Dips)



2.4.1.3 Data Loggers

A summary of the available logger data is presented in **Table 4**. An example of a logger plot is provided in **Figure 4**, with all plots provided in **Appendix B**.



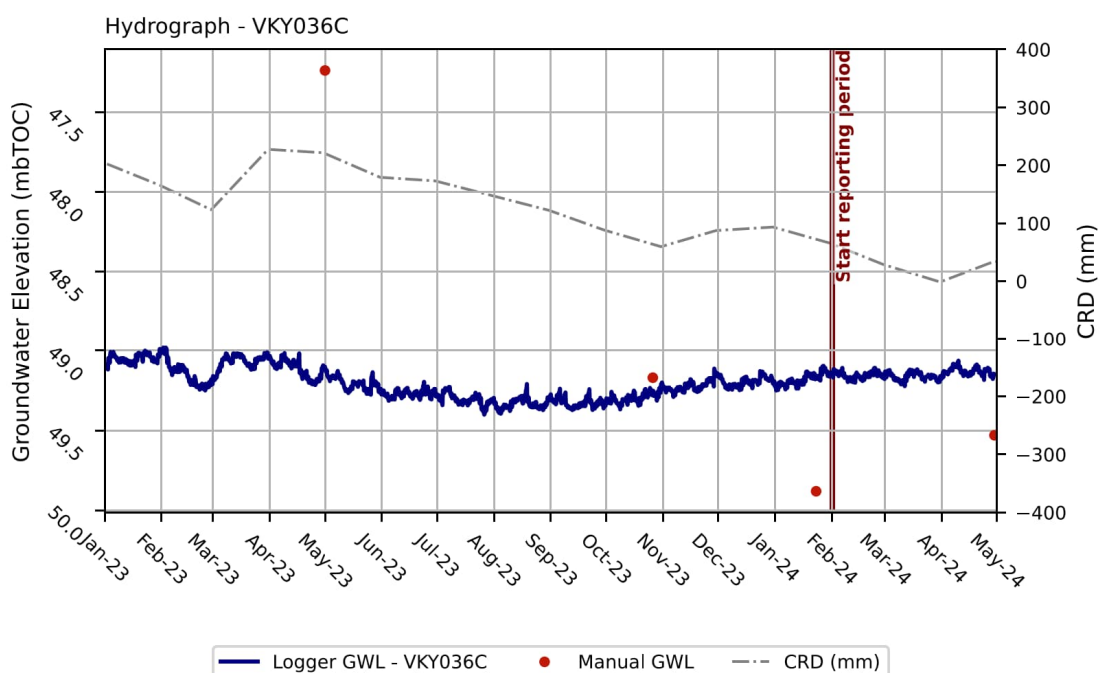
Table 4: Summary of Logger Data Available

Bore ID	Logger Type	Recording Period	Number of Data Points	Comments
GW01	VWP	10/10/2023 – 29/04/2024	1278	Sensor depth required to calculate the water depth. Significant drifting in the logger readings has been observed
GW02	VWP	15/11/2023 – 14/04/2024	99	Sensor depth and surface elevation required to calculate the water depth. VWP sensor depth to be confirmed
GW03	VWP (01-10-6743)	17/01/2024 – 15/04/2024	5840	Unreasonable logger readings have been removed from the hydrograph. Logger data indicate a drawdown of approximately 1.7 meters from July 2023 to February 2024. However, manual measurements suggest that the water level has remained stable.
GW-9	Logger (Rugged TROLL 100)	24/04/2020 – 15/04/2024	412	-
VNW395	Logger (Rugged TROLL 100)	17/01/2024 – 17/04/2024	363	-
TR7	Logger (Rugged TROLL 100)	17/03/2012 – 19/03/2014; and 03/06/2020 – 17/04/2024	1,688	Significant drifting in the logger readings has been observed
TR18	Logger (Rugged TROLL 100)	16/04/2020 – 16/04/2024	1,462	-
VKY034C	Logger (Rugged TROLL 100)	07/01/2020 – 24/04/2024	6,294	-
VKY035C	Logger (Rugged TROLL 100)	04/11/2020 – 29/04/2024	4,930	-
VKY036C	Logger (Rugged TROLL 100)	07/01/2020 – 29/04/2024	6,185	-
VKY041C (38, 51, 70, 95, 115 m)	VWP (DT2055-02023)	11/03/2015 – 17/04/2024	~3,325/sensor	Sensor depths to be confirmed.
VKY041C (140, 170, 199 m)	VWP (DT2055-02027)	11/03/2015 – 17/04/2024	~3,325/sensor	Sensor depths to be confirmed.
VKY042C	Logger (Rugged TROLL 100)	04/11/2020 – 29/04/2024	5,061	-
VKY043C	Logger (Rugged TROLL 100)	07/01/2020 – 13/07/2023	5,135	Logger stopped reading in July 23. Based on the GWMP, the water level monitoring for this bore is required quarterly; therefore, a logger is not essentially required.
VKY3053C	VWP	04/03/2020 – 17/01/2024		No data in April 2023. Sensor depths to be confirmed.
VKY33C (38, 51, 70, 95, 115m)	VWP (DT2055-02029)	11/03/2015 – 22/01/2024	3,240/sensor	Sensor depths to be confirmed.



Bore ID	Logger Type	Recording Period	Number of Data Points	Comments
VKY33C (140, 170, 190m)	VWP (DT2055-02087)	11/03/2015 – 22/01/2024	3,241/sensor	Sensor depths to be confirmed.
VS048 (30m)	VWP	17/06/2011 – 15/06/2012; and 04/03/2020 – 17/04/2024	7075	Sensor depths to be confirmed. The water level has been decreasing since December 2022, accumulating an approximate total decline of 0.8 metres by April 2024.
VS054	VWP (SN11-1769)	17/06/2012 – 15/06/2012; and 16/11/2023 – 17/04/2024	~7648/sensor	Sensor depths to be confirmed.
VS056-25m	VWP (SN11-1765)	04/03/2020 – 17/04/2024	1,252	Sensor depths to be confirmed.
VS056-100m	VWP (SN11-1771)	04/03/2020 – 17/04/2024	1,253	Sensor depths to be confirmed.
VS058 (30, 100, 170m)	VWP (SN11-1768)	16/04/2020 – 15/04/2024	~5,839 / sensor	
VS062	VWP	12/02/2021 – 14/04/2024	10,141	Sensor depths to be confirmed. In early March 2024, the water level was observed to have a decline of approximately 1.4 metres and since stabilised. Ongoing review to confirm accuracy of data and causation.
VS059 (30, 65, 113m)	VWP	16/04/2020 – 15/04/2024	~5840/sensor	Sensor depths to be confirmed.

Figure 4: Logger Hydrograph – VKY036C



2.4.2 TARP Trigger Level Summary

Groundwater levels in the Permian and Alluvial bores have remained steady with no significant changes or trends occurring in levels over the monitoring period.

Given no visual observation of groundwater seepage, occurring during the reporting period, this is as expected. There is insufficient data (less than 2 years) to provide commentary on seasonal fluctuations or changes in responds to climate conditions (residual rainfall mass). Analyses on these patterns will be included when more than 2 years of data has been collected.

Given the current status of mining, and lack of notable change in groundwater levels, the Groundwater Level TARP is not enacted during the monitoring period. The groundwater levels are considered to be reflective of natural conditions and not impacted by extraction activities.

2.5 Groundwater Quality and Exceedance Summary

Routine groundwater monitoring commenced in October 2023 and continues quarterly. The full April 2024 field and laboratory suite results are summarised in **Appendix C**.

Table 5 summarises the bores that have exceedances of the interim trigger values as set out in Table 8-3 of the GWMP. **Appendix D** provides a summary of all monitoring rounds to date compared to the interim trigger values or ANZECC default guideline values for slightly to moderately disturbed ecosystems.

Table 5: Summary of GW Interim Trigger Values Compared to Initial Results

Groundwater Bore ID	Parameters	Unit	Trigger Value	Monitoring Results
GW02	pH	pH unit	7.2 – 8.6	7.14
GW03	EC	µS/cm	811	862
GW-11	pH	pH unit	7.0 – 9.3	6.55
GW-7	pH	pH unit	7.7 – 8.5	8.79
	SO ₄ ²⁻	mg/L	86	399
GW-8	SO ₄ ²⁻	mg/L	86	100
GW-9	SO ₄ ²⁻	mg/L	86	128
MD01	pH	pH unit	6.7 – 8.4	10.73 [#]
MD02	pH	pH unit	6.7 – 8.4	6.59
SB02	SO ₄ ²⁻	mg/L	365	1,106
SB05	SO ₄ ²⁻	mg/L	365	520
TR18	pH	pH unit	6.7 – 8.4	6.69
	EC	µS/cm	12,315	12,730
	SO ₄ ²⁻	mg/L	86	592
TR26	SO ₄ ²⁻	mg/L	86	180
TR35	EC	µS/cm	12,315	16,740
	SO ₄ ²⁻	mg/L	86	622
TR7	pH	pH unit	7.4 – 7.8	6.71
	EC	µS/cm	12,970	14,410
	SO ₄ ²⁻	mg/L	365	501



Groundwater Bore ID	Parameters	Unit	Trigger Value	Monitoring Results
VKY034C	SO ₄ ²⁻	mg/L	86	116
VKY035C	SO ₄ ²⁻	mg/L	86	88
VKY036C	SO ₄ ²⁻	mg/L	86	281
VKY042C	pH	pH unit	6.7 – 8.4	6.61
	SO ₄ ²⁻	mg/L	86	312
VNW390	pH	pH unit	6.7 – 8.4	6.59
	SO ₄ ²⁻	mg/L	86	106
VNW391	SO ₄ ²⁻	mg/L	86	96
VNW392	pH	pH unit	6.7 – 8.4	6.66
	SO ₄ ²⁻	mg/L	86	296
VNW393	SO ₄ ²⁻	mg/L	86	200
VNW394	SO ₄ ²⁻	mg/L	365	560
GW-2	pH	pH unit	6.9 – 8.3	6.85
WR-1	pH	pH unit	6.9 – 8.3	6.70
	EC	µS/cm	10,083	26,500
	SO ₄ ²⁻	mg/L	365	1,320
WR-2	pH	pH unit	6.9 – 8.3	6.57
	EC	µS/cm	10,083	25,340
	SO ₄ ²⁻	mg/L	365	1,540

- value considered not representative of aquifer. Bore investigation and purge undertaken in Feb 2024, found bore potentially failed and high pH due to grout contamination.



The trigger level exceedances summarised in **Table 5** are unlikely to be a result of mining and highly likely to be due to natural variation in water quality as mining has not yet impacted the water table. The interim trigger levels were defined utilising standard guideline value and consequently are not reflective of the local natural conditions. As per the GWMP, these trigger values will be updated when reasonable baseline data is collected.

Given no indication of groundwater incursion is present and the early position in the project life cycle, it is highly unlikely these exceedances of interim trigger values reflect response to mining. Consequently, the groundwater quality results indicate a 'normal condition' TARP response.



3.0 Action and Response

Based on the results summary presented in **Section 2.0**, the fact that both Groundwater Level and Groundwater Quality are considered “Normal Conditions”, there are no specific action and responses required.



4.0 Recommendations

Table 6 provides a summary of the historical recommendations, from Annual and prior quarterly reporting, with a comment on their current status.

Table 6: Summary and Status of Recommendations to Date

Recommendation	Cited	Status
Several monitoring wells were unlocated (GW-2) or inaccessible (GW030051, GW030052, and GW036459) during the reporting period. It is recommended to locate these wells for future monitoring or provide justifications for updating the GWMP.	2023 Annual Review/Quarterly Report	ONGOING: GW-2 has been located in April 2024 monitoring event, and therefore continue monitoring GW-2 in the ongoing events. GW030051, GW030052, and GW036459 were not accessible for the January monitoring. Review their suitability for the ongoing monitoring. Monitoring network review underway.
Continue the monitoring program and the quarterly reporting on groundwater levels and quality as outlined in the GWMP.	2023 Annual Review	COMPLETE/ONGOING: ongoing monitoring and reporting established.
Survey two new bores WR1 and WR2 for location and incorporate into the next monitoring round.	January Quarterly	COMPLETE: Based on the fieldnote, the location have been surveyed for WR1 (227743, 6596215) and WR2 (227762, 6595746)
Review necessity of MD01 to network, as investigation indicate the bore is damaged. Confirm whether requires replacement or removal from the monitoring regime.	January Quarterly	ONGOING: Bore replacement planned within upcoming quarterly reporting period.
Logger to be replaced in bore VKY043C.	January Quarterly	COMPLETE: The faulty logger in VKY043C was removed in April 2024, and no replacement has been installed as continuous monitoring of this bore is not required according to the GWMP; thus, a logger is considered unnecessary.
GW-7: field sampling contractors noted this site was overgrown and dangerous. It is recommended to perform site maintenance prior to next monitoring event.	January Quarterly	COMPLETE: GW-7 has been sampled in April 2024.
VNW223 is blocked at ~1.3 mbtoc and was unable to be sampled since January. Recommend investigate blockage and action accordingly.	January Quarterly	ONGOING: VNW223 remained blocked in April 2024. Review planned.

Recommendations based on the review and analysis completed herein, are as follows:

- Review logger data from TR7 and GW01, as appears erroneous, and replace as necessary.
- Review depth of GW-2, cited as >150 mbgl, which is inconsistent with historical records indicating a shallow bore screening the alluvium.
- VNW223 is blocked at 1.3 mbtoc and was unable to be sampled since January. Recommend investigate blockage and action accordingly.



- Elevation survey of all bores to assist with groundwater level trigger development and plotting of bores as reduced water levels (i.e. as metres below Australian height datum – mAHD).
- Verify sensor depths for all VWPs in the network to assist with groundwater level calculation (calibration certificates in hand for review and update of database). Revise trigger levels based on updated sensor depth and calibration data.
- When adequate baseline data becomes available, review and update the trigger values.



5.0 References

Hydrosimulations. 2018. "Vickery Extension Project: Groundwater Assessment. Report ."

Queensland Government. 2024. *SILO Long Paddock*. <https://www.longpaddock.qld.gov.au/>.

Whitehaven. 2023. "Vickery Coal Mine Water Management Plan Appendic C Groundwater Management Plan."





Appendix A Trigger Action Response Plan

Vickery Extension Project Groundwater Monitoring Report

Quarterly Review February 2024 – April 2024

Whitehaven Coal Ltd

SLR Project No.: 640.031099.00001

5 July 2024

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response
<p><u>Performance Measure Feature</u> Negligible groundwater level impact on the Namoi Alluvium aquifer and associated surface watercourses, groundwater dependent ecosystems, and private landowner bores.</p> <p>Negligible groundwater level impact on the Permian bedrock and associated private landowner bores, outside that predicted by the approved groundwater impacts (Hydrosimulations, 2018).</p> <p><u>TARP Objective</u> This TARP defines levels of deviation in groundwater level from 'normal' conditions and the actions to be implemented in response to each level deviation as a result of open cut mining.</p> <p><u>Assessment Criteria</u> Bore specific trigger values are based on the water levels across the entire history of monitoring in each individual bore and the predicted impacts from the Hydrosimulations (2018) numerical groundwater model.</p>	<p><u>Locations</u> Open standpipes and VWPs All monitoring locations as set out in Table 4-1 of the Groundwater Management Plan (GWMP). All monitoring locations are shown in Figure 4-1 of the GWMP.</p> <p><u>Monitoring Frequency</u> During mining Quarterly manual measurements of water level. Continuous monitoring in bores installed with Vibrating Wire Piezometers (VWPs) and data loggers.</p> <p>Post-mining TBC</p>	Normal Condition		
		<ul style="list-style-type: none"> Groundwater level remains above the respective trigger limits (defined as the 95th percentile over the baseline period and detailed in Table 8-2 of the GWMP) for each individual groundwater bore. 	<ul style="list-style-type: none"> Continue monitoring and review of data as per monitoring program. 	<ul style="list-style-type: none"> No response required.
		Level 1		
		<ul style="list-style-type: none"> One quarterly monitoring result shows an exceedance of the trigger limit as detailed in Table 8-2 of the GWMP. 	<ul style="list-style-type: none"> <i>Actions as required for Normal Condition.</i> Re-sample of groundwater level within seven days. 	<ul style="list-style-type: none"> Report declines and climate investigation outcomes in Annual Review.
		Level 2		
<ul style="list-style-type: none"> Groundwater level in a groundwater bore exceeds the respective trigger limit during three consecutive quarterly monitoring rounds. <p>OR</p> <ul style="list-style-type: none"> Complaint received by landowners of private bores regarding groundwater level declines. 	<ul style="list-style-type: none"> <i>Actions as stated in Level 1.</i> <p>For Open Standpipe Monitoring Bores, VWPs, and Private Bores:</p> <ul style="list-style-type: none"> Undertake a preliminary hydrogeological investigation as efficiently as practicable to check and validate the data and assess cause of trigger exceedances to determine if mining related as per the requirements set out in Section 8.3 of the GWMP. Review of groundwater levels to be carried out by qualified personnel. Increase monitoring and review of data frequency for sites where Level 2 has been reached, subject to land access. <p>For Private Bores:</p> <ul style="list-style-type: none"> Undertake investigation to demonstrate if the decline will impact the long-term viability of the affected water supply works. Commence level monitoring of said private bore in quarterly monitoring rounds, subject to negotiation and land access restrictions. <p>The investigation will be commenced/ completed as efficiently as practicable.</p>	<ul style="list-style-type: none"> <i>Responses as stated in Level 1.</i> Include outcomes from the preliminary investigation report in Annual Review. 		
Level 3				
<ul style="list-style-type: none"> The reduction in water level is determined in the Level 2 preliminary investigation not to be controlled by climatic or external anthropogenic factors. <p>OR</p> <ul style="list-style-type: none"> Groundwater level in a groundwater bore continues to exceed the respective trigger limit during six consecutive monitoring rounds. 	<ul style="list-style-type: none"> <i>Actions as stated in Level 2.</i> <p>For Open Standpipe Monitoring Bores, VWPs, and Private Bores:</p> <ul style="list-style-type: none"> Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g., catchment changes, another effect unrelated to mining). Review groundwater model. <p>For Private Bores:</p> <ul style="list-style-type: none"> Review corrective management actions (CMAs) as specified in Section 8.3 of the GWMP considering findings from further investigations and consider additional reasonable and feasible options. 	<ul style="list-style-type: none"> <i>Responses as stated in Level 2.</i> Report trigger exceedance to DPE and key stakeholders. Provide the detailed investigation report to relevant agencies within a reasonable timeframe of identifying the non-compliance. Report trigger exceedance and investigation outcomes in Annual Review. Develop/design contingency and remedial measures based on the results of the above investigations. Contingency and remedial measures considered practical for implementation may include: <ul style="list-style-type: none"> Undertake landholder and government consultation; Offset groundwater leakage from the Namoi Alluvium aquifer; Review and refine the GWMP including undertaking additional specific monitoring of private landholder bores; Review Site Water Balance and predictive groundwater model; and Review mine plan impacts on alluvial groundwater source. <p>For Private Bores:</p> <ul style="list-style-type: none"> Provide DPE and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g., extending the depth of the bore, establishment of additional bores, compensation to affected landowners as per Section 8.3 of the GWMP). Implement CMAs, subject to land access (finalise negotiations and implement the agreed "make-good" arrangements). Monitor and report on success of CMAs in Annual Review. 		

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response
<p><u>Performance Measure Feature</u> Negligible quality impact on the Namoi Alluvium aquifer and associated surface watercourses and private landholder bores.</p> <p>Negligible quality impact on the Permian bedrock and associated private landowner bores, outside that predicted by the approved groundwater impacts (Hydrosimulations, 2018).</p> <p><u>TARP Objective</u> This TARP defines levels of deviation in groundwater quality from baseline conditions and the actions to be implemented in response to each level deviation.</p> <p><u>Assessment Criteria</u> Quality in each monitoring bore remains within the 5th and 95th percentile of the baseline conditions set out in Table 8-4 of the GWMP for the following parameters:</p> <ul style="list-style-type: none"> • Electrical Conductivity; • pH; and • Sulfate. <p>Other major and metal ions will be assessed against the relevant ANZECC guidelines.</p>	<p><u>Locations</u> Open standpipes All open standpipe monitoring locations as set out in Table 4-2 of the GWMP.</p> <p><u>Monitoring Frequency</u> During mining pH and EC will be measured in the field on a quarterly basis in the alluvial and waste rock deposits (after waste rock bores installed) and on a biannual basis in the Permian geology . Other parameters (detailed in Table 4-2 of the GWMP) to be measured on an annual basis.</p> <p>Post-mining TBC</p>	Normal Condition		
		<ul style="list-style-type: none"> • Groundwater pH remains within the baseline 5th and 95th percentile range, as specified in the GWMP. • Other groundwater quality parameters remain below the baseline 95th percentile, as specified in the GWMP. 	<ul style="list-style-type: none"> • Continue monitoring and review of data as per monitoring program. 	<ul style="list-style-type: none"> • No response required.
		Level 1		
		<ul style="list-style-type: none"> • Two six-monthly exceedances or one annual quality exceedances outside of the specified baseline range (pH) or above 95th percentile baseline (other quality parameters). 	<ul style="list-style-type: none"> • <i>Actions as required for Normal Condition.</i> • Re-sample of groundwater quality within seven days. 	<ul style="list-style-type: none"> • Report exceedances in Annual Review.
		Level 2		
		<ul style="list-style-type: none"> • Three consecutive six-monthly exceedances or two annual quality exceedances (including re-samples from Level 1) outside of the specified baseline range (pH) or above 95th percentile baseline (other quality parameters). <p>OR</p> <ul style="list-style-type: none"> • Complaint received by landowners of private bores regarding groundwater quality declines. 	<ul style="list-style-type: none"> • <i>Actions as stated in Level 1.</i> <p>For Open Standpipe Monitoring Bores:</p> <ul style="list-style-type: none"> • Undertake a preliminary hydrogeological investigation as efficiently as practicable to assess cause of quality exceedances and determine if mining related as per the requirements set out in Section 8.3 of the GWMP. Review of groundwater quality to be carried out by qualified personnel. <p>For Private Bores:</p> <ul style="list-style-type: none"> • Collect quality sample from said private bore for comparison with wider aquifer data, subject to negotiation and land access restrictions. • Undertake investigation to demonstrate if quality will impact the long-term viability of the affected water supply works. <p>The investigation will be commenced/ completed as efficiently as practicable.</p>	<ul style="list-style-type: none"> • <i>Responses as stated in Level 1.</i> • Include outcomes from the preliminary investigation report in Annual Review.
Level 3				
<ul style="list-style-type: none"> • The water quality changes are determined from Level 2 preliminary investigation to not be controlled by climatic, local land uses, or other external anthropogenic factors. <p>OR</p> <ul style="list-style-type: none"> • Groundwater quality continues to decline with six consecutive six-monthly exceedances or three annual quality exceedances outside of the specified baseline range (pH) or above 95th percentile baseline (other quality parameters). 	<ul style="list-style-type: none"> • <i>Actions as stated in Level 2.</i> <p>For Private Bores and Open Standpipe Monitoring Bores</p> <ul style="list-style-type: none"> • Increase monitoring to at least quarterly measurements for sites where Level 3 has been reached, subject to land access. • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g., catchment changes, another effect unrelated to mining). • Review corrective management actions (CMAs) as specified in Section 8.3 of the WMP considering findings from further investigations and consider additional reasonable and feasible options. 	<ul style="list-style-type: none"> • <i>Responses as stated in Level 2.</i> <p>For Private Bores and Open Standpipe Monitoring Bores:</p> <ul style="list-style-type: none"> • Report trigger exceedance to DPE and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review. <p>For Private Bores, if the changes have been confirmed to be related to mining effects:</p> <ul style="list-style-type: none"> • Initiate negotiations with impacts landowners as soon as practicable. Consider all reasonable and feasible options for remediation as relevant (e.g., isolation, remediation, etc.). • Provide DPE and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g., extending the depth of the bore, establishment of additional bores, compensation to affected landowners as per Section 10.2.2 of the WMP). • Implement CMAs, subject to land access (finalise negotiations and implement the agreed "make-good" arrangements). • Monitor and report on success of CMAs in Annual Review. 		



Appendix B Groundwater Level Results

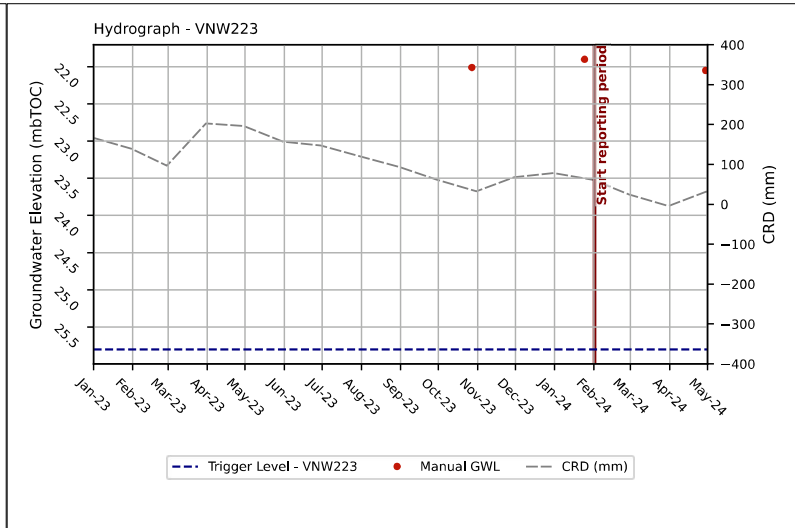
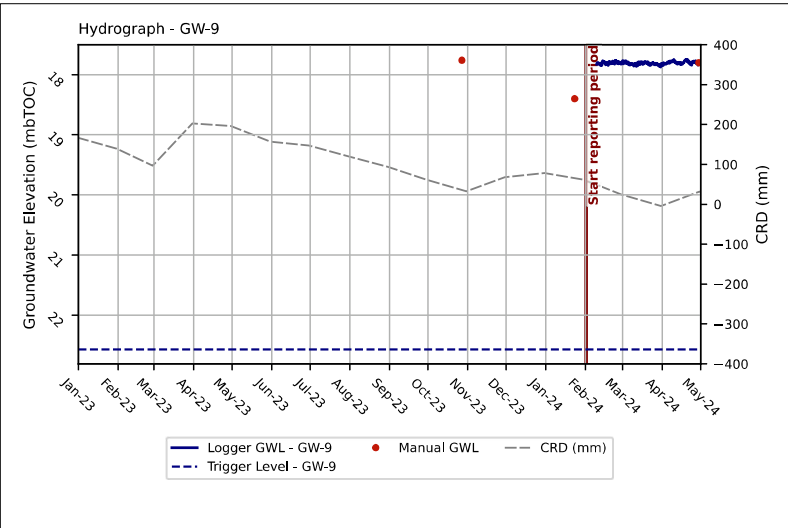
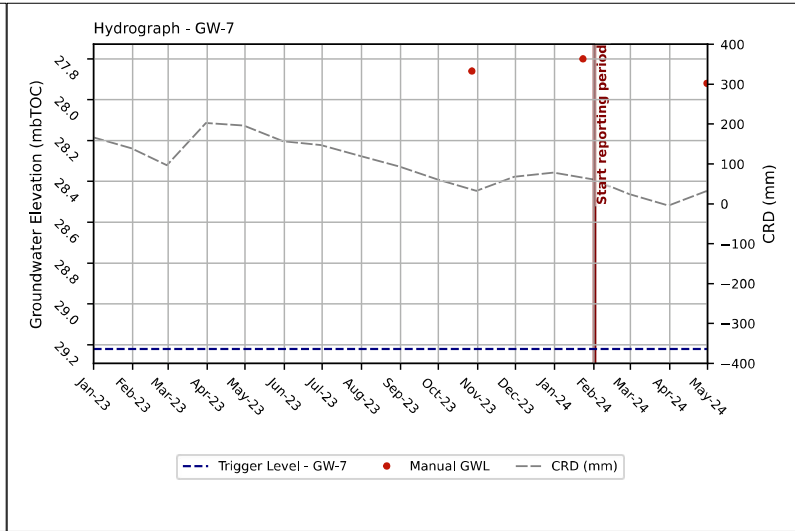
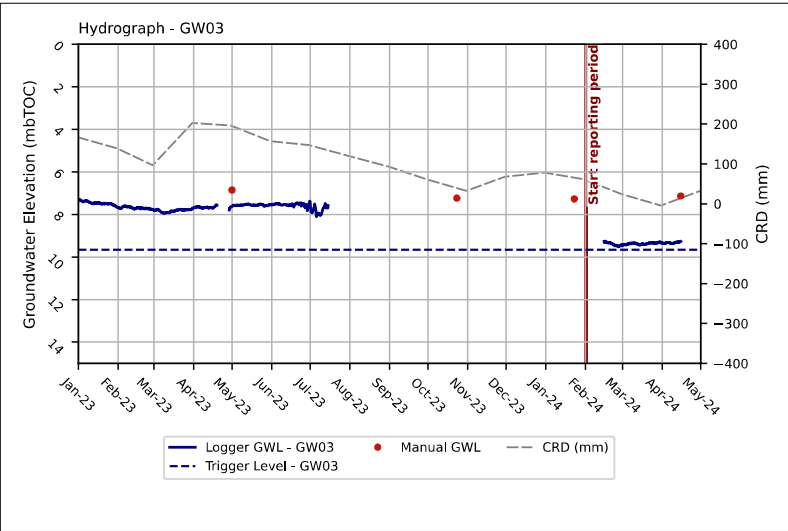
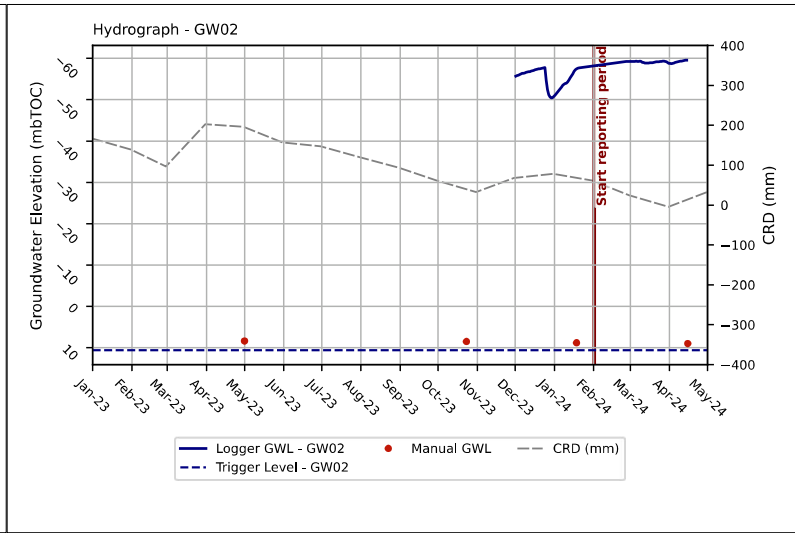
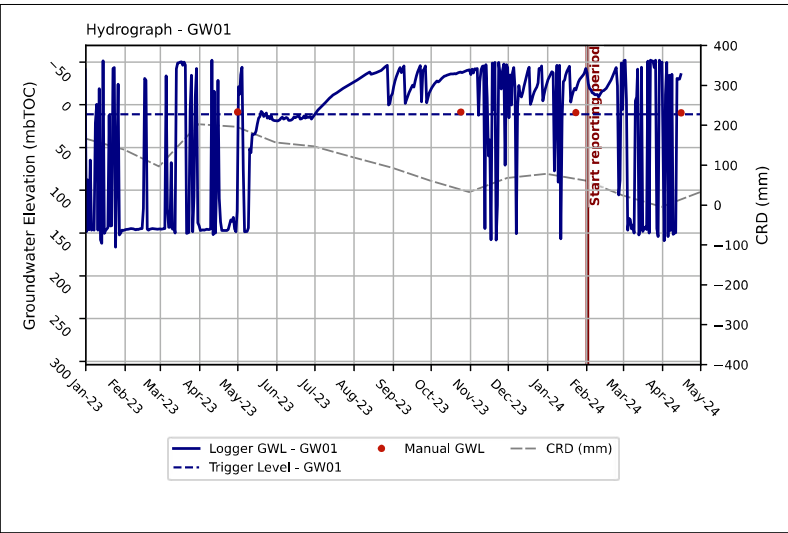
Vickery Extension Project Groundwater Monitoring Report

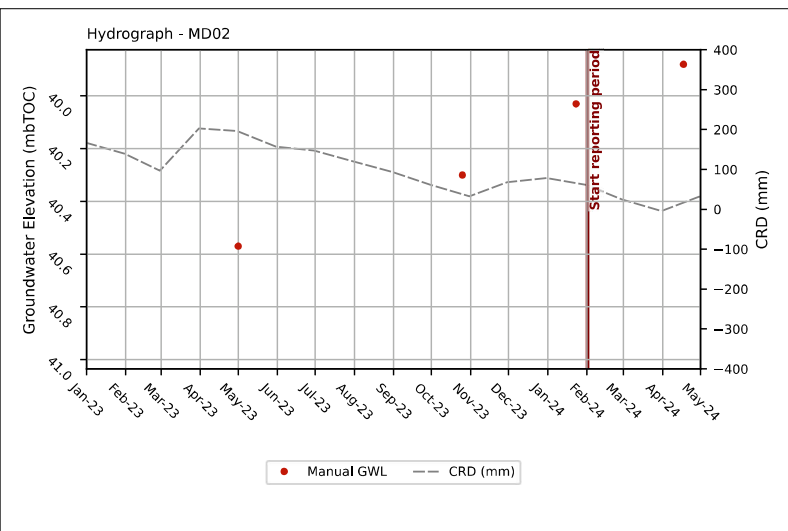
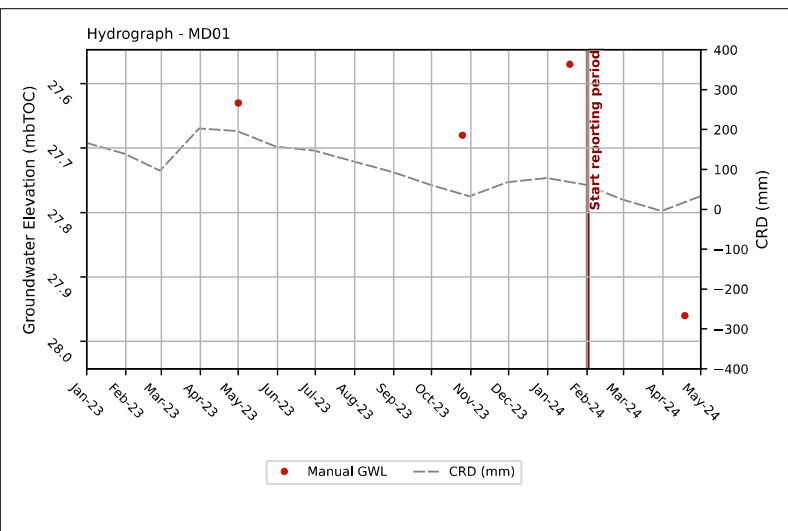
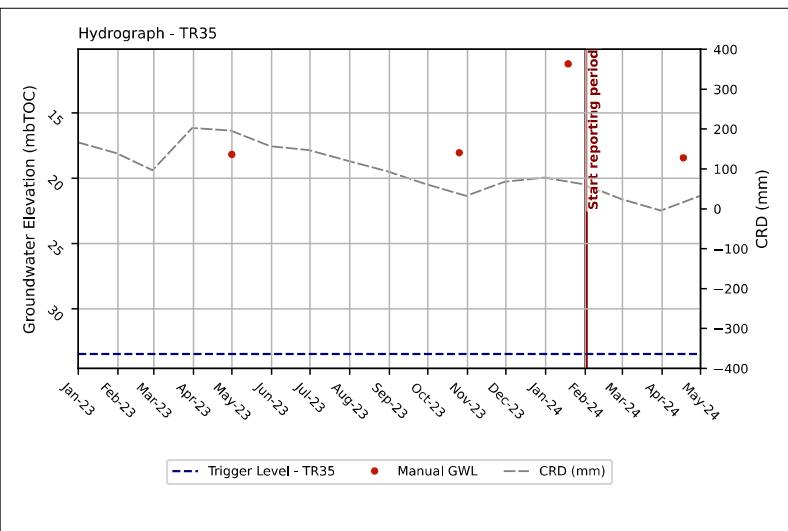
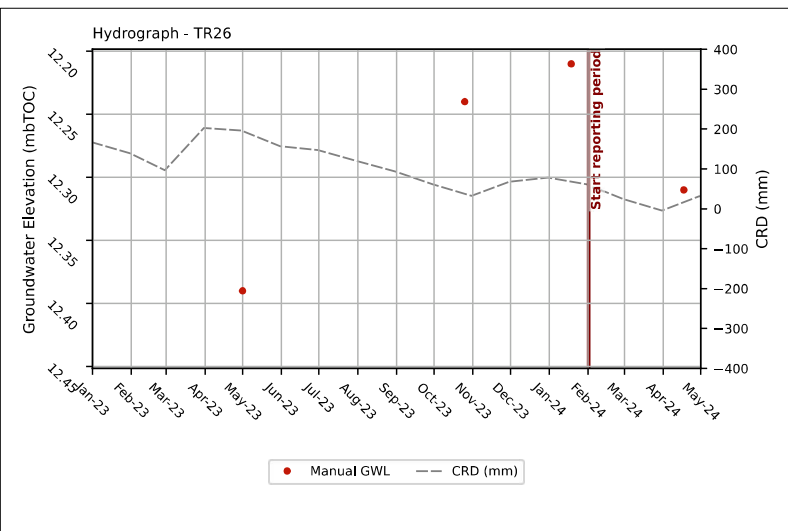
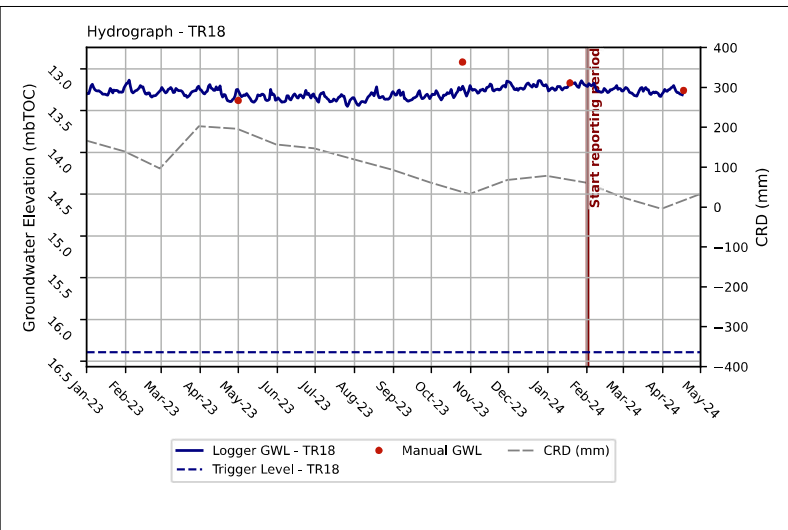
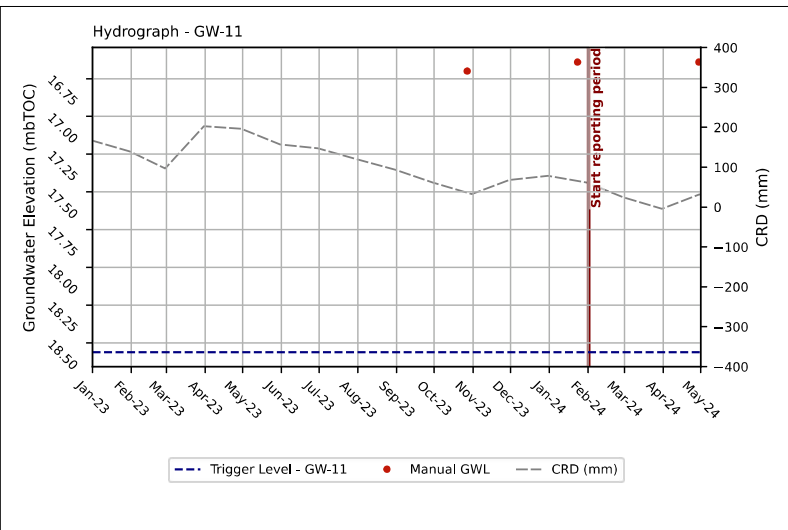
Quarterly Review February 2024 – April 2024

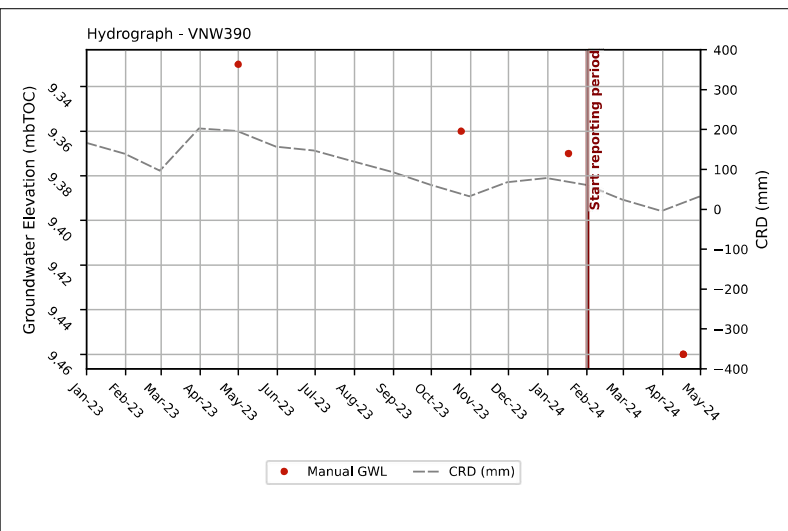
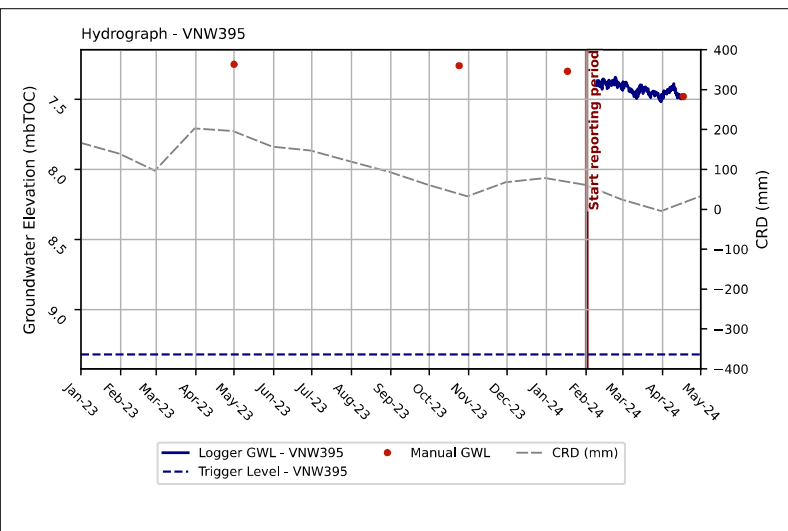
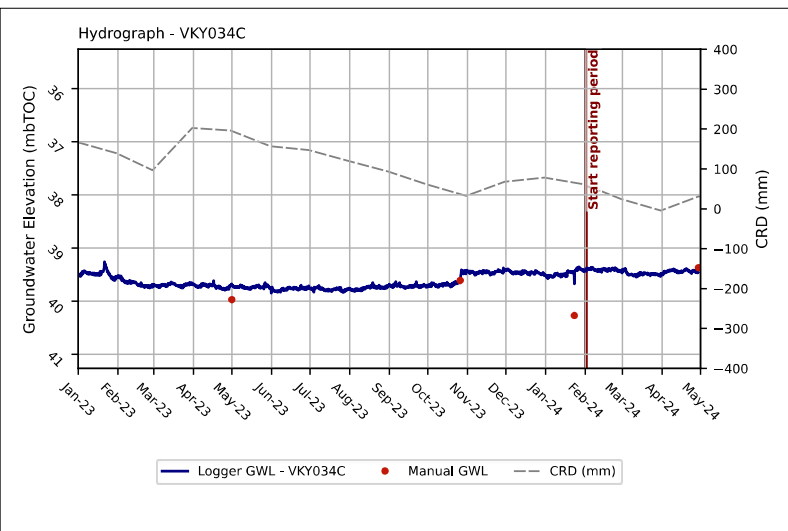
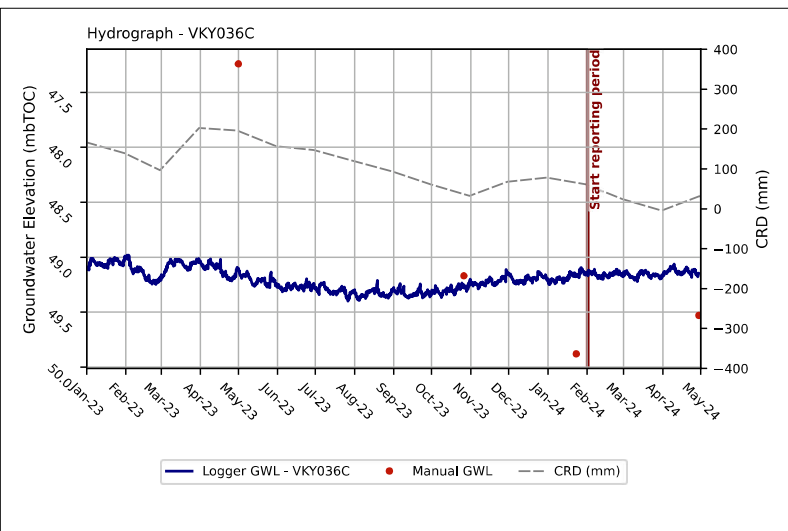
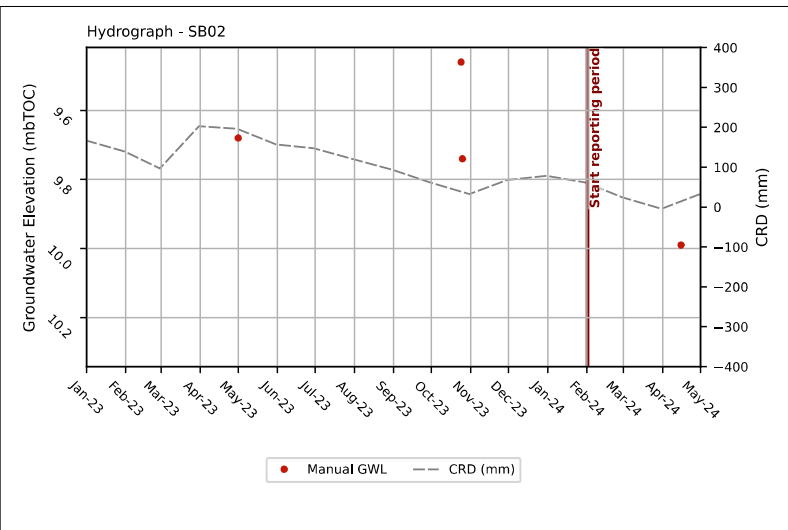
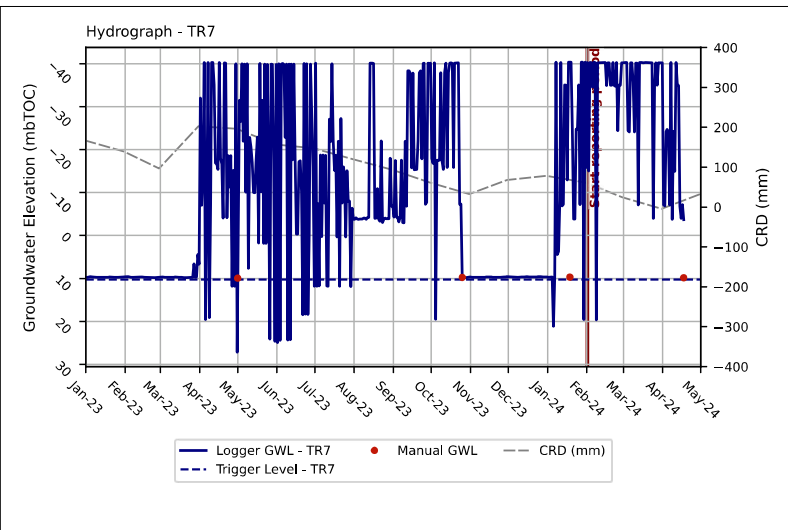
Whitehaven Coal Ltd

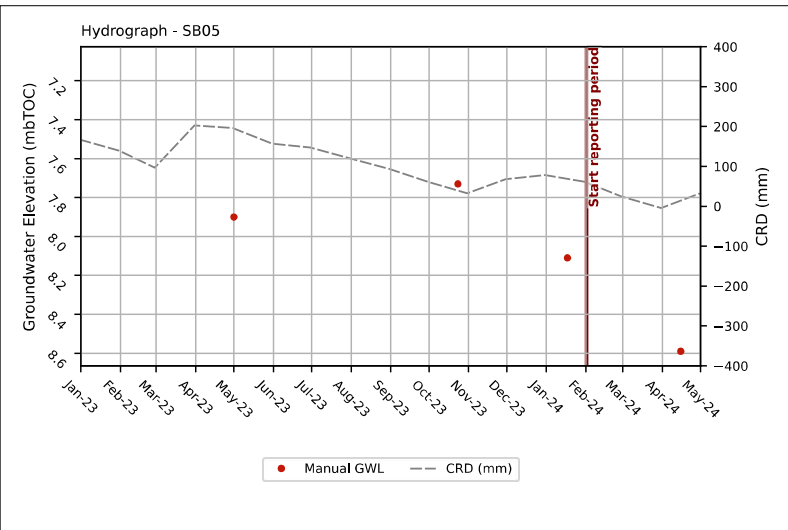
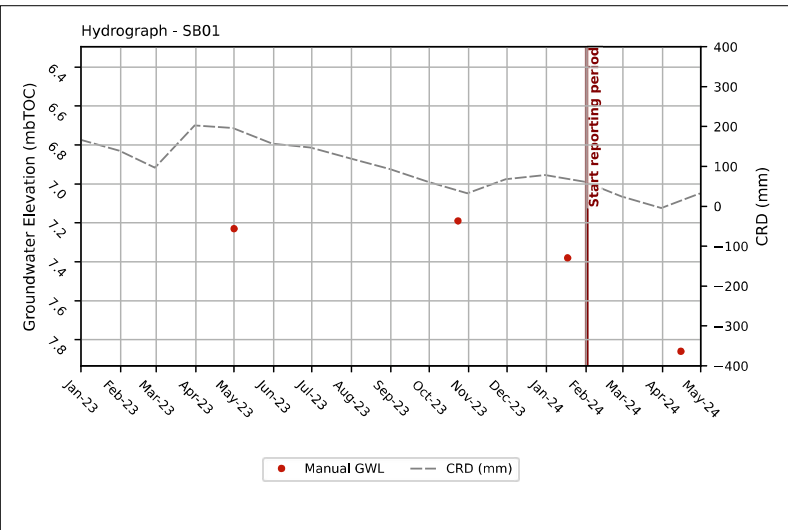
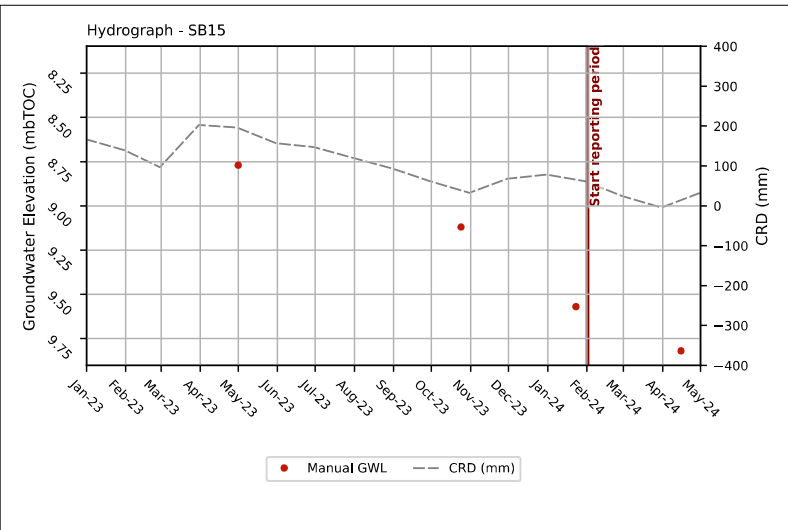
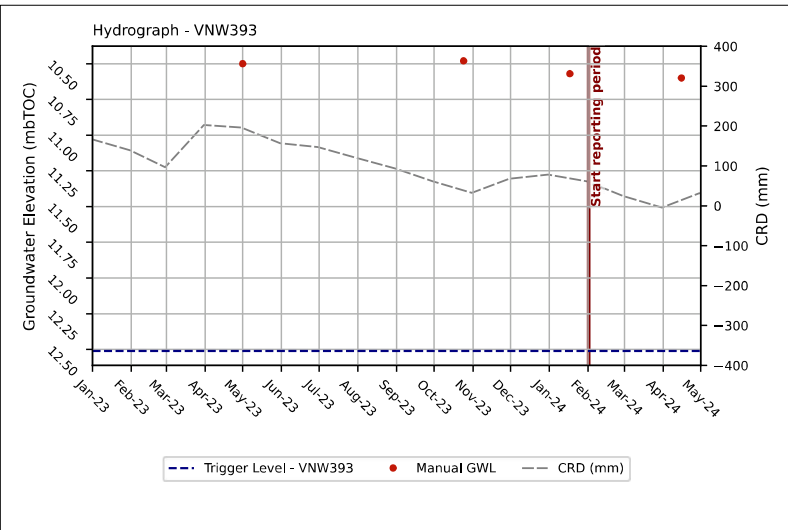
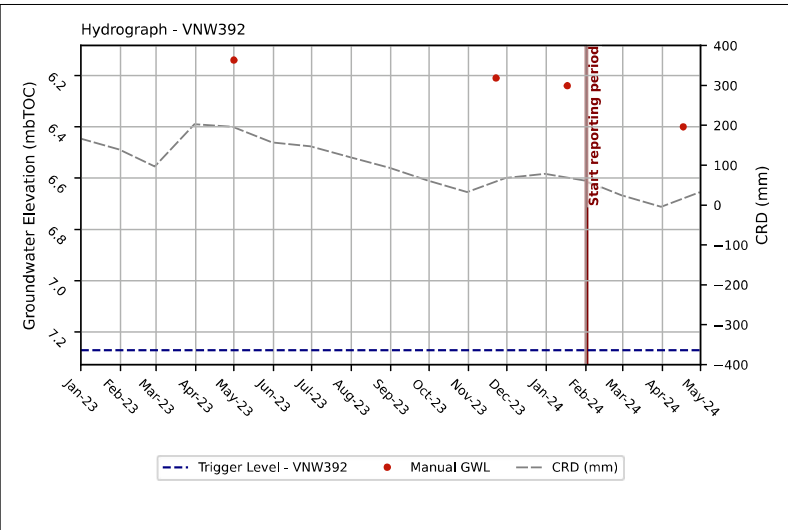
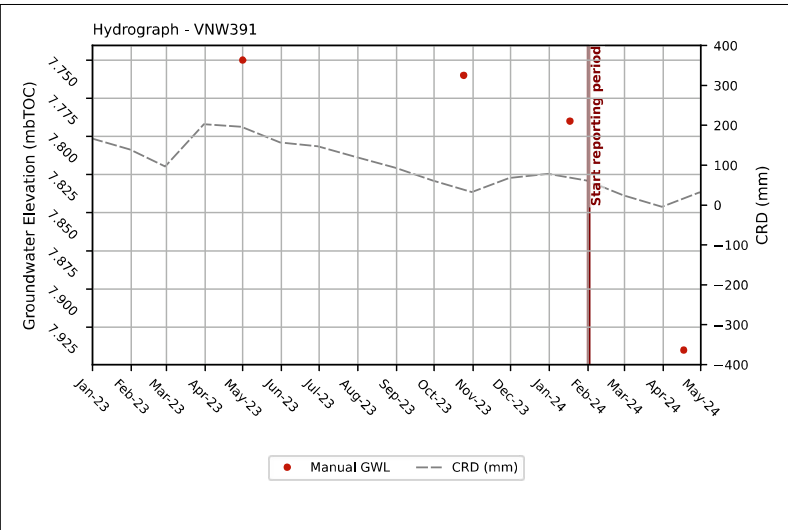
SLR Project No.: 640.031099.00001

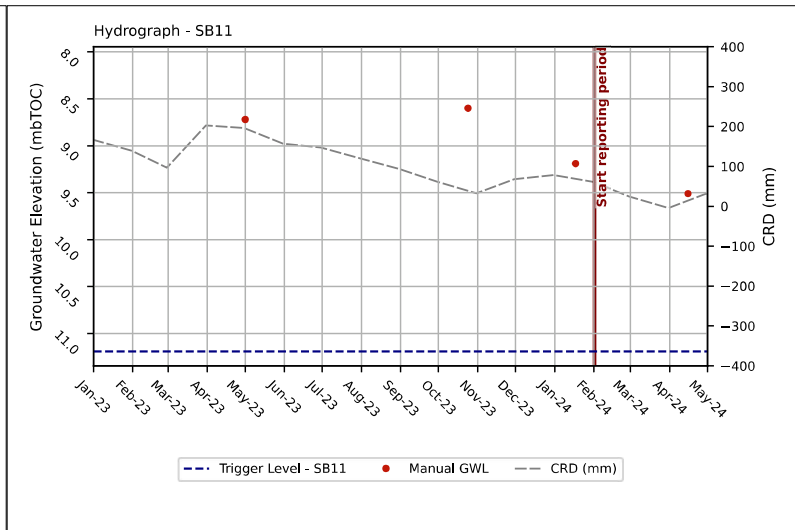
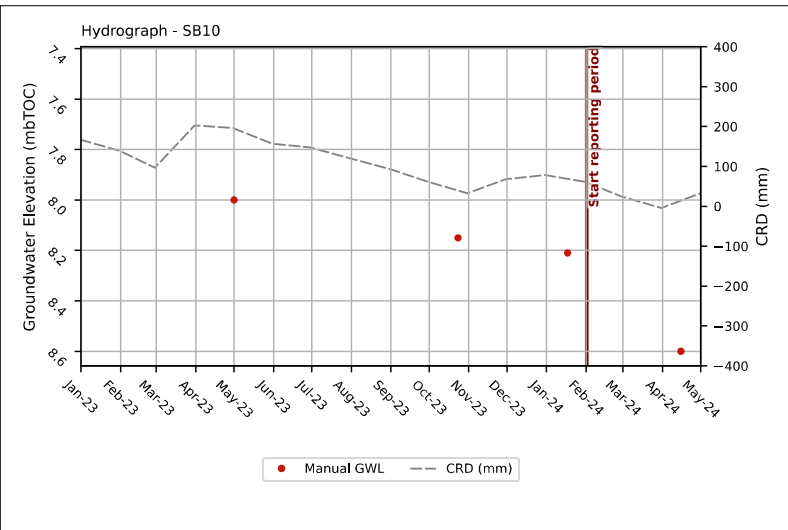
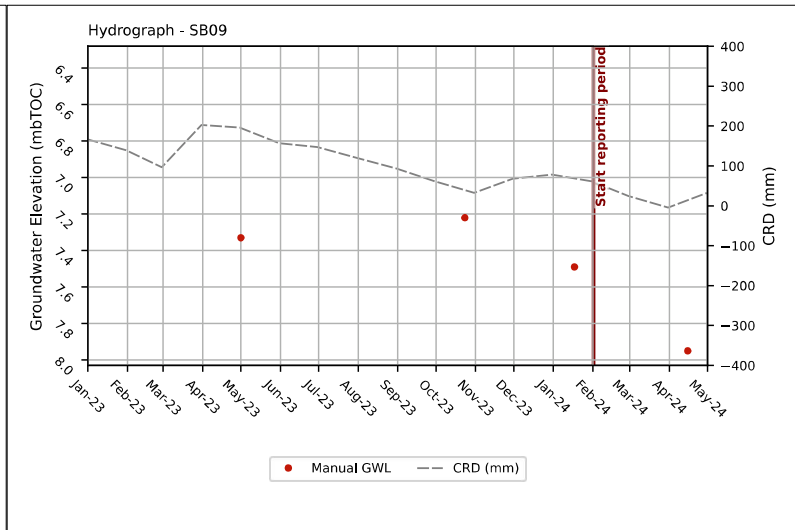
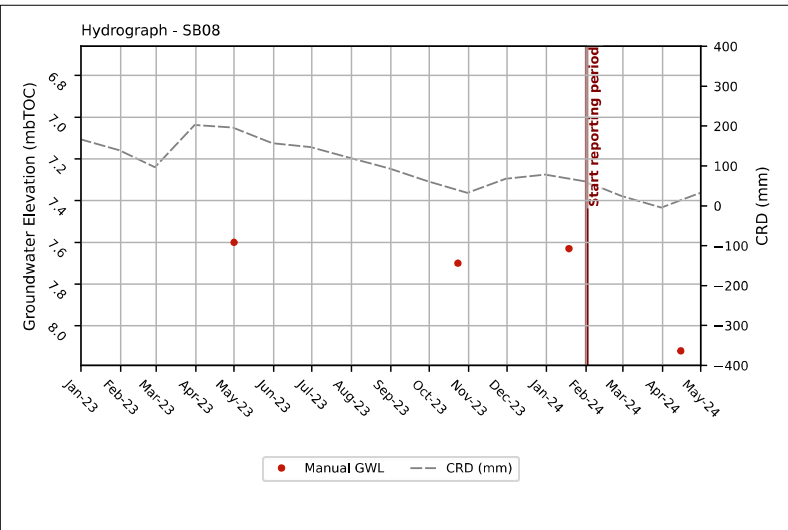
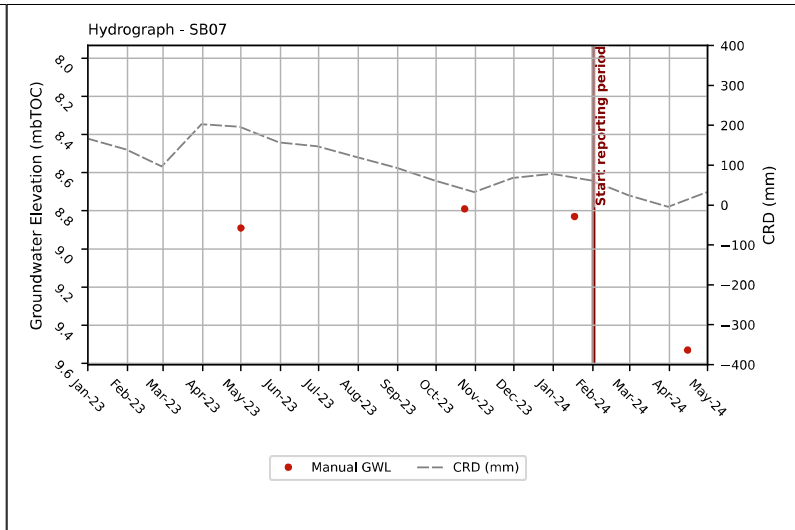
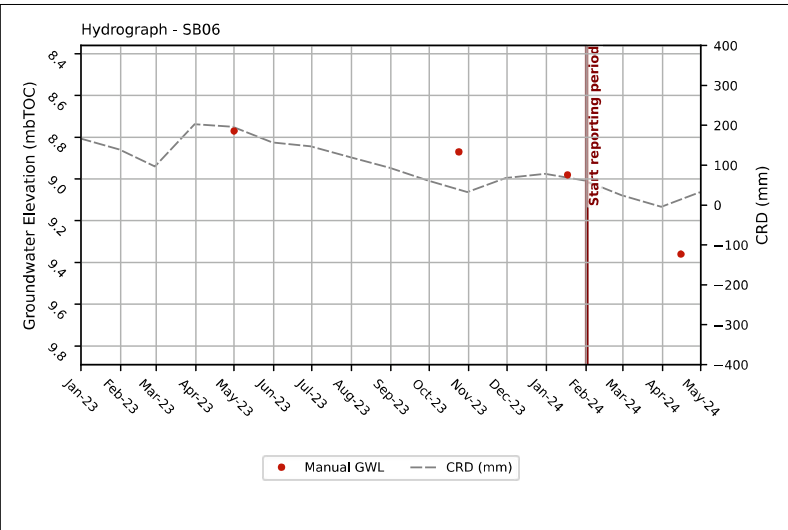
5 July 2024

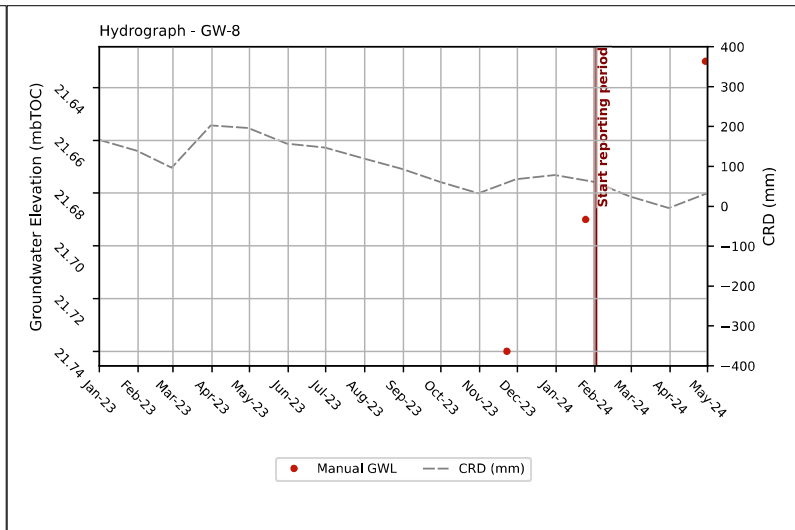
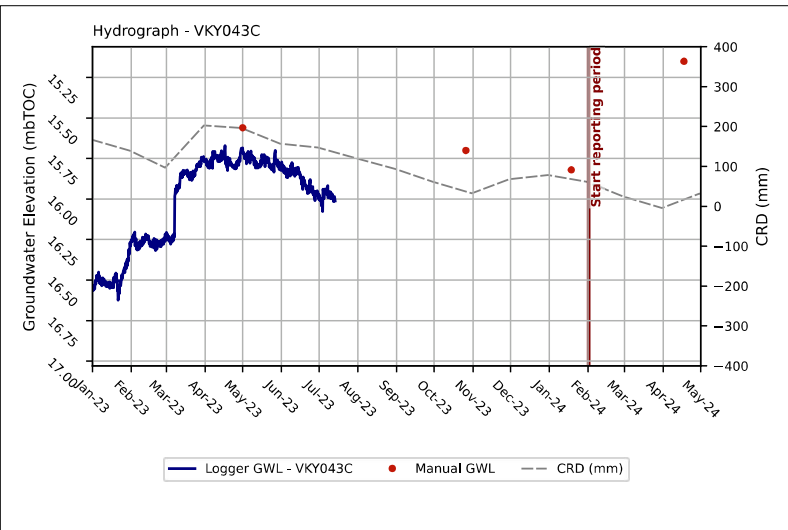
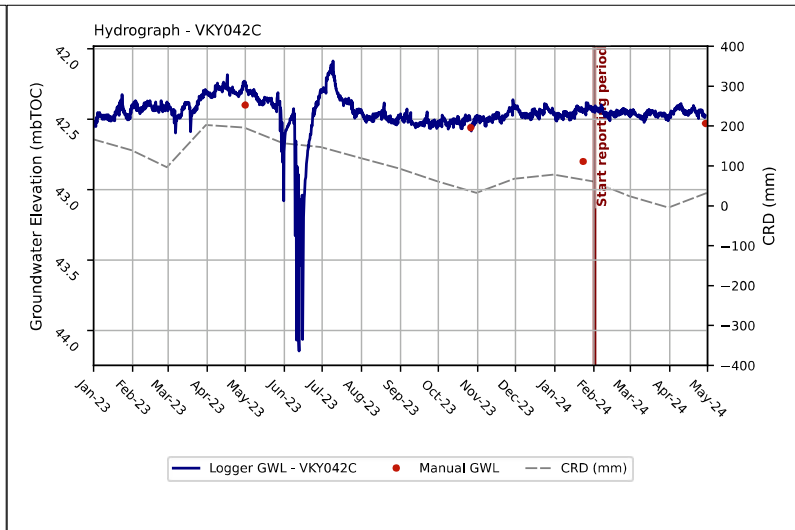
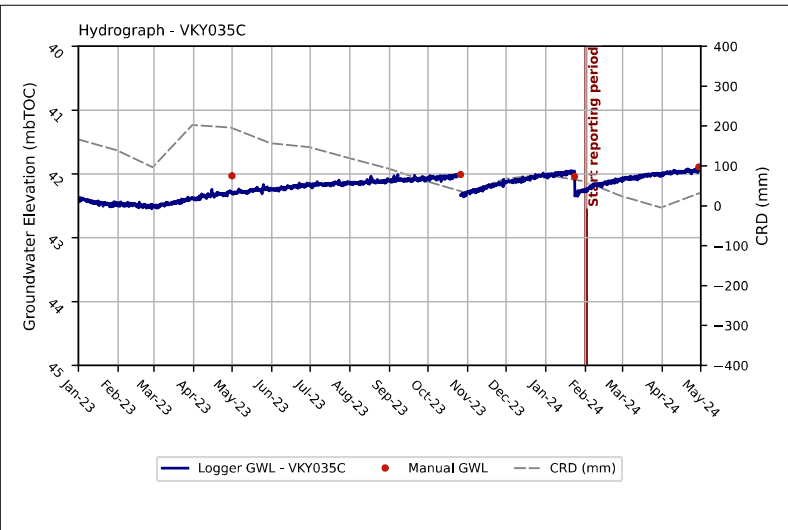
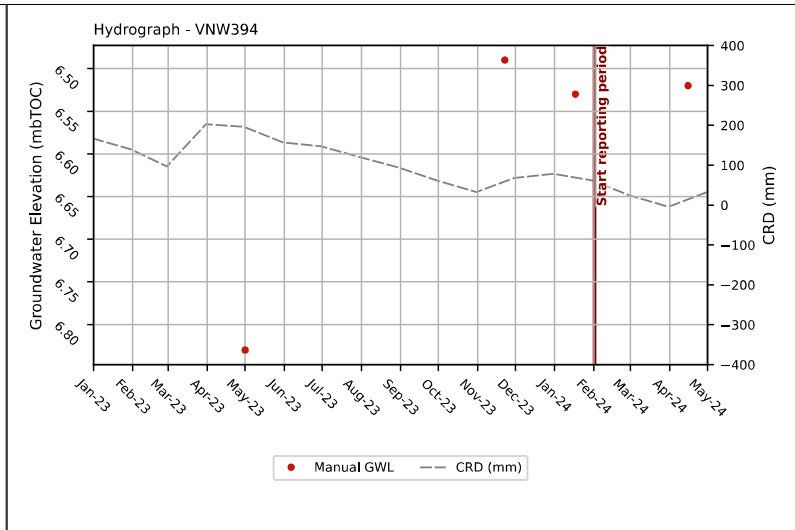
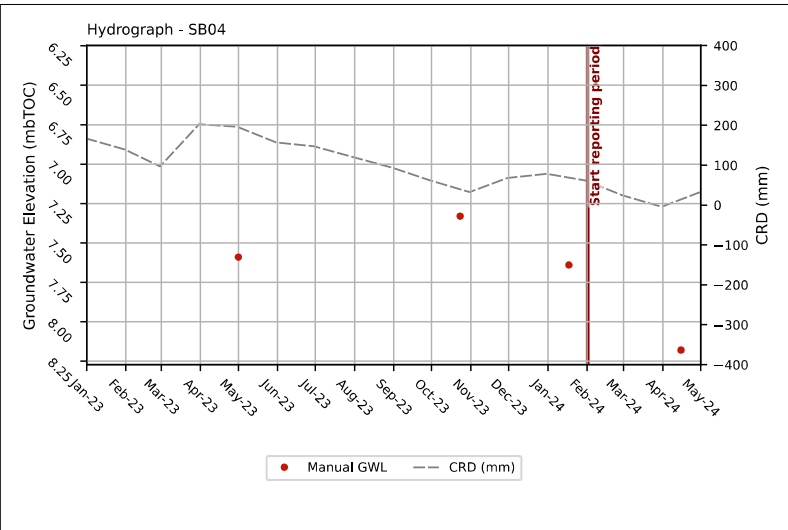


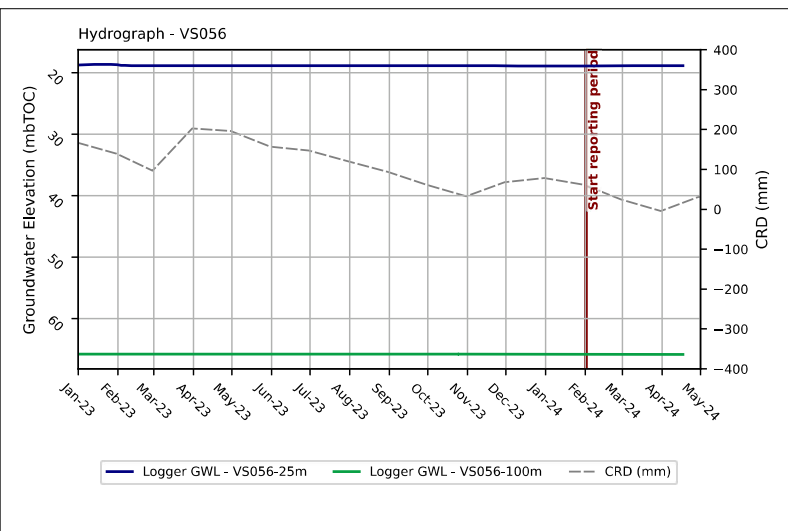
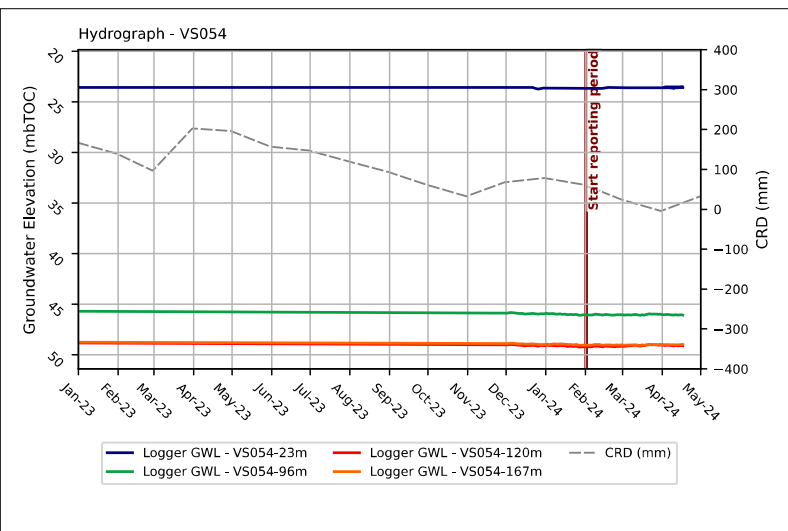
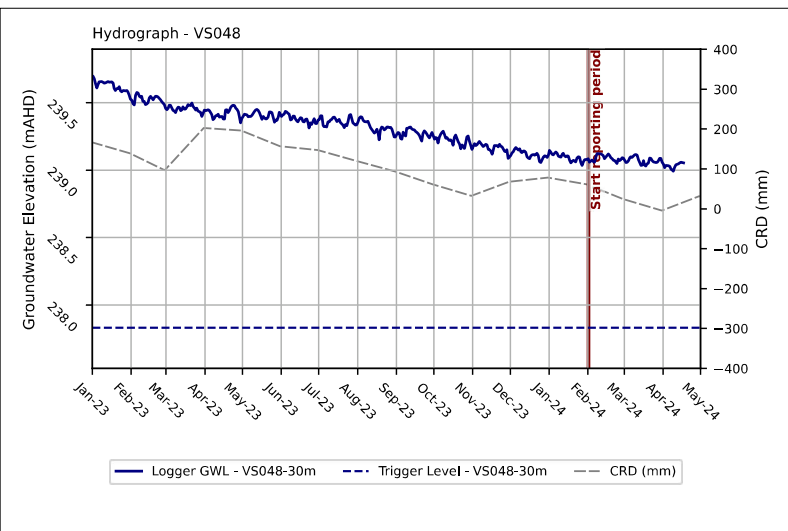
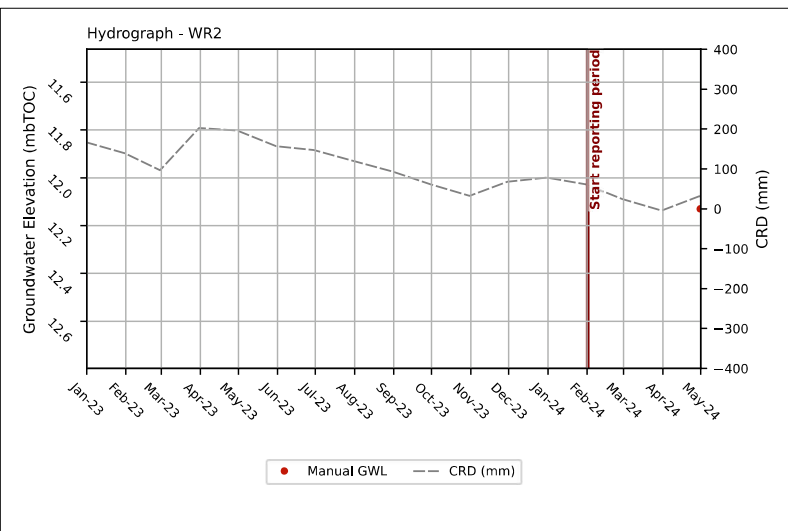
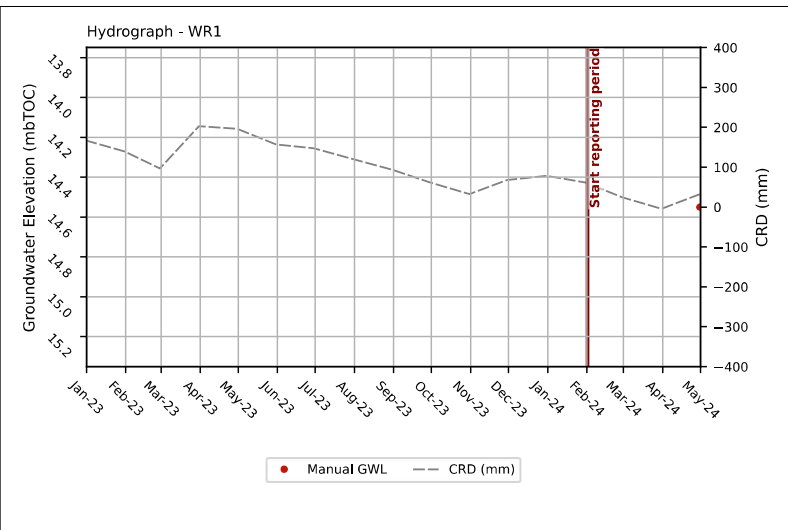
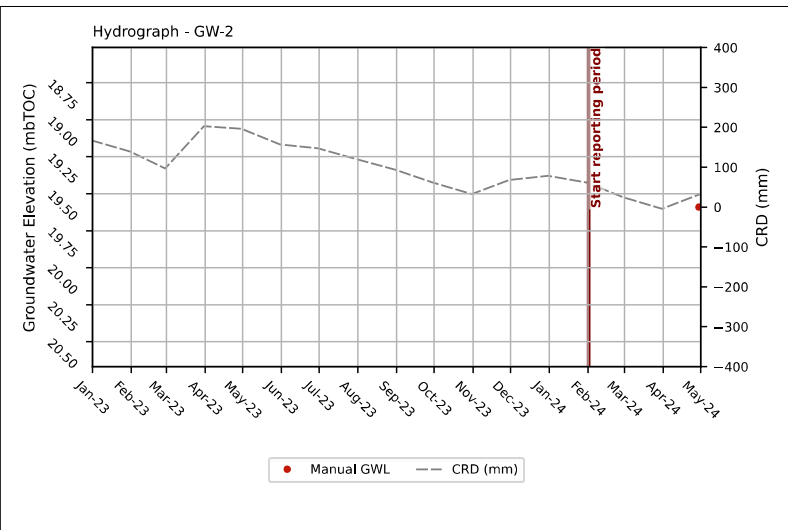


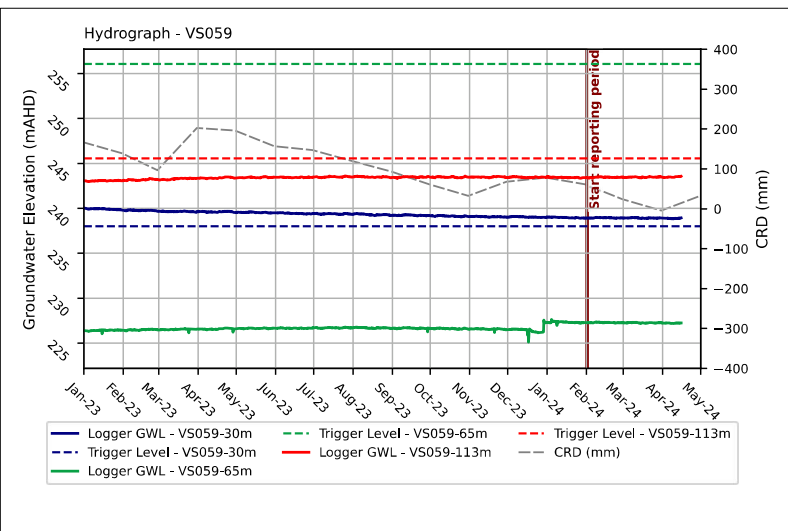
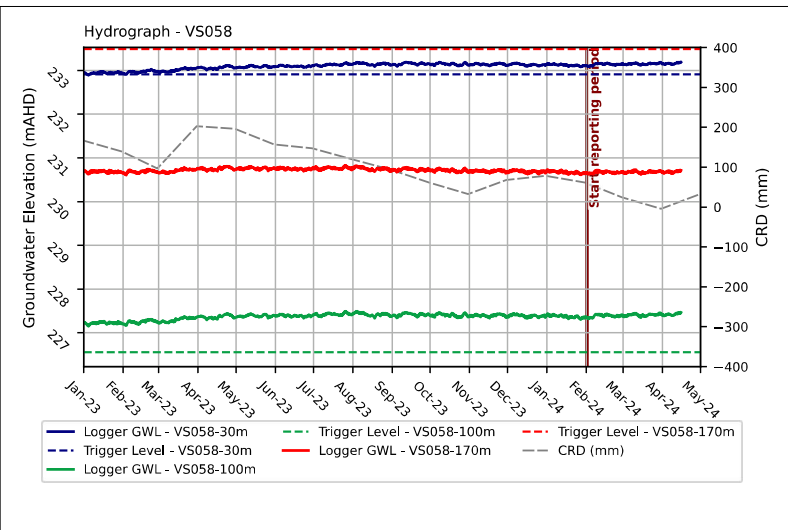
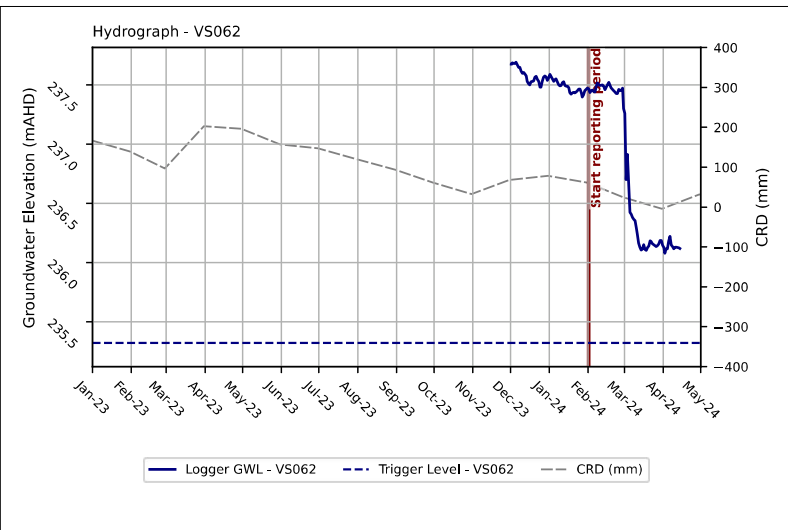














Appendix C Groundwater Quality Results

Vickery Extension Project Groundwater Monitoring Report

Quarterly Review February 2024 – April 2024

Whitehaven Coal Ltd

SLR Project No.: 640.031099.00001

5 July 2024

Table C-1: Field GW Monitoring Data

Sample Location	Date	pH - Field	EC - Field (uS)	Temperature	Redox	Odour	Appearance	Colour	Comments
SB02	24-10-2023 10:40	7.21	7250	24.1	44	Nil	Slightly turbid	Orange	Quarterly sampling
GW01	24-10-2023 9:36	7.33	1042	22.4	79	Nil	Clear	Colourless	Quarterly sampling
SB15	24-10-2023 10:10	7.29	1019	22.6	59	Nil	Clear	Colourless	Quarterly sampling
SB06	24-10-2023 7:35	7.35	3280	20.6	41	Nil	Clear	Colourless	Quarterly sampling
SB11	24-10-2023 8:25	7.26	1080	22.6	46	Nil	Clear	Colourless	Quarterly sampling
SB10	23-10-2023 15:55	7.43	1880	24.3	34	Nil	Clear	Colourless	Quarterly sampling; small amount of sediment in water
SB05	23-10-2023 16:20	2.09	3740	25	43	Nil	Clear	Colourless	Quarterly sampling
SB09	23-10-2023 15:20	3.32	949	27.3	28	Nil	Slightly turbid	Orange/brown	Quarterly sampling; a lot of sediment in water, possible rust particles
SB01	23-10-2023 15:00	7.44	1541	26.5	36	Nil	Clear	Colourless	Quarterly sampling
SB04	23-10-2023 13:19	7.29	2680	28.2	47	Slight	Slightly turbid	Grey	Quarterly sampling; bailed due to depth; Standpipe extremely unstable; too shallow to hydrasleeve so bailed to test.
SB08	23-10-2023 13:35	7.24	983	26.3	41	Nil	Clear	Colourless	Quarterly sampling
SB07	23-10-2023 11:47	7.35	770	23.2	46	Nil	Clear	Colourless	Quarterly sampling
GW02	23-10-2023 10:51	7.59	731	25.2	25	Nil	Clear	Colourless	Quarterly sampling
MD01	25-10-2023 9:50	11.58	1799	25.6	-91	Slight	Clear	Colourless	Quarterly sampling; Slight unknown odour. No cap on bore;
MD02	25-10-2023 11:10	6.84	1195	27.4	-69	Nil	Clear	Colourless	Quarterly sampling
GW03	23-10-2023 14:14	7.19	862	25.9	21	Nil	Clear	Colourless	Quarterly sampling; fence panels down and logger missing (assume down the bore).
TR26	25-10-2023 12:00	7.06	6290	26.3	52	Nil	Clear	Colourless	Quarterly sampling
TR7	25-10-2023 12:25	6.53	####	26.4	61	Nil	Clear	Colourless	Quarterly sampling
TR18	25-10-2023 13:30	6.58	####	27.8	99	Nil	Clear	Colourless	Quarterly sampling
TR35	25-10-2023 14:10	6.66	####	25.5	-55	Slight	Clear	Colourless	Quarterly sampling
VKY043C	26-10-2023 8:25	7.72	2990	20	-32	Nil	Clear	Colourless	Quarterly sampling
VKY042C	26-10-2023 11:45	6.75	5420	28.1	-28	Nil	Clear	Colourless	Quarterly sampling; Unable to determine total bore depth as it was greater than 150m (length of the dip tape)
VKY035C	26-10-2023 10:40	7.1	3110	25.5	-26	Nil	Clear	Colourless	Quarterly sampling
VKY034C	26-10-2023 9:15	7.3	3590	23.4	70	Nil	Clear	Colourless	Quarterly sampling
VKY036C	26-10-2023 12:40	7.08	5600	25.1	-39	Nil	Clear	Colourless	Quarterly sampling
VNW390	24-10-2023 12:35	6.92	2300	22.6	-96	Moderate	Clear	Colourless	Quarterly sampling; Sulphur odour
VNW391	24-10-2023 14:20	7.04	2530	23.9	-60	Nil	Clear	Colourless	Quarterly sampling
VNW392	22-11-2023 13:58	6.74	3690	20.8	-96	Slight	Clear	Colourless	Quarterly sampling; No access - locked out on 24/10/2023; Sampled 22/11/2023; Slight H2S odour
VNW393	24-10-2023 13:05	7.36	2740	22.1	26	Slight	Clear	Colourless	Quarterly sampling; Slight sulphur odour
VNW394	22-11-2023 13:12	7.13	5520	12.8	-70	Nil	Slight	Grey	Quarterly sampling;
VNW395	24-10-2023 13:41	7.47	463	20.9	57	Slight	Clear	Colourless	Quarterly sampling; no logger
GW-8	22-11-2023 15:47	7.11	4290	22.5	-176	Nil	Slight	Brown	Quarterly sampling; Unable to locate on 27/10/2023; Sampled 22/11/2023
GW-7	27-10-2023 11:50	8.89	4300	22.7	60	Nil	Clear	Colourless	Quarterly sampling; Suspended matter in water
VNW223	27-10-2023 10:10	7.25	5940	19.9	49	Nil	Clear	Colourless	
GW-11	27-10-2023 9:40	7.36	4360	21.5	-111	Nil	Clear	Colourless	Quarterly sampling; old windmill overhead
GW-9	27-10-2023 12:55	7.94	6110	22.6	-87	Nil	Clear	Brown	Quarterly sampling; old windmill overhead
VKY GW Duplicate 1	24-10-2023 8:25	7.26	1081	22.6	46	Nil	Clear	Colourless	Quarterly sampling; site duplicate taken from SB11
VKY GW Duplicate 2	26-10-2023 8:25	7.71	2990	20.1	-32	Nil	Clear	Colourless	Quarterly sampling; site duplicate taken from VKY0043C
VKY GW Lab Split Dup 1	24-10-2023 8:25	7.27	1080	22.7	47	Nil	Clear	Colourless	Quarterly sampling; site split duplicate taken from SB11

Sample Location	Date	pH - Field	EC - Field (uS)	Temperature	Redox	Odour	Appearance	Colour	Comments
VKY GW Lab Split Dup 2	26-10-2023 8:25	7.71	2990	20	-33	Nil	Clear	Colourless	Quarterly sampling; site split duplicate taken from VKY0043C
VKY GW Blank	24-10-2023 7:35	8.77	13	15.4	70	Nil	Clear	Colourless	Quarterly sampling; blank
SB02	25-10-2023 12:25	7.28	7330	22.5	Clear	Nil	Slightly turbid	Orange	
GW01	23-01-2024 7:39	7.2	1265	19.6	-15.7	Nil	Clear	Colourless	
SB15	23-01-2024 8:05	7.23	1070	21.1	-88	Nil	Clear	Colourless	
SB06	17-01-2024 12:55	7.61	3460	26.5	-84	Nil	Turbid	Brown	
SB11	17-01-2024 13:26	7.7	1021	26.4	-62	Nil	Clear	Colourless	
SB10	17-01-2024 13:49	7.47	1972	29.7	-69	Nil	Clear	Colourless	
SB05	17-01-2024 14:31	7.73	3690	28	-131	Nil	Clear	Colourless	
SB09	17-01-2024 15:18	7.56	1014	26.1	-70	Nil	Slightly turbid	Black	
SB01	17-01-2024 14:58	7.31	1716	28.3	-70	Nil	Clear	Colourless	
SB04	17-01-2024 15:51	7.43	3360	24.6	-188	Slightly	Clear	Colourless	Slight H2S odour
SB08	18-01-2024 16:09	7.39	1115	23.4	-119	Nil	Clear	Colourless	
SB07	17-01-2024 16:32	7.47	919	24.5	-87	Nil	Clear	Colourless	
GW02	18-01-2024 10:54	7.79	971	23.9	-74	Nil	Clear	Colourless	
MD01	18-01-2024 9:10	11.69	1786	22.9	-135	Nil	Slightly turbid	Brown	
MD02	23-01-2024 10:29	6.78	1306	24.3	-140	Nil	Clear	Colourless	
GW03	23-01-2024 6:59	7.16	888	19.6	66	Nil	Clear	Colourless	
TR26	18-01-2024 13:35	7.16	8380	24.8	-62	Nil	Slightly turbid	Brown	
TR7	18-01-2024 13:55	7.05	1539	25.2	-30	Nil	Slightly turbid	Brown	
TR18	18-01-2024 14:28	6.85	1364	24.5	-21	Nil	Slightly turbid	Brown	
TR35	18-01-2024 15:25	6.75	1733	24	-63	Nil	Clear	Colourless	
VKY043C	18-01-2024 14:58	7.8	3410	24.1	-74	Nil	Clear	Colourless	
VKY042C	23-01-2024 12:58	6.72	5430	31	-119	Nil	Clear	Colourless	
VKY035C	23-01-2024 12:14	7.01	3340	27.2	-170	Nil	Clear	Colourless	
VKY034C	23-01-2024 11:05	6.94	3850	29.4	-149	Nil	Slightly turbid	Brown	
VKY036C	23-01-2024 11:35	6.79	5810	28.7	-139	Nil	Clear	Colourless	
VNW390	17-01-2024 11:23	7.13	2376	24.3	-69	Nil	Clear	Colourless	
VNW391	17-01-2024 11:52	7.31	2471	23.1	-109	Nil	Clear	Colourless	
VNW392	17-01-2024 12:22	6.74	3310	26.1	-149	Nil	Clear	Grey	
VNW393	17-01-2024 10:51	7.56	2830	29.5	-90	Slightly	Clear	Colourless	Very slight H2S odour
VNW394	17-01-2024 9:30	6.92	5410	23.9	-104	Nil	Slightly turbid	Grey	
VNW395	17-01-2024 11:39	7.77	1395	27	-168	Nil	Clear	Grey	
GW-8	24-01-2024 13:55	7.03	3950	26.5	-208	Nil	Clear	Black	
GW-7	23-01-2024 9:12	8.82	4490	23	-64	Nil	Clear	Colourless	Site overgrown and dangerous - Need cleaning up
VNW223	24-01-2024	-	-	-	-	-	-	-	Blocked at 1.3 mbtoc
GW-11	23-01-2024 14:26	6.93	4340	30.6	-192	Nil	Slightly turbid	Orange	
GW-9	23-01-2024 13:49	6.68	3320	24.2	-196	Nil	Slightly turbid	Brown	No logger
GW030051	-	-	-	-	-	-	-	-	No access - NSWWater locked bore
GW030052	-	-	-	-	-	-	-	-	No access - NSWWater locked bore

Sample Location	Date	pH - Field	EC - Field (uS)	Temperature	Redox	Odour	Appearance	Colour	Comments
GW-2	-	-	-	-	-	-	-	-	Unable to locate
VKY GW Duplicate 1 - MD01	18-01-2024 9:38	11.54	1848	22.9	-147	Nil	Slightly turbid	Brown	
VKY GW Duplicate 2 - GW-11	23-01-2024 14:26	-	-	-	-	-	-	-	
VKY GW Lab Split Dup 1 - MD01	18-01-2024 9:42	11.73	1872	22.9	-149	Nil	Slightly turbid	Brown	
VKY GW Lab Split Dup 2 -	23-01-2024 13:53	6.65	3490	24.8	-193	Nil	Slightly turbid	Brown	
VKY GW Blank	17-01-2024 9:35	8.94	3.1	22.8	100	Nil	Clear	Colourless	
VS058	15-04-2024 13:49								Li Battery 3.67V
SB02	15-04-2024 13:36	7.14	7210	24.7	-128	Nil	Slightly Turbid	Orange	
GW01	15-04-2024 13:12	7.14	1384	26.5	-127	Nil	Slightly Turbid	Black	Suspended solids minor
SB15	15-04-2024 12:56	7.17	972	27	43	Nil	Clear	Clear	Suspended solids minor
SB06	15-04-2024 12:21	7.42	3410	26.1	-70	Nil	Turbid	Black	
SB11	15-04-2024 12:37	7.45	1048	24.3	69	Nil	Clear	Clear	
SB10	15-04-2024 11:11	7.28	1859	24	-5	Nil	Slightly Turbid	Black	Suspended solids minor
SB05	15-04-2024 11:31	7.63	3680	22.9	-113	Nil	Slightly Turbid	Black	Suspended solids moderate
SB09	15-04-2024 10:52	7.27	973	21.7	-61	Nil	Turbid	Black	Suspended solids minor
SB01	15-04-2024 10:34	7.2	1698	24.1	-91	Nil	Clear	Grey	Suspended solids minor
SB04	15-04-2024 9:21	7.27	1868	24.1	-214	Yes	Turbid	Black	Sufer odour, suspended solids
SB08	15-04-2024 9:31	7.17	1039	21.2	-55	Nil	Clear	Clear	
SB07	15-04-2024 8:48	7.28	934	21	57	Nil	Clear	Clear	Suspended solids minor
GW02	15-04-2024 8:16	7.14	926	24.3	8	Nil	Clear	Clear	Suspended solids moderate
VS062	15-04-2024 9:04								Li Battery 3.64V
VS059	15-04-2024 12:05								Li Battery 3.64V
VS056	17-04-2024 11:23								
	17-04-2024 11:26								
MD01	18-04-2024 10:23	10.73	1283	24.2	-286	Strong	Slightly Turbid	Grey	Strong fecal odour
VS048	17-04-2024 10:59								
VS054	17-04-2024 11:50								Li Battery 3.65V
MD02	17-04-2024 11:38	6.59	1210	31.1	-114	Slight	Clear	Clear	Suspended solids moderate
GW03	15-04-2024 9:56	7.05	862	24	-26	Nil	Clear	Grey	Suspended solids minor
TR26	17-04-2024 12:31	7.11	5180	29.4	60	Nil	Clear	Clear	
TR7	17-04-2024 12:49	6.71	####	27.4	157	Nil	Clear	Orange	Logger length recorded
TR18	17-04-2024 13:26	6.69	####	27.8	57	Nil	Slightly Turbid	Orange	Logger length recorded
TR35	17-04-2024 14:20	6.72	####	22.8	48	Nil	Clear	Clear	
VKY43C	17-04-2024 14:06	7.65	3410	23.6	-47	Nil	Slightly Turbid	Orange	Logger was not working, removed at client request, not being replaced
VKY041C	17-04-2024 12:14								51.7% (should be battery)
	17-04-2024 12:17								35.2% (battery?)
VKY042C	29-04-2024 10:32	6.61	5480	24.3	-36	Nil	Clear	Clear	last 8m of logger cable rusty
VKY33C	18-04-2024 11:03	-	-	-	-	-	-	-	-
	18-04-2024 11:04	-	-	-	-	-	-	-	-
VKY035C	29-04-2024 14:41	6.88	3230	25	-120	Nil	Clear	Clear	
VKY034C	29-04-2024 9:58	7.05	4030	23.4	-80	Nil	Clear	Grey	

Sample Location	Date	pH - Field	EC - Field (uS)	Temperature	Redox	Odour	Appearance	Colour	Comments
VKY036C	29-04-2024 14:10	6.8	5780	24.6	-93	Nil	Clear	Clear	
VKY3053C	29-04-2024 8:41	-	-	-	-	-	-	-	In forest? Incline to east VKY034C; Battery = 34.9%
VNW390	17-04-2024 8:30	6.59	2291	23.9	-98	Yes	Clear	Clear	Very slight sulfur odour
VNW391	17-04-2024 10:11	7.06	2352	24.3	-107	Nil	Clear	Clear	
VNW392	17-04-2024 10:25	6.66	3480	21.9	-90	Nil	Clear	Grey	Suspended solids minor
VNW393	15-04-2024 14:40	7.2	2840	26.9	-103	Nil	Clear	Grey	
VNW394	15-04-2024 14:16	6.94	5400	25.7	-104	Nil	Turbid	Black	
VNW395	17-04-2024 9:28	7.77	1681	27.1	41	Nil	Clear	Clear	Logger length recorded
GW036459		-	-	-	-	-	-	-	-
GW-8	29-04-2024 8:28	6.95	4000	19.7	-151	Nil	Clear	Grey	
GW-7	30-04-2024 11:31	8.79	4560	21.9	97	Nil	Clear	Clear	
VWN223	29-04-2024 13:42	-	-	-	-	-	-	-	Blocked at 1.3m
GW-11	29-04-2024 12:59	6.59	4550	25.1	-123	Nil	Clear	Orange	
GW-9	29-04-2024 12:10	6.81	5630	22.2	-125	Nil	Slightly Turbid	Orange	
GW030051		-	-	-	-	-	-	-	No access, NSW Water locked bore
GW030052		-	-	-	-	-	-	-	No access, NSW Water locked bore
GW-2	29-04-2024 11:30	6.85	1218	25.3	70	Nil	Clear	Clear	Located, NotE?
WR-1	30-04-2024 10:15	6.7	####	22.7	217	Nil	Clear	Grey	Logger + HS installed
WR-2	30-04-2024 11:50	6.57	####	22.5	155	Nil	Slightly Turbid	Orange	Logger + HS installed
VKY GW Duplicate 1 - VWN390	17-04-2024 9:07	6.72	2320	22.4	-96	Nil	Clear	Clear	
VKY GW Duplicate 2 - GW-9	29-04-2024 12:33	6.72	5650	22.4	-155	Nil	Clear	Orange	
VKY GW Blank	17-04-2024 8:25	7.56	3.7	18.1	141	Nil	Clear	Clear	
VKY GW Lab Split Dup 1 - TR18	17-04-2024 13:52	6.77	####	25.2	139	Nil	Slightly Turbid	Orange	
VKY GW Lab Split Dup 2 - GW-11	29-04-2024 13:20	6.55	4520	25.1	-121	Nil	Clear	Orange	

Table C-2: Laboratory GW Monitoring Data (as COA provided by ALS)



CERTIFICATE OF ANALYSIS

Work Order : **ES2413421**
Client : **CBASED ENVIRONMENTAL PTY LTD**
Contact : All Deliverables
Address : Unit 3 2 Enterprise Cres
Singleton NSW 2330
Telephone : +61 02 6571 3334
Project : Vickery Qtrly GW
Order number : ----
C-O-C number : ----
Sampler : Greg Quayle, Lee Jordan
Site :
Quote number : SYBQ/403/21v3 and PLANNED EVENTS
No. of samples received : 30
No. of samples analysed : 30

Page : 1 of 20
Laboratory : Environmental Division Sydney
Contact : Jessica Chen
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 24-Apr-2024 16:32
Date Analysis Commenced : 24-Apr-2024
Issue Date : 02-May-2024 14:11



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

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	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.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO₂ and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB02	GW01	SB15	SB06	SB11
Sampling date / time				15-Apr-2024 13:36	15-Apr-2024 13:12	15-Apr-2024 12:56	15-Apr-2024 12:21	15-Apr-2024 12:37	
Compound	CAS Number	LOR	Unit	ES2413421-001	ES2413421-002	ES2413421-003	ES2413421-004	ES2413421-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.81	7.89	7.92	8.02	8.11	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	7480	1220	1020	3520	1080	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	4800	748	642	2350	681	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	872	475	452	602	474	
Total Alkalinity as CaCO3	----	1	mg/L	872	475	452	602	474	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1160	132	95	362	93	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	1280	67	37	620	37	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	83	70	74	41	32	
Magnesium	7439-95-4	1	mg/L	70	44	42	41	24	
Sodium	7440-23-5	1	mg/L	1520	161	110	697	190	
Potassium	7440-09-7	1	mg/L	2	1	1	1	1	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	0.003	<0.001	
Barium	7440-39-3	0.001	mg/L	0.030	0.073	0.066	0.097	0.050	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.021	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB02	GW01	SB15	SB06	SB11
Sampling date / time				15-Apr-2024 13:36	15-Apr-2024 13:12	15-Apr-2024 12:56	15-Apr-2024 12:21	15-Apr-2024 12:37	
Compound	CAS Number	LOR	Unit	ES2413421-001	ES2413421-002	ES2413421-003	ES2413421-004	ES2413421-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L	0.002	<0.001	<0.001	0.002	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.003	<0.001	<0.001	0.002	0.002	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.018	<0.005	<0.005	
Manganese	7439-96-5	0.001	mg/L	0.697	0.063	0.004	1.19	0.006	
Molybdenum	7439-98-7	0.001	mg/L	0.004	<0.001	<0.001	0.003	<0.001	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Strontium	7440-24-6	0.001	mg/L	2.28	1.43	1.42	1.24	0.729	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.13	0.06	0.05	0.12	0.05	
Iron	7439-89-6	0.05	mg/L	2.17	0.06	<0.05	<0.05	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.18	0.05	0.05	0.06	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.02	0.32	0.49	0.02	0.25	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.32	0.49	0.02	0.25	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	2.72	0.14	0.09	1.86	0.04	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	77.7	14.1	12.0	37.0	12.4	
∅ Total Cations	----	0.01	meq/L	76.1	14.1	12.0	35.8	11.9	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB02	GW01	SB15	SB06	SB11
Sampling date / time					15-Apr-2024 13:36	15-Apr-2024 13:12	15-Apr-2024 12:56	15-Apr-2024 12:21	15-Apr-2024 12:37
Compound	CAS Number	LOR	Unit		ES2413421-001	ES2413421-002	ES2413421-003	ES2413421-004	ES2413421-005
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
Ø Ionic Balance	----	0.01	%		1.05	0.05	0.39	1.77	2.42
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	5	<5



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB10	SB05	SB09	SB01	SB04
Sampling date / time				15-Apr-2024 11:11	15-Apr-2024 11:31	15-Apr-2024 10:52	15-Apr-2024 10:34	15-Apr-2024 09:21	
Compound	CAS Number	LOR	Unit	ES2413421-006	ES2413421-007	ES2413421-008	ES2413421-009	ES2413421-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	8.00	8.17	7.92	7.81	7.84	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1860	3780	940	1670	2000	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1200	2380	574	991	1260	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	635	749	415	566	583	
Total Alkalinity as CaCO3	----	1	mg/L	635	749	415	566	583	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	196	520	70	190	220	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	152	482	44	150	228	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	46	30	56	99	74	
Magnesium	7439-95-4	1	mg/L	38	24	32	64	55	
Sodium	7440-23-5	1	mg/L	348	782	125	207	346	
Potassium	7440-09-7	1	mg/L	<1	<1	<1	1	<1	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	7440-38-2	0.001	mg/L	0.001	0.004	<0.001	<0.001	<0.001	
Barium	7440-39-3	0.001	mg/L	0.060	0.060	0.059	0.112	0.077	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB10	SB05	SB09	SB01	SB04
Sampling date / time				15-Apr-2024 11:11	15-Apr-2024 11:31	15-Apr-2024 10:52	15-Apr-2024 10:34	15-Apr-2024 09:21	
Compound	CAS Number	LOR	Unit	ES2413421-006	ES2413421-007	ES2413421-008	ES2413421-009	ES2413421-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	0.005	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.002	<0.001	0.027	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.013	<0.005	<0.005	
Manganese	7439-96-5	0.001	mg/L	0.146	0.405	0.306	0.730	0.094	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.005	<0.001	0.005	<0.001	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Strontium	7440-24-6	0.001	mg/L	1.07	0.711	0.962	1.98	1.50	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.08	0.13	<0.05	0.05	0.08	
Iron	7439-89-6	0.05	mg/L	<0.05	0.06	<0.05	0.09	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.15	0.04	0.04	0.14	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.19	0.45	0.12	0.01	0.05	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.19	0.45	0.12	0.01	0.05	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.10	2.04	0.22	0.25	0.53	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	21.0	39.4	11.0	19.5	22.7	
∅ Total Cations	----	0.01	meq/L	20.6	37.5	10.9	19.2	23.3	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB10	SB05	SB09	SB01	SB04
Sampling date / time					15-Apr-2024 11:11	15-Apr-2024 11:31	15-Apr-2024 10:52	15-Apr-2024 10:34	15-Apr-2024 09:21
Compound	CAS Number	LOR	Unit		ES2413421-006	ES2413421-007	ES2413421-008	ES2413421-009	ES2413421-010
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
Ø Ionic Balance	----	0.01	%		1.19	2.47	0.57	0.67	1.32
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	<5	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB08	SB07	GW02	MD01	MD02
Sampling date / time				15-Apr-2024 09:31	15-Apr-2024 08:48	15-Apr-2024 08:16	18-Apr-2024 10:23	17-Apr-2024 11:38	
Compound	CAS Number	LOR	Unit	ES2413421-011	ES2413421-012	ES2413421-013	ES2413421-014	ES2413421-015	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.82	7.90	7.91	10.6	7.46	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1020	912	930	1160	1230	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	645	592	584	638	702	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	23	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	342	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	406	391	390	<1	551	
Total Alkalinity as CaCO3	----	1	mg/L	406	391	390	365	551	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	88	78	81	26	28	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	66	41	44	128	87	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	69	54	50	7	81	
Magnesium	7439-95-4	1	mg/L	40	29	26	<1	52	
Sodium	7440-23-5	1	mg/L	116	135	140	229	131	
Potassium	7440-09-7	1	mg/L	<1	<1	1	23	9	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	0.28	<0.01	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.002	0.003	
Barium	7440-39-3	0.001	mg/L	0.052	0.046	0.047	0.017	0.249	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.011	0.001	0.007	0.006	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB08	SB07	GW02	MD01	MD02
Sampling date / time				15-Apr-2024 09:31	15-Apr-2024 08:48	15-Apr-2024 08:16	18-Apr-2024 10:23	17-Apr-2024 11:38	
Compound	CAS Number	LOR	Unit	ES2413421-011	ES2413421-012	ES2413421-013	ES2413421-014	ES2413421-015	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	0.006	0.019	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	0.213	<0.005	
Manganese	7439-96-5	0.001	mg/L	0.001	<0.001	0.026	<0.001	0.051	
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	0.019	0.003	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Strontium	7440-24-6	0.001	mg/L	1.04	0.662	0.602	0.113	1.16	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	3.66	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.01	0.05	19.8	0.29	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.15	0.30	0.39	0.03	0.25	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.15	0.30	0.39	0.03	0.25	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.05	0.06	0.17	0.49	0.47	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	11.8	10.6	10.7	11.4	14.0	
∅ Total Cations	----	0.01	meq/L	11.8	11.0	10.8	10.9	14.2	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SB08	SB07	GW02	MD01	MD02
Sampling date / time					15-Apr-2024 09:31	15-Apr-2024 08:48	15-Apr-2024 08:16	18-Apr-2024 10:23	17-Apr-2024 11:38
Compound	CAS Number	LOR	Unit		ES2413421-011	ES2413421-012	ES2413421-013	ES2413421-014	ES2413421-015
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
Ø Ionic Balance	----	0.01	%		0.10	1.67	0.14	2.44	0.72
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	18	<5



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW03	TR26	TR7	TR18	TR35
Sampling date / time				15-Apr-2024 09:56	17-Apr-2024 12:31	17-Apr-2024 12:49	17-Apr-2024 13:26	17-Apr-2024 14:20	
Compound	CAS Number	LOR	Unit	ES2413421-016	ES2413421-017	ES2413421-018	ES2413421-019	ES2413421-020	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.76	7.88	7.43	7.42	7.50	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	859	6010	15800	13900	17600	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	552	3480	10000	8830	12000	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	421	1110	761	724	742	
Total Alkalinity as CaCO3	----	1	mg/L	421	1110	761	724	742	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	58	180	501	592	622	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	22	1330	4600	3900	5130	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	81	136	324	266	341	
Magnesium	7439-95-4	1	mg/L	36	141	360	318	515	
Sodium	7440-23-5	1	mg/L	78	1060	2780	2370	2870	
Potassium	7440-09-7	1	mg/L	2	10	16	12	21	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Barium	7440-39-3	0.001	mg/L	0.078	0.101	0.100	0.064	0.117	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0004	
Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	<0.001	<0.001	0.002	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.346	0.036	1.73	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW03	TR26	TR7	TR18	TR35
Sampling date / time				15-Apr-2024 09:56	17-Apr-2024 12:31	17-Apr-2024 12:49	17-Apr-2024 13:26	17-Apr-2024 14:20	
Compound	CAS Number	LOR	Unit	ES2413421-016	ES2413421-017	ES2413421-018	ES2413421-019	ES2413421-020	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.004	<0.001	0.010	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.017	0.118	0.020	0.558	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.012	0.006	0.011	0.030	
Manganese	7439-96-5	0.001	mg/L	0.010	0.033	0.262	0.040	1.76	
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.005	0.002	0.002	0.017	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Strontium	7440-24-6	0.001	mg/L	0.877	3.01	9.08	6.69	8.00	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	0.07	<0.05	0.05	0.06	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	0.17	0.55	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.02	0.01	0.03	0.07	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.40	1.34	0.02	0.06	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.40	1.34	0.02	0.06	<0.01	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.39	0.08	0.38	0.51	0.04	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	10.2	63.4	155	137	172	
∅ Total Cations	----	0.01	meq/L	10.4	64.8	167	143	185	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW03	TR26	TR7	TR18	TR35
Sampling date / time					15-Apr-2024 09:56	17-Apr-2024 12:31	17-Apr-2024 12:49	17-Apr-2024 13:26	17-Apr-2024 14:20
Compound	CAS Number	LOR	Unit		ES2413421-016	ES2413421-017	ES2413421-018	ES2413421-019	ES2413421-020
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
Ø Ionic Balance	----	0.01	%		1.01	1.02	3.64	2.16	3.44
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	<5	<5



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VKY043C	VNW390	VNW391	VNW392	VNW393
Sampling date / time				17-Apr-2024 14:06	17-Apr-2024 08:30	17-Apr-2024 10:11	17-Apr-2024 10:25	15-Apr-2024 14:40	
Compound	CAS Number	LOR	Unit	ES2413421-021	ES2413421-022	ES2413421-023	ES2413421-024	ES2413421-025	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	8.27	7.44	7.68	7.29	7.80	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	3060	2370	2420	3500	3060	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1900	1400	1430	2300	1810	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1160	616	623	646	334	
Total Alkalinity as CaCO3	----	1	mg/L	1160	616	623	646	334	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	106	96	296	200	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	364	375	392	659	701	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	13	188	181	287	152	
Magnesium	7439-95-4	1	mg/L	8	45	58	92	33	
Sodium	7440-23-5	1	mg/L	762	279	278	356	457	
Potassium	7440-09-7	1	mg/L	6	12	13	18	7	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.001	<0.001	
Barium	7440-39-3	0.001	mg/L	0.284	0.126	0.164	0.121	0.052	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VKY043C	VNW390	VNW391	VNW392	VNW393
Sampling date / time				17-Apr-2024 14:06	17-Apr-2024 08:30	17-Apr-2024 10:11	17-Apr-2024 10:25	15-Apr-2024 14:40	
Compound	CAS Number	LOR	Unit	ES2413421-021	ES2413421-022	ES2413421-023	ES2413421-024	ES2413421-025	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.002	<0.001	0.003	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.007	0.014	0.005	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.006	0.007	0.013	<0.005	<0.005	
Manganese	7439-96-5	0.001	mg/L	0.004	0.239	0.225	0.315	0.150	
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.001	0.002	0.005	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Strontium	7440-24-6	0.001	mg/L	0.452	1.87	1.72	2.72	1.92	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.06	0.09	0.08	0.07	0.05	
Iron	7439-89-6	0.05	mg/L	0.09	0.71	0.74	2.18	0.49	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.34	0.35	0.21	0.46	0.31	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.03	0.06	0.20	0.01	0.19	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.06	0.20	0.01	0.19	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.11	0.08	0.04	0.13	0.06	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	33.4	25.1	25.5	37.6	30.6	
∅ Total Cations	----	0.01	meq/L	34.6	25.5	26.2	37.8	30.4	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VKY043C	VNW390	VNW391	VNW392	VNW393
Sampling date / time				17-Apr-2024 14:06	17-Apr-2024 08:30	17-Apr-2024 10:11	17-Apr-2024 10:25	15-Apr-2024 14:40	
Compound	CAS Number	LOR	Unit	ES2413421-021	ES2413421-022	ES2413421-023	ES2413421-024	ES2413421-025	
				Result	Result	Result	Result	Result	
EN055: Ionic Balance - Continued									
Ø Ionic Balance	----	0.01	%	1.70	0.86	1.40	0.24	0.42	
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	<5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VNW394	VNW395	VKY GW Duplicate 1	VKY GW Lab Split Dup 1 ALS	VKY GW Blank
Sampling date / time				15-Apr-2024 14:16	17-Apr-2024 09:28	17-Apr-2024 09:07	17-Apr-2024 13:52	17-Apr-2024 08:25	
Compound	CAS Number	LOR	Unit	ES2413421-026	ES2413421-027	ES2413421-028	ES2413421-029	ES2413421-030	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.57	8.20	7.62	7.60	6.07	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	5610	1760	2370	13800	<1	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	3650	1050	1390	9060	<10	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	383	433	621	725	<1	
Total Alkalinity as CaCO3	----	1	mg/L	383	433	621	725	<1	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	560	143	110	599	<1	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	1310	254	365	3840	<1	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	206	50	189	268	<1	
Magnesium	7439-95-4	1	mg/L	85	27	46	323	<1	
Sodium	7440-23-5	1	mg/L	915	328	279	2420	<1	
Potassium	7440-09-7	1	mg/L	7	8	12	12	<1	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	7440-38-2	0.001	mg/L	0.006	<0.001	0.001	<0.001	<0.001	
Barium	7440-39-3	0.001	mg/L	0.094	0.042	0.124	0.066	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	0.012	<0.001	0.028	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VNW394	VNW395	VKY GW Duplicate 1	VKY GW Lab Split Dup 1 ALS	VKY GW Blank
Sampling date / time					15-Apr-2024 14:16	17-Apr-2024 09:28	17-Apr-2024 09:07	17-Apr-2024 13:52	17-Apr-2024 08:25
Compound	CAS Number	LOR	Unit	ES2413421-026	ES2413421-027	ES2413421-028	ES2413421-029	ES2413421-030	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L	0.002	<0.001	0.002	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.006	0.455	0.002	0.020	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.008	0.006	0.007	<0.005	
Manganese	7439-96-5	0.001	mg/L	1.27	0.004	0.246	0.006	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.003	0.011	<0.001	0.002	<0.001	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Strontium	7440-24-6	0.001	mg/L	2.86	0.486	1.83	6.74	<0.001	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.09	0.05	<0.05	
Iron	7439-89-6	0.05	mg/L	1.70	<0.05	0.70	<0.05	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.11	0.02	0.37	0.01	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.02	0.36	0.09	0.07	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.36	0.09	0.07	<0.01	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.83	0.20	0.09	1.15	<0.01	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	56.3	18.8	25.0	135	<0.01	
∅ Total Cations	----	0.01	meq/L	57.2	19.2	25.6	146	<0.01	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VNW394	VNW395	VKY GW Duplicate 1	VKY GW Lab Split Dup 1 ALS	VKY GW Blank
Sampling date / time					15-Apr-2024 14:16	17-Apr-2024 09:28	17-Apr-2024 09:07	17-Apr-2024 13:52	17-Apr-2024 08:25
Compound	CAS Number	LOR	Unit		ES2413421-026	ES2413421-027	ES2413421-028	ES2413421-029	ES2413421-030
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
∅ Ionic Balance	----	0.01	%		0.87	1.04	1.31	3.65	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	<5	<5



CERTIFICATE OF ANALYSIS

Work Order : **ES2414546**
Client : **CBASED ENVIRONMENTAL PTY LTD**
Contact : All Deliverables
Address : Unit 3 2 Enterprise Cres
Singleton NSW 2330
Telephone : +61 02 6571 3334
Project : Vickery Qtrly GW
Order number : ----
C-O-C number : ----
Sampler : Greg Quayle/Lee Jordan
Site :
Quote number : SYBQ/403/21v3 and PLANNED EVENTS
No. of samples received : 13
No. of samples analysed : 13

Page : 1 of 11
Laboratory : Environmental Division Sydney
Contact : Jessica Chen
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 02-May-2024 16:00
Date Analysis Commenced : 06-May-2024
Issue Date : 16-May-2024 18:09



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

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	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.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO₂ and Fluoride to the Anions.
- EG035: Positive Mercury result ES2414546 #10 has been confirmed by reanalysis.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VKY042C	VKY035C	VKY034C	VKY036C	GW-8
Sampling date / time				29-Apr-2024 10:32	29-Apr-2024 14:41	29-Apr-2024 09:58	29-Apr-2024 14:10	29-Apr-2024 08:28	
Compound	CAS Number	LOR	Unit	ES2414546-001	ES2414546-002	ES2414546-003	ES2414546-004	ES2414546-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.28	7.55	7.66	7.41	7.49	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	5920	3310	4000	6030	4060	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	3840	1860	2530	3400	2340	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	812	927	1370	825	752	
Total Alkalinity as CaCO3	----	1	mg/L	812	927	1370	825	752	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	312	88	116	281	109	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	1320	564	578	1430	958	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	210	50	26	136	133	
Magnesium	7439-95-4	1	mg/L	233	46	32	111	87	
Sodium	7440-23-5	1	mg/L	743	655	903	1030	653	
Potassium	7440-09-7	1	mg/L	22	7	7	11	9	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.001	0.001	
Barium	7440-39-3	0.001	mg/L	0.138	0.076	0.230	0.091	0.180	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	0.003	0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.003	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VKY042C	VKY035C	VKY034C	VKY036C	GW-8
Sampling date / time				29-Apr-2024 10:32	29-Apr-2024 14:41	29-Apr-2024 09:58	29-Apr-2024 14:10	29-Apr-2024 08:28	
Compound	CAS Number	LOR	Unit	ES2414546-001	ES2414546-002	ES2414546-003	ES2414546-004	ES2414546-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.004	0.005	0.004	0.005	0.002	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.012	<0.005	0.008	<0.005	0.007	
Manganese	7439-96-5	0.001	mg/L	0.224	0.334	0.062	0.038	0.092	
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.010	0.002	0.002	<0.001	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Strontium	7440-24-6	0.001	mg/L	4.01	0.905	0.617	2.29	3.16	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.08	0.07	0.10	0.08	0.09	
Iron	7439-89-6	0.05	mg/L	1.07	1.23	0.17	0.68	9.84	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.68	0.89	0.80	1.49	0.38	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.01	0.02	<0.01	0.01	0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.02	<0.01	0.01	0.01	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.04	0.20	0.17	0.08	0.08	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	60.0	36.3	46.1	62.7	44.3	
∅ Total Cations	----	0.01	meq/L	62.5	35.0	43.4	61.0	42.4	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	VKY042C	VKY035C	VKY034C	VKY036C	GW-8
Sampling date / time				29-Apr-2024 10:32	29-Apr-2024 14:41	29-Apr-2024 09:58	29-Apr-2024 14:10	29-Apr-2024 08:28	
Compound	CAS Number	LOR	Unit	ES2414546-001	ES2414546-002	ES2414546-003	ES2414546-004	ES2414546-005	
				Result	Result	Result	Result	Result	
EN055: Ionic Balance - Continued									
Ø Ionic Balance	----	0.01	%	2.11	1.84	3.02	1.35	2.18	
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	<5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW-7	GW-11	GW-9	GW-2	WR-1
Sampling date / time				29-Apr-2024 11:31	29-Apr-2024 12:59	29-Apr-2024 12:10	29-Apr-2024 11:30	30-Apr-2024 10:15	
Compound	CAS Number	LOR	Unit	ES2414546-006	ES2414546-007	ES2414546-008	ES2414546-009	ES2414546-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	8.68	6.57	6.72	7.44	7.20	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	4480	4690	5750	1200	27700	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	2210	3260	3770	773	20200	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	108	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	910	31	81	511	597	
Total Alkalinity as CaCO3	----	1	mg/L	1020	31	81	511	597	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	399	1	51	23	1320	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	733	1400	1690	101	8680	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	5	213	101	91	1140	
Magnesium	7439-95-4	1	mg/L	154	54	85	30	810	
Sodium	7440-23-5	1	mg/L	608	649	923	153	4010	
Potassium	7440-09-7	1	mg/L	313	11	17	2	11	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001	
Barium	7440-39-3	0.001	mg/L	0.006	0.103	0.084	0.200	0.252	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.003	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW-7	GW-11	GW-9	GW-2	WR-1
Sampling date / time				29-Apr-2024 11:31	29-Apr-2024 12:59	29-Apr-2024 12:10	29-Apr-2024 11:30	30-Apr-2024 10:15	
Compound	CAS Number	LOR	Unit	ES2414546-006	ES2414546-007	ES2414546-008	ES2414546-009	ES2414546-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.002	<0.001	0.002	<0.001	0.017	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.056	<0.005	<0.005	0.006	
Manganese	7439-96-5	0.001	mg/L	0.019	1.15	3.01	<0.001	0.061	
Molybdenum	7439-98-7	0.001	mg/L	0.001	<0.001	<0.001	<0.001	0.001	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002	
Strontium	7440-24-6	0.001	mg/L	0.094	3.32	4.20	0.952	25.7	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.18	0.13	<0.05	0.06	0.17	
Iron	7439-89-6	0.05	mg/L	<0.05	13.3	32.0	<0.05	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0054	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.46	1.27	4.46	0.01	0.18	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.01	0.01	0.02	0.29	0.06	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.02	0.29	0.06	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.03	0.01	0.05	0.03	0.14	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	49.4	40.1	50.4	13.5	284	
∅ Total Cations	----	0.01	meq/L	47.4	43.6	52.6	13.7	298	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW-7	GW-11	GW-9	GW-2	WR-1
Sampling date / time					29-Apr-2024 11:31	29-Apr-2024 12:59	29-Apr-2024 12:10	29-Apr-2024 11:30	30-Apr-2024 10:15
Compound	CAS Number	LOR	Unit		ES2414546-006	ES2414546-007	ES2414546-008	ES2414546-009	ES2414546-010
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
Ø Ionic Balance	----	0.01	%		2.06	4.12	2.20	0.66	2.40
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	<5	<5



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WR-2	VKY GW Duplicate 2	VKY GW Lab Split Dup 2 ALS	----	----
Sampling date / time				30-Apr-2024 11:50	29-Apr-2024 12:33	29-Apr-2024 13:20	----	----	
Compound	CAS Number	LOR	Unit	ES2414546-011	ES2414546-012	ES2414546-013	-----	-----	
				Result	Result	Result	----	----	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.06	6.81	6.64	----	----	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	27400	5870	4640	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	21200	3750	3590	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	530	89	35	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	530	89	35	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1540	57	<1	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	8880	1730	1490	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	1180	100	208	----	----	
Magnesium	7439-95-4	1	mg/L	715	99	53	----	----	
Sodium	7440-23-5	1	mg/L	4110	981	633	----	----	
Potassium	7440-09-7	1	mg/L	19	18	11	----	----	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Barium	7440-39-3	0.001	mg/L	0.210	0.069	0.106	----	----	
Cadmium	7440-43-9	0.0001	mg/L	0.0003	<0.0001	<0.0001	----	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	<0.001	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WR-2	VKY GW Duplicate 2	VKY GW Lab Split Dup 2 ALS	----	----
Sampling date / time					30-Apr-2024 11:50	29-Apr-2024 12:33	29-Apr-2024 13:20	----	----
Compound	CAS Number	LOR	Unit		ES2414546-011	ES2414546-012	ES2414546-013	-----	-----
				Result	Result	Result		----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		0.004	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		0.018	0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		0.02	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		0.022	<0.005	0.040	----	----
Manganese	7439-96-5	0.001	mg/L		0.642	2.96	1.10	----	----
Molybdenum	7439-98-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Strontium	7440-24-6	0.001	mg/L		24.8	3.65	3.26	----	----
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		0.11	<0.05	0.12	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	28.6	12.1	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.18	4.54	1.24	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	0.06	0.03	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	0.06	0.03	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.38	0.08	0.01	----	----
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		293	51.8	42.7	----	----
∅ Total Cations	----	0.01	meq/L		297	56.3	42.6	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WR-2	VKY GW Duplicate 2	VKY GW Lab Split Dup 2 ALS	----	----
Sampling date / time					30-Apr-2024 11:50	29-Apr-2024 12:33	29-Apr-2024 13:20	----	----
Compound	CAS Number	LOR	Unit		ES2414546-011	ES2414546-012	ES2414546-013	-----	-----
					Result	Result	Result	----	----
EN055: Ionic Balance - Continued									
∅ Ionic Balance	----	0.01	%		0.65	4.17	0.20	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	----	----



Appendix D Quality Trigger Level Anlaysis

Vickery Extension Project Groundwater Monitoring Report

Quarterly Review February 2024 – April 2024

Whitehaven Coal Ltd

SLR Project No.: 640.031099.00001

5 July 2024

Table D-1: pH (Field) Trigger Level Review (Red Text Showing Exceedance of Trigger Level)

Bore	Trigger Level		Oct/Nov-23	Jan-24	Apr-24
GW01	6.90	8.30	7.33	7.20	7.14
GW02	7.20	8.60	7.59	7.79	7.14
GW03	6.10	8.10	7.19	7.16	7.05
GW-11	7.00	9.30	7.36	6.93	6.55
GW-7	7.70	8.50	8.89	8.82	8.79
GW-8	6.70	8.40	7.11	7.03	6.95
GW-9	6.60	8.20	7.94	6.68	6.81
MD01	6.70	8.40	11.58	11.69	10.73
MD02	6.70	8.40	6.84	6.78	6.59
SB01	6.90	8.30	7.44	7.31	7.20
SB02	6.90	8.30	7.28	7.28	7.14
SB04	6.90	8.30	7.29	7.43	7.27
SB05	6.90	8.30	2.09	7.73	7.63
SB06	6.90	8.30	7.35	7.61	7.42
SB07	6.90	8.30	7.35	7.47	7.28
SB08	6.90	8.30	7.24	7.39	7.17
SB09	6.90	8.30	3.32	7.56	7.27
SB10	6.90	8.30	7.43	7.47	7.28
SB11	6.90	8.30	7.26	7.70	7.45
SB15	6.90	8.30	7.29	7.23	7.17
TR18	6.70	8.40	6.58	6.85	6.69
TR26	6.70	8.40	7.06	7.16	7.11
TR35	6.70	8.40	6.66	6.75	6.72
TR7	7.40	7.80	6.53	7.05	6.71
VKY034C	6.70	8.40	7.30	6.94	7.05
VKY035C	6.70	8.40	7.10	7.01	6.88
VKY036C	6.70	8.40	7.08	6.79	6.80
VKY042C	6.70	8.40	6.75	6.72	6.61
VKY043C	6.70	8.40	7.72	7.80	7.65
VNW223	6.90	7.40	7.25	no data	no data
VNW390	6.70	8.40	6.92	7.13	6.59
VNW391	6.70	8.40	7.04	7.31	7.06
VNW392	6.70	8.40	6.74	6.74	6.66
VNW393	6.70	8.40	7.36	7.56	7.20
VNW394	6.90	8.30	7.13	6.92	6.94

Bore	Trigger Level		Oct/Nov-23	Jan-24	Apr-24
VNW395	6.90	8.30	7.47	7.77	7.77
GW-2	6.90	8.30	no data	no data	6.85
WR1	6.90	8.30	no data	no data	6.70
WR2	6.90	8.30	no data	no data	6.57

Note: Reported as field pH value; Red Text Showing Exceedance of Trigger Level.

Table D-2: EC Trigger Level Review

Bore ID	Trigger Level	Oct/Nov-23	Jan-24	Apr-24
GW01	10,083	1,042	1,265	1,384
GW02	969	731	971	926
GW03	811	862	888	862
GW-11	4,912	4,360	4,340	4,520
GW-7	5,378	4,300	4,490	4,560
GW-8	12,315	4,290	3,950	4,000
GW-9	12,740	6,110	3,320	5,630
MD01	12,315	1,799	1,786	1,283
MD02	12,315	1,195	1,306	1,210
SB01	10,083	1,541	1,716	1,698
SB02	10,083	7,330	7,330	7,210
SB04	10,083	2,680	3,360	1,868
SB05	10,083	3,740	3,690	3,680
SB06	10,083	3,280	3,460	3,410
SB07	10,083	770	919	934
SB08	10,083	983	1,115	1,039
SB09	10,083	949	1,014	973
SB10	10,083	1,880	1,972	1,859
SB11	10,083	1,080	1,021	1,048
SB15	10,083	1,019	1,070	972
TR18	12,315	13,400	13,640	12,730
TR26	12,315	6,290	8,380	5,180
TR35	12,315	15,300	17,330	16,740
TR7	12,970	14,800	15,390	14,410
VKY034C	12,315	3,590	3,850	4,030
VKY035C	12,315	3,110	3,340	3,230
VKY036C	12,315	5,600	5,810	5,780
VKY042C	12,315	5,420	5,430	5,480
VKY043C	12,315	2,990	3,410	3,410
VNW223	10,120	5,940	no data	no data
VNW390	12,315	2,300	2,376	2,291
VNW391	12,315	2,530	2,471	2,352
VNW392	12,315	3,690	3,310	3,480
VNW393	12,315	2,740	2,830	2,840
VNW394	10,083	5,520	5,410	5,400

Bore ID	Trigger Level	Oct/Nov-23	Jan-24	Apr-24
VNW395	10,083	463	1,395	1,681
GW-2	10,083	no data	no data	1,218
WR1	10,083	no data	no data	26,500
WR2	10,083	no data	no data	25,340

Note: Reported as field EC value; Red Text Showing Exceedance of Trigger Level.

Table D-3: Sulfate Trigger Level Review

Bore ID	Trigger Level	Oct/Nov-23	Jan-24	Apr-24
GW01	365	96	171	132
GW02	365	77	74	81
GW03	365	52	56	58
GW-11	365	<1	1	<1
GW-7	86	364	385	399
GW-8	86	no data	100	109
GW-9	86	102	128	51
MD01	86	22	23	26
MD02	86	28	29	28
SB01	365	182	183	190
SB02	365	1120	no data	1160
SB04	365	284	394	220
SB05	365	735	551	520
SB06	365	372	362	362
SB07	365	74	74	78
SB08	365	86	87	88
SB09	365	71	63	70
SB10	365	190	188	196
SB11	365	85	72	93
SB15	365	90	79	95
TR18	86	702	620	592
TR26	86	194	230	180
TR35	86	660	651	622
TR7	365	508	714	501
VKY034C	86	123	185	116
VKY035C	86	87	77	88
VKY036C	86	244	294	281
VKY042C	86	302	309	312
VKY043C	86	<1	<1	<1
VNW223	365	97	no data	no data
VNW390	86	95	95	106
VNW391	86	88	88	96
VNW392	86	no data	284	296
VNW393	86	179	185	200
VNW394	365	no data	551	560
VNW395	365	14	61	143

Bore ID	Trigger Level	Oct/Nov-23	Jan-24	Apr-24
GW-2	365	no data	no data	23
WR1	365	no data	no data	1,320
WR2	365	no data	no data	1,540

Note: Sulfate as SO₄ in mg/L; Red Text Showing Exceedance of Trigger Level.

Table D-4: Metal Trigger Against ANZECC Default Guideline Values

Bore ID	Parameters	Aluminium	Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
Unit		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
DGV		0.055	0.009	0.013	0.94	0.0002	0.001	0.0014	0.0014	0.0034	1.9	0.0006	0.034	0.011	0.011	0.00005	0.008
GW01	Jan-24	<0.01	<0.001	<0.001	0.14	<0.0001	<0.001	<0.001	<0.001	<0.001	0.967	<0.0001	<0.001	0.013	<0.01	<0.001	<0.005
GW01	Apr-24	<0.01	<0.001	<0.001	0.06	<0.0001	<0.001	<0.001	<0.001	<0.001	0.063	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005
GW02	Jan-24	<0.01	<0.001	<0.001	0.1	<0.0001	<0.001	<0.001	0.002	<0.001	0.021	<0.0001	<0.001	0.375	<0.01	<0.001	0.013
GW02	Apr-24	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.001	<0.001	0.007	<0.001	0.026	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005
GW03	Jan-24	<0.01	<0.001	<0.001	0.09	<0.0001	<0.001	<0.001	<0.001	<0.001	0.014	<0.0001	<0.001	0.971	<0.01	<0.001	<0.005
GW03	Apr-24	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	0.01	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005
GW-11	Jan-24	<0.01	<0.001	<0.001	0.13	<0.0001	<0.001	<0.001	<0.001	0.001	2.2	<0.0001	no data	0.00075	<0.01	<0.001	0.0075
GW-11	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	no data	0.004	<0.01	<0.001	0.012
GW-2	Jan-24	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
GW-2	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
GW-7	Jan-24	<0.01	<0.001	<0.001	0.18	<0.0001	<0.001	<0.001	0.003	<0.001	0.011	<0.0001	0.002	0.002	<0.01	<0.001	<0.005
GW-7	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
GW-8	Jan-24	<0.01	<0.001	<0.001	0.09	<0.0001	<0.001	<0.001	<0.001	<0.001	0.092	<0.0001	<0.001	0.001	<0.01	<0.001	0.012
GW-8	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
GW-9	Jan-24	<0.01	<0.001	<0.001	0.05	0.0001	<0.001	0.00075	<0.001	<0.001	3.8	<0.0001	<0.001	<0.001	<0.01	<0.001	0.00825
GW-9	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
MD01	Jan-24	0.58	0.001	<0.001	0.04	<0.0001	<0.001	<0.001	0.020	0.001	0.004	<0.0001	0.018	0.005	<0.01	<0.001	0.31
MD01	Apr-24	0.28	<0.001	0.002	<0.05	<0.0001	<0.001	<0.001	0.006	0.001	<0.001	<0.0001	0.019	0.006	<0.01	<0.001	0.213
MD02	Jan-24	<0.01	<0.001	0.001	0.08	<0.0001	<0.001	<0.001	<0.001	<0.001	0.039	<0.0001	0.001	0.036	<0.01	<0.001	<0.005
MD02	Apr-24	<0.01	<0.001	0.003	<0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	0.051	<0.0001	0.003	0.019	<0.01	<0.001	<0.005
SB01	Jan-24	<0.01	<0.001	<0.001	0.11	<0.0001	<0.001	0.003	<0.001	<0.001	0.39	<0.0001	<0.001	0.032	<0.01	<0.001	<0.005
SB01	Apr-24	<0.01	<0.001	<0.001	0.05	<0.0001	<0.001	0.005	<0.001	<0.001	0.73	<0.0001	0.005	0.027	<0.01	<0.001	<0.005



Bore ID	Parameters	Aluminium	Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
SB02	Jan-24	<0.01	<0.001	0.003	0.21	<0.0001	0.003	0.002	<0.001	<0.001	0.735	<0.0001	0.003	0.012	<0.01	<0.001	0.007
SB02	Apr-24	<0.01	<0.001	0.001	0.07	<0.0001	<0.001	0.003	<0.001	<0.001	0.315	<0.0001	0.002	0.014	<0.01	<0.001	<0.005
SB04	Jan-24	<0.01	<0.001	<0.001	0.16	<0.0001	<0.001	<0.001	<0.001	<0.001	0.38	<0.0001	0.001	<0.001	<0.01	<0.001	<0.005
SB04	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	<0.001	<0.001	0.094	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005
SB05	Jan-24	<0.01	<0.001	0.004	0.21	<0.0001	<0.001	<0.001	<0.001	<0.001	0.233	<0.0001	0.004	0.002	<0.01	<0.001	<0.005
SB05	Apr-24	<0.01	<0.001	0.004	0.13	<0.0001	<0.001	<0.001	<0.001	<0.001	0.405	<0.0001	0.005	0.002	<0.01	<0.001	<0.005
SB06	Jan-24	0.02	<0.001	0.003	0.19	<0.0001	<0.001	0.002	0.003	<0.001	1.18	<0.0001	0.002	0.002	<0.01	<0.001	<0.005
SB06	Apr-24	<0.01	<0.001	0.003	0.12	<0.0001	<0.001	0.002	<0.001	<0.001	1.19	<0.0001	0.003	0.002	<0.01	<0.001	<0.005
SB07	Jan-24	<0.01	<0.001	<0.001	0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.001	0.07	<0.01	<0.001	<0.005
SB07	Apr-24	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.001	<0.001	0.001	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005
SB08	Jan-24	<0.01	<0.001	<0.001	0.1	<0.0001	<0.001	<0.001	0.004	<0.001	0.002	<0.0001	<0.001	0.063	<0.01	<0.001	<0.005
SB08	Apr-24	<0.01	<0.001	<0.001	0.05	<0.0001	<0.001	<0.001	0.011	<0.001	0.001	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005
SB09	Jan-24	<0.01	<0.001	<0.001	0.11	<0.0001	<0.001	<0.001	<0.001	<0.001	0.335	<0.0001	0.001	0.015	<0.01	<0.001	<0.005
SB09	Apr-24	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	0.306	<0.0001	<0.001	<0.001	<0.01	<0.001	0.013
SB10	Jan-24	<0.01	<0.001	0.001	0.16	<0.0001	<0.001	<0.001	<0.001	<0.001	0.074	<0.0001	0.002	<0.001	<0.01	<0.001	<0.005
SB10	Apr-24	<0.01	<0.001	0.001	0.08	<0.0001	<0.001	<0.001	<0.001	<0.001	0.146	<0.0001	0.002	<0.001	<0.01	<0.001	<0.005
SB11	Jan-24	<0.01	<0.001	<0.001	0.13	<0.0001	<0.001	<0.001	0.01	<0.001	0.023	<0.0001	<0.001	0.057	<0.01	<0.001	<0.005
SB11	Apr-24	<0.01	<0.001	<0.001	0.05	<0.0001	<0.001	<0.001	0.021	<0.001	0.006	<0.0001	<0.001	0.002	<0.01	<0.001	<0.005
SB15	Jan-24	<0.01	<0.001	<0.001	0.12	<0.0001	<0.001	<0.001	0.001	<0.001	0.008	<0.0001	<0.001	0.032	<0.01	<0.001	<0.005
SB15	Apr-24	<0.01	<0.001	<0.001	0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	0.004	<0.0001	<0.001	<0.001	<0.01	<0.001	0.018
TR18	Jan-24	<0.01	<0.001	<0.001	0.11	<0.0001	<0.001	<0.001	0.07	<0.001	0.042	<0.0001	0.001	0.021	<0.01	<0.001	<0.005
TR18	Apr-24	<0.01	<0.001	<0.001	0.05	<0.0001	<0.001	<0.001	0.032	<0.001	0.023	<0.0001	0.002	0.020	<0.01	<0.001	0.009
TR26	Jan-24	<0.01	<0.001	<0.001	0.14	<0.0001	<0.001	<0.001	0.01	<0.001	0.07	<0.0001	0.002	0.014	<0.01	<0.001	<0.005
TR26	Apr-24	<0.01	<0.001	<0.001	0.07	<0.0001	0.002	<0.001	<0.001	<0.001	0.033	<0.0001	0.005	0.017	<0.01	<0.001	0.012
TR35	Jan-24	<0.01	<0.001	<0.001	0.12	0.0002	0.002	0.007	1.24	<0.001	1.72	<0.0001	0.011	0.713	<0.01	<0.001	0.015

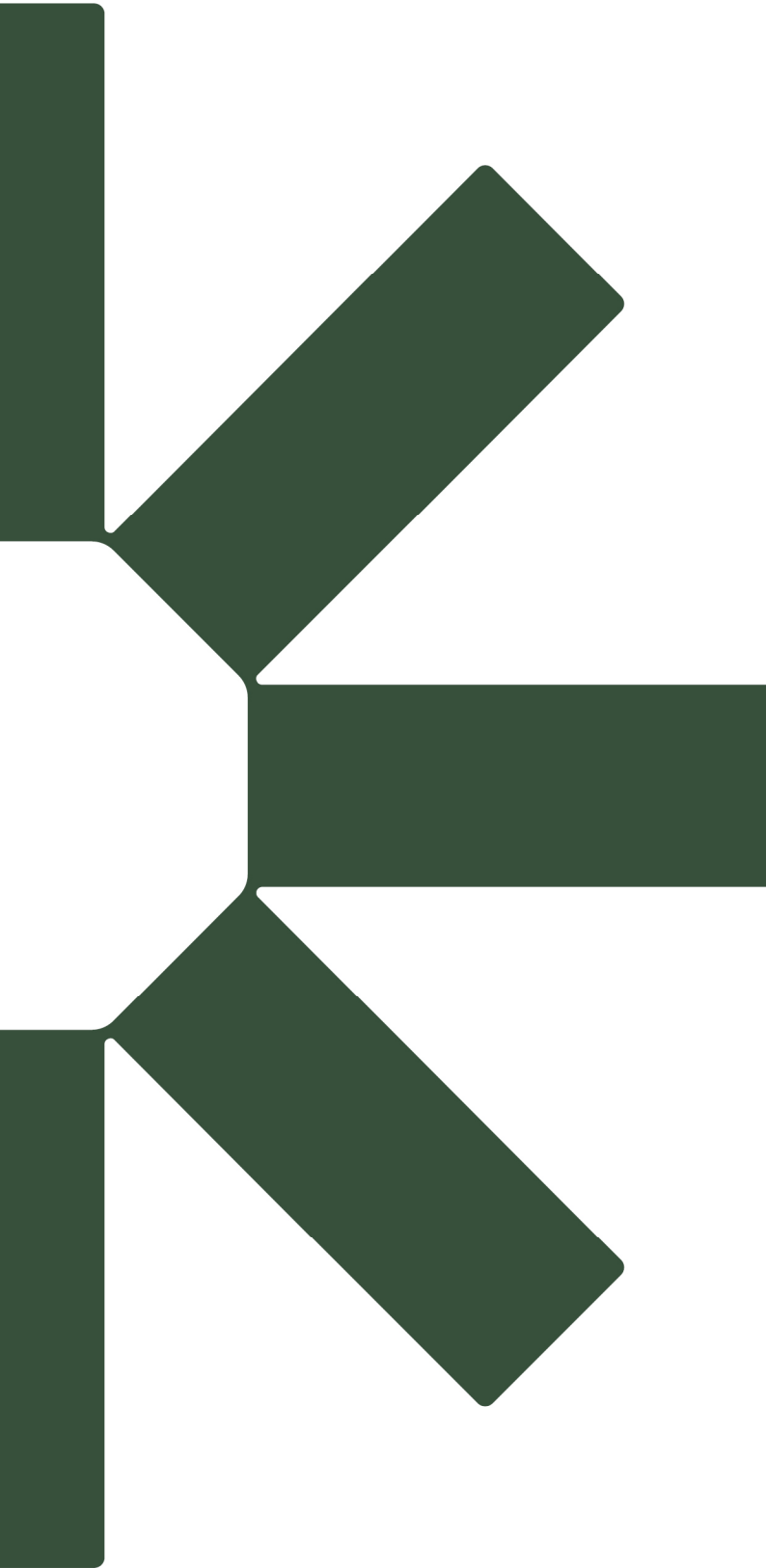


Bore ID	Parameters	Aluminium	Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
TR35	Apr-24	<0.01	<0.001	<0.001	0.06	0.0004	0.002	0.010	1.730	<0.001	1.76	<0.0001	0.017	0.558	<0.01	<0.001	0.030
TR7	Jan-24	<0.01	<0.001	<0.001	0.1	<0.0001	<0.001	0.008	0.863	<0.001	0.637	<0.0001	0.002	0.39	<0.01	<0.001	0.006
TR7	Apr-24	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.001	0.004	0.346	<0.001	0.262	<0.0001	0.002	0.118	<0.01	<0.001	0.006
VKY034C	Jan-24	<0.01	<0.001	0.002	0.09	<0.0001	<0.001	<0.001	<0.001	<0.001	0.102	<0.0001	0.007	0.008	<0.01	<0.001	<0.005
VKY034C	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
VKY035C	Jan-24	<0.01	<0.001	0.001	0.07	<0.0001	0.002	<0.001	<0.001	<0.001	0.329	<0.0001	0.007	0.006	<0.01	<0.001	0.006
VKY035C	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
VKY036C	Jan-24	<0.01	<0.001	<0.001	0.09	<0.0001	<0.001	<0.001	<0.001	<0.001	0.013	<0.0001	0.001	0.013	<0.01	<0.001	<0.005
VKY036C	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
VKY042C	Jan-24	<0.01	<0.001	<0.001	0.1	0.0001	<0.001	<0.001	0.006	<0.001	0.223	<0.0001	0.002	0.015	<0.01	<0.001	0.014
VKY042C	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
VKY043C	Jan-24	<0.01	<0.001	<0.001	0.11	<0.0001	<0.001	<0.001	<0.001	<0.001	0.005	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005
VKY043C	Apr-24	<0.01	<0.001	<0.001	0.06	<0.0001	<0.001	<0.001	<0.001	<0.001	0.004	<0.0001	<0.001	0.002	<0.01	<0.001	0.006
VNW390	Jan-24	<0.01	<0.001	<0.001	0.14	<0.0001	<0.001	<0.001	0.005	<0.001	0.003	<0.0001	<0.001	0.002	<0.01	<0.001	0.026
VNW390	Apr-24	<0.01	<0.001	0.002	0.09	<0.0001	<0.001	0.002	<0.001	<0.001	0.239	<0.0001	<0.001	0.002	<0.01	<0.001	0.007
VNW391	Jan-24	<0.01	<0.001	<0.001	0.13	<0.0001	<0.001	<0.001	0.001	<0.001	0.006	<0.0001	<0.001	<0.001	<0.01	<0.001	0.006
VNW391	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.225	<0.0001	0.001	0.007	<0.01	<0.001	0.013
VNW392	Jan-24	<0.01	<0.001	0.001	0.12	<0.0001	<0.001	0.003	<0.001	<0.001	0.333	<0.0001	0.002	0.02	<0.01	<0.001	0.008
VNW392	Apr-24	<0.01	<0.001	0.001	0.07	<0.0001	<0.001	0.003	<0.001	<0.001	0.315	<0.0001	0.002	0.014	<0.01	<0.001	<0.005
VNW393	Jan-24	<0.01	<0.001	<0.001	0.1	<0.0001	<0.001	<0.001	<0.001	<0.001	0.092	<0.0001	0.003	<0.001	<0.01	<0.001	<0.005
VNW393	Apr-24	<0.01	<0.001	<0.001	0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	0.15	<0.0001	0.005	0.005	<0.01	<0.001	<0.005
VNW394	Jan-24	<0.01	<0.001	0.007	0.1	<0.0001	<0.001	0.011	<0.001	<0.001	2.12	<0.0001	0.003	0.035	<0.01	<0.001	0.007
VNW394	Apr-24	<0.01	<0.001	0.006	<0.05	<0.0001	<0.001	0.002	<0.001	<0.001	1.27	<0.0001	0.003	0.006	<0.01	<0.001	<0.005
VNW395	Jan-24	<0.01	<0.001	0.001	0.08	<0.0001	<0.001	<0.001	0.002	<0.001	0.032	<0.0001	<0.001	0.001	<0.01	<0.001	<0.005
VNW395	Apr-24	<0.01	<0.001	0.001	0.0575	<0.0001	<0.001	0.00125	0.00625	<0.001	0.125	<0.0001	0.00575	0.2285	<0.01	<0.001	0.007



Bore ID	Parameters	Aluminium	Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
WR-1	Jan-24	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
WR-1	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012
WR-2	Jan-24	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
WR-2	Apr-24	<0.01	<0.001	<0.001	0.08	<0.0001	<0.001	<0.001	0.001	<0.001	0.224	<0.0001	<0.001	0.004	<0.01	<0.001	0.012





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