

Mineral Projects Pty Ltd

Dianne Copper Mine

Hydrogeology RFI response

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Executive summary

To support the environmental authority amendment application for the proposed mine extension at the Dianne Copper Mine (DCM), additional information was requested by Department of Environment, Tourism, Scientist and Innovation regarding the site's groundwater regime. This report consolidates findings from multiple supporting investigations to describe the current hydrogeological setting, assess potential risks to the receiving environment, and outline the framework for ongoing monitoring and management.

Groundwater at DCM occurs predominantly within fracture networks, fault zones and weathered mantles overlying the fresh rock, where permeability is controlled almost entirely by secondary structures. The regional and local structural fabric imposes a north-northwest to south-southeast (NNW-SSE) anisotropy in groundwater conductivity, with recharge occurring via localised rainfall infiltration into highly cleaved metasediments. Groundwater-surface water interactions are intermittent and primarily associated with post-recharge periods, with connectivity diminishing during the dry season. These conditions – coupled with aquifer compartmentalisation and the limited presence of nearby groundwater users – suggest a low potential for off-site groundwater impacts arising from the proposed mine expansion.

A conceptual hydrogeological model has been developed to characterise groundwater occurrence, flow and potential contaminant transport pathways. This model forms the basis for the design of an expanded groundwater monitoring network that integrates surface water, groundwater and sediment monitoring. Engineered containment measures – including lined leach pads, ponds and drainage capture systems – provide multiple layers of protection to minimise and control seepage, while strategically placed monitoring bores will enable early detection of any changes in groundwater quality or hydraulic behaviour.

Historical data indicate that localised surface water impacts downstream of the existing settling dam are associated with legacy mining activities, with elevated sulphate, cadmium, copper and zinc concentrations observed since monitoring commenced in 2021. These contaminant levels have substantially decreased since 2023, suggesting that implemented water management measures are improving site conditions. The proposed remediation of legacy areas and use of lower-risk materials in future waste storage facilities will further reduce the potential for contaminant migration.

To address ecological sensitivities, the receiving environment monitoring program will be updated before mining commencement. The revised framework will incorporate additional monitoring sites along North and Gum creeks to characterise water quality, habitat condition and riparian health, including water pools utilised by regional ecosystems and aquatic fauna. Biannual drone surveys will complement these efforts, enabling high-resolution assessment of riparian extent and early identification of ecological change.

Overall, the proposed mine extension at DCM is expected to have only limited and localised influence on the groundwater regime. Impacts will be inherently constrained by the geological framework and managed through the implementation of comprehensive surface water and groundwater monitoring programs, ensuring the protection of environmental values within and downstream of the receiving environment.

1 Introduction

1.1 Background

Dianne Copper Mine (DCM), located on Cape York Peninsula, operated as an open-cut copper mine before transitioning to underground (open stope) mining until 1982. It has since remained under care and maintenance. However, following recent, successful exploration activities at DCM, Mineral Projects Pty Ltd (Mineral Projects) plans to recommence operations. Mineral Projects is required to undertake major amendment to the current environmental authority (EA) EPML00881213 to progress the mine expansion. To assist preparation and review of the EA application, the Department of Environment, Tourism, Science and Innovation (DETSI) has issued a request for information (RFI) regarding groundwater, including:

- A comprehensive groundwater assessment to evaluate potential pathways and potential contaminant sources from all proposed mine features;
- A proposal for additional monitoring bores up- and downgradient of key structures, with placement justified in relation to sensitive receptors;
- A conceptual groundwater flow model developed to guide bore locations and inform a hydrogeological conceptual model; and
- Evaluation of recharge and discharge zones at local and regional scales, impacts on groundwater-dependent ecosystems (GDEs), and current and potential future groundwater uses.

This memorandum addresses these RFIs as part of a broader assessment of the local groundwater system, to be delivered following additional in-field investigations:

- C&R (2024a). *Dianne Copper Mine – Aquatic ecology report*. Prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 419.
- C&R (2024b). *Dianne Copper Mine – Groundwater and surface water impact assessment report*. Prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 73.
- C&R (2024d). *Dianne Copper Mine – Terrestrial ecology report*. Prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 311.

1.2 Scope of works

The scope of this memorandum includes:

- Contextualising DCM within the regional and local fractured aquifer system;
- Characterisation of surface water and groundwater regimes relevant to the mine lease site;
- Developing a conceptual hydrogeological model based on;
 - a. The regional geological setting in the context of the northeastern Australia fractured rock province;
 - b. Local structural, lithological and topographic mapping data; and
 - c. Application of geological information for aquifer/aquitard characterisation, recharge/discharge processes and location, interpreted groundwater flow directions and response, and groundwater aquifer water quality.
- Proposing an integrated monitoring network, including new bores up- and downgradient of key infrastructure. Bore site selection is rationalised given hydrogeological context and mine planning. The expanded groundwater network will:

- a. Provide new groundwater data to test local conceptual models;
 - b. Capture groundwater data up- and downgradient of mine features (pit, overburden/waste rock stockpile, heap leach pads (HLPs), processing plant, settling/release dam); and
 - c. Provide ongoing monitoring and allow for development of local empirical models.
- Outlining potential and future uses of – and impacts to – groundwater in relation to planned mine operations and identify potential risks to the groundwater system and environmental values.

2 Hydrogeological setting

2.1 North-eastern fractured network province

The project site lies within the north-eastern Australia fractured rock province (Geoscience Australia, 2024) which includes areas of orogenic rock outcrop or sub-crop not covered by younger sedimentary basins (Geoscience Australia, 2023). Characterising and modelling fractured aquifers is complex due to their intrinsic heterogeneity and anisotropy. Unlike sedimentary aquifers that are typically texturally homogenous with primary porosity/intragranular pore space, fractured aquifers in hard rocks (metamorphic and igneous) are dominated by secondary porosity as fractures, joints and faults resulting from brittle deformation. The 'layer cake' hydrogeological approach in sedimentary basins, where aquifers may be laterally continuous and extensive, is unsuitable in fractured aquifers that may be discontinuous and localised, controlled by complex interactions between lithology, folding and faulting.

Fractured rock aquifers are characterised by sometimes complex arrays of fractures, cleavage, joints, faults, schistosity, quartz veining and bedding planes producing cavities (secondary porosity) at variable scales within the rock mass. These aquifers are typically unconfined, forming discontinuous local groundwater flow systems restricted within catchment boundaries (Leach, 2013). Groundwater yield is extremely variable depending on the geometry of regional and local structural elements, topography, rainfall and distance from surface water drainage (Geoscience Australia, 2023). Likewise, rates of groundwater movement in fractured rock systems are difficult to quantify, and flow direction can be related more to the orientation of fractures than the hydraulic head distribution (Geoscience Australia, 2024).

2.2 Geological setting and structure

The DCM lease area in the central northwestern Hodgkinson Province comprises an Ordovician to early Carboniferous metasedimentary package with minor mafic intrusive dykes (Hodgkinson Formation; Halfpenny and Hegarty, 1991; Kositsin et al, 2015). Regional deformation resulted in strong folding and faulting of strata, characterised by north-northwest (NNW) stratal alignment, dipping steeply eastward (Henderson and Donchak, 2013). This regional control is expressed in the mine lease area as NNW-SSE (south-southeast) striking interbedded metasandstone, phyllite/slate and greywacke, dipping about 70° E (Figure 1).

The geological structure is characterised by shallow-plunging isoclinal folds with a pervasive, slaty cleavage that is NNW-aligned. The dominant fault system trends north to northwest, subparallel to the major bedding and cleavage direction (Davis and Henderson, 2013). A later east-southeast-trending fault set overprints the regional structure, accompanied by extensive diorite and microdiorite dykes aligned parallel to the major northwest faults. These structures and fabrics are associated with the main shortening events (D1 and D2) of the Mossman Orogen (Davis and Henderson, 2013).

The DCM deposit is situated on the sheared western limb of a kilometre-scale antiformal fold that closes to the east of the mine (Figure 2). Shear zones occur at an acute angle relative to the NNW regional fabric and at all scales. The western limb is disrupted by multiple shear zones with sinistral movement forming a NNW-oriented zone known as the Dianne high strain zone (DHSZ). At a local scale, this strain results in pervasive subvertical conjugate cleavage fractures and pencil cleavage where stratal bedding and cleavage intersect (Figure 3).

Pit-scale mapping shows well-developed horizontal sheeting joints (Figure 4). Sheeting joints typically develop from compressive horizontal stress and unloading. They are persistent, closely spaced and form within tens of metres from ground surface but tend to disappear below depths of 100 m (Fernandez et al., 2023).

The local geological context of deformed, metamorphosed, fractured, folded and faulted, fine- to medium-grained siltstone and sandstone (Hodgkinson Formation) is characteristic of a fractured aquifer system. Groundwater storage, therefore, is most likely within open cavities within the indurated, low permeability, meta-siltstone and -sandstone host rock, and associated with joints and fractures developed through multiple geological deformation events. Moderate to highly weathered near-surface rocks are potential additional groundwater repositories. Further discussion of controls on potential repositories and flow pathways is given in Section 3.2.2.

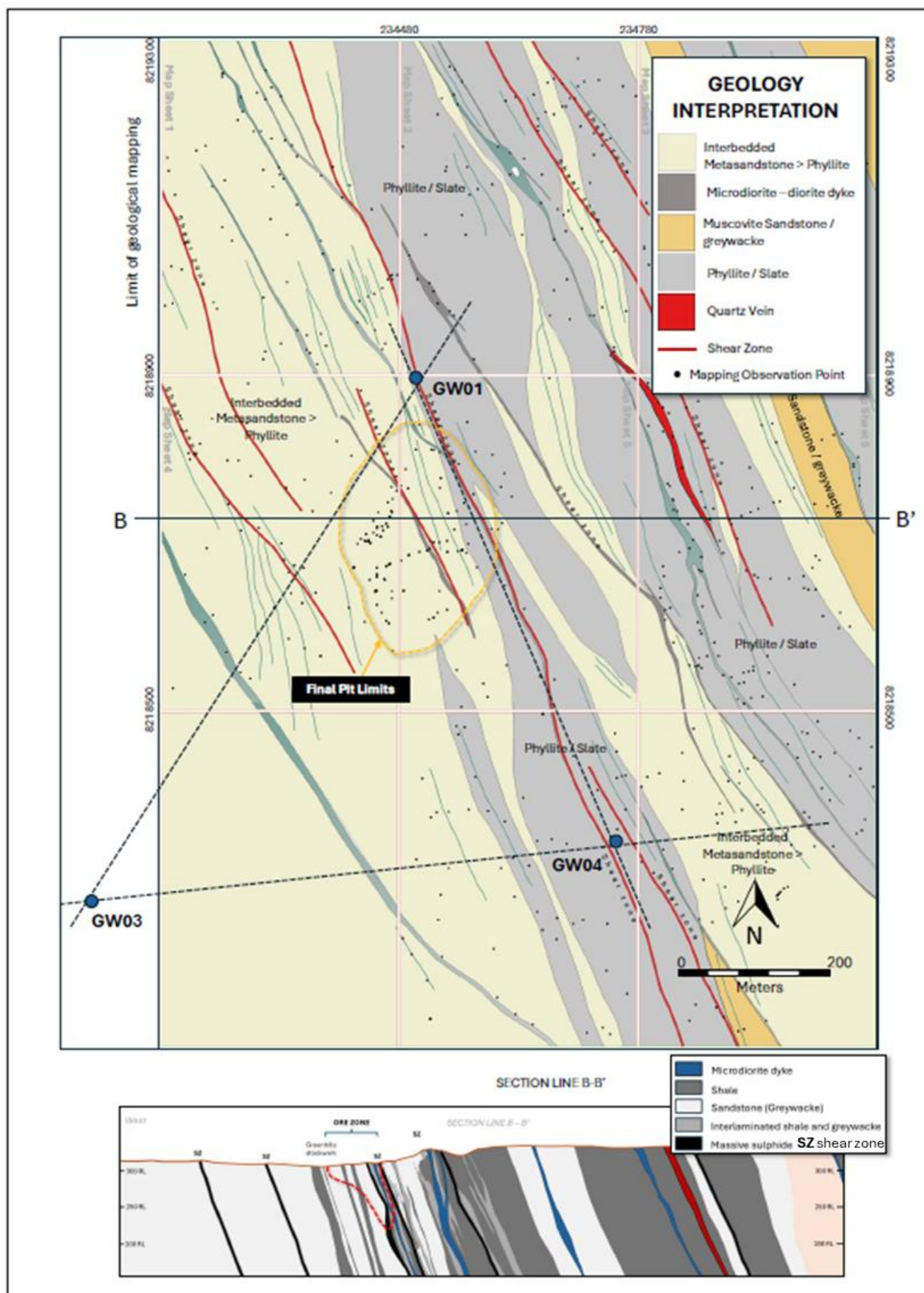


Figure 1: Geology of Dianne Copper Mine lease area, including east-west cross-section through proposed pit extension.

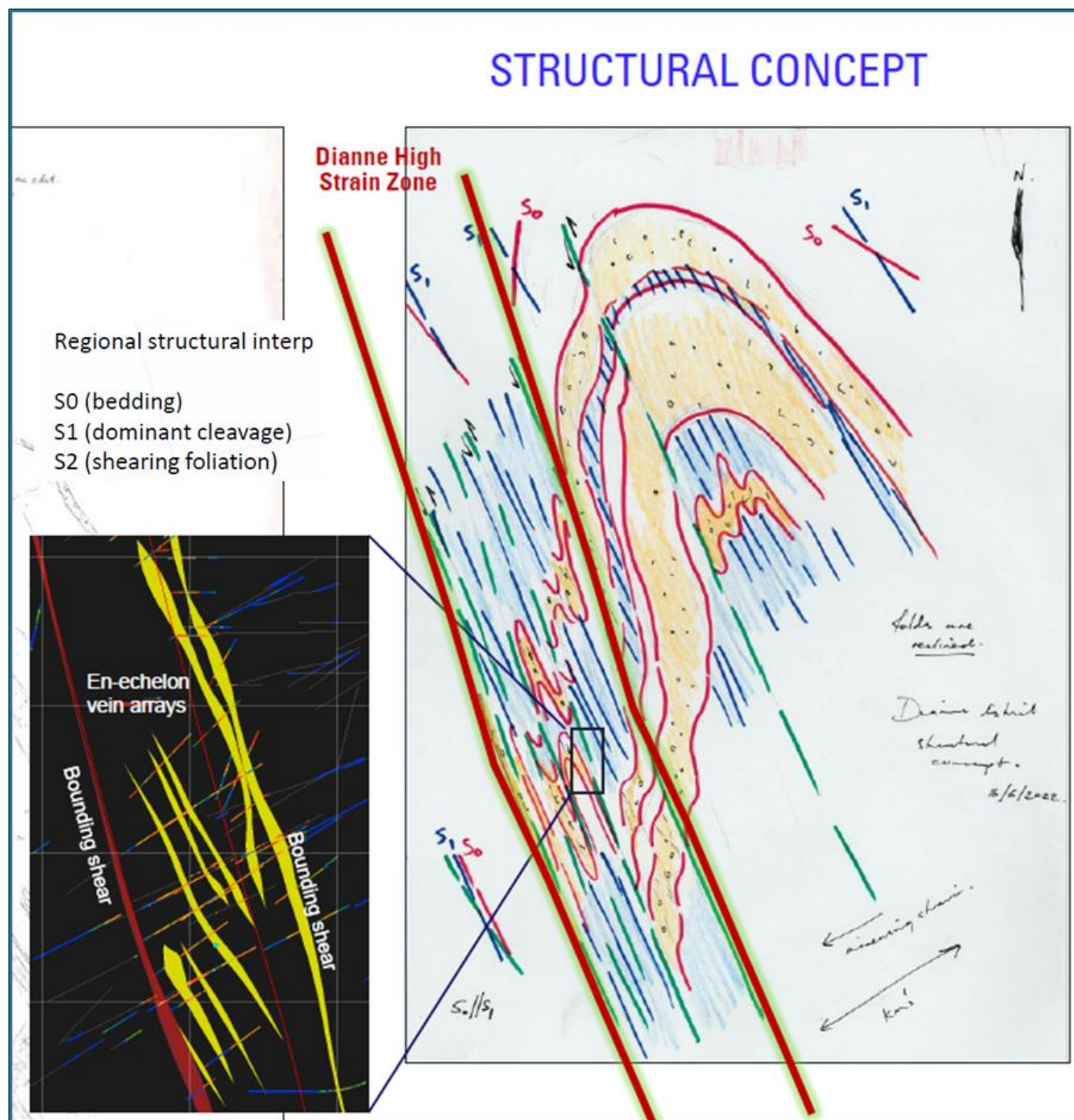


Figure 2: Regional-scale structural concept showing the northwest-southeast oriented DHSZ with bounding shear zones.



Figure 3: Surface exposure of steeply plunging pencil cleavage representing the bedding and cleavage intersection. Rare but indicate bedding cleavage intersection in fold noses plunge steep.



Figure 4: Horizontal sheeting joints in the DCM pit.

2.3 Geomorphology

Local geomorphology is controlled by surface geology. Hodgkinson Formation mudstone and sandstone forms rugged low to hilly terrain incised by a fine dendritic drainage pattern. Resistant chert and indurated sandstone conglomerates form strike ridges along bedding orientation (Halfpenny and Hegarty, 1991). The area is characterised by eucalypt woodlands covering rocky hills, interconnecting ridge-lined valleys and associated ephemeral and intermittent watercourses.

The project site lies within the Palmer River sub-basin (~8,424 km²), which is part of the Mitchell River basin (71,622 km²) flowing west into the Gulf of Carpentaria. The main watercourse associated with the project site is an unnamed tributary of Gum Creek, herein referred to as 'South Creek' (Figure 5). A second unnamed tributary of Gum Creek traverses the northern sections of the project site and is herein referred to as 'North Creek' (Figure 5). Both these tributaries flow into Gum Creek, which joins Granite Creek before entering the Palmer River less than 2 km north of the mine lease boundary.

3 Site-specific characterisation

3.1 Surface water

3.1.1 Hydrology

Watercourses within the region record peak flows during the wet season. Many smaller systems only flow while rains persist (ephemeral streams). The main watercourse associated with the project site is South Creek (Figure 5). North Creek – a second unnamed tributary of Gum Creek – traverses the northern sections of the project site (Figure 5). Both these tributaries flow into Gum Creek, which joins Granite Creek before entering the Palmer River.

The upper reaches of North Creek is considered ephemeral. Conversely, others like Gum Creek flow for extended periods, fed by groundwater outputs, following the cessation of the wet season (intermittent streams). Similar to Gum Creek, South Creek is an intermittent system, with minor flows sustained for an extended period after the wet season via groundwater seepage from the highly fractured rock (Hodgkinson Formation) within the upper reaches.

Annual receiving environment monitoring program (REMP) field assessments support the understanding that – under average climatic conditions – all three systems likely dry out entirely over the dry season, although pools are expected to persist year-round in some areas (C&R, 2025).

South Creek receives flows from the existing disturbance areas associated with the historical mining operations via the settling dam. The settling dam has the potential to passively release during flood events. Transition from the existing care-and-maintenance situation to open-cut mining and ore processing will require significant changes to the DCM water management systems. An enlarged release dam will replace the existing settling dam, with a remediated embankment and upgraded spillway to provide additional containment capacity and prevent seepage through the embankment, respectively. The release dam will also have any sediments from historical operations removed/remediated to improve water quality. The upgraded spillway will be designed and constructed to accommodate the peak flow associated with a 1% annual exceedance probability (AEP) from the 38.49 ha release dam catchment (Engeny, 2025).

The Gum Creek catchment is a relatively small sub-catchment of the Palmer River, located in the hills south of the river's main channel. The hills restrict the drainage lines in terms of width. Most drainage lines of Gum Creek are deeply incised and steep, creating fast-flowing waters during the wet season.

Except for the upper reaches of North Creek (ephemeral), the major waterways associated with the project site are intermittent, flowing for an extended period after significant rainfall. Therefore, various reaches of each major system associated with the project (North Creek, Gum Creek and South Creek) are considered GDEs, classified as riverine wetland GDEs under the DESTI terminology (Richardson et al., 2011)).

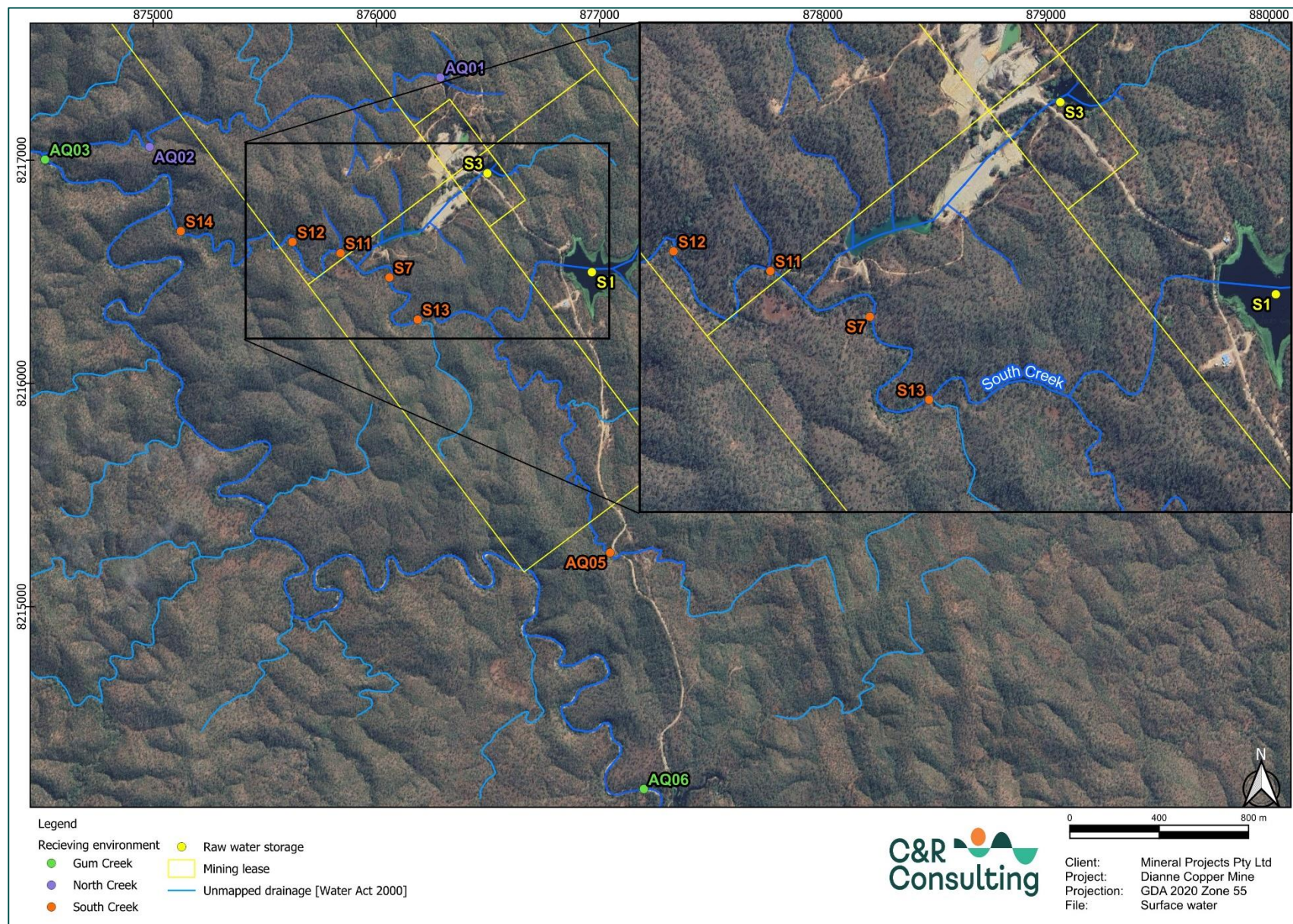


Figure 5: Local topography, drainage and surface water monitoring locations at DCM.

3.1.2 Surface water chemistry

RFI references: EA3i; EA3iii; EA4ii; EA5

All sites (Figure 5) exhibit pH levels ranging from neutral to mildly alkaline, with a minimum of 6.40 and a maximum of 9.11 (Figure 6). Upstream and downstream receiving environments vary minimally. The exception is North Creek, where pH increases from 6.8 at AQ01 (upstream) to 7.8 at AQ02 (downstream). However, it should be noted that only three data points have been collected from each location, so these data cannot substantiate any specific effects occurring within the receiving environment. All levels remained within the water quality objective (WQO) guideline values for pH (6.5 to 8.5; ANZG, 2018).

Figure 6 shows the degree of variability in electrical conductivity (EC) values across the receiving environment and on-site water storages between 2020 and 2025. Levels range from a minimum of 35 $\mu\text{S}/\text{cm}$ in AQ05 (upstream South Creek) to a maximum of 926 $\mu\text{S}/\text{cm}$ in AQ03 (downstream Gum Creek). The median value within across the receiving environments is 199 $\mu\text{S}/\text{cm}$, marginally below the aquatic ecology and livestock drinking WQO guideline values for EC (250 $\mu\text{S}/\text{cm}$ and 5,970 $\mu\text{S}/\text{cm}$; ANZG, 2018).

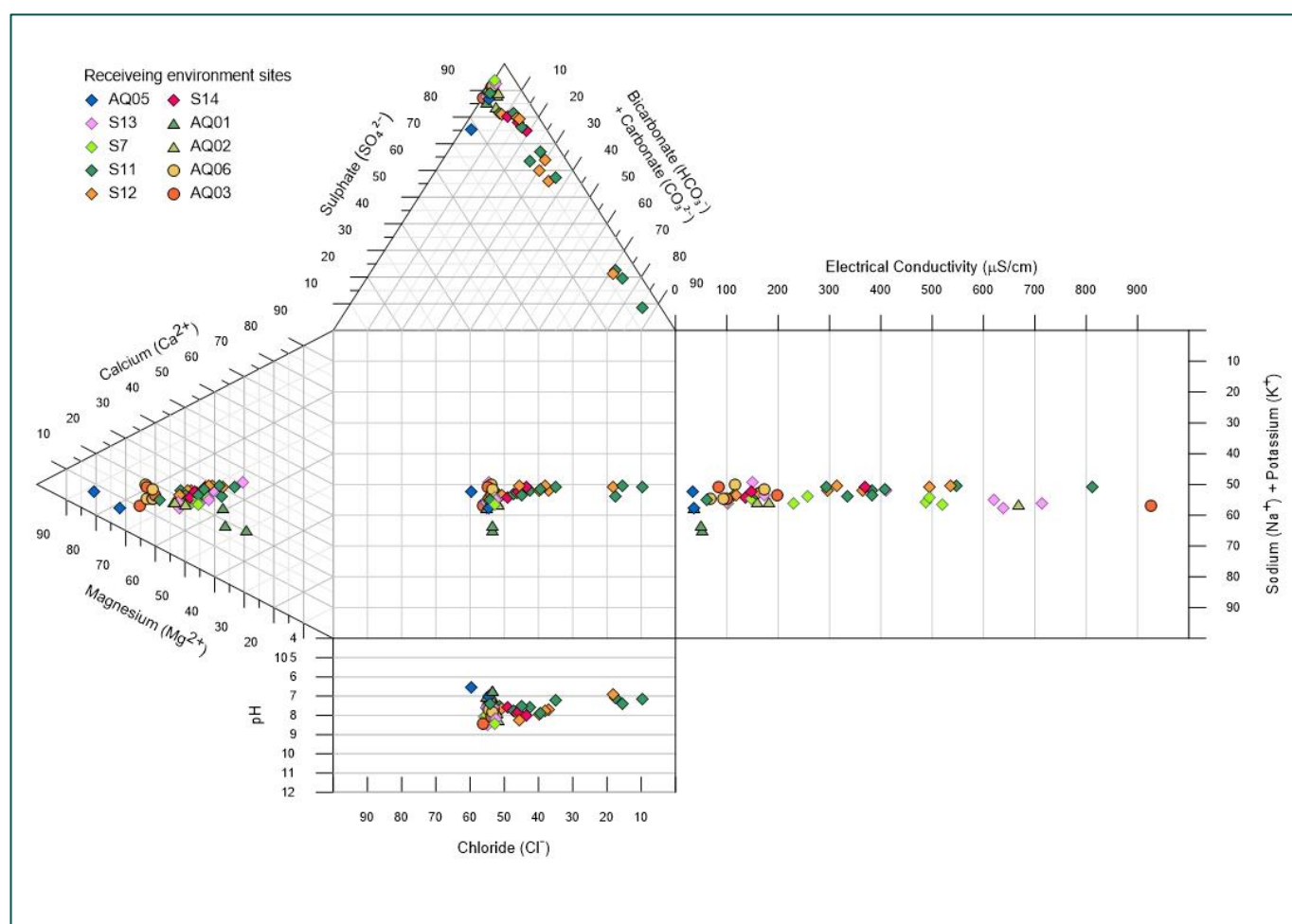


Figure 6: Hydrochemical facies of monitoring sites within the receiving environments of South, North and Gum creeks.

The water quality data captured at aquatic ecology sites (identified as AQ) were collected between November 2023 and April 2024, and are typically based on four data points. The degree of variation observed in most sites is attributable to flow conditions, whereby pooled water experienced a high level of evaporation once flows have ceased. Consequently, samples collected in April and May had elevated ECs in comparison to samples from January to March. Previous assessments (C&R, 2022, 2023, 2024c) found that EC levels are likely influenced

by a source (potentially the natural geology) upstream of DCM operations, although the levels at S11 in November 2023 are likely further concentrated by natural, evaporative processes.

The ionic composition varies significantly across different systems and individual sites (Figure 6). S11 and S12 – located directly downstream of the mine-affected release points S6 and S9 – share a similar anion signature, with a depletion in dissolved carbonates and enrichment in sulphate.

Sulphate, copper and zinc remain the key indicator contaminants associated with DCM, with concentrations consistently exceeding WQOs in downstream receiving waters since monitoring commenced in 2021 (C&R, 2021b, 2022, 2023, 2024c). However, these parameters have shown a marked decline relative to the peak concentrations recorded in April 2023, indicating that the implementation of on-site water management measures may be contributing to improved water quality (C&R, 2022, 2023). C&R (2024b) developed site-specific interim WQOs based on upstream reference sites in South Creek, benchmarked against best-practice guideline values.

All surface water raw data collected over the reporting period (January 2020 – May 2025) have been supplied in Microsoft Excel format as part of this submission.

3.2 Groundwater system

The Hodgkinson Formation is the only geological unit present at the mine site and therefore represents the single aquifer system. However, the monitoring bores are screened across different lithologies within this formation, as the rock type and degree of fracturing vary locally.

3.2.1 Geological controls on flow pathways

The regional tectonic setting and deformation history have shaped the primary lithology, metamorphism and structural overprints, which together define the regional and local fabric, creating pathways for groundwater flow at DCM.

Relevant structural and lithological features that control groundwater flow pathways include the following:

- The pervasive NNW shear fabric, subvertical bedding from folding and associated cleavage, shear fractures, extensional veins and microdiorite intrusions are the major control on generating secondary porosity and permeability in this fractured system. This fabric operates at all scales (regional, local and micro) and channels groundwater principally along the NNW–SSE axis.
- Local at DCM, bedding strikes 340° and foliation 320°, both dipping approximately 70°E.
- DCM's dominant rock types are a fine-grained phyllitic metasediment and interbedded metasandstone. Phyllitic metasediments have well-developed cleavage and foliation planes due to the alignment of platy minerals (e.g. mica and chlorite). These planes may act as micro-fractures that allow groundwater flow. Additionally, deformed phyllitic metasediments contain cleavage sets, shear zones, fault planes and bedding parallel partings that producing secondary permeability.
- A range of other rock types (e.g. altered and weathered microdiorite margins, sandstone and gossan cataclastics) have potentially high conductivity, although their distribution is localised. Fractures and foliation allow for enhanced weathering of these rock types, producing potential groundwater pathways. For example, intense kaolinitic weathering at a microdiorite dyke margin observed in the pit indicates likely subvertical groundwater flow (Figure 7).

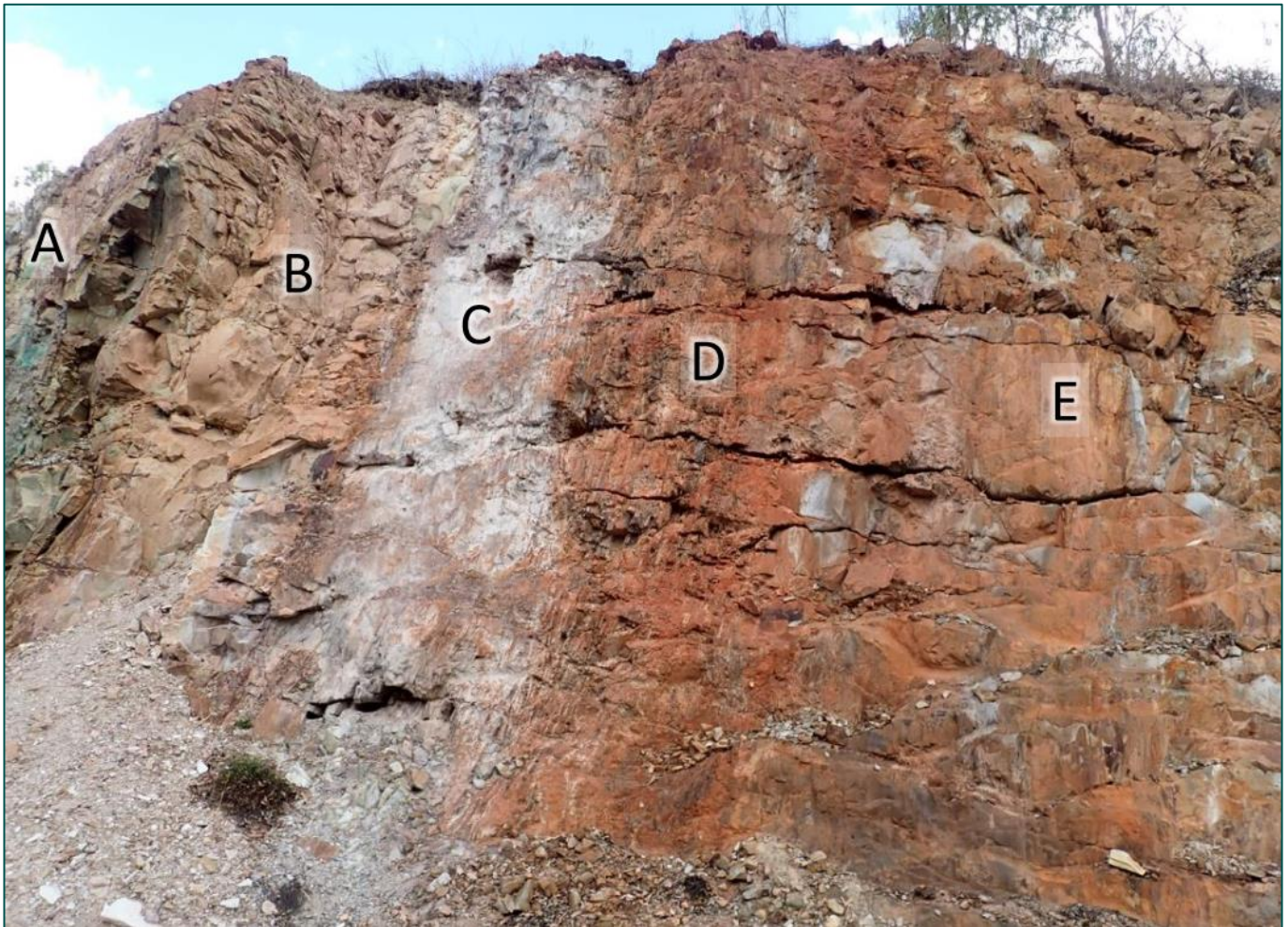


Figure 7: Eastern pit wall looking southeast, showing: A) sheared phyllitic metasediment, B) light-brownish, undeformed microgranite dyke, C) kaolinitic weathered rock, D) oxidised silicified shale and sandstone, and E) massive muscovite sandstone.

- Shallow, horizontal fracture sets (sheeting joints; Figure 4) crosscut metasandstone–phyllite interbeds. These may capture vertical infiltration and channel water laterally towards potential discharge points downslope, such as springs or seep zones. Hydraulic conductivity decreases with depth as vertical stress (rock overburden) increases, progressively reducing joint aperture at depths of around 100 m.

Features likely to constrain groundwater pathways include the following:

- Microdiorite dykes, about 2–5 m thick, are oriented subparallel to the regional NNW shear zones, likely exploiting the tectonic fabric during intrusion. They extend laterally over distances of tens to thousands of metres. These crystalline rocks are likely aquitards, constraining groundwater flow within NNW/SSE pathways.
- Silicified metasediment, chert and massive metasandstone beds are indurated, with consequently very low porosity. In zones of low strain, secondary fracturing in these rock types may be less than high strain zones, resulting in relatively reduced groundwater conductivity.

3.2.2 Physiographic controls on flow

At DCM, the topographic variation is generally less than 40 m but characterised by rugged ridges and incising drainage lines. Even small changes in elevation, however, can have a significant influence on local groundwater and surface water flow paths. Local topographic gradients control the direction and rate of flow in both surface runoff and shallow groundwater systems through surface recharge.

Surface recharge will infiltrate downwards along pre-existing structural features such as shear zones, cleavage planes and bedding surfaces. These planes of weakness act as preferential pathways, allowing water to move sub-vertically from the surface towards deeper portions of the aquifer, where flow is compartmentalised by the controlling geology into NNW/SSE aquifers. The regional catchment system drains at a low gradient towards the NNW into the Gulf of Carpentaria. This regional flow direction will likely control preferential deeper aquifer flow towards the NNW.

At a local scale, conductivity down subvertical joints may intersect sheeting joints if present near the surface, partially or wholly capturing flow to discharge where sheeting joints intersect topography. Consequently, shallow groundwater may discharge along ridge slopes as seeps, with localised flow direction controlled by topography.

3.2.3 Hydrogeological parameters

3.2.3.1 Current groundwater monitoring network

The current groundwater monitoring network consists of three monitoring sites at DCM and was established in the dry season of 2022 (Table 1). The relationship between the current borehole network and underlying geology is shown in Figure 8. The first monitoring round was undertaken about two months after bore installation. Continuous monitoring equipment has been installed in each monitoring bore to measure groundwater levels every four hours. Water quality monitoring has occurred seven times between October 2022 and May 2025, with a further reading collected in August 2025.

The lithology of the three monitoring bores listed in Table 1 is depicted in Figure 9 and Figure 10.

Table 1: Current groundwater monitoring network at DCM.

Bore ID	Eastings*	Northings*	Total depth (mBGL)	Surface elevation (mAHD)	Screen interval (mBGL)	Screened formation	Screened lithology
GW01	234497	8218901	86.5	429.34	80.5–86.5	Hodgkinson	Metasediment – phyllite/slate
GW03	234025	8218165	58.0	387.27	50–56	Hodgkinson	Metasediment – sandstone/greywacke
GW04	234740	8218311	83.0	420.31	75–81	Hodgkinson	Metasediment – phyllite/slate

*Projection GDA2020 Zone 55

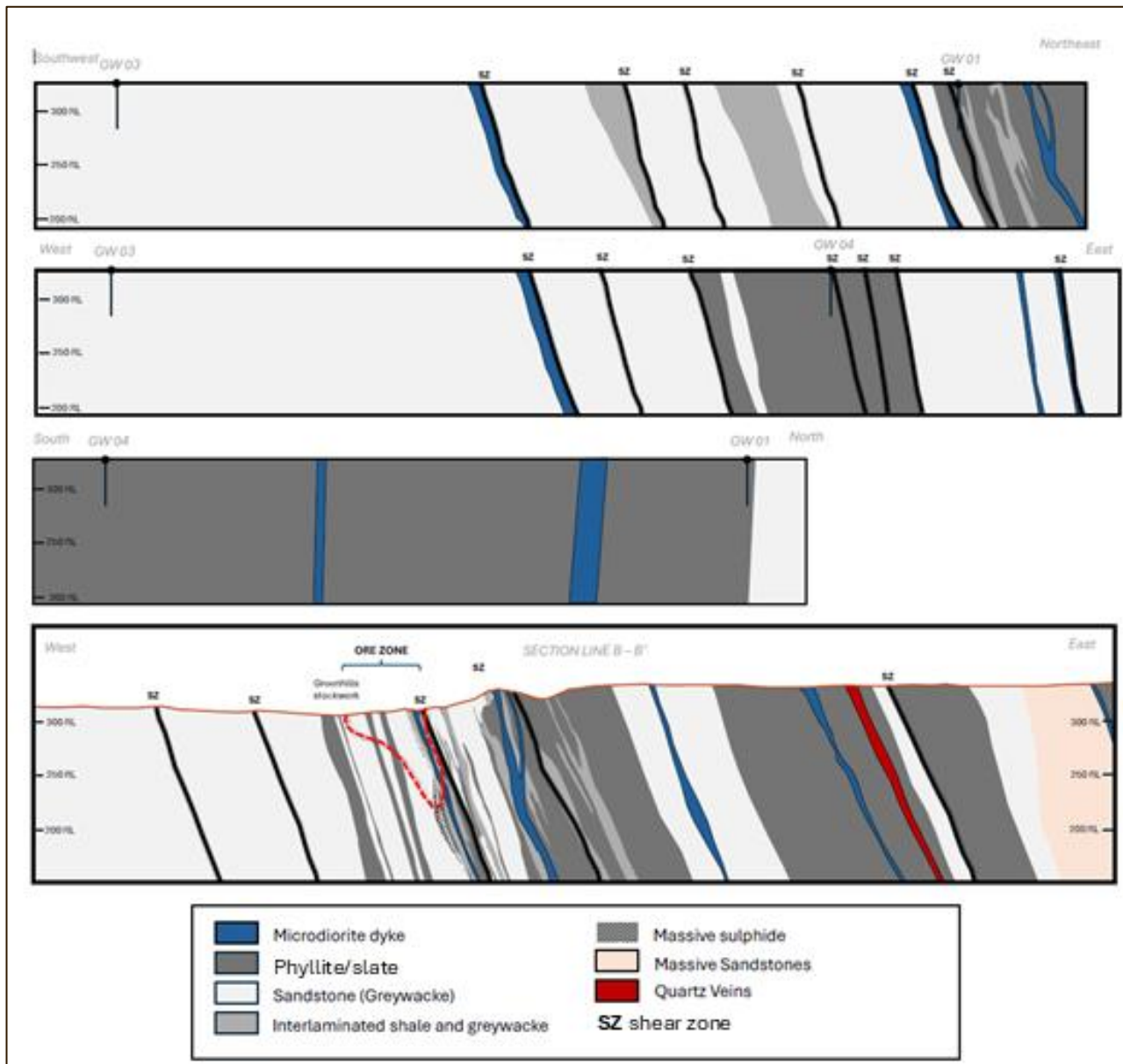


Figure 8: Geological cross-sections between boreholes GW03-GW01, GW03-GW04, GW04-GW01 and west-east through pit (B-B'). See Figure 1 for cross-section positions.

Borehole logs

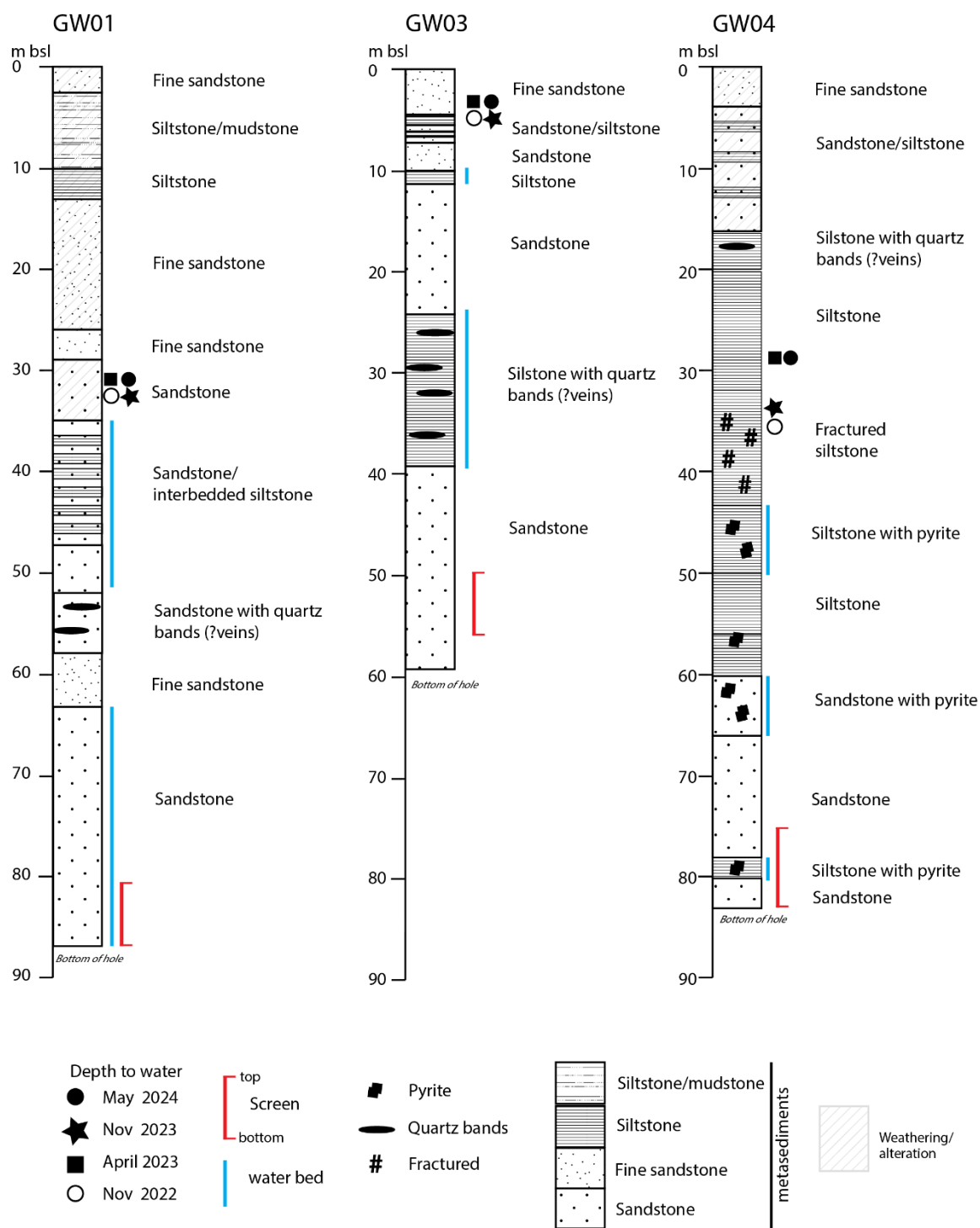


Figure 9: Bore logs of the current groundwater monitoring network.

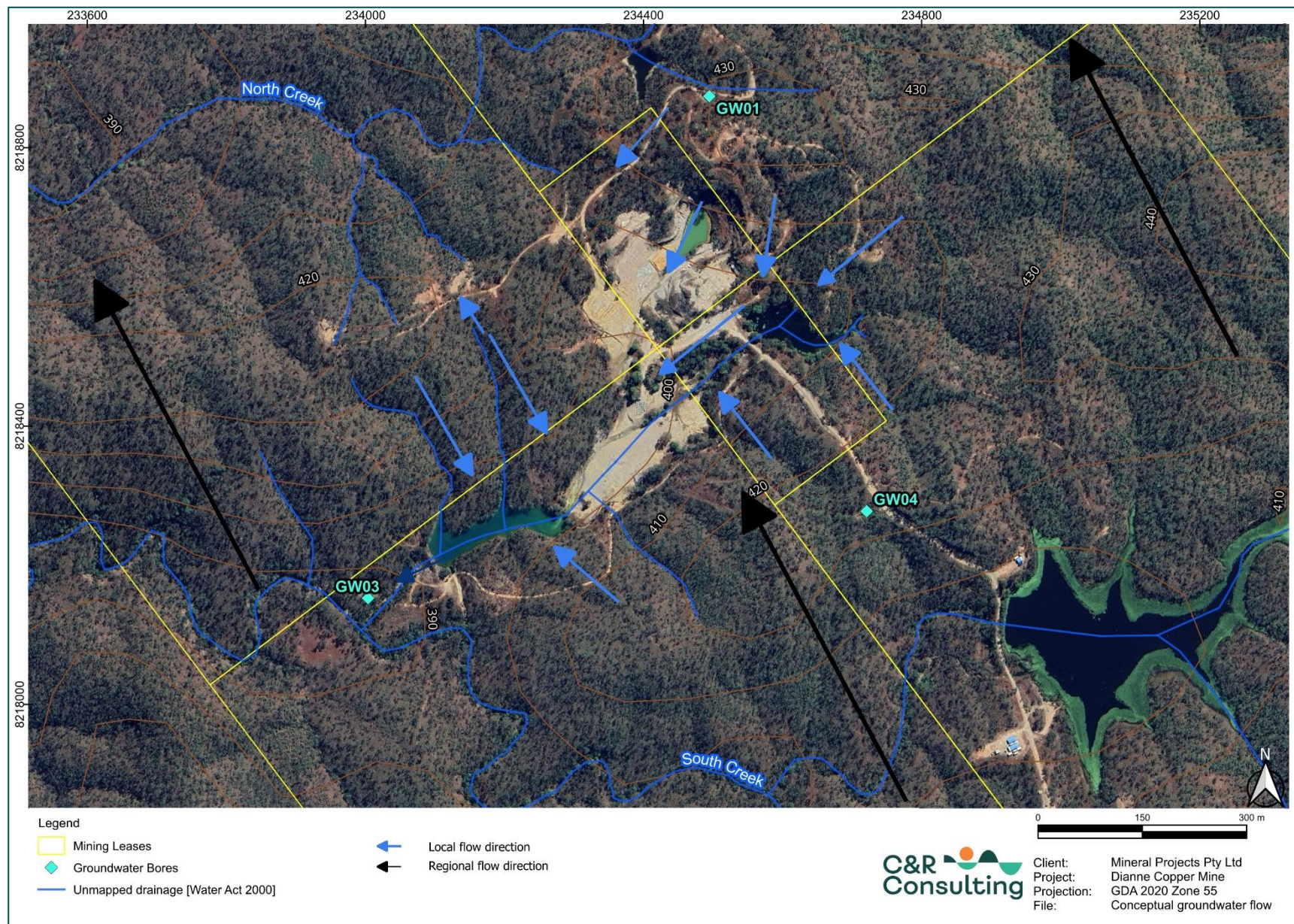


Figure 10: Groundwater bore locations and flow regime.

3.2.3.2 Hydraulic parameters

Between 26 and 27 August 2025, C&R undertook three replicate tests on each bore. Hydraulic conductivity was assessed using pneumatic slug tests. Each test was initiated by applying compressed air to the well casing to depress the water level below static equilibrium. The applied pressure was then rapidly released, allowing the water level to recover towards equilibrium. Recovery was monitored with an In-Situ Level Troll 500 transducer recording water level at 1-second intervals.

The test results were assessed using the AQTESOLV aquifer test analysis software program. Hydraulic conductivity (K) was determined using both the Bouwer and Rice (1976) and Hvorslev (1951) solutions, with results provided in Table 2. Outputs from the pump tests are displayed in Appendix A.

Table 2: Summary of hydraulic conductivity (K) test results.

Bore	Replicate	Bouwer–Rice K (m/day)	Hvorslev K (m/day)
GW01	A	3.057	3.132
	B	3.545	3.631
	C	3.640	3.729
	mean	3.414	3.497
	CV*	7%	7%
GW03	A	0.017	0.019
	B	0.016	0.018
	C	0.018	0.021
	mean	0.017	0.019
	CV*	6%	7%
GW04	A	0.199	0.202
	B	0.161	0.167
	C	0.162	0.167
	mean	0.174	0.179
	CV*	10%	9%

* Coefficient of variation (ratio of the standard deviation to the mean).

3.2.3.3 Drawdown impact predictions

The mine plan proposes excavation to a depth of approximately 124 m below ground level. Based on the hydraulic conductivity (K) values derived from tests completed in August 2025 (Table 2), the estimated inflow volume is 70 ML/yr. This estimate is primarily based on the GW01 K -value of 3.414 m/day (64 ML/yr), with additional contributions of 3 ML/yr each from longitudinal and latitudinal flow paths. Inflow volumes are dependent on the exposed depth of the void. This conservative estimate represents the best empirically derived value, given the vertical, largely impermeable, anisotropic nature of the system.

At 124 m depth, the pit is likely to intersect groundwater systems, which anecdotal evidence suggests have already been encountered. Groundwater inflows may occur through several pathways:

- Lateral movement along strike (deep and slow);
- Seepage from vertical transmissive zones intersecting the pit wall (e.g. altered or weathered zones adjacent to dykes or shear zones); or

- Discharge from shallow, horizontal joints around the pit wall.

Any localised reduction in the water table may also reduce the volume or duration of inputs into any associated watercourses following significant rainfall events.

Based on the same hydraulic parameters, drawdown values were estimated by reverse-engineering results to derive the parameters inherent in the Bouwer and Rice (1976) and Hvorslev (1951) methodologies. This process involved the back-calculation of real values from the normalised data plotted.

The derived information was used to estimate parameters applied in the Cooper and Jacobs (1946), Jacobs (1947), and Jacobs and Lohman (1952) approaches to predict drawdown, given the spatial positions of the boreholes relative to the pit. An approximate error analysis of this approach was also undertaken. The values presented are considered “*most likely*”, corresponding to a probability range of 0.67 to 0.95.

Estimating drawdown in fractured or faulted systems is inherently challenging due to unstable recharge zones and the tendency for narrow fracture pathways to become occluded (“cemented up”) during periods of aridity, limiting the accuracy of drawdown calculations. To estimate the likely magnitude of drawdown, an analytical approach was applied to bores GW01 and GW04. However, due to the anisotropy and geological architecture that predominantly control groundwater flow in a west–east orientation, this method was deemed inappropriate for GW03. The hydrogeological controls impose directional variations in hydraulic conductivity, while the geometry of the intervening aquitards restricts vertical and lateral flow in that direction. Based on the conceptual hydrogeological model, no hydraulic connection is interpreted between the pit and GW03. It is therefore considered that the anisotropy and geological framework exert a primary influence on the direction of groundwater flow and the extent of drawdown propagation.

In this analysis, the pit wall was considered the principal discharge point, which would have imposed asymmetry on the cone of depression around the boreholes. This asymmetry was not accounted for in the present investigation.

The results for GW04 are considered reasonably satisfactory. A greater degree of uncertainty is associated with the values for GW01. This arises from the high hydraulic conductivity values, approximately 20 times those of GW04.

Summary of drawdown values:

- GW01 – Most likely 6.8 m, most likely upper limit 34.0 m; and
- GW04 – Most likely approximately 1 m, most likely upper limit 4–5 m.

3.2.3.4 Constraints on numerical modelling

The geology in the project area is highly complex, with structural and lithological features exerting a dominant control on groundwater flow pathways. These features cannot be reliably represented in a numerical model without significant uncertainty, which would undermine the defensibility of any predictions produced. In addition, the site itself has a very limited footprint (less than 50 ha), with no identified groundwater users in the vicinity and no formally recognised GDEs. In this setting, the benefits of a numerical model would be negligible relative to the level of effort, assumptions and uncertainty involved.

A targeted, conceptual approach provides a more proportionate and technically robust basis for assessing groundwater conditions at this site.

3.2.4 Groundwater elevations

The groundwater elevations recorded in all bores from October 2022 to May 2025 are shown in Figure 11. Water level fluctuations correspond with periods of increasing and decreasing recharge associated with rainfall at DCM, indicating that recharge is localised and occurs primarily in elevated catchments where rainfall can infiltrate fractured and weathered zones. Figure 11 also suggests a correlation between rainfall response and bore depth, with shallower bores showing stronger responses to recharge events. With increasing depth, permeability in fractured rock aquifers commonly declines due to fracture closure and reduced connectivity under higher stress conditions. However, in high strain zones, transmissive fractures, shear zones and altered structural fabrics can remain hydraulically active, locally enhancing flow despite the general trend of decreasing permeability with depth. These deeper features may behave as semi-confined conduits, with water levels in monitoring bores sometimes rising above the depth of intersected fractures, indicating semi-confined conditions.

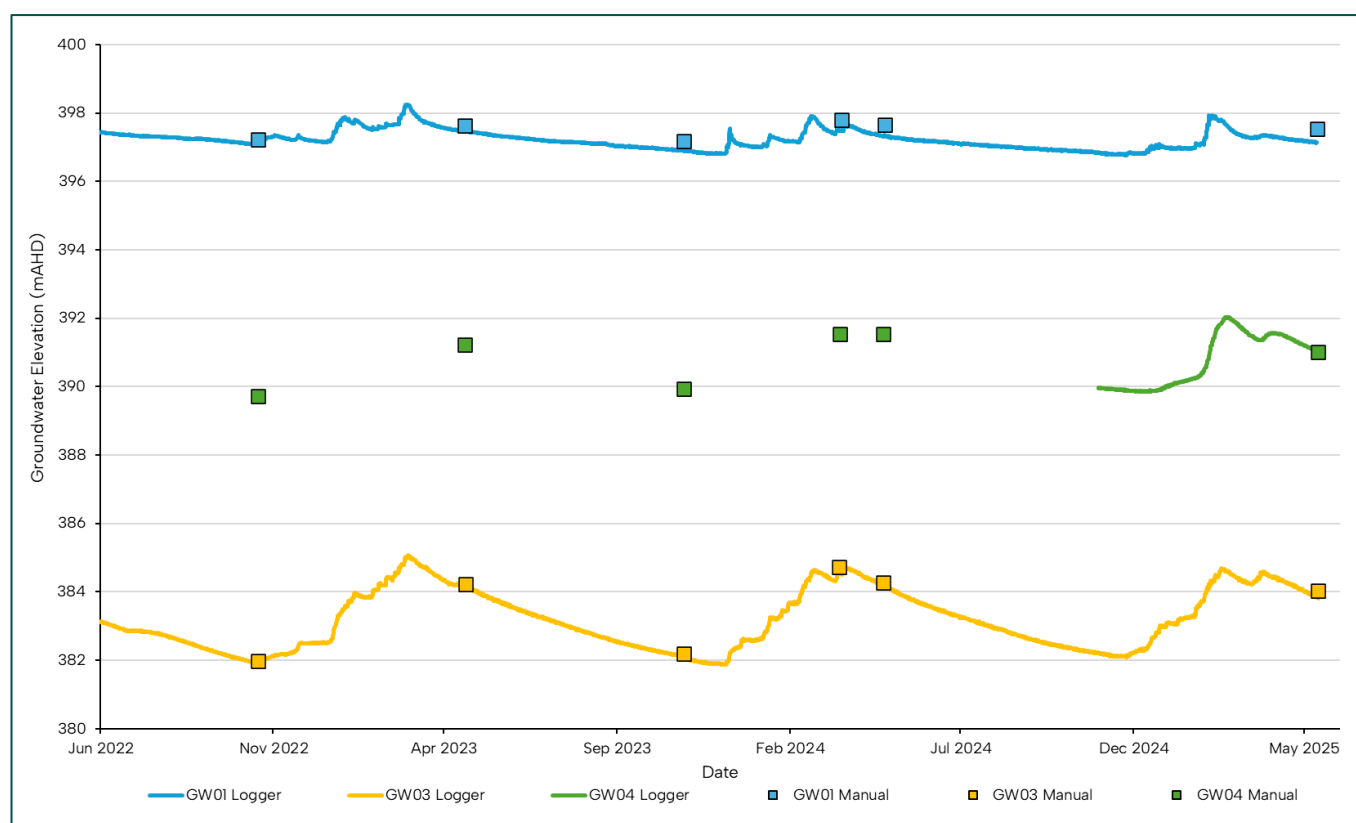


Figure 11: Hydrograph of groundwater bores in DCM from October 2022 to May 2025.

This mixed behaviour – unconfined recharge zones near the surface and semi-confined transmissive zones at depth – underpins their classification as complex unconfined aquifers. Storage within these systems is limited and tends to be compartmentalised, resulting in yields that can vary considerably over short distances. This interpretation is consistent with the bore responses observed during sampling, although further hydraulic testing is planned to refine estimates of hydraulic conductivity, potential inflow, drawdown extent and contaminant transport.

3.2.5 Recharge and discharge

RFI references: EA18; EA19

Recharge within the area is primarily local, captured by the pervasive geological fabric. Regional recharge is not considered meaningful due to the likely compartmentalised and localised nature of the aquifer system.

Shallow discharge occurs locally to surface flow, with most waterways in the area functioning as GDEs. Surface water flows and remnant pools are typically sustained for several months following significant rainfall events.

Baseflow is controlled by recharge and discharge processes through fractured rock aquifers characterised by subvertical cleavage, shear zones, lithological contacts and intersecting shallow (to approximately 10 m below surface) horizontal sheet joints. This fractured rock network facilitates connectivity between surface water recharge, shallow groundwater flow and surface water discharge.

Figure 11 presents the hydrographs for each monitoring bore. The response curves indicate that each bore exhibits a distinct hydraulic response to rainfall recharge events, reflecting spatial variability in aquifer characteristics and connectivity. In particular, GW03 demonstrates a response consistent with the current conceptual understanding of surface water–groundwater interactions within the catchment. The data suggest that the primary tributaries of South and Gum creeks operate as cyclic systems. To a lesser extent, the lower reaches of North Creek show similar behaviour, transitioning from losing conditions during high-flow events to gaining conditions as the dry season progresses. The hydrograph for GW03 supports this interpretation, with groundwater levels exhibiting a gradual recession indicative of sustained discharge to surface water features. This behaviour indicates hydraulic connectivity between the shallow groundwater system and surface drainage, maintaining residual baseflow and remnant pools well beyond the duration of direct runoff. As discussed in Section 3.2.3.3, the geological architecture controlling groundwater flow direction suggests very limited impact on GW03 groundwater levels. Consequently, impacts to baseflow are predicted to be minimal.

There is currently insufficient flow data to quantify baseflow contributions to regional ecosystems. However, field observations indicate a moderate baseflow contribution, evidenced by observed flow persisting for one to two months following the cessation of seasonal rainfall. Remnant pools have also been observed into the dry season (September to November), although this varies between years. Existing flow and depth gauges are not positioned within low-flow channels, resulting in no recorded flow until water levels exceed approximately 0.20 m.

At depth, groundwater is likely to discharge to surface drainage pathways. However, this remains conceptual because no regional model is currently available to confirm deeper flow dynamics.

3.2.6 Groundwater chemistry

RFI references: EA3i; EA3iii; EA4ii; EA5

Three groundwater monitoring bores were installed in mid-2022. Water quality monitoring has occurred seven times between October 2022 and May 2025 (Table 3). Based on the laboratory analysis data, the pH for all bores was within the range of 7.07–8.10 (Figure 12). ECs generally also varied minimally within and between the three DCM monitoring bores (Figure 12).

Table 3 compares the groundwater dataset against WQOs and ANZG guideline values. Dissolved metals and metalloids represent toxicants at different levels of protection, with trigger values applicable to typical slightly to moderately disturbed systems. Total metals and metalloids, by contrast, are derived from ANZG (2023) livestock drinking water guidelines.

Reported sulphate levels ranged from 41 mg/L to 70 mg/L in GW03 and from 14 mg/L to 69 mg/L in GW04. Conversely, GW01 has consistently shown lower sulphate levels, ranging from 9 mg/L to 24 mg/L over the six monitoring rounds. All sulphate concentrations are substantially below the ANZG (2018) WQO of 1,000 mg/L.

Water quality generally met all WQOs, except for dissolved manganese and zinc (Table 3). Exceedances of these metals are typical in highly altered zones and are associated with the target ore body. Copper and nickel concentrations also occasionally exceeded guideline values (Table 3).

In conjunction with the historical data collected to date and the proposed monitoring program (Section 6.2), DCM will have sufficient information to establish and implement interim groundwater contaminant limits before commencing extractive and processing activities. Analysis of the historical dataset indicates that, for most

parameters, the groundwater quality is sufficiently consistent to support the development of single trigger values, based on either site-specific derivations or relevant ANZG (2018) guideline values

All raw groundwater data collected over the reporting period (January 2020 – May 2025) have been supplied in Microsoft Excel format as part of this submission.

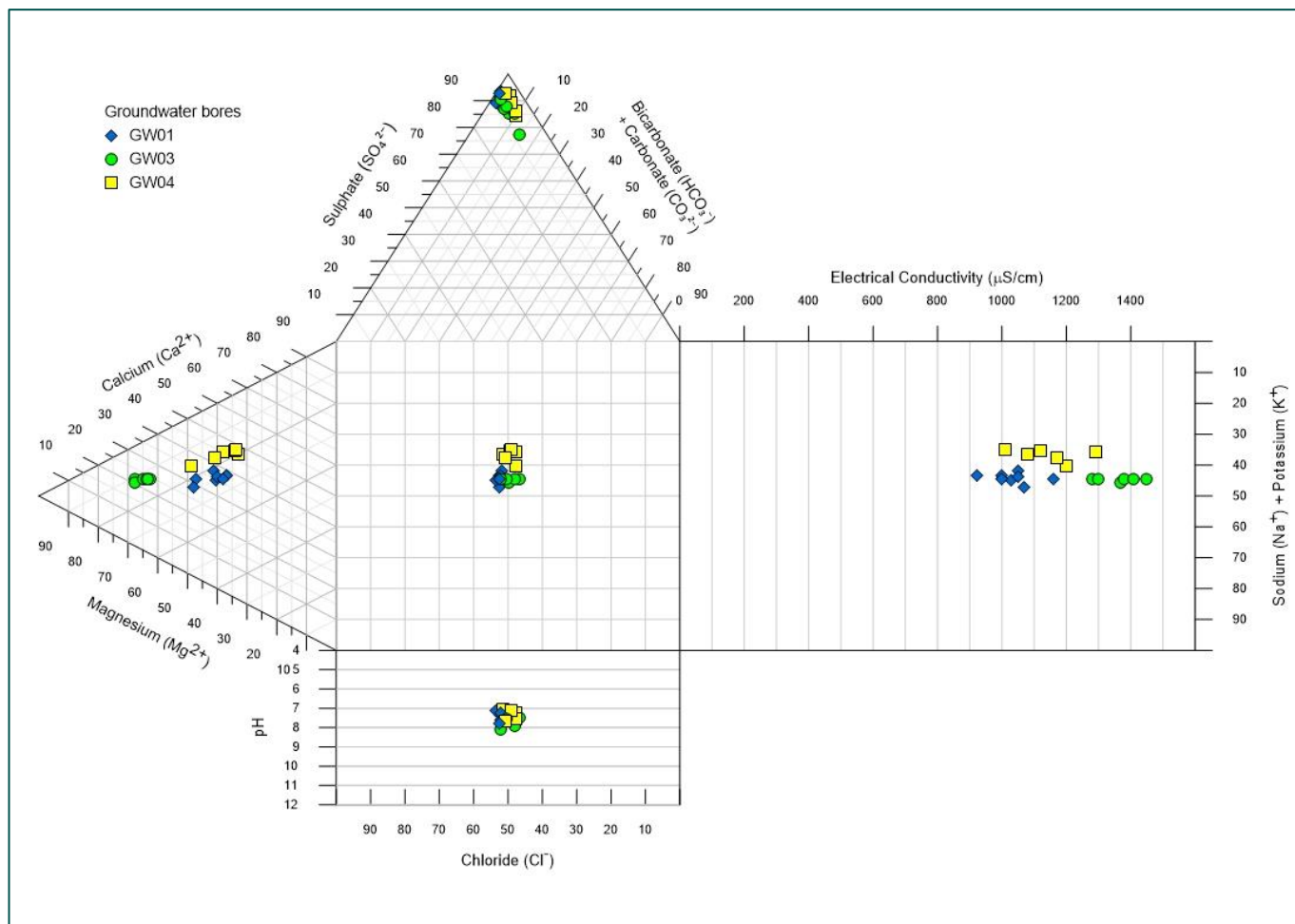


Figure 12: Hydrochemical facies of DCM monitoring bores.

Table 3: Historical groundwater quality against WQO and guidelines values.

Parameter	Unit	LoR	WQO	ANZG	GW01	GW03	GW04	GW01	GW03	GW04	GW01	GW03	GW04	GW01	GW03	GW04	GW01	GW04	GW01	GW03	GW04	GW04	GW01	GW03	GW03	GW04	GW01
					26/10/2022	26/10/2022	26/10/2022	27/04/2023	28/04/2023	27/04/2023	07/11/2023	07/11/2023	07/11/2023	31/01/2024	31/01/2024	31/01/2024	25/03/2024	25/03/2024	03/05/2024	03/05/2024	03/05/2024	7/11/2024	7/11/2024	7/11/2024	21/05/2025	21/05/2025	20/05/2025
pH	–	0.01	6 < > 8	6 < > 8.5	7.10	7.35	7.10	7.12	7.46	7.20	7.33	7.61	7.25	7.13	7.45	7.07	7.69	7.56	7.62	7.90	7.53	7.11	7.26	7.53	8.10	7.65	7.79
Electrical conductivity @ 25°C	µS/cm	1	125	500	1,000	1,960	1,840	1,160	1,450	1,680	1,070	1,370	1,200	1,030	1,380	1,080	1,050	1,120	1,050	1,410	1,290	1,010	921	1,280	1,300	1,170	998
Total dissolved solids @180°C	mg/L	10	–	–	572	1,320	1,300	636	878	1,120	638	910	754	618	848	670	592	656	600	858	744	676	582	838	852	715	585
Suspended solids (SS)	mg/L	5	–	–	<5	38	64	<5	12	34	<5	42	34	<5	<5	28	66	64	9	<5	32	55	26	33	20	26	<5
Total hardness as CaCO ₃	mg/L	1	–	–	364	327	439	366	261	424	333	269	358	319	272	402	366	429	341	270	422	387	325	251	260	381	328
Hydroxide alkalinity as CaCO ₃	mg/L	1	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbonate alkalinity as CaCO ₃	mg/L	1	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate alkalinity as CaCO ₃	mg/L	1	–	–	486	554	564	576	608	592	575	691	599	538	688	593	553	601	553	664	605	584	537	698	746	673	566
Total alkalinity as CaCO ₃	mg/L	1	–	–	486	554	564	576	608	592	575	691	599	538	688	593	553	601	553	664	605	584	537	698	746	673	566
Sulfate as SO ₄ ⁻²	mg/L	1	250	1,000	15	415	384	24	112	290	11	61	69	12	41	14	9	31	7	70	62	40	5	42	21	20	7
Chloride	mg/L	1	–	–	29	50	46	38	44	37	31	41	27	38	44	25	22	16	23	29	23	21	22	37	39	22	27
Calcium	mg/L	1	–	–	88	88	133	89	70	132	74	68	99	75	71	113	94	124	82	70	123	112	79	66	68	108	77
Magnesium	mg/L	1	–	–	35	26	26	35	21	23	36	24	27	32	23	29	32	29	33	23	28	26	31	21	22	27	33
Sodium	mg/L	1	–	–	97	366	308	148	248	264	139	258	154	99	230	90	116	101	104	207	117	88	86	203	205	118	92
Potassium	mg/L	1	–	–	2	5	6	2	3	6	2	3	4	1	3	2	2	3	2	2	2	3	2	2	2	3	2
Fluoride	mg/L	0.1	2.4	2.00	0.6	0.6	0.6	0.6	0.7	0.8	0.5	0.5	0.5	0.7	0.7	0.5	0.6	0.4	0.5	0.5	0.4	0.4	0.6	0.7	0.6	0.5	0.6
D – Aluminium	mg/L	0.01	0.055	0.055	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
D – Arsenic	mg/L	0.001	0.013	0.01	0.006	0.005	0.006	0.006	0.007	0.006	0.005	0.004	0.006	0.004	0.003	0.004	0.005	0.004	0.004	0.004	0.005	0.003	0.005	0.002	0.001	0.005	0.004
D – Cadmium	mg/L	0.0001	0.0002	0.00	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
D – Chromium	mg/L	0.001	0.001	0.00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
D – Copper	mg/L	0.001	0.0014	0.00	<0.001	<0.001	<0.001	0.026	0.001	0.003	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.002
D – Lead	mg/L	0.001	0.0034	0.00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
D – Manganese	mg/L	0.001	1.9	1.90	0.298	6.11	6.96	0.15	4.14	7.93	0.352	4.63	5.83	0.133	4.23	1.25	0.15	0.921	0.274	4.46	2.99	0.882	0.164	4.19	4.3	4.54	0.154
D – Nickel	mg/L	0.001	0.011	0.011	0.01	0.017	0.011	0.007	0.003	0.004	0.005	0.01	0.005	0.008	0.002	0.005	<0.001	<0.001	0.004	0.007	0.021	0.009	0.001	0.002	0.002	0.009	0.035
D – Selenium	mg/L	0.01	0.005	0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
D – Silver	mg/L	0.001	0.00005	0.00005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
D – Zinc	mg/L	0.005	0.008	0.008	0.006	<0.005	<0.005	0.018	0.016	0.011	<0.005	<0.005	<0.005	0.031	<0.005	0.032	<0.005	<0.005	<0.005	<0.005	0.008	0.029	0.01	0.015	<0.005	<0.005	0.006
D – Boron	mg/L	0.05	0.37	0.37	0.05	0.1	0.1	<0.05	0.07	0.12	<0.05	0.08	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	0.08	0.08	0.05	<0.05
D – Iron	mg/L	0.05	–	–	0.7	3.12	4.25	0.41	1.04	5.79	0.52	0.56	4.76	0.5	<0.05	1.75	0.61	2.19	1.36	1.18	4.02	1.64	0.57	0.26	2.09	8.05	0.42
D – Mercury	mg/L	0.0001	0.0006	0.0006	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	LoR	WQO	ANZG	GW01	GW03	GW04	GW01	GW03	GW04	GW01	GW03	GW04	GW01	GW03	GW04	GW01	GW04	GW01	GW03	GW04	GW04	GW01	GW03	GW03	GW04	GW01
					26/10/2022	26/10/2022	26/10/2022	27/04/2023	28/04/2023	27/04/2023	07/11/2023	07/11/2023	07/11/2023	31/01/2024	31/01/2024	31/01/2024	25/03/2024	25/03/2024	03/05/2024	03/05/2024	03/05/2024	7/11/2024	7/11/2024	7/11/2024	21/05/2025	21/05/2025	20/05/2025
T – Aluminium	mg/L	0.01	–	5.00	0.04	0.54	0.6	0.06	0.27	0.48	0.04	0.44	0.4	0.02	0.05	0.22	0.65	0.29	0.07	0.06	0.27	0.35	0.3	0.42	0.24	0.23	0.06
T – Arsenic	mg/L	0.001	–	0.50	0.006	0.006	0.006	0.006	0.008	0.007	0.006	0.006	0.006	0.005	0.004	0.005	0.005	0.005	0.004	0.004	0.005	0.005	0.006	0.009	0.003	0.006	0.005
T – Cadmium	mg/L	0.0001	–	0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
T – Chromium	mg/L	0.001	–	1.00	0.001	<0.001	0.003	<0.001	<0.001	0.002	<0.001	<0.001	0.01	0.003	<0.001	0.003	0.001	0.004	<0.001	<0.001	0.004	0.011	0.002	0.003	<0.001	0.002	0.003
T – Copper	mg/L	0.001	–	1.00	0.001	0.003	0.004	0.031	0.008	0.013	0.001	0.003	0.002	0.001	0.001	<0.001	0.135	0.003	0.004	0.008	0.003	0.011	0.044	0.052	0.033	0.001	0.032
T – Lead	mg/L	0.001	–	0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	0.001	<0.001
T – Manganese	mg/L	0.001	–	–	0.287	5.74	6.94	0.146	4.26	7.87	0.4	4.77	6.35	0.155	4.47	1.44	0.167	0.987	0.29	4.79	3.18	1.05	0.183	4.48	4.27	4.59	0.159
T – Nickel	mg/L	0.001	–	1.00	0.01	0.02	0.012	0.008	0.008	0.006	0.006	0.014	0.01	0.011	0.003	0.01	0.004	0.01	0.006	0.008	0.024	0.027	0.005	0.006	0.002	0.01	0.034
T – Selenium	mg/L	0.01	–	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
T – Silver	mg/L	0.001	–	–	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
T – Zinc	mg/L	0.005	–	20.00	0.015	0.036	0.018	0.45	0.041	0.022	0.006	0.036	0.023	0.044	0.026	0.047	0.018	0.028	0.005	0.008	0.022	0.053	0.041	0.054	0.014	0.017	0.008
T – Boron	mg/L	0.05	–	5.00	<0.05	0.11	0.1	<0.05	0.07	0.11	0.11	0.08	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	0.08	0.08	0.05	<0.05
T – Iron	mg/L	0.05	–	–	0.74	3.84	4.64	0.48	2.09	5.92	0.58	2.9	5.52	0.62	1.02	2.2	1.17	2.46	1.45	1.52	4.37	2.78	1.12	3.7	3.07	8.79	0.55
T – Mercury	mg/L	0.0001	–	0.002	<0.0001	<0.0001	<0.0001	0.0003	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Ammonia as N	mg/L	0.01	–	–	0.02	<0.01	0.05	0.03	0.04	0.03	0.11	<0.01	0.07	0.06	0.04	0.04	0.04	0.05	0.09	<0.01	0.35	0.01	0.03	0.02	<0.01	<0.01	0.02
Nitrite as N	mg/L	0.01	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate as N	mg/L	0.01	0.7	400	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.04	<0.10	<0.01	<0.01	<0.01	0.02	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Nitrite + nitrate as N	mg/L	0.01	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.04	<0.01	<0.01	<0.01	<0.01	0.02	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Total Kjeldahl nitrogen as N	mg/L	0.1	–	–	0.1	0.2	0.3	<0.1	0.2	0.2	0.7	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.4	0.2	0.1	0.1	0.3	0.1	0.1	<0.1
Total nitrogen as N	mg/L	0.1	–	–	0.1	0.2	0.3	<0.1	0.2	0.2	0.7	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.4	0.2	0.1	0.1	0.3	0.1	0.1	<0.1
Total phosphorus as P	mg/L	0.01	–	–	0.02	0.07	0.1	0.02	0.19	0.09	0.05	0.2	0.06	0.02	0.27	0.06	<0.01	0.05	0.07	0.14	<0.01	0.06	<0.01	0.34	0.38	0.18	0.06
Reactive phosphorus as P	mg/L	0.01	–	–	<0.01	<0.01	0.04	<0.01	0.01	<0.01	<0.01	0.07	<0.01	<0.01	0.13	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.17	<0.01	<0.01	<0.01
Total anions	meq/L	0.01	–	–	10.8	21.1	20.6	13.1	15.7	18.9	12.6	16.2	14.2	12.1	15.8	12.8	11.8	13.1	11.8	15.5	14	13.1	11.4	15.9	16.4	14.5	12.2
Total cations	meq/L	0.01	–	–	11.5	22.6	22.3	13.8	16.1	20.1	12.8	16.7	14	10.7	15.5	12	12.4	13	11.4	14.4	13.6	11.6	10.3	13.9	14.2	12.8	10.6
Ionic balance	%	0.01	–	–	3.13	3.34	4.12	2.72	1.15	3.09	0.63	1.32	0.72	5.98	1.03	3.44	2.32	0.23	1.98	3.67	1.61	5.9	5.38	6.59	7.42	6.09	7.03
C6–C9 fraction	µg/L	20	–	–	30	20	80	<20	50	100	<20	30	40	<20	50	<20	<20	<20	<20	<20	<20	<20	20	<20	<20	40	<20
C10–C36 fraction (sum)	µg/L	100	–	–	<50	<50	490	<50	190	290	<50	<50	360	<50	190	2180	820	330	<50	50	190	<50	250	280	<50	120	<50
Benzene	µg/L	1	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

LoR – limit of reporting.

4 Conceptual groundwater model

A conceptual hydrogeological model for fractured hard rock aquifers provides a simplified framework for understanding how groundwater is stored and transmitted within a structurally complex environment. This model outlines key hydrogeological units, structural and physiographic controls, recharge and discharge mechanisms, and potential interactions between surface water and groundwater. This framework serves as rationale for establishing the groundwater monitoring network, to establish an ongoing dataset to better understand the system, and guide groundwater management to maintain environmental values in and around the site.

The regional tectonic setting and deformation history provide context for this conceptual model. They control primary lithology, metamorphism and structural overprints, which in turn influence the regional and local fabric that governs groundwater pathways and reservoir characteristics. Conceptualisation of the groundwater regime within the mining lease at DCM reflects this complexity. Typically, unconfined, fractured rock aquifers consist of networks of fractures, joints and faults that store and transmit groundwater. The discontinuous nature of such fractures results in groundwater flow often being localised and compartmentalised, leading to a series of small, isolated flow systems, rather than the more commonly characterised, large, interconnected aquifers. Key elements of this conceptual model are summarised in Table 4, Figure 10 and Figure 13.

Table 4: Hydrogeological elements of DCM fractured aquifer system.

Hydrogeological controls	Description	Hydrogeological response
Hydrogeological units	Dominant rock type – fine-grained, phyllitic metasediment. A range of other rock types with potential porosity but localised distribution (e.g. altered and weathered microdiorite, sandstone, gossan cataclastics).	Potentially conductive units.
	Crystalline, unweathered microdiorite. Indurated metasandstone, thick-bedded to massive.	Aquitards.
Structural control	Strata are subvertical to steeply dipping (~70°) towards the east. A pervasive NNW shear fabric is associated with primary bedding, cleavage, fracture, associated extensional veins and microdiorite intrusions in subparallel alignment. Associated intersecting lineations also dip subvertically.	Fluid migration pathways are down subvertical joints, along cleavage/shear planes and bedding planes. Conductivity is constrained NNW/SSE.
	Sheeting joints observed at pit/outcrop scale, related to horizontal compressional regime.	Shallow intersection of vertical flow paths partially or wholly capturing flow to discharge where sheeting joints intersect topography.
Geomorphology	Regional catchment surface flow is of low gradient, trending towards NNW.	Regional migration pathways at depth towards NNW.
	Rugged, incised topography with ~40 m elevation difference between ridges and drainage lines.	Seeps and spring surface-discharge of shallow groundwater where sheeting joints intersect topography.
	Soil and exposed outcrop in rugged terrain.	Surface recharge from rainwater through soil and exposed fractured rock.

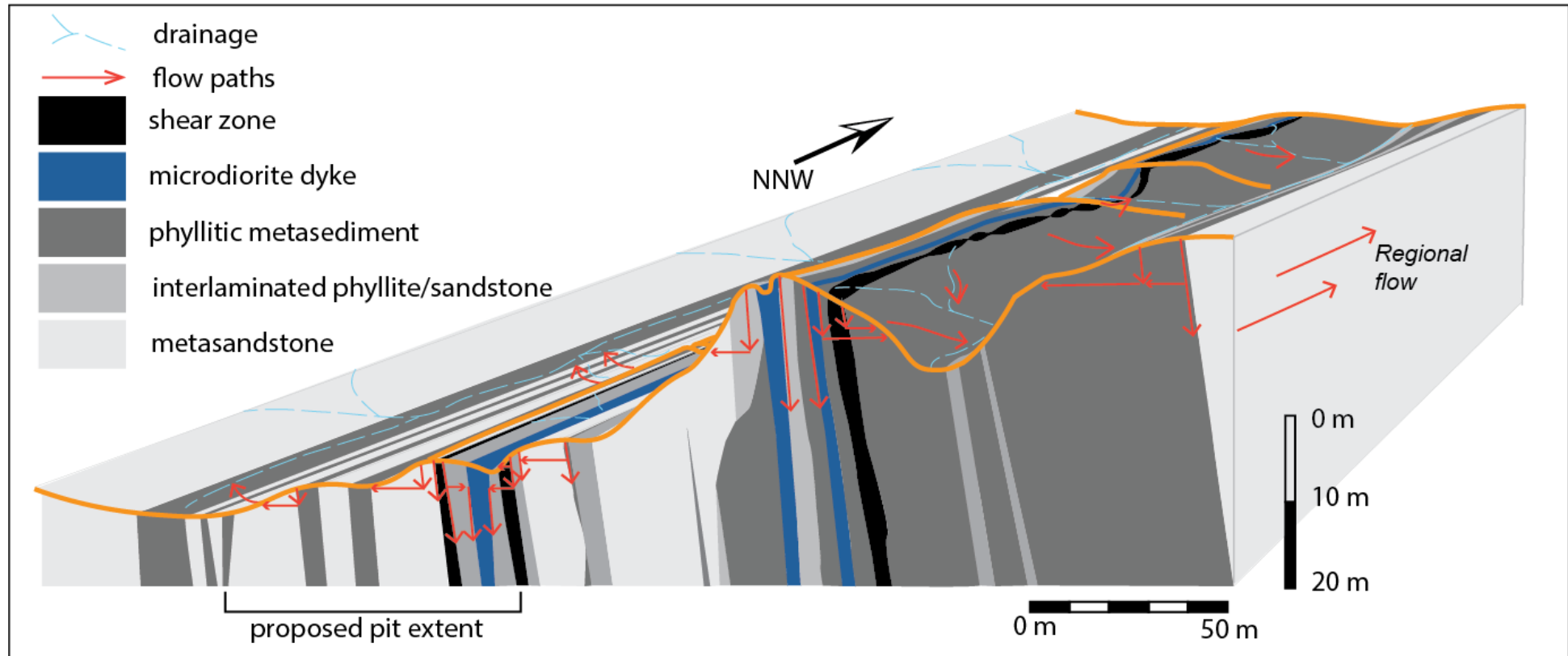


Figure 13: Conceptual hydrogeology drawing. The geological cross-section shows lithology and stratal structure. The orange line highlights topography. Sub-vertical flow paths (red arrows) indicate surface recharge localised at ridges, bedding planes, dyke–metasediment contacts and shear/weathering zones. Horizontal arrows show diversion of vertical flow along shallow sheeting joints. Curved arrows indicate surface discharge where horizontal joints intersect topography. Note variable scales showing vertical exaggeration.

In summary, groundwater flow and storage in this fractured aquifer system are primarily controlled by secondary features such as fractures, joints, bedding planes, shear and weathered zones. The steeply east-dipping strata of interbedded metasediments, intrusive dykes and veins compartmentalise flow and constrain deeper regional groundwater movement to the NNW. Additionally, shallow horizontal secondary joints intersecting topography capture vertical flow and discharge shallow groundwater to ridge slopes and intersecting drainage lines.

Recharge processes are localised and strongly influenced by topography and fracture density. Recharge is via vertical infiltration through steeply dipping fractures, cleavage and bedding surfaces as well as weathered zones, including shear zones and dyke margins. It is therefore closely linked to rainfall. Shallow discharge commonly occurs via springs or seeps intersecting transmissive zones of horizontal joints. Deeper infiltration is compartmentalised by crystalline and indurated rock units, aligned within the regional fabric to the NNW/SSE. Regional catchment gradients to the northwest likely control preferential deep flow to the NNW. Infiltration depth is unknown but is likely limited to relatively shallow levels (e.g. less than about 200 m) because the weight of overlying rock reduces fracture apertures with increasing depth (Fernandez et al., 2023).

This conceptualisation provides the foundation for identifying preferential flow paths and, where appropriate, applying simple quantitative techniques to support groundwater assessments. With ongoing monitoring, it also enables evaluation of uncertainties associated with the spatial heterogeneity inherent in fractured rock environments.

5 Mine expansion risk

5.1 Potential contaminant sources

RFI references: EA3ii; EA4ii; EA10; EA18

The proposed expansion increases the levels of disturbance and operational activities from 14.1 ha to a maximum of 50 ha, which may pose a risk to groundwater quality. Potential contaminant sources include chemicals used in ore processing (HLP leachate) and the failure to contain mine-affected water (MAW). Seepage from these sources of elevated contaminants of concern may result in detrimental impacts on groundwater and surface water quality. Any such increases could subsequently affect downstream receiving environments.

Waste rock dumps (both in-pit and out-of-pit) containing construction material, overburden (<0.2% copper cut-off) and spent ore are sites of rainwater percolation, with potential groundwater interaction in the case of in-pit waste. This percolation can result in seepage to pit water, groundwater and surface water. Geochemical characterisation of DCM indicates that 95% of the total quantity mined is chemically benign, but some ore and overburden material is potentially acid-forming (PAF), comprising 230 kt of the 4,211 kt total mined.

The waste rock characterisation by Noventum Group Pty Ltd (Noventum, 2025) indicates that 75% of waste material will be oxidised metasandstone/shale. The waste domains show enrichment in copper, cadmium, zinc and, to a lesser extent, silver and boron relative to average crustal abundance. This is consistent with sediment quality data from samples downstream of the existing settlement pond and legacy waste rock dump, which show exceedances of sediment quality objectives for copper, cadmium and zinc (C&R, 2024a), implying that these metals are signature contaminants of the waste rock. In contrast, sediment sampling across the mine lease area shows generally elevated fluoride, manganese and sulphate, indicating elevated background levels rather than contaminant transmission.

More than 75% of analysed waste material samples are sulphur-barren (contain <0.07% sulphur). Acid-base accounting indicates that the waste rock is likely acid consuming, with a low risk for acid mine drainage (AMD; Noventum, 2025). Noventum (2025) provides a more complete assessment of waste rock geochemistry and explanations.

The HLP and process water dams host potential contaminants associated with ore processing. Agglomerated ore material delivered to the HLP is leached with dilute sulphuric acid to dissolve copper carbonate mineral species and enable oxidation of copper sulphide mineral species by direct bacterial oxidation. Ferric and ferrous sulphates are produced by direct and indirect bacterial oxidation. Copper leaching from carbonate species takes days to months. Leaching of copper sulphide species by bacterial-enabled leaching takes 9–12 months (Noventum, 2025).

The acidic copper leachate (pregnant liquor) is captured and treated using electrowinning that extracts the copper onto sheets charged as cathodes in an electrical circuit. Once the extraction process is completed, the remaining liquor is treated through a solvent extraction process so that the acid can be recycled again through the heap leach process. The leaching area (pads, lined storage and lined process ponds) is constructed to minimise the risk of contaminating surface water and groundwater receiving environments. Site preparation involves clearing, stripping topsoil and removing reactive clays, followed by engineered fill placement sourced from early mining under strict quality assurance control for compaction and moisture. A compacted minus 19 mm road base “under-cushion” layer is installed beneath all lined areas to provide a stable foundation. Sub-soil drainage systems, arranged in a herringbone pattern, are constructed using perforated pipes embedded in aggregate and wrapped in geotextile to enable controlled collection and conveyance of any leakage. In the unlikely event of a breach of the HLP or process-water dam infrastructure, contaminants of concern would

include elevated sulphate and copper. These would be readily detected at groundwater and surface water monitoring sites, allowing for early detection of leaks, rapid identification of the source and timely repair.

The implementation and continuation of surface water, REMP and groundwater monitoring regimes – discussed in detailed in Section 6 – will enable DCM to accurately detect and assess the contaminants of concern.

5.2 Surface water and groundwater discharge

RFI references: EA3ii; EA4ii;
EA6; EA8; EA18

Figure 14 displays the hydrochemical facies from the four environments monitored at DCM: groundwater, raw water dam, MAW dams and the receiving environments of North, South and Gum creeks. There is a clear delineation between the non-mine-affected environments groundwater, raw water dams and, to a lesser extent, the receiving environment. The groundwater elevation and hydrochemistry data collected to date indicate localised impact from historical mining immediately downstream of the present settling dam (Section 3.1.2). Surface water from the settling dam is characterised by high sulphate, low bicarbonate/carbonate and elevated cadmium, copper and zinc, compared with surface water elsewhere. Immediately downstream of the settling dam, surface water intermittently displays similar sulphate–bicarbonate/carbonate affinities, with elevated cadmium, copper and zinc, although this pattern is attenuated at sites further downstream. Sediment samples collected as part of the annual REMP assessment (C&R, 2024c) show a similar downstream trend. Figure 14 supports the groundwater conceptualisation that legacy mining issues have not impacted the deeper groundwater systems present at DCM.

These patterns reflect existing conditions from legacy mining activities, where waste rock and unprocessed ore material accumulated in the waste rock dump above the settling pond continue to leach into the pond and downstream areas. This represents a worst-case scenario because the proposed works will remediate the site, and new waste dumps will contain overburden and spent ore with a lower contaminant risk than the legacy material. Historical data, therefore, provide baseline evidence of limited contaminant migration to receiving environments. Furthermore, the historical dataset, together with the proposed monitoring program (Section 6), provide DCM with an adequate technical basis to derive and apply interim groundwater contaminant threshold criteria before the initiation of extractive and processing operations.

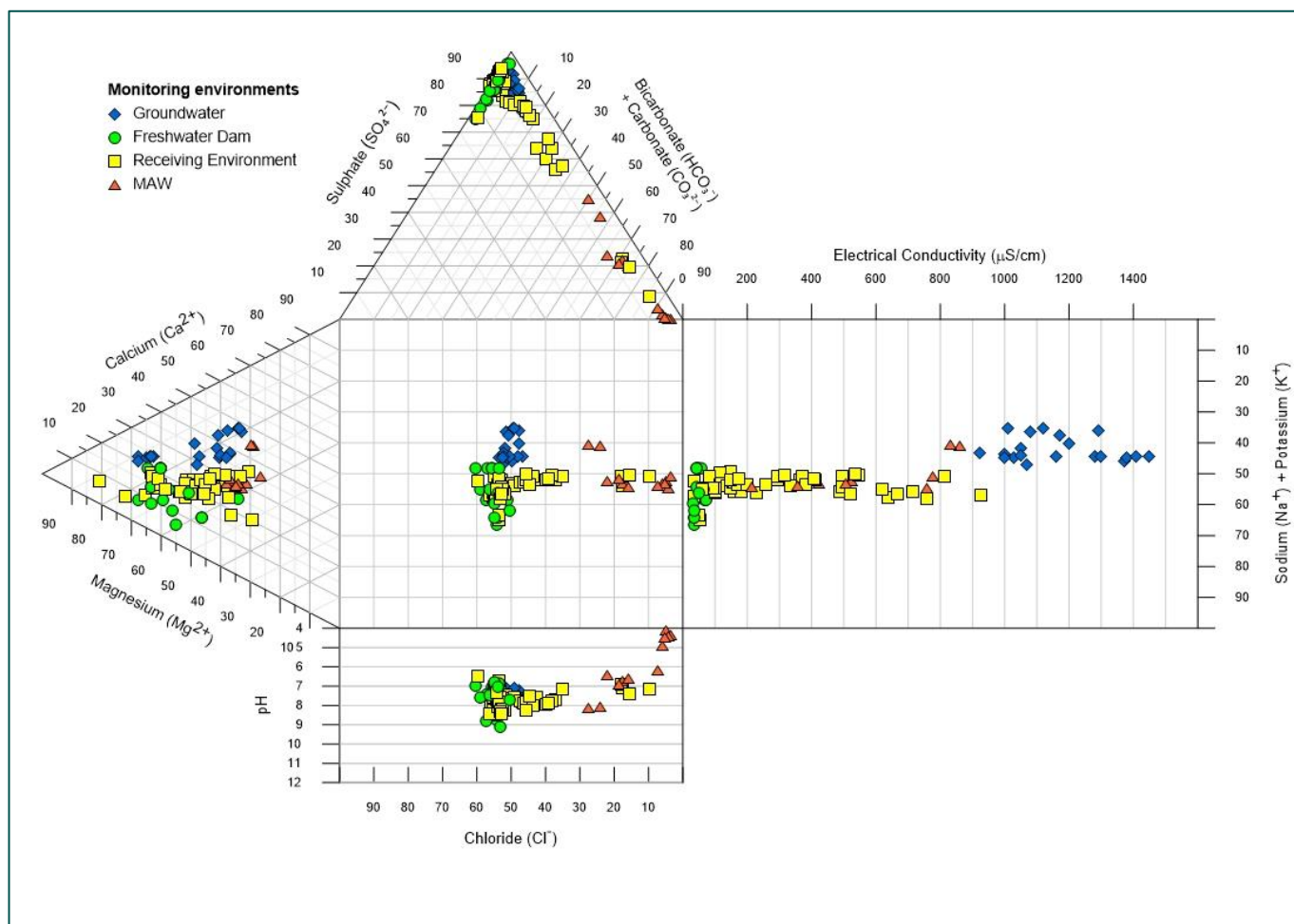


Figure 14: Hydrochemical facies of the four monitoring environments at DCM.

5.3 Groundwater-dependent ecosystems

No GDEs are currently mapped around DCM based on the national-scale GDE atlas by the Bureau of Meteorology (BoM, 2024). However, field assessments indicate that most waterways within the local area are GDEs because water (i.e. flows and remnant pools) is maintained for months following significant rainfall. Larger waterways within the local area exhibit an intermittent surface water–groundwater relationship. During periods of elevated groundwater levels following recharge events, creeks may transition to gaining systems, with groundwater sustaining flows and remnant pools beyond rainfall events. However, this connection typically diminishes and ceases altogether as groundwater levels decline through the dry season, reflecting the influence of the fractured rock geology, which allows hydraulic connectivity between groundwater and surface water systems.

Copper and zinc are signature contaminants associated with DCM and have remained elevated compared to WQOs in downstream receiving waters since investigations began in 2021 (C&R, 2021b, 2022, 2023, 2024c, 2025). However, concentrations of these metals have substantially decreased compared to the maximum levels recorded in April 2023, suggesting that on-site water management measures may be helping to reduce them (C&R, 2022, 2023). Despite this, habitat condition at all sites is characterised as *good*, with few physical anthropogenic impacts, which is consistent with watercourses in the region. The sites have a diversity of substrates but are primarily gravel and sand.

Conversely, macroinvertebrate indices suggest that communities inhabiting the upstream sites were in significantly better condition than the downstream sites in the receiving environment. The macroinvertebrate communities residing in the downstream sites showed reduced diversity and Plecoptera, Ephemeroptera and Trichoptera (PET) richness when compared with upstream sites, suggesting that an ongoing impact is occurring. The analytical tools used to assess macroinvertebrate communities support the findings of the water and sediment quality analysis – that the downstream sites in the receiving environment are impacted by historical and current uncontrolled releases (seepage) of MAW from DCM, although minor gains/improvements have been noted in some indices over the past few years as water management techniques improve on site.

The REMP design document will be updated before the commencement of extractive activities at DCM to ensure alignment with site-specific ecological values. The annual REMP assessment will include additional monitoring sites within the receiving environments of North and Gum creeks, targeting locations that represent sensitive regional ecosystems and water pools utilised by aquatic and terrestrial flora and fauna. C&R (2024b) developed site-specific interim WQOs based on upstream reference sites in South Creek, benchmarked against best-practice guideline values. It is recommended that these interim WQO are updated and implemented into the amended REMP design document.

Furthermore, biannual drone surveys will be undertaken at each creek site to assess riparian health and spatial extent, providing a means to detect early signs of ecological stress and to implement timely mitigation measures where required. The riparian health and extent will be assessed using images captured from a multispectral drone. A standardised plot will be established at each site using drone image capture software. The multispectral drone collects a red–green–blue (RGB) and a multispectral camera array, with five cameras covering blue, green, red, red edge and near-infrared (NIR) bands on a 3-axis, stabilised gimbal.

From these images, normalised difference vegetation index (NDVI) images can be created to determine the photosynthetic health of the vegetation. Additionally, the spectral response will identify bodies of water and bare ground that are not covered in vegetation. The images captured from the drone are georeferenced and must be analysed using the NDVI algorithms within imaging analysis software (such as DJI Terra). The software calculates the vegetation index outputs and assigns a class to each pixel, which is used to determine the photosynthetic health of the vegetation.

5.4 Regional ecosystems

The DCM site does not fall within a high-risk area (C&R, 2024d) as identified on the flora survey trigger map (Queensland Government, 2023). Searches across the study area failed to detect the presence of any plants of conservation significance. Additionally, no threatened flora species have been recorded within a 20 km radius from the site. It is unlikely that the project will impact any flora species of conservation significance.

No threatened flora species are known to occur within the study area and field surveys have not identified any threatened flora species. The flora survey trigger map (Queensland Government, 2023) does not identify the project site as being within a high-risk area. Suitable habitat does exist for several of the listed species.

The regional ecosystem descriptions within the site are provided in table 6 of the DCM terrestrial ecology report (C&R, 2024d). None of the regional ecosystems present within the study area have an *endangered* or *of-concern* vegetation management status. Furthermore, all regional ecosystems are classified as *least concern*.

As discussed in Section 5.3, implementing biannual drone surveys will enhance the management of riparian health and extent by providing regular assessments of site conditions, allowing for early identification of potential issues and timely application of mitigation measures if required.

5.5 Third-party users

Excluding the three groundwater monitoring bores, no registered groundwater bores exist within the bounds of the DCM mining leases, whereas drawdown is predicted to be minimal within the mining lease. The risk to other potential groundwater users is deemed extremely low, with no registered groundwater bores within 10 km of the mining leases.

Furthermore, government records accessed through the Queensland Globe (Department of Resources [DoR], 2025) spatial data portal indicate that – within a 30 km radius outside the mining lease – there are 31 registered bores, ten of which are abandoned (Table 5). Stated within the bore registration details, the purpose of individual boreholes varies and include:

- Groundwater monitoring bores;
- Mineral exploration; and
- Homestead and domestic stock water supply.

Table 5: Registered bores within 30 km of the DCM mining lease boundary.

Bore ID	Longitude (°E)	Latitude (°S)	PDF URL	Facility status	Date drilled	Role	Formation name	Top (m)	Bottom (m)
72158	144.3014	16.0325	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72158	Existing	13/08/1991	None	None	None	None
72573	144.3017	16.0335	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72573	Existing	15/05/1991	None	None	None	None
72867	144.7206	16.2067	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72867	Existing	24/09/1987	None	Hodgkinson Formation	27	40
72868	144.7373	16.193	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72868	Existing	3/10/1987	None	Hodgkinson Formation	25	54
72900	144.3761	16.229	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72900	Abandoned and destroyed	2/05/1986	None	Hodgkinson Formation	1.2	1.5
72901	144.3647	16.2233	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72901	Abandoned and destroyed	2/05/1986	None	Hodgkinson Formation	None	None
72902	144.3647	16.215	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72902	Abandoned but still usable	3/05/1986	None	Hodgkinson Formation	26.5	26.8
72903	144.3651	16.2093	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72903	Abandoned but still usable	4/05/1986	None	Hodgkinson Formation	12.5	42.1
72904	144.3677	16.2067	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72904	Abandoned and destroyed	5/05/1986	None	Hodgkinson Formation	None	None
72905	144.3704	16.2037	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72905	Abandoned and destroyed	5/05/1986	None	Hodgkinson Formation	None	None
72906	144.3731	16.201	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72906	Abandoned and destroyed	6/05/1986	None	Hodgkinson Formation	13.1	52.8
72907	144.3564	16.2177	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=72907	Abandoned and destroyed	7/05/1986	None	Hodgkinson Formation	17.4	48.5
148090	144.3044	16.035	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=148090	Existing	5/06/2009	Water supply	None	None	None
148091	144.3041	16.0352	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=148091	Existing	6/06/2009	Water supply	None	None	None
148193	144.3478	16.2276	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=148193	Existing	5/11/2009	Water supply	None	None	None

Bore ID	Longitude (°E)	Latitude (°S)	PDF URL	Facility status	Date drilled	Role	Formation name	Top (m)	Bottom (m)
157970	144.7508	16.1581	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=157970	Existing	10/08/2015	Water supply	Hodgkinson Formation	26	31
171328	144.3022	16.0386	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=171328	Existing	31/03/2016	Water supply	None	None	None
183166	144.7681	16.0481	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=183166	Existing	19/09/2018	Mineral or coal exploration	None	None	None
183574	144.75	16.0367	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=183574	Existing	10/05/2019	Water supply	Hodgkinson Formation	30.5	31
183574	144.75	16.0367	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=183574	Abandoned and destroyed	16/12/2019	Water supply	Hodgkinson Formation	37	38
183957	144.4394	16.3086	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=183957	Abandoned and destroyed	16/12/2019	Water supply	None	None	None
193202	144.7033	16.0075	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=193202	Existing	25/11/2020	Sub artesian monitoring	None	None	None
193203	144.698	16.0049	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=193203	Existing	18/11/2020	Sub artesian monitoring	None	None	None
193204	144.6955	16.0025	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=193204	Existing	18/11/2020	Sub artesian monitoring	None	None	None
193600	144.4481	16.3272	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=193600	Existing	27/11/2020	Water supply	None	None	None
193601	144.4439	16.3319	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=193601	Existing	24/11/2024	Water supply	None	None	None
193696	144.5179	16.0955	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=193696	Existing	2/06/2022	Sub artesian monitoring	None	None	None
193697	144.5135	16.1021	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=193697	Existing	2/06/2022	Water supply	None	None	None
193698	144.5202	16.1009	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=193698	Existing	2/06/2022	Water supply	None	None	None
203098	144.5885	16.327	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=203098	Existing	1/06/2022	Water supply	None	None	None
206644	144.2742	16.1861	https://resources.information.qld.gov.au/groundwater/reports/borereport?gw_pub_borecard&p_rn=206644	Existing	5/10/2023	Domestic stock	None	None	None

6 Integrated monitoring network

The proposed network expansion integrates both surface water and groundwater monitoring, reflecting the shallow cycling of groundwater and the short residence time associated with the local shallow sheet fracture network. The groundwater monitoring network includes seven additional monitoring bores, with two sites nested as shallow and deep bores. The siting of these ten monitoring bores aims to detect potential changes to groundwater conditions adjacent to mine infrastructure and is informed by the conceptual groundwater model and the likely surface water and groundwater discharge flow paths (see sections 4 and 5.2). The proximity of the proposed bores to mining infrastructure allows for timely detection of changes in groundwater level and chemistry (Figure 15).

Table 6 summarises the proposed monitoring network, integrating both groundwater and surface water monitoring.

Detailed rationale for bore sites is provided in Table 7. All groundwater monitoring bores intersect the Hodgkinson Formation, which is the sole geological formation and aquifer unit present at the site. However, individual bores are screened across varying lithologies within this formation, reflecting local heterogeneity in the fractured rock system.

Table 6: Integrated monitoring network.

Mine infrastructure	Lithological, surface water or leachate risk	Information reference	Potential flow pathways	Monitoring location and frequency	Rationale
Pit In-pit waste	- Pit water; - Spent ore; - Overburden (<0.25% cutoff grade copper); and - PAF material.	- Projectick (2025); - Noventum (2025); - Engeny (2025); - C&R (2021b, 2022, 2023) REMP reports; - C&R (2024b) surface water – groundwater impact assessment; and - C&R <i>Dianne Copper Mine – Hydrogeology RFI response</i> (this report).	Ponding in pit	Surface water: void (ID to be announced [TBA]); Quarterly.	Water that is potentially interacting with the ore body and exposed waste rock (where water is present).
			Infiltration to deep groundwater	- Groundwater: GW01 (screened at 80–86 m below surface); Quarterly. - Groundwater: GW07 (to be screened at 70 m below surface); Quarterly. - Groundwater: GW11 (to be screened at 70 m below surface); Quarterly.	- To monitor for any groundwater infiltration from pit water. - Dominant fracture surface pathways are subvertical. However, regional gradient is to NNW. Any lateral movement of groundwater will most likely be to NNW along shear zone (GW01), the metasediment cleavage fracture network (GW07), or along dyke/shearzone/metasediment contact (GW11). - Baseline groundwater quality before mine expansion activities.
				Groundwater: GW09 (to be screened at TBA following major earthworks and landform redesign); Quarterly.	Baseline groundwater quality before mine expansion activities in metasediment. In the event the pit-water generates a hydrological head directing deep groundwater infiltration to SE, groundwater chemistry changes may be detected.
				Groundwater: GW04 (screened at ~76–82 m); Quarterly.	Baseline groundwater quality upgradient of pit/mine workings and before mine expansion activities. Borehole in shear/alteration zone.
HLP and process liquor dams (PWDs)	- Leachate; - Sulphuric acid; and - Solvent.	- Projectick (2025); - Engeny (2025); - Noventum (2025); - C&R <i>Dianne Copper Mine – Hydrogeology RFI response</i> (this report); and - Ongoing assessment of multi-stage water extraction of spent ore for rinsing/treatment regime.	Beneath liner to surface runoff	- Weekly integrity inspection to assess for leakage. - Individual leak detection drains for each pad and pond to be sampled and tested daily in the event of outflows.	- Identify any liner failures in exposed areas of liner. - In the event of liner failure, contaminants will drain between the liner and the compacted earth through the leak detection drains. Having individual drains will allow identification of the source of failure.
			Beneath liner to infiltrate shallow groundwater (unconsolidated sediment)	- Groundwater: GW08; Quarterly. - Integrity inspection of each pad after removal of a spent ore stockpile.	- To assess level of any shallow subsurface infiltration to unconsolidated sediment. Baseline water quality before mine expansion activities. - Removal of spent ore stockpiles is the highest risk of liner damage but liner can be repaired before the risk to acid infiltration (when irrigation commences after the next stockpile is placed).
			Beneath liner to infiltrate deep groundwater	Groundwater: GW09; Quarterly.	To assess subsurface infiltration to deep groundwater. Dominant fracture surface pathways are subvertical. However, regional gradient is to NNW. Any lateral movement of groundwater will most likely be to NNW through metasediment cleavage fracture network. Baseline water quality before ore processing. Any contamination from heap leachate may be distinguished from pit water seepage (see pit water above) from geochemical signature.
			Surface seepage into unconsolidated sediment from heap leach or PWD	Groundwater: GW10 (to be screened at ~10 m below surface following major earthworks and landform redesign); Quarterly.	Proximal site in unconsolidated sediment (from mine operations) to detect any shallow seepage from heap leach or PWD.
Out-of-pit waste rock dump (NAF overburden, NAF spent ore)	Overburden (<0.25% cutoff grade copper)	- Waste rock characterisation report Noventum (2025); - Projectick (2025); and - Awaiting geotechnical testing for hydraulic conductivity for seepage models.	Surface water runoff	- Surface water: S06; Quarterly. - Surface water: SD02 and SD03; Weekly. - Visual inspection: SD02 and SD03; Weekly.	Final landform gradient towards south into the release dam; potential for minor northward flow, captured by surface/sediment drains.
			Surface infiltration to shallow groundwater, with shallow discharge to surface runoff	- Surface water: S06; Quarterly - REMP: AQ01 and AQ02; Bi-annually.	- Shallow groundwater/surface water discharge directed southward to sediment dams (SD02 and SD03). Runoff and passive overflows will be contained within bunding and directed downgradient to the release dam (S06). - Potential discharge northward not captured by surface drains will drain to North Creek. These sites will be incorporated into the REMP design document, whereby sites will be assessed for water quality, sediment quality, macroinvertebrate, as well as riparian health and extent.
			Surface infiltration to deeper groundwater	Groundwater: GW06 (to be screened at ~25 m below surface); Quarterly.	Dominant fracture surface pathways are subvertical. However, regional gradient is to NNW. Any lateral movement of groundwater will most likely be to NNW through the metasediment cleavage fracture network. Baseline water quality before mine expansion activities.
Out-of-pit waste rock dump (PAF overburden, PAF spent ore)	- Spent ore; and - Overburden (<0.25% cutoff grade copper).	- Projectick (2025). - Waste rock characterisation report Noventum (2025);	Surface water runoff	- Surface water: S06; Quarterly. - Surface water: SD02 and SD03; Weekly. - Visual inspection: SD02 and SD03; Weekly.	Daily visual inspection for leaching and pH to be completed prior to any releases of leachate via pipelines commencing into associated sediment dams (SD02 and SD03).

Mine infrastructure	Lithological, surface water or leachate risk	Information reference	Potential flow pathways	Monitoring location and frequency	Rationale
					Final landform gradient towards south into the release dam; potential for minor northward flow, captured by surface/sediment drains.
			Beneath liner to infiltrate shallow groundwater (unconsolidated sediment)	- Surface water: S06; Quarterly - REMP: AQ01 and AQ02; Bi-annually.	- Shallow groundwater/surface water discharge directed southward to sediment dams (SD02 and SD03). Runoff and passive overflows will be contained within bunding and directed downgradient to the release dam (S06). - Potential discharge northward not captured by surface drains will drain to North Creek. These sites will be incorporated into the REMP design document, whereby sites will be assessed for water quality, sediment quality, macroinvertebrate, as well as riparian health and extent.
			Beneath liner to infiltrate shallow groundwater (unconsolidated sediment)	Groundwater: GW06 (to be screened at ~25 m below surface); Quarterly.	Dominant fracture surface pathways are subvertical. However, regional gradient is to NNW. Any lateral movement of groundwater will most likely be to NNW through the metasediment cleavage fracture network. Baseline water quality before mine expansion activities.
Release dam (aka settling pond)	Pond water currently with contamination from legacy workings (elevated Cu and Zn; 'sulphate type' ionic composition and depleted dissolved carbonate).	- Engeny (2025); - C&R REMPs; and - C&R (2024a) aquatic ecology report.	Currently ponded water	Surface water: S06; Quarterly.	Pools surface water draining legacy-disturbed and -contaminated mine workings. Known poor water quality.
			Currently discharging from below dam wall through unconsolidated sediment and surface seepage	Surface water: S09; Quarterly.	- Known contaminated surface water seep from legacy mine workings. - Note: S09 will be decommissioned and incorporated into the new release dam (S06).
		C&R REMPs.	Surface infiltration to unconsolidated colluvium/regolith	REMP: S07, S11, S12 and S13; Bi-annually.	Known contaminated sediment from surface water seep from legacy mine workings. Monitoring sites provide both upstream and downstream coverage of potential contaminants entering South Creek.
			Infiltration to shallow groundwater in metasediment	Groundwater: GW05 (to be screened at ~7 m below surface); Quarterly.	To assess level of subsurface infiltration, if any. Baseline water quality before mine expansion activities.
			Infiltration to deeper groundwater in metasediment	Groundwater: GW03 (screened at ~50–56 m below surface); Quarterly.	Continued monitoring for infiltration of contaminated surface water to deep groundwater. Baseline water quality before mine expansion activities.
Existing waste rock dump	Legacy mine material.	Projectick (2025).	Surface runoff to the release dam; Surface infiltration to unconsolidated colluvium/regolith	Surface water: S06; Quarterly.	- Currently monitored at release dam and related downgradient drainage. - All material currently in the existing waste rock dump will be relocated to the run-of-mine as one of the earliest operations.
Run-of-mine (ROM) Sediment dam	- Existing waste rock dump material; and - Oxide and secondary sulphide material >0.2% copper.	- Projectick (2025); - Engeny (2025); and - Noventum (2025) waste rock characterisation report.	Surface water run-off	- Surface water: S15; Quarterly. - REMP: S07, S11, S12 and S13; Biannually.	- Runoff will be directed to sediment dams. Monitoring of surface water at sediment dam location (Engeny, 2025; Projectick, 2025). - REMP sites will be assessed for water quality, sediment quality, macroinvertebrate, as well as riparian health and extent.
			Deep groundwater infiltration along potential shearzone/alteration zone aquifer	Groundwater: GW04 (screened at ~76–82 m); Quarterly.	Baseline groundwater quality upgradient of mine workings and before mine expansion activities. Borehole in shear/alteration zone.
Roads, pads, dams, drains, HLP construction, hardstands, laydown areas	Overburden (<0.25% cutoff grade copper)	Projectick (2025).	Surface runoff	Surface water: S06, S14 and S15; Quarterly.	Noventum (2025) indicates negligible risk material.

Table 7: Proposed groundwater monitoring network and rationale for bore specification.

Proposed ID	Easting (GDA94, Z55)	Northing (GDA94, Z55)	Screened formation	Screened lithology	Surface RL (mAHD)	Total depth (m BGL)	Screen depth (m BGL)	Status	Rationale
DCM_GW05	234030	8218163	Hodgkinson Formation	Unconsolidated sediments	374.90	7.5	1.5–6	Phase 1	- Field evidence suggests that seepage is beneath dam wall. During construction of the mine, the settling dam and associated dam wall will undergo significant repair and remediation to prevent further seepage. A shallow bore downgradient will monitor any surface infiltration to ensure all remediation works have achieved the desired outcomes. - GW03 shows no evidence of impacts from historical mining operations, consistent with its position orthogonal to fabric-controlled fluid pathways (i.e. it is west of the dam). The new bore will be positioned on the same drill pad to allow comparative assessment between the shallow and deep aquifer systems downgradient of the settling pond.
DCM_GW06	234136	8218620	Hodgkinson Formation	Metasediment – sandstone/greywacke	417.60	22.6	16.6–22.6	Phase 1	- Monitor for seepage from waste dump site that may flow along fabric-controlled flow pathways and downslope into drainage line. - Baseline data before mine works. - Shallow bore within weathered zoned or zone adjacent to microdiorite dyke.
DCM_GW07	234379	8218808	Hodgkinson Formation	Metasediment – sandstone/greywacke	418.2	77.2	71.2–77.2	Phase 1	- Will assess any infiltration north-westward from the pit. The proximity to the pit will identify any short time-scale seepage/flow. - Recommendations for a single deep bore to capture potential fabric pathways (deep).
DCM_GW08*	234611	8218625	Hodgkinson Formation	Unconsolidated sediments	To be announced (TBA)	TBA	TBA	Phase 2	- Two new groundwater bores (one shallow, one deep) will be installed following completion of planned land reformation works, with the shallow bore targeting unconsolidated sediments and the deeper bore intersecting the underlying geological fabric pathways beneath the proposed HLP platform. - Initially will assess any topographically controlled infiltration southward from the pit and later will monitor any seepage from heap leach. - Baseline heap leach data before processing works commencing on the HLP.
DCM_GW09*	234611	8218625	Hodgkinson Formation	Metasediment – phyllite/slate	TBA	TBA	TBA	Phase 2	
DCM_GW10*	234427	8218506	Hodgkinson Formation	Unconsolidated sediments	TBA	TBA	TBA	Phase 2	- Shallow bore targeting potential subsurface seepage. - Initially will assess any topographically controlled infiltration southward from the run-of-mine (ROM) to the smaller tributary and later will monitor any seepage from the ROM. - Baseline ROM data before extraction works commencing and emplacement of ore on the ROM.
DCM_GW11*	234408	8218839	Hodgkinson Formation	Metasediment – microdiorite	TBA	TBA	TBA	Phase 2	- Deep bore to capture fabric-controlled fluid pathways along the ore body strike. - Baseline pit data before dewatering and extraction works commence.

* Approximate locations, to be confirmed with final constructed designs.

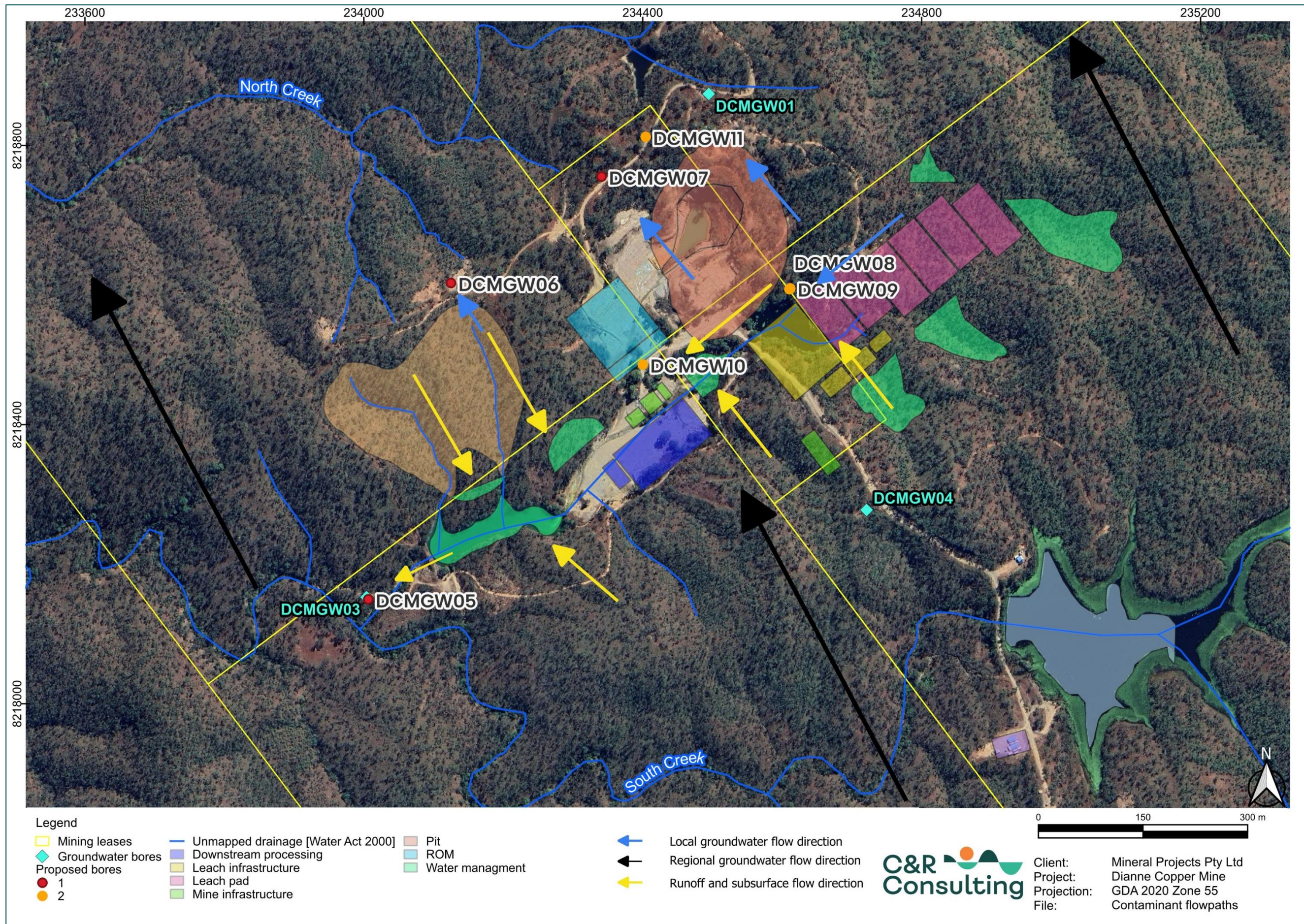


Figure 15: Proposed groundwater network with contaminants of concern preferential flow pathways.

6.1 Location and rationale

6.1.1 Surface water

Table 8.1 in Engeny (2025) outlines the surface water monitoring scheduled for DCM. In addition to quarterly sampling, bi-annual surveys within the receiving environment will be conducted. The REMP design document will be updated before extractive activities commence, expanding the network to include additional sites so that the receiving environments of North Creek and Gum Creek are incorporated into the annual REMP assessment.

6.1.2 Groundwater

Seven new bore locations are recommended (Table 7) based on the conceptual groundwater model and proposed mine expansion infrastructure plan. The expansion of the DCM groundwater monitoring network improves the ability to triangulate between existing and proposed bores, thereby enhancing spatial coverage and strengthening the capacity to define groundwater flow directions and gradients (Figure 15). In addition, the expanded network facilitates a clearer distinction between local variability within the shallow system and broader regional trends by incorporating bores positioned both up- and downgradient. This design increases confidence in detecting potential impacts and, collectively, these elements contribute to greater certainty and robustness of the DCM conceptual groundwater model. The proposed drilling program has been separated into two phases to allow for essential surface groundworks to be completed before the installation of monitoring bores DCM_GW08 to DCM_GW11. Rationale for each site is given Section 6.2.

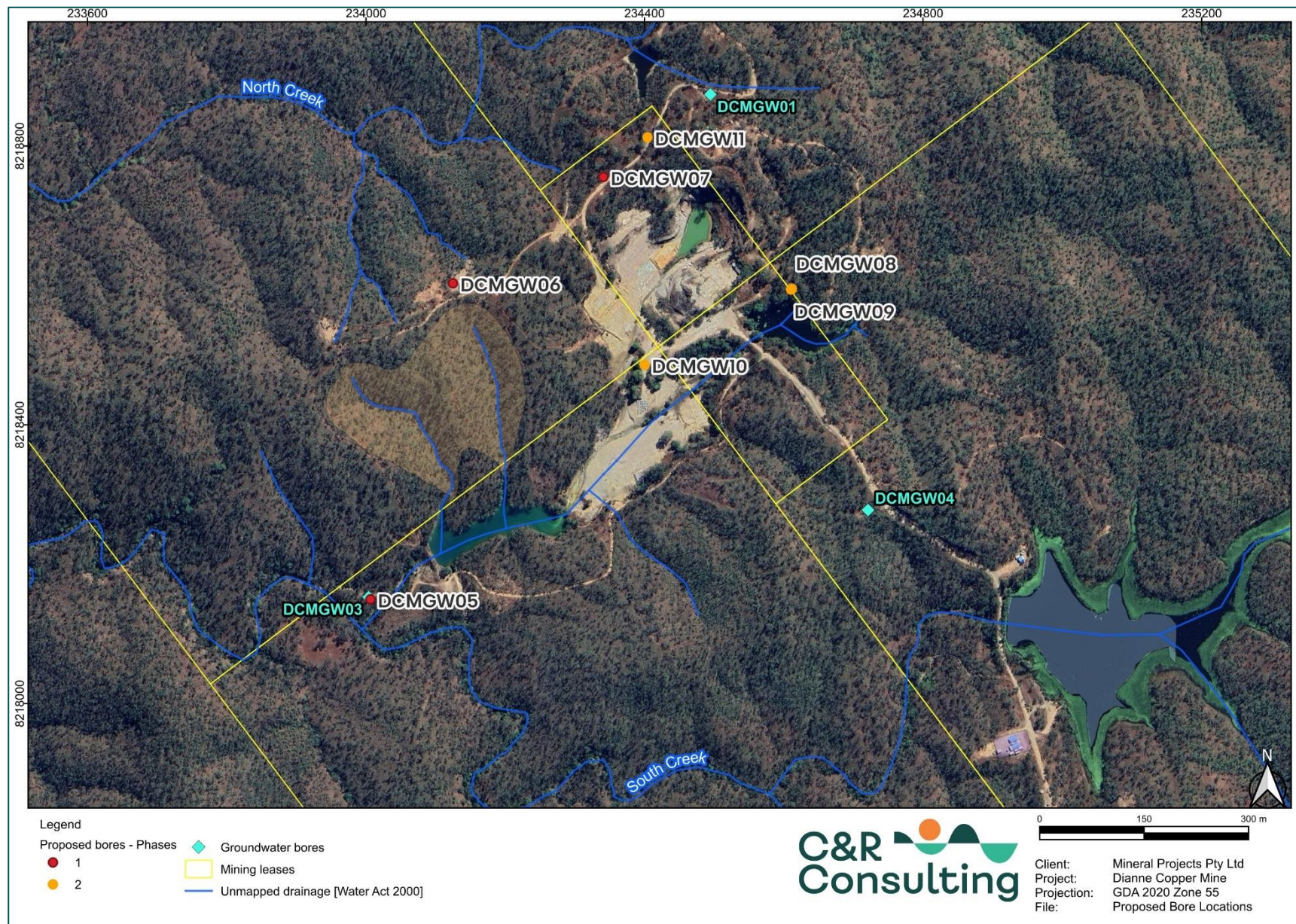


Figure 16: Proposed groundwater monitoring network.

6.2 Monitoring regimes

6.2.1 Surface water

6.2.1.1 Frequency

The on-site water management plan (Engeny, 2025) outlines the monitoring scheduled to be completed. Monitoring frequency is outlined in their table 8.1 (*surface water monitoring program*), with on-site water storage units monitored quarterly. Conversely, release dams and receiving environments are required to be sampled daily for one week during flow events with a duration greater than 24 hours, then weekly thereafter until the flow event ceases (when site and monitoring location safely accessible).

Additionally, bi-annual surveys within the receiving environment will be conducted under the REMP. The REMP design document will be updated before extractive activities commence, expanding the monitoring network to include additional monitoring locations so that the receiving environments of North Creek and Gum Creek are incorporated into the annual REMP assessment.

6.2.1.2 Sampling procedure

Sampling procedures are outlined within the DCM water management plan (Engeny, 2025) and the REMP design document (C&R, 2021a).

6.2.1.3 Analytes targeted

Basic water quality analysis was undertaken at each site using an in-situ field meter. The following parameters were measured:

- Water temperature (°C);
- EC (µS/cm);
- pH (pH units);
- Dissolved oxygen (DO; mg/L and %sat);
- Turbidity (nephelometric turbidity units [NTU]); and
- Oxidation–reduction potential (ORP; mV).

Grab water samples were also collected from each site and analysed at a National Association of Testing Authorities–accredited (NATA–accredited) laboratory for the following quality characteristics:

- pH;
- EC (µS/cm);
- Total dissolved solids (mg/L);
- Total suspended solids (mg/L);
- Major anions and cations (mg/L);
- Alkalinity (full suite; mg/L);
- Total hardness (mg/L);
- Dissolved and total metals (including aluminium, arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver and zinc; mg/L);
- Ammonia as N (mg/L);

- Nitrate as N (mg/L);
- Nitrite as N (mg/L);
- Nitrite + nitrate as N (mg/L);
- Total Kjeldahl nitrogen as N (mg/L);
- Total nitrogen as N (mg/L);
- Total and reactive phosphorus as P (mg/L);
- Total petroleum hydrocarbons (µg/L); and
- Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN; µg/L).

6.2.1.4 Quality assurance and quality control

To ensure appropriate sampling procedures are followed in the field, additional samples, quality assurance and quality control (QA/QC) techniques are required. These included the following:

- In-situ water quality meter is regularly calibrated;
- In-situ water quality meter is washed with ambient, potable water before sampling and thoroughly cleaned at the end of a sampling event;
- Samples were delivered to the laboratory within the appropriate holding times and holding conditions (specified by the NATA-accredited laboratory);
- One field duplicate for every 10 samples and one field blank for every 20 samples were collected during both the surface and groundwater sampling events to assess handling procedures;
- Field-filtering (0.45 µm) was undertaken for dissolved metals samples; and
- An appropriate chain-of-custody form was completed for each sample event for submission to the laboratory.

Duplicate samples were assessed for laboratory precision using the relative percent difference (RPD) equation, defined in the *Queensland Monitoring and sampling manual* (Department of Environment and Science [DES], 2018). DES (2018) reported that RPD values below 20% for water may be acceptable, provided the result is five to ten times the laboratory limit of reporting. Values greater than 20% may be acceptable if the result is close to the limit of reporting. This is an expression of the reduced certainty associated with results near the limit of reporting.

Blank samples were assessed for any results above the laboratory limit of reporting to provide an estimate of potential contamination associated with environmental conditions or sampling procedures.

6.2.1.5 Data collation and analysis

For the purposes of summarising the data and developing key statistics, all results below the limit of reporting have been assumed to be half the limit of reporting, in accordance with the *Queensland water quality guidelines* (Department of Environment and Heritage Protection [DEHP], 2009). This approach generates slightly lower descriptive statistics than using the limit of reporting. Hence, any WQOs developed from these statistics will be conservative.

There are no regionally specific WQOs available for the area. Instead, water quality data are assessed against the current best-practice guideline values detailed in ANZG (2018). Under these guidelines, watercourses of the area are considered *slightly to moderately* disturbed due to the existing land uses within the catchment area. Therefore, the 95% species protection level guideline values for freshwater ecosystems are considered the most relevant to the study area.

It is recommended that site-specific WQOs be determined for these systems once sufficient data have been collected (i.e. interim WQOs can be developed on a minimum of 8 data points from each bore). Site-specific WQOs should be developed for groundwater monitoring bores in accordance with the following relevant guidelines/methods:

- *Using monitoring data to assess groundwater quality and potential environmental impacts* (DES, 2021);
- ANZG (2018); and
- DEHP (2009).

The annual REMP assessment will be completed and submitted to DETSI upon request or by the specified annual date.

6.2.2 Groundwater

Eight historical data points are available from the existing monitoring network (DCM_GW01, DCM_GW03 and DCM_GW04). These provide a foundation for establishing interim groundwater contaminant limits, which will be implemented ahead of extractive and processing activities. Historical data collected to date suggest that, for the majority of parameters, it may be possible to establish single trigger values, either derived from site-specific conditions or adopted from the ANZG guidelines. In parallel, DCM will use the intervening period to undertake monthly monitoring of the new bores (GW05–GW011) to further strengthen the dataset before operations commencing. The combination of existing historical data and the proposed monitoring program will enable DCM to establish and implement interim groundwater contaminant limits before initiating extractive and processing operations.

Once extractive and processing activities commence, the monitoring program detailed in sections 6.2.2.1 to 6.2.2.5 is proposed for implementation. The ten monitoring bores have been strategically located to detect changes in groundwater levels and quality that may be attributed to mining activities. Additionally, the bore locations have been selected with longevity in mind, ensuring consistency across the monitoring network from operations through to mine closure.

6.2.2.1 Frequency

Groundwater monitoring of water level and water quality should be conducted on a quarterly basis, whereas in-situ pressure transducers should be maintained at a logging interval of every four hours.

6.2.2.2 Sampling procedure

Pressure transducers (Solinst Levellogger 100) are installed in each monitoring bore following construction, with a barometric pressure transducer installed in one bore to allow calibration of logged level data. Each pressure transducer is set to measure changes in groundwater elevation at four-hourly intervals. On each sampling occasion, an electrode-sensor water level meter is used to determine the depth to water in each bore before sampling commences, and the level is recorded on the respective field sheet.

Low-flow purging techniques are applied to sample groundwater bores at DCM. The low-flow pumps are lowered into the bores 0.5–1 m above the bottom of the screen. The In-situ Aqua Troll 600 water quality meter is used to measure water quality characteristics in-situ via a low-flow cell. Targeted in-situ water quality characteristics are recorded every litre. Samples are collected once the required purge volume is achieved and three consecutive stable readings are obtained for all field parameters. The In-situ VuSitu app is used to verify that stable parameter criteria are met before sampling begins.

All samples are collected in accordance with AS5667 (*Water quality – Sampling*) and the *Queensland Monitoring and sampling manual* (DES, 2018). Water quality analysis is undertaken by the NATA-accredited ALS laboratory.

6.2.2.3 Analytes targeted

Basic water quality analysis was undertaken at each site using an in-situ field meter. Three consecutive readings that remain within the limits specified in Table 8 must be obtained before sampling to ensure the water chemistry has stabilised and that a representative sample of the target system is collected. Laboratory analytes should include those listed in Section 6.2.1.3.

Table 8: Stabilisation criteria for groundwater field parameter before sample collection.

Parameter	Stabilisation criterion
pH	± 0.10 pH units
Electrical conductivity	± 3%
Dissolved oxygen	± 10 % (or ± 0.2 mg/L, whichever is greater)
Oxidation–reduction potential (ORP)	± 10 mV
Temperature	± 0.20 °C
Turbidity	± 10 %

6.2.2.4 Quality assurance and quality control

To ensure appropriate sampling procedures are followed in the field, additional samples and QA/QC techniques are required. These should be applied as per Section 6.2.1.4.

6.2.2.5 Data collation and analysis

Groundwater data and collation should be completed as per Section 6.2.1.5.

Annual groundwater data will be assessed as part of the annual groundwater monitoring review that should include:

- A review of all groundwater quality and standing water level data that will be listed in an upcoming EA update. The table will be named *Groundwater monitoring locations and frequency*;
- Details of any review undertaken of the groundwater conceptual model;
- An assessment of any impacts on groundwater level due to the mining activities;
- Comparison with receiving environment surface water quality monitoring results to determine any interaction or impact from groundwater on surface water; and
- The suitability of the current groundwater monitoring network to effectively detect impacts from mine-related activities, including any proposed improvements to the groundwater monitoring network.

7 Summary and conclusions

To assist the Mineral Projects EA amendment application for mine extension at DCM, DETSI has requested additional information regarding the groundwater regime. Further information was requested on hydrological and hydrogeological characterisation, groundwater monitoring, receiving environments (including GDEs, aquatic and terrestrial ecosystems, and other users), potential contaminant sources, and associated monitoring. This document draws together summary information from a range of supporting studies to provide an overview of the site's hydrological and hydrogeological characteristics, from which a conceptual hydrogeological model is developed. The relationship between potential sources of contaminants from proposed mine elements (pit, waste rock dumps, HLP and processing facilities) and likely subsurface and surface flow paths to receiving environments informs the extension of the current monitoring network to an integrated monitoring array, which includes surface water, groundwater and sediment sampling to mitigate any contamination risk.

Groundwater at DCM occurs mainly within fracture networks, fault zones and weathered mantles overlying the fresh rock. Primary porosity is negligible; permeability is controlled almost entirely by secondary structures. The regional and local structural fabric imposes a NNW–SSE anisotropy to groundwater conductivity. These systems rarely form laterally extensive, uniformly productive aquifers; instead, they behave as discontinuous and heterogeneous water stores. Groundwater recharge is localised, controlled by rainfall infiltration of highly cleaved metasediments. A shallow horizontal sheet fracture system captures vertical flow, allowing for discharge as seepage at intersecting topographic surfaces, implying a likely short groundwater residence time. Additionally, field assessments suggest that surface water–groundwater interactions in the larger waterways are intermittent, with connectivity occurring mainly following recharge events and diminishing as groundwater levels decline through the dry season. Aquifer compartmentalisation and shallow discharge, together with few or no other groundwater users near the mine site, minimise the risk to groundwater posed by the mine expansion.

Review of new local DCM geological data in the context of a fractured aquifer system have allowed for development of a conceptual groundwater model relevant to the proposed small-scale mine expansion. This model provides a framework for development of an appropriate groundwater monitoring network relevant to the mine infrastructure, which in turn will allow for a more comprehensive groundwater assessment over time.

The installation of additional monitoring bores – combined with the engineered design of the lined leach pads, lined ponds and associated drainage capture systems – provides a comprehensive approach to mitigating the risk of contaminant migration to surrounding surface and groundwater systems. The monitoring bores enable early detection of any changes in groundwater quality or hydraulic response, while the engineered arrangements – including sub-soil drainage, high-density polyethylene (HDPE) lining, and protective over-cushioning – ensure that seepage is both minimised and contained. Together, these measures provide multiple layers of protection and monitoring, supporting effective environmental management and safeguarding the integrity of local water resources.

Groundwater elevation and hydrochemical data indicate that historical mining has resulted in a localised impact immediately downstream of the existing settling dam. Surface water within the dam is characterised by elevated sulphate, cadmium, copper and zinc, and reduced bicarbonate/carbonate concentrations relative to other catchment sites. Downstream, these signatures are occasionally detected but attenuate with distance, consistent with trends observed in sediment samples (C&R, 2024c).

These results reflect legacy conditions from historical waste rock and unprocessed ore materials that continue to leach into the settling pond and adjacent drainage lines. This represents a worst-case condition, noting that proposed remediation works and future waste storage facilities will utilise lower-risk materials. Historical

monitoring therefore provides a suitable baseline demonstrating limited contaminant migration, whereas the proposed monitoring program (Section 6) establishes a robust framework for deriving interim groundwater contaminant threshold criteria before mining operations.

Before the commencement of extractive activities at DCM, the REMP design document will be revised to strengthen its focus on ecological sensitivity within the receiving environment. The updated framework will include additional monitoring sites across North and Gum creeks to capture spatial variation in water quality, habitat condition and riparian health, particularly at locations representative of sensitive regional ecosystems and water pools supporting local flora and fauna. Biannual drone surveys will complement these assessments by providing high-resolution data on riparian extent and condition, facilitating early detection of potential ecological impacts and timely implementation of mitigation measures.

The proposed groundwater monitoring network is designed to provide comprehensive insight into both direct and indirect changes in groundwater elevations and hydrochemistry within the DCM mining leases. Bores are strategically positioned up- and downgradient of critical infrastructure – at both local and regional scales – to monitor conditions across shallow and deep aquifers, whereas surface water sampling captures any associated shallow groundwater discharge. This integrated approach supports the objectives of the groundwater monitoring and management program to protect both groundwater and surface water environmental values.

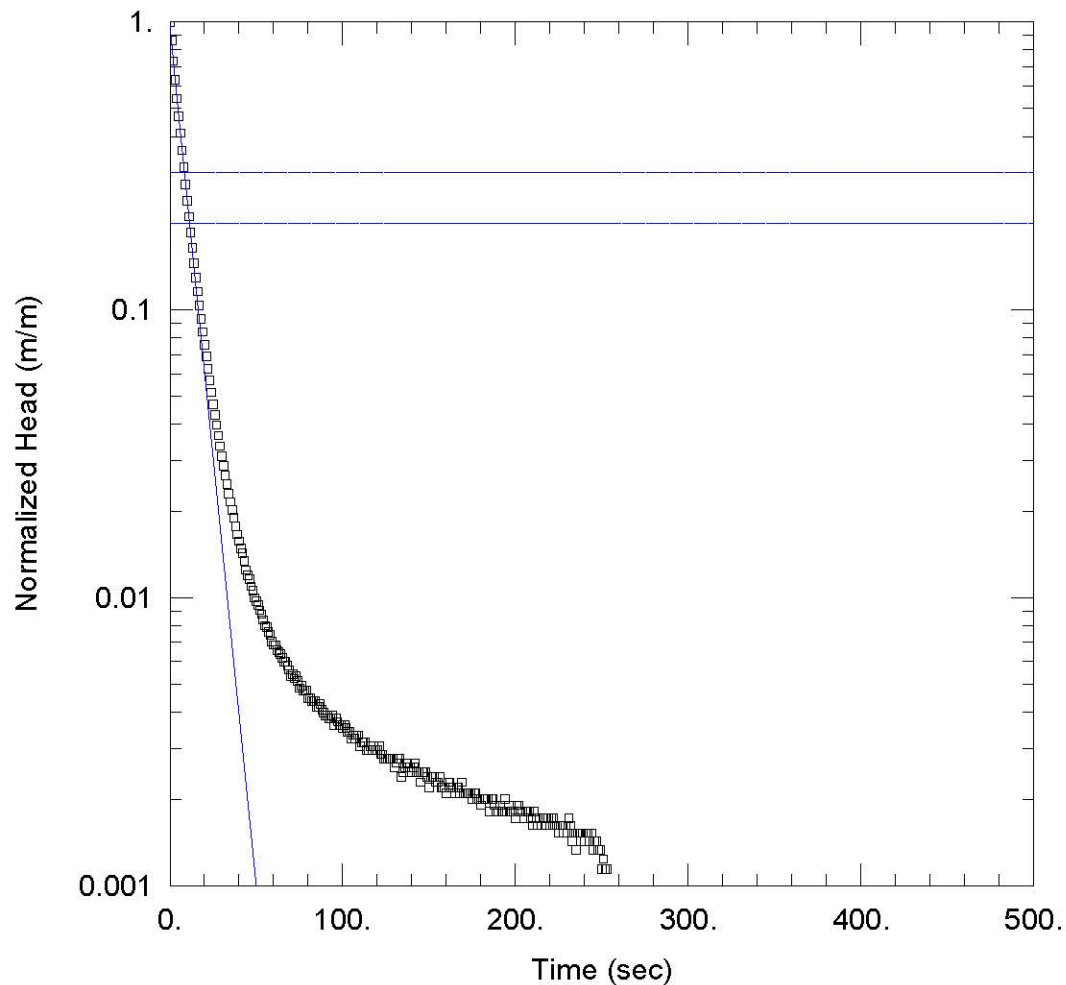
DCM's proposed mining infrastructure is expected to have limited, localised influence on the groundwater regime, with impacts inherently contained by the site's geological characteristics and verified through a comprehensive surface water and groundwater monitoring program.

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Appendix A – AQTESOLV pump test analysis



WELL TEST ANALYSIS

Data Set: Y:\...\GW01_A.aqt

Date: 09/08/25

Time: 14:25:24

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW01_A

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 54.44 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW01_A)

Initial Displacement: -10.5 m

Static Water Column Height: 32.06 m

Total Well Penetration Depth: 86.5 m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

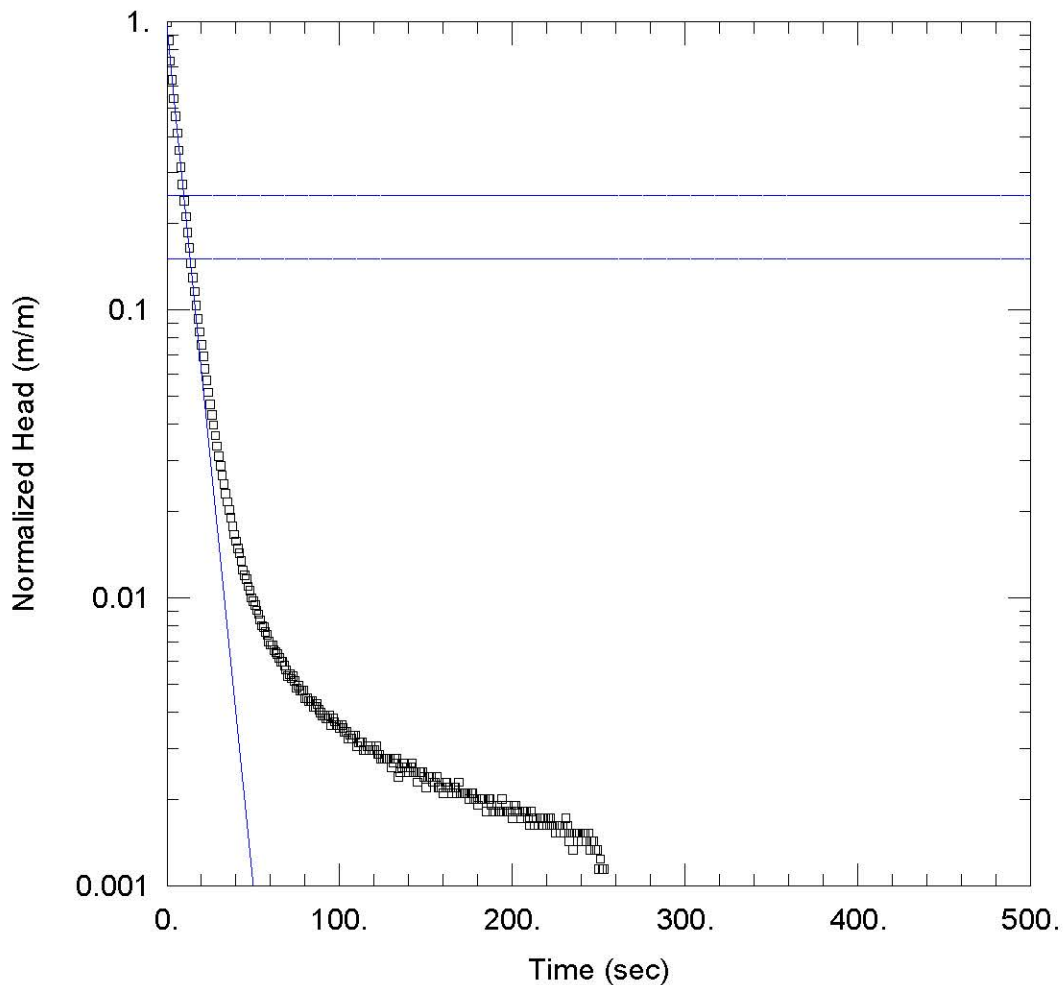
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 3.057$ m/day

$y_0 = -10.18$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW01_A.aqt

Date: 09/08/25

Time: 14:24:20

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW01_A

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 54.44 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW01_A)

Initial Displacement: -10.5 m

Static Water Column Height: 32.06 m

Total Well Penetration Depth: 86.5 m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

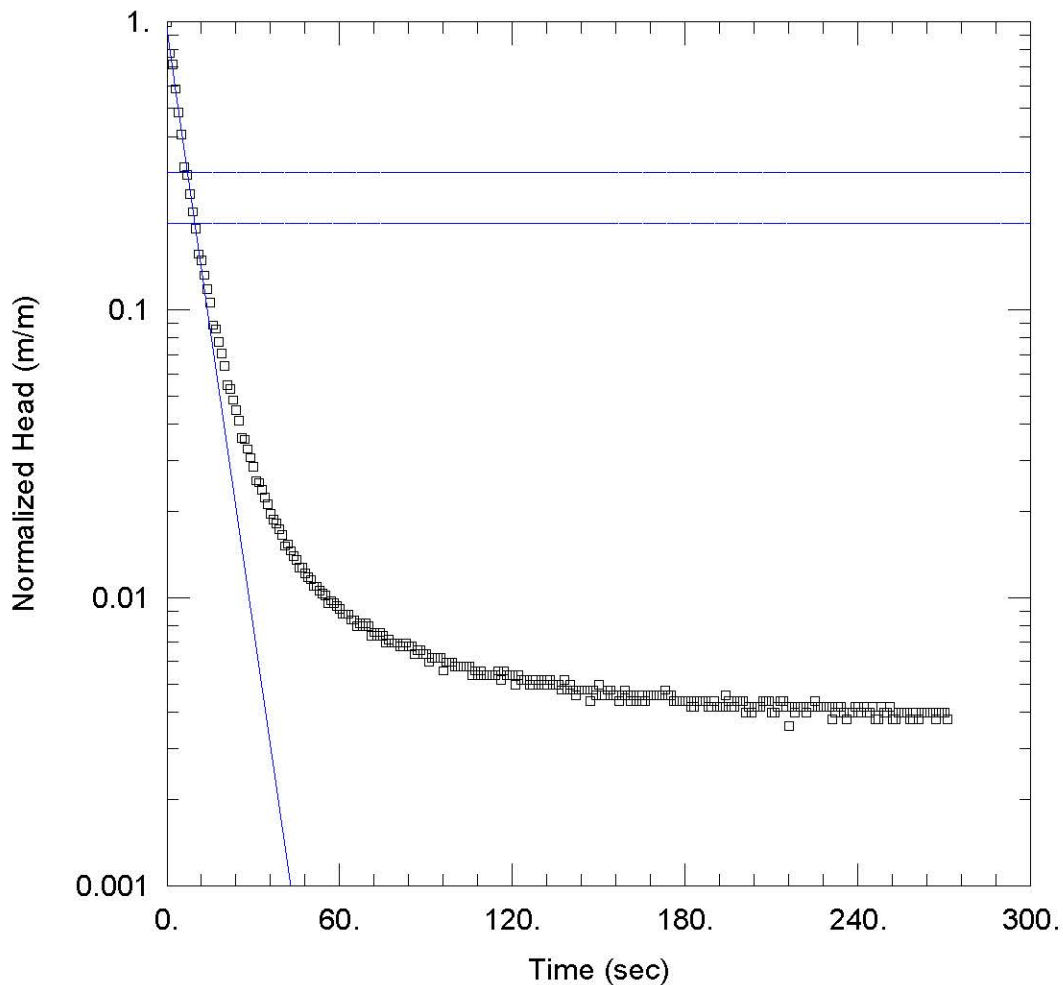
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 3.132$ m/day

$y_0 = -10.18$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW01_B.aqt

Date: 09/08/25

Time: 14:42:41

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW01_B

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 54.44 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW01_B)

Initial Displacement: -5.017 m

Static Water Column Height: 32.06 m

Total Well Penetration Depth: 86.5 m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

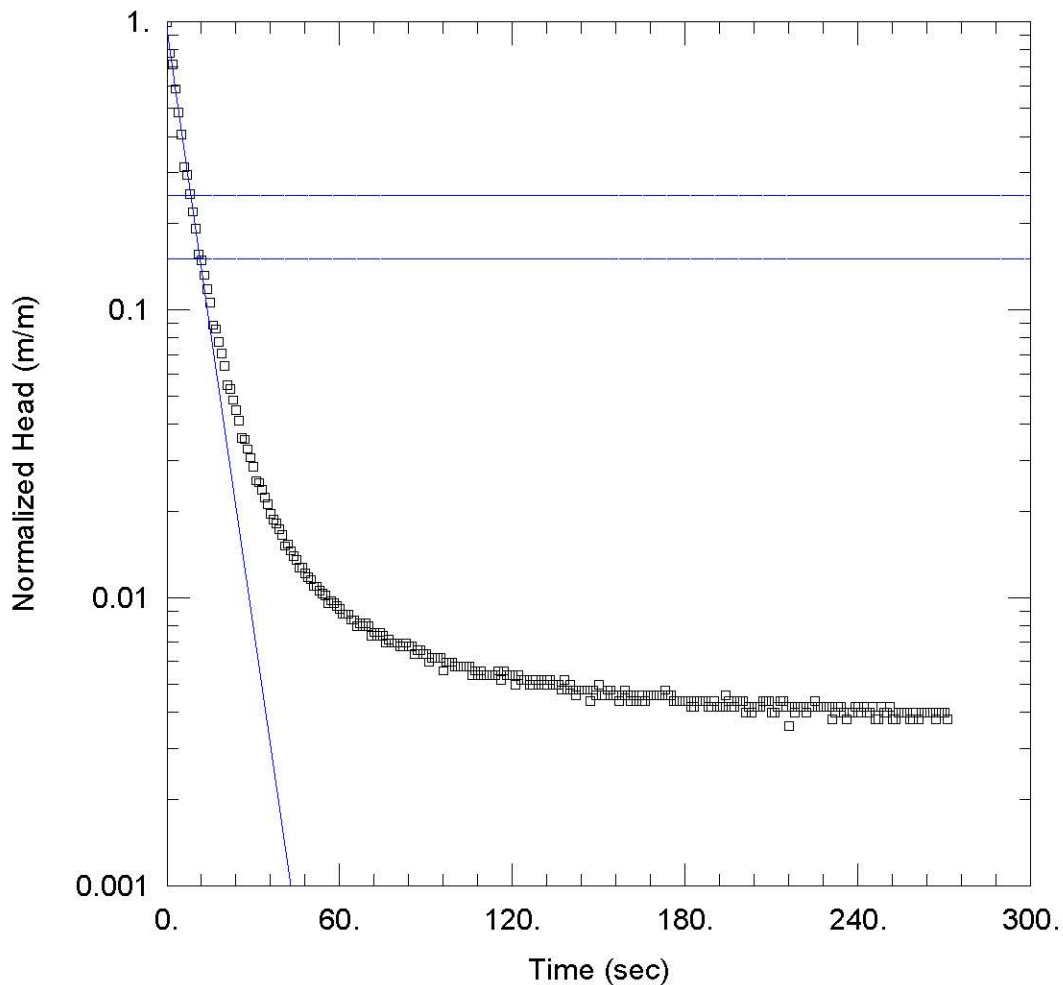
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 3.545$ m/day

$y_0 = -4.763$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW01_B.aqt

Date: 09/08/25

Time: 14:43:22

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW01_B

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 54.44 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW01_B)

Initial Displacement: -5.017 m

Static Water Column Height: 32.06 m

Total Well Penetration Depth: 86.5 m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

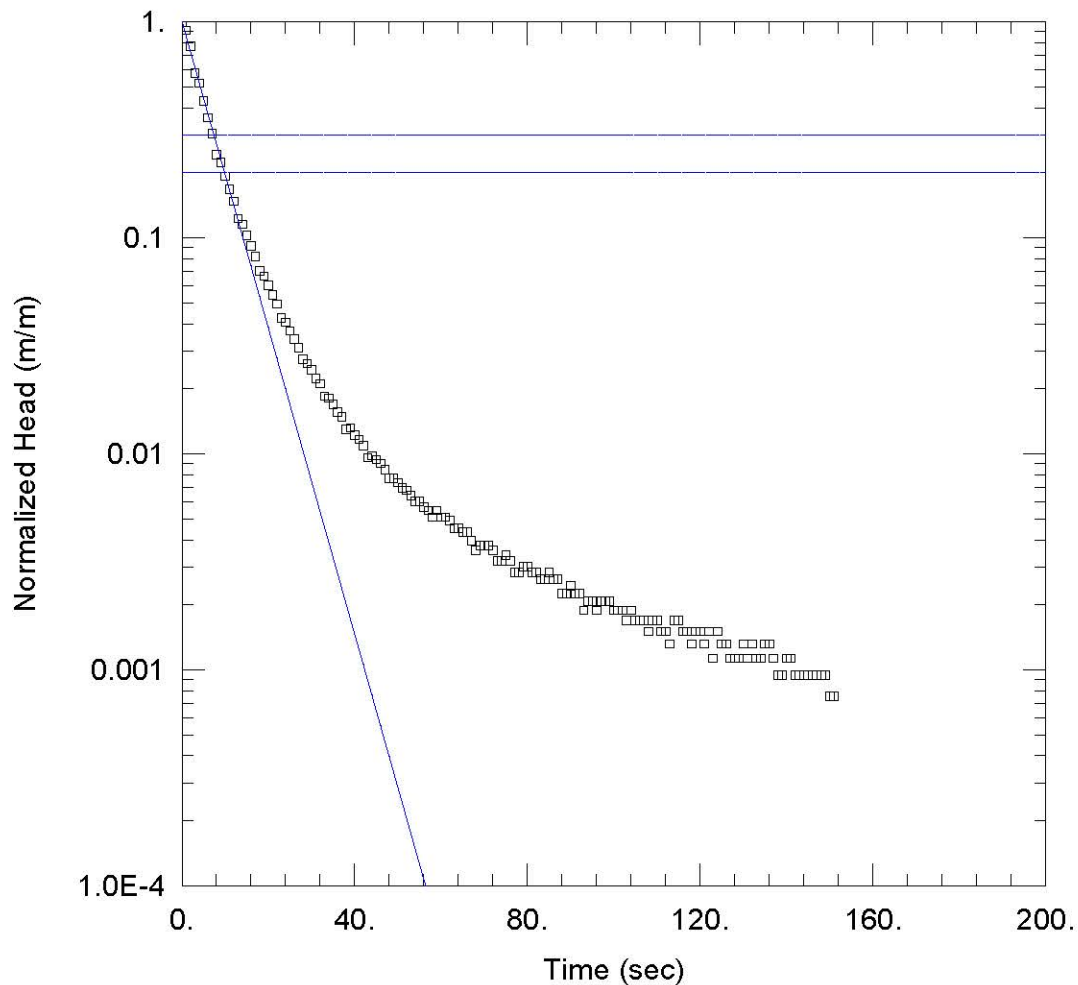
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 3.631$ m/day

$y_0 = -4.761$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW01_C.aqt

Date: 09/08/25

Time: 14:46:17

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW01_C

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 54.44 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW01_C)

Initial Displacement: -5.31 m

Static Water Column Height: 32.06 m

Total Well Penetration Depth: 86.5 m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

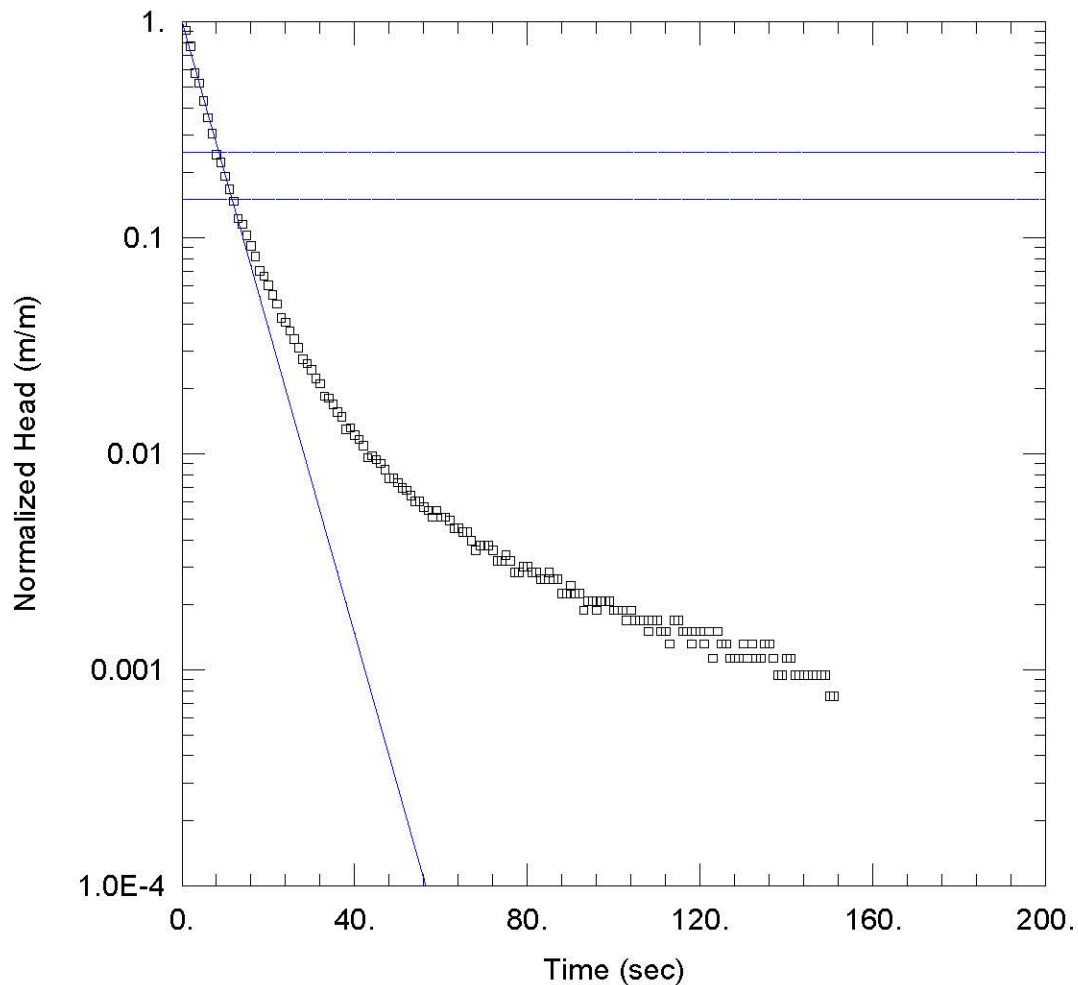
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 3.64$ m/day

$y_0 = -5.402$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW01_C.aqt

Date: 09/08/25

Time: 14:45:31

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW01_C

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 54.44 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW01_C)

Initial Displacement: -5.31 m

Static Water Column Height: 32.06 m

Total Well Penetration Depth: 86.5 m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

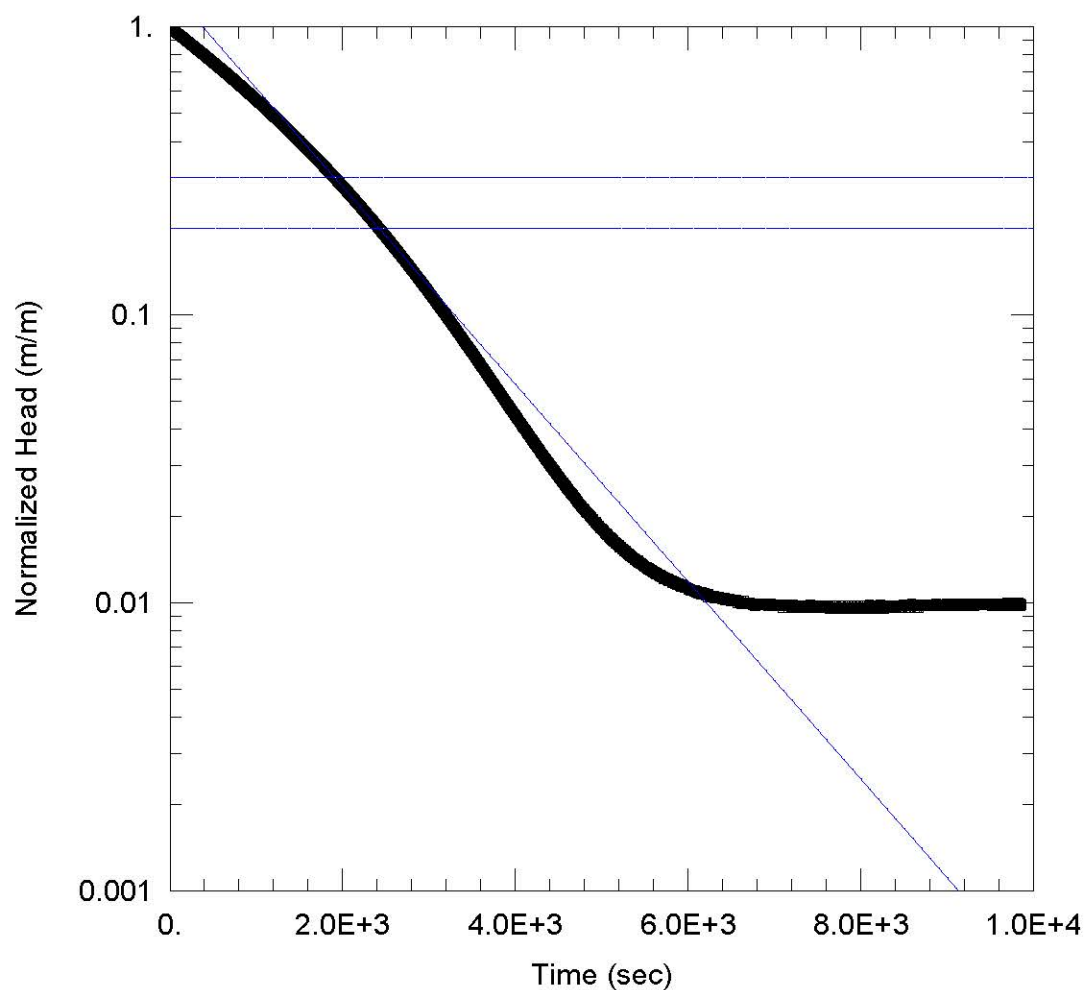
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 3.729$ m/day

$y_0 = -5.401$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW03_A.aqt

Date: 09/08/25

Time: 14:22:39

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW03_A

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 53.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW03_A)

Initial Displacement: -10.53 m

Static Water Column Height: 4.36 m

Total Well Penetration Depth: 56. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

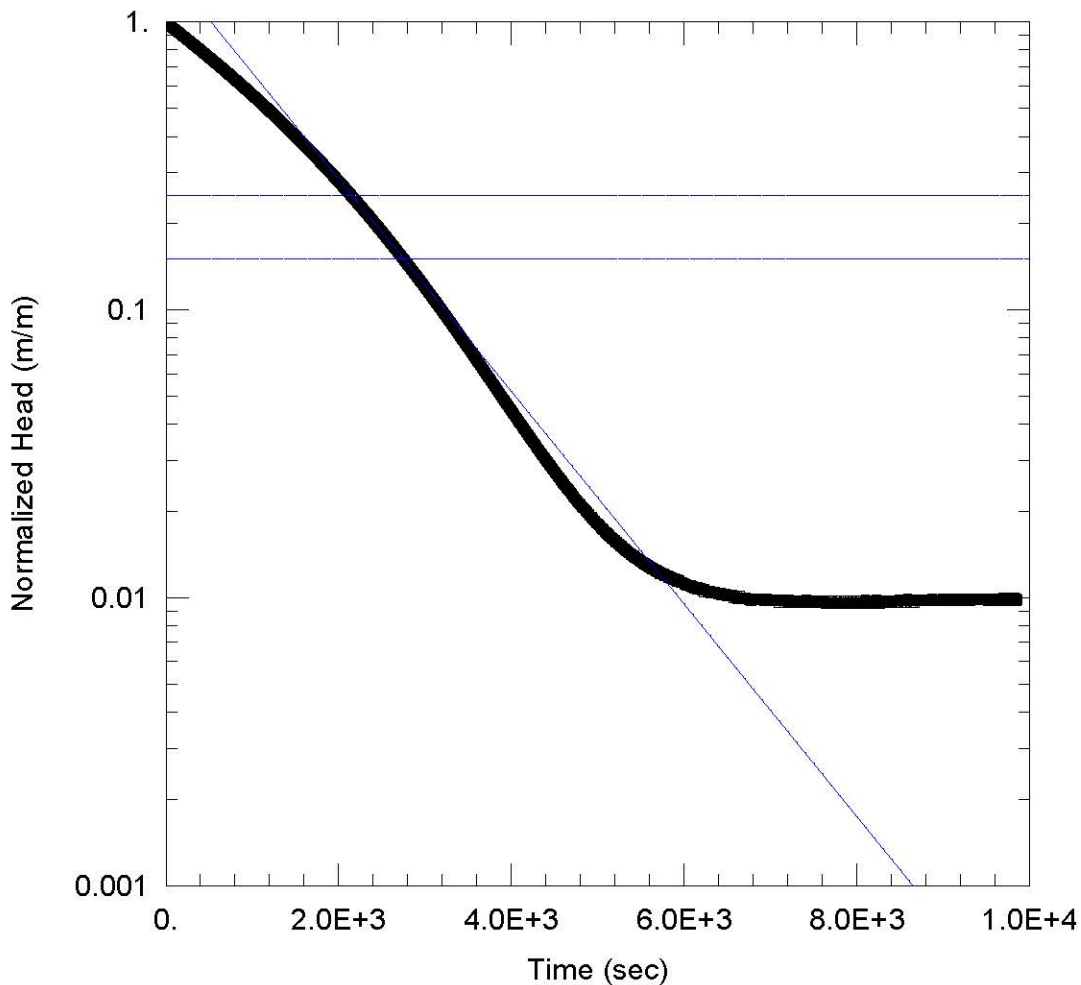
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.01674$ m/day

$y_0 = -14.25$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW03_A.aqt

Date: 09/08/25

Time: 14:21:04

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW03_A

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 53.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW03_A)

Initial Displacement: -10.53 m

Static Water Column Height: 4.36 m

Total Well Penetration Depth: 56. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

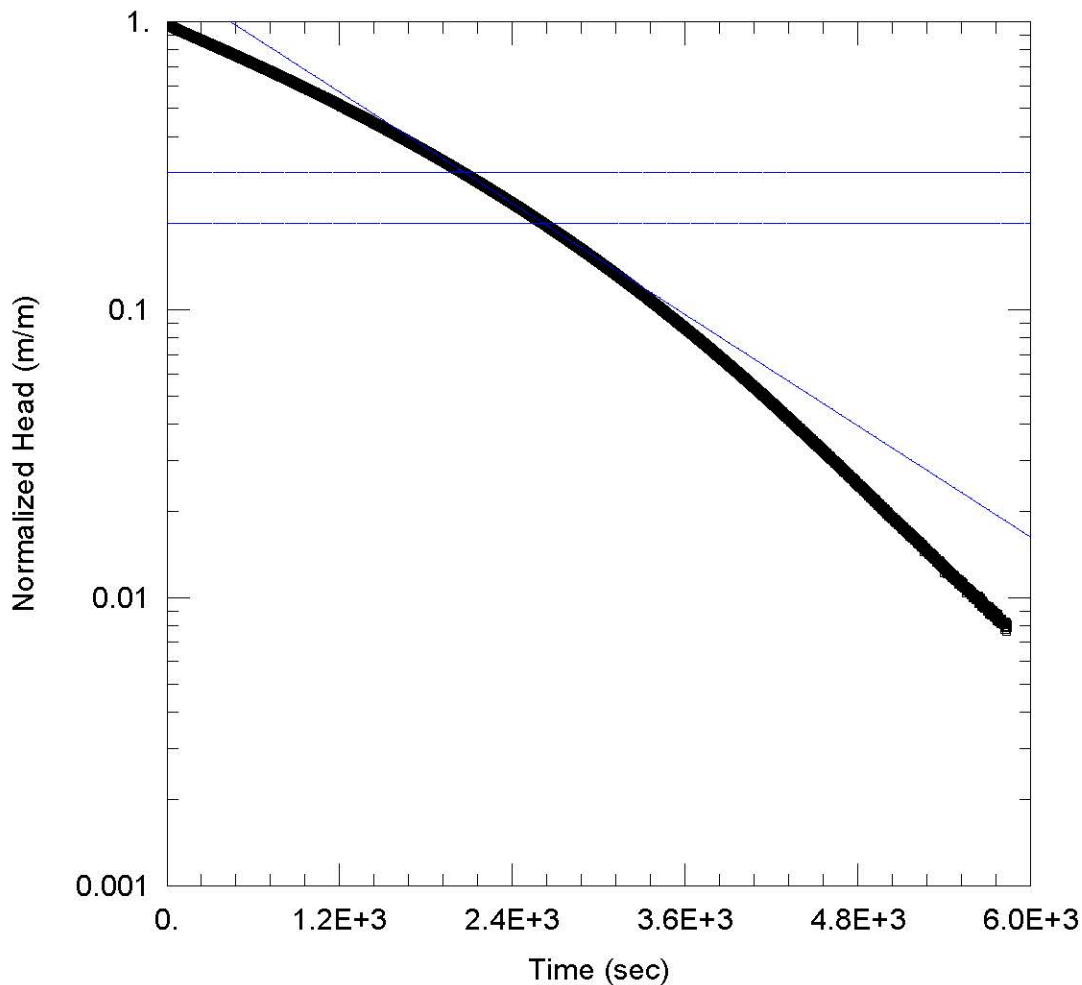
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 0.01942$ m/day

$y_0 = -16.48$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW03_B.aqt

Date: 09/08/25

Time: 14:50:49

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW03_B

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 53.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW03_B)

Initial Displacement: -10.67 m

Static Water Column Height: 4.36 m

Total Well Penetration Depth: 56. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

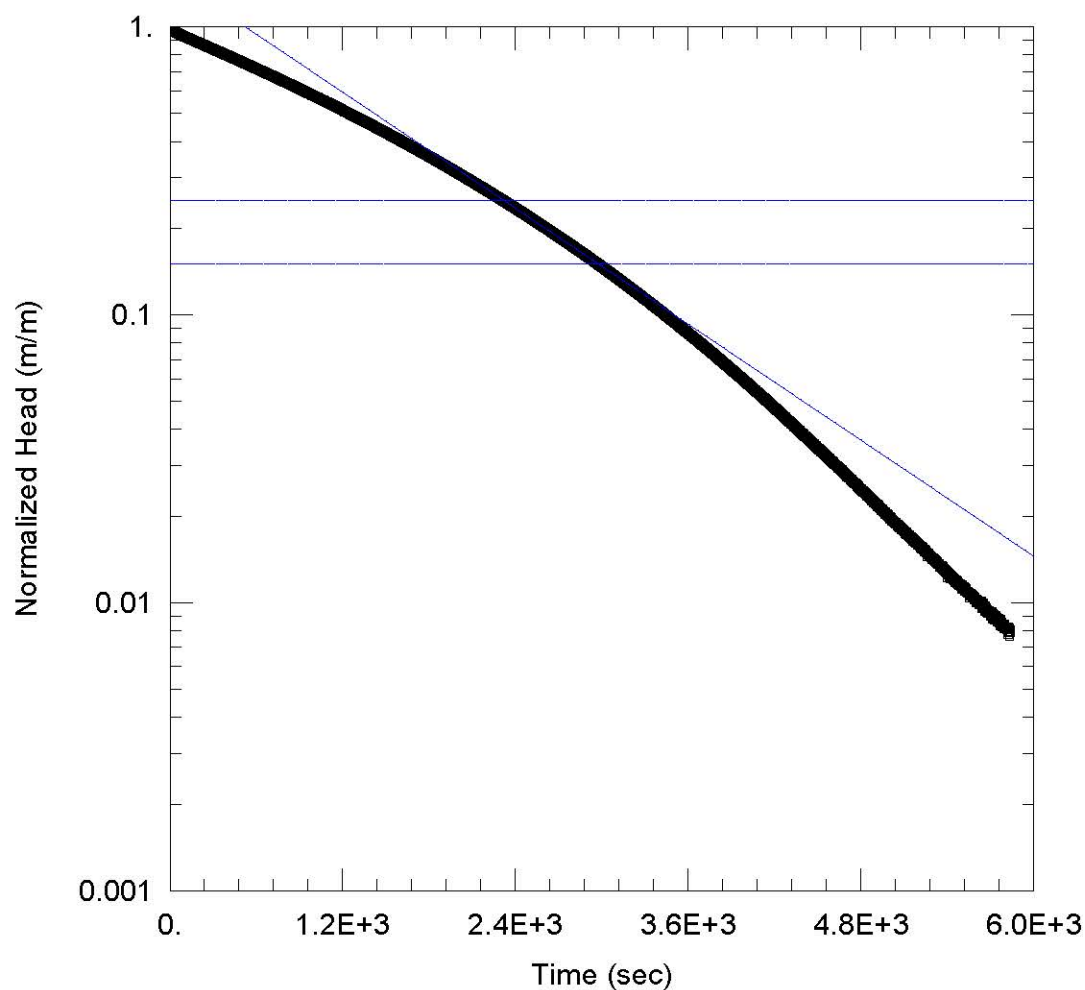
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.01572$ m/day

$y_0 = -14.84$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW03_B.aqt

Date: 09/08/25

Time: 14:52:43

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW03_B

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 53.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW03_B)

Initial Displacement: -10.67 m

Static Water Column Height: 4.36 m

Total Well Penetration Depth: 56. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

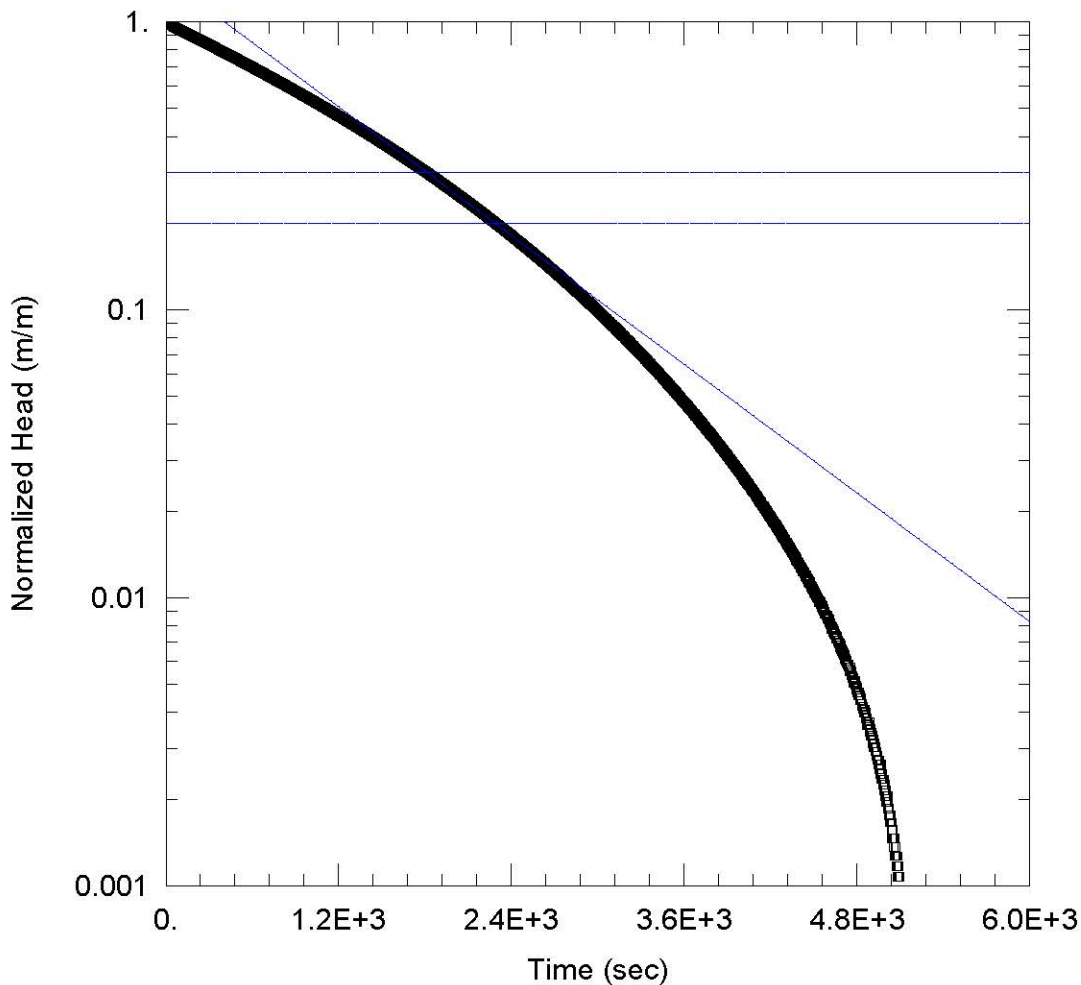
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 0.01766$ m/day

$y_0 = -16.03$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW03_C.aqt

Date: 09/08/25

Time: 14:55:40

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW03_C

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 53.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW03_C)

Initial Displacement: -10.25 m

Static Water Column Height: 4.36 m

Total Well Penetration Depth: 56. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

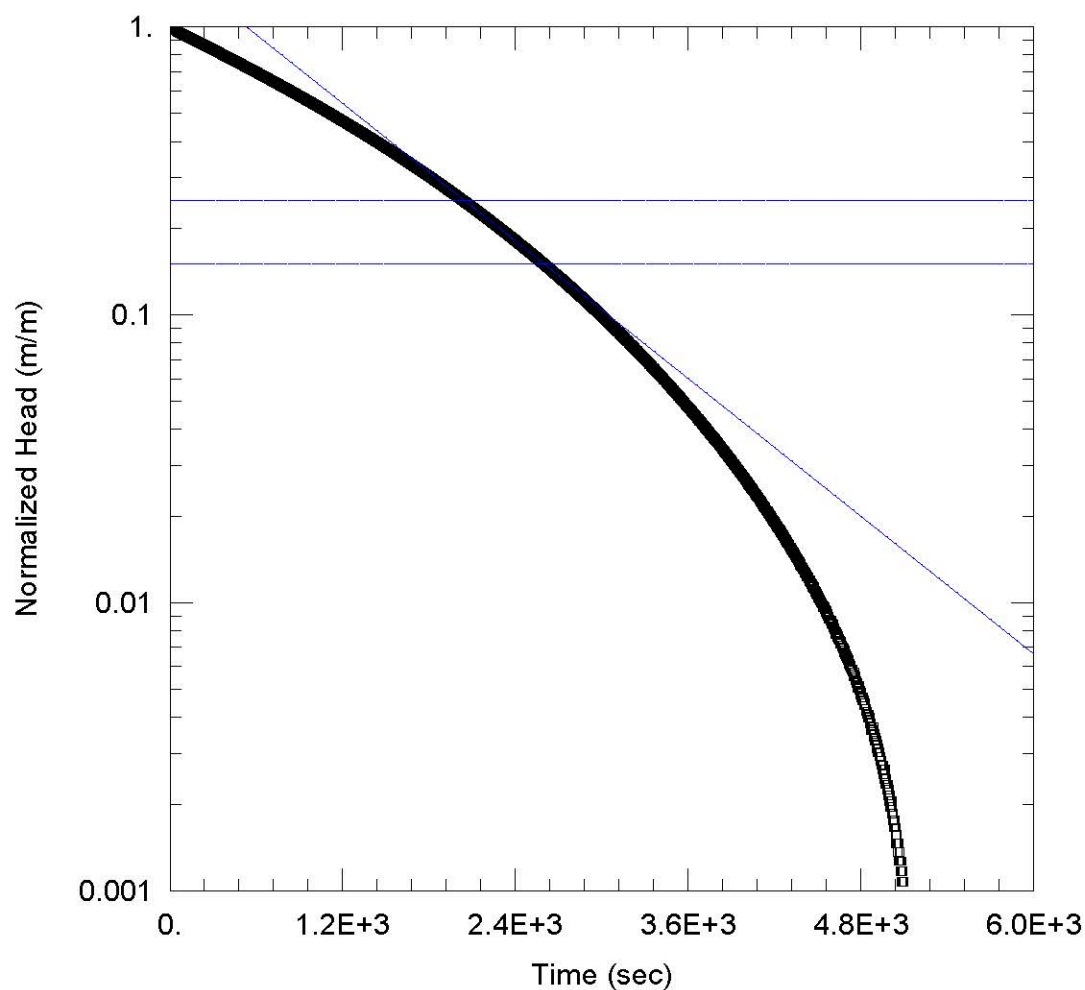
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.01819$ m/day

$y_0 = -14.58$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW03_C.aqt

Date: 09/08/25

Time: 14:54:51

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW03_C

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 53.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW03_C)

Initial Displacement: -10.25 m

Static Water Column Height: 4.36 m

Total Well Penetration Depth: 56. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

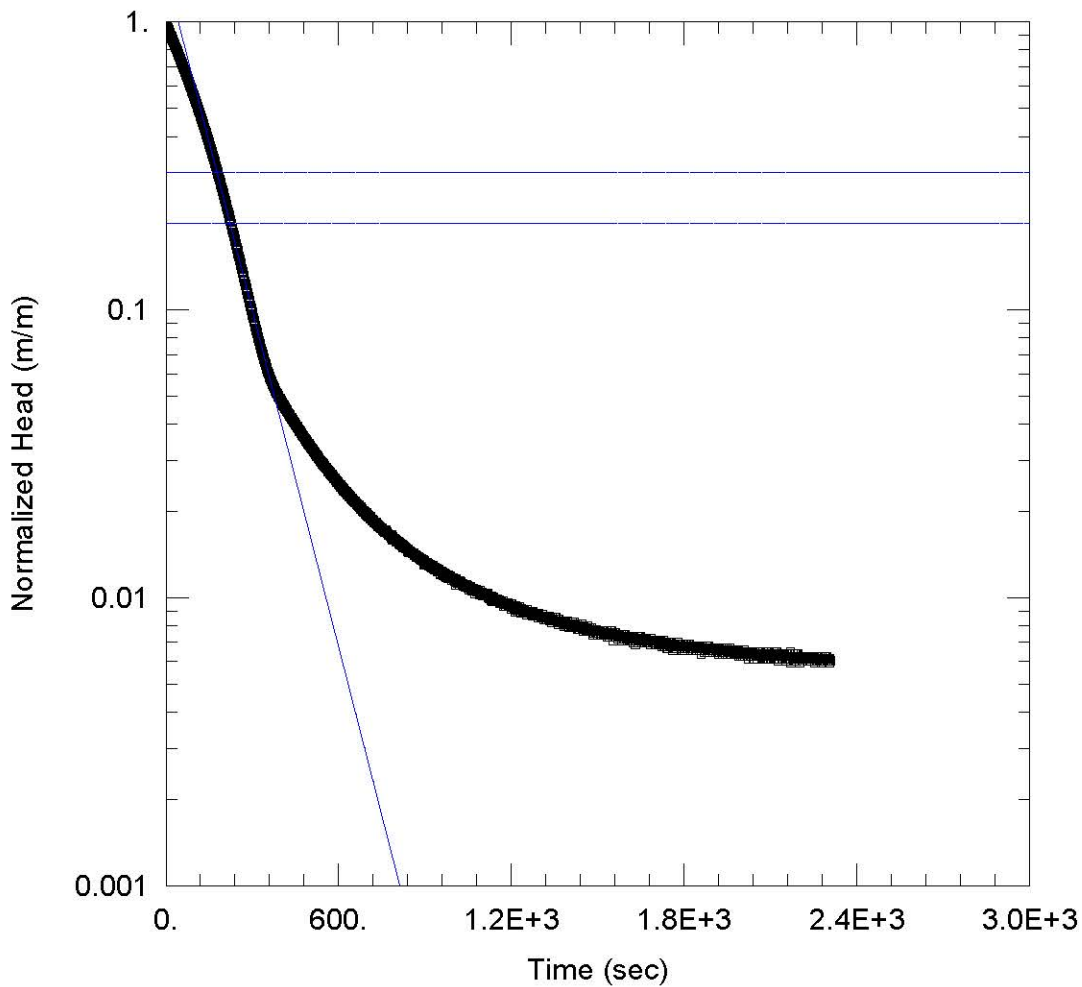
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 0.02095$ m/day

$y_0 = -16.74$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW04_A.aqt

Date: 09/08/25

Time: 15:00:15

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW04_A

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 52.87 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW04_A)

Initial Displacement: -9.271 m

Static Water Column Height: 30.13 m

Total Well Penetration Depth: 81. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

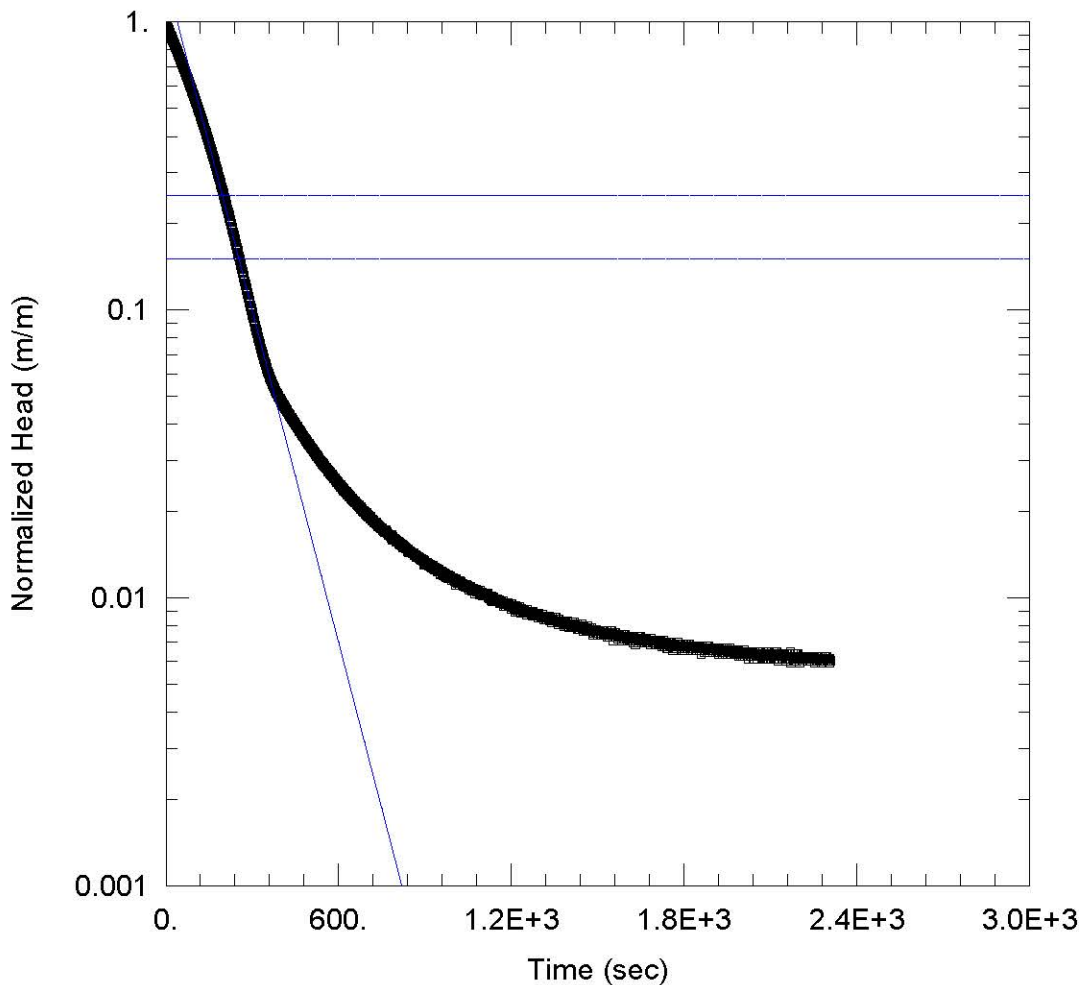
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.1987$ m/day

$y_0 = -13.78$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW04_A.aqt

Date: 09/08/25

Time: 15:01:18

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW04_A

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 52.87 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW04_A)

Initial Displacement: -9.271 m

Static Water Column Height: 30.13 m

Total Well Penetration Depth: 81. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

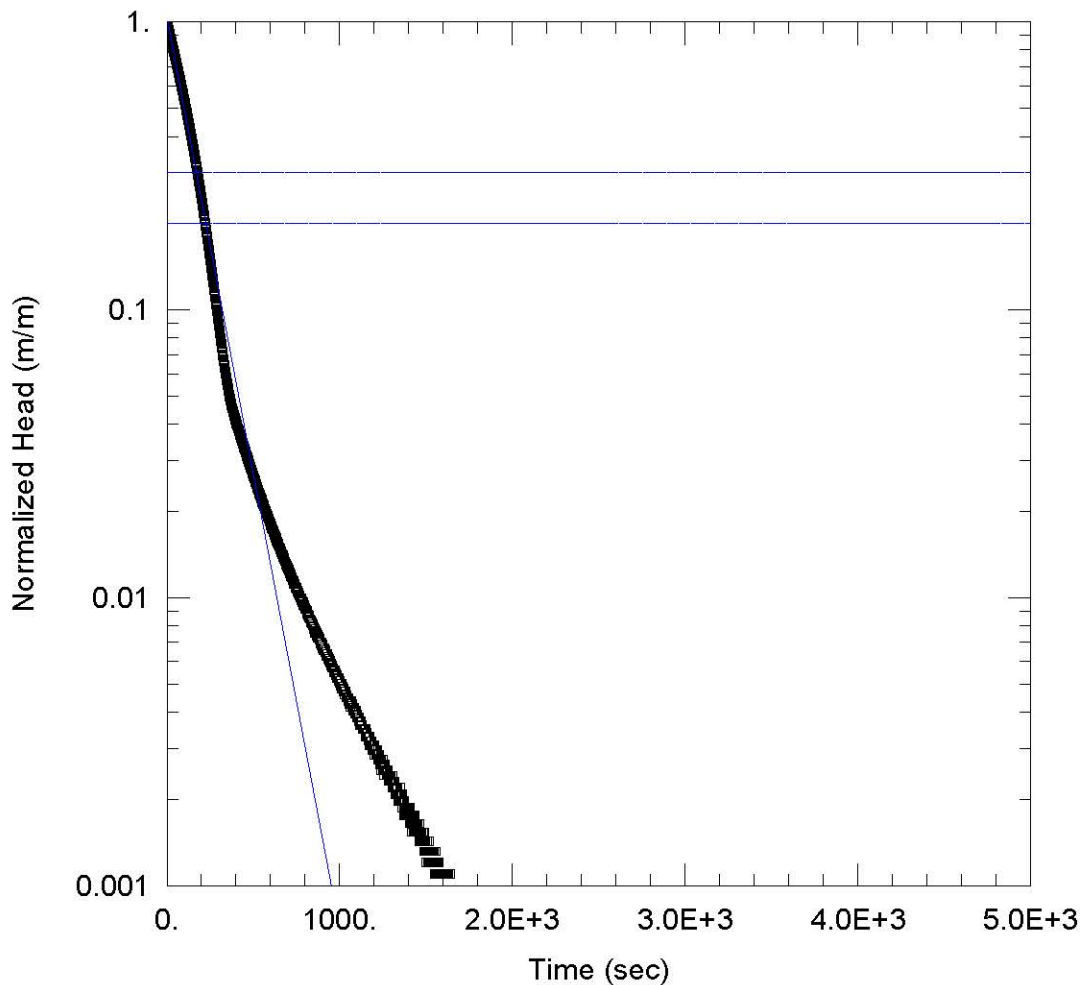
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 0.2023$ m/day

$y_0 = -13.26$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW04_B.aqt

Date: 09/09/25

Time: 10:08:12

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW04_B

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 52.87 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW04_B)

Initial Displacement: -9.115 m

Static Water Column Height: 30.13 m

Total Well Penetration Depth: 81. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

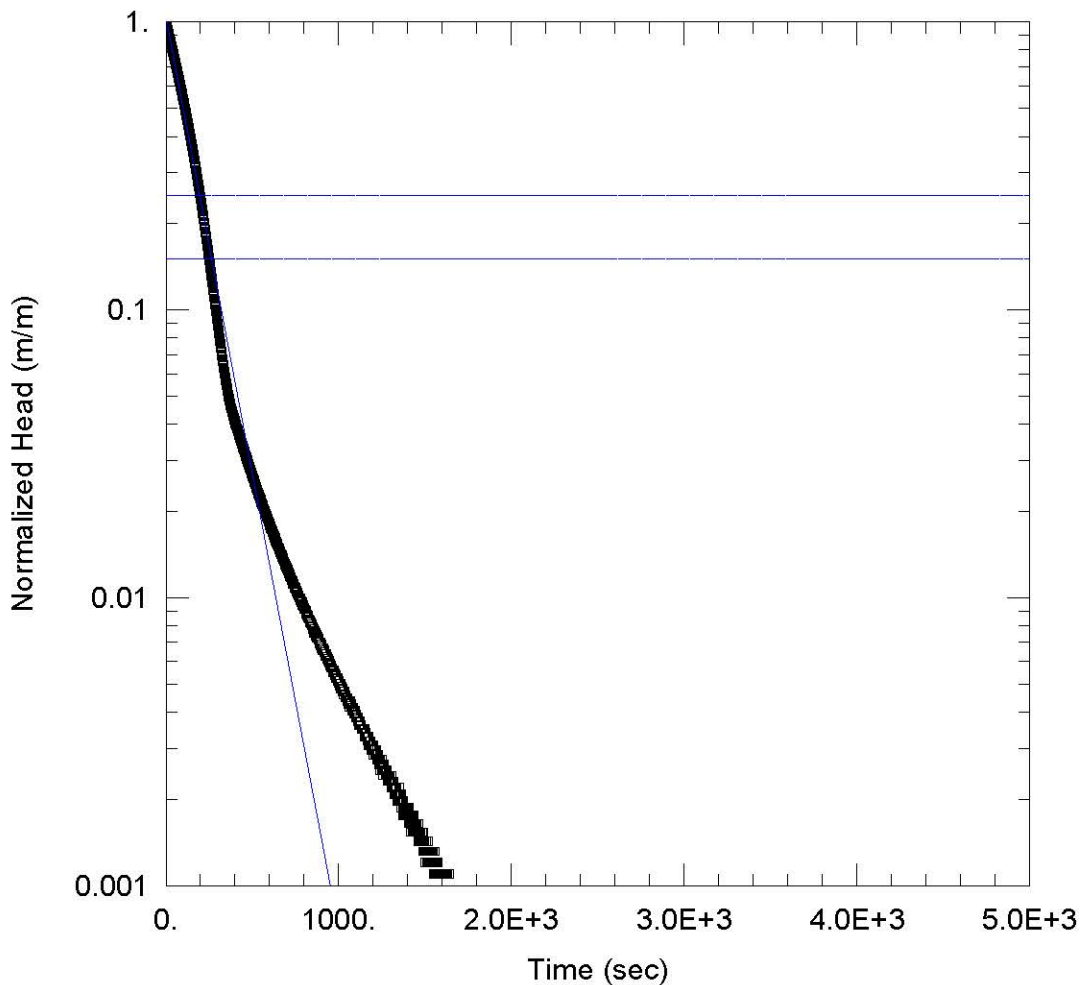
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.1614$ m/day

$y_0 = -9.589$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW04_B.aqt

Date: 09/09/25

Time: 10:08:57

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW04_B

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 52.87 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW04_B)

Initial Displacement: -9.115 m

Static Water Column Height: 30.13 m

Total Well Penetration Depth: 81. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

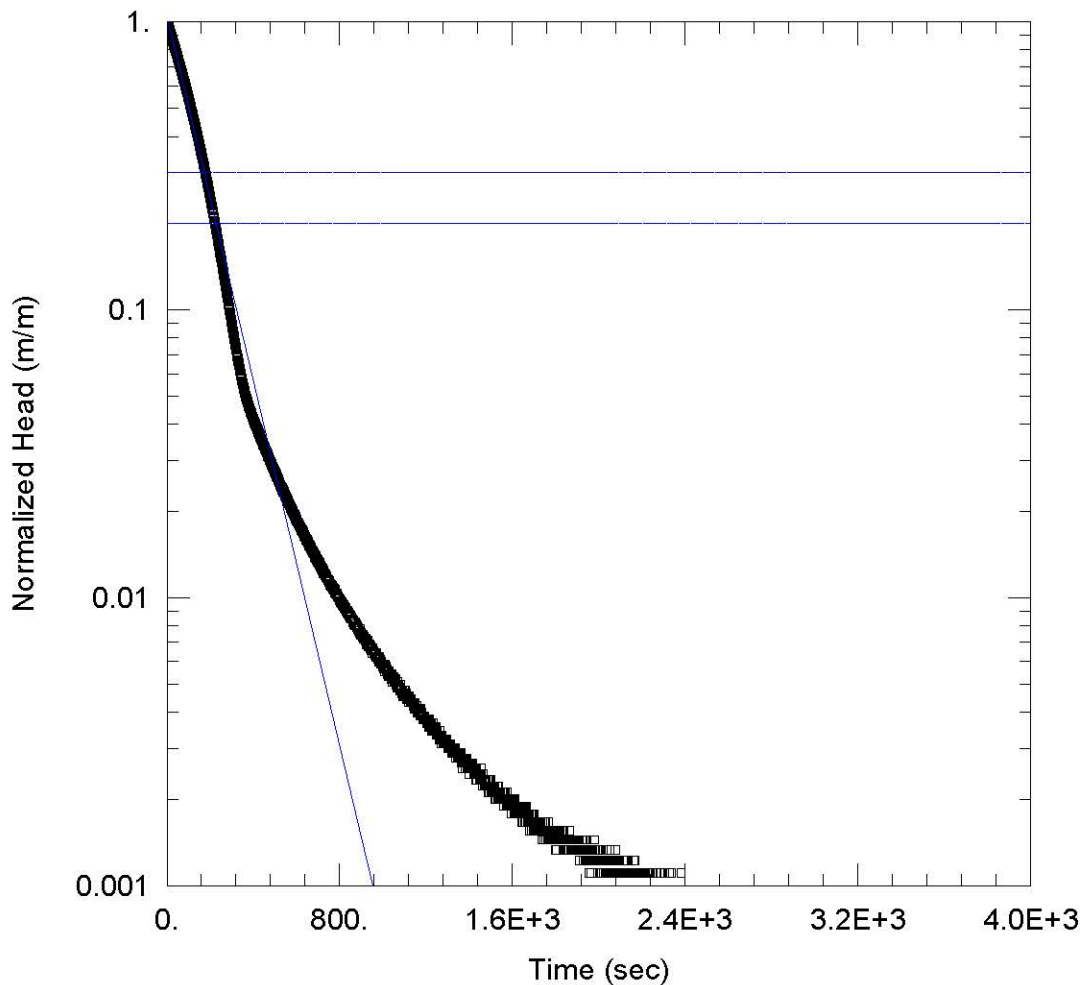
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 0.1667$ m/day

$y_0 = -9.59$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW04_C.aqt

Date: 09/09/25

Time: 10:16:45

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW04_C

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 52.87 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW04_C)

Initial Displacement: -9.005 m

Static Water Column Height: 30.13 m

Total Well Penetration Depth: 81. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

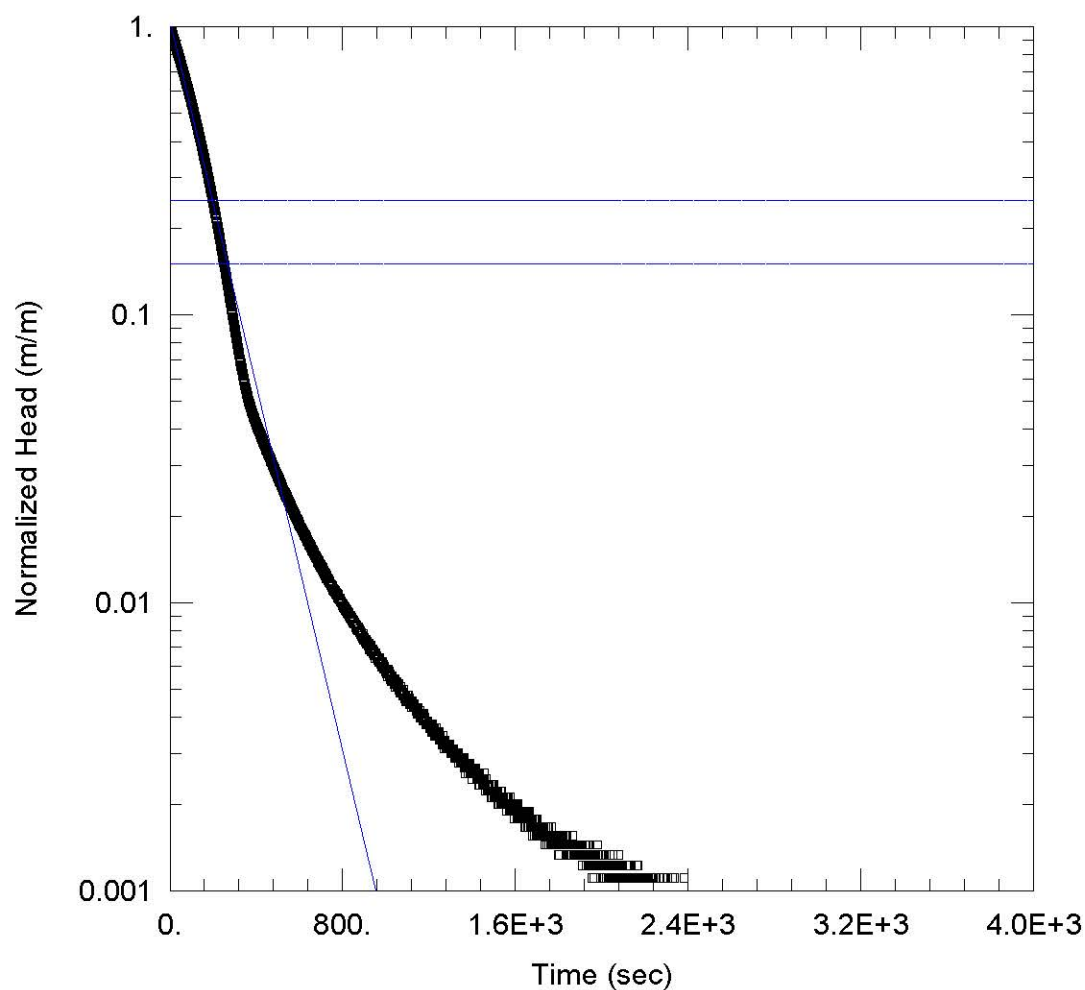
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.1615$ m/day

$y_0 = -9.591$ m



WELL TEST ANALYSIS

Data Set: Y:\...\GW04_C.aqt

Date: 09/09/25

Time: 10:14:22

PROJECT INFORMATION

Company: C&R Consulting

Client: Mineral Projects

Location: DCM

Test Well: GW04_C

Test Date: 23/08/2025

AQUIFER DATA

Saturated Thickness: 52.87 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GW04_C)

Initial Displacement: -9.005 m

Static Water Column Height: 30.13 m

Total Well Penetration Depth: 81. m

Screen Length: 6. m

Casing Radius: 0.025 m

Well Radius: 0.075 m

SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

$K = 0.1668$ m/day

$y_0 = -9.591$ m