REPORT ON

MACKENZIE NORTH ANNUAL GROUNDWATER MONITORING REPORT

JULY 2023 TO JUNE 2024 WATER YEAR

For: Jellinbah Group Pty Ltd

Project number: 4159

Date: 15/11/2024

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Mackenzie North Annual Groundwater Monitoring Report

July 2023 to June 2024 Water Year

Prepared for

Jellinbah Group Pty Ltd

1. Introduction

This Annual Groundwater Monitoring Report for the Mackenzie North Project (the Project) has been prepared by **hydrogeologist.com.au** on behalf of the Jellinbah Group Pty Ltd (Jellinbah) to satisfy the conditions of the Project's Associated Water Licence (AWL) number 618107. The AWL authorised activity includes the taking of associated water from the Mackenzie River alluvium, Rangal Coal Measures and adjacent formations with the point of take on or under the area of Mining Leases (ML) 70445, 70445, 70448 and 70449.

Jellinbah Resources have an obligation under the AWL for the Project to prepare an Annual Monitoring Report, with the report requirements outlined in Condition 47. The Annual Monitoring Report requirements under Conditions 47 of the AWL and the report section in which they are addressed, are shown in Table 1-1.

Table 1-1 Reporting requirements and report section

AWL Condition	Requirement	Report section
47	The Licensee must provide an Annual Monitoring Report to the chief executive. These reports must include:	
	a) the underground water levels in the monitoring bores of the approved Underground Water Monitoring Program.	Section 5
	b) any changes in water quality in the monitoring bores.	Section 5
	c) maps showing the actual water level drawdown contours caused by the take of associated water for each aquifer.	Section 5
	d) details of any review undertaken of the numerical underground water model since the previous Annual Monitoring Report, as required under Conditions 48 or 49.	Section 6
	e) an assessment of any differences between the actual water level impact and the impact predicted for the same period in the most current numerical underground water model.	Section 6
	f) details of any bores which are predicted by the most current numerical underground water model to be located in the affected area.	Section 7
	g) raw data provided in a format as requested by the chief executive.	Attachment A Attachment B

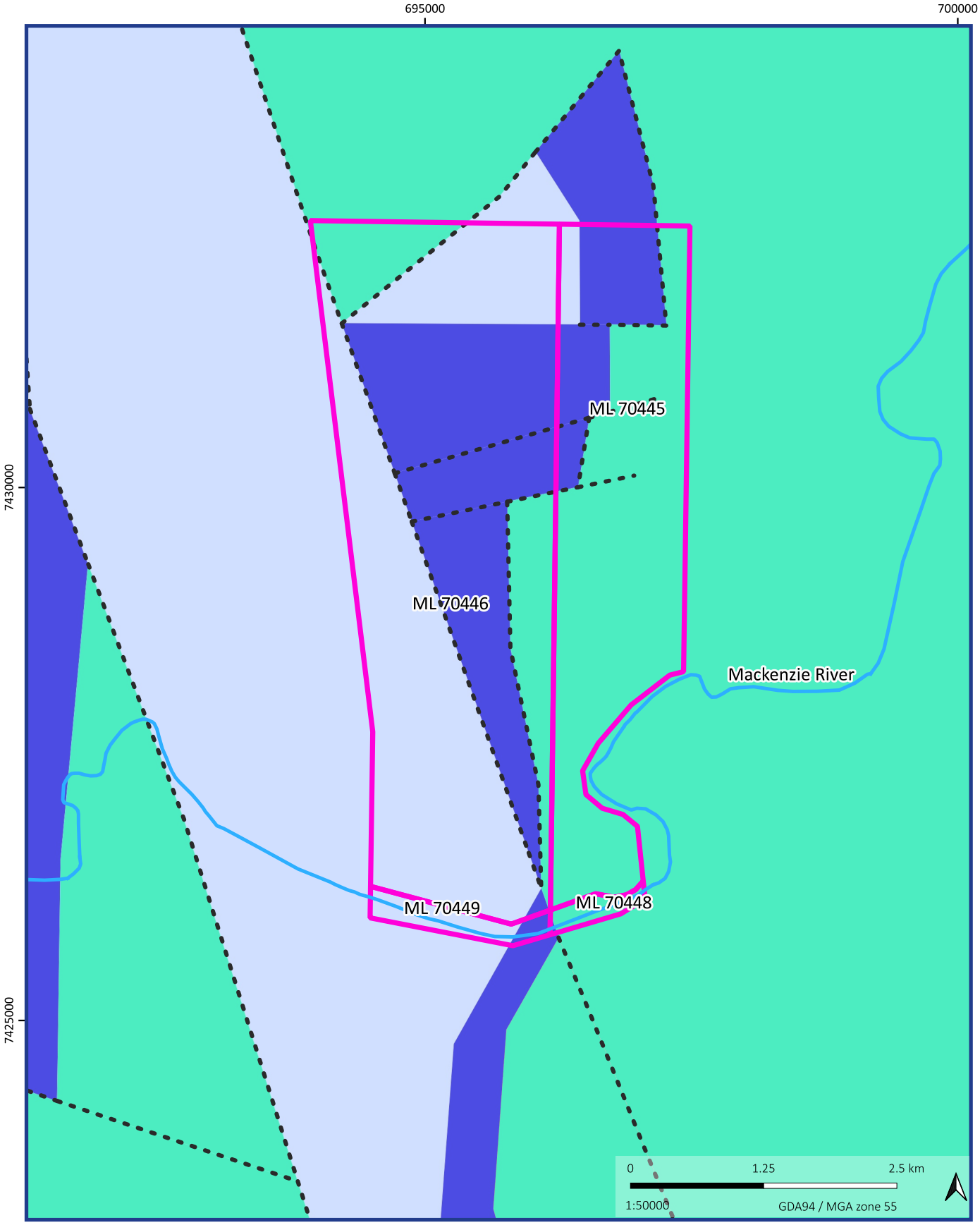
2. Geology and hydrogeology

The Project is located within the central part of the Bowen Basin, an early Permian to middle Triassic age basin that covers an area of approximately 160,000 km^2. Table 2-1 shows the stratigraphic relationship and description of strata that occurs within the Project area. This includes Bowen Basin strata (Late Permian Burngrove Formation and Rangal Coal Measures and the Triassic Rewan Sub-group) that are overlain by Quaternary / Tertiary alluvium.

Figure 2-1 shows the Bowen Basin solid geology for the Project area. The Project area is underlain predominantly by strata of the Rangal Coal Measures, with the underlying Burngrove Formation occurring in the west of the Project area and the overlying Rewan Sub-group occurring in the eastern and south-eastern area of the Project. The Rangal Coal Measures contain the target coal seams for mining at Mackenzie North, including the Pollux Upper seam and the Pollux Lower seam. The Permian and Triassic units are overlain by unconsolidated Quaternary and Tertiary alluvium, with the Quaternary age alluvial sediments associated with the Mackenzie River floodplain. The surface geology of the project area is shown in Figure 2-2. The Project area is underlain by Quaternary alluvium, which is deposited directly over strata of the Rangal Coal Measures in the central part of the Project.

Table 2-1 Stratigraphy

Geological age	Unit	Lithology	Thickness (m)
Quaternary / Tertiary	Alluvium	Unconsolidated soil, silty clay, sand, and gravel. The basal sand and gravel thicken towards the Mackenzie River.	14 to 42
Triassic	Rewan Sub-group	Green-grey claystone, siltstone and sandstone with a minor pebbly conglomerate unit at its base.	0 to 100
Late Permian	Rangal Coal Measures	Feldspathic and lithic sandstone, carbonaceous mudstone, siltstone, tuff, and coal seams. Coal seams include: - Castor - Pollux Upper - Pollux Lower	100 +
		- Aries	0 to 2.2
		- Castor	0 to 1.1
		- Pollux Upper	0 to 7.6
		- Pollux Lower	0 to 6.4
	Burngrove Formation	Sandstone, siltstone, mudstone and banded coal seams, frequently interbedded with tuff and tuffaceous mudstone.	>200



Solid geology

Legend

- Mackenzie River
- Mining leases

Geology

- Fault
- Pwg - Burngrove Formation
- Pwj - Rangal Coal Measures
- Rr - Rewan Sub-Group

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Figure 2-1

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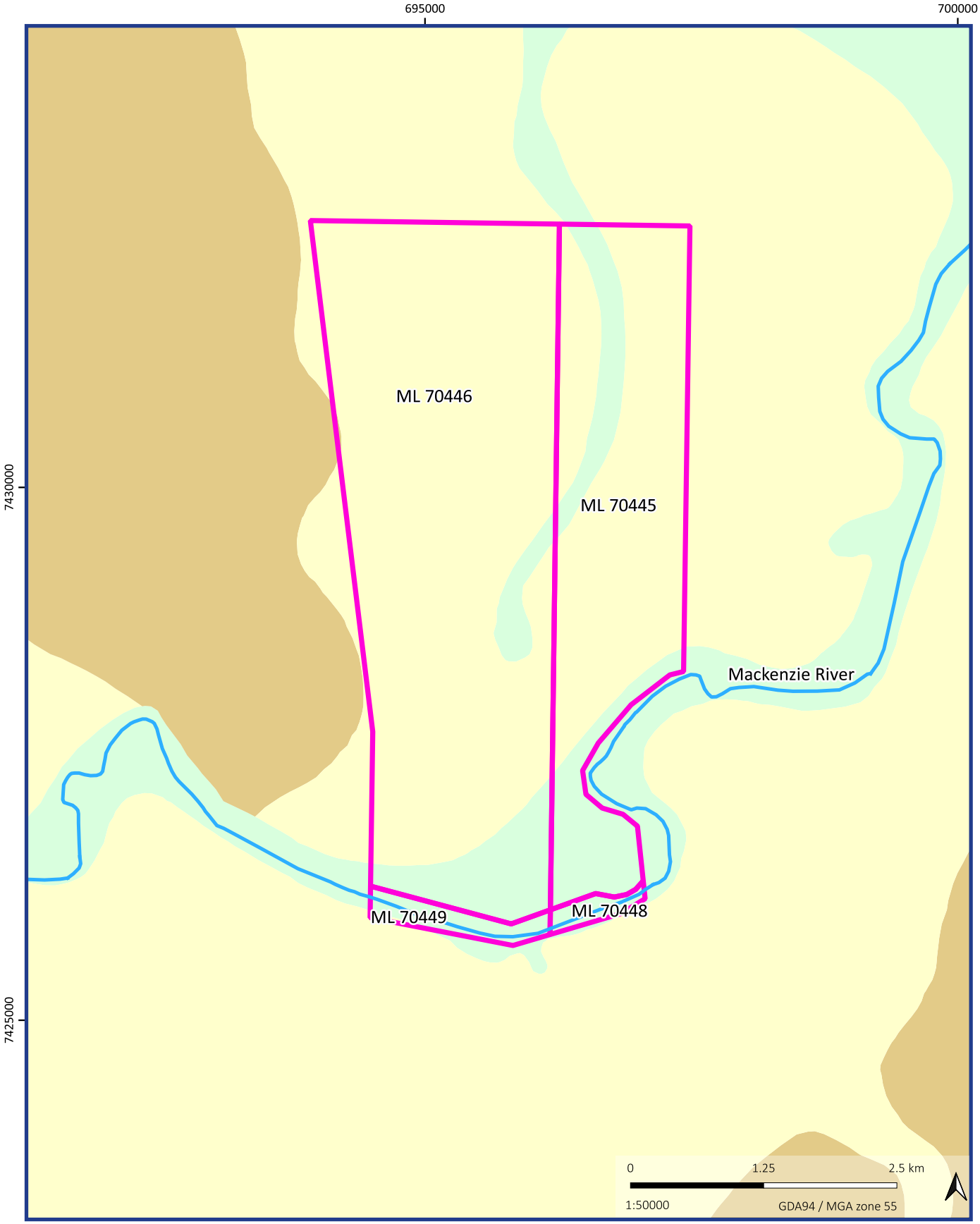

Surface geology

Legend

- Mackenzie River
- Mining leases

Geology

- Qa - Alluvium
- Qha - Alluvium
- Tu - Duaringa Formation

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Figure 2-2

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3. Rainfall

Rainfall data for the Project was obtained from the Queensland Government SILO Data Drill website. The SILO data accesses grids of climate data available from surrounding Bureau of Meteorology (BoM) point observations and then creates interpolated climate values for a site specific location. The interpolated climate data are calculated for the site specific location using splining and kriging techniques, based on the proximity of surrounding BoM point observations.

Monthly rainfall data and the Cumulative Rainfall Departure (CRD) curve is shown in Figure 3-1. The CRD is calculated by subtracting the long term average monthly rainfall from the actual monthly rainfall, to provide a monthly departure from average conditions. Periods of below average rainfall are represented as downward trending slopes and above average rainfall as upward trending slopes. The CRD curve is used in groundwater investigations due to the potential correlation between the CRD and groundwater level trends.

The CRD curve shows an upward trend from 2010 to 2011 due to above average rainfall over that period but has been in decline due to generally below average rainfall conditions from 2012 to 2021. The overall trend of the CRD curve has been rising from January 2021 to June 2024. This rise is primarily driven by multiple above average rainfall events.

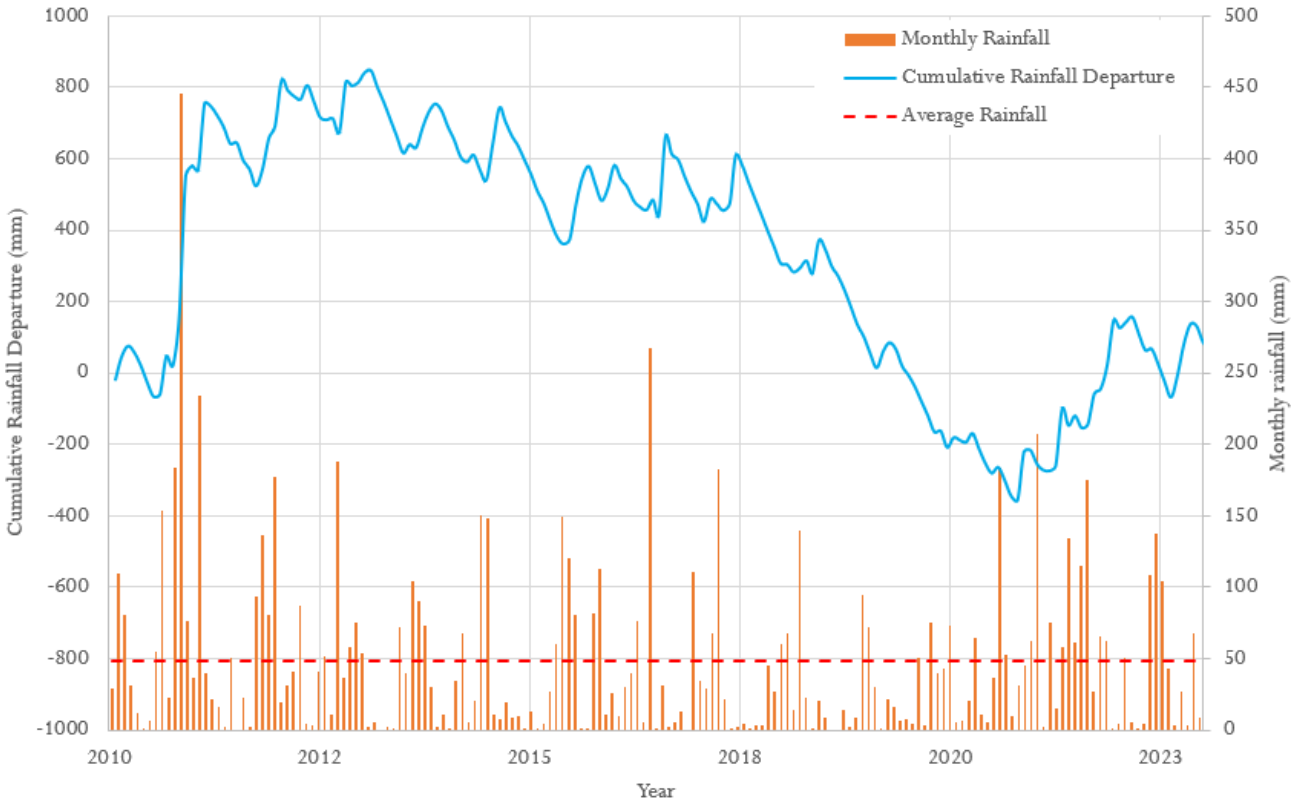


Figure 3-1 Monthly rainfall data and cumulative rainfall departure

4. Groundwater monitoring network

The AWL groundwater monitoring network is shown in Table 4-1 and bore locations are presented in Figure 4-1. Eight bores monitor groundwater within the Quaternary / Tertiary alluvium, with two bores in the Permian coal measures and one within the Permian overburden. Three bores have been replaced including bores MR4WP, JMR24WP and JMR22WP. These have been replaced by JMR4WP2, JMR24WP2 and JN1119E, respectively. During the 2023 to 2024 water year no new monitoring bores were drilled and no monitoring bores were decommissioned.

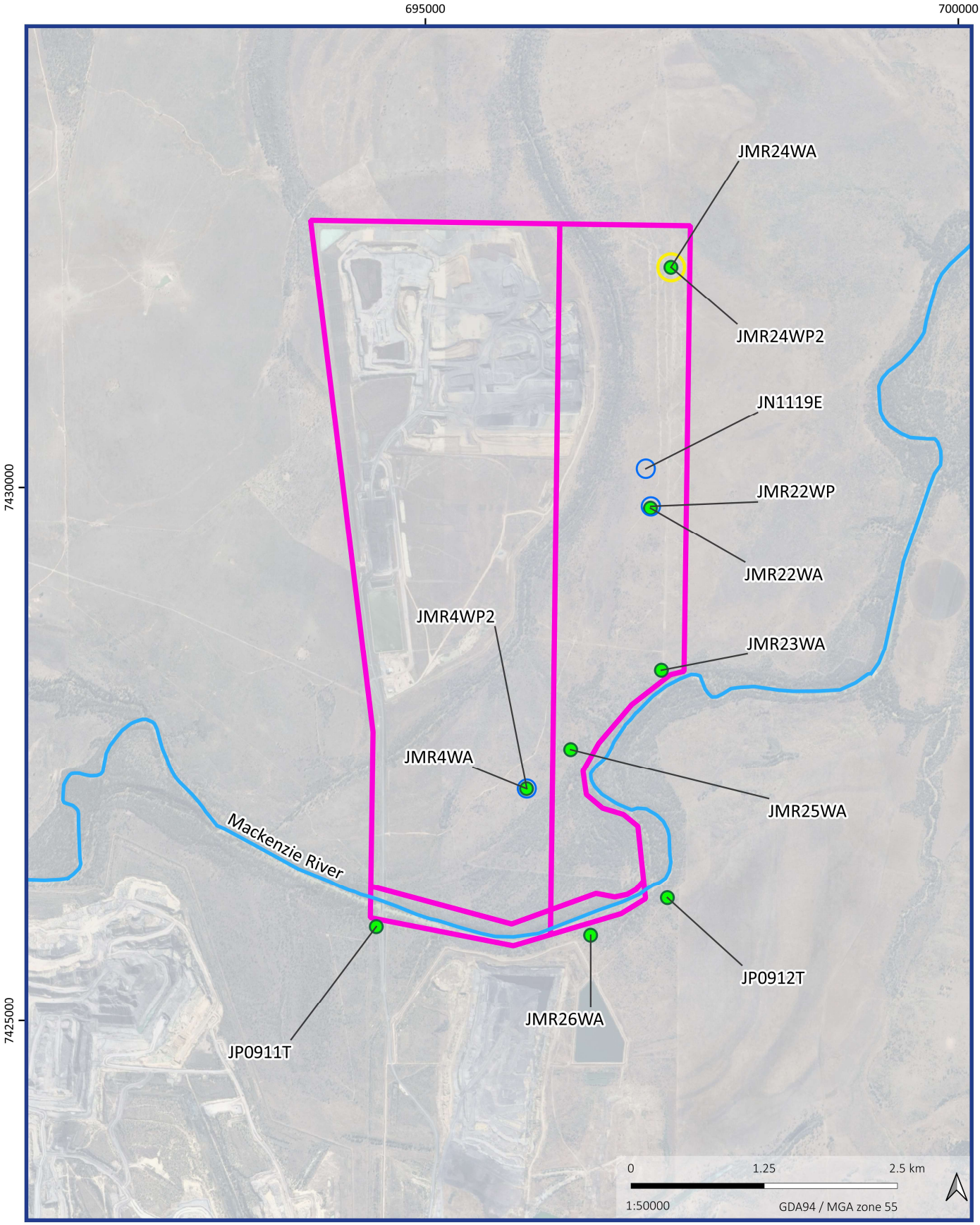
Table 4-1 AWL groundwater monitoring network

Monitoring bore	Hydrogeological unit	Easting (GDA94)	Northing (GDA94)	Monitoring frequency	
				Water level	Water quality
JMR4WA	Alluvium	695947	7427173	Data logger (daily)	Quarterly
JMR22WA	Alluvium	697110	7429809	Quarterly	n/a
JMR23WA	Alluvium	697212	7428280	Data logger (daily)	Quarterly
JMR24WA	Alluvium	697301	7432067	Quarterly	n/a
JMR25WA	Alluvium	696362	7427545	Data logger (daily)	Quarterly
JMR26WA	Alluvium	696547	7425797	Quarterly	n/a
JP0911T	Tertiary	694540	7425880	Quarterly	n/a
JP0912T	Tertiary	697270	7426150	Quarterly	n/a
JMR4WP	Permian-Pollux seam	695950	7427175	n/a	n/a
JMR4WP2*	Permian-Pollux seam	695952	7427176	Quarterly	Quarterly
JMR24WP	Permian overburden	697302	7432068	n/a	n/a
JMR24WP2**	Permian overburden	697305	7432067	Quarterly	Quarterly
JMR22WP	Permian-Pollux seam	697113	7429825	Quarterly	Quarterly
JN1119E***	Permian-Pollux seam	697068	7430176	Quarterly	Quarterly

Notes: * *JMR4WP2 is a replacement bore for JMR4WP*

** *JMR24WP2 is a replacement bore for JMR24WP*

*** *JN1119E is a replacement bore for JMR22WP*



Groundwater monitoring bore locations

Legend

- Alluvium monitoring bore locations
- Permian-Pollux seam monitoring bore locations
- Permian overburden monitoring bore locations
- Mackenzie River
- Mining leases

(4159C) Mackenzie North Project -
Annual Groundwater Monitoring Report 2024 Year

Figure 4-1

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5. Groundwater monitoring

5.1. Monitoring requirements

5.1.1. Water level monitoring

Water level monitoring is undertaken at all sites on a quarterly basis. Data loggers are fitted to three of the Quaternary alluvium monitoring bores (JMR4WA, JMR23WA and JMR25WA), which are located between the mining operation and the Mackenzie River. The logger data is analysed to establish seasonal variations in water levels, including response to rainfall recharge and response to flow events in the Mackenzie River.

5.1.2. Water quality monitoring

Groundwater quality monitoring frequency and parameters are summarised in Table 5-1.

Table 5-1 Water quality sampling parameters and frequency

Monitoring Bore	Hydrogeological Unit	Monitoring Frequency	Parameters
JMR4WA	Quaternary alluvium	Quarterly	• pH (field and laboratory) • EC (field and laboratory) • TDS • Major Ions: Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Alkalinity (carbonate, bicarbonate, hydroxide, total) • Metals/metalloids (total and dissolved, by ICP-MS/FIMS): Aluminium, Arsenic, Boron, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Uranium, Vanadium, Zinc • Total Petroleum Hydrocarbons (C6-C9, C10-36)
JMR23WA	Quaternary alluvium	Quarterly	
JMR25WA	Quaternary alluvium	Quarterly	
JMR4WP2*	Permian-Pollux seam	Quarterly	
JMR24WP2**	Permian overburden	Quarterly	
JN1119E***	Permian-Pollux seam	Quarterly	

Notes: * *JMR4WP2 is a replacement bore for JMR4WP*

** *JMR24WP2 is a replacement bore for JMR24WP*

*** *JN1119E is a replacement bore for JMR22WP*

5.2. Assessment of groundwater monitoring data

5.2.1. Groundwater quality monitoring

With the exception of bores JMR23WA and JMR25WA, water quality sampling has been undertaken at frequency intervals for the bores and sampling parameters shown in Table 5-1. There was insufficient water within JMR23WA and JMR25WA for water quality sampling. All available water quality data (pH, electrical conductivity, major ions, metals/metalloids, total petroleum hydrocarbons) are provided in Appendix A.

5.2.1.1. Electrical conductivity (EC) data

The field electrical conductivity (EC) data is shown in Figure 5-1 and is summarised below:

- The alluvium bores have a mean field EC value of 3,827 µS/cm, the Permian overburden bore has a mean field EC value of 7,742 µS/cm and the Permian coal measure bores have a mean field EC value of 10,660 µS/cm. Water is considered too saline for crops at 8,100 µS/cm and water below 7,460 µS/cm is considered suitable for beef cattle (Queensland Government, 2018).

- JMR4WA (alluvium) field EC ranges between 3,986 to 7,189 µS/cm, with a mean of 5,717 µS/cm for 19 samples.
- JMR25WA (alluvium) field EC ranges between 1,171 to 2,358 µS/cm, with a mean of 1,574 µS/cm for 12 samples. The groundwater level has fallen below the base of the bore since January 2022 and no further readings are available.
- JMR23WA (alluvium) field EC ranges between 822 to 944 µS/cm, with a mean of 867 µS/cm for three samples. The groundwater level was insufficient for sampling since August 2023 and no further readings are available.
- JMR4WP (Pollux seam) field EC ranges between 7,450 to 9,833 µS/cm, with a mean of 8,885 µS/cm for six samples. The bore was last sampled in July 2019 due to downhole equipment loss. The bore was redrilled at a nearby location as bore JMR4WP2 in April 2020. For the ten samples taken at JMR4WP2 between November 2020 and May 2024, the field EC ranges between 3,448 and 6190 µS/cm with a mean of 4,120 µS/cm.
- JMR24WP (Permian overburden) field EC ranges between 7,670 to 9,490 µS/cm for eight samples. Replacement bore JMR24WP2 (Permian overburden) field EC ranges between 6,912 to 8,587 µS/cm, with a mean of 7,464 µS/cm for 12 samples. A single EC value of 11,491 µS/cm for JMR24WP2 in January 2021 is excluded from the statistical analysis, as it has been assessed as an outlier (JBT, 2023).
- JN1119E (Pollux seam) field EC ranges between 10,851 to 14,181 µS/cm, with a mean of 12,874 µS/cm for 12 samples. A single EC value of 17,353 µS/cm for the first sampling event in November 2019 is excluded from the statistical analysis, as it has been assessed as an outlier (JBT, 2023).
- JMR22WP (Pollux seam) has continued to be sampled. The field EC ranges between 8,547 to 18,096 µS/cm with a mean of 14,466 µS/cm for 13 samples.

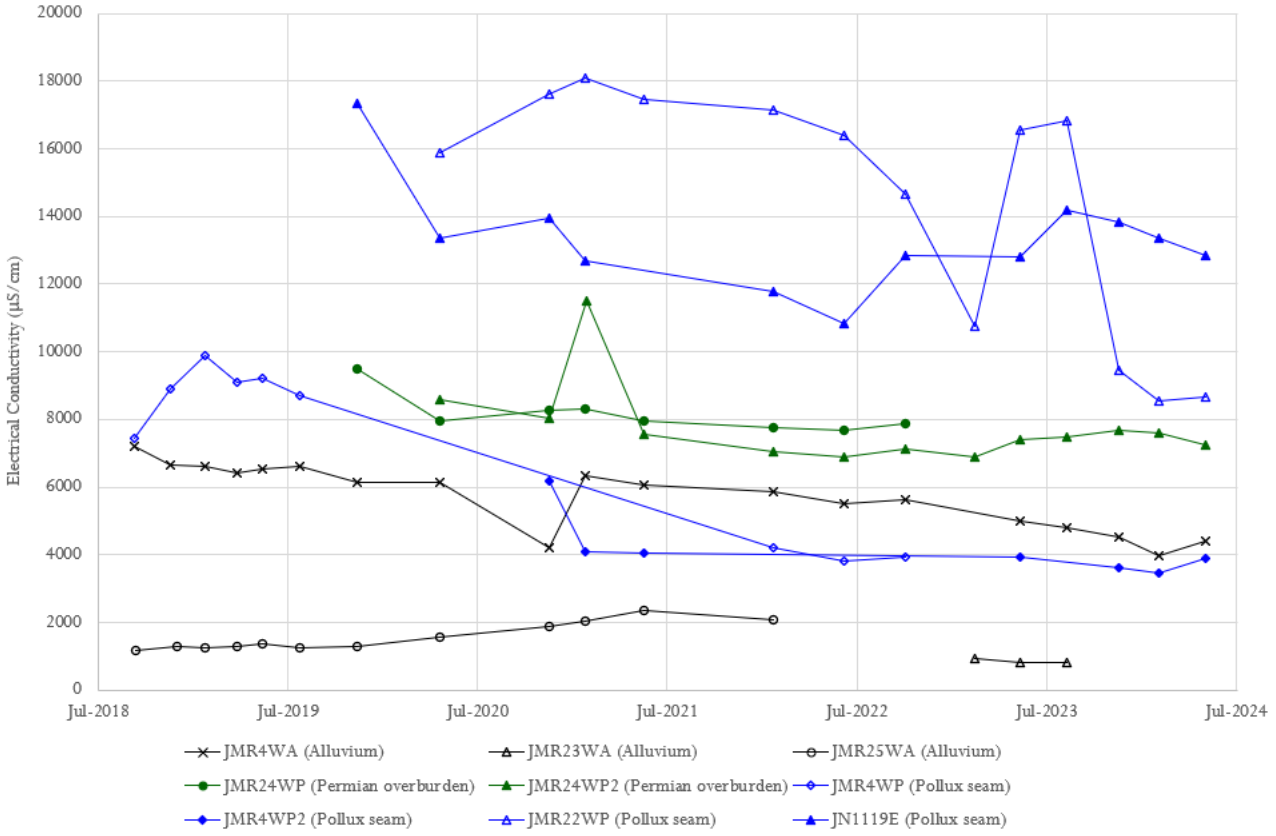


Figure 5-1 Field electrical conductivity

5.2.1.2. pH data

The field pH data is shown in Figure 5-2 and is summarised below:

- Field pH for the alluvium bores have a mean value of 6.6, the Permian overburden bores have a mean pH value of 7.4 and the Permian coal measure bores have a mean pH value of 9.3.
- The alluvium bores JMR4WA, JMR23WA and JMR25WA have the lowest pH values, which are consistent over time ranging between 6.4 to 7.3. Permian overburden bore JMR24WP is slightly higher in pH than the alluvium bores ranging between 6.8 to 7.8.
- The Permian (Pollux seam) bore JN1119E has the highest field pH. The high pH values are discussed in the previous AWL reporting (2022 and 2023), which concluded the high pH may be due to grouting issues during construction or some other cause, for example site geological personnel advise that the bore is located in the area of basic dykes, where the groundwater could locally be expected to be alkaline (JBT, 2023). The pH value has remained consistently above 11.5 for most readings. The original Permian (Pollux seam) bore JMR22WP recorded a decrease in pH between April 2020 and June 2022, pH values have fluctuated from October 2022 to May 2024, ranging between 7.8 to 11.8.

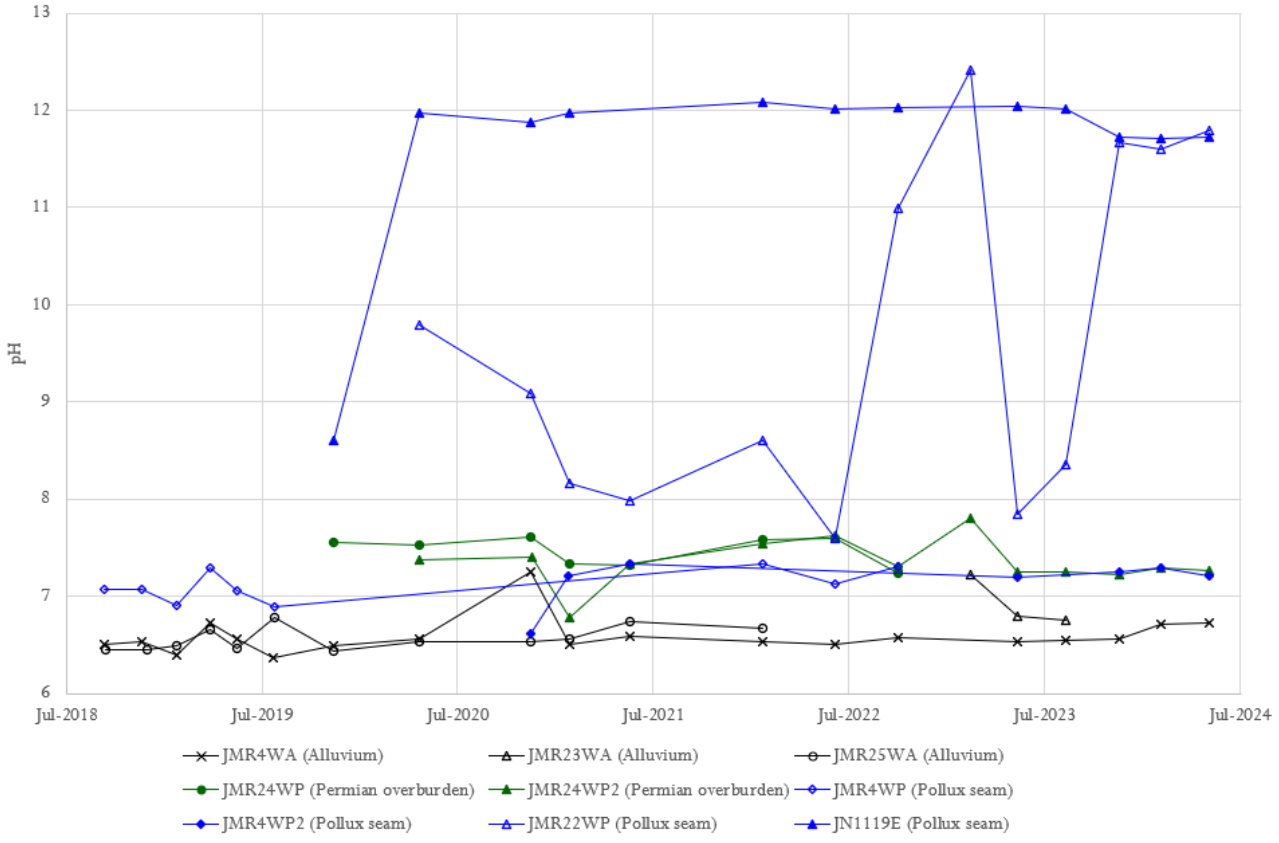


Figure 5-2 Field pH

5.2.2. Groundwater level monitoring

Groundwater level monitoring has been undertaken in accordance with Table 5-1 and data sets are provided in Appendix B. Figure 5-3 shows the groundwater level monitoring results in metres Australian Height Datum (mAHD) and the data is summarised below:

- The alluvium bores have declined in water levels likely in response to reduced or below average rainfall conditions rainfall from 2018 to 2021. Above average rainfall from 2021 to 2022 resulted in higher groundwater recharge and rising groundwater levels are evident in some monitoring bores. Groundwater levels recorded over the 2023 to 2024 water year are stable and reflect the recent rainfall conditions.
- Alluvium bore JMR22WA has been dry since December 2018, JMR24WA has been dry since October 2018 and JMR26WA has been dry since November 2018. Bores JP0911T and JP0912T monitor the Tertiary alluvium to the south of the Mackenzie River. The bores were monitored from August to October 2023 with access in 2024 impeded due to rainfall and poor access conditions.
- Figure 5-4 shows the logger data for JMR4WA, which has been collected at six hourly intervals since November 2020. The groundwater elevation recorded over the 2023 to 2024 Water Year are stable ranging between 102.15 mAHD to 102.37 mAHD.
- Figure 5-5 shows the logger data for JMR23WA. Groundwater levels were recorded above the base of bore since June 2022. However, the data was assessed as being unreliable prior to January 2023 (JBT, 2023). Over the reporting period manual groundwater levels are slightly declining and a rapid change is evident in the data. The most recent data shows a discrepancy between the manual and data logger measurements.
- Figure 5-6 shows the logger data for JMR25WA. Since June 2022, the groundwater level was just above the bore base or dry. Over the reporting period the bore was dry in November 2023 and recorded a groundwater level of 21.56 mbgl in February 2024.
- The Permian overburden bores JMR24WP and JMR24WP2 have a degree of hydraulic isolation from the coal seams (JBT, 2013). Groundwater levels have increased in these bores since May 2023.
- The Permian bore JN1119E is located approximately 800 metres from the mining area. The bore has previously been reported to be within the zone of predicted groundwater level impact from mining (JBT, 2018). Over the reporting period groundwater levels have recovered and remained stable.
- The Permian bore JMR4WP groundwater level was stable over the 2023 to 2024 water year. The data shows no response to mining activities and unlikely to be impacted by mining.

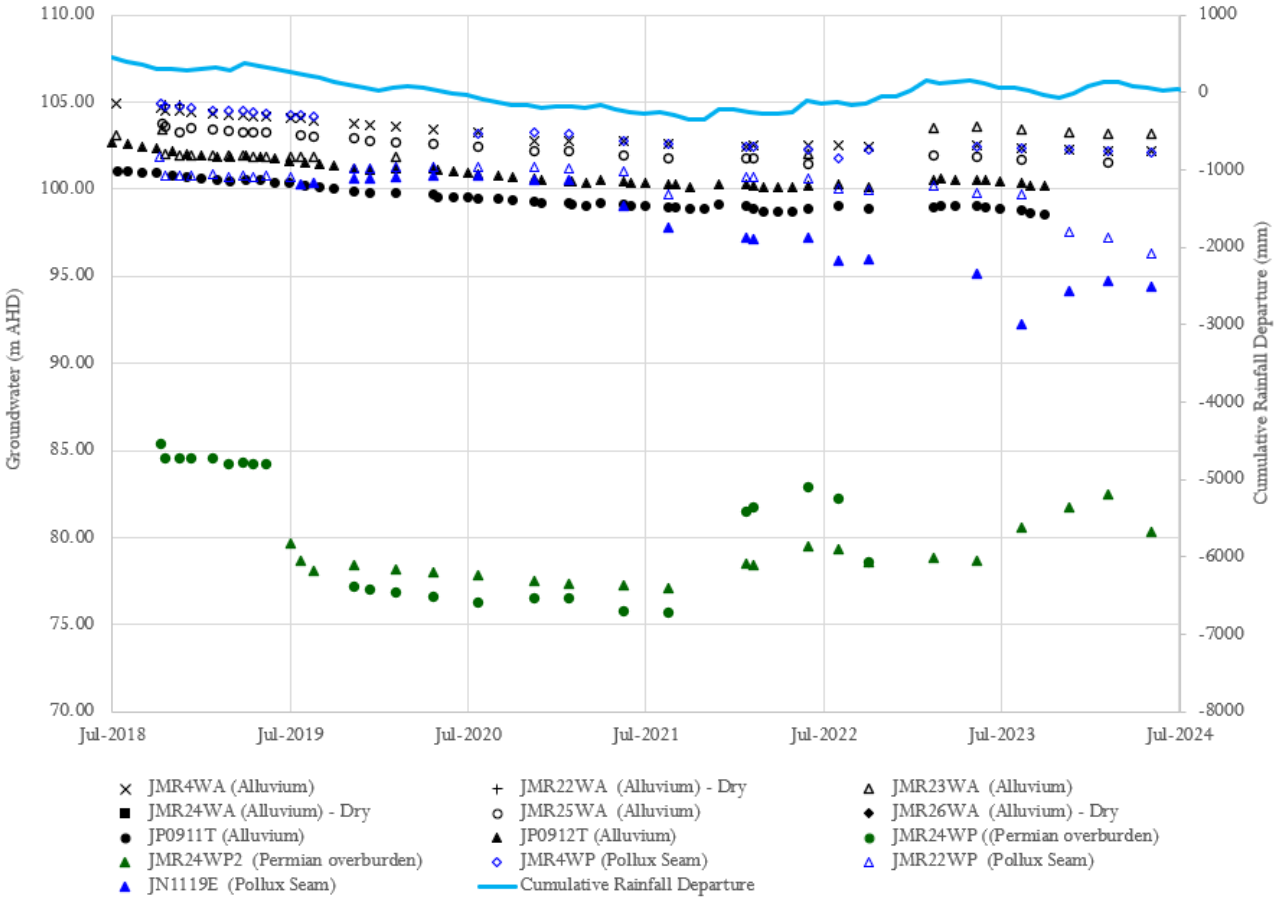


Figure 5-3 Hydrographs

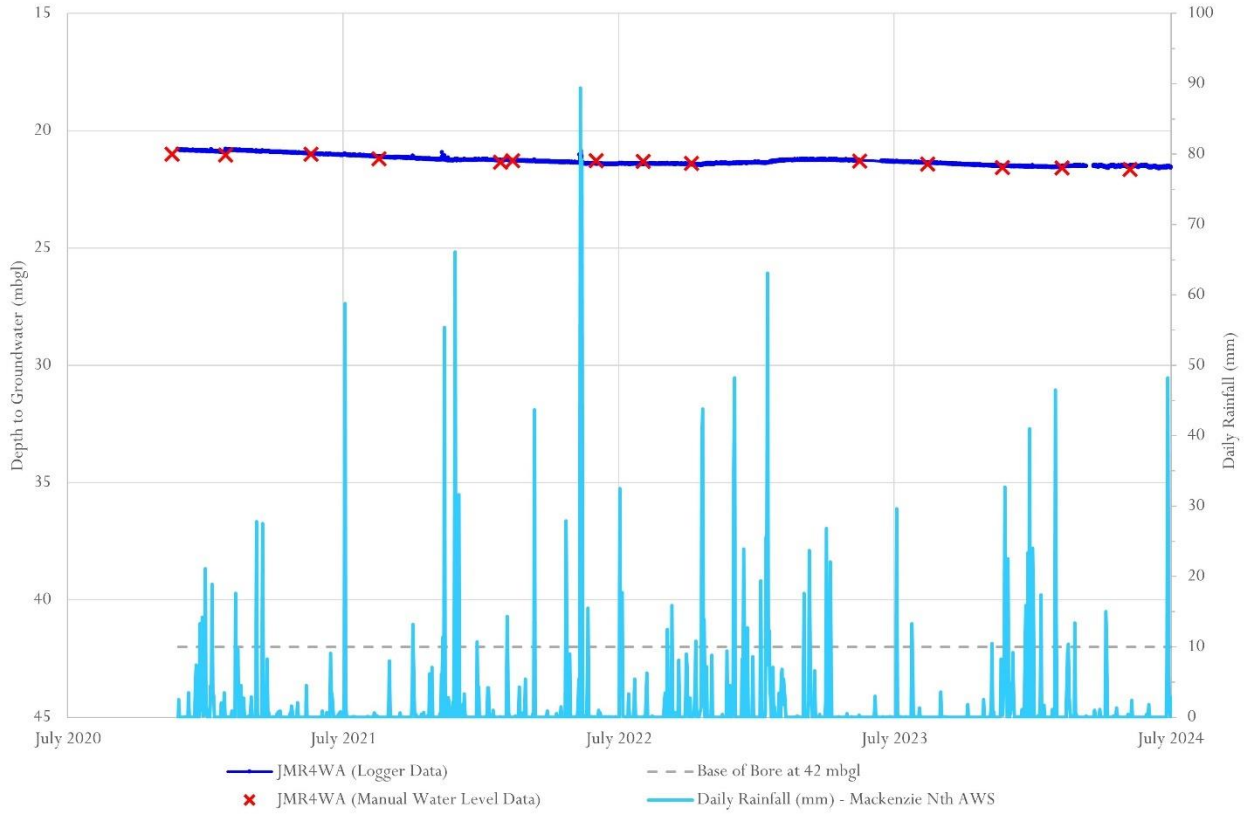


Figure 5-4 JMR4WA datalogger and manual water level data

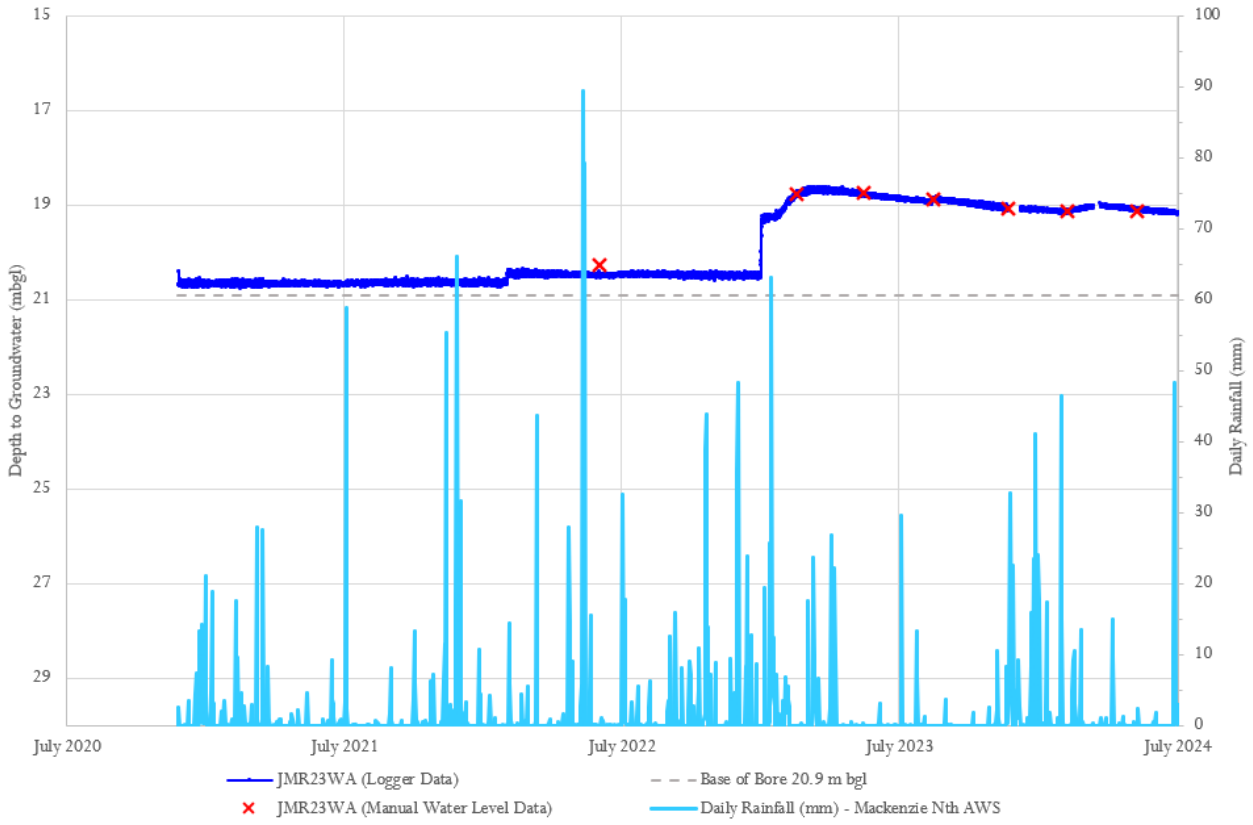


Figure 5-5 JMR23WA datalogger and manual water level data

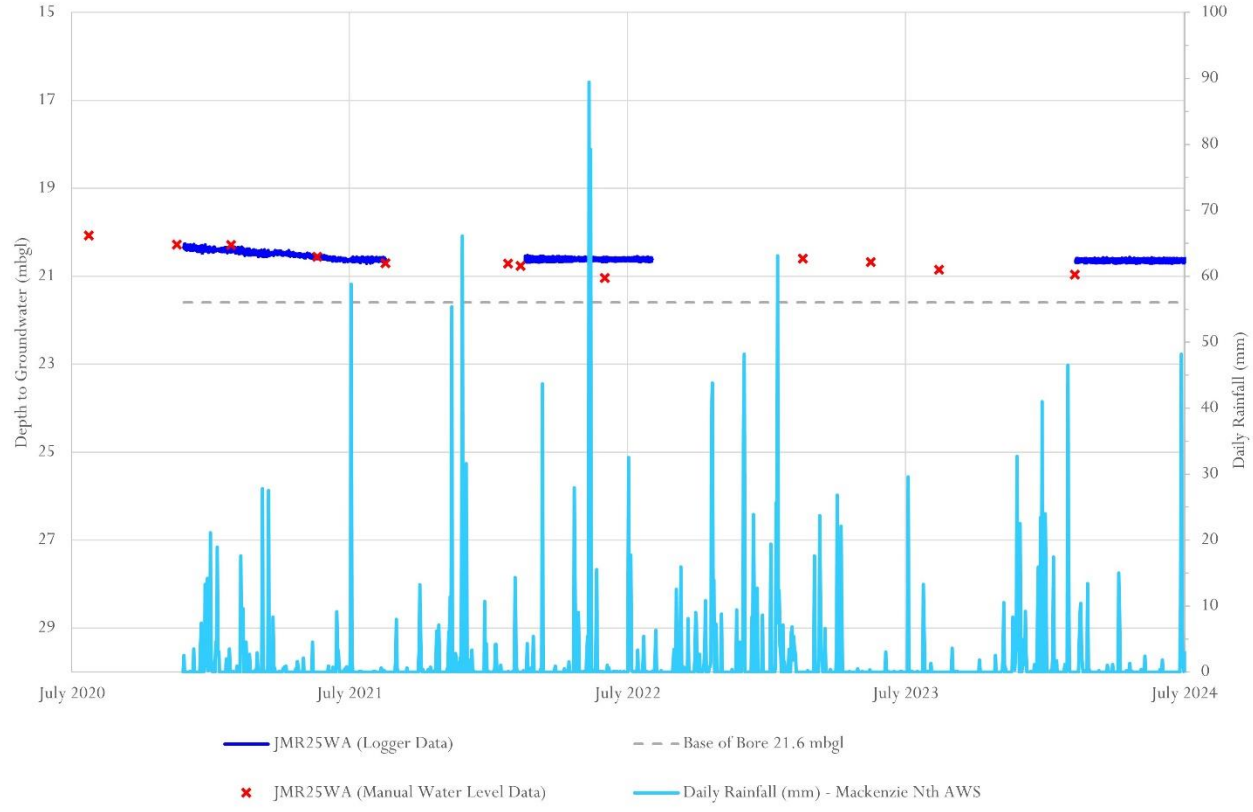


Figure 5-6 JMR25WA datalogger and manual water level data

6. Impact of mining on groundwater levels

Condition 47 (d) requires details of any review undertaken of the numerical underground water model since the previous Annual Monitoring Report. It is assessed that the take of associated water commenced in June 2021 and a review of the numerical underground water model was completed in July 2023 and September 2023 (JBT, 2023). The revised numerical underground water model was based on a transient calibration and results of the transient modelling. Condition 47 (e) requires an assessment of any differences between the actual water level impact and the impact predicted.

The following points are summarised from the JBT Consulting (JBT, September 2023) report regarding the transient modelling hydrographs of observed verses simulated water levels within the calibration target bores.

- Figure 6-1 shows the simulated and observed water level hydrographs for the alluvium calibration target bores, with observations as follows (JBT, 2023):
    - The model starting water level (from the steady-state model) is satisfactory for most bores and the model is capturing the trend of water level reduction that is interpreted to be related to climatic conditions rather than mining. It was noted during the first phase of transient calibration (JBT, 2023) that the model was not able to capture the climate-related water level trend. The difference with the current version of the model was the use of the rainfall recharge cutoff function, where recharge was only applied if the monthly rainfall exceeded the cutoff value of 47 mm/month.
    - Bores MSP0209 and MSP0213 display a steeper water level reduction that is due to impacts from mining at Plains Pit, where the water level reduced significantly before the bores were eventually mined out. The trend was also captured by the model, with the step-wise reduction in groundwater level in the period after observed data ceased to be available (due to the bores being mined out) being related to the simulation of mining in the model.
- Figure 6-2 shows the simulated and observed water level hydrographs for the Permian calibration target bores. The main stressor that can be calibrated for the Permian bores is drawdown in response to mining, with observations as follows (JBT, 2023):
    - JMR17WP is the closest bore to mining at the Mackenzie North Mine (approximately 450 m south of the pit crest in March 2023) and is located along strike of mining at a location where the bore will eventually be destroyed by mining. This bore has water level data available for both the pre-mining and post-mining periods at Mackenzie North, and the observed water level drawdown is interpreted to be related to mining. The calibration hydrograph for this bore is showing a good match to both the onset of water level reduction and the trend of water level reduction, considering that the modelled starting water level at this site (from the steady-state model) is approximately 5 m higher than the observed value.
    - JMR1119E is located approximately 900 m southeast of the pit crest in March 2023. The bore shows a water level response to mining, and this is partially captured by the model, but not with as good a fit as bore JMR17WP. This bore is located near a dyke, and it is uncertain whether the dyke is having any impact on groundwater flow. Continued transient calibration efforts in the next phase of modelling will focus on improving the model response in this location.
    - Bores JMR15WP and JMR22WP the model predicts the onset of mining-induced drawdown but this is not matched by the observed data, which shows a relatively flat groundwater level trend at both sites (where a slight downward water level trend is interpreted to be related to climatic influences). It is noted that both bores are located to the south of the dyke with the current mining area for Mackenzie North being north of the dyke. It is postulated that the dyke (which is not represented in the model) may be having an influence of the southward propagation of drawdown from the Mackenzie North Mine.

The extent and depth of mining in August 2024 is shown in Figure 6-3. The deepest area of mining of the pit was 20 mAHD or 100 mbgl, compared to a ground elevation at the adjacent crest of 120 mAHD. Figure 6-4 shows the depth of mining in August 2024 below the pre-mining groundwater level contours for the Permian groundwater unit, based on inferred water levels from December 2012 (JBT, 2023). Mining is occurring approximately 65 m below the pre-mining groundwater level. There have been no reported observations of groundwater inflow to the mine, this is attributed to the groundwater inflow rates being lower than evaporation rates. Alluvium monitoring bores JMR22WA and JMR24WA that

located near the mining area are dry. The bores have not recorded a groundwater level since monitoring began in 2020 (JBT, 2023). Based on the available data the alluvium is dry in the current area of mining.

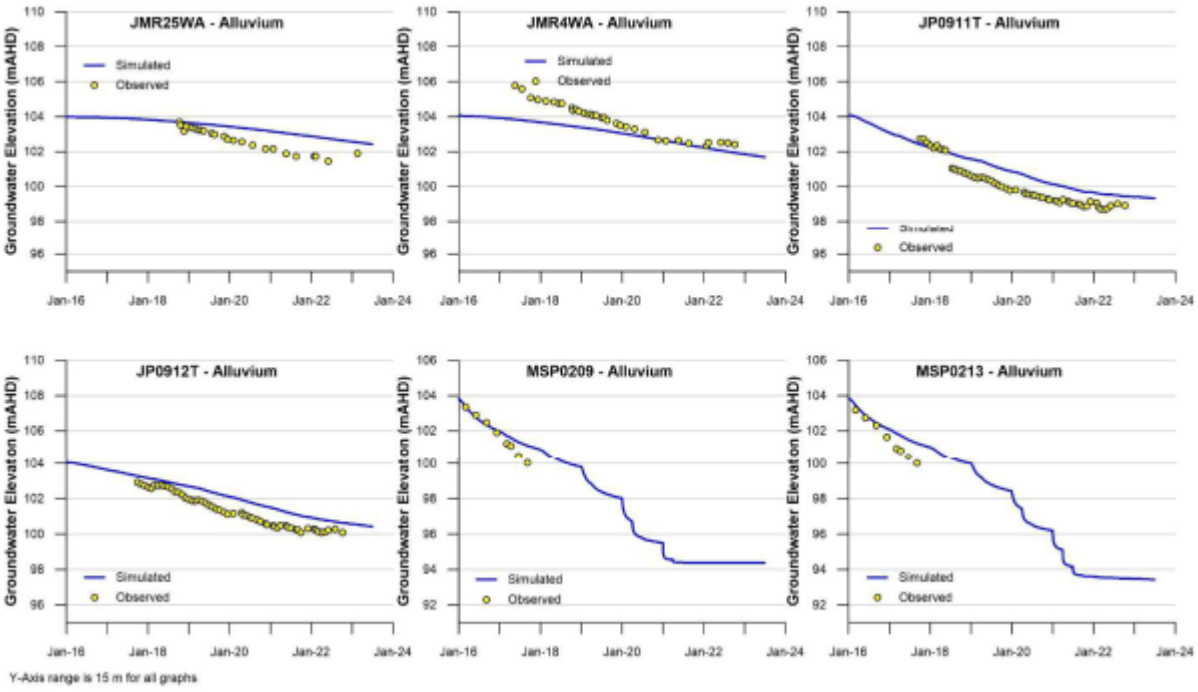


Figure 6-1 Alluvium bores transient calibration, observed / simulated water level (JBT, 2023)

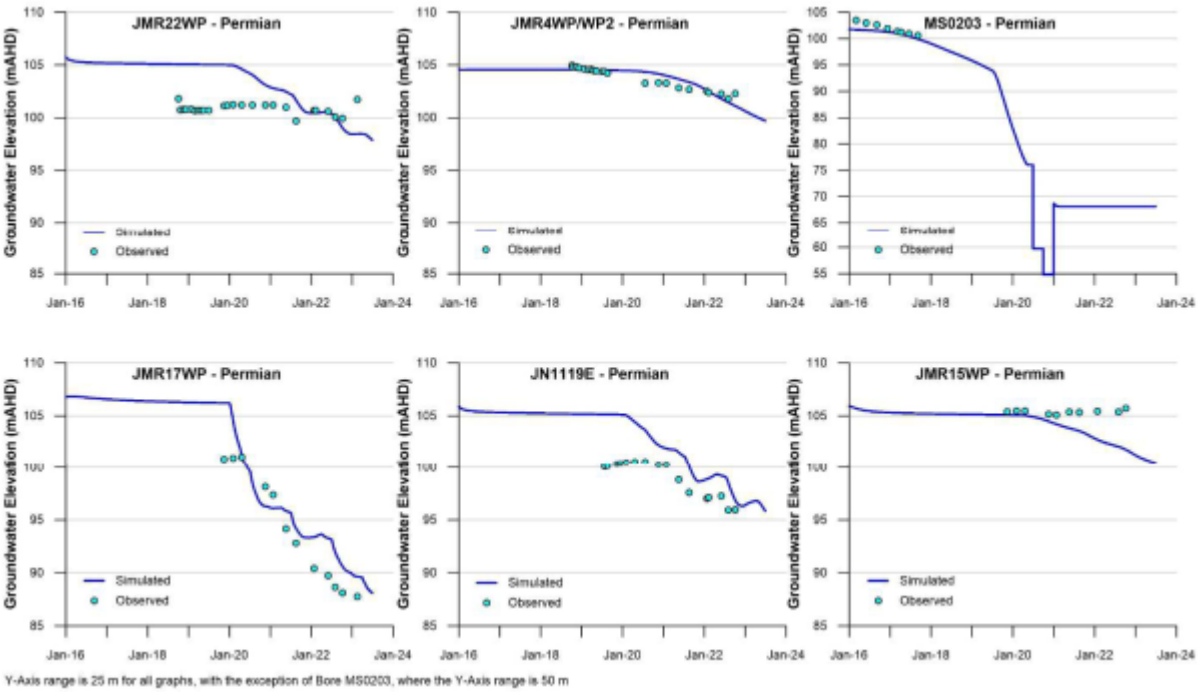
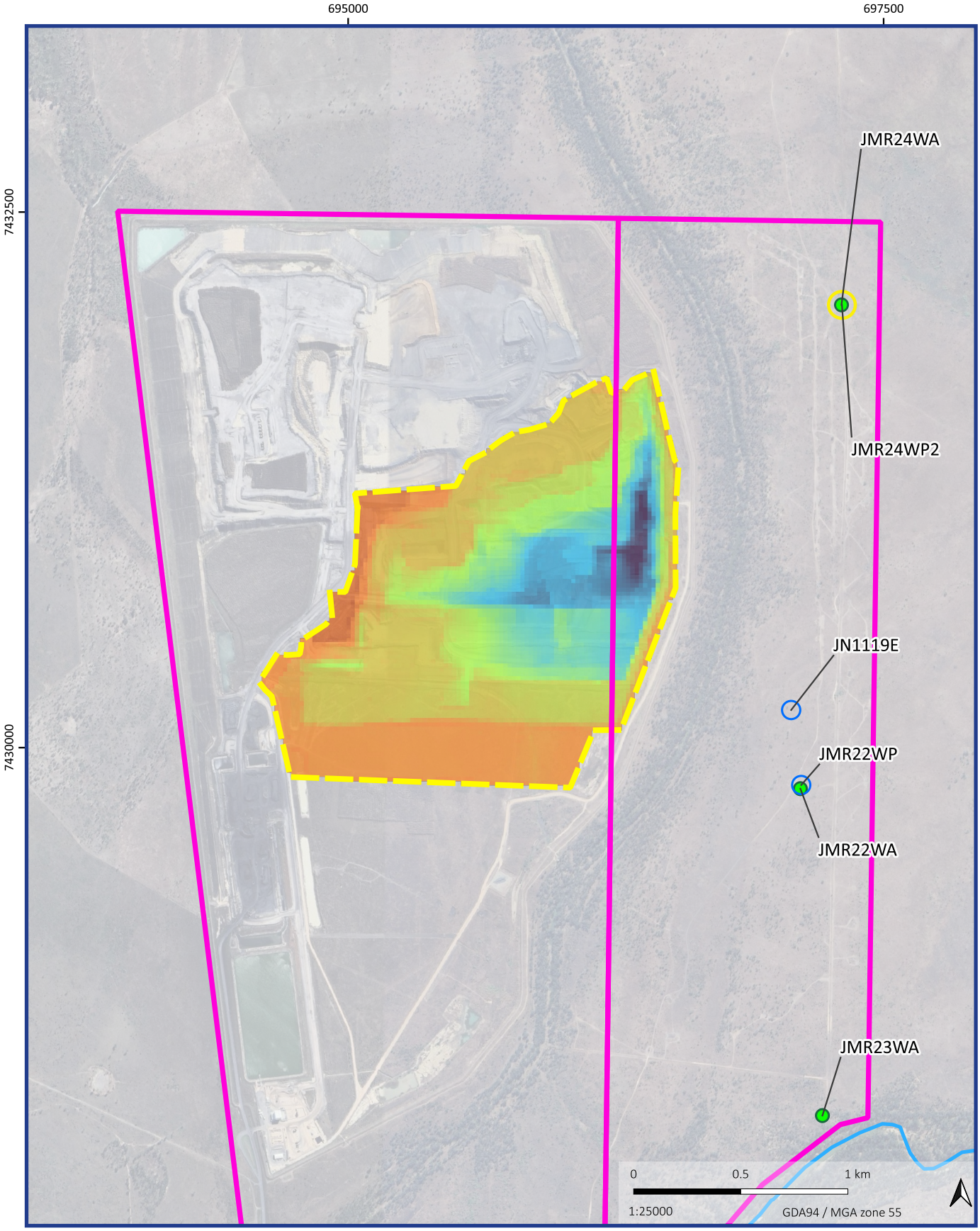


Figure 6-2 Permian bores transient calibration, observed / simulated water level (JBT, 2023)



Legend

- Mackenzie River
- Mining lease
- Extent of mining (August 2024)

Elevation (mAHD)

- 28
- 60
- 92
- 123
- 155

Elevation and extent of mining

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Figure 6-3

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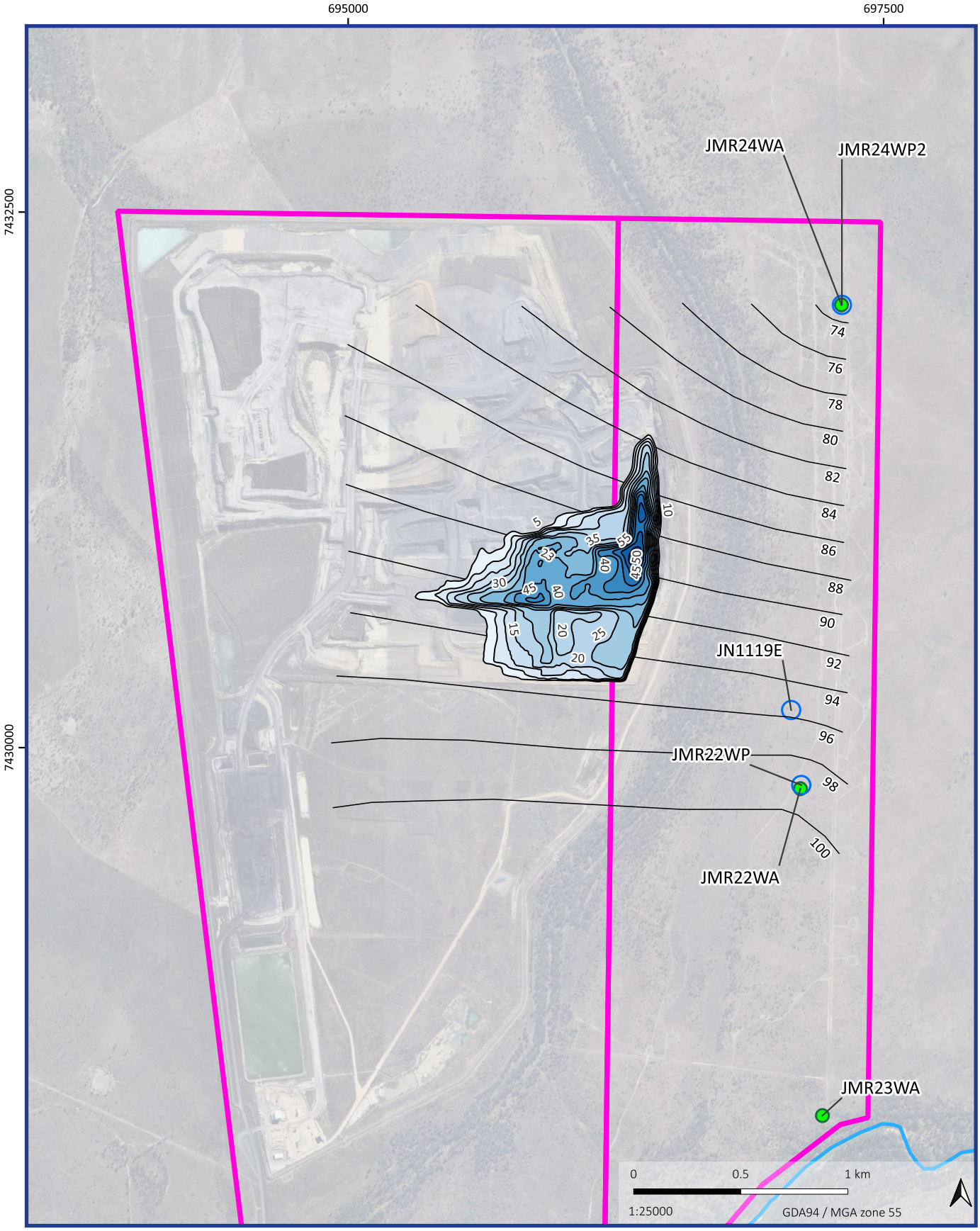

Legend

- Alluvium monitoring bore locations
- Permian-Pollux seam monitoring bore locations
- Groundwater level contour (mAHD)
- Mackenzie River
- Mining lease

Depth of mining (m) at August 2024 below Dec 2012 Permian Water Level

- 5m
- 10m
- 15m
- 20m
- 25m
- 30m
- 35m
- 40m
- 45m
- 50m
- 55m
- 60m

Extent of mining below grounwater level

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Figure 6-4

16/09/2024

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7. Private bores within the affected area

Section 47 (f) of the AWL requires the Annual Monitoring Report to include "details of any bores which are predicted by the most current numerical underground water model to be located in the affected area". The Project's AWL defines the "*affected area*" for the purpose of this licence, which *means the area identified by the most current numerical underground water model where the water level is predicted to decline, at any time because of the Authorised Purpose authorised by this associated water licence, by more than 5 m for a consolidated aquifer or 2 m for an unconsolidated aquifer*. The affected area, as defined in the AWL, has been determined based on predicted drawdown data at the end of mine life for the most current numerical underground water model.

A bore census was undertaken in 2013 as part of the field investigations for the Mackenzie North Groundwater Assessment. The bore census included review of data from the Queensland Government groundwater database as well as discussions with landholders. The bore census found no active groundwater bores within 10 km of the Project area, with all private groundwater bores within a 10 km radius assessed to be abandoned and destroyed (JBT, 2023). One registered bore (111533) from the bore census is in the area of interest and classified as abandoned and destroyed.

7.1. Quaternary alluvium – unconsolidated aquifer

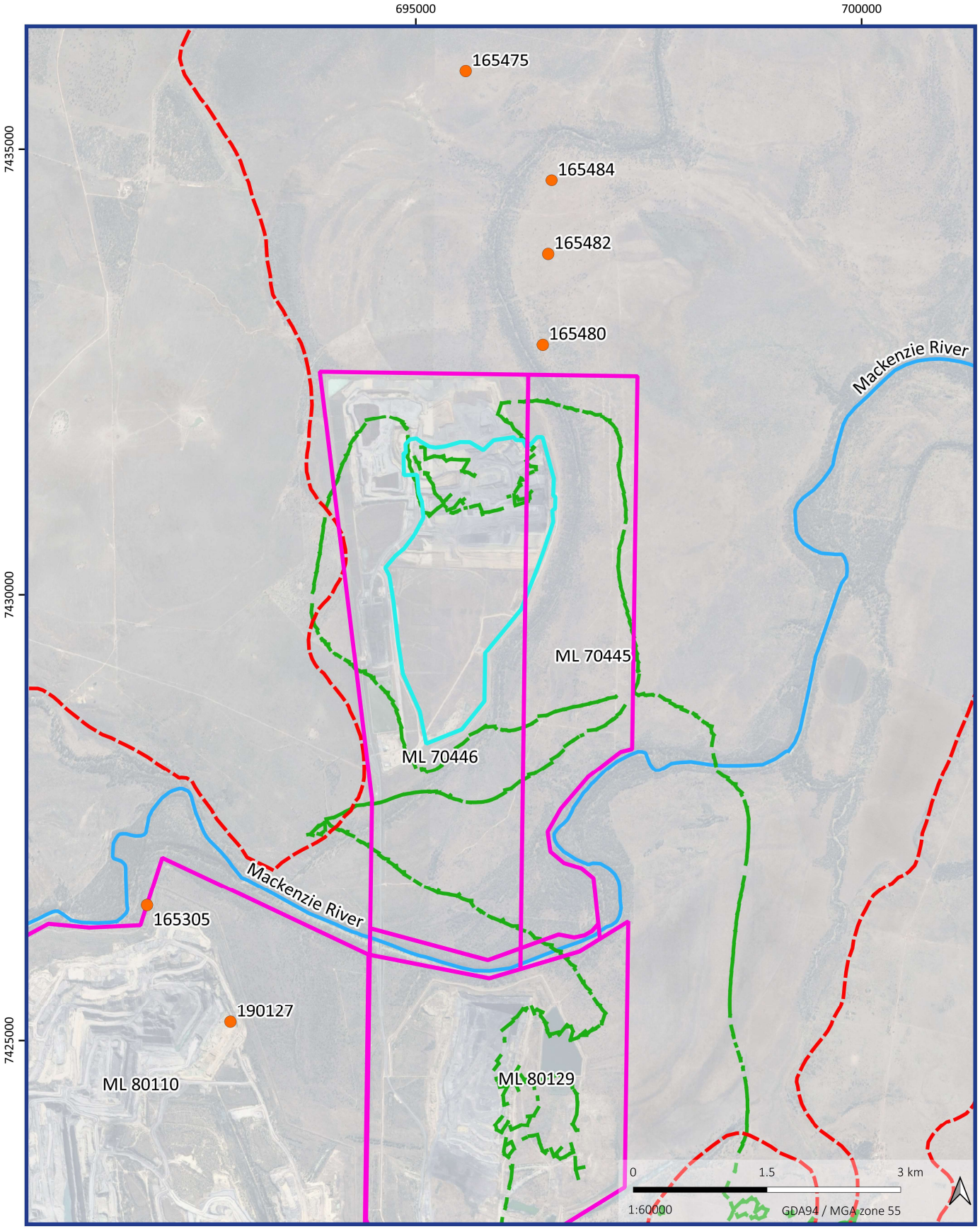
Figure 7-1 shows the Queensland Government registered bores screened in the alluvium aquifer. A desktop review of the Queensland Government registered bore database showed no new private bores have been drilled in the alluvium within the affected area during the 2023 and 2024 reporting period. No private registered groundwater bores exist that are screened in the alluvium within the tenure or affected area.

Several bores exist that are north of the Mackenzie North tenure area and outside the affected area. All bores are listed as mine monitoring including registered bores 165480, 165482, 165484 and 165475. Registered bores 165305 and 190127 are located south of the Mackenzie River and are outside the affected area. Both these bores are listed as mine monitoring.

7.2. Permian coal measures – consolidated aquifer

For this assessment, the Permian coal measures are assumed to be a consolidated aquifer. Figure 7-2 shows the Queensland Government registered bores screened in the Permian coal measures. A desktop review of the Queensland Government registered bore database showed no new private bores have been drilled in the Permian within the affected area during the 2023 and 2024 reporting period. No private registered groundwater bores exist that are screened in the Permian within the tenure or affected area.

Several bores exist that are north of the Mackenzie North tenure area, but outside the affected area. All bores are listed as mine monitoring including registered bores 165479, 165481, 165483, 165485 and 165474. Registered bore 111553 identified in the 2013 bore census is located outside the tenure area and the affected area.



Legend

- Registered Bores (Existing)
- Mackenzie River
- Alluvial aquifer - extent of 2 m drawdown at end of mine life
- Mining lease
- Proposed disturbance area
- Extent of alluvium

Registered bore locations relative to the affected area - alluvium

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Figure 7-1

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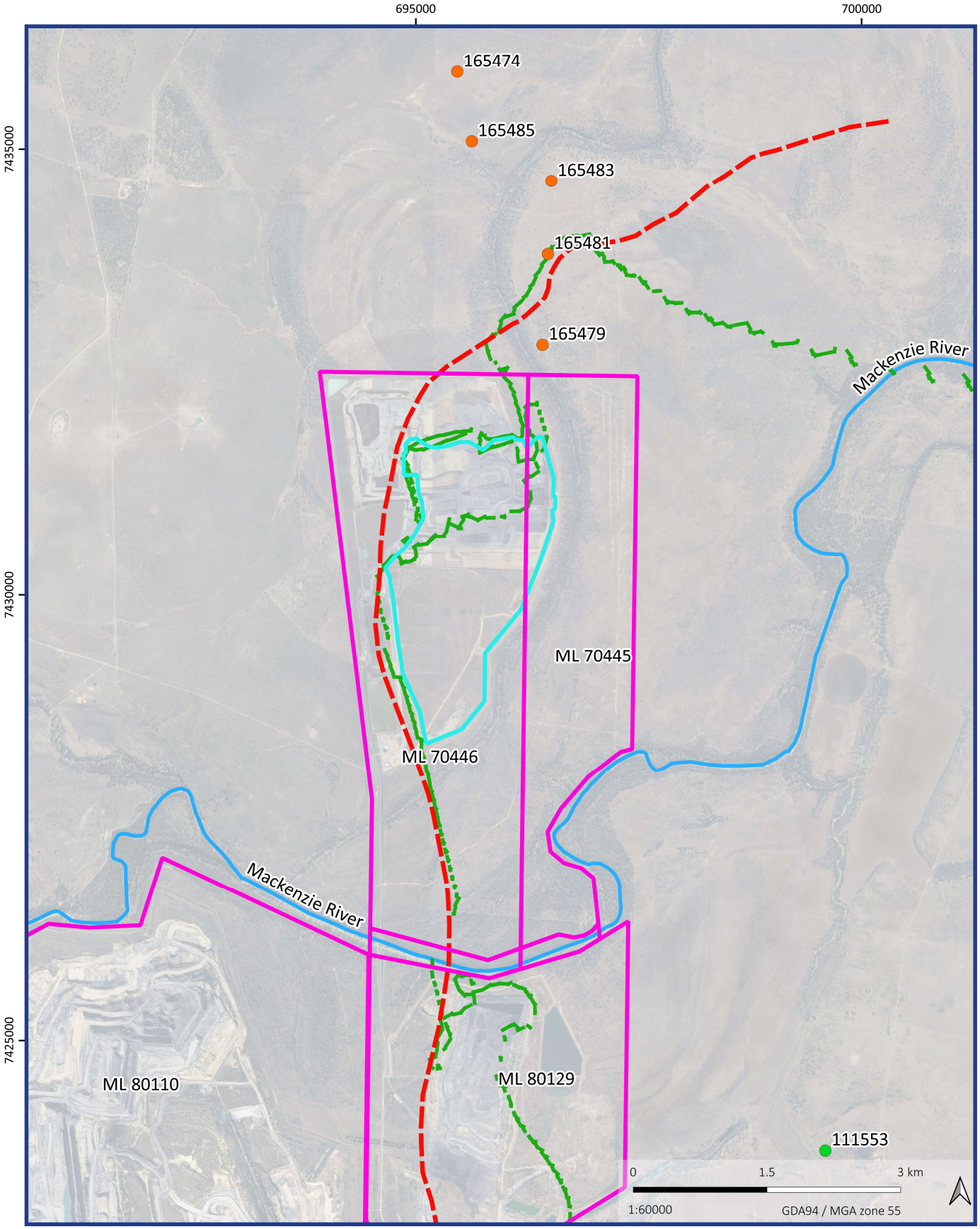

Legend

- Registered Bores (Existing)
- Registered Bores (Abandoned)
- Mackenzie River
- Coal Measures - extent of 5 m drawdown at end of mine life
- Inferred Pollux Upper Line of Oxidation (LOX)
- Mining lease
- Proposed disturbance area

Registered bore locations relative to the affected area - Permian

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Figure 7-2

15/08/2024

hydrogeologist.com.au

8. References

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Appendix A Water quality monitoring data

Mackenzie North groundwater quality monitoring - pH, EC, TDS, Major Ions, Hydrocarbon data

Bore ID	Sample Date	pH		Electrical Conductivity		TDS	Major Ions										Total Petroleum Hydrocarbons			
		Field	Lab	Field	Lab	Total Dissolved Solids (TDS)	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Hydroxide Alkalinity	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction
JMR22WP	16-Feb-2023	12.41	12.1	10748	10400	5770	371	<1	1320	35	1960	68	1000	101	<1	1100	<20	70	150	<50
JMR22WP	16-May-2023	7.84	8.07	16551	17400	10800	108	68	3660	10	6000	1	<1	<1	144	144	<20	<50	<100	<50
JMR22WP	14-Aug-2023	8.36	8.24	16842	19400	11200	166	75	3760	11	5150	1	<1	<1	139	139	<20	<50	<100	<50
JMR22WP	21-Nov-2023	11.67	12	9453	8670	4160	320	<1	1160	70	1630	63	699	57	<1	756	<20	140	600	<50
JMR22WP	08-Feb-2024	11.6	12.2	8547	9010	4410	326	<1	1120	59	1720	67	882	64	<1	946	<20	50	340	<50
JMR22WP	08-May-2024	11.79	12.2	8651	8970	3930	385	<1	1120	44	1590	56	831	67	<1	899	<20	70	240	<50
JMR24WP	12-Nov-2019	7.56	8.14	9490	9570	6530	224	131	1590	8	3270	8	<1	<1	222	222	<20	<50	<100	<50
JMR24WP	20-Apr-2020	7.53	7.97	7950	8250	5190	202	152	1220	8	2670	<1	<1	<1	198	198	<20	<50	<100	<50
JMR24WP	16-Nov-2020	7.61	7.98	8269	7860	5570	203	147	1300	9	2800	4	<1	<1	215	215	<20	<50	<100	<50
JMR24WP	26-Jan-2021	7.33	7.98	8308	8020	5210	191	144	1200	7	2850	12	<1	<1	204	204	<20	<50	<100	<50
JMR24WP	19-May-2021	7.32	7.94	7966	7810	4510	180	124	1170	7	2740	2	<1	<1	203	203	<20	<50	<100	<50
JMR24WP	24-Jan-2022	7.58	8.04	7752	7790	5140	189	137	1300	8	2720	1	<1	<1	212	212	<20	<50	<100	<50
JMR24WP	08-Jun-2022	7.6	8.09	7670	7830	5260	181	132	1300	8	2680	1	<1	<1	204	204	<20	<50	<100	<50
JMR24WP	05-Oct-2022	7.24	7.77	7875	8230	4630	168	126	1290	7	2630	2	<1	<1	221	221	<20	<50	<100	<50
JMR24WP2	20-Apr-2020	7.38	7.96	8587	8870	5500	182	125	1420	8	2910	2	<1	<1	204	204	<20	<50	<100	<50
JMR24WP2	17-Nov-2020	7.4	7.86	8036	7730	5190	172	111	1370	7	2750	<1	<1	<1	214	214	<20	<50	<100	<50
JMR24WP2	27-Jan-2021	6.79	7.8	11491	11200	6420	281	171	1910	8	3430	404	<1	<1	992	992	70	<50	960	610
JMR24WP2	19-May-2021	7.34	7.96	7553	7400	4250	139	90	1150	7	2550	<1	<1	<1	233	233	<20	<50	<100	<50
JMR24WP2	24-Jan-2022	7.54	8.07	7059	7110	4550	144	97	1290	7	2350	<1	<1	<1	282	282	<20	50	150	120
JMR24WP2	08-Jun-2022	7.62	8.2	6912	7060	4460	134	93	1270	6	2260	<1	<1	<1	266	266	<20	<50	<100	80
JMR24WP2	05-Oct-2022	7.31	7.89	7116	7460	4410	120	90	1280	6	2280	6	<1	<1	298	298	<20	<50	<100	<50
JMR24WP2	16-Feb-2023	7.8	7.47	6912	6390	4030	122	82	1160	7	2100	1	<1	<1	311	311	<20	<50	<100	<50
JMR24WP2	16-May-2023	7.25	8.12	7397	8060	4560	157	122	1230	8	2540	1	<1	<1	207	207	<20	<50	<100	<50
JMR24WP2	14-Aug-2023	7.25	7.9	7487	8830	4960	191	135	1270	8	2700	2	<1	<1	202	202	<20	<50	<100	<50
JMR24WP2	21-Nov-2023	7.22	7.92	7671	7890	5380	170	127	1220	8	2620	<1	<1	<1	197	197	<20	<50	<100	<50

Bore ID	Sample Date	pH		Electrical Conductivity		TDS	Major Ions										Total Petroleum Hydrocarbons			
		Field	Lab	Field	Lab	Total Dissolved Solids (TDS)	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Hydroxide Alkalinity	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction
JMR24WP2	08-Feb-2024	7.3	7.78	7591	7690	4890	175	126	1190	8	2590	<1	<1	<1	217	217	<20	<50	<100	<50
JMR24WP2	08-May-2024	7.27	7.78	7257	7420	4940	174	120	1130	7	2490	2	<1	<1	213	213	<20	<50	<100	<50
JMR25WA	11-Sep-2018	6.45	7.01	1171	1190	905	67	43	66	5	282	14	<1	<1	161	161	<20	<50	100	50
JMR25WA	29-Nov-2018	6.45	6.93	1299	1200	738	81	44	80	5	298	17	<1	<1	153	153	<20	<50	<100	<50
JMR25WA	24-Jan-2019	6.5	6.99	1273	1200	1010	82	44	83	5	302	15	<1	<1	171	171	<20	<50	<100	<50
JMR25WA	27-Mar-2019	6.66	7.51	1292	1260	909	93	49	97	6	297	16	<1	<1	163	163	<20	<50	<100	<50
JMR25WA	15-May-2019	6.47	7.14	1374	1220	919	96	50	96	5	334	16	<1	<1	166	166	<20	<50	<100	<50
JMR25WA	25-Jul-2019	6.78	7.03	1272	1280	815	82	43	87	5	316	14	<1	<1	184	184	<20	<50	<100	<50
JMR25WA	12-Nov-2019	6.44	7.32	1285	1280	942	90	45	99	5	327	8	<1	<1	189	189	<20	<50	<100	<50
JMR25WA	20-Apr-2020	6.54	7.44	1561	1560	1040	99	60	122	3	401	6	<1	<1	197	197	<20	<50	<100	<50
JMR25WA	16-Nov-2020	6.54	7.16	1904	1870	1430	120	74	159	4	522	5	<1	<1	242	242	<20	<50	<100	<50
JMR25WA	26-Jan-2021	6.56	7.55	2029	1920	1460	113	74	153	2	545	6	<1	<1	235	235	<20	<50	<100	<50
JMR25WA	19-May-2021	6.74	7.71	2358	2220	1510	124	77	178	2	656	2	<1	<1	276	276	<20	<50	<100	60
JMR25WA	24-Jan-2022	6.68	7.48	2072	2070	1670	130	80	183	5	590	3	<1	<1	270	270	<20	<50	170	120
JMR4WA	09-Sep-2018	6.51	7.05	7189	6570	3610	271	275	783	8	1620	96	<1	<1	838	838	<20	60	140	<50
JMR4WA	18-Nov-2018	6.54	6.97	6665	6450	3980	290	253	793	8	1440	81	<1	<1	834	834	<20	<50	<100	<50
JMR4WA	24-Jan-2019	6.4	7.13	6604	6360	4280	299	253	784	8	1670	78	<1	<1	843	843	<20	<50	<100	<50
JMR4WA	27-Mar-2019	6.73	7.68	6407	6400	3990	294	254	795	8	1510	88	<1	<1	832	832	<20	70	130	<50
JMR4WA	15-May-2019	6.56	7.07	6547	6070	4440	302	247	757	8	1720	102	<1	<1	794	794	<20	70	130	<50
JMR4WA	24-Jul-2019	6.37	7.03	6614	6550	4170	286	233	727	8	1660	105	<1	<1	882	882	<20	<50	<100	<50
JMR4WA	12-Nov-2019	6.5	7.51	6161	6230	4310	287	228	716	7	1660	100	<1	<1	763	763	<20	<50	2170	850
JMR4WA	20-Apr-2020	6.56	7.36	6133	6320	3800	244	236	683	8	1660	98	<1	<1	704	704	<20	<50	<100	<50
JMR4WA	16-Nov-2020	7.26	7.88	4197	4040	2270	77	68	743	4	1100	66	<1	<1	475	475	<20	<50	<100	<50
JMR4WA	26-Jan-2021	6.51	7.65	6333	6110	4240	260	240	676	7	1680	99	<1	<1	679	679	<20	<50	220	<50
JMR4WA	19-May-2021	6.59	7.55	6053	5890	3840	227	196	577	7	1640	93	<1	<1	668	668	<20	<50	140	<50
JMR4WA	24-Jan-2022	6.54	7.42	5856	5820	4020	235	214	622	7	1590	91	<1	<1	677	677	<20	50	130	<50
JMR4WA	08-Jun-2022	6.51	7.69	5529	5710	3850	231	229	659	8	1550	74	<1	<1	617	617	<20	<50	360	50

Bore ID	Sample Date	pH		Electrical Conductivity		TDS	Major Ions										Total Petroleum Hydrocarbons			
		Field	Lab	Field	Lab	Total Dissolved Solids (TDS)	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Hydroxide Alkalinity	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction
JMR4WA	05-Oct-2022	6.58	7.26	5627	5960	3990	219	213	644	7	1500	87	<1	<1	646	646	<20	<50	150	<50
JMR4WA	15-May-2023	6.53	7.93	5010	5430	3060	192	198	574	8	1400	74	<1	<1	554	554	<20	50	110	<50
JMR4WA	14-Aug-2023	6.55	7.3	4792	5350	3060	214	203	559	8	1340	76	<1	<1	508	508	<20	60	140	<50
JMR4WA	22-Nov-2023	6.56	7.37	4519	4830	3420	182	182	524	8	1260	70	<1	<1	486	486	<20	<50	<100	<50
JMR4WA	08-Feb-2024	6.71	7.27	3986	4010	2750	174	161	479	8	1130	18	<1	<1	469	469	<20	<50	1060	120
JMR4WA	08-May-2024	6.73	7.49	4406	4690	3240	195	179	514	9	1580	81	<1	<1	497	497	<20	<50	<100	<50
JMR4WP	09-Sep-2018	7.07	7.65	7450	6870	4050	140	110	1070	5	1860	38	<1	<1	458	458	<20	<50	<100	<50
JMR4WP	18-Nov-2018	7.08	7.44	8921	8600	5010	252	143	1490	7	2710	22	<1	<1	428	428	<20	<50	<100	<50
JMR4WP	24-Jan-2019	6.91	7.54	9883	9500	5620	263	153	1570	6	3160	22	<1	<1	432	432	<20	<50	<100	<50
JMR4WP	27-Mar-2019	7.29	8.01	9096	9070	5620	280	146	1610	7	2830	18	<1	<1	428	428	<20	<50	<100	<50
JMR4WP	15-May-2019	7.06	7.68	9235	8620	5650	345	149	1650	7	3060	22	<1	<1	419	419	<20	<50	<100	<50
JMR4WP	25-Jul-2019	6.9	7.59	8725	8760	5250	254	128	1380	6	2800	18	<1	<1	480	480	<20	<50	<100	<50
JMR4WP	16-Nov-2020	6.62	7.28	6190	5920	4270	267	241	710	8	1640	98	<1	<1	696	696	<20	<50	160	<50
JMR4WP	26-Jan-2021	7.21	8.13	4099	3980	2170	62	65	695	4	1060	64	<1	<1	473	473	20	<50	<100	<50
JMR4WP	19-May-2021	7.33	8.11	4046	3930	2170	61	53	621	4	1070	56	<1	<1	476	476	20	<50	<100	<50
JMR4WP	24-Jan-2022	7.34	8.05	4207	4220	2330	63	56	670	4	1140	48	<1	<1	503	503	<20	<50	<100	<50
JMR4WP	08-Jun-2022	7.13	8.14	3803	3930	2170	68	66	723	4	1040	43	<1	<1	457	457	<20	<50	<100	<50
JMR4WP	05-Oct-2022	7.31	7.89	3952	3990	2180	66	57	733	5	1010	42	<1	<1	486	486	<20	<50	<100	<50
JN1119E	13-Nov-2019	8.6	8.35	17353	18000	11400	98	99	3550	10	6300	3	<1	5	119	124	<20	<50	<100	80
JN1119E	20-Apr-2020	11.97	11.6	13343	13100	7670	90	<1	2550	17	3860	11	396	113	<1	509	<20	50	170	<50
JN1119E	16-Nov-2020	11.88	11.6	13958	12800	6880	81	<1	2680	18	4060	10	468	109	<1	578	<20	50	280	<50
JN1119E	26-Jan-2021	11.97	11.4	12691	11400	5310	7	<1	2240	12	3520	16	349	308	<1	657	<20	<50	240	<50
JN1119E	19-May-2021	11.98	11.6	11974	11100	6360	<1	<1	2240	12	3290	16	433	294	<1	727	<20	<50	210	<50
JN1119E	24-Jan-2022	12.08	12	11791	11300	6340	22	<1	2250	12	2870	18	712	253	<1	964	<20	70	200	<50
JN1119E	08-Jun-2022	12.01	11.6	10851	10300	5770	5	<1	2300	11	3100	14	379	394	<1	773	<20	50	130	<50
JN1119E	05-Oct-2022	12.03	11.8	12838	12700	5910	15	<1	2470	11	3140	12	733	340	<1	1070	<20	50	110	<50
JN1119E	16-May-2023	12.04	12	12822	11800	5390	94	<1	2240	11	2580	16	805	414	<1	1220	<20	80	140	<50

Bore ID	Sample Date	pH		Electrical Conductivity		TDS	Major Ions										Total Petroleum Hydrocarbons			
		Field	Lab	Field	Lab	Total Dissolved Solids (TDS)	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Hydroxide Alkalinity	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction
JN1119E	14-Aug-2023	12.01	12.1	14181	14400	6300	172	<1	2530	11	3160	13	1030	268	<1	1300	<20	<50	<100	<50
JN1119E	21-Nov-2023	11.73	12	13844	12700	6060	151	<1	2190	10	2980	16	850	309	<1	1160	<20	70	110	<50
JN1119E	08-Feb-2024	11.71	12.3	13348	13300	6590	230	<1	1940	10	2510	16	1400	295	<1	1700	<20	<50	<100	<50
JN1119E	08-May-2024	11.73	12.3	12848	12700	5200	267	<1	1870	10	2260	16	1410	140	<1	1550	<20	80	<100	<50

Mackenzie North Groundwater Quality Monitoring - Dissolved Metals/Metalloids Data

Bore ID	Sample Date	Dissolved Metals																	
		Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Uranium	Vanadium	Zinc	Boron	Iron
		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	mg/L	mg/L
JMR22WP	16-Feb-2023	0.06	0.001	<0.0001	0.061	<0.001	0.008	0.002	<0.001	<0.0001	0.094	0.004	<0.01	<0.001	<0.001	<0.01	<0.005	0.14	0.1
JMR22WP	16-May-2023	0.01	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	0.084	<0.0001	0.002	0.001	<0.01	<0.001	<0.001	<0.01	0.011	0.52	0.06
JMR22WP	14-Aug-2023	0.01	0.003	<0.0001	<0.001	<0.001	<0.001	<0.001	0.054	<0.0001	0.003	<0.001	<0.01	<0.001	<0.001	<0.01	0.01	0.56	<0.05
JMR22WP	21-Nov-2023	0.17	0.001	<0.0001	0.062	<0.001	0.011	0.002	<0.001	<0.0001	0.09	0.004	<0.01	<0.001	<0.001	<0.01	0.012	0.12	0.17
JMR22WP	16-Feb-2024	0.06	0.001	<0.0001	0.061	<0.001	0.008	0.002	<0.001	<0.0001	0.094	0.004	<0.01	<0.001	<0.001	<0.01	<0.005	0.14	0.10
JMR22WP	08-May-2024	0.14	0.001	<0.0001	0.054	<0.001	0.007	<0.001	<0.001	<0.0001	0.077	0.004	<0.01	<0.001	<0.001	<0.01	0.007	0.11	0.22
JMR23WA	16-Feb-2023	<0.01	0.02	<0.0001	<0.001	0.001	<0.001	<0.001	0.822	<0.0001	0.003	0.006	<0.01	<0.001	<0.001	<0.01	<0.005	0.08	2.09
JMR23WA	16-May-2023	0.01	0.005	<0.0001	<0.001	0.001	<0.001	<0.001	0.911	<0.0001	0.002	0.004	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	1.89
JMR23WA	14-Aug-2023	0.01	0.006	<0.0001	<0.001	<0.001	<0.001	<0.001	1.07	<0.0001	0.002	0.004	<0.01	<0.001	<0.001	<0.01	0.036	0.08	2.68
JMR24WP	12-Nov-2019	<0.01	0.002	<0.0001	0.004	<0.001	<0.001	<0.001	0.193	<0.0001	0.008	0.02	<0.01	<0.001	<0.001	<0.01	0.01	0.51	<0.05
JMR24WP	20-Apr-2020	<0.01	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.196	<0.0001	0.001	0.009	<0.01	<0.001	<0.001	<0.01	0.014	0.49	<0.05
JMR24WP	16-Nov-2020	<0.01	0.002	<0.0001	0.002	<0.001	0.003	<0.001	0.214	<0.0001	0.004	0.017	<0.01	<0.001	<0.001	<0.01	0.019	0.36	<0.05
JMR24WP	26-Jan-2021	<0.01	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	0.22	<0.0001	0.002	0.005	<0.01	<0.001	<0.001	<0.01	0.017	0.46	<0.05
JMR24WP	19-May-2021	<0.01	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	0.218	<0.0001	0.002	0.004	<0.01	<0.001	<0.001	<0.01	0.017	0.46	<0.05
JMR24WP	24-Jan-2022	<0.01	0.002	<0.0001	0.016	<0.001	0.002	<0.001	0.248	<0.0001	0.016	0.072	<0.01	<0.001	<0.001	<0.01	0.014	0.51	<0.05
JMR24WP	08-Jun-2022	<0.01	0.002	<0.0001	<0.001	<0.001	0.002	<0.001	0.2	<0.0001	0.001	0.004	<0.01	<0.001	<0.001	<0.01	0.016	0.61	<0.05
JMR24WP	05-Oct-2022	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.219	<0.0001	0.002	0.008	<0.01	<0.001	<0.001	<0.01	0.03	0.55	<0.05
JMR24WP2	20-Apr-2020	<0.01	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.257	<0.0001	0.002	0.005	<0.01	<0.001	<0.001	<0.01	0.012	0.43	0.2
JMR24WP2	17-Nov-2020	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.258	<0.0001	0.002	0.006	<0.01	<0.001	<0.001	<0.01	0.047	0.39	0.21
JMR24WP2	27-Jan-2021	0.02	0.003	<0.0001	0.003	<0.001	<0.001	<0.001	0.321	<0.0001	0.002	0.002	<0.01	<0.001	0.002	<0.01	<0.005	1.26	0.06
JMR24WP2	19-May-2021	<0.01	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.217	<0.0001	0.002	0.003	<0.01	<0.001	<0.001	<0.01	0.011	0.5	0.16
JMR24WP2	24-Jan-2022	`	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.23	<0.0001	0.002	0.004	<0.01	<0.001	<0.001	<0.01	0.008	0.6	<0.05
JMR24WP2	08-Jun-2022	<0.01	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.202	<0.0001	0.003	0.003	<0.01	<0.001	<0.001	<0.01	0.008	0.64	<0.05
JMR24WP2	05-Oct-2022	<0.01	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.204	<0.0001	0.002	0.006	<0.01	<0.001	<0.001	<0.01	0.024	0.59	0.45
JMR24WP2	16-Feb-2023	<0.01	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.168	<0.0001	0.002	0.001	<0.01	<0.001	<0.001	<0.01	0.007	0.6	0.1

Bore ID	Sample Date	Dissolved Metals																	
		Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Uranium	Vanadium	Zinc	Boron	Iron
		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	mg/L	mg/L
JMR24WP2	16-May-2023	0.01	0.003	<0.0001	<0.001	<0.001	<0.001	<0.001	0.219	<0.0001	0.001	0.001	<0.01	<0.001	<0.001	<0.01	0.014	0.5	0.37
JMR24WP2	14-Aug-2023	<0.01	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	0.225	<0.0001	0.002	0.003	<0.01	<0.001	<0.001	<0.01	0.007	0.54	0.05
JMR24WP2	21-Nov-2023	<0.01	0.001	<0.0001	<0.001	<0.001	0.008	<0.001	0.258	<0.0001	0.002	0.002	<0.01	<0.001	<0.001	<0.01	0.046	0.51	0.09
JMR24WP2	08-Feb-2024	<0.01	0.004	<0.0001	<0.001	<0.001	<0.001	<0.001	0.213	<0.0001	0.002	0.003	<0.01	<0.001	<0.001	<0.01	0.013	0.52	0.55
JMR24WP2	08-May-2024	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.221	<0.0001	0.002	<0.001	<0.01	<0.001	<0.001	<0.01	<0.005	0.18	0.20
JMR25WA	11-Sep-2018	0.01	<0.001	<0.0001	<0.001		0.002	<0.001		<0.0001		0.001	<0.01				0.014		<0.05
JMR25WA	29-Nov-2018	<0.01	<0.001	<0.0001	<0.001	-	0.002	<0.001	0.015	<0.0001	<0.001	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	<0.05
JMR25WA	24-Jan-2019	<0.01	<0.001	<0.0001	0.001	<0.001	0.001	<0.001	0.016	<0.0001	<0.001	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	<0.05
JMR25WA	27-Mar-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.01	<0.0001	<0.001	0.001	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	<0.05
JMR25WA	15-May-2019	<0.01	<0.001	<0.0001	<0.001	0.001	<0.001	<0.001	0.088	<0.0001	<0.001	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	<0.05
JMR25WA	25-Jul-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.006	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	<0.05
JMR25WA	12-Nov-2019	<0.01	<0.001	0.0002	<0.001	<0.001	0.005	<0.001	0.022	<0.0001	<0.001	0.005	<0.01	<0.001	<0.001	<0.01	0.013	<0.05	<0.05
JMR25WA	20-Apr-2020	<0.01	<0.001	<0.0001	<0.001	0.003	<0.001	<0.001	0.216	<0.0001	<0.001	0.012	<0.01	<0.001	<0.001	<0.01	0.005	<0.05	<0.05
JMR25WA	16-Nov-2020	<0.01	<0.001	<0.0001	<0.001	<0.001	0.001	<0.001	0.055	<0.0001	<0.001	0.007	<0.01	<0.001	0.001	<0.01	0.011	<0.05	<0.05
JMR25WA	26-Jan-2021	<0.01	0.001	<0.0001	<0.001	0.006	<0.001	<0.001	0.769	<0.0001	<0.001	0.014	<0.01	<0.001	0.002	<0.01	<0.005	<0.05	0.09
JMR25WA	19-May-2021	<0.01	0.002	<0.0001	<0.001	0.01	<0.001	<0.001	1.9	<0.0001	0.001	0.023	<0.01	<0.001	0.002	<0.01	<0.005	<0.05	0.34
JMR25WA	24-Jan-2022	<0.01	0.004	<0.0001	0.001	0.012	<0.001	<0.001	3.03	<0.0001	0.002	0.021	<0.01	<0.001	0.001	<0.01	0.006	0.07	4.43
JMR4WA	09-Sep-2018	<0.01	<0.001	<0.0001	<0.001		<0.001	<0.001		<0.0001		<0.001	<0.01				<0.005		5.61
JMR4WA	18-Nov-2018	<0.01	<0.001	<0.0001	<0.001	-	<0.001	<0.001	1.64	<0.0001	<0.001	<0.001	<0.01	<0.001	0.001	<0.01	<0.005	0.13	5.9
JMR4WA	24-Jan-2019	<0.01	<0.001	<0.0001	0.002	<0.001	<0.001	<0.001	1.94	<0.0001	<0.001	0.001	<0.01	<0.001	0.001	<0.01	<0.005	<0.05	6.69
JMR4WA	27-Mar-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.9	<0.0001	<0.001	<0.001	<0.01	<0.001	0.002	<0.01	<0.005	0.05	6.49
JMR4WA	15-May-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.67	<0.0001	<0.001	<0.001	<0.01	<0.001	0.002	<0.01	<0.005	<0.05	6.45
JMR4WA	24-Jul-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.88	<0.0001	<0.001	<0.001	<0.01	<0.001	0.001	<0.01	<0.005	0.06	6.92
JMR4WA	12-Nov-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.72	<0.0001	<0.001	0.004	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	5.54
JMR4WA	20-Apr-2020	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.55	<0.0001	<0.001	0.003	<0.01	<0.001	0.002	<0.01	<0.005	<0.05	4.59
JMR4WA	16-Nov-2020	<0.01	0.015	<0.0001	<0.001	<0.001	0.015	<0.001	0.075	<0.0001	0.004	0.007	<0.01	<0.001	0.002	<0.01	0.061	0.16	<0.05
JMR4WA	26-Jan-2021	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.93	<0.0001	<0.001	0.008	<0.01	<0.001	0.002	<0.01	0.01	0.05	5.11

Bore ID	Sample Date	Dissolved Metals																	
		Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Uranium	Vanadium	Zinc	Boron	Iron
		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	mg/L	mg/L
JMR4WA	19-May-2021	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.59	<0.0001	<0.001	0.006	<0.01	<0.001	0.002	<0.01	<0.005	<0.05	4.57
JMR4WA	24-Jan-2022	<0.01	<0.001	<0.0001	0.013	<0.001	<0.001	<0.001	1.5	<0.0001	0.012	0.062	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	4.64
JMR4WA	08-Jun-2022	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.64	<0.0001	<0.001	0.017	<0.01	<0.001	0.002	<0.01	0.006	0.09	3.9
JMR4WA	05-Oct-2022	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.49	<0.0001	<0.001	0.005	<0.01	<0.001	0.001	<0.01	<0.005	<0.05	5.36
JMR4WA	15-May-2023	0.01	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.23	<0.0001	<0.001	0.004	<0.01	<0.001	<0.001	<0.01	0.062	0.06	3.67
JMR4WA	14-Aug-2023	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.39	<0.0001	<0.001	0.003	<0.01	<0.001	<0.001	<0.01	0.048	0.05	3.99
JMR4WA	22-Nov-2023	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.24	<0.0001	0.002	0.002	<0.01	<0.001	<0.001	<0.01	0.072	0.07	3.31
JMR4WA	08-Feb-2024	<0.01	0.004	<0.0001	<0.001	<0.001	<0.001	<0.001	0.971	<0.0001	<0.001	0.004	<0.01	<0.001	<0.001	<0.01	0.013	0.09	1.75
JMR4WA	08-May-2024	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.18	<0.0001	0.002	0.003	<0.01	<0.001	<0.001	<0.01	0.052	0.06	2.18
JMR4WP	09-Sep-2018	<0.01	<0.001	<0.0001	<0.001		<0.001	<0.001		<0.0001		0.001	<0.01				<0.005		0.14
JMR4WP	18-Nov-2018	<0.01	<0.001	<0.0001	<0.001	-	<0.001	<0.001	0.096	<0.0001	0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.016	0.25	0.21
JMR4WP	24-Jan-2019	<0.01	<0.001	<0.0001	0.001	<0.001	<0.001	<0.001	0.104	<0.0001	<0.001	0.001	<0.01	<0.001	<0.001	<0.01	0.006	0.18	0.13
JMR4WP	27-Mar-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.11	<0.0001	0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.009	0.19	0.13
JMR4WP	15-May-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	0.001	<0.001	0.111	<0.0001	0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.012	0.17	0.1
JMR4WP	25-Jul-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.107	<0.0001	0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.007	0.21	0.07
JMR4WP	16-Nov-2020	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.6	<0.0001	<0.001	0.012	<0.01	<0.001	0.002	<0.01	0.012	<0.05	4.17
JMR4WP	26-Jan-2021	<0.01	0.021	<0.0001	<0.001	0.001	<0.001	<0.001	0.178	<0.0001	0.006	0.003	<0.01	<0.001	0.001	<0.01	0.007	0.16	0.5
JMR4WP	19-May-2021	<0.01	0.014	<0.0001	<0.001	<0.001	<0.001	<0.001	0.135	<0.0001	0.004	0.006	<0.01	<0.001	<0.001	<0.01	<0.005	0.14	<0.05
JMR4WP	24-Jan-2022	<0.01	0.005	<0.0001	0.003	<0.001	<0.001	<0.001	0.152	<0.0001	0.006	0.02	<0.01	<0.001	<0.001	<0.01	<0.005	<0.05	0.15
JMR4WP	08-Jun-2022	<0.01	0.004	<0.0001	<0.001	<0.001	<0.001	<0.001	0.141	<0.0001	0.003	0.019	<0.01	<0.001	<0.001	<0.01	<0.005	0.23	0.07
JMR4WP	05-Oct-2022	<0.01	0.004	<0.0001	<0.001	<0.001	<0.001	<0.001	0.171	<0.0001	0.007	0.009	<0.01	<0.001	<0.001	<0.01	<0.005	0.18	<0.05
JMR4WP2	16-May-2023	0.01	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.187	<0.0001	0.002	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	0.18	0.13
JMR4WP2	22-Nov-2023	0.01	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	0.152	<0.0001	0.002	<0.001	<0.01	<0.001	<0.001	<0.01	0.006	0.19	0.14
JMR4WP2	08-Feb-2024	<0.01	0.002	<0.0001	0.001	<0.001	<0.001	<0.001	0.194	<0.0001	0.004	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	0.18	0.21
JMR4WP2	08-May-2024	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.221	<0.0001	0.002	<0.001	<0.01	<0.001	<0.001	<0.01	<0.005	0.18	0.20
JN1119E	13-Nov-2019	<0.01	0.007	<0.0001	<0.001	<0.001	<0.001	<0.001	0.01	<0.0001	0.007	0.002	<0.01	<0.001	<0.001	<0.01	0.009	0.52	<0.05
JN1119E	20-Apr-2020	0.07	0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.038	0.001	<0.01	<0.001	<0.001	<0.01	<0.005	0.21	<0.05

Bore ID	Sample Date	Dissolved Metals																	
		Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Uranium	Vanadium	Zinc	Boron	Iron
		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	mg/L	mg/L
JN1119E	16-Nov-2020	0.02	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	0.05	0.003	<0.01	<0.001	<0.001	<0.01	0.011	0.18	<0.05
JN1119E	26-Jan-2021	0.02	0.002	0.0002	<0.001	<0.001	<0.001	<0.001	<0.001	0.0003	0.077	0.001	<0.01	<0.001	<0.001	<0.01	<0.005	0.18	<0.05
JN1119E	19-May-2021	0.02	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0001	0.066	0.003	<0.01	<0.001	<0.001	<0.01	<0.005	0.14	<0.05
JN1119E	24-Jan-2022	0.24	0.001	<0.0001	0.001	<0.001	<0.001	<0.001	<0.001	0.0002	0.065	0.009	<0.01	<0.001	<0.001	<0.01	<0.005	0.16	<0.05
JN1119E	08-Jun-2022	0.03	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0001	0.06	0.002	<0.01	<0.001	<0.001	<0.01	0.006	0.22	<0.05
JN1119E	05-Oct-2022	0.06	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.058	0.001	<0.01	<0.001	<0.001	<0.01	<0.005	0.21	<0.05
JN1119E	16-May-2023	0.02	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.069	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	0.13	<0.05
JN1119E	14-Aug-2023	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0003	0.056	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	0.23	<0.05
JN1119E	21-Nov-2023	0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.055	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	0.17	<0.05
JN1119E	08-Feb-2024	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.054	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	0.13	<0.05
JN1119E	08-May-2024	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.051	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	0.10	<0.05

Mackenzie North Groundwater Quality Monitoring - Total Metals/Metalloids Data

Bore ID	Sample Date	Total Metals																
		Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Uranium	Vanadium	Zinc	Boron	Iron
		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	mg/L	mg/L
JMR22WP	16-Feb-2023	0.13	0.002	<0.0001	0.065	<0.001	0.012	0.002	0.002	<0.0001	0.107	0.005	<0.01	<0.001	<0.001	<0.01	0.028	0.14	0.17
JMR22WP	16-May-2023	0.05	0.003	<0.0001	0.001	<0.001	0.002	<0.001	0.092	<0.0001	0.003	0.002	<0.01	<0.001	<0.001	<0.01	0.017	0.49	0.18
JMR22WP	14-Aug-2023	0.09	0.003	<0.0001	0.002	<0.001	0.002	<0.001	0.069	<0.0001	0.004	<0.001	<0.01	<0.001	<0.001	<0.01	0.021	0.53	0.32
JMR22WP	21-Nov-2023	0.23	0.002	<0.0001	0.071	<0.001	0.015	0.002	0.003	<0.0001	0.101	0.005	<0.01	<0.001	<0.001	<0.01	0.036	0.12	0.25
JMR22WP	08-Feb-2024	0.19	0.001	<0.0001	0.063	<0.001	0.010	0.001	0.001	<0.0001	0.090	0.004	<0.01	<0.001	<0.001	<0.01	0.016	0.12	0.34
JMR22WP	08-May-2024	0.19	0.001	<0.0001	0.057	<0.001	0.008	<0.001	0.001	<0.0001	0.090	0.004	<0.01	<0.001	<0.001	<0.01	0.019	0.13	0.29
JMR23WA	16-Feb-2023	2.38	0.023	<0.0001	0.007	0.003	0.028	0.002	0.981	<0.0001	0.004	0.013	<0.01	<0.001	0.001	0.02	0.024	0.07	6.65
JMR23WA	16-May-2023	12.1	0.01	0.0002	0.029	0.012	0.109	0.019	1.41	<0.0001	0.002	0.041	<0.01	<0.001	0.001	0.05	0.086	0.07	22.6
JMR23WA	14-Aug-2023	19.9	0.011	0.0005	0.049	0.02	0.113	0.024	1.44	0.0001	0.002	0.06	<0.01	<0.001	0.002	0.08	0.166	0.07	34.3
JMR24WP	12-Nov-2019	0.32	0.003	<0.0001	0.007	<0.001	0.003	<0.001	0.199	<0.0001	0.004	0.007	<0.01	<0.001	<0.001	<0.01	0.052	0.49	0.46
JMR24WP	20-Apr-2020	1.38	0.002	<0.0001	0.006	0.001	0.009	0.003	0.23	<0.0001	0.001	0.012	<0.01	<0.001	<0.001	<0.01	0.028	0.45	2.42
JMR24WP	16-Nov-2020	0.44	0.002	<0.0001	0.002	0.001	0.003	0.001	0.219	<0.0001	0.003	0.009	<0.01	<0.001	<0.001	<0.01	0.015		0.61
JMR24WP	26-Jan-2021	0.09	0.002	<0.0001	<0.001	<0.001	0.003	<0.001	0.222	<0.0001	0.003	0.007	<0.01	<0.001	<0.001	<0.01	0.022		0.37
JMR24WP	19-May-2021	0.04	0.002	<0.0001	<0.001	<0.001	0.002	<0.001	0.216	<0.0001	0.002	0.005	<0.01	<0.001	<0.001	<0.01	0.025	0.44	0.35
JMR24WP	24-Jan-2022	0.88	0.004	<0.0001	0.009	0.002	0.014	0.005	0.305	<0.0001	0.002	0.009	<0.01	<0.001	<0.001	<0.01	0.059	0.5	3.66
JMR24WP	08-Jun-2022	0.33	0.004	<0.0001	0.003	<0.001	0.019	0.003	0.235	<0.0001	0.002	0.007	<0.01	<0.001	<0.001	<0.01	0.047	0.57	2.32
JMR24WP	05-Oct-2022	0.19	0.001	<0.0001	0.002	<0.001	0.003	<0.001	0.216	<0.0001	0.002	0.009	<0.01	<0.001	<0.001	<0.01	0.037	0.51	0.69
JMR24WP2	20-Apr-2020	0.44	0.002	<0.0001	0.007	<0.001	0.003	<0.001	0.282	<0.0001	0.004	0.009	<0.01	<0.001	<0.001	<0.01	0.074	0.5	0.84
JMR24WP2	17-Nov-2020	0.16	0.001	<0.0001	0.004	<0.001	0.007	<0.001	0.271	<0.0001	0.003	0.009	<0.01	<0.001	<0.001	<0.01	0.071		0.54
JMR24WP2	27-Jan-2021	6.07	0.012	0.0001	0.033	0.004	0.018	0.007	0.366	<0.0001	0.003	0.026	<0.01	<0.001	0.003	0.02	0.462		8.42
JMR24WP2	19-May-2021	0.06	0.001	<0.0001	0.002	<0.001	0.002	<0.001	0.222	<0.0001	0.002	0.006	<0.01	<0.001	<0.001	<0.01	0.031	0.45	0.36
JMR24WP2	24-Jan-2022	0.75	0.001	<0.0001	0.005	<0.001	0.006	<0.001	0.246	<0.0001	0.002	0.006	<0.01	<0.001	<0.001	<0.01	0.036	0.6	0.86
JMR24WP2	08-Jun-2022	0.1	0.001	<0.0001	0.001	<0.001	0.004	<0.001	0.215	<0.0001	0.002	0.004	<0.01	<0.001	<0.001	<0.01	0.03	0.68	0.51
JMR24WP2	05-Oct-2022	0.06	<0.001	<0.0001	0.001	<0.001	0.002	<0.001	0.188	<0.0001	0.002	0.006	<0.01	<0.001	<0.001	<0.01	0.037	0.58	0.58
JMR24WP2	16-Feb-2023	0.08	0.001	<0.0001	0.001	<0.001	0.003	<0.001	0.185	<0.0001	0.003	0.002	<0.01	<0.001	<0.001	<0.01	0.027	0.69	0.29

Bore ID	Sample Date	Total Metals																	
		Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Uranium	Vanadium	Zinc	Boron	Iron
		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	mg/L	mg/L
JMR24WP2	16-May-2023	0.56	0.004	<0.0001	0.002	<0.001	0.003	0.001	0.244	<0.0001	0.002	0.003	<0.01	<0.001	<0.001	<0.01	0.026	0.52	1.4
JMR24WP2	14-Aug-2023	0.59	0.002	<0.0001	0.003	<0.001	0.003	0.001	0.246	<0.0001	0.002	0.005	<0.01	<0.001	<0.001	<0.01	0.019	0.55	1.62
JMR24WP2	21-Nov-2023	0.26	0.002	<0.0001	0.002	<0.001	0.028	<0.001	0.272	<0.0001	0.002	0.004	<0.01	<0.001	<0.001	<0.01	0.054	0.52	0.88
JMR24WP2	08-Feb-2024	0.02	0.004	<0.0001	<0.001	<0.001	0.002	<0.001	0.224	<0.0001	0.002	0.003	<0.01	<0.001	<0.001	<0.01	0.014	0.56	0.90
JMR24WP2	08-May-2024	2.68	0.002	<0.0001	0.015	0.002	0.041	0.002	0.243	<0.0001	0.002	0.016	<0.01	<0.001	<0.001	<0.01	0.044	0.57	3.96
JMR25WA	11-Sep-2018	89.3	0.028	0.0003	0.202		0.209	0.046		0.0002		0.241	<0.01				0.302		152
JMR25WA	29-Nov-2018	14.7	0.009	<0.0001	0.028	-	0.057	0.01	1.38	<0.0001	<0.001	0.04	<0.01	<0.001	0.002	0.06	0.055	<0.05	27.4
JMR25WA	24-Jan-2019	15.2	0.008	<0.0001	0.025	0.022	0.035	0.008	0.942	<0.0001	<0.001	0.034	<0.01	<0.001	0.001	0.06	0.048	<0.05	25
JMR25WA	27-Mar-2019	11.4	0.014	<0.0001	0.018	0.022	0.04	0.01	0.924	<0.0001	<0.001	0.052	<0.01	<0.001	0.002	0.05	0.043	<0.05	20.7
JMR25WA	15-May-2019	13.5	0.008	<0.0001	0.024	0.021	0.024	0.007	0.929	<0.0001	<0.001	0.026	<0.01	<0.001	0.001	0.05	0.04	<0.05	21.4
JMR25WA	25-Jul-2019	7.42	0.007	<0.0001	0.013	0.016	0.019	0.006	0.64	<0.0001	<0.001	0.02	<0.01	<0.001	<0.001	0.03	0.036	0.1	13.5
JMR25WA	12-Nov-2019	13	0.005	<0.0001	0.019	0.016	0.051	0.005	0.668	<0.0001	<0.001	0.026	<0.01	<0.001	0.001	0.04	0.042	<0.05	19.1
JMR25WA	20-Apr-2020	23.5	0.009	0.0002	0.046	0.035	0.053	0.044	1.16	<0.0001	<0.001	0.058	<0.01	<0.001	0.002	0.09	0.07	<0.05	41.9
JMR25WA	16-Nov-2020	5.16	0.002	<0.0001	0.011	0.006	0.016	0.003	0.17	<0.0001	<0.001	0.017	<0.01	<0.001	0.002	0.02	0.037		8.1
JMR25WA	26-Jan-2021	36.4	0.01	0.0002	0.084	0.049	0.149	0.031	1.9	0.0004	<0.001	0.102	<0.01	<0.001	0.005	0.15	0.146		70.6
JMR25WA	19-May-2021	49.4	0.019	0.0007	0.132	0.144	0.496	0.114	8.42	0.0009	<0.001	0.276	<0.01	<0.001	0.018	0.33	0.314	<0.05	95.1
JMR25WA	24-Jan-2022	465	0.075	0.0047	1.01	0.629	2.56	2.01	23	0.0024	<0.005	1.27	<0.05	<0.005	0.105	2.11	2.22	0.11	562
JMR4WA	09-Sep-2018	0.03	<0.001	0.0001	<0.001		<0.001	<0.001		<0.0001		<0.001	<0.01				<0.005		5.41
JMR4WA	18-Nov-2018	<0.01	<0.001	<0.0001	<0.001	-	<0.001	<0.001	1.76	<0.0001	<0.001	<0.001	<0.01	<0.001	0.002	<0.01	<0.005	0.06	6.01
JMR4WA	24-Jan-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.83	<0.0001	<0.001	<0.001	<0.01	<0.001	0.001	<0.01	<0.005	<0.05	6.69
JMR4WA	27-Mar-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.84	<0.0001	<0.001	<0.001	<0.01	<0.001	0.002	<0.01	<0.005	0.05	6.78
JMR4WA	15-May-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.73	<0.0001	<0.001	<0.001	<0.01	<0.001	0.002	<0.01	<0.005	<0.05	6.07
JMR4WA	24-Jul-2019	0.02	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.85	<0.0001	<0.001	<0.001	<0.01	<0.001	0.002	<0.01	<0.005	0.1	7.28
JMR4WA	12-Nov-2019	0.03	<0.001	0.0002	<0.001	<0.001	<0.001	<0.001	1.81	<0.0001	<0.001	0.005	<0.01	<0.001	0.002	<0.01	0.006	0.06	6.27
JMR4WA	20-Apr-2020	0.02	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.93	<0.0001	<0.001	0.004	<0.01	<0.001	0.003	<0.01	<0.005	<0.05	5.67
JMR4WA	16-Nov-2020	0.02	0.014	<0.0001	<0.001	<0.001	0.014	<0.001	0.077	<0.0001	0.005	0.007	<0.01	<0.001	0.002	<0.01	0.053		<0.05
JMR4WA	26-Jan-2021	0.05	<0.001	0.0001	<0.001	<0.001	0.003	<0.001	1.85	<0.0001	<0.001	0.01	<0.01	<0.001	0.003	<0.01	0.019		5.67

Bore ID	Sample Date	Total Metals																	
		Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Uranium	Vanadium	Zinc	Boron	Iron
		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	mg/L	mg/L
JMR4WA	19-May-2021	0.01	<0.001	0.0001	<0.001	<0.001	0.002	<0.001	1.62	<0.0001	<0.001	0.006	<0.01	<0.001	0.002	<0.01	0.01	<0.05	4.76
JMR4WA	24-Jan-2022	0.02	<0.001	<0.0001	0.002	<0.001	<0.001	<0.001	1.75	<0.0001	<0.001	0.012	<0.01	<0.001	0.002	<0.01	0.006	<0.05	5.94
JMR4WA	08-Jun-2022	0.05	<0.001	<0.0001	<0.001	<0.001	0.004	<0.001	1.7	<0.0001	<0.001	0.018	<0.01	<0.001	0.002	<0.01	0.013	0.09	4.54
JMR4WA	05-Oct-2022	0.03	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	1.36	<0.0001	<0.001	0.005	<0.01	<0.001	<0.001	<0.01	0.005	<0.05	5.11
JMR4WA	15-May-2023	0.04	0.001	<0.0001	0.002	<0.001	0.002	<0.001	1.37	<0.0001	<0.001	0.005	<0.01	<0.001	<0.001	<0.01	0.07	0.07	3.93
JMR4WA	14-Aug-2023	0.02	<0.001	<0.0001	<0.001	<0.001	0.002	<0.001	1.29	<0.0001	<0.001	0.003	<0.01	<0.001	<0.001	<0.01	0.051	<0.05	3.97
JMR4WA	22-Nov-2023	0.03	<0.001	<0.0001	<0.001	<0.001	0.002	<0.001	1.3	<0.0001	0.002	0.003	<0.01	<0.001	<0.001	<0.01	0.078	0.07	3.6
JMR4WA	08-Feb-2024	0.03	0.004	<0.0001	<0.001	<0.001	0.003	<0.001	0.994	<0.0001	<0.001	0.004	<0.01	<0.001	<0.001	<0.01	0.029	0.11	2.11
JMR4WA	08-May-2024	0.02	<0.001	<0.0001	<0.001	<0.001	0.002	<0.001	1.14	<0.0001	0.002	0.004	<0.01	<0.001	<0.001	<0.01	0.052	<0.05	2.46
JMR4WP	09-Sep-2018	0.02	<0.001	<0.0001	<0.001		<0.001	<0.001		<0.0001		0.002	<0.01				<0.005		0.18
JMR4WP	18-Nov-2018	0.01	<0.001	<0.0001	<0.001	-	<0.001	<0.001	0.091	<0.0001	0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.007	0.2	0.2
JMR4WP	24-Jan-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.095	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.01	0.18	0.14
JMR4WP	27-Mar-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.107	<0.0001	0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.008	0.21	0.13
JMR4WP	15-May-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.103	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.006	0.18	0.11
JMR4WP	25-Jul-2019	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.12	<0.0001	0.002	<0.001	<0.01	<0.001	<0.001	<0.01	0.009	0.29	0.08
JMR4WP	16-Nov-2020	0.04	<0.001	0.0001	<0.001	<0.001	0.004	<0.001	1.6	<0.0001	<0.001	0.012	<0.01	<0.001	0.002	<0.01	0.013		4.71
JMR4WP	26-Jan-2021	0.08	0.023	<0.0001	<0.001	0.001	0.002	<0.001	0.184	<0.0001	0.006	0.005	<0.01	<0.001	0.001	<0.01	0.016		0.74
JMR4WP	19-May-2021	0.1	0.014	<0.0001	0.001	<0.001	0.002	<0.001	0.149	<0.0001	0.005	0.008	<0.01	<0.001	<0.001	<0.01	0.026	0.15	0.24
JMR4WP	24-Jan-2022	0.01	0.006	<0.0001	0.003	<0.001	<0.001	<0.001	0.185	<0.0001	0.004	0.004	<0.01	<0.001	<0.001	<0.01	0.015	0.21	0.23
JMR4WP	08-Jun-2022	0.1	0.005	<0.0001	<0.001	<0.001	0.002	<0.001	0.142	<0.0001	0.003	0.021	<0.01	<0.001	<0.001	<0.01	0.019	0.22	0.35
JMR4WP	05-Oct-2022	0.06	0.003	<0.0001	0.003	<0.001	0.002	<0.001	0.157	<0.0001	0.007	0.01	<0.01	<0.001	<0.001	<0.01	0.027	0.18	0.17
JMR4WP2	16-May-2023	0.02	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	0.203	<0.0001	0.002	0.003	<0.01	<0.001	<0.001	<0.01	0.011	0.19	0.17
JMR4WP2	22-Nov-2023	0.02	0.002	<0.0001	<0.001	<0.001	0.001	<0.001	0.16	<0.0001	0.002	0.001	<0.01	<0.001	<0.001	<0.01	0.01	0.19	0.17
JMR4WP2	08-Feb-2024	0.01	0.003	<0.0001	0.002	<0.001	0.003	<0.001	0.206	<0.0001	0.004	0.002	<0.01	<0.001	<0.001	<0.01	0.008	0.18	0.28
JMR4WP2	08-May-2024	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.217	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.009	0.22	0.24
JN1119E	13-Nov-2019	11.6	0.012	<0.0001	0.013	0.008	0.025	0.013	0.203	<0.0001	0.006	0.016	<0.01	<0.001	0.003	0.02	0.062	0.51	12.7
JN1119E	20-Apr-2020	1.29	0.002	<0.0001	0.006	<0.001	0.002	0.002	0.023	<0.0001	0.07	0.003	<0.01	<0.001	<0.001	<0.01	0.01	0.22	1.13

Bore ID	Sample Date	Total Metals																
		Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Uranium	Vanadium	Zinc	Boron	Iron
		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	mg/L	mg/L
JN1119E	16-Nov-2020	0.04	0.002	<0.0001	<0.001	<0.001	0.002	<0.001	0.001	0.0009	0.069	0.002	<0.01	<0.001	<0.001	<0.01	<0.005		0.21
JN1119E	26-Jan-2021	0.1	0.002	0.0002	0.002	<0.001	0.001	<0.001	0.009	0.0005	0.082	0.004	<0.01	<0.001	<0.001	<0.01	<0.005		0.19
JN1119E	19-May-2021	0.06	0.002	<0.0001	<0.001	<0.001	<0.001	<0.001	0.001	0.0003	0.08	0.002	<0.01	<0.001	<0.001	<0.01	<0.005	0.14	0.06
JN1119E	24-Jan-2022	0.83	0.002	<0.0001	0.002	<0.001	0.001	<0.001	0.001	0.0002	0.084	0.004	<0.01	<0.001	<0.001	<0.01	<0.005	0.16	0.06
JN1119E	08-Jun-2022	0.06	0.002	<0.0001	<0.001	<0.001	0.002	<0.001	<0.001	0.0003	0.075	0.003	<0.01	<0.001	<0.001	<0.01	<0.005	0.14	0.06
JN1119E	05-Oct-2022	0.25	0.001	<0.0001	0.003	<0.001	<0.001	<0.001	0.002	<0.0001	0.057	0.003	<0.01	<0.001	<0.001	<0.01	<0.005	0.15	0.11
JN1119E	16-May-2023	0.03	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0002	0.08	0.003	<0.01	<0.001	<0.001	<0.01	<0.005	0.14	<0.05
JN1119E	14-Aug-2023	0.12	<0.001	<0.0001	0.002	<0.001	<0.001	<0.001	0.007	0.0005	0.062	0.002	<0.01	<0.001	<0.001	<0.01	0.008	0.25	0.07
JN1119E	21-Nov-2023	0.07	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.004	0.0002	0.062	0.002	<0.01	<0.001	<0.001	<0.01	0.007	0.19	<0.05
JN1119E	08-Feb-2024	0.84	0.001	<0.0001	0.001	<0.001	0.002	<0.001	0.023	0.0003	0.062	0.003	<0.01	<0.001	<0.001	<0.01	0.008	0.16	0.65
JN1119E	08-May-2024	0.10	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	0.002	0.0001	0.062	0.002	<0.01	<0.001	<0.001	<0.01	0.006	0.10	0.06

Appendix B Water level monitoring data

Mackenzie North groundwater level monitoring

Date	JMR4WA	JMR4WP2	JMR22WA	JMR22WP	JN1119E	JMR23WA	JMR24WA	JMR24WP	JMR24WP2	JMR25WA	JMR26WA	JP0911T	JP0912T
12-Oct-2015	18.45					20.00							
17-May-2017	18.50					19.30							
19-Jul-2017	18.70					19.40							
28-Sep-2017												22.81	20.30
06-Oct-2017	19.20					19.15							
01-Nov-2017												22.80	20.43
01-Dec-2017												23.00	20.48
09-Dec-2017	19.30					19.85							
01-Jan-2018												23.19	20.59
01-Feb-2018												23.35	20.65
20-Feb-2018	19.40					19.90							
01-Mar-2018												23.19	20.46
01-Apr-2018												23.40	20.48
01-May-2018												23.44	20.47
03-May-2018	19.44					19.90							
18-May-2018												23.46	
01-Jun-2018													20.53
16-Jun-2018	19.52					19.94							
01-Jul-2018													20.58
09-Jul-2018	19.52					19.96							
13-Jul-2018												24.48	
01-Aug-2018												24.52	20.68
01-Sep-2018												24.61	20.83
01-Oct-2018												24.62	20.88
05-Oct-2018				21.04									
08-Oct-2018	19.78												
09-Oct-2018		19.75						35.90					

Date	JMR4WA	JMR4WP2	JMR22WA	JMR22WP	JN1119E	JMR23WA	JMR24WA	JMR24WP	JMR24WP2	JMR25WA	JMR26WA	JP0911T	JP0912T
11-Oct-2018						19.64			22.20	19.35			
19-Oct-2018	19.93	19.91	17.96	22.11		21.10	Dry	36.74		19.53			
01-Nov-2018											Dry	24.75	21.02
17-Nov-2018	19.88	19.87	17.97	22.09		21.18	Dry	36.73	2.85	19.87			
01-Dec-2018											Dry	24.82	21.19
10-Dec-2018	19.97	19.99	Dry	22.07		21.18	Dry	36.71	1.72	19.59			
01-Jan-2019											Dry	24.93	21.26
24-Jan-2019	20.08	20.09	Dry	22.04		21.18	Dry	36.69		19.68			
01-Feb-2019											Dry	25.02	21.36
25-Feb-2019	20.14	20.16	Dry	22.18		21.18	Dry	37.02		19.73			
01-Mar-2019											Dry	25.06	21.35
27-Mar-2019	20.13	20.14	Dry	22.14		21.18	Dry	36.98		19.80			
01-Apr-2019											Dry	25.00	21.32
18-Apr-2019	20.21	20.25	Dry	22.15		21.19	Dry	37.06		19.81			
01-May-2019											Dry	25.05	21.38
13-May-2019	20.23	20.27	Dry	22.14		21.19	Dry	37.06		19.84			
01-Jun-2019											Dry	25.14	21.48
01-Jul-2019											Dry	25.21	21.60
02-Jul-2019	20.34	20.35	Dry	22.16		21.19	Dry		41.66				
24-Jul-2019	20.34	20.34	Dry		21.97	21.19	Dry		42.65	20.00	Dry		
01-Aug-2019											Dry	25.36	21.69
20-Aug-2019	20.49	20.49	Dry		21.87	21.19	Dry		43.25	20.05			
01-Sep-2019											Dry	25.46	21.82
01-Oct-2019											Dry	25.53	21.89
12-Nov-2019	20.67	NM	Dry	21.73	21.63	Dry	Dry	44.07	42.87	20.16	Dry	25.65	22.01
13-Dec-2019	20.76	NM	Dry	21.68	21.59	Dry	Dry	44.23		20.33	Dry	25.76	22.12
04-Feb-2020	20.87	NM	Dry	21.61	21.49	21.20	Dry	44.44	43.17	20.40	Dry	25.81	22.08
20-Apr-2020	20.98	NM	Dry	21.64	21.41	Dry	Dry	44.68	43.34	20.48	Dry	25.74	22.08
01-May-2020											Dry	25.74	22.04

Date	JMR4WA	JMR4WP2	JMR22WA	JMR22WP	JN1119E	JMR23WA	JMR24WA	JMR24WP	JMR24WP2	JMR25WA	JMR26WA	JP0911T	JP0912T
01-Jun-2020											Dry	25.86	22.04
01-Jul-2020											Dry	25.97	22.15
23-Jul-2020	21.17	21.43	No access	21.64	21.43	No access	No access	44.95	43.52	20.67	Dry	25.99	22.21
01-Sep-2020											Dry	26.01	22.28
01-Oct-2020											Dry	26.06	22.35
16-Nov-2020	21.62	21.39	Dry	21.64	21.7	Dry	Dry	44.72	43.82	20.88	Dry	26.11	22.44
01-Dec-2020											Dry	26.18	22.52
26-Jan-2021	21.65	21.44	Dry	21.67	21.72	Dry	Dry	44.78	43.96	20.89	Dry	26.24	22.65
01-Feb-2021											Dry	26.31	22.71
01-Mar-2021											Dry	26.36	22.78
01-Apr-2021											Dry	26.38	22.81
19-May-2021	21.63	21.9	Dry.	21.87	23.21	Dry.	Dry.	45.45	44.08	21.16	Dry	26.46	22.88
01-Jun-2021											Dry	26.46	22.84
01-Jul-2021											Dry	26.51	22.89
17-Aug-2021	21.81	22.02	Dry	23.16	24.45	Dry	Dry	45.56	44.25	21.3	Dry	26.55	22.98
01-Sep-2021											Dry	26.55	22.99
01-Oct-2021											Dry	26.68	23.14
01-Nov-2021											Dry	26.66	
01-Dec-2021											Dry	26.38	22.92
25-Jan-2022	21.96	22.2	Dry	22.15	25.02	Dry	Dry	39.74	42.86	21.31	Dry	26.48	22.95
10-Feb-2022	21.90	22.22	Dry	22.19	25.10	Dry	Dry	39.53	42.90	21.36	Dry	26.69	23.01
01-Mar-2022											Dry	26.81	23.09
01-Apr-2022											Dry	26.85	23.16
01-May-2022											Dry	26.80	23.14
01-Jun-2022	21.89	22.36	Dry	22.27	24.98	21.04	Dry	38.4	41.83	21.64	Dry	26.65	23.03
02-Aug-2022	21.93	22.85	Dry	22.81	26.3		Dry	39.03	41.99	Dry	Dry	26.51	22.97
06-Oct-2022	22.01	22.34	Dry	22.94	26.28		Dry	42.67	42.72	Dry	Dry	26.63	23.15
16-Feb-2023			Dry	22.70		19.56	Dry		42.49	21.20	Dry	26.59	22.73
01-Mar-2023											Dry	26.48	22.67

Date	JMR4WA	JMR4WP2	JMR22WA	JMR22WP	JN1119E	JMR23WA	JMR24WA	JMR24WP	JMR24WP2	JMR25WA	JMR26WA	JP0911T	JP0912T
01-Apr-2023											Dry	26.46	22.71
16-May-2023	21.92	22.19	Dry	23.10	27.09	19.51	Dry		42.63	21.28	Dry	26.50	22.73
01-Jun-2023											Dry	26.55	22.74
01-Jul-2023											Dry	26.66	22.82
14-Aug-2023	22.05	22.24	Dry	23.19	29.98	19.65	Dry		40.73	21.45	Dry	26.77	22.88
01-Sep-2023											Dry	26.93	23.03
01-Oct-2023											Dry	26.97	23.05
21-Nov-2023	22.19	22.37	Dry	25.31	28.10	19.85	Dry		39.59	Dry			
08-Feb-2024	22.20	22.41	Dry	25.64	27.52	19.92	Dry		38.87	21.56			
08-May-2024	22.27	22.49	Dry	26.59	27.78	19.92	Dry		41.02				

Notes: *Standing Water Level (SWL) - metres below top of casing (mTOC)*

** JN1119E is a replacement bore for JMR22WP for water quality sampling. Water level data is collected from both bores.*

*** JMR24WP2 is a replacement bore for JMR24WP for water quality sampling. Water level data is collected from both bores.*

No access - road to bore closed due to rain and no safe access