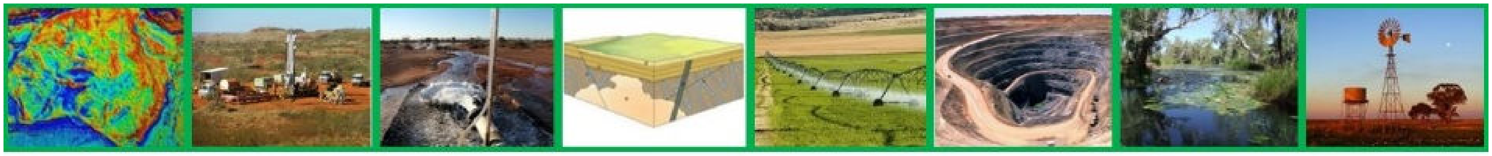
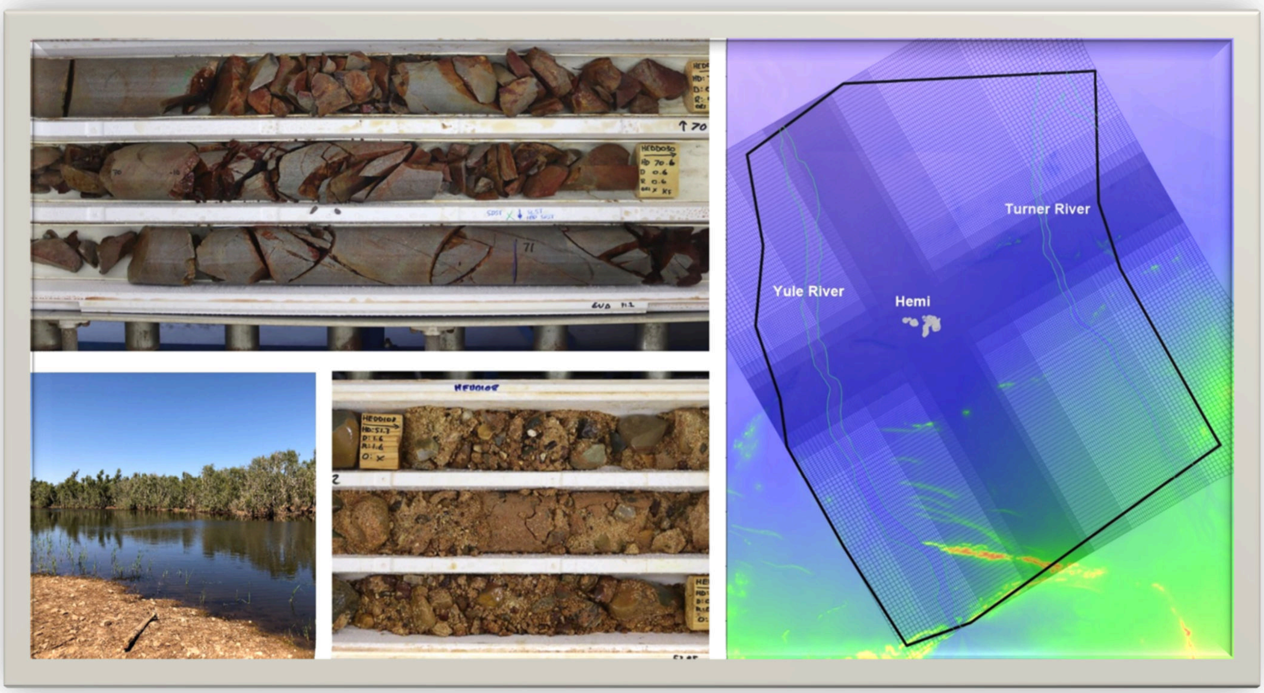


HEMI GOLD PROJECT –

DEFINITIVE FEASIBILITY STUDY

CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING – OPERATIONAL PHASE



Report prepared for:

De Grey Mining Ltd

September 2023

Geowater CONSULTING

Document Title

Hemi Gold Project – Pre-Feasibility Study – Conceptual and Numerical Groundwater Modelling – Operational Phase

Cover Photos (clockwise from top left)

Fractured Rock Aquifer zone in drillhole HEDD030, Numeric groundwater model domain, Highly permeable basal gravels in drillhole HEDD108, Jelliabidina Pool April 2021.

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Executive Summary

Work Completed and Objectives

This report documents the development of conceptual and numerical groundwater models by Geowater for the Hemi Project, which were then applied to the Definition Phase Study (DFS) mine schedule and pit designs to achieve the following objectives:

- Estimation of dewatering and water supply requirements to a technical standard to suit a DFS level of accuracy for water system designs and costings.
- Complete a robust technical assessment of the potential impacts of De Greys planned water uses on surrounding water users and the environment. The assessment is to be of a '*H3'* level to adequately support the submission of a *5C Groundwater Well Licence (GWL)* application to the Department of Water and Environmental Regulation (DWER).

This report focuses only on the operational phase of the proposed Project. Modelling and impact assessments relating to the mine closure phase are still ongoing and will be reported later in 2023. This report incorporates the feedback from an independent technical review of the precursor PFS report by Jurassic Groundwater consultants in September 2022.

Findings – Conceptual Groundwater Model

An area measuring approximately 50 x 30 km surrounding Hemi has been assessed and the following findings made:

- Relatively shallow alluvium is widespread and forms a significant shallow aquifer that extends from Hemi to some reaches of the Yule River but not the Turner River. Within the alluvial cover at Hemi, there is a paleochannel river system comprised of up to 15 m of highly permeable sands and gravels, that is about 1,000 m wide, up to 42 m deep and which drains towards the Watercorp Yule River Borefield and the current day coast.
- Groundwater flow directions and hydraulic gradients are relatively uniform, with regional flow towards the north-northwest. The depth to groundwater is typically between 5 – 10 m, and is only shallower in parts of the current Yule and Turner riverbeds, and only deeper in rock outcrop and sand dune areas. The water quality of shallow aquifer zones is good, being typically fresh to slightly brackish, slightly alkaline and fit for the existing pastoral and mining usage. In the north-west of the study area along the Yule River, groundwater is of potable quality.
- The Turner River lacks river pools over most of the study area as a result of the water table typically being 2 – 4 metres below the shallowest parts of the riverbed during dry season periods. The Yule River has three river pools that are permanent or semi-permanent (Jellibidina, Mardagubiddina, Portree) that elevated ecological and heritage values. North of these, river pool sites have become dry in each dry season since 2021.
- Evaporation and evapotranspiration (ET) during dry periods are considered to be limited to sections of the main rivers where river pools, or shallow water tables and riparian vegetation occur. Recharge from river flows to the shallow aquifer systems are variable over time and location. The largest amounts of river recharge occur from the Yule River in the north-western part of the model area where large flow events spill over the main channel onto the surrounding floodplain. The least amount of recharge is considered to occur in the southern reach of the Turner River, where significant amounts of slightly weathered to fresh bedrock occur in or near the riverbed.

Key groundwater findings in and near the Hemi deposits are:

- Weathered bedrock zones do not typically form significant aquifer zones, apart from the saprock profile of igneous intrusives, which exhibit moderate permeability and low storativity. At the Eagle Deposit, a localised zone of higher permeability in the intrusive saprock has developed.

- Within fresh bedrock, permeability is restricted to localised fractured rock zones. Review of core photographs suggest fracture zones within fresh rock tend to occur close to the contact zones between (more brittle) igneous intrusives and (more ductile) sedimentary units, and potentially enhanced within and near fold hinges and later stage faulting. The amount of fracture zone development within fresh bedrock is limited such that the overall fresh rock mass is likely to have a very low permeability.

- Both the shallower alluvium and paleochannel aquifer at Hemi are in a direct geologic and hydraulic connection with the nearest groundwater user (Atlas Iron – Mt Dove Borefield). A direct connection with the more remote Watercorp Yule River Borefield is interpreted.

- Rainfall recharge to the water table in the Hemi area and surrounding alluvial plain is low but significant. A long term average of 1 – 3% of annual rainfall is likely in areas near and above the palaeochannel aquifer, and less than 1 % in areas of very shallow alluvial cover and bedrock outcrop. The increasing salinity trend of the shallow water table at Hemi from west to east is considered to reflect variation in rainfall recharge.

- Elevated levels of dissolved arsenic occur in the weathered rock profile within and adjacent to ore zones. Elevated, but smaller levels of dissolved arsenic (typically 20 – 60 ug/L) also occur in the basal sections of the alluvial aquifer within short down-gradient distances of ore zones.

- The Hemi Deposit hydrogeology is considered suitable for successful advance dewatering of the alluvial cover and underlying weathered rock profile by a conventional borefield system. Within the more extensive fresh rock profile, relatively minor inflows are expected that would require in-pit sumps and/or targeted dewatering bores to support dewatering.

Conclusions - Dewatering Requirements and Outcomes

- Large dewatering rates of up to 97 ML/day (see Figure ES-1) are required in the first few years of the operations given the high permeability and high storage within the alluvial aquifer and the shallow depth to groundwater.

- Dewatering needs to start well in advance of the initial mining planned at the Brolga Stage 1, Falcon and Diucon pits. The modelling has adopted a 15-month lead time and the results suggest a slightly shorter lead time may be possible, however, given the levels of uncertainty in the model, the 15 month lead time should be retained.

- The 24 month period between commencing dewatering and starting ore processing creates a large surplus of water. Reinjection of most of the surplus water into the palaeochannel aquifer to the north and south of Hemi is considered viable, but not for all of the surplus . Consequently, a portion of the dewatering surplus is proposed to be discharged to the Turner River over a 2 – 3 year period at rates of up to 24 ML/day for a simulated total volume of about 16.6 GL.

- Dewatering rates are predicted to gradually decline below the total project water demand (25 ML/day) in Mining Year 9 (Figure ES-1). At this stage, several reinjection bores between Hemi and Mt Dove would be converted to supply bores and pump water to the process plant at rates of up to about 8 ML/day by the end of Operations.

- Model sensitivity analyses were completed to consider model uncertainty. These resulted in maximum dewatering rates ranging between 86 - 103 ML/day in comparison to the base case rate of 97 ML/day. A dewatering system with a peak design pump rate of 120 ML/day is considered suitable for the Hemi DFS mine schedule scenario.

- Modelling results indicate that the vertical drainage of water through the highly weathered bedrock zones occurs without significant perching or build-up of pore pressure heads in these zones immediately behind pit wall positions. However, observations of core suggest lower permeabilities may be present in some parts of the saprolite profile within fine-grained sedimentary bedrock or within silty zones within saturated alluvium. This may result in higher pore pressures behind pit wall positions to levels that could be of significance to pit slope stability.

- Whilst ex-pit dewatering bores spaced closely enough capture most groundwater inflows to the pits, it is often impractical for them to capture 100% of inflow. Within the basal sections of the palaeochannel aquifer where it intersects upper pit walls, consideration of berm-sump toe drainage is warranted.

- Management of groundwater with elevated levels of arsenic in the first two years of dewatering will be a significant issue for the Project. Once the ore processing and TSF circuits are commissioned this issue will be managed by directing elevated arsenic water to the process plant. The design and operation of the dewatering system will create two different water 'streams';

    - Type I water – suitable for discharge to the Turner River, aquifer reinjection without subsequent recapture and for camp and potable water supplies (once RO treated). Water quality that meets ANZECC 2018 guideline values for freshwater aquatic ecosystem protection to Level of Species Protection (LOSP) 95% criteria (0.024 mg/L for dissolved arsenic (III)).

    - Type II water – all other dewatering surplus to be directed to dust suppression use and to aquifer reinjection where recapture of the reinjected water occurs by the dewatering system during Operations and by mine void lake capture during the closure phase.

- Alternatives and variations to the surplus water management strategy are possible and warrant more consideration based on consultation with regulatory agencies, relevant communities, and other potential water users. These include:

    - Increasing aquifer reinjection rates and volumes and/or distributing reinjection over a large area if additional access to tenure currently held by Atlas Iron and Mantle Minerals is secured by De Grey.

    - Potentially increasing the Turner River discharge rates and volumes (within the first three year period) assuming that the predicted wetting front extent and inundated areas within the Turner River, nor the associated ecological risks, are not significantly increased.

    - Temporary storage of dewatering discharge or in-pit rainfall runoff within completed interim pits, assuming this does not comprise wall stability issues or future mine schedules.

    - Relatively short-term commercial arrangements with other mining companies to supply them with water during De Greys period of water surplus. Caution should be applied to such arrangements given the existing water balance predicts a water deficit by Mining Year 9, which would happen earlier if the some of the water surplus is provided to off-site third parties.

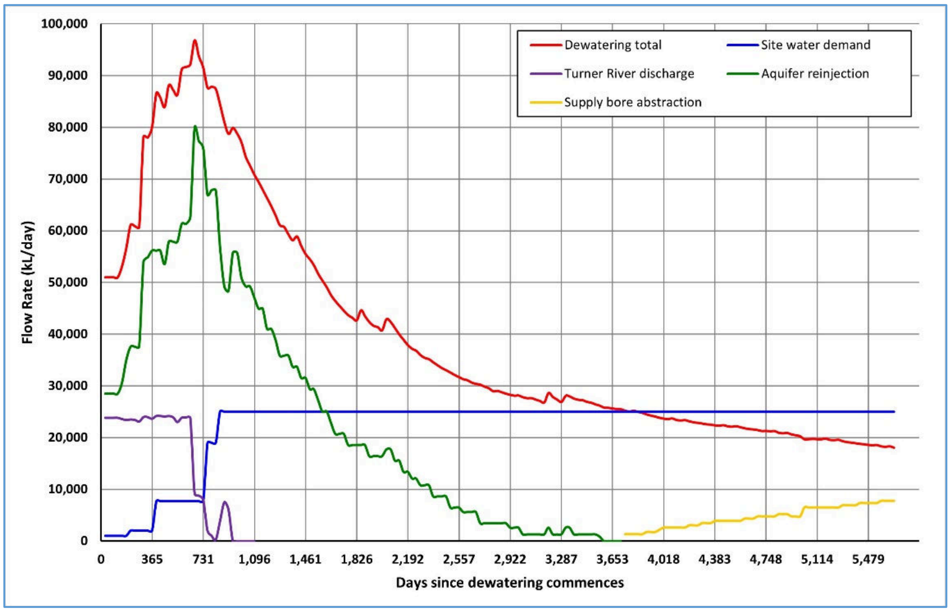

Figure ES-1 Base Case Dewatering and Site Water Balance Rates

Conclusions - Environmental Issues and Impacts of Proposed Groundwater Use

- Three (3) pastoral bores on Indee Station are highly likely to be rendered inoperable by the water table drawdown caused by dewatering. These livestock water points would need to be made good by installation of new deeper bores or the piping of similar water quality from the Hemi water system.

- Drawdown in one of the Atlas iron bores at Mt Dove is predicted to be about 8 m by the end of Operations. This may reduce the supply potential of the bore and hence De Grey would have to provide any of the supply loss from MDEX6 with water of similar quality, which would be readily available from the Type I water streams from Hemi. Modelling indicates that solutes from at least one of the De Grey reinjection bores could be transferred to bore MDEX6 during Operations, but given the similar water quality, this would not have an adverse impact on the use of water from MDEX6 for its historical water end uses.

- No adverse impacts on the Yule River Borefield or groundwater resources within the Yule PDWSA reserve are expected. Whilst drawdown from Hemi dewatering propagates the significant distance of about 12 km to the northwest, the nearest Watercorp production bore is about 32 km from Hemi. Minor levels of drawdown (less than 2 m) are predicted to extend up to one kilometre inside the PDWSA boundary, but this has been shown to have no material effect on the integrity or yield of the public supply water resource.

- At the conclusion of dewatering, the alluvial aquifer within the model domain has a volume reduction of about 7% compared to the pre-dewatering November 2022 aquifer volume. In the context of reduced habitat for stygofauna, this minor reduction is not considered to be significant.

- No significant impacts on river pools or riparian vegetations in the Yule River are expected. Three intermittent pools occur within 1 km of the maximum drawdown extent. The highest value pools in the study area (Jelliabidina, Mardagubiddina and Portree) occur between 2.5 – 5.5 km beyond the predicted maximum drawdown extent.

- The potential for adverse impacts from the proposed aquifer reinjection is low as the strategy and model simulations are designed to limit water table mounding in reinjection areas reaching no higher than three (3) m below ground. Additionally, reinjection of elevated arsenic water is restricted to the first two years of dewatering, and only to bores which particle tracking modelling confirms that the reinjected water travels back to the open pit and is recaptured by the dewatering system during the operational phase or during the early stages of mine closure when the mine voids continue to act as a groundwater sink.

- Potential impacts on the shallow aquifer beneath reaches of the Turner River that become saturated from the proposed river discharge have been assessed as insignificant or minor. The mounding of the water table under the wetted river channels has been modelled and the lateral extent of mounding is predicted to be within 300 – 600 of the water channels. Adverse water quality impacts are highly unlikely.

- Seepage of TSF water through the floor of the TSF to the underlying water table has been modelled and assessed to have no potential for adverse impacts given the relatively low seepage rates determined by CMW and the fact that the TSF lies well within the significant drawdown footprint from nearby pit dewatering.

- Model uncertainty has been assessed by completing sensitivity analyses in which aquifer permeability, specific yield and natural recharge rates were varied above and below the base model values. These indicate that drawdown extents could be increased by up to 3 km or decreased by up to 1.5 km in some parts of the model domains compared to the base case prediction of drawdown (see Figure ES-2). These changes are not considered enough to alter the impact assessment findings or water management measures tabled in this report for the base case model.

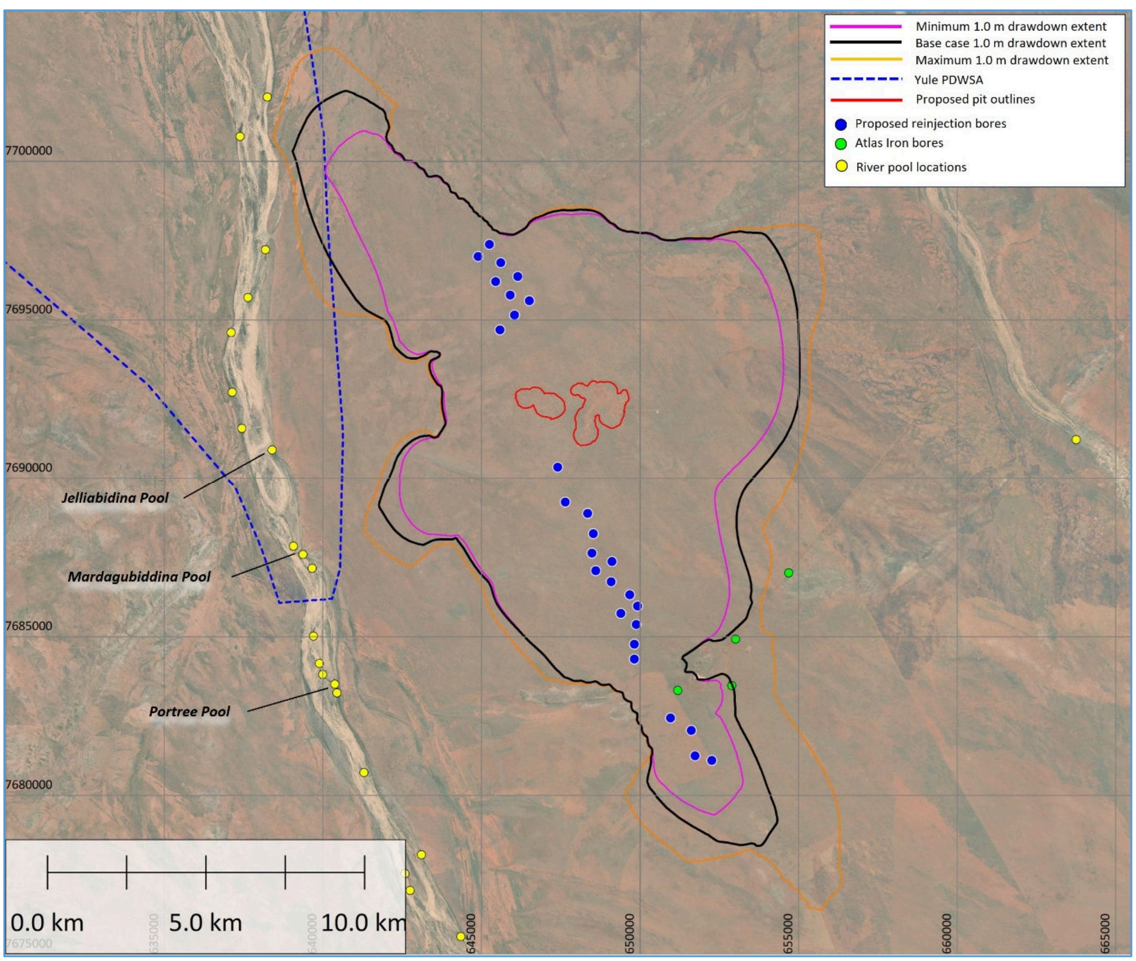

Figure ES-2 Base Case Dewatering Drawdown Uncertainty

Recommendations

Recommendations for advancing the project water studies to support the 5C GWL licensing process and progress dewatering and water management system designs into construction and early operations are provided below:

1. Use the results of the May – October 2023 field programmes and the pit void closure modelling to refine and conclude the H3 level groundwater report and draft Water Operating Strategy. Submission of these documents with the 5C GWL application to DWER by the end of February 2024.

2. Continue the current baseline monitoring programmes to capture natural variations to the surface water and groundwater systems as outlined in Tables 13-1 and 13-2.

3. Consider and implement the recommendations made in Tables 13-1 and 13-3 for establishing water monitoring systems to detect and help assess any potential environmental impacts during the Operations phase (noting that some of the recommended installations have already commenced or are scheduled to commence before the end of 2023)

4. Review and implement the thirteen recommendations made in Table 12-1 for optimising the cost and effectiveness of the dewatering and surplus water management systems (noting that some of the recommended installations have already commenced or are scheduled to commence before the end of 2023.

5. Use the results of the groundwater model sensitivity run with reduced permeability values across the saprolite profile in the pit wall slope stability assessments being undertaken by MineGeoTech.

6. As part of regulatory environmental approvals De Grey should seek to establish the wetting front extent and inundated areas within the Turner River as key licence criteria rather than using maximum flow rates or total volumes as licence criteria. This should provide more flexibility in managing and operating the surplus water system without increasing any ecological risks within the Turner River.

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APPENDICES

1 INTRODUCTION

1.1 Groundwater Study and Report Objectives

De Grey Mining Ltd (De Grey) discovered the Hemi gold deposit on Indee Station in 2019 and have been undertaking resource drilling, project feasibility studies and environmental impact assessments since 2020. Geowater Consulting Pty Ltd (Geowater) was engaged by De Grey in the second half of 2020 to undertake and oversee groundwater investigations and technical assessments to support the development of the Hemi Project.

This report represents the culmination of field investigations and assessments to June 2023 by describing the conceptual and numerical groundwater models developed and applied by Geowater to support the Definition Feasibility Study (DGS) being concluded by De Grey in Q3 2023. The two key objectives of the modelling work and this report are to provide De Grey with:

- Estimation of dewatering and water supply requirements to a suitable technical standard to support a DFS level of accuracy for water system designs and costings.
- A robust technical assessment of the potential impacts of De Greys planned water uses on surrounding water users and the environment.

It is important to note that this report focusses only on the operational phase of the proposed Hemi Project and does not incorporate an assessment of the mine closure phase. Neither does the report fully capture the results of currently ongoing field work designed to validate the conceptual and numerical groundwater models. These aspects and results will be presented in a subsequent report to support the application to the Department of Water and Environmental Regulation for a 5C Groundwater Well Licence in late 2023 or early 2024.

This report incorporates the feedback from an independent technical review of the precursor PFS report by Jurassic Groundwater consultants in September 2022.

1.2 Previous Investigations and Reports

1.2.1 Field Investigations

Groundwater field investigations completed for the Hemi Project since late 2020 are summarised briefly below:

- *November – December 2020*. Installation of eleven (11) local and semi-regional monitoring bores (by Topdrill) using a conventional RC drill rig under the supervision of Geowater staff. One water supply bore was also installed for drill rig water supplies and dust suppression.

- *April 2021*. A regional census of pastoral bores and wells surrounding the Hemi Deposit was completed by De Grey and Geowater staff. This has been followed by ongoing six-monthly monitoring of groundwater levels and basic water quality in these bores.

- *July 2021*. Drilling of 37 air-core holes (by Wallis Drilling) to investigate the main paleochannel aquifer to the immediate north and south of the Hemi Deposit, followed by the installation of four (4) multi-piezometer bores in these areas in November 2021.

- *August – September 2021.* Installation of four water supply bores (by Topdrill) within the alluvial aquifer system at Hemi for drill rig water supplies.

- *August – November 2021*. Drilling and construction of eleven (11) production bores and ten (10) monitoring bores (by Austral Drilling) in alluvial and bedrock aquifer zones within and near proposed open-pit locations at the Hemi Deposit.

- *September 2021*. Drilling and construction of six (6) monitoring bores (by Austral Drilling) along three transects across the Turner River in the region where the option of surplus water discharge to the river has been assessed.

- *October 2021 – January 2022*. Test-pumping of ten (10) production bores by MDP under the supervision of Geowater and De Grey staff

- *October-November 2021*. A passive seismic geophysical survey (by Respot and De Grey staff) to investigate alluvium-bedrock contacts along the Turner River and on two select transects near Hemi.

- *March – May 2022*. Drilling and construction of twelve (12) monitoring bores (by Topdrill) in the region of the proposed tailings storage facility (TSF).

- *September 2021 – June 2022*. Estimation of aquifer hydraulic properties by undertaking small scale falling head (slug) tests in monitoring bores.

- *March – May 2023*. Drilling of 130 air-core holes (by Bostech Drilling) to investigate the main paleochannel aquifer in locations up to five kilometres north (downstream) and up to 15 km south (upstream) of the Hemi Deposit.

- *May 2023 to present*. Bore drilling programme commenced to trial different drilling and bore construction methods for bedrock aquifer settings, as well as drilling of two aquifer reinjection bores to enable a reinjection trial to be undertaken later in 2023.

- *December 2020 - present*. Six-hourly groundwater levels collected using In-Situ RuggedTroll loggers in select monitoring bores.

- *December 2020 – present*. Detailed water quality analyses of groundwater samples collected at the time of bore installation and at approximately six-monthly intervals thereafter.

1.2.2 Previous Geowater Reports

The following groundwater reports have been prepared to date by Geowater for the Hemi Gold Project:

- *Mallina Gold Project Scoping Study – Groundwater Report (May 2021)*. Submitted for the project Scoping Study using the preliminary results of field work completed in late 2020 and early 2021.
- *Hemi Gold Project Pre-Feasibility Study – Groundwater and Surface Water Field Investigations Report (August 2022)*. Detailed factual report describing the field investigations completed between August 2021 to June 2022.
- *Hemi Gold Project Pre-Feasibility Study – Conceptual and Numerical Groundwater Modelling – Operational Phase (November 2022)*. Report describing the assessment of dewatering requirements to the PFS mine schedule and Project description, as well as the potential impacts upon surrounding groundwater users and the environment.
- *Hemi Gold Project Feasibility Study Report – Groundwater and Surface Water Assessment (March 2023)*. Report compiled from the above reports (including a summary of surface water assessments by others) to support the Project Referral to the Western Australian EPA in June 2023.

1.3 Report Structure

This report has a structure that is consistent with the hydrogeological reporting guidelines specified by DWER for proponents seeking groundwater allocations from the West Australian government. The assessment and report are of a 'H3' level, which is defined in the DWER guidelines as a *detailed hydrogeological assessment including drilling, test pumping and a groundwater model. (*DOW, 2009*)*. The report content and structure are also considered consistent with the groundwater modelling guidelines issued by the National Water Commission of the Australian Government in 2012.

The report has the following structure:

1. *Introduction* – Statement of objectives, reference to previous relevant studies and explanation of report structure.
2. *Project Description* – Brief overview of the proposed Hemi Gold Project, with a focus on water-related issues, including a description of project water demands.
3. *Surrounding Water Values and Users* – Summary of known groundwater use and values surrounding the Project, serving as the basis for identifying potential impacts later in the report.
4. *Climate* – A summary of historic and recent rainfall and evaporation patterns in the region given their significance to groundwater systems.
5. *Hydrology* – An outline of recorded river levels, flows and water quality in the Turner and Yule rivers, which occur about twelve (12) and eight (8) kilometres from the Project.
6. *Groundwater Investigations to Date* – A summary of field work and key results is provided, as the reader is directed to previous reports to access this information in detail.
7. *Conceptual Groundwater Model* – Section that provides details on the interpretations and conclusions from the field studies, culminating in a qualitative description of the aquifer system(s) present at Hemi and in the surrounding region where impacts from the proposed water use are likely or possible.
8. *Numeric Groundwater Model* – Detailed section that follows the logic of the Australian Modelling Guidelines (Barnett et al, 2012) and describes the:
    1. development and construction of the numeric model.
    2. calibration of the model to recent groundwater levels.
    3. open-pit mining schedule provided by De Grey, which dictates the dewatering effort required.
    4. predictive scenarios simulated by the model to assess dewatering inflows, groundwater supply pumping and selected water management measures for the operational phase of the Project.
9. *Project Water Balance* – This section discusses the effect of different water management measures simulated above on the overall project water balance. It is evident that the Hemi Gold Project will have a very large water surplus in the early years, with a small deficit possible in the latter stages.
10. *Impact Assessment* – This section applies the results of the modelling to identify and discuss likely and possible impacts on surrounding groundwater users and the environmental values of the local and regional water resources. In the case of environmental values, the assessment is not a detailed and complete risk assessment, instead, it is intended to provide technical groundwater inputs to the full EIA process being undertaken by De Grey and technical specialists from several disciplines.
11. *Uncertainty Analysis* – This section uses both the conceptual and numeric models to consider the potential consequences of technical uncertainty in the models in relation to the most significant impact issues.
12. *Water Monitoring* – This section conforms to the 2009 DWER Guidelines by outlining the various water resource monitoring De Grey will commit to and implement to obtain and maintain the large scale groundwater licence allocation the Project requires.

Some report figures are presented within the body of the document, however, most are presented as attachments, which allows for printing and/or viewing of the figures at full A4 or A3 size. Note that all maps in this report and geospatial digital products for the DFS groundwater studies are presented and provided in the GDA94 – MGA Z50 datum-projection system.

2 PROJECT DESCRIPTION

2.1 Project Overview

De Grey Mining Ltd (De Grey) is a Western Australian based mining company listed on the Australian Securities Exchange ("ASX:DEG") that is seeking to develop the Hemi Gold Project ("Project") in the Pilbara region of Western Australia, some 85 kms south from the regional hub of Port Hedland.

The Project is of a scale that places it in a Tier 1 category for gold mine developments. The Project consists of six deposits; Aquila, Brolga, Crow, Diucon, Eagle and Falcon, collectively known as the Hemi deposits. Although the Hemi deposits will provide ore for the Project over a mine life in excess of twelve years, there is also potential for additional resources from regional deposits that may, subject to the outcomes of further studies, be processed at the Hemi processing facility.

The location of the Hemi deposits in relation to Port Hedland and the regional deposits is shown on **Figure 2-1**Figure 2-1 and the proposed layout of the associated infrastructure is shown on Figure 2-2.

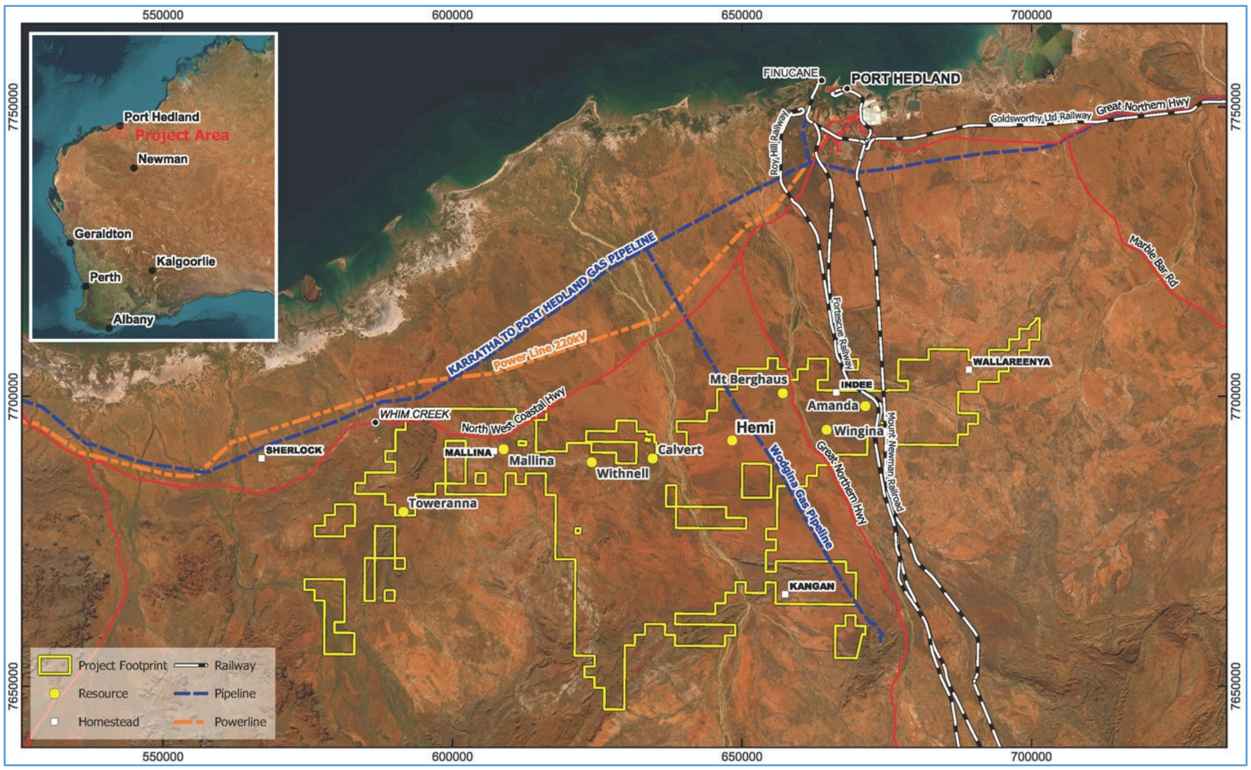

Figure 2-1 Hemi Gold Project Location **(De Grey, August 2023)**

The Project comprises the following key components:

- Development of open cut pit operations at the Hemi deposits in a sequential manner for the life of mine;
- Construction and operation of a nominal 10.0 Mtpa processing facility located adjacent to the Hemi deposits capable of achieving 93% to 95% gold recovery from free milling and semi refractory ores;
- Staged construction of tailings storage facilities ("TSF") with a planned capacity for 130 Mt of processed tailings slurry;
- A water supply from the local groundwater aquifer with accompanying groundwater and surface water management infrastructure to facilitate mine dewatering and site flooding protection;
- A village with messing and accommodation capacity for approximately 600 personnel;
- An airstrip with capacity for 100 seat jet aircraft; and,
- A 12 km sealed access road from the Great Northern Highway.

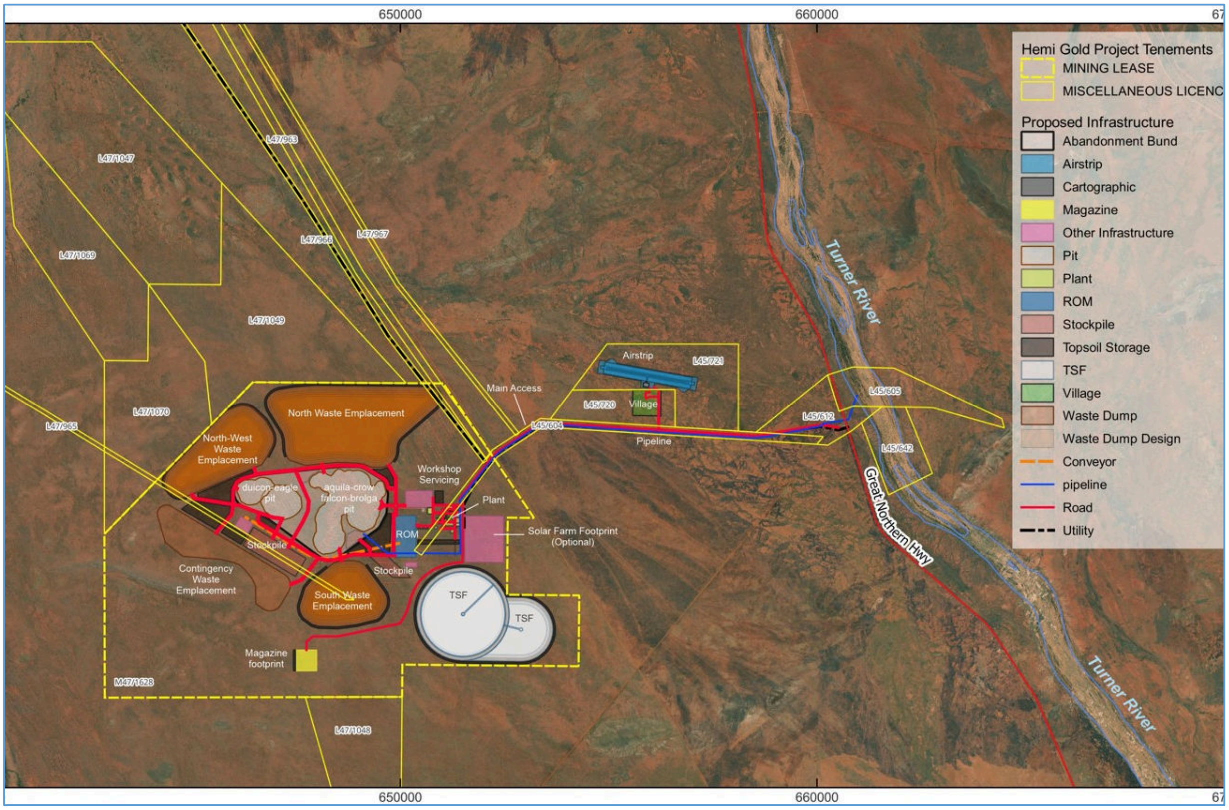

Figure 2-2 Hemi Gold Project Infrastructure (De Grey, August 2023)

2.2 Mining and Processing

Mining will be undertaken by conventional open-pit methods with ore trucked from the open-pits to a nearby stockpile for crushing and milling prior to gold extraction by gravity, pressure oxidation and carbon in leach (CIL) methods. Waste rock and low-grade ore material will be placed in large stockpiles as close as practically possible to the open pits. No backfilling of pit voids is planned.

Groundwater occurs between six (6) to seven (7) metres below ground in the open-pit area, such that dewatering of the open pits will need to commence in advance of actual mining so that safe, dry mining conditions are achieved. The groundwater system at Hemi is considered amenable to dewatering by a borefield system, with some groundwater abstraction occurring from in-pit floor sumps. Completed pits are planned to remain dewatered in case of additional mining, with two separate pit voids being formed at the end of mining, with a combined volume of about 366 million m^3.

The ore processing rate of 10 mtpa will generate a large volume of saturated tailings material that will be stored within large circular storage facilities designed to limit the seepage of water from inside the TSF to the underlying water table. Decant and rainfall runoff from the TSF surface will be reclaimed and used in the processing circuit.

2.3 Project Water Requirements

The main water requirements of the Project comprise:

- Process water – 17.2 ML/day - used in the various stages of ore processing from milling, gold recovery and tailings transfer as a slurry.
- Dust suppression water – 7.2 ML/day - used predominantly to suppress dust created by equipment and vehicles on haul roads, access roads and within other work areas.
- Camp water – 0.6 ML/day used to source and supply potable and domestic use water in the mine village.

Figure 2-3 displays the various water demand rates on a quarterly basis as the Project ramps up to the maximum steady-state rate of 25 ML/day. The start of Q1Y1 correlates to the start of ore processing, with mining commencing in Y-1 and early construction works in Y-2. Ore processing is scheduled to commence nine (9) months after the start of mining given the need to excavate the alluvial overburden and develop an adequate amount of stockpiled ore. At full production rates, the total water demand of 25 ML/day equates to an annual volume of 9.1 GL or an average demand rate of 289 L/sec.

Subject to the timing of further feasibility assessments and regulatory approvals, De Grey are planning to commence open-pit mining in 2026.

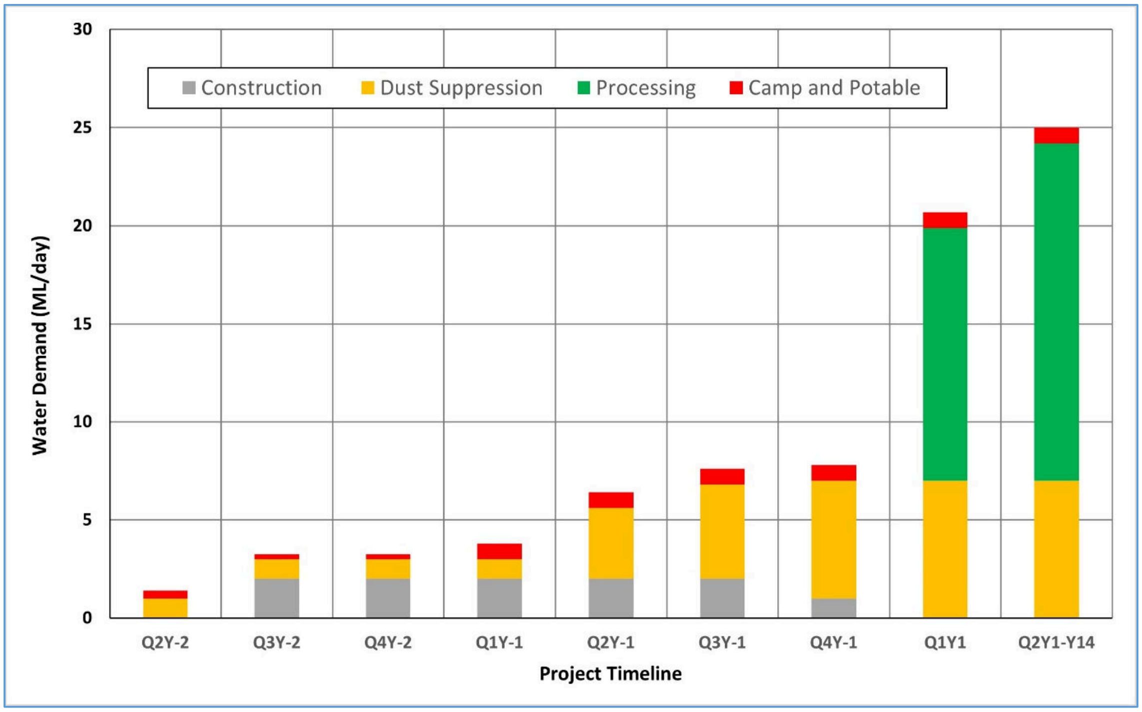

Figure 2-3 Project Water Demand Profile

3 SURROUNDING WATER VALUES AND USERS

3.1 Water Values

3.1.1 DWER Groundwater Resources

The Hemi area occurs within the Ashburton Sub-area of the Pilbara Groundwater Area as defined by DWER. The adjoining East Pilbara Sub-area occurs within 11 to 16 km to the southwest and south of the Hemi deposits as shown on Plan 3-1. This plan also highlights the three (3) Groundwater Resource systems defined by DWER in the study area:

- *Pilbara – Lower Yule Alluvial Aquifer*. The boundary of this groundwater resource coincides with the boundary of the *Yule River Water Reserve* which is in place to help protect the public drinking water supplies accessed by the Water Corporation for use in Port Hedland.
- *Pilbara – Lower Turner Alluvial Aquifer*. This is a smaller alluvial aquifer resource defined by the DWER management systems. Years ago, this resource was associated with a public drinking water borefield, but is now mainly accessed by pastoral users and by FMG and Roy Hill for their port operations. This resource occurs over twenty-seven (27) kilometres north-northeast of the Hemi deposits.
- *Pilbara – Fractured Rock Aquifer*. This resource is present throughout the entire Pilbara Groundwater Area and is often recognised by DWER as including sedimentary alluvial sequences as well as the underlying bedrock lithologies.

3.1.2 DWER Surface Water Resources

The Hemi Project occurs within the Yule Surface Water Allocation Area within the Port Hedland Coast Basin (see Plan 3-1). Within this broader management area, the Hemi deposits occur within the Turner surface water resource area, and are also within two (2) kilometres of the western boundary of the Yule surface water resource as defined by DWER and shown on Plan 3-1.

3.1.3 River Pools

The reaches of the Turner (Kapankalanha) and Yule (Kakurrka Muri) Rivers within the study area are of significant cultural importance to the Kariyarra People.

Mapping of river pools in the Pilbara was undertaken by DWER in 2008 (as shown on Plan 3-1) and indicates that most river pools in the Hemi region occur in the Yule River. Within a 20 km radius of Hemi, the DWER mapping has classified 25 pools in the Yule River; 11 are classed as intermittent, 13 as semi-permanent and one as permanent (Jelliabidina Pool). Only one (intermittent) pool occurs in the Turner River within a 20 km radius of Hemi. Sampling and surveying of several pools has been ongoing since 2021 (Geowater, 2022 and this report). More detail on individual pools is presented in Section 10.

3.1.4 Riparian and Groundwater Dependant Vegetation

Government vegetation mapping indicates the plains of the Hemi region between the Yule and Turner rivers are dominated by grasses and shrubs in a grassland steppe type structural setting. Woodland vegetation, including groundwater dependant species, such as *Eucalyptus camuldensis* (river redgum) and *Melaleuca argentea* (silver-leaved paperbark), are restricted to riparian settings within the current day channels of the Turner and Yule rivers.

The ecological water requirements of these riparian species were evaluated in detail in the region of the Yule River Borefield by the DoW (2013). This study ultimately led to the establishment of environmental water provisions in the form of water level criteria and controls to be adhered to by Watercorp in operating the borefield.

Extensive flora and vegetation assessments of the Project area, including a reach of the Turner River, have been undertaken by Umwelt (2023). They concluded that obligate phreatophytes are absent from the project survey area between the Yule and Turner rivers. The mapped occurrences of the facultative phreatophyte species *Eucalyptus victrix* (coolabah) in the Hemi region are considered by Umwelt (2023) likely to be vadophyte individuals and not groundwater-dependant.

3.1.5 Stygofauna

Stygofauna are small, largely invertebrate, fauna that can occur within the pore spaces of aquifers. Sampling and assessment of these species has become a standard component of EIA's for most mining projects in Western Australia in recent years. The WA EPA requirements for assessing stygofauna is driven by a concern that many of these species exhibit short range endemism (geographically restricted ranges), which increases *the possibility that a species conservation status may be impacted as a result of the implementation of a* [mining] *proposal* (WA EPA, 2016).

Bennelongia have undertaken several stygofauna surveys since 2020 on behalf of De Grey, which identified at least 45 stygofauna species from within and outside of the Project area. Based on the groundwater changes predicted by Geowater (2022) for the PFS, Bennelongia (2022) concluded that "*the threat to stygofauna conservation values from Project dewatering and reinjection is considered to be low*".

Section 10.2 of this report incorporates assessment and discussion of the changes to aquifer conditions (and resultant changes to stygofauna habitat) from the newer, revised DFS groundwater modelling.

3.2 Existing Groundwater Users

3.2.1 Pastoral

The Hemi Deposit is situated on the Indee pastoral lease. Field visits by Geowater and De Grey staff in 2021-2022 have confirmed the presence of 47 active pastoral bores and wells on the Indee and adjoining Mundabullangana lease within a 25-kilometre radius of Hemi, as shown on Plan 3-2. Eleven abandoned wells and bores have also identified. Details of these sites and groundwater data measured during the 2021-2022 visits are provided in previous Geowater reports (2021, 2022). A summary of the pastoral sites is included here as Appendix A.

The Indee and Mundabullangana leases are active cattle properties that rely extensively on local groundwater resources for stock watering and domestic purposes. The Boodarie pastoral lease, held by BHPB, occurs to the north and east of the Indee and Mundabullangana leases and is currently de-stocked. To the south-west of Hemi, no pastoral activities are undertaken on the Yandeyarra Indigenous Reserve.

3.2.2 Atlas Iron - Mt Dove

Atlas Iron Pty Ltd currently hold Groundwater Well Licence (GWL) 175319, which provides a 650,000 kL annual allocation for abstraction from the Pilbara Fractured Rock Aquifer Resource. Four production bores are associated with this GWL and occur about 9 – 10 km from the Hemi Deposit (Plan 3-2). The licence was originally obtained to support the Mt Dove iron ore mining operation, which was active in 2012 and 2013. The site then crushed ore from Wodgina before going into a care and maintenance phase in April 2015 (Atlas Iron, 2016).

For almost ten years now, groundwater use by Atlas Iron has been highly limited (relative to their allocation). During 2021 – 2022, groundwater use was restricted to camp supplies for the Mt Dove Village, which De Grey utilised on a hire basis to accommodate some of its Hemi workforce. The Village went back into care-and-maintenance mode in late 2022.

3.2.3 Water Corporation – Yule River

The Water Corporation operates the Yule River Borefield in accordance with the terms of GWL65501 to provide public and industrial water supplies to Port Hedland. Ten (10) production bores are located near the eastern bank of the Yule River as shown on Plan 3-3. These bores are between 32 to 45 kilometres to the northwest of Hemi.

The GWL allows for the annual abstraction of 10,500,000 kL. Public *Hansard* records highlight that abstraction is usually much lower than the allocation limit, ranging from 2,800,000 kL in 2013/14 to 7,197,000 kL in 2018/19. An important aspect of water use from this borefield is the need to limit water salinity to maximum levels of about 500 – 600 mg/L. In years with significant flooding of the Yule River and resultant increases to aquifer recharge, more low salinity water can be accessed by the borefield, compared to dry years with limited or no river flows.

As a public drinking water source, the Yule River Borefield is protected by the Yule River Water Reserve water source protection plan, which was last updated in 2019 (DWER, 2019). The entire reserve is designated as a Priority 1 area to protect its water quality. The boundary of this reserve is shown on Plan 3-3, which highlights that the south-eastern edge of the reserve occurs about five (5) kilometres from the nearest Hemi orebody (Eagle).

3.2.4 Other Licensed Groundwater Users

Table 3-1 summarises all current groundwater licence holders within a 50 km radius of Hemi, with the approximate locations of these licensees shown on Plan 3-3. The GWL details were sourced from DWERs online *Water Register* tool on 18 July 2023.

Table 3-1 Current Groundwater Well Licences (July 2023)

GWL #	Licensee	Annual Allocation (kL)	Aquifer Resource	Expiry
175319	Atlas Iron Pty Ltd	650,000	Pilbara – Fractured Rock	16/06/2025
167110	BHP Iron Ore Pty Ltd	480,000	Pilbara – Fractured Rock	14/08/2023
179392	Z, C. Day	50,000	Pilbara – Fractured Rock	14/10/2028
183717	Days Contracting	280,000	Pilbara – Fractured Rock	14/01/2029
161699	FMG Ltd	100,000	Hamersley – Fractured Rock	07/09/2024
176212	Hanson Constructions	280	Pilbara – Lower Yule Alluvial	09/09/2028
84876	Holcim (Australia) Pty Ltd	150,000	Pilbara – Fractured Rock	07/05/2023
202110	Karratha Gold Pty Ltd	95,000	Pilbara – Fractured Rock	05/11/2028
182429	Main Roads	13,750	Pilbara – Fractured Rock	30/07/2030
202856	Main Roads	10,000	Pilbara – Lower Yule Alluvial	09/06/2029
154570	MARBL Lithium Operations	5,610,000	Pilbara – Fractured Rock	27/05/2030
160528	*Northwest Nonferrous Australian Mining*	*20,000*	*Pilbara – Fractured Rock*	*12/05/2024*
18193	D. North	250	Pilbara – Lower Turner Alluvial	05/11/2025
183354	Pilgangoora Operations Pty Ltd	6,900,000	Pilbara – Fractured Rock	05/08/2029
174994	Roy Hill Infrastructure Pty Ltd	100,000	Pilbara – Fractured Rock	02/02/2024
176004	Roy Hill Infrastructure Pty Ltd	150,000	Pilbara – Lower Turner Alluvial	18/06/2029
65501	Water Corporation	10,500,000	Pilbara – Lower Yule Alluvial	14/12/2026
173692	Yaandina Family Centre	5,000	Pilbara - Alluvial	26/05/2026
201863	C Flesser	200,000	Pilbara – Fractured Rock	20/08/2028

The Main Roads Department of the West Australian government hold two small groundwater allocations in the region surrounding Hemi for occasional use on road maintenance works. GWL160528 is held by Northwest Nonferrous Australia Mining and is part of the De Grey suite of companies and mining tenure associated with the Withnell Deposit (formerly the Indee Gold Mine).

3.3 Existing Licensed Surface Water Users

Very little licensed surface water abstraction occurs in the study area. Only three (3) surface water licenses are in force as of July 2023, as shown on Plan 3-4, and summarised in Table 3-2.

Table 3-2 Current Surface Water Licences

SWL #	Licensee	Annual Allocation (kL)	Surface Water Resource	Expiry
179532	Main Roads	1,250	Turner	16/11/2030
204450	Nimble Resources Pty Ltd	250	Yule	17/06/2030
202597	Pilbara Minerals Ltd	60,000	Turner	21/03/2029

4 CLIMATE

The Hemi region climate is classified by the *Koppen* system as having a *hot desert climate*. It experiences hot summers and mild winters, with most rainfall occurring during the summer months between December – March. Annual rainfall is characterised by high variability, much of which is related to the occurrence of tropical cyclones in the region. Annual pan evaporation typically exceeds annual rainfall by an order of magnitude.

4.1 Rainfall

4.1.1 Long-term Records

Bureau of Meteorology (BOM) rainfall records commenced in Port Hedland in December 1897. Official rain records also commenced at pastoral homesteads surrounding Hemi in around 1900, however, these stations often have significant gaps in their data record. The Queensland state government maintains the *SILO* database, which provides interpolated climate data since 1889 at key localities and regular grid positions throughout Australia. These datasets were used to collate the long term rainfall statistics shown in Table 4-1, which highlights similar values between Port Hedland on the coast and at Hemi which is located about 60 kilometres inland from the coast, as well as the variable nature of rainfall from year to year.

Table 4-1 Annual Rainfall Statistics 1898 – 2022

Statistic	**Port Hedland (BOM)**	**Hemi (*SILO*)**
Mean (mm)	318	314
Median (mm)	289	281
Standard deviation (mm)	168	156
Minimum (mm)	45	11
Maximum (mm)	1,020	781

Figure 4-1 plots the cumulative deviation from the mean annual rainfall at Hemi and Port Hedland (for the 1989 – 2022 period) and indicates that:

- The first few years of records at Hemi and Port Hedland had above average rainfalls, followed by a drier period until around 1933.
- After 1933, the drying trend continued slowly overall at Hemi until the early 1970's, whilst rainfall at Port Hedland had a brief wet period followed by largely average rainfall trends until the mid-1990's.
- Since 1995, both Hemi and Port Hedland have been in a wetter than average period until about 2020. In the 30-year period since 1993, mean annual rainfall at Port Hedland has been 8% higher than the 125-year average, and 20% higher at Hemi (Table 4-2).

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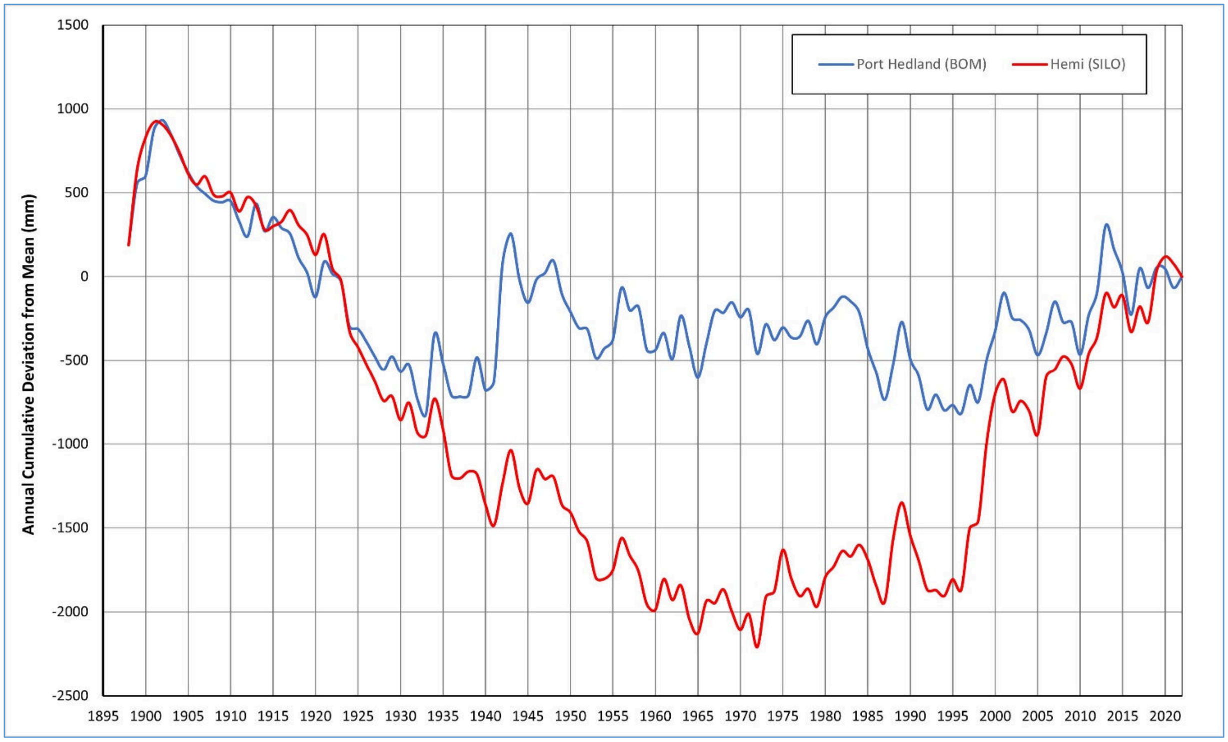

Figure 4-1 Long term rainfall – cumulative deviation from men

4.1.2 Recent Rainfall

Automated weather stations were installed at the Hemi Deposit, Wingina Camp and Withnell Camp by De Grey in the latter stages of 2021. Two additional rain gauge loggers were installed in late 2022 several kilometres to the north and south of the Hemi Deposit (see Plan 3-2 for locations). These newer localised datasets will map local rainfall variability and help to improve surface water and groundwater modelling studies in the future.

Table 4-2 provides average rainfalls for the past 30 years as well as 2018 – 2023 annual amounts and highlights the significant variability of annual rainfall between years and locations. Most groundwater and surface water level monitoring completed to date at Hemi has been during the past 24 months, which Table 4-2 shows have been notably drier than average. The high rainfall for the 12 months to June 30 2019 was almost entirely due the rainfall associated with Cyclone Veronica in March 2019.

Table 4-2 Summary Rainfall Data (from *SILO*)

Site	*Average Annual Rainfall 1993 – 2022 (mm)*	Rainfall Year Ending 30 June 2018 (mm)	Rainfall Year Ending 30 June 2019 (mm)	Rainfall Year Ending 30 June 2020 (mm)	Rainfall Year Ending 30 June 2021 (mm)	Rainfall Year Ending 30 June 2022 (mm)	Rainfall Year Ending 30 June 2023 (mm)
Hemi	*376*	263	616	254	419	236	201
Port Hedland Aero[1]	*344*	240	437	216	296	364	197
Indee Homestead	*392*	295	641	273	416	213	203
Mallina Homestead	*369*	234	566	238	451	264	192

Note 1. Port Hedland Aero rainfall sourced from BOM website

4.2 Evaporation and Evapotranspiration

Class A Pan evaporation exceeds rainfall in all months of the year, as shown on Figure 4-2 using the *SILO* 30-year average data for Hemi. The average annual evaporation amount from this dataset is 3,180 mm, which is very similar to the 3,200 mm amount shown by the BOM on their national average maps.

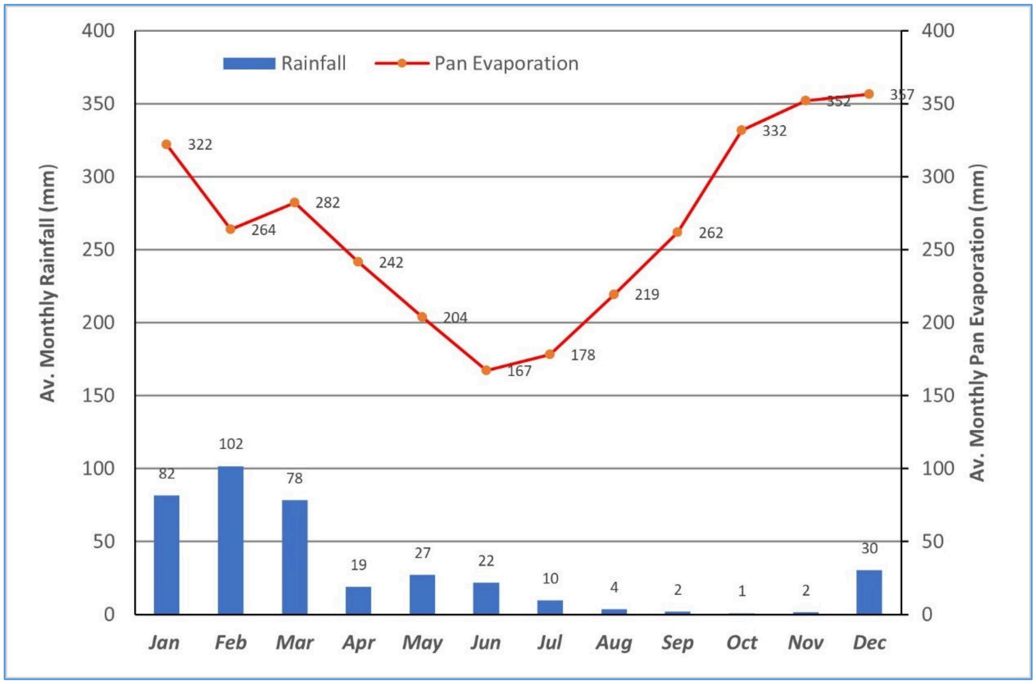

Figure 4-2 Hemi Average Monthly Rainfall and Pan A Evaporation

Evapotranspiration (ET) is a more important term than pan evaporation in most groundwater studies, as ET represents the overall total transfer of water, as water vapour, to the atmosphere from both vegetated and un-vegetated land surfaces. It is affected by climate, availability of water and vegetation.

'Areal actual ET' is defined by the BoM as *the ET that actually takes place, under the condition of existing water supply, from an area so large that the effects of any upwind boundary transitions are negligible and local variations are integrated to an areal average. For example, this represents the evapotranspiration which would occur over a large area of land under existing (mean) rainfall conditions.* In the Hemi region, the BoM indicates that the average areal actual ET is of the order of 350 mm. This is similar to the average rainfall amount, thus inferring that virtually all of the rainfall in the Hemi region is lost to the atmosphere as ET, and that rainfall recharge to groundwater is limited.

'Areal potential ET' is defined by the BoM as *the ET that would take place, under the condition of unlimited water supply, from an area so large that the effects of any upwind boundary transitions are negligible and local variations are integrated to an areal average. A large area is defined as an area greater than one square kilometre*. In the Hemi region, the BoM indicates that the average areal actual ET is about 1,700 mm. This situation may arise in parts of the current day river channels close to river pools where the water table remains close to the ground surface month after month.

5 HYDROLOGY

The Hemi area occurs as part of a flat spinifex plain that slopes gradually to the north-northwest with only local minor relief caused by bedrock outcrop or sand-dunes. The Yule River and Turner River occur about nine (9) kilometres to the west and fourteen (14) kilometres to the east of the Hemi Deposit.

Plan 5-1 shows the catchment areas of the Turner and Yule Rivers used by Surface Water Solutions (SWS) to estimate river flows near Hemi. The Yule River at this location has a catchment area of 8,337 km^2, which is much larger than the equivalent Turner River catchment area of 2,225 km^2. Three government river flow gauging stations on the Yule and Turner rivers occur in the region (Plan 5-1). The Kangan gauge on the Yule River upstream of Hemi is no longer in service and only has flow data for the period between 1966 – 1979, whilst Pincunah has daily flow records since 1985 and Jelliabidina has daily flow since 1972.

Flow in both rivers near Hemi is reliant on large rain fall events of the order of +150 mm, and the biggest river flows are typically related to the occurrence of cyclones that generate large and widespread rainfall as they cross the Pilbara Coast. Daily flow data for the Jelliabidina and Pincunah sites has been collated for the past 31 years and summarised as annual flows on Figure 5-1. The figure also indicates the number of months in which flow occurred (noting that months with total flows less than 5 ML were excluded from the count). The flow data highlights:

- No flow was recorded in 8 of the 31 years at the Yule River gauge and in 4 of the 31 years at the Turner River gauge.
- Peak monthly river flow in the Yule at Jelliabidina occurred in February 1995 (811,831 ML) following a large rainfall event associated with Cyclone Bobby.
- Peak monthly river flow in the Turner at Pincunah occurred in March 2007 (90,644 ML) following large rainfall events associated with cyclones George and Jacob.
- Flows in the Turner River at Pincunah are typically an order of magnitude lower than in the Yule River at Jellibidina, consistent with the large difference in catchment areas of the two gauges.

Flood modelling of the study area has been completed by Surface Water Solutions (SWS, 2023). A conservative approach to the flood modelling of the Hemi area has been taken by SWS by assuming that peak river flows in the Turner and Yule rivers occur simultaneously, and are coincident in time with peak flooding in the Hemi area from local scale rainfall events. Plans 5-2 and 5-3 show the maximum flood depths predicted by the SWS model for the 20% AEP (1-in-5 year) and 1% AEP (1-in-100 year) events. These indicate:

- For the 1-in-5 year event, river flooding is limited to within the current day channels, and localised flooding in the immediate Hemi area is not significant.
- For the 1-in-100 year event, the Turner River overtops it main bank and generates flow in an anabranch to the east. The Yule River generates widespread flooding to the northwest of the Hemi area; this has significance to the shallow aquifer system that is discussed in Section 7.
- Large Turner and Yule River flows do not cause flooding of the Hemi area. Instead, widespread but shallow flooding is likely to be generated by ponding and sheet flow from incident rainfall over and near Hemi. This would tend to coalesce into low points that form a subtle drainage line over Hemi that trends to the northwest as seen on Plan 5-3.

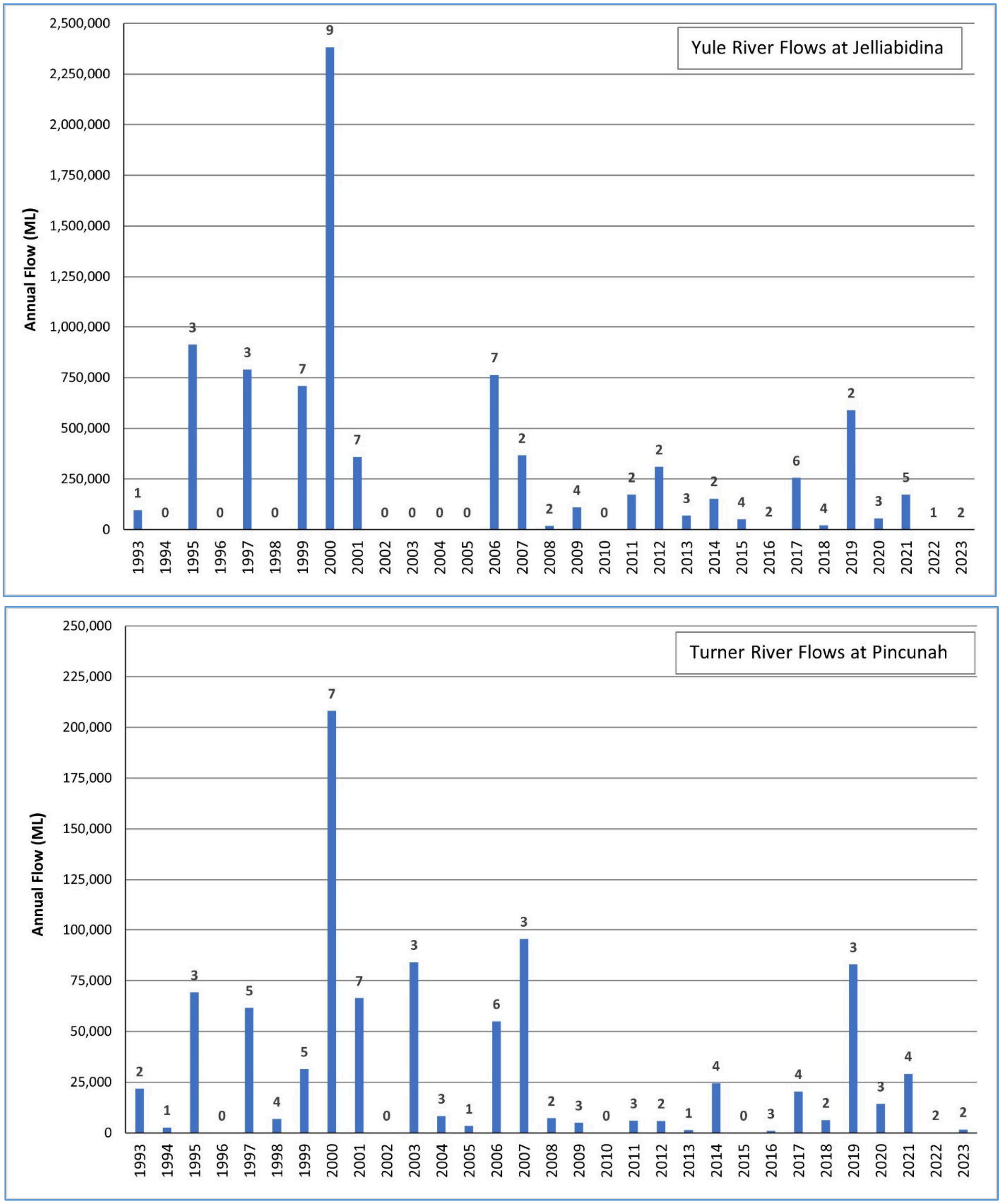

Figure 5-1 Annual River Flows at DWER Gauging Stations

5.1 Hemi Deposit Area

No obvious drainage lines or creeks exist at the Hemi Deposit. Following a 24-hour rainfall event of about 90 mm at Hemi (to 9 am) on 2 February 2021, De Grey flew a drone survey on the following day (3 Feb). The rainfall event corresponds approximately to a 1 in 2 year recurrence for that event size. Figure 5-2 is an aerial image looking north-northwest over the Crow Deposit and shows only minor flooding on cleared tracks and pads, with little or no ponding of water in uncleared areas.

Figure 5-2 Aerial Image over Crow Deposit 3 February 2021

5.2 Surface Water Quality

Water quality sampling within the Turner and Yule rivers commenced in 2021 and has been largely constrained to sampling of small river pools given the limited occurrences of river flows during the past two wet seasons. Laboratory reports for the detailed analyses of surface water samples collected by Geowater and De Grey staff to date are included as Appendix B. Table 5-1 provides a summary of these results, which indicates:

- Water quality from the available Turner River flow events (June 2022 and February 2023) shows relatively limited variation, with water being low salinity, slightly alkaline and containing low levels of the trace metals arsenic, chromium, uranium, and vanadium.
- River pool water quality is similar between the Turner and Yule rivers, and compared to the river flow events, can be brackish in salinity, slightly more alkaline and with trace metal levels up to 2 – 20 times higher.

The differences between the river flow and pool water quality analyses are consistent with expectations and is most likely to be a result of the effects of evaporation and increased groundwater contributions to river pools during sustained dry periods.

An *In-Situ Aquatroll* logger installed in the Turner riverbed just upstream of the Indee Station crossing revealed a consistent water quality was evident during the flow event between 6 -11 February 2023. Six-hourly electrical conductivity (EC) readings ranged between 295 -350 uS/cm, displaying a small rising trend and no indication of a more saline 'first flush'.

Table 5-1 2021-2023 Surface Water Quality Summary

Analyte	**Unit**	**Yule River Pools**	**Turner River Pools**	**Turner River Flow**
Number of water samples	*n/a*	*18*	*9*	*6*
Electrical Conductivity	uS/cm	224 – 3,280	236 – 3,200	225 - 276
Total Dissolved Solids (sum of ions)	mg/L	175 – 2,230	191 – 1,975	149 - 213
Total Suspended Solids	mg/L	< 5 - 27	< 5 - 147	< 5
pH (lab)	pH units	8.0 – 9.3	7.7 – 9.4	7.7 – 8.0
Hardness	mg/L as $CaCO_3$	23 - 411	25 - 312	43 - 65
Arsenic (dissolved)	ug/L	0.4 – 5.8	1.0 – 9.8	0.6 – 0.8
Arsenic (total)	ug/L	0.5 – 6.1	1.1 – 11.1	0.2 – 0.4
Chromium (dissolved)	ug/L	<0.2 – 0.4	<0.2 – 1.5	0.4 - 0.7
Chromium (total)	ug/L	<0.2 – 1.5	0.6 - 36	2.7 – 6.1
Uranium (dissolved)	ug/L	0.3 – 19.3	0.6 – 8.5	0.5 – 1.3
Uranium (total)	ug/L	0.8 – 23.4	0.8 – 9.79	0.8 – 1.1
Vanadium (dissolved)	ug/L	0.3 – 10.4	2.3 – 11.2	1.9 – 2.9
Vanadium (total)	ug/L	0.7 – 11.5	3.3 – 25.5	3.6 – 4.9

6 GROUNDWATER FIELD INVESTIGATIONS TO DATE

6.1 Overview – Scoping Study and PFS Phases

Groundwater field investigations at Hemi commenced in November 2020 as part of the project Scoping Study (SS) and continued throughout 2021 and 2022 as part of the Pre-Feasibility Study (PFS). Details of these field investigations are presented in earlier Geowater reports (2021, 2022) and are not re-presented here.

A summary chronology of the completed field SS and PFS investigations is provided below:

- ***November – December 2020*** - Drilling and construction of eleven (11) shallow monitoring bores, followed by falling head (slug) tests and laboratory analysis of groundwater samples collected during bore development. One production bore at Hemi and tow production bores near the Wingina Camp were also installed.

- ***April 2021*** - Inspection and monitoring of pastoral bores and select river pools located within 20 km from the Hemi Deposit. Commencement of bi-annual detailed water quality analyses from monitoring and production bores.

- ***July 2021*** - Drilling of 37 air-core holes to investigate the main paleochannel aquifer location to the north and south of the Hemi Deposit, followed by the installation of four (4) multi-piezometer bores in these areas in November 2021.

- ***August – November 2021*** - Drilling and construction of eleven (11) production bores and ten (10) monitoring bores in alluvial and bedrock aquifer zones within and near proposed open-pit locations at the Hemi Deposit. Four of the four production bores were installed for the purpose of supplying water to drill rigs undertaking diamond core drilling. Drilling and construction of four (4) multi-piezometer bores in the main palaeochannel aquifer zone up- and down gradient of the Hemi Deposit.

- ***September – October 2021*** - Drilling and construction of six (6) monitoring bores along three transects across the Turner River (in the region where the option of surplus water discharge to the river has been assessed). A passive seismic geophysical survey to help delineate alluvium-bedrock contacts along the Turner River and on two select transects near Hemi.

- ***October 2021 – January 2022*** - Pumping tests completed in ten (10) production bores. Falling head (slug) test completed in all monitoring bores.

- ***December 2021*** - Bore census assessment of pastoral bores and wells in December 2021 on Mundabullangana and Indee pastoral lease.

- ***March – May 2022*** - Drilling and construction of twelve (12) monitoring bores in the region of the proposed tailings storage facility (TSF).

6.2 DFS Phase – July 2022 – June 2023

Throughout the DFS phase, regular groundwater and surface monitoring that commenced in 2021 was continued. Key components of this monitoring comprised:

- Six-monthly groundwater sampling from selected bores and detailed laboratory water quality analyses.
- Six monthly in-bore profiling of electrical conductivity in selected monitoring bores.
- Six monthly measurement of groundwater level and basic water quality in pastoral bores and wells on Mundabullangana and Indee stations.
- Six-hourly logging of groundwater levels in select bores at Hemi and the surrounding region, as well as monthly manual recording of groundwater levels in bores without loggers installed.
- Surface water quality sampling and water level surveying in selected pools in the Turner and Yule rivers on an event-based and ad-hoc schedule.

To complement the above monitoring and support the assessment of groundwater-surface water interactions, the following monitoring stations were installed during the DFS:

- Tipping bucket rain gauge loggers with satellite telemetry were installed by in November 2022 about three (3) kilometres north and five (5) kilometres south of Hemi (see Plan 3-4 for locations) (EWS, 2022).
- Water level loggers on a satellite telemetry system were installed in two river pools on the Yule River (Mardagubiddina and Portree pools) and in one (unnamed) pool on the Turner River in April 2023. Representatives from the Kariyarra first nations people were present for the installation by EWS and Geowater staff. The locations of these sites are shown on Plan 6-1.

Following a two-month delay securing suitable drill rigs and bore casing materials, a water bore drilling and construction programme commenced in May 2023. A diamond drill rig from *Topdrill* and a water bore rig from *Foraco* are being utilised to:

- Drill and construct six (6) to eight (8) dewatering production bores at Hemi (in the Brolga and Diucon deposit areas). The focus of these bores is to validate the conceptual groundwater model in bedrock (fractured rock aquifer) settings and to also trial different forms of drilling and construction techniques in order to select the most optimal method(s) for bore installation during the Operations phase.
- Drill and construct two reinjection bores within the man paleochannel aquifer south of Hemi to enable reinjection trials planned for September 2023.
- Drill and construct multi-piezometer monitoring bores adjacent to the above dewatering bores to enable monitoring and assessment during pumping tests planned for later in 2023.
- Drill and construct up to 15 monitoring bores across all of Hemi to allow sampling and mapping of bedrock water quality to the same extent that has already been established for the alluvial aquifer zones in 2021-2022.

As at the end of June 2023, one of the dewatering bores, one of the reinjection bores, and 12 of the monitoring bores have been installed. The remaining bores should be installed by the end of September.

6.3 Drilling and Bore Construction

Plans 6-1 and 6-2 show the location and type of water bores installed by Topdrill, Austral Drilling Services and Foraco to the end of June 2023, as well as the bores of other groundwater users in the Hemi regional and local areas. Plan 6-3 shows completed bores to date within the local Hemi area, as well as the remaining Hemi bores planned for installation in Q3 2023. The bores drilled to date have had various objectives, which can be summarised according to the following groupings:

- Dewatering investigation bores at the Hemi Deposit – Production bores with casing sizes ranging from 200 – 300 mm DN to enable pumping tests to assess aquifer hydraulic properties and groundwater quality with the intent to estimate open pit dewatering requirements. Most of these bores will be utilised as dewatering bores during the operational phase.
- Drilling water supply bores – Four shallow production bores (HPB002 – HPB005) with 150 mm DN casing set in the alluvium to provide drilling water supplies for mineral resource drill rigs. These are not suitable for operational dewatering.
- Monitoring bores at Hemi – Both single 50 mm cased monitoring bores and dual 50 mm cased multi-piezometer bores designed to investigate lateral and vertical groundwater quality variations throughout the Hemi area, and to also provide observation sites for pumping tests and ongoing baseline water level monitoring.
- Monitoring bores near the proposed TSF – designed to provide baseline groundwater levels and water quality of the shallow aquifer system, and to provide input to assessment of potential TSF seepage on the underlying aquifer.
- Monitoring bores near the Turner River – designed to provide baseline water quality and to help assess any potential connection between local groundwater and (ephemeral) surface water in the area where the discharge of surplus dewatering into the river is being evaluated.

- Monitoring bores within a 2 – 7 kilometre radius of the Hemi deposit – to establish baseline groundwater conditions within the shallow aquifer system that may be impacted by future dewatering.

Most of the De Grey water bores installed in the period between November 2020 and May 2022 have also been used for sampling subterranean stygofauna. Monitoring bores HMB012 – HMB042 were constructed with 2.0 mm slots to suit this purpose. Bore details, including graphic bore logs, are provided in the previous Geowater reports (2021, 2022), whilst Appendix C provides summary details of all water bores installed by De Grey to date for the Hemi study.

6.4 Pumping Tests and Falling Head Tests

Determination of aquifer hydraulic properties was achieved by completing pumping tests in all PFS production bores (apart from HPB005). These were done by McArthur Drilling and Test Pumping (MDP) under the technical supervision of Geowater staff. Step-drawdown tests were completed in all bores, whilst constant rate tests (CRT) of between 24 – 72 hours duration, with water level recovery monitoring, were completed in ten (10) bores. Details of these tests, and analyses, are provided in the *Hemi PFS Field Investigation Report* by Geowater (2022).

Pumping tests and falling head tests for all the new bores currently being installed are planned to be undertaken in the second half of 2023.

6.4.1 Reinjection Trial

Two reinjection bores (HPB015 and HPB016) are being installed in the main palaeochannel aquifer zone between two to three kilometres south of the proposed Falcon Pit. In Q3 2023, reinjection trials are planned whereby 50 Mega-litres of water will be pumped from one of the bores and reinjected into the second bore over a period of about two weeks to assess the groundwater level responses. Once the first trial is completed, the bores will be allowed to recover, and the pumping and reinjection bore locations reversed so that the second trial can be completed. Figure 6-1 shows the location of the reinjection bores and the surrounding bores that will be monitored during the trial.

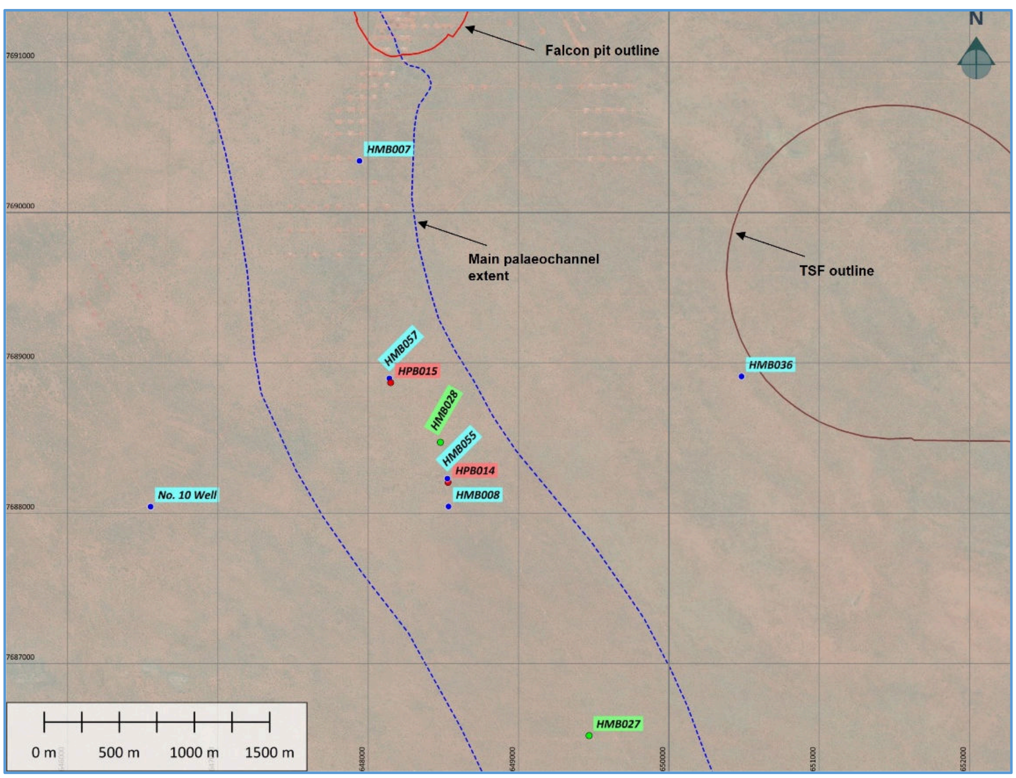

Figure 6-1 Reinjection Trial – Bore Locations

7 CONCEPTUAL GROUNDWATER MODEL

7.1 Model Extent and Data Availability

Given the known high permeability and spatial extent of the alluvial aquifer near Hemi, a relatively large area was selected for groundwater model development to consider the potential impacts of planned groundwater use at Hemi. The model area totals 1,520 km^2 and is shown on Plan 7-1. It includes both the Turner and Yule rivers and extends about 25 km upgradient and downgradient of the Hemi Deposit.

The conceptual and numeric groundwater models have been derived using datasets and interpretations up to specific points in time, as outlined below:

- Hemi water bore pump testing and groundwater level monitoring results up to December 2022.
- De Grey mineral resource drilling datasets up to December 2022. Significant numbers of diamond drill core holes have been completed at Hemi, including intersections of the alluvial aquifer zones. These drillholes provided excellent input to the development of the conceptual groundwater model.
- Lithological surfaces, bedrock weathering surfaces and bed-rock structures modelled and interpreted by De Grey geologists up to the end of December 2022.
- Available data and reporting from two previous groundwater studies in the surrounding region; the Atlas Iron Mt Dove project and the Water Corporation Yule River Borefield
- Data and reports from previous mineral resource exploration, as available from the Department of Mines, Industry Regulation and Safety (DMIRS) *WAMEX* information system.

7.2 Geology

7.2.1 Regional Geology

Surficial Geology

Plan 7-1 presents the surficial geology of the study area as defined by DMIRS 1:100,000 geological mapping products. The surficial geology of the region is dominated by Quaternary alluvial deposits associated with current and ancient drainage lines through a relatively flat sand plain setting. Minor colluvial and sheetwash sediments occur adjacent to bedrock outcrops, which are dominant to the south and south-east of the study area. In the Hemi area, De Grey has shown the alluvial sediments to be up to 45 m thick in parts of Hemi, whilst previous drilling near the Water Corporations Yule River Borefield to the north of the study area indicates that alluvium reaches up to 80 m thickness.

Bedrock Geology

The study area occurs predominantly within the Archaean Mallina Basin, which is part of the Central Pilbara Tectonic Zone in the Pilbara Craton (Figure 7-1). Previous reporting by De Grey (2022) is reproduced here to describe the regional bedrock setting:

- *The age of the Mallina Basin is poorly constrained to 3015-2931Ma. The basin is a closed basinal structure composed of older conglomerate and arkosic sandstone overlain by turbiditic wacke siltstones and shales (derived from older Pilbara Craton crust) with minor basaltic rocks accumulated in a rift related extensional setting. The sediments have been intruded by rocks of the Sisters Supersuite which are compositionally heterogenous.*
- *The most prominent intrusive rocks have been assigned to the Indee Suite, and are granitic in composition, and are the most voluminous suite in the region. The second intrusive suite are the ultramafic-mafic rocks of the Millindinna Intrusion which are part of the Langenback Suite, and which are proximal to the Hemi mineralisation.*
- *The Tabba Tabba Shear Zone (TTSZ) is a large Northeast-Southwest trending crustal tectonic structure that forms the southern-eastern boundary between the Central Pilbara Zone and the East Pilbara Terrane and it also forms the eastern-southern boundary of the Turner River Project area.*

Deformation within the Mallina basin reached a maximum low to moderate greenschist facies adjacent to the major shear zones, but is less intense away from the shear zones.

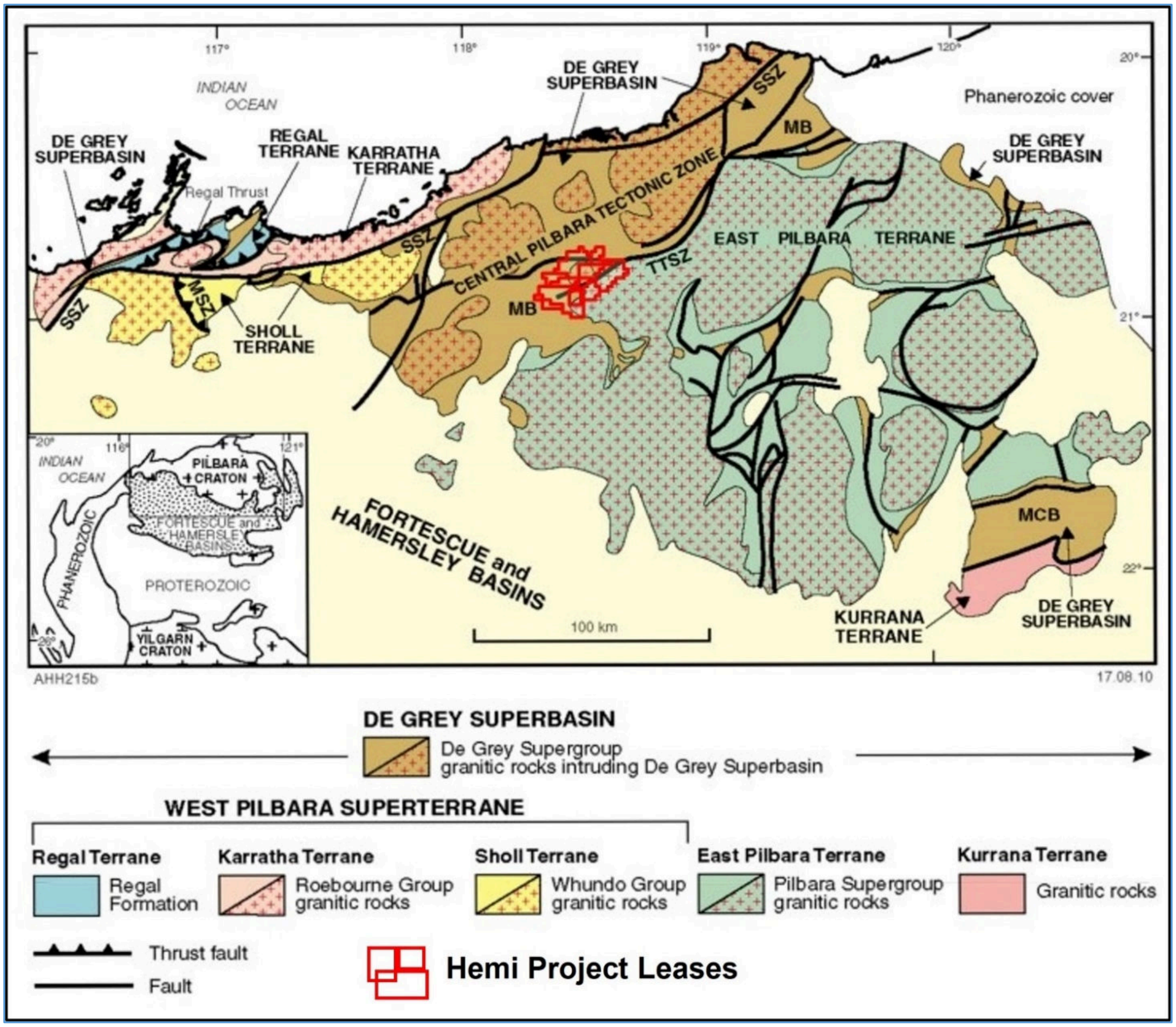

Figure 7-1 Regional Geology Plan (after De Grey [2022])

7.2.2 Hemi Area Geology

Plan 7-2 presents a plan of the bedrock geology of the local Hemi area as interpreted by De Grey geologists in the latter stages of 2022, as well as contours of alluvium thickness interpreted by Geowater at a similar time. The lithology boundaries and shear zones shown on Plan 7-2 represent their elevation at the base of the alluvial sequence. The plan also highlights the location of the six (6) different ore zones that make up the Hemi Deposit; Aquila, Brolga, Crow, Diucon, Eagle and Falcon.

Italicised text in this section represent geological descriptions repeated directly from De Grey reports (De Grey, 2022, 2023).

Alluvium

In the Hemi area, the thickness of alluvium is quite variable, ranging from about 5 m to the southeast of the proposed TSF site, up to almost 45 mat Duicon. Plan 7-2 highlights how the deepest alluvial sediments form a palaeovalley with an axis that trends to the north-northwest. Within this alignment, a coarse sand and gravel unit occurs that is up to 15 m thickness and 1,000 m wide. This basal unit often presents highly unconsolidated in drill core. Small interbeds of finer sand and silt can be present in this basal coarse grained unit. The basal unit becomes thinner at greater lateral distances, but can still be a few metres thick over a total palaeovalley width of 2.0 – 2.5 km. The coarse basal alluvium was deposited by a large, high-energy ancient river system draining in the direction of the current day coast.

Above the coarse basal alluvium, there is a variable thickness of poorly sorted finer-grained alluvium that ranges in thickness from 5 – 30 m. This unit is dominated by silty sands and sandy silts with minor amounts of gravel and clay variably throughout. Overall, this alluvium is very poorly sorted and typically only weakly consolidated. No significant or persistent clay beds are present in this alluvium, however, relatively smaller scale interbeds or lenses of sand and gravel, as well as silt-clay intervals, do occur. The lateral extent of these sediment interbeds can be limited (< 100 m). Diagenetic overprints in this alluvium are typically weak, with only minor development of calcareous and siliceous zones, typically between 1 – 6 m below ground. These overprints are not considered significant to the hydrogeology of the Hemi area.

The textural contrasts between the lower (coarse) and upper alluvium are highlighted by the diamond drill core photos presented on Figure 7-2.

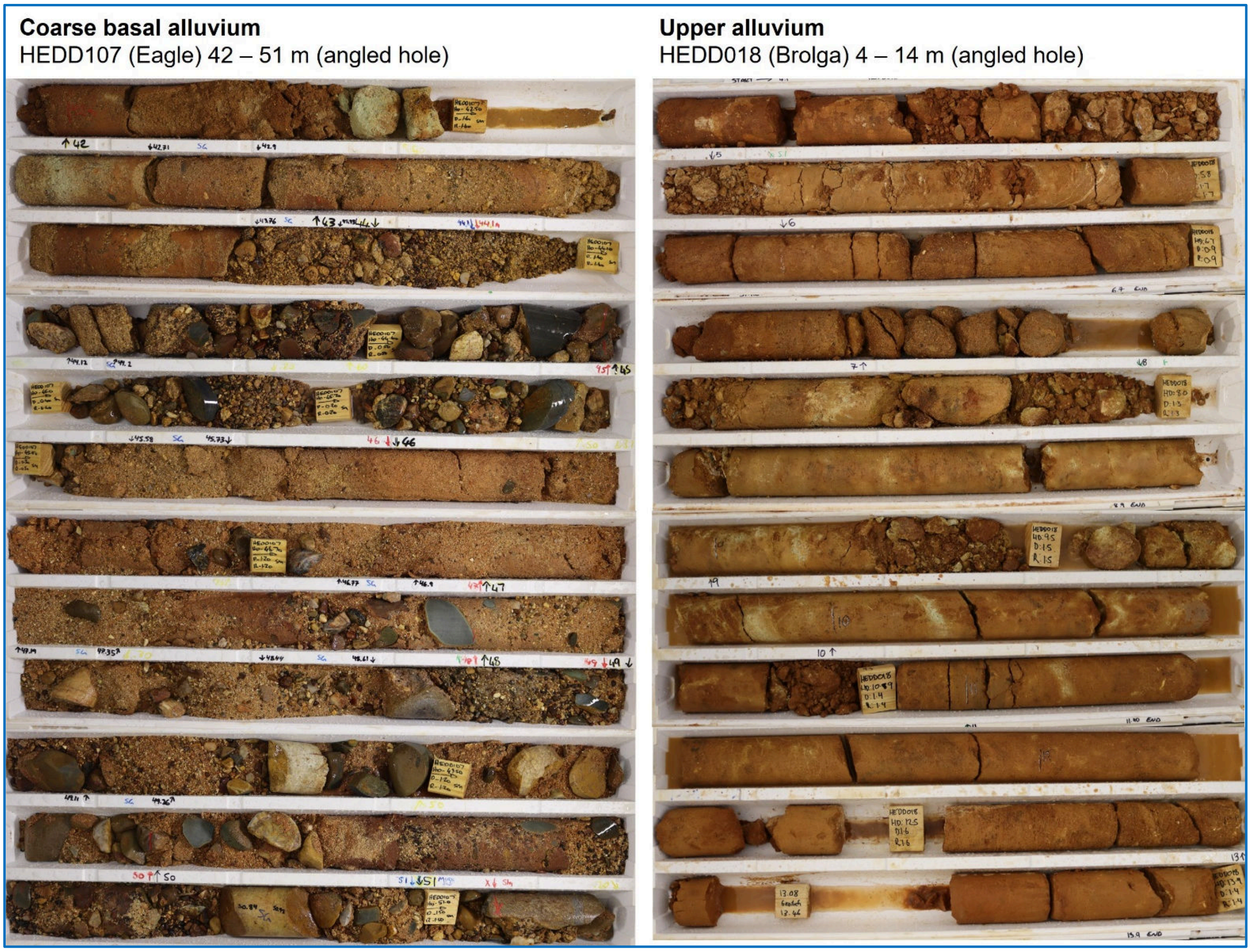

Figure 7-2 Lower and Upper Alluvium Core Photos

Bedrock Lithologies

Sedimentary rocks of the Archaean Mallina Formation commonly form the footwall and hanging wall lithologies at Hemi. They are comprised of interbedded shales, siltstones and fine-medium grained wackes, and locally black shales, which have undergone low-medium greenschist facies regional metamorphism and locally contact metamorphosed immediately adjacent to the intrusive rocks (De Grey, 2022).

Intermediate igneous intrusives, as diorites and quartz-diorites, occur as the main host-rock to gold mineralisation at Hemi, with lesser amounts of more felsic and mafic intrusives. These lithologies form larger intrusive bodies as well as sills. In the Eagle and Diucon area, an ultramafic unit up to 200 m wide occurs concordantly within the sedimentary-intrusive rock suite (Plan 7-2). Bedding and intrusive contacts are mainly near vertical to steeply south-easterly dipping at Hemi.

The large granitoid body to the east of the Hemi Deposit is informally known as the Mount Dove Granite and is part of the Sisters Supersuite. Local intersections show it is typically a coarse grained massive granodiorite.

Bedrock Structures and Weathering

The rock sequence at Hemi has undergone a complex deformation history commencing in extension during basin development, basin inversion during a compression event that resulted in SW-NE striking folding and brittle-ductile shear zone development. The area was subject to a locally less significant compression event that has resulted NW-SE striking folding and typically local scale faulting. The SW-NE striking folding and brittle-ductile shear zone development has resulted in dislocation, truncation, and repetition of the lithostratigraphy. Current studies are ongoing but the brittle-ductile shear zones are likely to have initiated in response to the inability of flexural slip and flow mechanism during folding to accommodate continued strain. The shear zones occur as fold hinge parallel shears and as imbricate thrust fault fans/stacks that are important constraints on the lithostratigraphy and mineralisation (De Grey , 2023).

The bedrock weathering profile is quite complex at Hemi and is influenced by several factors, including the primary lithology type, presence and nature of structural features and elevation within the Cainozoic landscape. The weathering profile (defined as the thickness of material from the base of alluvium to the top of fresh rock) ranges from 15 – 150 m. The thinnest profiles tend to occur in parts of Brolga, Crow and Eagle within relatively wide igneous intrusive zones that are relatively devoid of major structures. Conversely, the deepest weathering profiles tend to be associated with the finer grained sedimentary rock units and in areas associated with significant shear zones and faulting, notably at Aquila, Falcon, and parts of Diucon. The sedimentary bedrock and felsic intrusives present in the deeper weathering zones have developed a strong kaolinitic saprolite profile.

Alteration and Gold Mineralisation

The Hemi Deposit is a large gold system that comprises six (6) adjacent deposits; Aquila, Brolga, Crow, Diucon, Eagle and Falcon. The location of these deposits in relation to the main shear zones are shown in isometric view from the De Grey Leapfrog model on Figure 7-3. De Grey (2023) report that:

- *There are two main deposit alteration and mineralisation styles, informally named as the Brolga-type and the Diucon-type:*
    - *The Brolga-type, strong albite-chlorite-sulphide alteration occurs within the intrusions and this alteration is intimately associated with cataclasite development and a stockwork of chlorite-sulphide-silica veins. Rare sericite and later chlorite alteration and veins are also observed.*
    - *The Diucon-type is a similar assemblage of alteration minerals is present with the exception of an initial development of sericite and albite alteration and smoky quartz veining. Penecontemporaneous brittle-ductile shear zones exploit the alteration and veining, where later chlorite-carbonate-talc alteration and sulphide-gold mineralisation is observed.*
- *Minor sericite-chlorite-albite-sulphide alteration and quartz-carbonate veins occur within the sediments that are proximal to the intrusions. Un-mineralised intrusions adjacent to the deposits are characterised by reduced sulphide levels, lower to no albite and increased chlorite and/or carbonate.*
- *Sulphide abundance in the mineralised intrusions typically ranges from 2.5% to 10%, whilst marginal alteration zones peripheral to the gold mineralised zones comprise sulphide contents that typically range from 0.5% to 1%. The ore mineralogy is consistent in type but not content across the different deposits and consists of arsenopyrite, pyrite, trace galena, sphalerite, chalcopyrite, and native gold. In general, the gold mineralisation is semi-refractory in nature.*

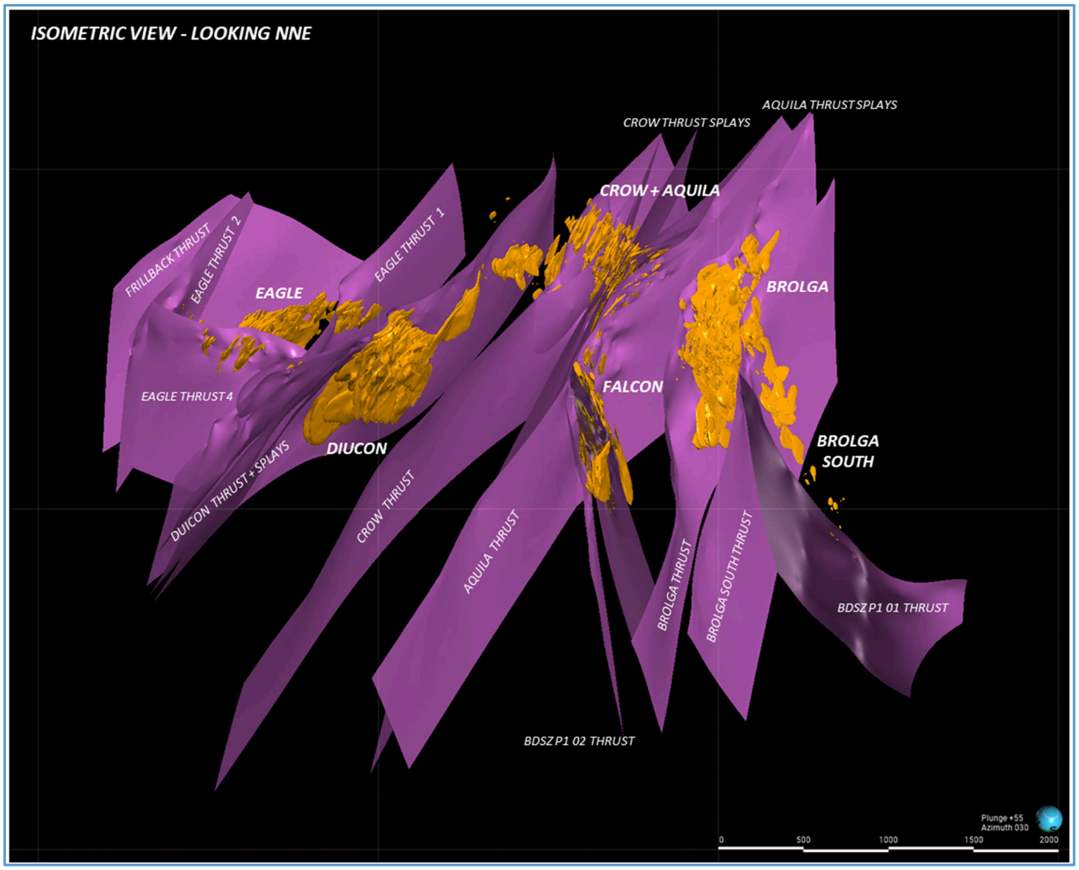

Figure 7-3 Isometric view (looking northeast) of Hemi orebodies and major shear zones (from De Grey, 2023)

7.3 Hydrogeology

7.3.1 Aquifer Settings

A schematic section through the Hemi Deposit is displayed as Figure 7-4 to highlight the hydrostratigraphy that has been resolved by the mineral resource drilling and groundwater bores installed to date. The different aquifer zones are based on their fundamental lithology type and comprise, from shallowest to deepest:

- ***Upper alluvium*** – a laterally extensive aquifer system having low to moderate permeability and saturated thickness.
- ***Lower alluvium*** – this comprises the basal paleochannel sands and gravels which form a major aquifer system with high permeability and storage values, Extensive continuity in the north-south direction and of the order of 1 – 2 km in the transverse east-west direction near Hemi.
- ***Saprolite zone*** – the uppermost sections of weathered bedrock that commonly weather to a clay-rich assemblage with a resultant inherent limited permeability, notably within the sedimentary and ultramafic lithologies. This zone encompasses both the upper and lower saprolite regolith profiles modelled by De Grey.
- ***Saprock zone*** – this covers the lower part of the weathering profile and comprises moderately to slightly weathered rock. At Hemi, the intermediate igneous intrusives have developed a relatively higher permeability than the surrounding sedimentary and ultramafic units in the saprock profile. Diamond drill core and water bore testing indicate low – moderate fractured rock permeability in the intrusives. This zone encompasses both the saprock and 'strongly joint weathered fresh rock' regolith profiles modelled by De Grey.

- ***Fresh bedrock*** – The bedrock lithologies present at and near Hemi do not form aquifer zones when they are unweathered, including the arkosic wackes and sandstones. Extensive reviews of diamond drill core logs and photos indicates that minor amounts of discrete fracture zones within fresh rock may form narrow flow paths with elevated permeability. There is a general trend for these discrete fractures to close and tighten with depth, such that permeable fractures in core were rarely observed below about 150 m (vertically) below ground. It is interpreted that the greatest occurrence of fracture permeability in fresh bedrock occurs near intrusive-sedimentary lithology contacts and the related shear zones.

Interpolating these aquifer zones into the regional extent of the model area has been completed, but has significantly more uncertainty due to the limited data availability compared to the Hemi site.

Alluvium

Plan 7-3 highlights the various datasets that have been used to map alluvium throughout the study area. Given the extent and significance of the alluvial aquifer in the wider study region, mapping of this unit is important to assessment of potential impacts. The available datasets tend to be concentrated in the areas of most significance (the Water Corporation and Atlas Iron borefields and the Yule and Turner River reaches nearest to Hemi). A brief commentary on the various data sources is provided below:

- There are 12,400 mineral resource drillholes from the De Grey database located within the groundwater model area, mostly within about six kilometres of the Hemi deposits. Some of the holes are shallow and do not intersect the base of transported cover above bedrock. Additionally, many of the holes do not provide definitive information on the nature of the alluvials nor the true base of the alluvials (especially when highly weathered sedimentary bedrock occurs immediately beneath).
- The DMP Yule River investigation bores and holes (from the 1960's and 1970's) closest to the study area are shown; many more were drilled further north. The results of this drilling would have been captured (alongside other datasets) by MWH when they undertook the groundwater modelling exercise of the Yule River Borefield on behalf of the Department of Water in 2010.
- The MWH (2010) model extent covers the Hemi area, however, the geology layering used in this area would have been very uncertain at that point in time, and has been replaced by the more accurate De Grey drilling and Geowater assessments.
- The north-west part of the De Grey model area near the Yule River includes some useful mineral resource drilling results accessed from the DMIRS *WAMEX* database:
    - Shallow drilling for tin deposits in alluvium by Texas Gulf in 1982
    - Aircore drilling by Golden State Mining in 2020.
- Aerial imagery, government and De Grey mapping were used to identify areas of bedrock outcrop and shallow subcrop.
- The regolith modelling by De Grey geologists incorporates geochemistry indicators (such as tin content) in addition to lithological and textural logging to model the base of transported cover within the immediate Hemi area. This included estimation of the coarser basal sand and gravel unit near Hemi.

The main palaeochannel hosting the coarse basal sands and gravels at Hemi is interpreted to extend downstream (north) of the model area. The limited drilling data and nearby TEM geophysical survey available data suggests the paleochannel becomes close to the current day Turner River alignment near the North West Coastal Highway. Its exact geological and stratigraphic relationship to the thick sands and gravels intersected by the Water Corporation production bores further north is uncertain. However, it is considered likely that the aquifer zones are in direct hydraulic connection with each other. Plan 7-4 shows the interpreted lateral extent of the coarse basal alluvium (main palaeochannel). The recent 2023 aircore drilling south of Mt Dove indicates the location and nature of the palaeochannel system near the southern end of the model area is uncertain.

The elevation (mAHD) of the base of alluvium cover over the whole model area was interpreted using the available datasets and gridding into 20 m cell-sizes using *Surfer v16* software. Within and near areas with outcropping bedrock, the interpolated elevations of the base of alluvium surface are not highly accurate, as the gridding has been undertaken to produce a singular continuous geological layer throughout the model domain and not create the 'islands' of absent alluvium (bedrock). The unrealistic presence of alluvium in these areas is overcome in the numeric model by assigning bedrock hydraulic properties to the uppermost alluvial layers. Plan 7-4 shows the interpreted alluvium thickness and areas of bedrock outcrop and shallow subcrop within the model area.

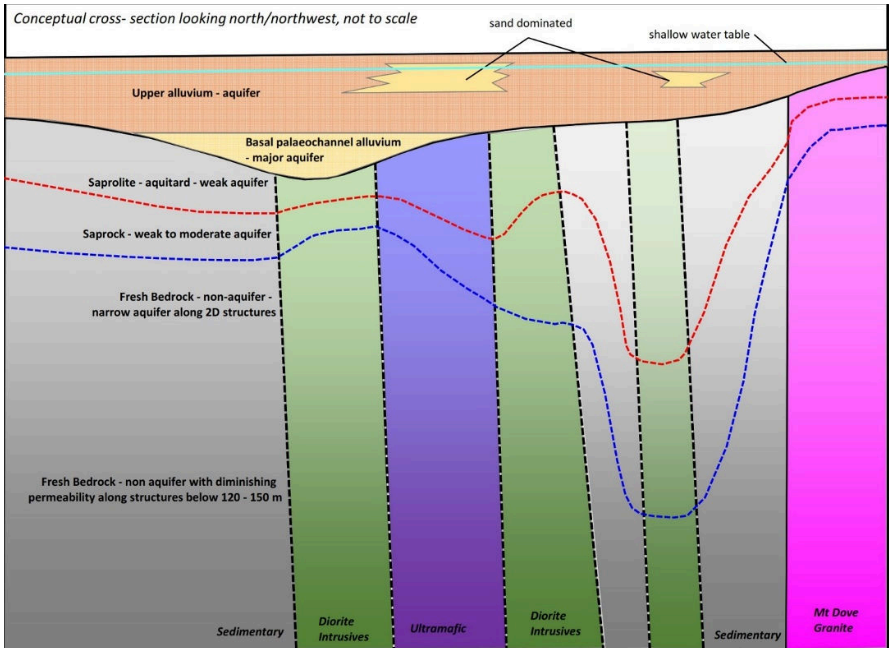

Figure 7-4 Hemi Aquifer Settings

Bedrock / Weathering

De Grey geologists prepared a regolith model for the immediate Hemi area as part of the PFS studies using *Leapfrog* software (the model extent of 7 x 5 km is shown as shown on Plan 7-3). The modelling was updated in early 2023 for the DFS using multiple datasets and observations that include logging of drill core and percussion samples, density measurements, geochemical analyses, and short-wave infrared (SWIR) logging. The regolith modelling generated several continuous surfaces throughout the bedrock profile; Upper Saprolite (RSU), Lower Saprolite (RSL), Saprock (RSR), Strongly Joint Weathered Fresh Rock (FRJS), Weakly Joint Weathered Fresh Rock (FRJW) and Fresh Rock (FR). These surfaces were provided in digital Leapfrog and *.dxf* formats to Geowater.

The De Grey regolith model results were reconciled at a broad level against the water bore logging and test-pumping results, as well as review by Geowater of drill core photographs from almost 200 diamond drill holes. Overall, the occurrences of saprolite, saprock and fresh rock were considered similar, whilst the De Grey occurrences of 'strongly jointed weathered fresh rock' and 'weakly jointed fresh rock' were not uniformly aligned with the Geowater singular category of 'slightly weathered' as these two De Grey categories of joint-weathered rock were sometimes considered as saprock or fresh rock by Geowater. However, both the De Grey and Geowater weathering categories exhibit the common trend of reducing permeability from overlying saprock down through slightly weathered rock and into underlying tight fresh bedrock.

Outside of the De Grey regolith model area, most drillholes are shallow aircore holes that rarely intersect the full rock weathering profile. In these areas, and where there is no drilling at all, the following assumptions were made by Geowater to enable interpretation of rock weathering profiles across the entire groundwater model domain:

- The upper and lower saprolite layers within the DeGrey model are considered to exhibit similar hydraulic properties and were interpolated as a single layer (corresponding to the base of saprolite).
- In regions of low relief and significant alluvial cover, the full rock weathering profile was assumed to have a maximum thickness ranging between 20 – 40 m, with relatively uniform sub-layer thicknesses.
- In bedrock outcrop and shallow subcrop areas, the full weathering profile was assumed to be only 5 – 10 m thick.

The Hemi and regional area interpretations were merged and re-gridded in Surfer to produce a 20 m sized grid over the whole study area and then used for the numerical model construction. Isopach (thickness) maps of saprolite, saprock and slightly weathered rock weathering profiles are provided as Plans 7-5 to 7-7. The geometries of the weathering profiles are also highlighted on the cross-sections discussed in Section 7.4.

The review of drill core photographs has provided useful information about aquifer occurrences and potential properties of the different bedrock profiles at Hemi. Key observations comprise:

- The sedimentary and ultramafic bedrock within the highly to moderately weathered profiles appear less permeable in comparison to the suite of mineralised igneous intrusive rocks.
- The saprock and slightly weathered profiles within igneous intrusive rocks can exhibit high permeability in zones of strong jointing and fracturing. These zones tend to have limited vertical extent given the relatively shallow depth of weathering in many parts of the igneous intrusive suites. At the Eagle Deposit, there is an area of up to 200 x 200 m in which most of the drill core holes present display significant joint and fracture sets. Figure 7-5 shows drill core exhibiting these elevated permeability zones.
- Minor occurrences of narrow felsic dykes (typically less than 1 m, logged in the De Grey system as porphyries (AFPY), are notable for their very low permeability, both internally and along their contacts with surrounding rock. There is some potential for these dykes to act as minor barriers to groundwater flows and promote compartmentalised flow in bedrock settings.
- Increased amounts of minor to moderate fracturing within slightly weathered and fresh bedrock often appears to be associated near the boundaries between sedimentary and igneous intrusive units. This increased fracturing and hence permeability is probably related to the brittle-ductile response of the two different lithologies during deformation events.
- As commonly observed at many other bedrock mines, shear zones in deeper fresh bedrock at Hemi appear to be mostly impermeable owing to their foliated and intact nature.
- Within slightly weathered and fresh bedrock, there is an overall trend of decreasing permeability with depth, with very limited indications of significant fracture permeability below about 150 m. The limited occurrence below this depth is often associated with minor-scale vuggy veins, however, these show no obvious indications of weathering or extensive continuity.

Figure 7-5 Drill core examples of elevated saprock permeability within Hemi igneous intrusives

7.3.2 Groundwater Levels

Regional Water Table

The regional water table as of November 2022 has been interpolated using *Surfer v16* software to produce the contours shown on Plan 7-8 which also shows the location of water bores and wells with groundwater level data. Only minor adjustments were made to the contours, by assuming several river pool elevations to be representative of the water table and by interpreting several conceptual values near the outer limits of the study area.

The water table in the project region is a broad reflection of the overlying ground surface and shows that regional groundwater flow in the shallow aquifer system is north-northwesterly under low hydraulic gradients of between 1-in-800 to 1-in-1600. These are similar to the average riverbed gradients of the nearby Yule River (1 in 900) and Turner River (1 in 650).

The depth to the water table below ground (in November 2022) was calculated in *Surfer v16* by subtracting the water table surface from a ground surface DTM generated on a 20 m grid size from finer resolution Lidar data provided by De Grey. As shown on Plan 7-9, the water table in the immediate Hemi area occurs between five (5) to seven (7) m below surface, with a broad trend of slowly increasing depth to the south and slightly decreasing to the north in areas of low relief. The greatest depths to the water table (> 20 m) occur below outcropping bedrock and sand dune areas, which are more prominent to the south of Hemi.

Hydrographs

Figure 7-6 Hemi Region Groundwater Hydrographs – December 2020 – June 2023Figure 7-6 displays groundwater levels for Hemi bores HMB001 – 011, as well as daily rainfall and monthly abstraction volumes from Hemi production bores used to supply water for drill rigs and dust suppression on the main Hemi access track. The rainfall data are not actual rainfall amounts, but rather the interpolated values for the Hemi area made by the Queensland Government's *SILO* database.

Several monitoring bores show a slight increase in groundwater levels of 0.3 – 0.5 m between December 2020 and March 2021, which is considered to reflect minor but significant recharge from the two large (+100 mm) rain events in that period. Since the 20/21 wet season, most monitoring bores at Hemi show a slow gradual declining trend to June 2023, with a few bores showing a small rise from the anomalous rainfall event in early June 2022. The monitoring bores closest to abstraction sites at Hemi (HMB001 – 4) do not show any signs of aquifer dewatering in response to water supply pumping to date; the observed groundwater levels here are considered to reflect natural variations in seasonal rainfall recharge events.

The six (6) monitoring bores located next to the Turner River were installed to help investigate the option of discharging surplus water expected from pit dewatering to the Turner River. Monitoring of groundwater levels in these bores commenced in December 2021 utilising pressure transducers with manual readings and data downloads every two (2) months. Hydrographs for these bores are shown on Figure 7-7 , as well as the lowest elevation within the nearby section of the Turner River and ground level at the bore. As expected, all the monitoring bores showed small recharge rises of between 0.4 – 2.0 m in response to the two observed river flow events in June 2022 and January 2023.

In the region of the monitoring bores, the hydrographs show that the water table occurs between two (2) to five (5) metres below the lowest elevations of the riverbed during sustained dry periods.

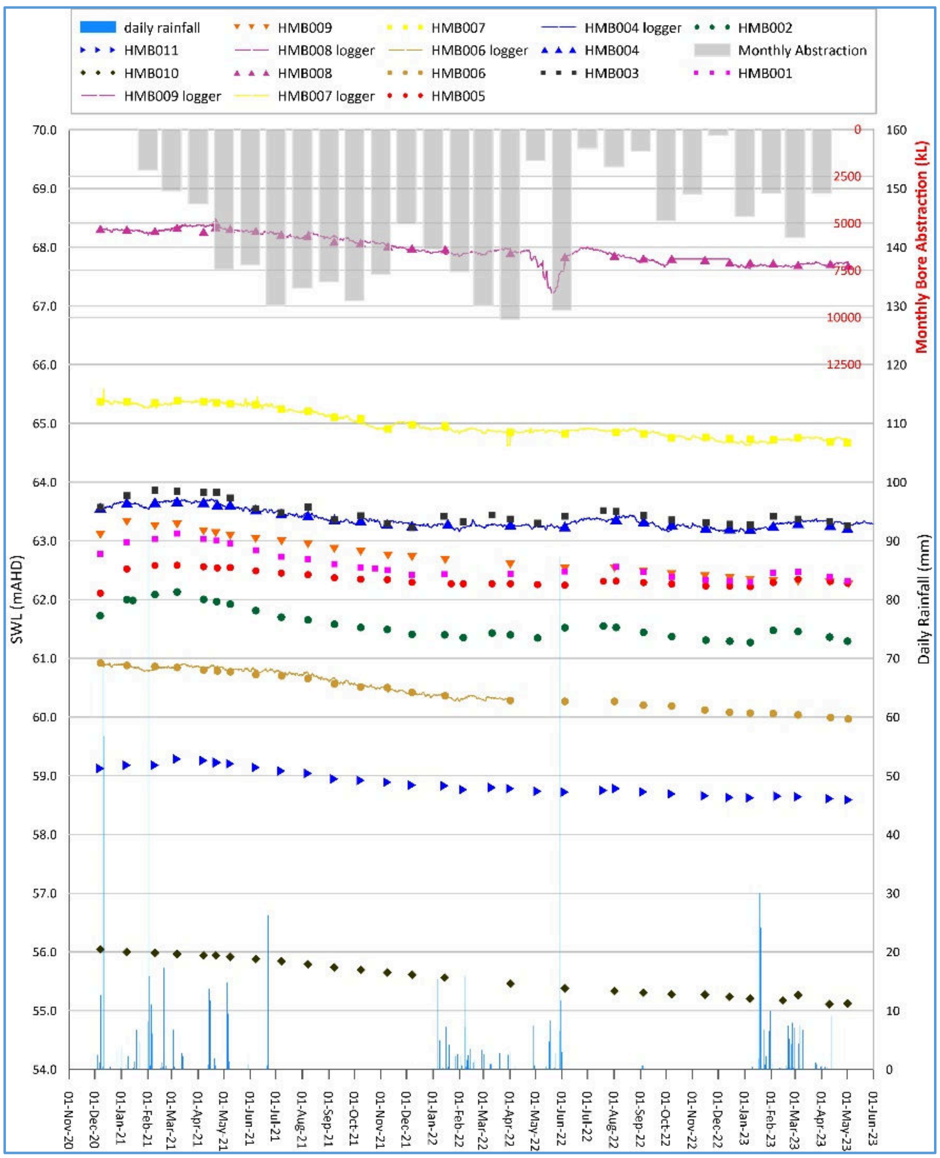

Figure 7-6 Hemi Region Groundwater Hydrographs – December 2020 – June 2023

Figure 7-7 Turner River Hydrographs – December 2021 – June 2023

Vertical Head Gradients

Eight (8) multi-piezometer monitoring bores were installed in 2021 at Hemi with a shallow and deep standpipe constructed in the same drill hole and isolated from each other by an annular cement-bentonite seal. The main purpose of these is to measure groundwater quality from different geological intervals, however, they also provide a measurement of any vertical head differences present in the groundwater system. The vertical head differences observed to date under the natural baseline regime are limited (less than 0.15 m), which is as expected given the likely strong hydraulic connection present between alluvium zones and underlying weathered bedrock, as well as the lack of large hydraulic stresses during the observation period.

Saturated Alluvium

Estimation of the alluvial aquifer thickness has been achieved by subtracting the base of alluvium grid from the November 2022 water table grid in *Surfer v16*. Contours of the aquifer thickness are shown on for the regional area on Figure 7-8 and on Figure 7-9 for the local Hemi area. These figures highlight the following:

- The alluvial aquifer is not continuous throughout the entire model area, notably to the east of Hemi, and along much of the Turner River. Between Hemi and the Yule River there are some ‘islands’ where the alluvium is unsaturated, and the water table would be present within the bedrock profile.
- In the Hemi Deposit area, there are large areas of alluvial aquifer between 20 – 36 m thickness that will require dewatering ahead of open-pit mining. On the south-east side of the proposed TSF, the water table is present just below the base of alluvium.

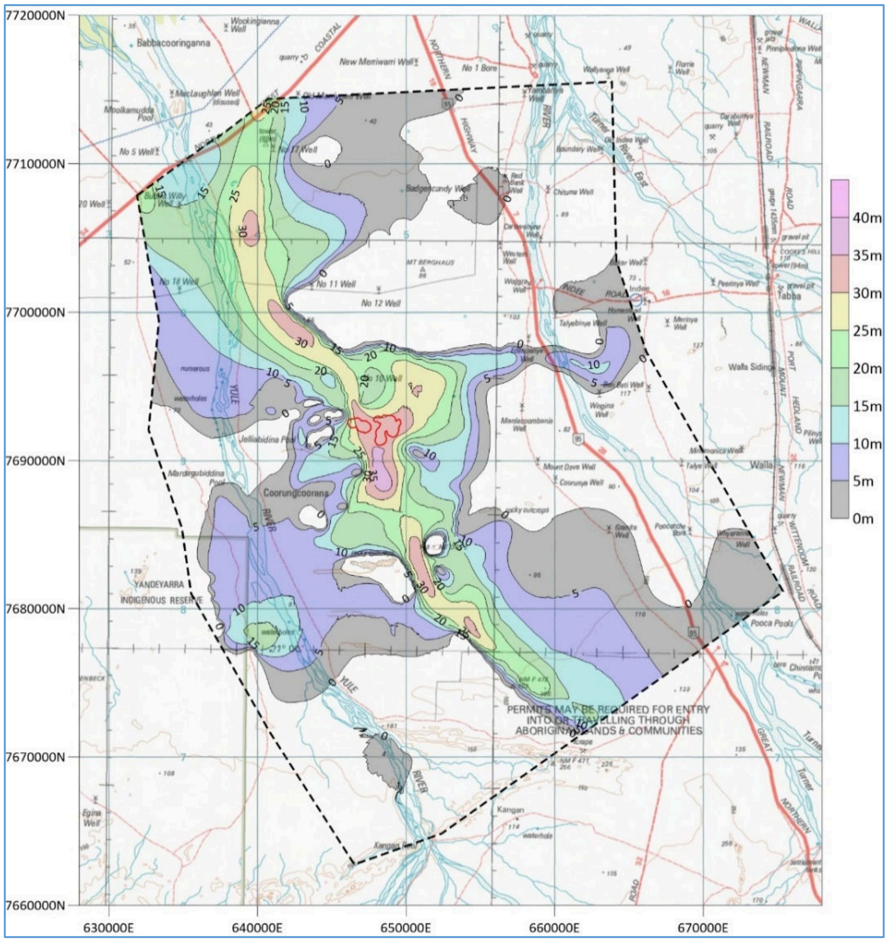

Figure 7-8 Alluvial Aquifer Thickness (m) – Regional – November 2022

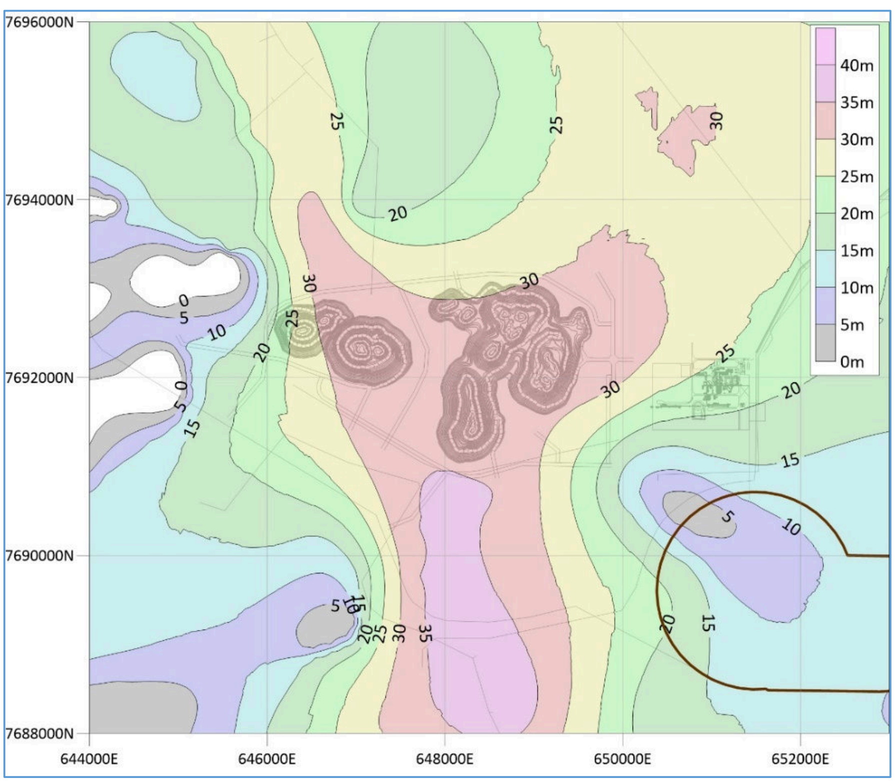

Figure 7-9 Alluvial Aquifer Thickness (m) – Hemi – December 2021

7.3.3 Groundwater Quality

Groundwater quality in the Hemi region is typically fresh to brackish (800 – 1,100 mg/L TDS), near-neutral to slightly alkaline (pH mostly in the range from 7.5 – 8.5), and with elevated hardness (average of 270 mg/L as calcium carbonate). Since December 2020, almost 120 groundwater samples from the Hemi and Turner River areas have been analysed for detailed water quality by ALS at their Wangara laboratory in Perth. The ALS analytical reports are included in full as part of the field investigations report (Geowater, 2022). Summary results are included here as Appendix D.

Water type

A Piper trilinear diagram has been prepared (Figure 7-10) to highlight the different proportions of major and minor ions between three sample groupings (Hemi alluvium, Hemi bedrock and Turner River). Groundwater in the Hemi region can be characterised as a mixed water type, with sodium and potassium the dominant cations, with lesser magnesium and only minor calcium. Chloride and bicarbonate are the dominant anions with only minor sulphate. The bedrock intervals sampled to date are relatively shallow, but show a trend towards increasing sodium and potassium levels at the expense of magnesium. This may be a result of cation exchange within the clay mineralogies of the saprolite and saprock intervals that the bedrock bores are screened within.

In a vertical context, the salinity of groundwater within alluvium and weathered bedrock at Hemi is very similar, with no obvious changes between shallow and deeper intervals (excluding the finer-scaled observation of fresher water at or very close to the water table surface in some bores. Water samples collected from multi-piezometer bores on the same dates have salinity values within 10% of each other between shallow and deep intervals.

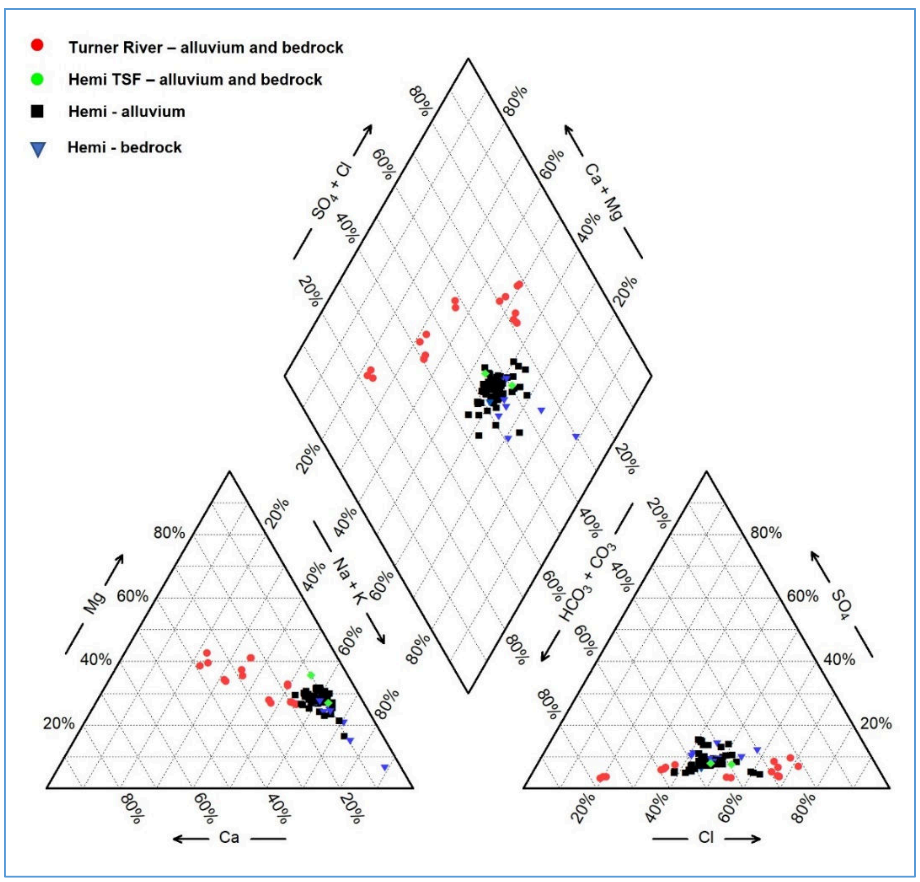

Figure 7-10 Piper Plot – All Bores

As indicated on Figure 7-10, groundwater quality in the Turner River monitoring bores is more variable than in the Hemi area. Figure 7-11 is another Piper diagram that identifies individual bores and shows that bores

HMB017, HMB020, HMB021 can be characterised as a sodium-chloride type water, HMB018 as a mixed water type and HMB019 and HMB022 as a mixed cation-bicarbonate type. The two northern bores (HMB019 and HMB022) are screened within sedimentary bedrock and have low salinity (350 – 550 mg/L) and may have a reasonable hydraulic connection to occasional recharge from river flooding events. Surficial calcrete deposits have been observed in the riverbed close to this drill transect.

The southernmost bores (HMB017 and HMB020) are screened within mafic schistose bedrock of relatively low permeability. The sodium chloride nature and salinity values (about 1,000 – 1,350 mg/L) suggest limited or no significant groundwater recharge from river flooding events in this bedrock-dominated reach of the river.

Salinity Trends

The alluvial aquifer in the Hemi region shows a trend of increasing salinity from west to east as shown by the regional EC contour plan (Plan 7-10). The major ion water chemistry of this trend is highlighted on the Durov plot (Figure 7-12) which shows that, from west to east, cation ratios remain similar whilst chloride increases notably at the expense of bicarbonate. Given the similar geochemistry of the alluvium, the increasing salinity and chloride to the east is interpreted to reflect relatively lower rates of groundwater recharge.

Review of EC:TDS relationships show that the relationship of EC * 0.71 is a good indicator of groundwater salinity in the Hemi region (Geowater, 2022).

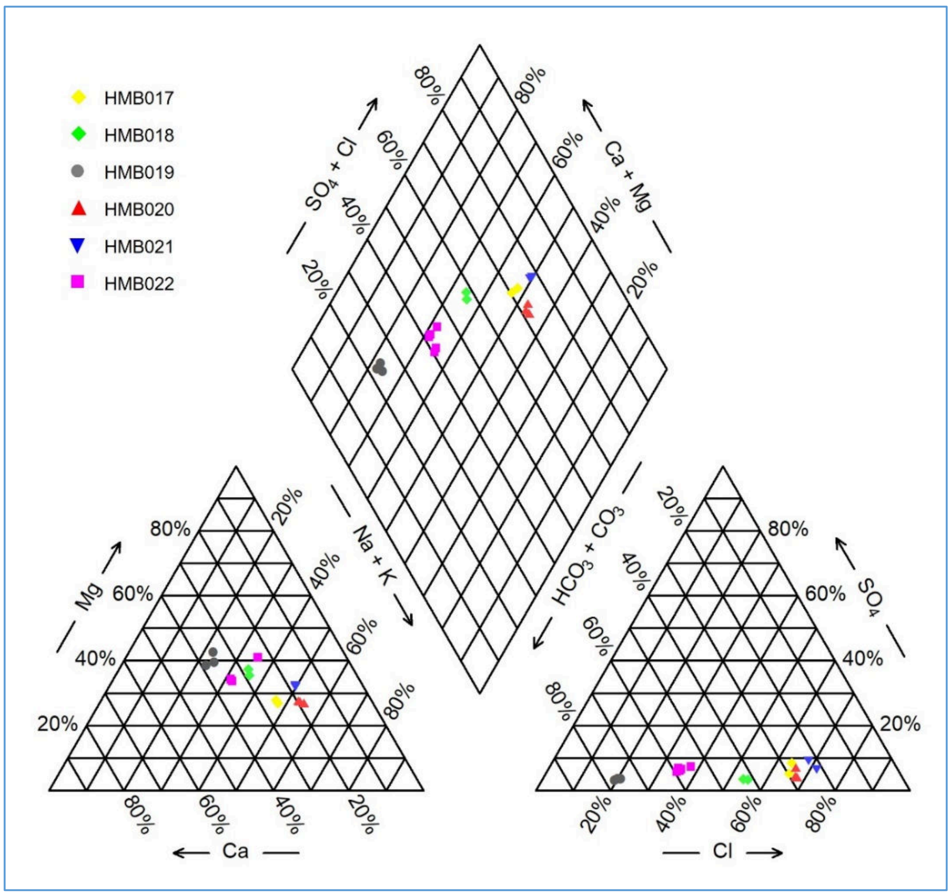

Figure 7-11 Piper Plots – Turner River Bores

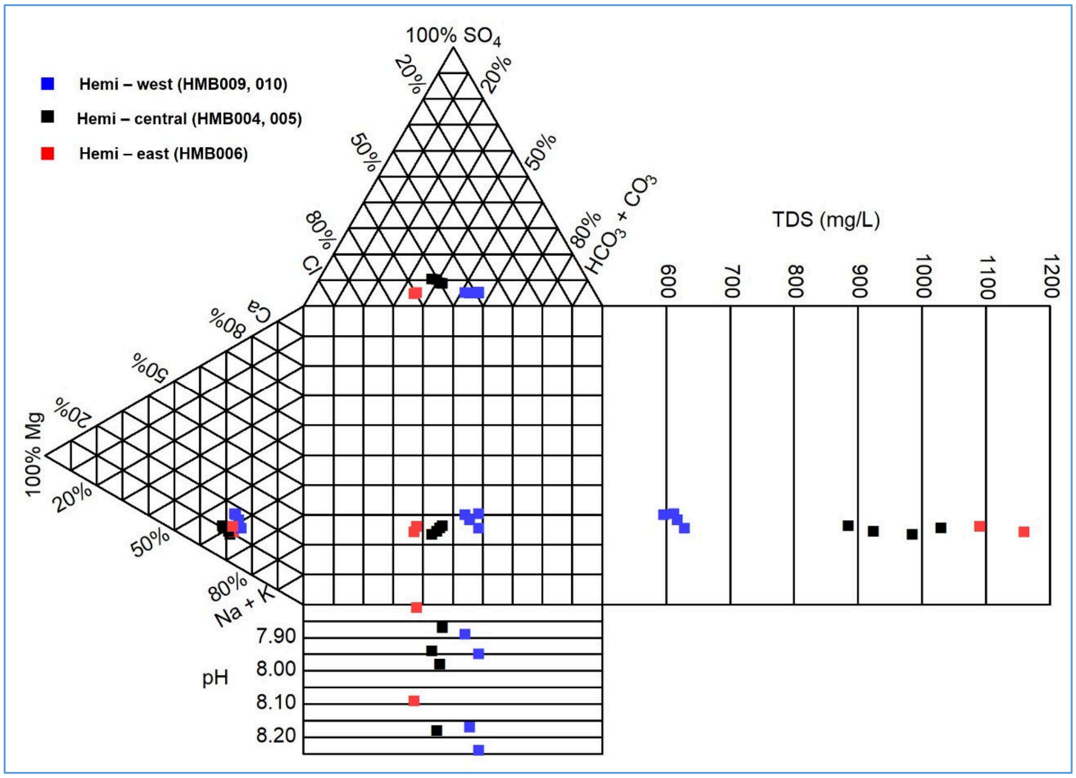

Figure 7-12 Durov Plot – Hemi Alluvial Aquifer

Trace Metals

Gold mineralisation at Hemi is associated with elevated pyrite and arsenopyrite levels. The occurrence and fate of dissolved arsenic is an important aspect of the environmental impact studies. To facilitate these studies, a comprehensive suite of trace metals has been analysed on all groundwater samples, to the lowest detection limits available at ALS. Most of the analyses are for dissolved metal levels on samples that have been filtered in the field at the time of collection using a 0.45 micron filter. Total metals analyses have also been undertaken since October 2021 on groundwater samples that exhibit a cloudy or turbid nature.

The lab results indicate that dissolved arsenic, chromium, uranium, and vanadium levels in some bores at Hemi can be significantly higher than the levels in bores more distant from Hemi and/or in baseline surface water samples collected in the Turner River to date. Figure 7-13 plots these dissolved metal levels against the distance from the known main ore zones at Hemi, and highlights the different sample categories. Both distance and concentration values are plotted on a logarithmic scale given the large variations present.

Comments regarding the trace metal data comprise:

- The distance of 10 m is nominal and equates to the bore location being within or very close to Hemi ore zones.
- Groundwater samples in bedrock are only available for bores located within ore zones, and show the highest arsenic levels (up to almost 1 mg/L).
- There is a tendency for arsenic values in alluvium in bores located directly downgradient of ore zones to be higher than alluvium bores located upgradient of the Hemi ore zones. The three alluvial arsenic values of around 50 ug/L at around 1,400 m form an outlier to the dataset. These results are from bore HMB005, which is located just downgradient from a mineralised deposit area called Scooby.
- Chromium values are typically higher in alluvium bores located upgradient and laterally distant from the Hemi ore zones, which suggest that elevated chromium levels are not related to the Hemi gold mineralisation system.
- Groundwater near the Turner River bores typically have the lowest arsenic, chromium, and uranium levels relative to the Hemi region.

- Uranium and vanadium levels are similar in concentration between upgradient, downgradient and Hemi bedrock zones, which suggest their distribution in the groundwater system is not closely related to the Hemi gold system. It may be more in relation to all the Hemi sites being broadly downgradient of a large granodiorite dome present to the south-east of Hemi.

Figure 7-13 Dissolved Trace Metals

7.3.4 Hydraulic Parameters

Ten of the De Grey production bores installed at Hemi in 2021 underwent controlled pumping tests to estimate key hydraulic aquifer parameters, with a focus on the alluvial aquifer system compared to the fractured and weathered bedrock system. All monitoring bores had falling head (slug) tests completed. Details of all these tests are provided in Geowater (2022) and are not repeated here. Instead, the derived hydraulic parameters are summarised in Table 7-1, alongside other hydraulic parameters used in groundwater studies at Mount Dove and the Yule River Borefield.

Test-pumping of the dewatering and reinjection investigation bores being installed in the period between May and August 2023 will be undertaken around September-October 2023 and the results of the work adopted in future modelling updates.

Table 7-1 Hydraulic Parameters

Bore(s) / Category	Geology Unit(s) Screened	Transmissivity [T] (m^2/day)	Aquifer Thickness [b] (m)	Hydraulic Conductivity [K] (m/day)	Storativity [S]	Specific Storage [Ss]	Specific Yield [Sy]
De Grey Pumping Tests							
HPB002	Basal sands and gravels	360	24	15	-	-	-
HPB003	Alluvium and basal sands/gravels	1,312	41	32	6.0E-3	1.5E-4	-
HPB004	Alluvium and basal sands/gravels	1,050	30	35	-	-	-
HPB006	Alluvium and basal sands/gravels	2,300	45	51	1.0E-4	2.2E-6	-
HPB007	Alluvium	600	20	29	2.0E-3	9.5E-5	-
HPB008	Alluvium	250	29	8.6	4.0E-4	1.4E-5	-
HPB009	Alluvium and basal sands/gravels	900	39	23	6.0E-4	1.5E-5	0.05
HPB010	Bedrock	180	30	6.0	2.6E-4	8.7E-6	-
HPB011	Bedrock	0.3	21	1.4E-2	-	-	-
HPB012	Alluvium and basal sands/gravels	2,000	30	67	2.5E-4	1.5E-5	0.10
De Grey Falling Head (Slug) Tests							
various	Turner River alluvium and/or	-	-	3.5E-3 – 0.7	-	-	-
various	Hemi Deposit alluvium	-	-	0.05 - 40	-	-	-
various	Hemi Deposit bedrock	-	-	1.5E-2 – 1.7	-	-	-
various	TSF alluvium and/or bedrock	-	-	0.15 – 9.0	-	-	-
various	Hemi regional alluvium	-	-	0.1 – 60	-	-	-
Atlas Iron Mt Dove Pumping Tests							
MDEX2	alluvium	91	20	4.5	-	-	-
MDEX3	alluvium	283	12	24	-	-	-
MDEX5	bedrock	32	51	0.6	-	-	-
MDEX6	alluvium & bedrock	2213	22	100	-	-	-
DMP Yule River Investigations, 1960's – 1970's							
23	alluvium	974	12	80	-	-	-
13	alluvium	207	9	24	-	-	-
11	bedrock	29	6	5	-	-	-
33	alluvium	16	7	2.2	-	-	-
MWH Yule River Numeric Model, 2010							
Calibrated model values	Alluvium Sand	-	-	35	-	1.0E-4	0.07
	Alluvium Clay	-	-	0.4	-	9.8E-3	0.05
	Bedrock	-	-	0.02	-	1.0E-6	0.02

7.4 Conceptual Model Summary and Water Balance

Several plans have been prepared to help visualise key aspects of the local and regional hydrogeology. Plan 7-11 shows an isometric plan view of the whole model area, Plans 7-12 to 7-14 are scaled regional sections (looking north) and Plans 7-15 and 7-16 are local (NE looking) sections through Eagle-Diucon-Falcon and Crow-Aquila-Brolga. Summary aspects of the known and interpreted hydrogeology at Hemi and the wider model domain are provided below:

Regional

i. The alluvial cover at Hemi is widespread and forms a significant shallow aquifer that extends to significant reaches of the Yule River but with no to very limited connection or continuity to the Turner River.
ii. Within the alluvial cover, there is a paleochannel river system comprised of up to 15 m of highly permeable sands and gravels, that is about 1,000 m wide and which drains towards the current day coast and Water Corporation Yule Borefield.
iii. The depth to groundwater is typically between 5 – 10 m over most of the model domain, and only higher in elevated areas of rock outcrop and sand dune areas.
iv. Groundwater flow directions and hydraulic gradients are relatively uniform, with groundwater levels around 105 mAHD on the southern boundary and 26 mAHD on a section of the northern boundary.
v. The Turner River lacks river pools over most of the model domain as a result of the water table typically being 2 – 5 metres below the shallowest parts of the riverbed during sustained dry periods.
vi. The Yule River has several river pools that are likely to have a connection to the surrounding dry season water table (Jellibidina, Mardagubiddina and Portree pools). Groundwater inflows to these pools may be limited but significant to the maintenance of the pool level during sustained dry periods.
vii. Evaporation and evapotranspiration (ET) during dry periods are considered to be spatially restricted within the model area, being limited to sections of the main rivers where river pools, or shallow water tables and riparian vegetation occur.
viii. Recharge from river flows to the shallow aquifer systems are variable over time and location. The largest amounts of river recharge occur from the Yule River in the north-western part of the model area where large flow events spill over the main channel onto the surrounding floodplain. The least amount of recharge is considered to occur in the southern reach of the Turner River, where significant amounts of slightly weathered to fresh bedrock occurs in or near the riverbed.
ix. The model domain is a 'net' producer of groundwater as groundwater outflows at the northern (downgradient) boundary are higher than groundwater inflows at the southern (upgradient) boundary.
x. The water quality of shallow aquifer zones is good, being typically fresh to slightly brackish, slightly alkaline and fit for the existing pastoral and mining usage. In the north-west of the study area along the Yule River, groundwater is of potable quality.

Hemi

xi. At Hemi, weathered bedrock zones do not typically form significant aquifer zones. The saprolite profile in all lithologies, as well as most of the saprock zones within sedimentary bedrock, have limited permeability and may act as weak aquitard units in response to the proposed dewatering and mining. Fractured rock aquifer zones with significant permeability and limited storage are interpreted to have developed in the following weathered bedrock settings:
    a. Relatively thin (often less than 10 m) sub-horizontal zones of strongly jointed igneous intrusives in parts of the Eagle and Brolga deposits where the overlying saprolite profile is very thin or absent.
    b. Near and along the intrusive -sedimentary bedrock contacts and the north-east trending thrust zones prevalent through the deposits.
xii. Within fresh bedrock, permeability is restricted to localised fractured rock zones associated with the north-east trending thrust zones and igneous-sedimentary bedrock contacts. Review of core photographs indicates that permeability in these zones decreases significantly with depth and below about 150 m, these fracture zones are likely to be effectively impermeable and contain no effective storage of water.
xiii. Both the shallower alluvium and paleochannel aquifer at Hemi are in a direct geologic and hydraulic connection with the nearest groundwater users (Atlas Iron – Mt Dove Borefield and Indee pastoral bores). A direct geological and hydraulic connection with the more remote Watercorp Yule River Borefield is interpreted.
xiv. Rainfall recharge to the water table in the Hemi area and surrounding alluvial plain is low but significant. A long term average of 1 – 3% of annual rainfall is feasible in areas near and above the palaeochannel

aquifer, and less than 1 % in areas of very shallow alluvial cover and bedrock outcrop. The increasing salinity trend of the shallow water table at Hemi from west to east is considered to reflect historic variations in rainfall recharge.

xv. Elevated levels of dissolved arsenic occur in the weathered rock profile within and adjacent to ore zones. Elevated, but smaller levels of dissolved arsenic (typically 0.02 – 0.06 mg/L) also occur in the basal sections of the alluvial aquifer within short down-gradient distances of ore zones.

Table 7-2 provides a summary water balance for the conceptual model, derived from interpretations and simple analytical estimates.

Table 7-2 Conceptual Model Water Balance

Component	Value (kL/day)	Value (GL/year)	Comments
INFLOWS			
Groundwater Inflow – Bedrock	200	0.07	Based on Darcy Equation (Q = K*i*b*L), December 2021 swls and Conceptual Section 1
Groundwater Inflow - Alluvium	3,360	1.23	Based on Darcy Equation (Q = K*i*b*L), December 2021 swls and Conceptual Section 1
Riverbed Recharge	19,230	7.02	Limited accuracy estimate based on assuming river flow recharge is equivalent to a rainfall recharge rate of 10% in the Turner River and recharge rates of 35 – 140 mm/year (decreasing southwards) in the Yule River based on reconciliation of river recharge assessments by MWH (2010) for Yule River Borefield
Direct Rainfall Recharge	8,240	3.00	Based on higher recharge area rate of 2.5% of annual rainfall, lower recharge area rate of 0.5% annual rainfall and de levels in rainfall vs shallow aquifer, long erm rainfall average of 350 mm/year and mapping of thicker alluvial cover at 600 km^2 (higher recharge) and shallow alluvial cover and outcrop at 817 km^2 (lower recharge) area.
Total Inflows	31,030	11.32	Long term average estimate
OUTFLOWS			
Groundwater Outflow - Bedrock	360	0.13	Based on Darcy Equation (Q = K*i*b*L), December 2021 swls and Conceptual Section 3
Groundwater Outflow - Alluvium	6,020	2.20	Based on Darcy Equation (Q = K*i*b*L) , December 2021 swls and Conceptual Section 3
Bore Pumping	450	0.16	Based on pastoral usage estimate and low level pumping in recent years by Atlas Iron at Mt Dove
ET	24,200	8.83	Not a standalone estimate, but rather the value required to balance total inflows with total outflows.
Total Inflows	31,030	11.32	Long term average estimate

The conceptual water balance is of limited accuracy given that the largest components of the balance (recharge and evapotranspiration) are the least understood. River recharge is significant to the overall balance, however, the variable and ephemeral nature of river flows in the Pilbara makes the conversion to long term average rates assumed by a steady state water balance more complicated and less certain. Support for some of the recharge and ET steady state estimates are provided by:

- Chloride analyses of a limited number of rainfall samples from Wingina Camp show low chloride levels (0.5 – 1 mg/L). Coupled with the chloride levels in groundwater samples from the upper sections of the shallow alluvial aquifer in the Hemi region, a simple 1-D chloride balance approach indicates rainfall recharge rates of between 0.5 – 3%.
- River recharge in the Yule numeric model by MWH (2010) was calibrated in a transient model using a long period of river flow and groundwater level data to align groundwater recharge with rainfall and river flow patterns. This produced a probabilistic set of recharge values:
    - For a 20th percentile (dry) year, total recharge was 4 GL. This is assumed to be a zero river flow year, with the 4 GL a result of applying values of 0 – 2.5 % of rainfall to estimate direct rainfall recharge to parts of the aquifer away from the river.
    - For a 50th percentile (mean) year, total model recharge was 20 GL.
    - For a 90th percentile (flood) year, total model recharge was 44 GL.
    - The mean recharge total of 20 GL is twice the amount of the Hemi conceptual (mean) estimate of about 7 GL. The greater volume is expected given the greater area of the Yule model and the known occurrences of significant groundwater recharge from river flooding in the Yule model.
- The derived ET losses of 8.8 GL/year in the Hemi conceptual model equates to an area of about 5.2 km^2 if the BOM annual average ‘areal potential ET’ rate of 1,700 mm/year is applied. This area is only small but is of a similar magnitude to the observed areas of water pools and very shallow water tables in the Yule and Turner rivers.

8 NUMERIC GROUNDWATER MODEL

8.1 Objectives and Approach

As stated in Section 1, the objectives of developing the numeric groundwater model are to provide De Grey with:

- Estimation of dewatering and water supply requirements to a standard suitable for supporting DFS - level designs and costings being undertaken by De Grey.
- A robust technical assessment of De Greys planned use of the local groundwater resources at Hemi and the possible impacts of this use on surrounding water users and the environment. The assessment is to be of a 'H3 level' to adequately support the submission of a 5C Groundwater Well Licence application to the Department of Water and Environmental Regulation (DWER) in the latter stages of 2023.

The approach taken in developing the numeric model is consistent with other similar mine water studies and involved the conversion of the conceptual model into a numeric format for calibration and prediction simulations by:

- Using the conceptual model and field investigations to develop the layering and initial distribution of aquifer properties and boundary conditions. The boundary of the conceptual model was used for the numeric model domain as there are no large physical boundaries close to the areas of interest, and the conceptual model boundaries are considered distal enough to minimise numeric boundary effects to the areas of interest.
- Calibrating the numeric model in steady state to available datasets and concepts. The local and regional water table data and interpreted surface for November 2022 was used as the key steady state calibration dataset to modify model parameters to obtain a suitable fit to the observed values. Transient calibration of the model in the Hemi area was limited by the absence of significant hydraulic stresses and available data. Groundwater level data in several monitoring bores over a 12 month period was utilised.
- Applying predictive simulations to estimate dewatering requirements for the PFS mine schedule using passive dewatering (in-pit drains only) and advance dewatering (bores and in-pit drains) scenarios.
- Reconciling dewatering inflows with the project water demand schedule to develop an iterative dewatering base case scenario which incorporates simulation of aquifer reinjection of some of the dewatering surplus.
- Assessing uncertainty in the model predictions by varying model inputs for parameters considered the most significant to modelling objectives (permeability, specific yield, and recharge).
- Creating a closure model using the end state of the operational phase model as the starting point for the closure model, which is run over many decades to predict the development of pit void lakes and any long term effects on the surrounding aquifer system and environmental values. The closure modelling is still being conducted at the time of reporting and will be documented later in 2023.

The numeric model has been developed in a staged manner consistent with recommendations from the *Australian Groundwater Modelling Guidelines* (Barnett, et al., 2012). The guidelines define three 'confidence levels' (C1, C2, C3) for models as a means of providing a non-technical benchmark by which the reliability or confidence of the required model predictions can be assessed and communicated amongst stakeholders and non-modellers. Overall, the developed model for Hemi is considered by Geowater to be of the intermediary Class 2 level of confidence and fit for purpose.

The model development and results presented here for the DFS are broadly similar to the PFS model previously described by Geowater (2022), with the following key changes and additions:

- Re-interpretation of the base of alluvium surface in outer areas of the model based on bore logs near the Yule River provided by the Water Corp and by updated mapping and interpretation of bedrock outcrop and subcrop areas by De Grey geologists.

- Steady state calibration to the mapped November 2022 water table surface.
- Inclusion of two years of observed groundwater level data in the transient calibration.
- Application of revised pit designs and a new mine schedule for the DFS.

8.2 Model software selection

The numerical model code selected was *MODFLOW SURFACT*, a finite-difference code, which is an enhanced version of the widely used U.S. Geological Survey modular three-dimensional (3-D) groundwater flow modelling code, *MODFLOW*. It includes adaptive time stepping for model stability and fractured well package for better representation of multi-aquifer bores. *Visual MODFLOW FLEX* and *Surfer* software were used as the pre- and post-processors.

The known and interpreted sub-horizontal and sub-vertical geometries of the main aquifer zones throughout the model domain, as well as their relatively linear nature, suits the block nature of *MODFLOW* and negated the need to consider the use of unstructured grid or finite element model platforms.

8.3 Model Construction

As a finite-difference code, the model domain is discretised into rectangular blocks representing the hydraulic properties of the material inside each block. Finer grids were assigned to areas of interest and areas of large hydraulic gradient making a total of 2,823,088 blocks within the model. The largest model blocks have areas of 400 x 400 m, and the smallest blocks measure 25 x 25 m. Plan 8-1 shows the model extent and grid discretisation and highlights how the model axes are rotated from real-world systems to align with the main north-west palaeochannel trend.

The model layers were based on the hydrostratigraphic units of the conceptual model and De Grey regolith model:

- Upper Alluvium.
- Lower (basal) Alluvium.
- Saprolite.
- Saprock.
- Slightly Weathered Bedrock.
- Transitional Weathered Bedrock; and
- Fresh Bedrock.

Plans 8-2 to 8-7 show the interpolated elevations of the base of each hydrostratigraphic unit adopted in the numeric model. The six uppermost hydrostratigraphic units were each subdivided into two equal layers in the numeric model to create improved vertical discretisation. The fresh bedrock unit was subdivided into five layers which resulted in a total of 17 model layers. The base of the model (layer 17) was set at -400 mRL to be below the vertical limit of proposed open pit mining.

Within each hydrostratigraphic unit, variability in hydraulic parameters were defined as separate property zones based on the hydraulic testing done at Hemi and other projects (Mt Dove and Yule borefields), as well as interpretive values from the conceptual model for areas lacking field testing. Table 8-1 provides a reconciliation of hydraulic property zones with the hydrostratigraphic units and includes the hydraulic parameters adopted at the completion of model calibration. Plans 8-2 to 8-7 show the spatial extent of each property zone within the main model layers.

8.4 Boundary Conditions

Based on the conceptual model, the northern and southern model boundaries were assigned *MODFLOW* constant head boundary conditions to facilitate throughflow in the direction of groundwater flow. Plan 8-8 shows the calibrated constant head values along these boundaries. The eastern and western boundaries were assigned no flow boundaries as supported by the typical regional groundwater flow directions shown on Plan 7-9.

Given the distance of Hemi from the rivers and the relatively short project life, the two rivers were simulated as simple ‘gaining’ streams only in the model. This was done by setting drain cells at the basal riverbed elevations along the river reaches within the model (Plan 8-8). The influence of actual river recharge to the surrounding shallow aquifer (i.e., ‘losing’ streams) is approximated in the steady state model by applying estimates of average recharge to the water table within the confines of the existing river channels. These areas are shown on Plan 8-8 alongside rainfall recharge zones applied over the model domain.

Evapotranspiration (ET) is set throughout the numeric model domain into two spatial zones (river and plains). Within the banks of the Yule and Turner rivers, evaporation from the deeper rooted riparian vegetation present there was approximated using an averaged ET rate of 8.2 mm/day with an extinction depth of 5.0 metres. In all other areas of the model a lower rate of 6.1 mm/day with an extinction depth of 2.0 m was used. This shallower extinction depth in the sand plain regions of Hemi is partly based on the observed groundwater levels and water quality, and the overall lack of large trees or potentially groundwater dependent vegetation present, suggesting very little or no effective ET in this region.

8.5 Model calibration

Based on the available datasets, the numeric model was calibrated in a staged manner to groundwater levels only. The first stage (steady state) involved the establishment of a water level condition consistent with the existing (pre-mining) water level, and the second stage (transient state) involved the simulation of temporal changes in water level caused by applied stresses to the aquifer system.

8.5.1 Steady State

The steady state calibration of the numeric model was achieved using a trial-and-error approach (Barnett et al., 2012) by adjusting the conceptual model values of hydraulic conductivity (permeability), constant head boundary elevations, recharge rates and ET extinction depths within the model until a suitable match between simulated and measured November 2022 water table values and a low mass balance closure error was achieved.

The calibrated hydraulic conductivity values are listed in Table 8-1 whilst Plan 8-9 displays contours of the simulated November 2022 water table against the interpreted contours from the conceptual model. Figure 8-1 provides a scatter plot of simulated and measured water table data from 87 bores and wells (measured in November-December 2022), and shows a root-mean-square (RMS) error of 2.36 m. This represents a numerical improvement from the PFS model which had an RMS of 3.27 m utilising 56 bores and wells against the observed December 2021 water table.

Table 8-2 provides the water balance for the calibrated steady state model and indicates that the model domain is a net recharge environment with recharge gains exceeding ET losses. The steady state balance is maintained by groundwater outflows at the northern model boundary that exceed groundwater inflows at the southern model boundary. This balance is consistent with the conceptual model estimates.

The model outflows include a ‘recharge out’ amount which represents a minor component of the recharge applied (about 10%) that is effectively rejected by the numeric model in areas where shallow water tables and the ET function cannot accept the recharge.

If the evapotranspiration flux by the numeric model is applied to the BOM average ‘areal potential ET’ rate of 1,700 mm/year, this would equate to a surface area of about 5.2 km^2. This in turn represents 3.2% of the total riverbed area of the Turner and Yule rivers in the model domain and appears consistent with the magnitude of river pools and very shallow water table areas present along the riverbeds.

Table 8-1 Hydrostratigraphic units and Hydraulic Property Zones and Calibrated Values

Hydrostratigraphic Unit & Model Layers	Model Material Zone	Material description	Horizontal Hydraulic Conductivity Kx,y (m/day)	Vertical Hydraulic Conductivity Kz (m/day)	Specific Yield Sy	Specific Storage Ss
Upper Alluvium (1,2)	1	Alluvium where thickest and/or distal from outcrop	3	1.5	0.075	1E-6
	8	Upper alluvium closest to outcrop or subcrop	1	0.5	0.05	1E-6
	9	Alluvium where bores show some shallow sand and gravel lenses but with uncertain extents	15	3	0.10	1E-6
	23	Bedrock outcrop within model layers 1,2	0.01	0.01	0.01	1E-6
	36	Alluvium NW area (values consistent with MWH model)	15	15	0.15	1E-6
Lower Alluvium (3,4)	10	Basal sands gravels in main palaeochannel	75	15	0.20	1E-6
	11	Basal sands and gravels on shoulder of main palaeochannel	15	3	0.15	1E-6
	12	Basal sands and gravels in potential paleo-tributaries	15	3	0.10	1E-6
	13	Alluvium closest to outcrop or subcrop	0.5	0.5	0.05	1E-6
	2	Lower alluvium (in remaining Layer 3,4 areas)	3	1.5	0.075	1E-6
	24	Bedrock subcrop within model layers 3,4	0.001	0.001	0.01	1E-6
	35	Basal alluvium NW area (values consistent with MWH model)	25	5	0.10	1E-6
Saprolite (5,6)	14	Hemi igneous intrusives	0.50	0.50	0.05	1E-6
	15	Mt Dove granite dome	0.01	0.01	0.05	1E-6
	3	All other lithologies areas in saprolite layer	0.10	0.10	0.05	1E-6
	31	Subcrop area	0.01	0.01	0.03	1E-6
	24	Subcrop area	0.001	0.001	0.001	1E-6
	26	Hemi Thrust Zones in saprolite layers	1	1	0.05	1E-6
Saprock (7,8)	16	Hemi igneous intrusives (excluding ultramafic units)	2	2	0.03	1E-6
	17	Hemi elevated permeability zones in saprock at Eagle	15	15	0.03	1E-6
	4	All other lithologies in saprock layer	0.1	0.1	0.03	1E-6
	32	Subcrop area	0.01	0.01	0.03	1E-6
	27	Hemi Thrust Zones in saprock layers	5	5	0.03	1E-6
Slightly Weathered (9,10)	19	Hemi igneous intrusives (includes ore zones and 20 m buffer into surrounding rock types)	1	1	0.04	1E-6
	5	All other areas in slightly weathered layer	0.01	0.01	0.03	1E-6
	33	Subcrop area	0.001	0.001	0.001	1E-6
	28	Hemi Thrust Zones in slightly weathered layers	5	5	0.03	1E-6
Fresh Transition (11,12)	21	Hemi igneous intrusives (includes ore zones and 20 m buffer into surrounding rock types)	0.1	0.1	0.03	1E-6
	6	All other lithology areas in fresh transition layer	0.001	0.001	0.02	1E-6
	34	Subcrop area	0.0001	0.0001	0.02	1E-6
	29	Hemi Thrust Zones in fresh transition layers	1	1	0.03	1E-6
Fresh Rock (13,14,15,16,17)	7	All lithologies	0.0001	0.0001	0.0001	1E-6
	30	Hemi Thrust Zones in fresh rock layers	0.5	0.5	0.01	1E-6

Groundwater abstraction from bores and wells within the model domain was not included as part of the steady state model calibration, as no significant amounts of abstraction have occurred in recent years. Abstraction from the Mt Dove borefield in recent years has been very limited (of the order of less than 50 kL/day) to support minor camp accommodation levels (Atlas Iron, 2016). There are about 40 active pastoral bores and wells within the model domain; however, these probably pump less than 400 kL/day in total given that most of them recirculate unused or overflowing water back into the bore.

Table 8-2 Calibrated Steady State Model Values and Water Balance

Parameter	***Steady State Model***	***Conceptual Model***
River recharge rates	55; 110; 220 mm/year	35; 70; 140 mm/year
Rainfall recharge rates	0; 8; 12 mm/year	0; 1.75; 7 mm/year
Evapotranspiration rate	Rivers - 3,000 mm/year 5m extinction, Elsewhere – 2,227 mm/year 2m extinction	n/a
CHB Elevations – North	32;24;24;24;38 mAHD	n/a
CHB Elevations – South	94;94;96;98;98;98;100;100mAHD	n/a
CHB Inflows	5,821 kL/day (2.12 GL/year)	3,560 kL/day (1.30 GL/year)
Recharge	23,706 kL/day (8.65 GL/year)	27,470 kL/day (10.02 GL/year)
Total In	*29,527 kL/day (10.77 GL/year)*	*31,030 kL/day (11.32 GL/year)*
Evapotranspiration	19,989 kL/day (7.29 GL/year)	29.544 kL/day (8.83 GL/year)
CHB Outflows	6,906 kL/day (2.52 GL/year)	6,380 kL/day (2.33 GL/year)
Drains Out	4 kL/day	-
Recharge Out	2,254 kL/day (0.82 GL/year)	-
Total Out	*29,544 kL/day (10.79 GL/year)*	*31,030 kL/day (11.32 GL/year)*
Mass Balance Discrepancy	17 kL/day or 0.06%	n/a

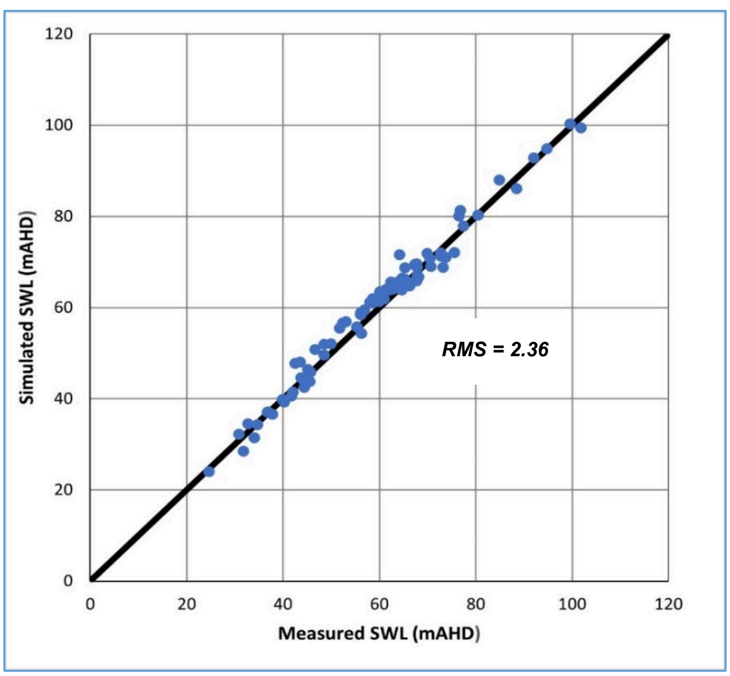

Figure 8-1 Simulated vs Measured December 2021 Groundwater Levels

8.5.2 Transient Calibration

Transient calibration of the model was limited by the absence of significant hydraulic stresses in the Hemi area of interest. Rainfall data and groundwater level data from 11 monitoring bores (HMB001 – 011) over a two year period to December 2022 was used by applying recharge at the same ratios as the steady state model to the actual rainfall data of the calibration period and then comparing simulated and measured water levels in the monitoring bores.

Plans 8-10 and 8-11 present the simulated vs measured transient hydrographs, which show a good fit in a broad sense, but not a finer scale, as the observed water table rises of 0.3 – 0.5 m in some bores in response to the 2021/22 wet season are not replicated in the simulation. In the Hemi region, the numeric model applies different recharge rates ranging from 0 – 3% of rainfall. The calibration hydrographs suggest this rate may be lower than the actual recharge response observed in several bores. However, the recharge rates throughout the transient model (and other model inputs such as specific yield) were left unchanged from the steady state model for the following reasons:

- The transient dataset has limited spatial extent and hydraulic stress magnitude.
- The rainfall recharge rates may underestimate the amount of actual recharge from rare but very large (cyclonic) rainfall events in the Hemi region, however, the lower annual average rates adopted may provide a degree of conservatism when estimating dewatering impacts with the predictive numeric model, by overestimating drawdown amounts and extents.

8.6 Predictive Scenarios

Key project assumptions for the predictive simulations comprised:

- No backfilling of pits occurs, and each completed pit is kept dewatered until the end of ore processing.
- Supply bores, if required, would be established in the main alluvial paleochannel aquifer to the south of the mine.
- The developed 'base case' scenario includes:
  - Advance dewatering by commencing some bores 15 months prior to commencement of mining (which is equivalent to 24 months prior to the start of ore processing).
  - Surplus dewatering discharge, in excess of site water demand and planned short-term discharge to the Turner River, is re-injected into the palaeochannel aquifer to the north and south of the mine.
  - Prior to commissioning of the ore processing circuit, any dewatering discharge with elevated arsenic levels unsuitable for other management options would be pumped to reinjection bores close enough to the pit dewatering system such that the injected water would be recirculated and captured by the dewatering system and pit void lakes in later years.

The dewatering simulations were conducted in two ways;

- Estimation of inflows using only in-pit dewatering by drain cells was completed first. This method is the simplest and fastest way to simulate dewatering inflows in the numeric model. Although a drain-only system is not recommended for the Hemi pits, its simulation in numeric models provides a lower bound estimate for likely dewatering inflows, and also a worst case type prediction of groundwater levels and pore pressures near the pits as inputs to geotechnical assessments of pit wall stability and slope angles.
- Simulation of dewatering inflows using bores and drains in the numeric model. This represents the recommended dewatering strategy for Hemi; with dewatering bores considered to be suitably effective for advanced dewatering of the alluvial aquifer, and suitable for a significant portion of the weathered rock aquifer zones. In-pit drain cells are still simulated in the numeric model in these aquifer zones to estimate water not captured by bores, as well as the deeper slightly weathered to fresh bedrock areas where in-pit drains are commonly the only practical option to capture groundwater inflows from these zones.

The average rainfall and river recharge rates from the steady state model were applied to the prediction scenarios by repeating the same schedule year after year, with the majority of the recharge applied in wet season months in proportion to the average monthly rainfall patterns.

It should be noted that the numeric model only simulates groundwater inflows to the pit and does not include any rainfall runoff generated within the confines of the open pit crests. These runoff volumes can be significant in large pits during cyclonic rain events and are addressed as a separate part of the pit dewatering system design outside of this report.

8.6.1 Mine Schedule

Previous modelling of dewatering requirements was completed in 2022 for the PFS (Geowater, 2022). Pit designs and the mining schedule were subsequently updated by De Grey as part of the DFS. The mine schedule (*v02_DFS_Run02 Case J*) was provided in May 2023 and used to undertake the DFS groundwater modelling.

After completing the groundwater modelling, a new DFS mine schedule was derived in early July 2023 (*v04_DFS_Run02 Case K*). Both these schedules are summarised on Figure 8-2, which shows the vertical advance schedule of each open-pit by plotting the deepest pit floor elevation against the months elapsed in the mine schedule. Whilst details are presented later in this report, Geowater has assessed the groundwater model results against the newer mine schedule and determined that the dewatering requirements of the newer mine schedule are still effectively met by the dewatering designs.

Summary aspects of the revised DFS schedule relevant to dewatering and water supply requirements are:

- Mining commences as a starter pit at Brolga, then at Falcon and Diucon within the first three years of mining. The relatively close start times at Diucon and Falcon are likely to increase the peak dewatering requirements (compared to the PFS results).
- Dewatering has been designated to commence 15 months ahead of starting mining, due to the shallow water table and the elevated permeability and aquifer storage of the shallow alluvial aquifer.
- Pit depths range from 240 m for Brolga Stage 1 to about 420 m for Diucon.
- Ore processing commences nine (9) months after mining starts (24 months after dewatering commences).
- Mining is completed over a 11.75 year duration and ore processing over 12.5 years (ore processing concludes 18 months after mining is completed).
- The main change in the revised DFS schedule is bringing the commencement of Brolga Stage 2 pit forwards by 18 months. Given this is still the last pit to be mined at Hemi, much of the pit area would already be dry from previous (and maintained) dewatering at the Brolga Stage 1, Falcon, and Aquila-Crow pits.
- The vertical advance rate of mining is typically ranges between 40 – 75 m/year, but is typically about 60 m/year (5 m/month).

Figure 8-2 shows the vertical advance schedule of each open-pit relative to the number of elapsed months since mining commences.

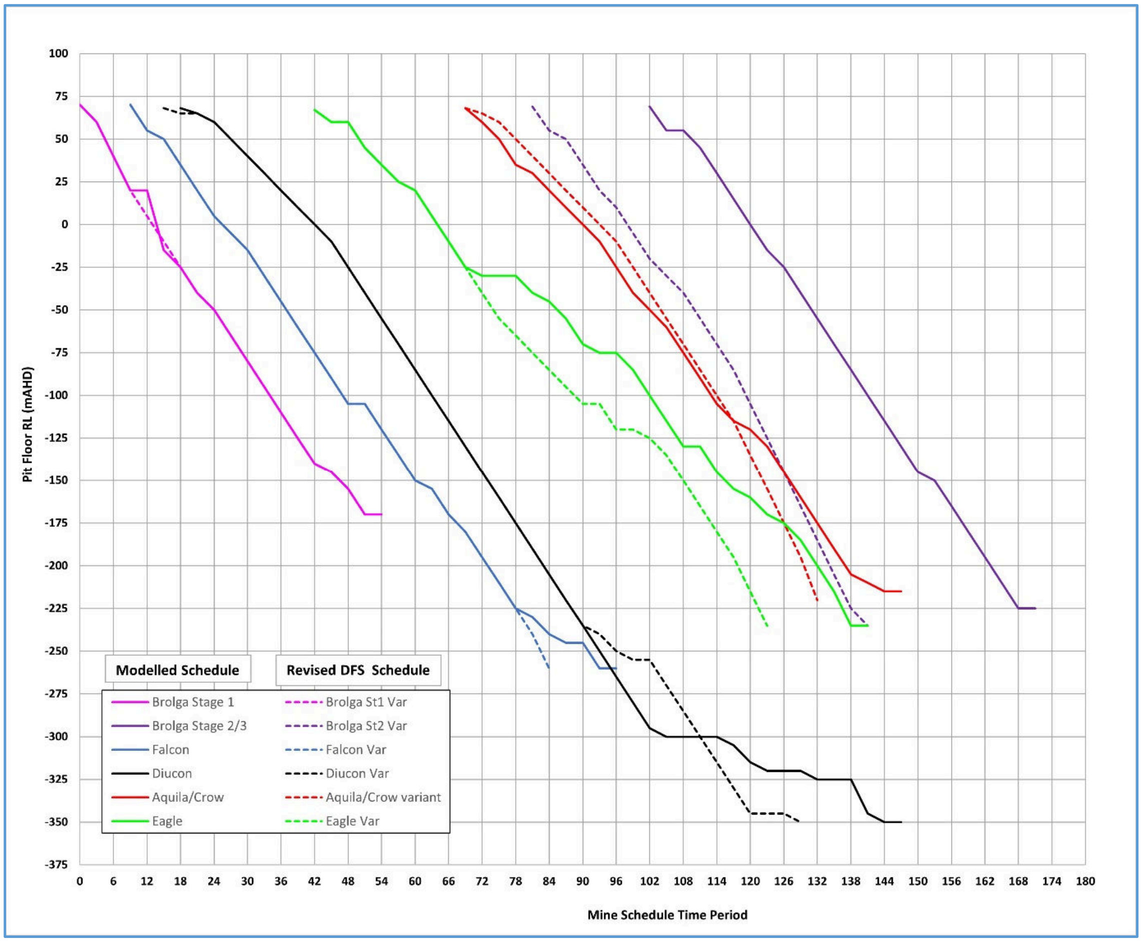

Figure 8-2 PFS Mine Schedule – Pit Vertical Advance

8.6.2 Drains Only

Drain cells were set in the model on a monthly schedule by assuming a drain cell elevation five (5) m below the interpolated pit floor elevation from the quarterly mining schedule. The drain cells were applied to the full pit area at each floor elevation based on the assumption that the entire pit floor was mined and exposed at each time step in the model.

The drain cell only simulation was run assuming the first day of mining commenced 15 months after the groundwater model starts. This helps make comparisons later in this report section with the dewatering bore models, which commence simulated pumping 15 months before mining starts.

Figure 8-3 shows the annual groundwater inflows and maximum daily flow rates (as averaged over the monthly time steps in the model). A total of 181 Gigalitres (GL) dewatering discharge occurs across the project life. This amount is partly academic, as the Hemi dewatering system will be based on bores and drains, which involve the abstraction of greater volumes of groundwater to facilitate advance dewatering for mining and reduced groundwater levels in pit wall areas that should benefit slope stability through the alluvium and weathered bedrock profile.

Minor model instability was experienced with some drain cells set in the deeper, low permeability bedrock layers, resulting in convergence issues and artificial inflow spikes at several time step junctions. These elevated flows are artificial and were reduced to surrounding trend values, which are adopted within the totals shown on Figure 8-3.

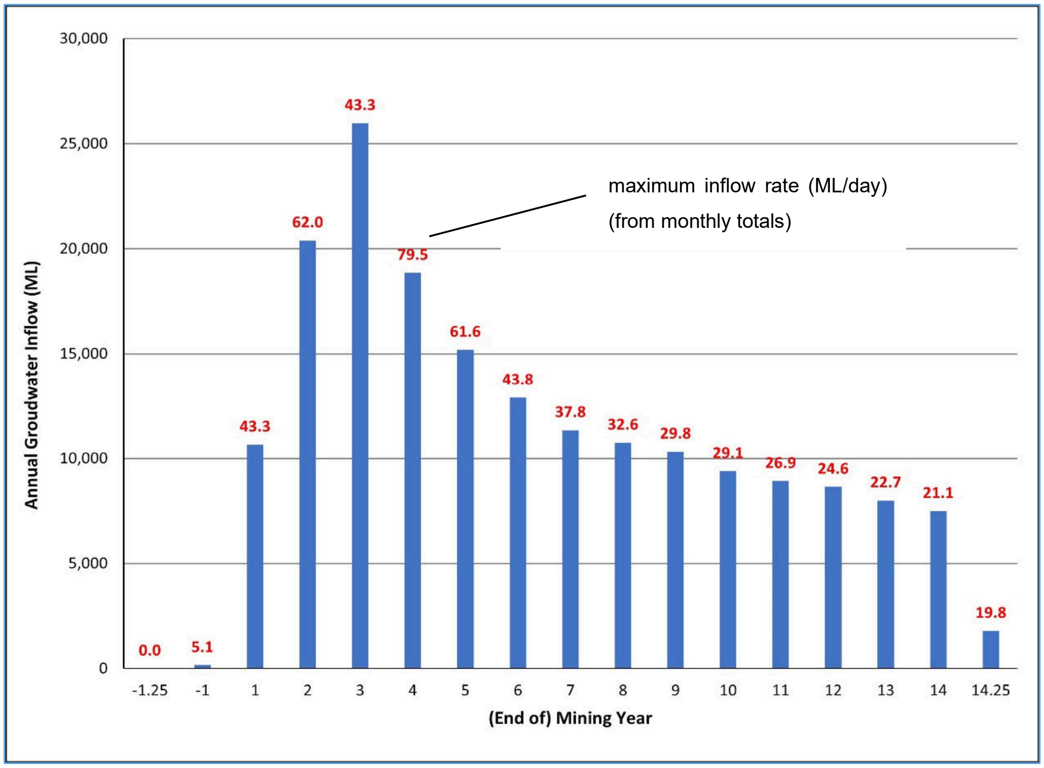

Figure 8-3 Drain Only Dewatering Scenario – Groundwater Inflows

8.6.3 Bores and Drains

A conceptual dewatering borefield was developed for the numeric model that has internal dewatering bores located inside pit crests and external bores beyond the perimeter of pit crests. Plan 8-12 shows the location of the 104 dewatering bores simulated across the mine life; nine of these simulated bores correspond to existing and imminent dewatering investigation bores.

The internal bores were set to operate over shorter time periods in the early years of dewatering to provide sufficient advance dewatering through the upper pit levels. These internal bores were made inactive at the time that mining first starts in the relevant pit, i.e., in-pit dewatering bores active during mining were not simulated. Drain cells across the pit floors were maintained in the model to capture inflows not reporting to bores in the model. External dewatering bores were placed typically within 30 – 70 m of interim and final pit crest positions.

Sixteen (16) of the dewatering bores were set as shallow bores with screens only set within the alluvial aquifer. The remaining bores were simulated in the model as deeper bores with screens set in both the alluvial aquifer and underlying saprolite, saprock and selected slightly weathered intervals. These deeper bores were not screened in the transitional weathering zone or fresh bedrock, as given the low permeability of these zones, model instability is promoted, and only insignificant flows are expected. The bore locations and initial pumping rates were optimised according to their location relative to the alluvial palaeochannel aquifer and bedrock geology, with bedrock bores preferably located adjacent to intrusive-sedimentary rock contacts and major thrust zones. Initial flow rates assigned to bores in the model also depended on the timing of bore pumping commencement. Bores in the early years of dewatering within the most transmissive aquifer zones were assigned rates of between 2,160 – 2,592 kL/day (25 – 30 L/sec) whilst bores in less transmissive zones in later years were assigned initial rates of between 500 – 864 kL/day (5.8 – 10 L/sec). Two comments are made regarding the higher bore pumping rates set in the model:

- Modelled flow rates effectively assume that bores pump continuously. In the real world, actual pumping rates would need to be higher to allow for bore pumping downtime.
- Field investigations show that higher pumping rates can be achieved in the main palaeochannel aquifer zone (up to about 4,320 kL/day), however, these would not be sustained for long periods and the lower

initial flows are used to represent a more realistic input to cost effective design of pump and generator sizes.

Once each bore commences in the model at the assigned rate, the model determines the available rate in subsequent time steps based on the reducing groundwater levels from the combined effects of all surrounding bores and drains. Once dewatering of aquifer zones occurs, the inflow rates to each bore start to decline (as happens in reality).

Figure 8-4 presents the annual groundwater discharges and includes the drain-only scenario flows for comparison. Bore abstraction commences 15 months before the start of mining in the Brolga Stage 1 Pit. Part of this lead time is in recognition of a ramp-up period required to bring a large dewatering system to full capacity. Figure 8-4 Bores and Drains Dewatering Scenario – Groundwater Inflows highlights this indirectly by showing a flow rate of 51 ML/day in the first three months of dewatering, with peak dewatering rates and volumes not being reached until the second year of dewatering. The duration of this dewatering lead time very significant to the overall project and regulatory approvals schedules and should be further investigated and optimised as part of the Operational Readiness phase.

The final borefield layout in the model shown on Plan 8-12 was developed iteratively over several model runs by checking the progressive dewatering results were adequate for the mine schedule.

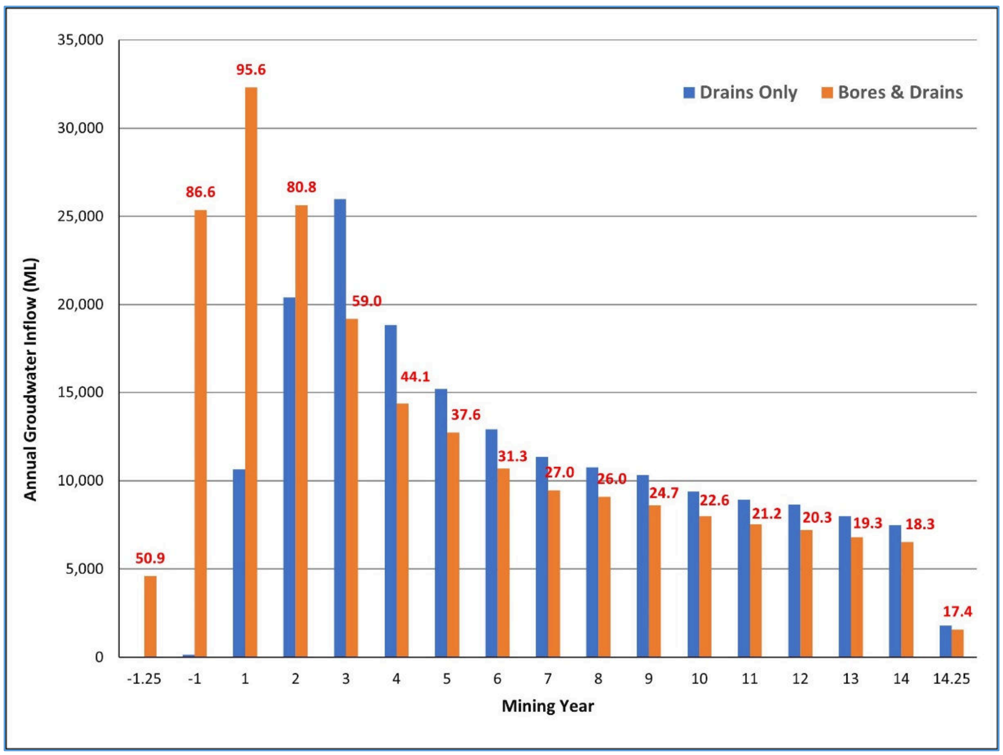

Figure 8-4 Bores and Drains Dewatering Scenario – Groundwater Inflows

The bores and drains scenario totals 210 GL of abstraction over the life of mine. Much of the increased abstraction is derived from aquifer storage in the first two years of dewatering in comparison to the drains-only inflow results. As expected, inflow rates are greatest in the first three years of dewatering, with a maximum rate of almost 96 ML/day. In later years, inflow rates are slightly lower than the drain only scenario, which reflects the greater extent of dewatering and lower hydraulic gradients around the pits.

Plan 8-13 shows the maximum drawdown contours, which occur at the end of the project (which equates to 15.5 years after the start of dewatering. Drawdown contours above 60 m are not shown on Plan 8-13 as the focus of the figure is to compare the regional extent of dewatering drawdown for environmental impact purposes. These contours are discussed in Section 8.7.

Water Balance

The results of the drain and bore simulation were compared to the project water demand schedule (see Figure 2-3), which indicates:

- Nearly all dewatering discharge is surplus to project requirements in the first two years of dewatering until the ore processing circuit is commissioned and lifts total project water demand to 25 ML/day.
- After about nine (9) years of dewatering, the groundwater inflows start to gradually drop below the project water demand, dropping to about 17 ML/day at the end of Operations, creating a maximum supply shortfall of 8 ML/day.

The evaluation of options for management of surplus dewatering discharge has been completed by De Grey during the DFS. The two preferred options involve:

- Discharge of suitable quality water to the Turner River for the first two to three years of dewatering when the overall water surplus is greatest.
- Reinjection of surplus water into the main palaeochannel (alluvial) aquifer to the north (downgradient) and south (upgradient) of the Hemi pits. In the later stages of Operations, some of the reinjection bores would be converted to become supply production bores to meet the supply shortfall identified above.

Assessment of the Turner River discharge option by Surface Water Solutions (SWS) and Geowater in 2002 resulted in an estimate of acceptable discharge rates and volumes. These in turn were used to determine the amount of aquifer reinjection required on a monthly basis that are described below.

8.6.4 Bores, Drains and Reinjection Scenario

The simulation of dewatering bores and drain cells in the model was accompanied in this scenario by the incorporation of 27 reinjection bores located to the north and south of Hemi as shown on Plan 8-14. The reinjection bore locations are influenced by three factors:

- Reinjection bores are designed to target the thickest and most permeable sections of the palaeochannel aquifer.
- Reinjection bores to the north are limited to within five kilometres of the proposed open pits to coincide with existing tenure held by De Grey. The main paleochannel continues northwards and De Grey currently has pending tenure applications in this region to further increase its water security position.
- To the south of Hemi, simulation of reinjection is limited to about three kilometres south of Mt Dove, despite De Grey holding significantly more tenure to the south of this location. Recent air-core drilling in this region in 2023 shows the main palaeochannel aquifer may be meandering or bifurcating into tributaries south of where reinjection bores have been simulated in the model. More aircore drilling would be required to gain confidence in locating additional high-yield reinjection sites further south.

Reinjection of water relatively close to the open pit dewatering systems results in some re-circulation of the water back to the dewatering system. Reinjection rates were assigned based on the proximity to the open-pits, the interpreted thickness of the aquifer and the depth to the existing baseline water table (6 – 9 m to the south and 5 – 6 m to the north):

- South of Mt Dove – 864 to 2,592 kL/day.
- Between Mt Dove and Hemi – 2,160 to 3,024 kL/day
- North of Hemi – 2,160 to 3,024 kL/day

Figure 8-5 shows the annual dewatering and reinjection volumes and maximum rates, as well as the dewatering inflows from the bores and drains scenario for comparison. Plan 8-15 shows the maximum drawdown contours which occur at the end of the project and includes the 1.0 m maximum drawdown contour from the bores and drains only scenario.

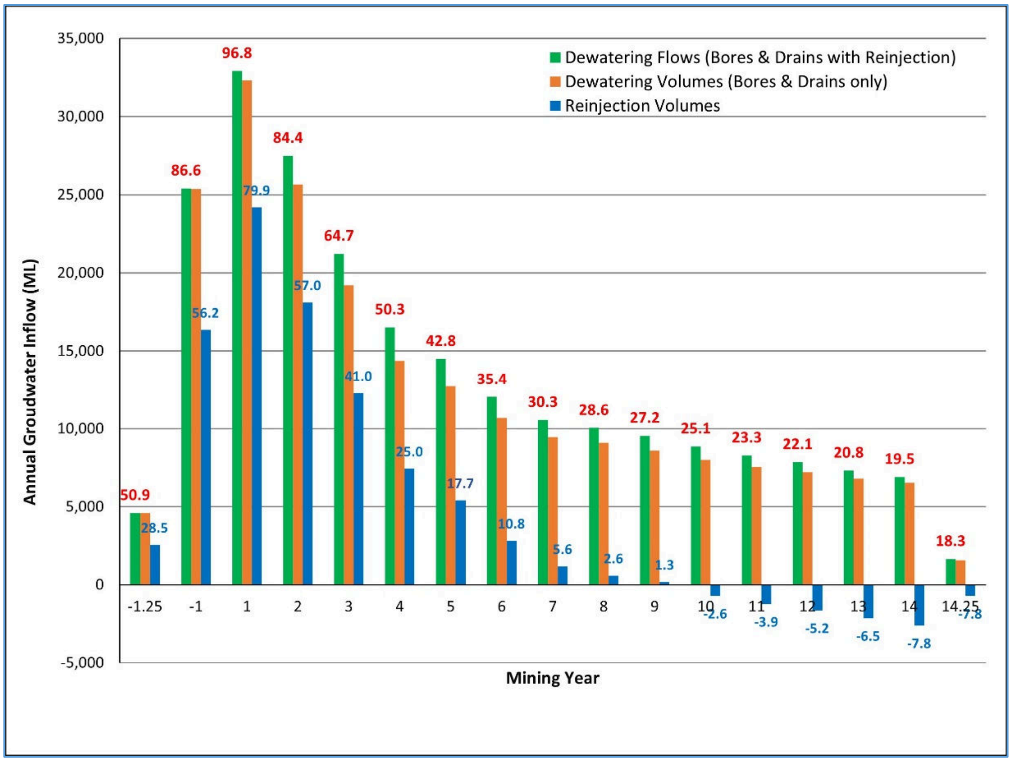

Figure 8-5 Bores and Drains with Reinjection Scenario – Annual Volumes

Review of the flows and regional dewatering effects for this scenario indicate:

- Dewatering inflows are higher than the bores and drains only scenario (after about 16 months of dewatering) due to re-circulation of some reinjection water back to the pit dewatering system. The re-circulation is not considered significant or adverse to the dewatering system; the reinjection scenario has a total of 226 GL abstracted by the dewatering system compared to the bores and drains scenario total of 210 GL (an increase of about 8%).
- A total of 91 GL of dewatering discharge is reinjected back into the paleochannel aquifer until mining year 9, at which point reinjection ceases and some reinjection bores are switched to being supply bores, with a total of 9 GL being abstracted from supply bores during the last five years of Operations. The supply volumes are shown on Figure 8-5 as the negative reinjection volumes. The maximum reinjection rate reaches almost 80 ML/day 22 months after dewatering commences.
- The reinjection of dewater discharge reduces the extent and amount of regional drawdown created by dewatering. At the end of Operations, Plan 8-15 shows a small reduction in the downgradient extent of dewatering by about 0.5 km and an upgradient extent reduction of 1.5 km.
- The highest dewatering rates still occur in the second year of dewatering (month 22) at a rate of 97 ML/day.

This model simulation was adopted as the base case result and is referred to as the *base case dewatering scenario* in remaining sections of this report. The effectiveness of the simulated dewatering was assessed by comparing predicted groundwater levels against required target levels for each model iteration completed. Plan 8-12 presents the trace of four dewatering cross-sections used to show dewatering progress as groundwater levels across the various pit outlines at progressive points in time. Twenty-four (24) transient sections were produced that show groundwater levels against pit progress and the main regolith profiles and are included as Appendix E.

Key aspects of the base case dewatering model results in the context of the Hemi conceptual groundwater model and Geowaters experience on other dewatering projects are discussed below:

- Overall, the magnitude of dewatering and the 15-month lead time ahead of mining indicates dewatering of the alluvial aquifer is achieved notably ahead of the mining schedule at Brolga Stage 1, Diucon and Falcon. It may be feasible to reduce the dewatering lead time ahead of mining given this could have significant benefits in relation to the project and regulatory approval schedules. However, this is not recommended due to the various uncertainties involved in developing and applying the groundwater model, as well as the potential for delays in commissioning the borefields and ramping up to maximum pumping rates.
- The alluvial aquifer sequence at Hemi shows a broad coarsening (and increasing permeability) trend downwards, which will help promote vertical drainage of the upper sections of the alluvial aquifer downwards into the coarse basal units, which then act as a suitable underdrainage horizon and help optimise dewatering by bore pumping. In the upper alluvial areas where significant volumes of silty alluvium occur and vertical drainage effects are reduced, there may be a tendency for such sediments to drain at slower rates than those predicted by the model. This aspect is a contributing factor to the recommendation to adopt a 15-month dewatering lead time. The observed responses in the various geology domains to early dewatering will be critical to reconciling the dewatering predictions and adjusting if required.
- The dewatering of Brolga Stage 1 and Falcon in the early years of the Project effectively provides advance dewatering to much of the Brolga Stage 2 and Aquila-Crow pits, which do not commence mining until almost six (6) years after the initial pits. This is the reason why bringing the Brolga Stage 2 and 3 pits forwards by 21 months in the July-revised DFS mine schedule does not create a need to simulate new dewatering designs for the Stage 2/3 pits.
- The transient sections E-1 to E-12 show that elevated groundwater levels within weathered bedrock profiles near and behind pit wall locations may develop on the southern wall of Falcon and the northern walls of Diucon and then Eagle over time. This is consistent with expectations as these pit wall locations coincide with the position of the main palaeochannel aquifer immediately beyond the limits of mining excavations. Elsewhere, elevated groundwater levels near pit wall locations only occur well below the base of weathering within fresh competent bedrock, where the potential for elevated pore pressures to adversely affect pit slope stability may be low or insignificant.
- Several bores that are activated in the model during the later years of Operations in the Crow and Aquila areas have low flow rates (less than 400 kL/day). These bores may not require installation and any minor groundwater inflows may be acceptably managed with in-pit sumps. However, these lower flow bores should be retained for the purpose of DFS dewatering system designs and costings.
- Meeting 100% of the dewatering requirements by use of bores only (i.e., no in-pit sumps) would not be practical nor cost effective at Hemi (nor virtually any other open-pit mining extending hundreds of metres below the pre-mining water table). The model simulations indicate that minor groundwater is first intercepted by drains in the Brolga Stage 1 in month 21 of the dewatering schedule. Inflows to the in-pit drain cells (i.e., sumps) gradually increase to a maximum rate of about 11.5 ML/day in Year 7 of dewatering and then stabilise around 10 – 11 ML/day for the remainder of Operations. In relative terms, in-pit sump flows are only 0 – 10% of total bore flows in the first three years of dewatering, but gradually increase to be about 130% more than bore flows by the end of Operations. It is likely the in-pit sump flows predicted by the model could be decreased and overall in-pit dewatering potentially improved by retaining existing in-pit bore locations (and possibly additional new in-pit bores) once mining has commenced. In-pit bores can be typically problematic for mining activities and suffer from damage and low utilisation rates, however, in-pit bores can be effective on a case-by-case, pit-by-pit basis.

- Compared to the PFS groundwater modelling, the regional drawdown of the water table in the DFS model is more elongated along the northwest trending axis of the main palaeochannel aquifer. This is largely a result of the revised mapping and interpretations of bedrock geometries and properties completed in early 2023. These greater drawdown amounts occur within the proposed reinjection borefield areas, which has the net effect of reducing the predicted mounding of the water table in reinjection areas. Plans 10-8 and 10-9 show water table mounding is limited to about two metres over broad areas (close to the reinjection bores, local scale mounding would be greater).

9 WATER BALANCE AND SURPLUS WATER MANAGEMENT STRATEGY

The large dewatering requirements in the early years of the project, coupled with the need to start dewatering two (2) years before ore processing commences, creates a large water surplus. Management options for the dewatering surplus have been considered by De Grey in accordance with the published DWER guidelines and policies (DoW 2103b, DWER 2020a), which state that *mine dewatering volumes must first be used for:*

- *mitigation of environmental impacts.*
- *fit-for-purpose onsite activities (for example processing, dust suppression and mine camp use).*

Any dewatering volumes that remain after these requirements have been met constitute mine dewatering surplus*. The mining guideline states the options for disposing of this water, as follows:*

- *transferring the water to meet other demands, including those of other proponents in the area and public water supply.*
- *injecting back into an aquifer at sites determined by the proponent and agreed to by the former Department of Water.*
- *controlled release to the environment where the dewatering surplus is allowed to flow (either through a pipe or overland) into a designated water course or wetland determined by the proponent and agreed to by the department.*

During the PFS and DFS stages, De Grey have considered the commercial transfer of surplus water to surrounding mining projects and also the use of water for crop irrigation. However, the magnitude of the surplus and the time frames involved have contributed to the lower feasibility rankings for these options against the two preferred options of:

- discharge of water of suitable quality to the Turner River for a two to three year period; and
- reinjection of water into the main palaeochannel zone of the alluvial aquifer upgradient and downgradient of Hemi.

Figure 9-1 presents the overall project water balance based on the base case dewatering scenario described in Section 8.6.4 and shows the schedules for aquifer reinjection and river discharge against which impact assessments have been conducted and described in Section 10. The figure shows that about eight (8) years after ore processing commences, the dewatering flows are insufficient to meet the total site water demand. At this point in time, aquifer reinjection ceases and four of the reinjection bores located between Mt Dove and Hemi are converted to supply bores, with supply abstraction gradually increasing to about 7 ML/day at the end of Operations.

9.1 Turner River Discharge

Controlled release to the Turner River of a portion of the dewatering surplus during the first three years of dewatering has been assessed by De Grey. The Turner River was identified as more suitable than the Yule River for the following reasons:

- Absence of any DWER-mapped river pools for nearly 23 km downstream from the conceptual discharge location (opposite the Mt Dove turnoff on the North West Highway)
- Greater depths to the underlying water table.
- The Yule Public Drinking Water Reserve may preclude release of mine dewater surplus within its boundaries.

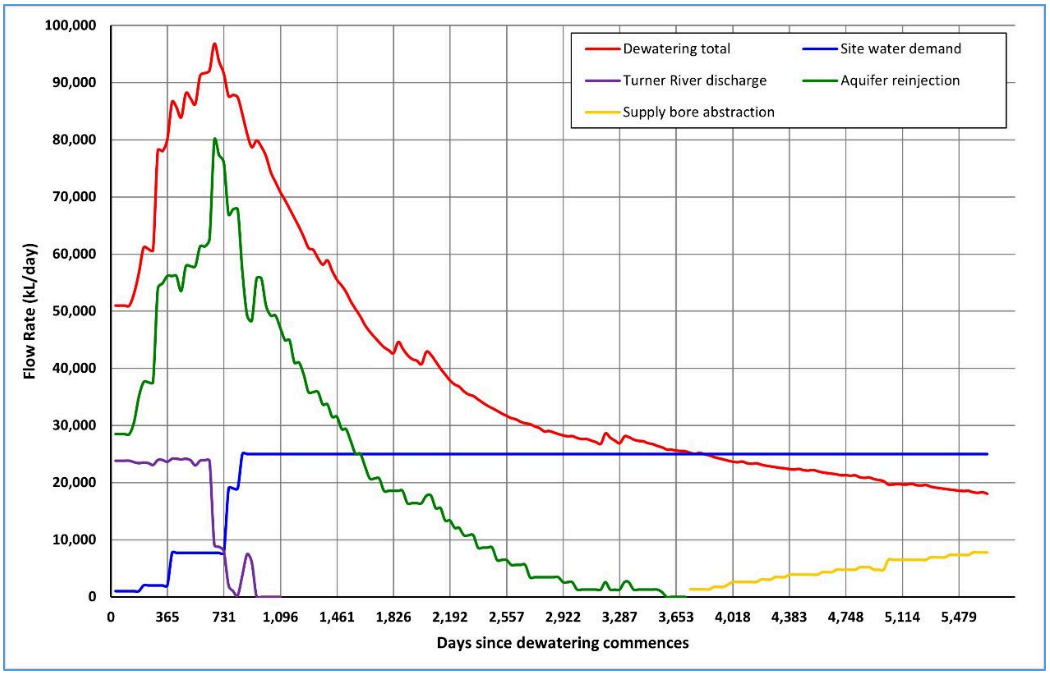

Figure 9-1 Base Case Water Balance

The potential impacts of river discharge on the surface water system, the associated ecological systems and values, and the surrounding groundwater system have been assessed by SWS (2022) and Stantec (2023). These assessments were undertaken in an iterative manner and partly influenced the derivation of the monthly flow discharge schedule shown on Figures 9-1 and 9-2.

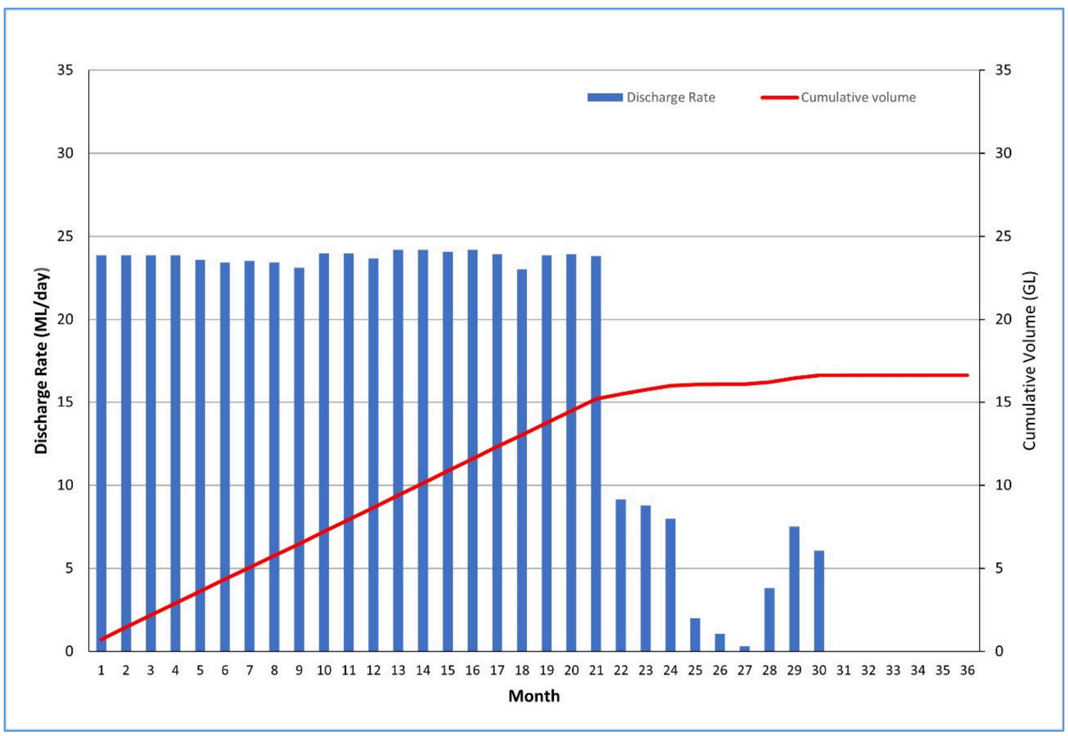

Figure 9-2 Proposed Turner River Discharge Schedule

9.2 Elevated Arsenic Water Management

Dissolved arsenic levels above natural background levels have been measured in bores screened within and near bedrock ore zones and in basal alluvium up to a few hundred metres downgradient of the ore zones at Hemi. Once the processing plant is operational, elevated levels of dissolved arsenic in the groundwater from relevant in-pit sumps and dewatering bores will be directed to the processing water stream. The processing plant flowsheet allows for the stabilisation of elevated metals such as dissolved arsenic via the pressure oxidation stage in the circuit.

Prior to the commissioning of the processing plant, De Grey will manage water quality issues related to the dewatering surplus by establishing two water type streams from dewatering activities:

- Type I water – suitable for discharge to the Turner River, aquifer reinjection without subsequent recapture and for camp and potable water supplies (once RO treated). Water quality that meets ANZECC 2018 guideline values for freshwater aquatic ecosystem protection to LOSP 95 criteria (0.024 mg/L for dissolved arsenic (III))
- Type II water – all other dewatering surplus to be directed to dust suppression use and to aquifer reinjection where recapture of the reinjected water occurs by the dewatering system during Operations and by mine void lake capture during the closure phase.

Creating the two water types within the dewatering system will be achieved by:

- Installing and managing dual header and pipeline system for selected bores to enable transfer of water to separate Type I and Type II water storages at different stages of the bore life. Dewatering bores in areas known to only have background groundwater quality and no significant potential for change during their transient dewatering lifespan will only have a single header and pipe system.
- Installing dual dewatering bores (shallow and deep) at selected locations where a strong contrast in dissolved arsenic exists between the alluvial aquifer and the underlying bedrock aquifer zones.

Figure 9-3 shows the dewatering bore locations by water type and the trunk pipelines against a base map showing bedrock arsenic levels about 80 m below ground level.

Estimation of dissolved arsenic levels within the dewatering system during operations has been completed by De Grey and shows that there is sufficient capacity in the water system and reinjection borefield area between Mt Dove and Hemi to accommodate the required amounts of reinjection of Type II water during the first two years of Operations. The predictions of transient arsenic levels were based on initial arsenic levels assigned to each dewatering bore by Geowater using the results of sampling to date, as well as estimates of the changing ratio between alluvial and bedrock groundwater as dewatering of aquifer zones in the numeric model progresses over time. The estimation of initial and transient dissolved arsenic levels should be updated later in 2023 when laboratory analyses of water quality become available from the new bedrock bores currently being installed on site.

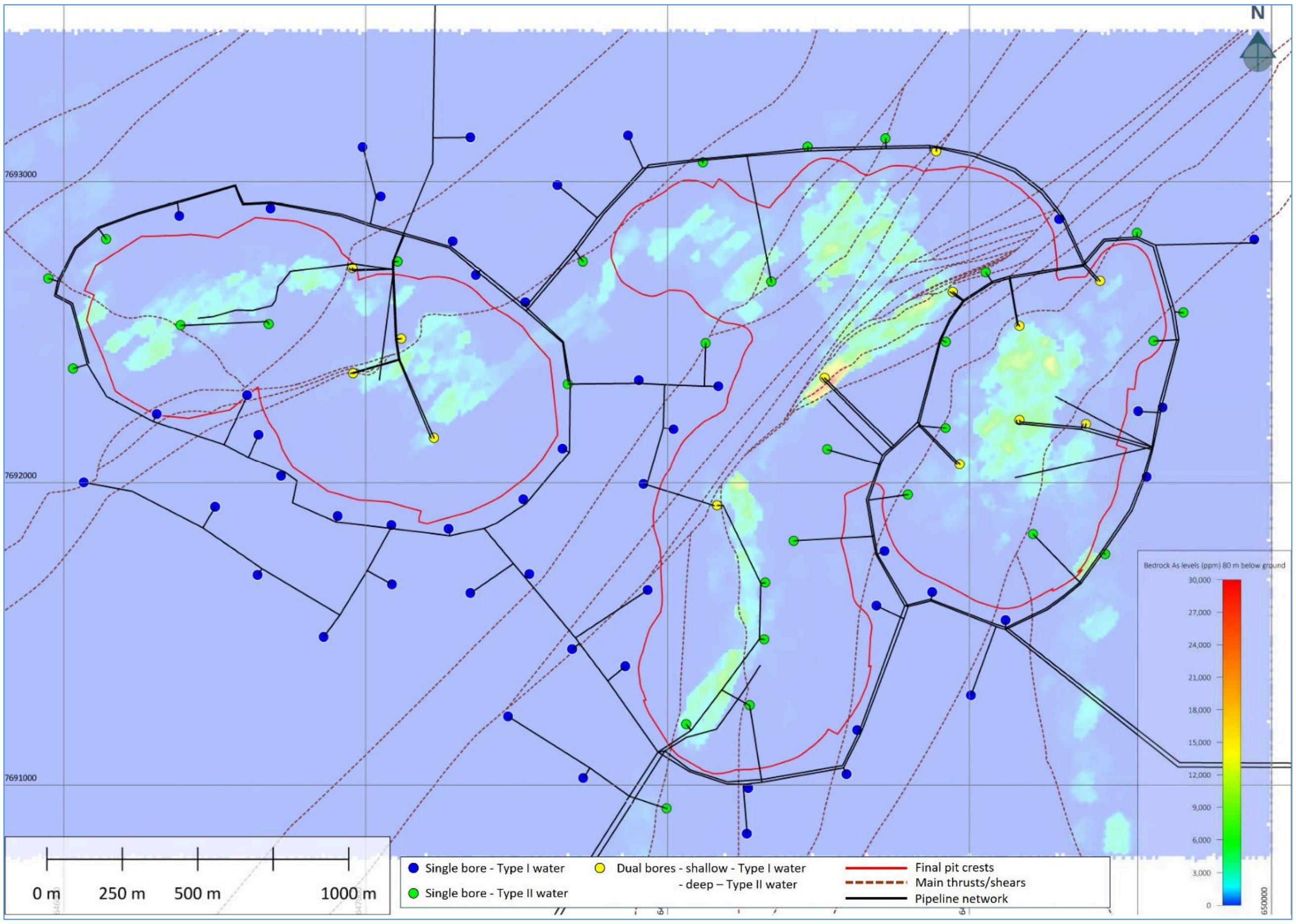

Figure 9-3 Dewatering Bore Types by Water Quality

10 IMPACT ASSESSMENT – OPERATIONAL PHASE

This section documents the identified potential impacts of the proposed groundwater abstraction based on the modelled results relating to Section 8.6.4. This simulation is considered the groundwater *base case* and includes a level of aquifer reinjection, which represents one element of impact mitigation. Other measures for impact mitigation are recommended below as considered relevant by Geowater. Section 11 considers the significance of model uncertainty in relation to the identified impacts.

Once groundwater modelling and assessments are completed for the closure phase, this report will be updated to consider the potential longer term impacts of a pit lake on the surrounding groundwater system, other water users and environmental values.

10.1 Other Users

10.1.1 Pastoral Users

Plan 10-1 provides the model prediction of maximum water table drawdown contours, which occurs at the end of the project, just over 14 years after mining commences. The simulations indicate that five pastoral bores on Indee Station will occur within the drawdown cone created by the project:

- No. 2 Well – 16 m of drawdown.
- No. 10 Well – 15 m of drawdown.
- No. 16 Well – 5 m of drawdown.
- Owens Bore – 3 m of drawdown.
- UNK3A – 1 m of drawdown.

The drawdowns of 5 m and more are highly likely to render the bores ineffective. Consequently, the recommended mitigation measures would be for De Grey to either:

- drill and construct deeper bores; or
- pipe water at a suitable rate and quality to these locations.

The available drilling and hydrogeological modelling indicate that deeper replacement bores would be feasible for No. 2 and No.6 wells, but that NO.16 Well may require the pipeline option.

The closest active pastoral bores on the Mundabullangana lease occur between 11 – 16 km to the north of Hemi (No.18 Well, Chimney Well, Wodgina and SE Corner). No drawdown is predicted at these sites (Plan 10-1). To address any potential concerns the Mundabullangana lessee has with the security of their groundwater supply from Hemi impacts, routine monitoring of their bores and De Grey water bores closer to Hemi could be undertaken to reconcile future actual groundwater levels against simulated levels.

10.1.2 Atlas Iron Mt Dove

The Hemi project is predicted to affect groundwater levels at the most westerly of the four Mt Dove production bores (MDEX6), with a predicted maximum decline of about eight (m) metres by the end of Operations (Plan 10-1). This amount of drawdown may affect the operation of the bore if it was pumped continuously at its recommended maximum pumping rate of 20 L/sec (MWH, 2011). However, is possible that future abstraction from the Mt Dove bores by Atlas Iron will remain at their historically low levels, in which case, the predicted drawdown in bore MDEX6 would not have a significant impact. There is a potential for De Grey to have provide any of the supply loss from MDEX with water of similar quality, which would be readily available from the Type I water streams from Hemi.

Maximum drawdowns of about 0.8 – 1.0 m are predicted in two other Mt Dove bores, but this would not have an adverse impact on their yield or sustainability.

Aquifer reinjection into the main palaeochannel aquifer is proposed to the north and south of the Atlas Iron Mt Dove Borefield. Mounding of the water table caused by reinjection is only predicted to increase groundwater levels in the Atlas bore MDEX6 by less than one (1) metre in the early stages of the Hemi Project (see Plans 10-8 and 10-9). This level of water level change would be of no consequence to the bore's operation. The water reinjected by De Grey upgradient and near the Mt Dove bores would be Type I water, which is very similar to the native groundwater quality present in MDEX6 (reported as 740 mg/L TDS, 8.1 pH and 390 mg/L bicarbonate alkalinity by MWH (2011). Plan 10-10 shows that solutes from at least one reinjection bore could be transferred to MDEX6 during Operations, but given the similar water quality, this would not have an adverse impact on the use of water from MDEX6 for its historical water end uses.

Given the predicted lack of impact from Hemi abstraction, no direct mitigation measures are considered necessary. However, routine monitoring of De Grey bores to the south of Hemi would be undertaken and should be reconciled with groundwater monitoring data from the Mt Dove bores (either provided by Atlas Iron or as collected by De Grey under a suitable bore access agreement) by a qualified hydrogeologist.

10.1.3 Water Corporation Yule River Borefield

Groundwater abstraction and aquifer reinjection for the Hemi Project would not have an adverse impact on the operation or sustainability of the Watercorp Yule River Borefield. Plan 10-2 shows that, during the Hemi operational period, the maximum drawdown extends about eleven (11) kilometres to the northwest of the project and that WaterCorp production bores are located a further 20 – 34 km away. Modelling by MWH (2010) for a maximum abstraction scenario (10 GL/yr) predicted the extent of 1m of drawdown as shown on Plan 10-2, which indicates the distance between the two drawdown regimes is at least 15 km.

The predicted groundwater levels confirm the lack of potential for 'interference' or cumulative impacts between the two borefields. This is consistent with expectations, as the Yule River Borefield is configured and operated such that most of the groundwater it abstracts is low-salinity water that is replenished by large, albeit irregular, river flow events adjacent to the borefield.

10.2 Aquifer Resource Depletion

Plan 8-15 shows the maximum drawdown contours of the water table predicted at the end of mining for the base case dewatering scenario. Given the predicted drawdown extent, it infers a significant amount of the alluvial aquifer is dewatered by the Project. *Surfer* software has been used to estimate the reduction in alluvial aquifer volume:

- Within the confines of the model area, the alluvial aquifer has a total volume of 9,113 million m^3 using the November 2022 water table surface.
- At the conclusion of mining and processing, the alluvial aquifer has a total volume of 8,486 million m^3, which equates to an aquifer volume reduction of almost 627 million m^3 (or about 7% of the pre-dewatering volume).

In terms of stygofauna habitat issues, the estimated reduction in aquifer volume is likely to be insignificant. This is based on the findings of Bennelongia (2022) who concluded that *"the threat to stygofauna conservation values from Project dewatering and reinjection is considered to be low*". This was based on the PFS drawdown predictions by Geowater, which estimated a 13% reduction in alluvial aquifer volume, whereas the DFS estimate of aquifer habitat reduction is significantly lower.

In the long term after completion of mining, groundwater levels in the region surrounding Hemi will start to recover slowly as natural recharge events occur and abstraction from the Hemi bores and pits ceases. Prior to this, there is a potential for regional water tables to continue declining for a period following completion of mining, as the alluvial aquifer near the open pits continues to drain groundwater into the pit voids. This effect is referred to as residual drawdown and is being assessed as part of the closure groundwater modelling currently underway.

10.3 Dewatering Discharge to Turner River

This section is limited to consideration of impacts upon the groundwater system beneath the Turner River that may potentially develop from the proposed discharge of surplus water to the river. Assessment of the potential impacts upon surface water quality and the ecology of the river system from discharge of surplus water into the riverbed have been undertaken by others (De Grey, Stantec) in 2022-23.

Modelling by SWS (2022b) of the surplus water schedule provided by Geowater (Figure 9-2) indicates that the wetting front within the river channel will travel downstream between 25 – 48 km from the discharge location depending on the time of year and discharge rate (these wetting fronts equate to 42 – 19 km upstream from the coast). Plan 10-3 shows the maximum extent of inundation predicted by SWS in the Turner River within the first 12 km downstream of the proposed discharge location. The modelling by SWS is focussed on the impacts of discharge on the river during the dry season periods with no natural flows. Key reasons for the long and narrow saturation front include:

- Presence of relatively narrow sub-channels within the overall river channel, as mapped from a detailed Lidar survey flown by De Grey for the purpose of the discharge modelling.
- Evaporation losses are relatively low given that the ponding created by discharge maintains a narrow water channel width (typically less than 90 m, with an average width of about 50 m).
- The infiltration losses to the subsurface and underlying water table aquifer are low.

The infiltration loss terms used in the hydrology model by SWS were provided by Geowater based on the following approach and assumptions. The transient nature of seepage below the wetted riverbed was addressed by simplifying seepage into two categories:

1 ***Early stage of water seepage into the unsaturated zone above the underlying water table***. Within the investigated reaches of the river, the dry season water table occurs 2- 4 m below the lowest elevations of the riverbed. The geology of the unsaturated zone is relatively complex and comprises various combinations of:
   a. coarse sand and gravel deposited by current river system, with very high permeability and porosity (assumed to be 25%);
   b. older, finer grained alluvium, with minor to moderate permeability and porosity (assumed 10%); and
   c. weathered to near fresh bedrock of low to very low permeability and porosity (assumed 5%).

   Plans 10-4 and 10-5 show the geology profiles and December 2021 water table position at four different transects across the river, using the results of the monitoring bore drilling and passive seismic survey undertaken near and over the Turner River south of the Indee Station causeway in 2021. The lithology profiles and assumed porosities were then used in conjunction with the modelled saturated widths to calculate the unsaturated zone storage above the water table at each transect. Values of between 110 – 150 ML per kilometre of river reach were derived. These were treated in the hydrology model as a ‘one-off’ loss term as the saturated front progressed downstream over time.

2 ***Later ongoing stage of seepage once water table mounded to the riverbed***. Given the typical vertical permeability profiles below the riverbed, it was assumed that mounding of the water table would rise to the base of the ponded riverbed sections, at which point the ongoing seepage loss to the shallow aquifer would be largely controlled by the lateral permeability of the aquifer and the developed hydraulic gradients. Estimates of the ongoing seepage rates were made using *Moundsolv v4.0* software with the Zlotnik et al, 2017 transient solution for a rectangular recharge source. This software is typically used to estimate the geometry of mounding for a given seepage (recharge) rate. For our case, the

maximum mounding height was fixed as the depth to the water table below the lowest parts of the riverbed and then the recharge rate was 'reverse' calculated. Values of ongoing seepage of 0.08 – 0.24 ML/day per kilometre of river reach were derived at different locations.

Table 10-1 Turner River and Discharge Water Quality Summary

Parameter	Unit	Dewatering Discharge[1]	Turner River Groundwater	Turner River Surface Water[2]
Salinity (as TDS)	mg/L	700 – 1,000	360 – 1,360	150 – 1,800
Suspended Solids (TSS)	mg/L	< 20	n/a	5 - 150
pH	-	7.9 – 8.4	7.4 – 8.1	6.6 – 9.4
Total Alkalinity	mg/L as $CaCO_3$	310 – 410	200 - 410	30 - 460
Hardness	mg/L as $CaCO_3$	200 - 320	250 - 510	50 - 310
Iron (dissolved)	mg/L	0.002 – 0.050	0.002 – 0.680	0.005 – 0.120
Aluminium (dissolved)	mg/L	0.005 – 0.030	0.005 – 0.020	0.005 – 0.011
Arsenic[1] (dissolved)	mg/L	0.005 – 0.025	0.001 – 0.009	0.001 – 0.010

Notes 1. Excludes bedrock bore samples from ore zones 2. Includes flowing surface water and dry season pool samples collected by De Grey and also DWER at Pincunah Gauge Station

The impacts of the proposed river discharge on the underlying aquifer are likely to be negligible and non-adverse for the following reasons:

- As shown on Plan 10-6, the *Moundsolv* analyses indicate that the lateral extent of water table mounding above 0.5 m is limited to within 300 – 600 km of the water channel.
- The discharge water quality is similar to the baseline groundwater quality (Table 10-1).
- The changes caused by discharge are of a smaller magnitude and short timeframe relative to the ongoing episodic natural flood events that results in recharge to the underlying and surrounding water table aquifer.

10.4 River Pool and Riparian Vegetation

10.4.1 Yule River

Plan 10-7 shows the maximum predicted drawdown extent of groundwater abstraction by De Grey at the completion of Operations (15.5 years after dewatering commences) and the location of river pools mapped by the Department of Water in 2008. This plan shows that three DoW-mapped pool locations in the Yule River occur about 0.5 – 1.0 km beyond the maximum 0.5 m drawdown extent predicted with the groundwater model. Ad-hoc water monitoring and flyovers at these locations indicates the riverbed has been predominantly dry since 2021, with only minor inundation for several months in 2021. Figure 10-1 shows recent drone survey images from these sites. Given the intermittent nature of water ponding at these three locations, if minor drawdown from mine dewatering did occur beneath the riverbed, the nature and values of these pool locations are not likely to be altered significantly.

Monitoring since 2021 indicates the Jellibidina, Mardagubiddina and Portree Pools on the Yule River are either semi-permanent or permanent water pools with a groundwater dependence considered highly likely. These sites have known heritage values and were assessed by Stantec (2022) as having moderate to high ecological values. These pools occur between 2.5 – 5.5 km beyond the predicted drawdown from mine dewatering (Plan 10-7) and are not expected to be affected by the Hemi Project.

Regional scale government mapping vegetation indicates that riparian woodland species of vegetation occur only within the current day channels of the Yule River. These species include the obligate phreatophytes *Melaleuca argentea* and *Eucalyptus camuldensis.* The predicted drawdowns from mine dewatering are less than 0. 5m near a 4 -5 km reach of the river and may have a low potential to affect any groundwater-dependant vegetation int e later stages of Operations.

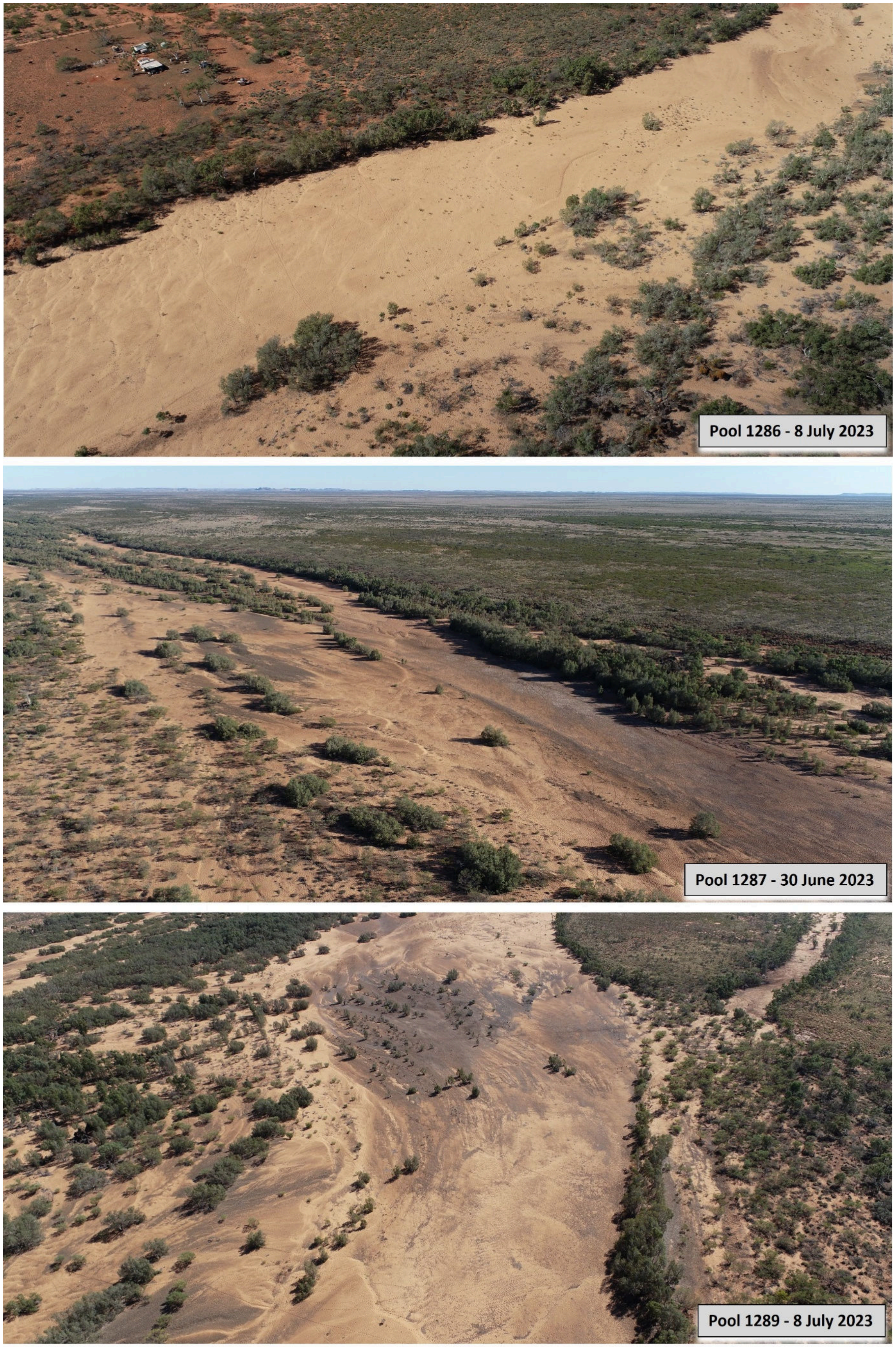

Figure 10-1 Yule Pool Locations – Drone Photos

To manage the potential risks to pools and vegetation within the Yule River, groundwater monitoring bore transects between Hemi and across the Yule River are recommended as shown on Plan 10-7. Combined with monitoring of pool water levels and water quality, these installations and ongoing monitoring will resolve the degree of pool dependence eon groundwater and allow for adaptive management measures to be implemented during operations if assessment of impacts changes. Continuous water level monitoring with telemetry commenced at Mardagubbidina and Portree pools in early 2023.

10.4.2 Turner River

As shown on Plan 10-7, mine dewatering drawdown predictions do not extend closer than about five (5) kilometres from the Turner River. This, combined with the lack of river pools in the reaches closest to Hemi, indicates no adverse impacts are possible from dewatering drawdown. The potential impacts tot Turer River relate to the proposed discharge of **surplus** water for a 2 -3 year period as described in Sections 9.1 and 10.3.

10.5 Aquifer Reinjection

The majority of surplus water generated by the Project will be reinjected into the high permeability palaeochannel aquifer via 27 reinjection bores located up to 5 km north (down-gradient) and 12 km south (up-gradient) of the open pits (Plan 8-14). This water management strategy has the benefit of partly mitigating the maximum amounts of drawdown and aquifer depletion and effectively banking water for later abstraction when the project water demand exceeds dewatering inflows around Year 9 of the Project. Opposing these benefits will be additional dewatering costs to deal with the greater amounts of water reporting to the dewatering system as re-circulation from the reinjection system. There is also a potential for increased pore pressures and hydraulic gradients behind the southern walls of Falcon and the northern walls of Diucon and Eagle pits because of aquifer reinjection in areas closest to Hemi.

Potentially adverse impacts associated with the proposed aquifer reinjection comprise:

- Causing existing relatively shallow water tables to rise (mounding) to a level whereby:
    - shallow rooted vegetation may be adversely impacted;
    - waterlogging close to or at surface affects nearby infrastructure; or
    - salinisation of the water table zone occurs via near-surface evaporation.
- Differences in water quality between the native groundwater and injected water leading to adverse impacts on nearby groundwater users and environmental values.

Awareness of these potential impacts was used explicitly in deriving the proposed reinjection bore locations, reinjection rates and volumes. A key example of this awareness was adopting the criteria to prevent the mounding of the water table from becoming any shallower than three (3) metres below ground in the reinjection areas. On a local (drill-pad) scale, groundwater levels within the reinjection bore and immediate surrounds may rise close to surface due to well loss effects of the bore casing and construction.

Plans 10-8 and 10-9 show the predicted levels of water table mounding during the early years of the project when reinjection rates are the greatest. These show the maximum amount of mounding over the broader borefield areas is between 2 – 2.5 m, which is not likely to have any adverse impacts given the baseline water table in these areas occurs between 5 – 8 m below ground.

The water quality of reinjected water will be fundamentally the same as the native groundwater present in the nearby reinjection borefield areas, with only small differences in salinity, pH, and alkalinity. The key difference relates to the dissolved arsenic levels of the dewatering discharge, given the association of arsenopyrite with gold mineralisation at Hemi. Baseline levels of arsenic in the proposed reinjection areas are between 0.005 – 0.010 mg/L. Dissolved arsenic levels in some dewatering bores and in-pit sumps could reach levels one to two orders of magnitude higher (in-pit sumps in weathered bedrock ore zones have predicted upper dissolved arsenic levels of 0.5 mg/L).

Two reinjection bores were installed south of Falcon in July 2023. Reinjection trials are planned for these two bores during September – October 2023 to assess achievable injection flow rates, water table mounding responses and any water quality changes from the abstraction and reinjection of up to 100 ML of groundwater.

10.5.1 Reinjection of Elevated Arsenic Water

As described in Section 9.2, Type II water containing elevated arsenic will be reinjected into the palaeochannel aquifer in the bores closest to the Hemi pit for the initial two years of dewatering. After this point in time, Type II water will be sent to the process plant for ore processing and tailings placement.

To consider the fate of reinjected Type II water, the groundwater model applied particle tracking to each simulated reinjection bore, with particles 'released' after 730 days of dewatering, i.e., tracking the fate of the last of the Type II water reinjected before the process plant starts and receives Type II water. The particle tracking ran for a 13.5 year period to the end of Operations and shows that 11 of the 27 reinjection bores would be suitable for ensuring recirculation of the injected Type II water back to the dewatering system. This recapture effect would continue into the closure phase for a significant period and mitigates the risk of any long term or permanent change to groundwater quality of the alluvial aquifer resource surrounding Hemi.

The particle tracking assessment does not consider the potential for reactive solute transport processes or significant attenuation of trace metals within the palaeochannel aquifer between the Type II reinjection bores and the Hemi pits. An assessment of the potential for reactive transport and metals attenuation is currently underway by SRK and will be used to finalise the assessment of impacts associated with the proposed reinjection of Type II water.

10.6 TSF

The potential impact of any seepage through the floor of the TSF upon the underlying water table has been considered as part of the numeric groundwater modelling. The estimate of seepage rates has been provided by CMW as part of their TSF design work and consists of a volumetric rate of 57 kL/day over a circular area of 10 Hectares around the central decant part of the TSF. This seepage term was applied to the groundwater model as a linear recharge rate of 208 mm/year across the 10 Hectares starting on day 731 of the model calendar (which corresponds to the start of ore processing). For comparison, the pre-mining baseline groundwater modelling adopted a natural recharge rate of 2.8 mm/year in the TSF area.

The groundwater modelling results confirm that there is no mounding of the water table underneath the TSF during the operational phase for the adopted seepage rates and areas. These results were expected ahead of the modelling, given the relatively low seepage rates, the permeability of the alluvial aquifer, and the proximity to the dewatering effects of the pit. Plan 10-11 shows the drawdown contours predicted after one year of ore processing and at the end of the operational phase in the TSF area and highlights that drawdown (due to mine dewatering) of up to 10 m has been modelled, which dominates the groundwater regime beneath the majority of the TSF. The contours near the centre of the main TSF show a small distortion, which would be a result of the simulated seepage.

11 MODEL UNCERTAINTY ANALYSIS

11.1 Introduction

All groundwater models that seek to predict the behaviour of complex aquifer systems over large areas and long time periods are challenged by the issue of accuracy and uncertainty. Numeric models built using multiple high quality data sets over long calibration and validation timeframes have the potential to be the most accurate models. Additionally, when the length of predictive models is not excessive compared to the length of the calibration period, and the levels and type of stresses used in predictions are similar to those present in the calibration, then the potential for higher model accuracy increases further (Barnett er al, 2012). The Hemi model has very few of these high accuracy pre-requisites, and so it is important to understand model uncertainty and any consequences for the Project.

A suite of numeric groundwater models can be run that consider the results of different values for numerous input parameters (one change per model run) as a way of investigating model uncertainty. This methodology is typically labelled as model sensitivity and has been performed for several key Hemi model inputs. Sensitivity and other numeric assessments of model uncertainty can be limited by the reality that the fundamental geology and aquifer settings that underpin the numeric model construction remain unchanged. A qualitative consideration of the conceptual model uncertainty is also presented below.

11.2 Sensitivity Analyses

The model inputs considered to have the greatest influence on predictions of dewatering inflows and regional drawdowns are aquifer permeability (hydraulic conductivity), aquifer specific yield and aquifer recharge. Six sensitivity models were created that incorporate potentially valid changes to these parameters as shown in Table 11-1.

Table 11-1 Model Sensitivity Details

Sensitivity Case	Upper Alluvium	Lower Alluvium	Saprolite	Saprock	Slightly Weathered Transition	Fresh Rock	Fault Domains
Increased Hydraulic Conductivity (K+)	+67% Z1,9	+33% Z10 +67% Z2,11,12	no change	+100% Z16	+100% Z19	no change	+100% Z26, 29,30
Decreased Hydraulic Conductivity (K-)	-33% Z1,9	-33% Z10, 11, 12 , 2	- 1 order of magnitude Z3	no change	no change	no change	no change
Increased Specific Yield (Sy+)	+33% Z1 +50% Z9	+25% Z10 +33% Z11,2 +50% Z12	+50% Z3,14,15	+67% Z16,17,18	no change	no change	+50% Z26 +67% Z27
Decreased Specific Yield (Sy-)	-33% Z1 -25% Z9	-25% Z10 -17% Z11	-33% Z2	-25%	no change	no change	no change
Increased Recharge	Yule River + 33%, Turner River +33%, rainfall recharge +50%						

Decreased Recharge	Yule River - 50%, Turner River -50%, rainfall recharge -50%

11.2.1 Dewatering Inflows

The sensitivity analyses were undertaken using the base case dewatering model (with dewatering bores, drains and reinjection bores) but without any attempts to revise initial bore rates nor balance dewatering surplus with reinjection amounts. The changes to life-of-mine dewatering volumes and maximum inflow rates are shown in Table 11-2 and indicate that:

- Changes to hydraulic conductivity and specific yields of the main aquifer zones have similar effects on the life of mine volumes dewatering volumes, with the increased cases generating an additional 26 – 30 GL of dewatering (or about 12 – 14% more than the base case volume.). The reduced permeability and specific yield simulations show a decline in volume of a similar amount.
- The changes to permeability and specific yield do not change the maximum daily inflow rates significantly (3 – 11%).
- Recharge rates changes have negligible effects on dewatering volumes and flow rates, which is as expected, given the changes to recharge rates are very low in absolute terms and the greatest recharge volumes occur in the Yule and Turner rivers which are a considerable distance from Hemi.

Table 11-2 Model Sensitivity Results

Sensitivity Case	Life of Mine Dewatering Volume (GL)	Maximum Dewatering Rate (ML/day)
No Change, i.e., base	*221*	*97*
K +	251	103
K -	191	88
Sy +	247	100
Sy -	193	86
Recharge +	222	97
Recharge -	219	97

A dewatering system capable of a peak flow rate of 120 ML/day is considered suitable to accommodate the combined effects of model uncertainty and bore utilisation factors A reminder is provided here that the dewatering inflows from the model only represent groundwater and do not consider rainfall runoff that will be generated inside the pit crests when large rainfall events occur at site.

11.2.2 Regional Drawdown

The predicted 1.0 m drawdown contours at the end of each model sensitivity run have been plotted on Plan 11-1 to highlight the effects of model uncertainty on the extent and potential regional impacts from dewatering. These highlight that:

- Drawdown extents are reduced by up to 1.5 km for the reduced permeability and increased specific yield cases.
- Drawdown extents are increased by up to 3 km for the increased permeability, reduced specific yield reduced recharge cases.

- Drawdown extents are largely unchanged in areas where shallow bedrock and outcrop occur.

The base case model has a drawdown ‘footprint’ of 18,410 Ha as defined by using the maximum 1.0 m drawdown contour. The sensitivity results indicate this footprint area increases to 22,770 Ha (+24%) in the worst case setting and decreases to 15,660 Ha (-15%) for the best case setting. In relation to potential impacts on other existing groundwater users, the increased drawdown cases would be insignificant, whilst the potential for slightly highly drawdowns near the Yule River northwest of Hemi would be greater. The alternative scenarios resulting in reduced regional drawdown amounts and extents are just as likely to occur.

11.3 Qualitative Uncertainty of Conceptual Model

Numeric model sensitivity analyses can consider certain aspects of the conceptual model, but they cannot consider changes to some of the more fundamental hydrogeology aspects of the area(s) of interest, such as geology and the geometry of the aquifer zones. Three aspects considered the most significant to conceptual model uncertainty and project consequences are discussed below:

1 ***Fractured Rock Aquifer Settings at Hemi.*** This aspect has significance to dewatering inflows, the dewatering system design and surrounding environmental impacts. The conceptual model incorporates three distinct aquifer zones within bedrock that have enhanced permeability compared to surrounding bedrock. These zones are expected to form preferred flow paths that will help dewater and depressurise the less permeable surrounding bedrock, but they would also increase the amount of dewatering and drainage of the overlying alluvium where it is in direct hydraulic connection with these fractured rock zones. The three settings comprise:

   i. The sub-horizontal saprock profile within the diorite and quartz-diorite intrusives, notably where there is a relative absence of overlying saprolite and where the intrusives are laterally extensive, such as observed in drill core in parts of the Eagle deposit.
   ii. Contact zones between the quartz diorites and the meta-sediments away from the main thrust structures, where other phases of defamation by folding and faulting could cause a brittle-ductile response and the development of fracture zones.
   iii. Fracturing and deformation along the main NE-SW trending thrust structures identified by De Grey geologists from drilling and structural geology interpretations. At least 30 of these structures have been mapped as shown on Plan 8-12. Based on discussion with De Grey staff, only the five major thrusts (Diucon, Crow, Aquila, Brolga and Brolga South) have been applied within the numeric model, each as a 100 m wide vertical zone.

   The current water bore drilling programme is testing bedrock and structural zones, and combined with subsequent pumping tests, will help quantify the aquifer properties of the fractured rock aquifer zones. However, one aspect of uncertainty that will remain involves the lateral extent and hydraulic nature of the main NE-SW thrust zones in the model. This has a strong effect on the drawdown amounts and pattern, as indicated by the drawdown contours displayed on Plan 10-1. The model currently interprets these structures as absent or effectively impermeable beyond about 2 – 3 km beyond the proposed pit outlines. If they are more laterally extensive and permeable, then drawdowns could propagate further in the NE-SW directions away from the proposed pits.

2 ***Regional location of paleochannel aquifer***. This aspect has significance to the environmental impact issues related to regional water table drawdowns and virtually none to the amount and timing of dewatering inflows. The Hemi and regional drilling by De Grey, as well as the Mt Dove borefield, provides a high level of confidence in mapping the location and nature of the main palaeochannel aquifer over a reach of about 19 km (about 5 km north of Eagle and 12 km south of Falcon). The location and nature of the palaeochannel aquifer upstream and downstream of this reach is less certain. Aircore drilling completed in May 2023 to the south of the of the simulated (southern) reinjection

borefield suggests that the palaeochannel becomes smaller and may split into multiple tributaries. This southern region is thus likely to have different aquifer geometries and properties than the current model, which would influence the model's calibration and water balance but is not likely to change the modelled responses to reinjection significantly given the reinjection bores are located to the north of this area. Further aircore drilling within existing De Grey tenements in this southern region would resolve this paleochannel uncertainty.

To the north of De Grey's Hemi tenements, the location of the main palaeochannel has some uncertainty. The position of the channel in the northern parts of the model domain was changed from the PFS model based on :

i. Bore logs for two bores near the Yule River provided by the Water Corporation in January 2023
ii. Potential palaeochannel locations north of the model domain, as interpreted by MWH and/or Fugro from airborne TEM geophysical surveys completed as part of the 2010 groundwater model of the Lower Yule catchment (MWH, 2020)
iii. Updated bedrock outcrop and shallow subcrop mapping by De Grey and Geowater in late 2022

The changes made still result in a direct and permeable connection between the paleochannel and the shallower coarse alluvium underlying and adjacent to the Yule River in the northwest part of the model domain. The additional tenure being sought by De Grey to the north of Hemi would allow a further five (50 kilometre reach of the palaeochannel to be drilled and evaluated if required.

3 ***Long term episodic river recharge***. The amount of recharge to the alluvial aquifer within the model domain from episodic river flows and floodplain inundation may be underestimated in the current prediction models, in comparison to other relevant Pilbara groundwater models. The simplistic approach adopted for the Hemi steady state model is considered warranted given the distance of Hemi from the rivers and the lack of groundwater level data in the areas of interest. Given the relatively short time frame of dewatering (15 years) to the timescale of larger natural flood size variability, the potentially low river recharge rates used in the predictive models may contribute to an overly conservative estimate of dewatering extents. However, the numeric groundwater modelling needed for mine closure studies will make predictions over much longer timeframes that would include repeated large scale river flooding. The closure modelling may thus need to adopt a different river recharge approach and schedule.

12 INPUTS TO DEWATERING DESIGN AND OPERATIONS.

Table 12-1 provides a summary of the recommendations for progressing the dewatering designs through to construction and early operations in the context of uncertainties associated with the Hemi conceptual and numerical groundwater models completed to date and Geowater's general dewatering experience at other projects.

Table 12-1 Dewatering System Recommendations

Aspect	Recommendation
System sizes	The base case dewatering model has a peak dewatering rate of 97 ML/day. To account for bore utilisation effects and model uncertainty, the dewatering system should be designed for a peak flow rate of 120 ML/day
Pipeline sizing	Spur pipeline should be sized to at least 130% of the bores maximum modelled flow. Trunk pipelines should be sized to 150% of modelled flows
Production Bore sizing	Investigation bores have been constructed using 200, 250 and 300 mm nominal production casing diameters. Individual bore yields to date (as measured by airlift development) have ranged between 3 – 50 L/sec (0.25 – 4.3 ML/day). Given the uncertainty in predicting fractured bedrock bore yields, it is recommended that all dewatering bores scheduled to be commissioned in the first two years of operations are installed using 250 or 300 mm casing. This will mitigate the risk of individual bores not being able to achieve actual maximum rates. All reinjection bores installed within the main paleochannel aquifer should have 300 mm DN production interval casing (and wire wound screens)
Submersible pump sizing	Submersible pumps should be over-sized by at least 130% of the modelled peak bore flow. Given successful dewatering involves bore flow rates declining strongly over time, smaller pumps may need to be installed in the latter stages of the bore life, and/or variable speed pump/power sources be used to avoid energy wastage and unnecessary operational costs.
Bore Construction	Reinjection bores require wire-wound screens through the basal sands and gravels of the paleochannel aquifer to ensure the injection interval remains open. Dewatering bores external to the open-pits are suitable for slotted PVC construction, with potentially a short length of wire-wound screens placed near the lowermost permeable part of the aquifer to improve the hydraulic efficiency of the bore
Drilling Method	To date, only two methods of drilling have been used at Hemi; (1) conventional mud-rotary and (2) mud-rotary, case off upper sections then drill (telescoped) deeper hard section by air-hammer rotary. Alternative methods involving casing-advance systems coupled to the air-rotary method (e.g., ODEX and DR) have significant potential to lower the time and costs required to drill and construct many of the future production bores. The existing water bore contractor (Foraco) has been booked to install 2 -3 bores using ODEX when a suitable rig becomes available in December 2023. A trial involving installation of 2 -3 bores using the DR rig method is also recommended, despite the relative lack of availability of DR providers in 2023.

Remote operation of pumps	The dewatering system should be equipped with a remote control telemetry system that will allow the performance of individual bores (both dewatering and reinjection bores), transfer pump and water storage levels to be monitored and adjusted from relevant office locations.
Monitoring Bores	Between 70 – 90 monitoring bores are recommended to be installed within and near the open pits for the purpose of measuring groundwater levels to monitor dewatering progress and effectiveness, as well as monitoring water quality to support review and operation of the two 'stream' water system. About 30 of these bores are already installed. Some of the bores will have a limited lifespan due to mining activities, but can be readily replaced in in-pit locations using blast hole or grade control drilling rigs. Many of the bores should be equipped with pressure transducer loggers and telemetry to provide continuous water level datasets.
Trial Reinjection	A trial involving the reinjection of 100 ML of groundwater into two reinjection bores is scheduled to occur between September – October 2023. Based on these results and the results of further drilling to the south of Mt Dove, another reinjection trial(s) may be warranted. This work also requires the completion of the desktop geochemical assessment by SRK for the potential of trace metal attenuation and reactive transport between Hemi and Mt Dove.
In-pit interception wall drains	It is not practical nor likely that the ex-pit dewatering bores will capture 100% of the groundwater inflows through the alluvial aquifer sequence. Final pit designs should consider and incorporate toe drains that can capture and direct seepage water to transfer pumps near permanent berm-ramp locations or to sump pump locations on deeper pit floor levels.
Rainfall runoff in-pit	As each pit is developed and deepens, the potential for large volumes of rainfall runoff to be generated off pit walls and floors during large storm or cyclonic rainfall is significant. For example, the March 2019 rainfall event associated with Cyclone Veronica produced about 560 mm of rain over a three day period. This equates to a rainfall volume of 566 ML inside the Brolga Stage 1 and Diucon pit designs. Designs and management procedures for removing this runoff water from active pits and discharging to the environment are required as part of the overall site surface water management plan.
Pit wall designs and slope stability	Whilst the overall aquifer settings and dewatering designs at Hemi will favour vertical drainage of water from the lower permeability saprolite profile in bedrock and silty zones within the alluvial sequence, there is a potential for elevated pore pressures to occur within these geology domains to levels that may have a material effect on pit wall slope stability. Given that dewatering is scheduled to commence 15 months before mining, it is recommended that a suitable vibrating-wire-piezometer (VWP) network is established (on telemetry) **before** mining commences. This should provide enough data on pore pressure responses to dewatering to help optimise and conclude final pit wall designs.
Dissolved trace metals monitoring	Rapid measurement and confirmation of arsenic and other trace metal levels in the Type I and Type II water streams will be critical to the proposed water management system. Field measurement kits (that take 15 minutes to get a result) commenced in April 2023 and further trials are scheduled to evaluate if higher accuracy can be achieved by using an electronic colorimeter device. If these trials do not provide enough certainty, then it is recommended that De Grey install an on-site laboratory capable of accurate trace metal analyses by inductively couple plasma mass spectrometry (ICP-MS) methods

13 GROUNDWATER & SURFACE WATER MONITORING TO SUPPORT LICENSING PROCESS AND ASSESS OPERATIONAL IMPACTS

This section provides an outline of the water monitoring recommended to support the DWER licensing process and development of suitable adaptive management measures during the early years of Operations. It does not represent the full and final monitoring programme that will be required to be submitted to DWER to obtain the 5C *Groundwater Well Licence (GWL*). This is expected to be submitted to DWER in early 2024 once water-related mine closure modelling and any refinements to the operating phase water models are concluded.

13.1 DWER Licensing and Operating Strategy Background

Given the large scale of intended groundwater use, the application to DWER for a 5C GWL for Hemi will require a 'H3' level technical report and also the need for De Grey to develop and submit a *water resource operating strategy* as defined by DWER (2020b). The intent of the DEWR operating strategy policy is to use the State's water licensing process *when granting access to the state's water resources to better manage the resources by:*

- *adopting a flexible approach to the production of a water resource operating strategy to satisfactorily address issues related to the taking of water from a particular water resource at a specific location.*
- *increasing the licensee's awareness of their responsibilities and their participation in managing the water resources and specifically managing the impacts of taking and using water .*
- *utilising the licensee's knowledge of the local area and their industry to address site specific and operational issues related to the taking and use of water.*
- *support the principle of water conservation where water taken is used in an efficient and productive manner .*
- *ensure licensees have considered risk and contingency options should water shortages or unexpected impacts from water abstraction occur.*

The water monitoring programme becomes a key segment of the operating strategy. Both are submitted as draft versions at the time of submitting the 5C GWL application. A final agreed operating strategy is reached after review and inputs from DWER are addressed by the licensee. The finalised operating strategy becomes a binding GWL condition.

13.2 Water Management Trigger-Action-Response Plans

As part of preparing the *water resource operating strategy* and other site water management plans, the full set of baseline data and concluded environmental impact assessments will be used to develop Trigger Action Response Plans (TARP's). Trigger levels will be established as numeric values of various surface water and groundwater water attributes at different locations and times. If these levels are approached and/or exceeded, a set of binding technical actions and management responses will be initiated.

The water TARP's will be aligned with the risk profile of each known and potential environmental and third party impact issue.

13.3 Periodic Reviews

In relation to Groundwater Well Licence (GWL) conditions and other regulatory compliance requirements, regular reviews and reporting will be prepared and submitted to DWER. Groundwater use and impact reports will conform to the reporting requirements stipulated by DWER (2009) and would be submitted according to the proposed schedule below:

- *Groundwater monitoring review* reports completed annually for the first three years of dewatering.
- A cycle of *groundwater monitoring summary* reports completed annually for the next two years, followed by a *groundwater monitoring review* in the next (third) year.

Groundwater monitoring summary reports have a focus on just the 12-month reporting period, whereas *groundwater monitoring review* reports incorporate all data on a project-to-date basis and include more detailed assessment of trends and potential impacts in the surrounding environment.

The *water resource operating strategy* may need to be amended from time to time and if so, would be done in consultation with DWER and their published requirements (2009). At a minimum, De Grey would review the water resource operating strategy every three years.

Reviews and updates to the conceptual and numeric groundwater models would be undertaken on an ad-hoc and as-needed basis. Updated models involving changes related to environmental impacts would be shared with DWER as required. It is possible that new local scale models may be developed for such applications as detailed dewatering designs; such models would not require submission to regulators.

13.4 Surface Water Impact Monitoring

Table 13-1 provides a summary of existing and proposed surface water monitoring that is based on the current awareness of groundwater-surface water interactions in the study area and the intent to release a portion of the mine dewatering surplus to the Turner River for a 2 – 3 year period. Yule River monitoring is focussed on river pool levels and water quality, whilst the Turner River monitoring is focussed on river flows and associated water levels and quality, for both natural and discharged flows.

The surface water monitoring conducted by De Grey will be supplemented by other datasets to inform technical periodic reviews of the river systems and potential mine impacts:

- Climate data from automated weathering stations located at each De Grey accommodation camp/village and the process plant.
- 2 – 3 dedicated rainfall logging stations at and near Hemi (two were installed in 2022 – see Plan 3-2).
- Aerial drone surveys flown by De Grey on an ad-hoc flood event basis.
- Public domain datasets such as *SILO* rainfall and satellite imagery.
- WA DWER gauging station data from the Jelliabidina site (Yule River) and Pincunah station (Turner River).
- Purchase and evaluation of monthly satellite imagery over the Turner River along a 65 km reach from the coast to upstream of the proposed surplus water discharge location (commenced in July 2023).

Table 13-1 Surface Water Impact Monitoring Summary

River	Locations	Parameters	Frequency	Comments
Baseline Period				
Yule River	6 x river pools	Water level	Quarterly, ad-hoc (after floods)	Locations are DOW sites 1286, 1287, 1289, Jelliabiddina, Mardagubiddina and Portree Pools. (Note that continuous water level monitoring commenced at Mardgubiddina and Portree Pools in February 2023)
		Water quality - basic	Quarterly	Basic suite includes EC, TDS, pH, DO, ORP, turbidity
		Water quality - detailed	6-monthly	Detailed suite includes above, major, and minor ions, nutrients, trace metals
Turner River	4 x river pools	Water level	Quarterly, ad-hoc (after floods)	Locations are Meerandanganna Pool, North West Coastal Highway, nr Holcim Quarry and pool 2 km upstream of discharge locations)
		Water quality - basic	Quarterly	As per Yule River. Includes 3 x Rising Stage Sampler stations installed in 2022
		Water quality - detailed	6-monthly	As per Yule River. Includes 3 x Rising Stage Sampler stations installed in 2022
	Indee Station Causeway	Water level, EC	Hourly	Recorded with *In-Situ Aquatroll* logger
Operational Period				
Yule River	As for baseline period except water levels in pools to be 6-hourly data from loggers in each permanent and intermittent pool location.			
Turner River	Discharge point, Indee Station Crossing	Flow and levels	continuous	Planned to be installed prior to 2023/24 wet season
		Water Quality	weekly	Basic and detailed suite
	4 x river pools	Water Quality	monthly	Basic and detailed suite

13.5 Groundwater Impact Monitoring

Table 13-2 provides a summary of existing and proposed groundwater monitoring for the remainder of the baseline (pre-dewatering) period, whilst Table 13-3 provides a summary of recommended monitoring for the operational period. Both tables focus on monitoring related to potential impacts, whilst groundwater monitoring related to assessing the effectiveness of the dewatering and water management systems is briefly summarised in Section 12. There is an overlap of monitoring data between the two purposes and invariably all the datasets are used during periodic reviews. Such groundwater reviews are also supported by using the surface water and auxiliary data described in Section 13.2. Groundwater-related data from surrounding groundwater users (Watercorp and Atlas Iron) may be used during technical reviews if it is both required and accessible.

Table 13-2 Groundwater Impact Monitoring Summary – Baseline Period

Location / Group	Purpose	Sites	Parameters	Frequency	Comments
Turner River Transects	Baseline variation, surface water-groundwater interactions	6 x mb's (HMB017 – 022)	1. Swls 2. EC profiling 3. Water quality – detailed	1. 6-hourly 2. 6-monthly 3. 6-monthly	3 x 2-bore transects installed in 2021
Pit and TSF areas	Baseline variation	40 x mb's	1. Swls 2. EC profiling 3. Water quality – detailed	1. some bores 6 hourly, some bores monthly 2. subset of bores done 6-monthly 3. subset of bores done 6-monthly	Baseline programme to be adjusted in October 2023 to incorporate the 19 monitoring bores installed between May – Sep 2023
Reinjection and Regional areas	Baseline variation	14 x mb's	As above	As above	35 x new bores planned for installation during the remainder of 2023 and into 2024 (see Plan 10-7)
Yule River Transects	Baseline variation in relation to river flood recharge events	8 x mb's	As above	As above	4 x 2-bore transects across the Yule River (3 new transects to be installed in 23/24, one x existing transect from Watercorp bores 16-10 and 18-10
Pastoral Bores and Wells	Baseline variation	47 x pastoral bores and wells	1. Swls 2. Water quality – basic 3. Water quality detailed	1. 6-monthly (all sites) 2. 6-montlhy (all sites) 3. 6-monthly (subset of sites, ~ 6)	

Abbreviations. – swl = static groundwater level, mb = monitoring bore,

Table 13-3 Groundwater Impact Monitoring Summary – Operational Phase

Area / Group	Sites	Parameters	Frequency	Comments
Turner River	6 x mb's (HMB017 – 022)	1. Swl's 2. EC profiling 3. Water quality – detailed	1. 6-hourly 2. 6-monthly 3. 6-monthly	Parameter (1) via loggers or telemetry
TSF	8 x mb's	1. Swl's 2. EC profiling 3. Water quality – detailed	1. 6-hourly 2. 6-monthly 3. 6-monthly	Parameter (1) via loggers or telemetry. Detailed water quality analyses to included total cyanide and WAD cyanide
Reinjection and Regional areas	42 x bores	1. Swl's 2. EC profiling 3. Water quality – detailed	1. 6-hourly 2. 6-monthly 3. 6-monthly	Parameter (1) via loggers or telemetry. Parameters (2), (3) in subset of bores 8 of the 42 monitoring bores completed as multi-piezometer sites and remainder as single monitor bores set within upper sections of water table aquifer
Yule River Transects	8 x mb's	As above	As above	Parameter (1) via loggers or telemetry.
Pastoral Bores and Wells	47 x pastoral bores and wells	1. Swl's 2. Water quality – basic 3. Water quality detailed	1. 6-monthly (all sites) 2. 6-montlhy (all sites) 3. 6-monthly (subset of sites, ~ 6)	As per baseline period
Note – Groundwater monitoring within and near open-pits for monitoring dewatering system effectiveness not included here (see Section 12)				

Abbreviations. – swl = static groundwater level, mb = monitoring bore, WAD = weak acid dissociable

14 CONCLUSIONS

The conclusions listed below represent the key observations and interpretations made to date using the results of surface water and groundwater field investigations and modelling to May 2023.

Conceptual Groundwater Model

A 1,500 km^2 area surrounding Hemi has been assessed and the following findings made:

- Relatively shallow alluvium is widespread and forms a significant aquifer that extends from Hemi to some sections of the Yule River but not the Turner River. Within the alluvial cover at Hemi, there is a paleochannel river system comprised of up to 15 m of highly permeable sands and gravels, that is about 1,000 m wide, up to 42 m deep, and which drains towards the current day coast.
- Groundwater flow directions and hydraulic gradients are relatively uniform, with regional flow towards the north-northwest. The depth to groundwater is typically between 5 – 10 m, and is only shallower in parts of the current Yule and Turner riverbeds, and only deeper in elevated areas of rock outcrop and subcrop.
- The water quality of shallow aquifer zones is good, being typically fresh to slightly brackish, slightly alkaline and fit for the existing pastoral and mining usage. In the north-west of the study area along the Yule River, groundwater is of potable quality.
- The Turner River lacks river pools over most of the study area because the water table is typically 2 – 4 metres below the shallowest parts of the riverbed. The Yule River has several river pools that are likely to have a connection to the surrounding dry season water table. In the northern parts of the Yule River that has been investigated, no permanent pools have been identified. Three permanent or semi-permanent pools (Jelliabiddina, Mardagubiddina and Portree Pools) have been identified in the Yule River that are located between 9 – 10 km west and southwest of the Hemi deposits.
- Evaporation and evapotranspiration (ET) during dry periods are considered to be limited to sections of the main rivers where river pools, or shallow water tables and riparian vegetation occur.
- Recharge from river flows to the shallow aquifer systems is variable over time and location. The largest amounts of river recharge occur from the Yule River in the north-western part of the model area where large flow events spill over the main channel onto the surrounding floodplain. The least amount of recharge is considered to occur in the southern reach of the Turner River, where significant amounts of slightly weathered to fresh bedrock occur in or near the riverbed.
- The model domain is a ‘net’ producer of groundwater as groundwater outflows at the northern (downgradient) boundary are higher than groundwater inflows at the southern (upgradient) boundary. A water mass balance has been estimated that indicates the study area has about 11 GL/year of water entering and exiting the groundwater system on average, with inflows dominated by riverbed recharge (7.0 GL/year) and direct rainfall recharge (3.0 GL/yr) and outflows dominated by evapotranspiration (8.8 GL/year).

Key groundwater findings within and near the Hemi deposits are:

- Weathered bedrock zones do not typically form significant aquifer zones, apart from the saprock profile of igneous intrusives, which exhibit moderate permeability and low storativity. At the Eagle Deposit, a localised zone of higher permeability in the intrusive saprock (beneath the main palaeochannel) has is evident.
- Within fresh bedrock, permeability is restricted to localised fractured rock zones. Review of core photographs suggest:
    - Fracture zones within fresh rock tend to occur close to the contact zones between (more brittle) igneous intrusives and (more ductile) sedimentary units, and potentially enhanced within and near fold hinges and later stage faulting.

    - The amount of fracture zone development within fresh bedrock is limited such that the overall fresh rock mass is likely to have a very low permeability. Below about 150m, there is little or no evidence of permeable fractures in drill core.
- Northeast-southwest trending thrust and shear zones are the dominant bedrock structures at Hemi and often coincide with the contact boundaries of the quart-diorite intrusives that host the bulk of gold mineralisation. Five of the main structures are interpreted to be relatively permeable over widths of up to 100 m.
- Both the shallower alluvium and paleochannel aquifer at Hemi are in a direct geologic and hydraulic connection with the nearest groundwater users (Atlas Iron – Mt Dove Borefield and several pastoral bores). A direct connection with the more remote Watercorp Yule River Borefield is interpreted.
- Rainfall recharge to the water table in the Hemi area and surrounding alluvial plain is low but significant. A long term average of 1 – 3% of annual rainfall is likely in areas near and above the palaeochannel aquifer, and less than 1 % in areas of very shallow alluvial cover and bedrock outcrop. The increasing salinity trend of the shallow water table at Hemi from west to east is considered to reflect variations in rainfall recharge.
- Elevated levels of dissolved arsenic occur in the weathered rock profile within and adjacent to ore zones. Elevated, but smaller levels of dissolved arsenic (typically 20 – 60 ug/L) also occur in the basal sections of the alluvial aquifer within short down-gradient distances of ore zones.
- The Hemi Deposit hydrogeology is considered suitable for successful advance dewatering of the alluvial cover and underlying weathered rock profile by a conventional borefield system. Within the more extensive fresh rock profile, relatively minor inflows are expected that would require in-pit sumps and/or targeted dewatering bores to support dewatering.

Dewatering Requirements and Outcomes

The numeric model has been applied against the DFS mine schedule, with the following outcomes and findings:

- Very high dewatering rates of up to 97 ML/day are required in the first few years of the operations given the high permeability and storage within the alluvial aquifer and the shallow depth to groundwater.
- Dewatering needs to start well in advance of the initial mining planned at the Brolga Stage 1, Falcon and Diucon pits. The modelling has adopted a 15-month lead time and the results suggest a slightly shorter lead time may be possible, however, given the levels of uncertainty in the model, the 15 month lead time should be retained.
- Maximum (monthly averaged) rates of 97 ML/day are simulated in the second year of dewatering with the ex-pit bores and in-pit sump dewatering scenario. Dewatering rates are significantly higher than the PFS results, principally because the DFS mine schedule involves relatively early mining of both the Falcon and Diucon pits, which both overly the main paleochannel aquifer zone, whereas the PFS mining schedule only mines the Diucon pit in the early stages.
- The 24 month period between commencing dewatering and starting ore processing creates a large surplus of water. Reinjection of most of the surplus water into the palaeochannel aquifer to the north and south of Hemi is considered viable, but not for all the surplus due to:
    - potential localised mounding of the (already) shallow natural water table reaching natural surface, or close to it;
    - unacceptable dewatering efficiencies created by recirculation of reinjected water back to the pit dewatering system; and
    - uncertainty in gaining access to additional land tenure.
- A portion of the dewatering surplus is proposed to be discharged to the Turner River over a 2 – 3 year period at rates of up to 24 ML/day for a simulated total volume of about 16.6 GL.
- Dewatering rates are predicted to gradually decline below the total project water demand (25 ML/day) in Mining Year 9. At this stage, several reinjection bores between Hemi and Mt Dove would be

converted to supply bores and pump water to the process plant at rates of up to about 8 ML/day by the end of Operations.

- Model sensitivity analyses were completed to consider model uncertainty. These resulted in maximum dewatering rates ranging between 86 - 103 ML/day in comparison to the base case rate of 97 ML/day. A dewatering system with a peak design pump rate of 120 ML/day is considered suitable for the Hemi DFS mine schedule scenario.
- Modelling results indicate that the vertical drainage of water through the highly weathered bedrock zones occurs without significant perching or build-up of pore pressure heads in these zones immediately behind pit wall positions. However, observations of core suggest lower permeabilities may be present in some parts of the saprolite profile within fine-grained sedimentary bedrock or within silty zones within saturated alluvium. This may result in higher pore pressures behind pit wall positions to levels that could be of significance to pit slope stability.
- Whilst ex-pit dewatering bores spaced closely enough capture most groundwater inflows to the pits, it is often impractical for them to capture 100% of inflow. Within the basal sections of the palaeochannel aquifer where it intersects upper pit walls, consideration of a berm-sump drainage system is warranted.
- Management of groundwater with elevated levels of arsenic in the first two years of dewatering will be a significant issue for the Project. Once the ore processing and TSF circuits are commissioned this issue will be managed by directing elevated arsenic water to the process plant. The design and operation of the dewatering system will create two different water 'streams';
    - Type I water – suitable for discharge to the Turner River, aquifer reinjection without subsequent recapture and for camp and potable water supplies (once RO treated). Water quality that meets ANZECC 2018 guideline values for freshwater aquatic ecosystem protection to LOSP 95 criteria (0.024 mg/L for dissolved arsenic (III))
    - Type II water – all other dewatering surplus to be directed to dust suppression use and to aquifer reinjection where recapture of the reinjected water occurs by the dewatering system during Operations and by mine void lake capture during the closure phase.
- Alternatives and variations to the surplus water management strategy are possible and warrant more consideration based on consultation with regulatory agencies, relevant communities, and other potential water users:
    - Increasing aquifer reinjection rates and volumes and/or distributing reinjection over a large area if additional access to tenure currently held by Atlas Iron and Mantle Minerals is secured by De Grey.
    - Potentially increasing the Turner River discharge rates and volumes (within the first three year period) assuming that the predicted wetting front extent and inundated areas within the Turner River, nor the associated ecological risks, are not significantly increased.
    - Temporary storage of dewatering discharge or in-pit rainfall runoff within completed interim pits, assuming this does not comprise wall stability issues or future mine schedules.
    - Relatively short-term commercial arrangements with other mining companies to supply them with water during De Greys period of water surplus. Caution should be applied to such arrangements given the existing water balance predicts a water deficit by Mining Year 9, which would happen earlier if the some of the water surplus is provided to off-site third parties.

Environmental Issues and Impacts of Proposed Groundwater Use

The water resources of the Hemi region are highly valued by the Kariyarra peoples, pastoral lessees, and other mining companies, as well as the community of Port Hedland via the Watercorp-operated Yule River Borefield. The reliance of surface water resources, vegetation, and other associated ecosystems upon the groundwater resources of the Hemi region is of significance, but is considered to be spatially limited to within the confines of the current day riverbed of the Yule River.

The assessment of potential impacts on these water users and environmental values during the operational phase of the Project has been completed and is based on project-induced changes to groundwater levels, flows and quality. Most potential impacts are related to the large drawdown extent expected from dewatering, which is predicted to affect an area of about 18,400 Ha at the end of Operations. This extent is based on the 1 m drawdown contour from model predictions as using a lower value is unrealistic given such values are within the range of typical natural variations. Key conclusions regarding environmental issues and impacts are:

- Three (3) pastoral bores on Indee Station are highly likely to be rendered inoperable by the water table drawdown caused by dewatering. These livestock water points would need to be made good by installation of new deeper bores or the piping of similar water quality from the Hemi water system. Two other bores may be affected but not adversely.
- Drawdown in one of the Atlas iron bores at Mt Dove is precited to be about 8 m by the end of Operations. This may reduce the supply potential of the bore and hence De Grey would have to provide any of the supply loss from MDEX6 with water of similar quality, which would be readily available from the Type I water streams from Hemi. The drawdown impact on the other Atlas bores is likely to be insignificant (less than 1m). Reinjection of water to the north and south of the Mt Dove bores is predicted to cause minor water levels increases (less than 1 m) in one of the Atlas Iron bores. These changes would not affect the operation or sustainability of the borefield. Modelling indicates that solutes from at least one of the De Grey reinjection bores could be transferred to bore MDEX6 during Operations, but given the similar water quality, this would not have an adverse impact on the use of water from MDEX6 for its historical water end uses.
- No adverse impacts on the Yule River Borefield or groundwater resources within the Yule PDWSA reserve are expected. Whilst drawdown from Hemi dewatering propagates the significant distance of about 12 km to the northwest, the nearest Watercorp production bore is about 32 km from Hemi. Minor levels of drawdown (less than 2 m) are predicted to extend up to one kilometre inside the PDWSA boundary, but this has been shown to have no material effect on the integrity or yield of the public supply water resource.
- At the conclusion of dewatering, the alluvial aquifer within the model domain has a volume reduction of about 7% compared to the pre-dewatering November 2022 aquifer volume. In the context of reduced habitat for stygofauna, this minor reduction is not considered to be significant (based on the work by Bennelongia in 2002 using a larger (13%) aquifer volume reduction).
- No significant impacts on river pools or riparian vegetations in the Yule River are expected. Three intermittent pools occur within 1 km of the maximum drawdown extent. The highest value pools in the study area (Jelliabiddina, Mardagubiddina and Portree) occur between 2.5 – 5.5 km beyond the predicted maximum drawdown extent.
- The potential for adverse impacts from the proposed aquifer reinjection is low as the strategy and model simulations are designed to limit:
    - Water table mounding in reinjection areas reaching no higher than three (3) m below ground.
    - Reinjection of elevated arsenic water is restricted to the first two years of dewatering, and only to bores which particle tracking modelling confirms that the reinjected water travels back to the open pit and is recaptured by the dewatering system during the operational phase or during the early stages of mine closure when the mine voids continue to act as a groundwater sink.

- Potential impacts on the shallow aquifer beneath reaches of the Turner River that become saturated from the proposed river discharge have been assessed as insignificant or minor. The mounding of the water table under the wetted river channels has been modelled and the lateral extent of mounding is predicted to be within 300 – 600 of the water channels. Adverse water quality impacts are highly unlikely.
- Seepage of TSF water through the floor of the TSF to the underlying water table has been modelled and assessed to have no potential for adverse impacts given the relatively low seepage rates determined by CMW and the fact that the TSF lies well within the significant drawdown footprint from nearby pit dewatering.
- Model uncertainty has been assessed by completing sensitivity analyses in which aquifer permeability, specific yield and natural recharge rates were varied above and below the base model values. These indicate that drawdown extents could be increased by up to 3 km or decreased by up to 1.5 km in some parts of the model domains compared to the base case prediction of drawdown. These changes are not considered enough to alter the impact assessment findings or water management measures tabled in this report for the base case model.

15 RECOMMENDATIONS

Recommendations for advancing the project water studies to support the 5C GWL licensing process and progress dewatering and water management system designs into construction and early operations are provided below:

1. Use the results of the May – October 2023 field programmes and the pit void closure modelling to refine and conclude the *H3* level groundwater report and draft Water Operating Strategy. Submission of these documents with the *5C GWL* application to DWER by the end of February 2024.
2. Continue the current baseline monitoring programmes to capture natural variations to the surface water and groundwater systems as outlined in Tables 13-1 and 13-2.
3. Consider and implement the recommendations made in Tables 13-1 and 13-3 for establishing water monitoring systems to detect and help assess any potential environmental impacts during the Operations phase (noting that some of the recommended installations have already commenced or are scheduled to commence before the end of 2023)
4. Review and implement the thirteen recommendations made in Table 12-1 for optimising the cost and effectiveness of the dewatering and surplus water management systems (noting that some of the recommended installations have already commenced or are scheduled to commence before the end of 2023.
5. Use the results of the groundwater model sensitivity run with reduced permeability values across the saprolite profile in the pit wall slope stability assessments being undertaken by MineGeoTech.
6. As part of regulatory environmental approvals De Grey should seek to establish the wetting front extent and inundated areas within the Turner River as key licence criteria rather than using maximum flow rates or total volumes as licence criteria. This should provide more flexibility in managing and operating the surplus water system without increasing any ecological risks within the Turner River.

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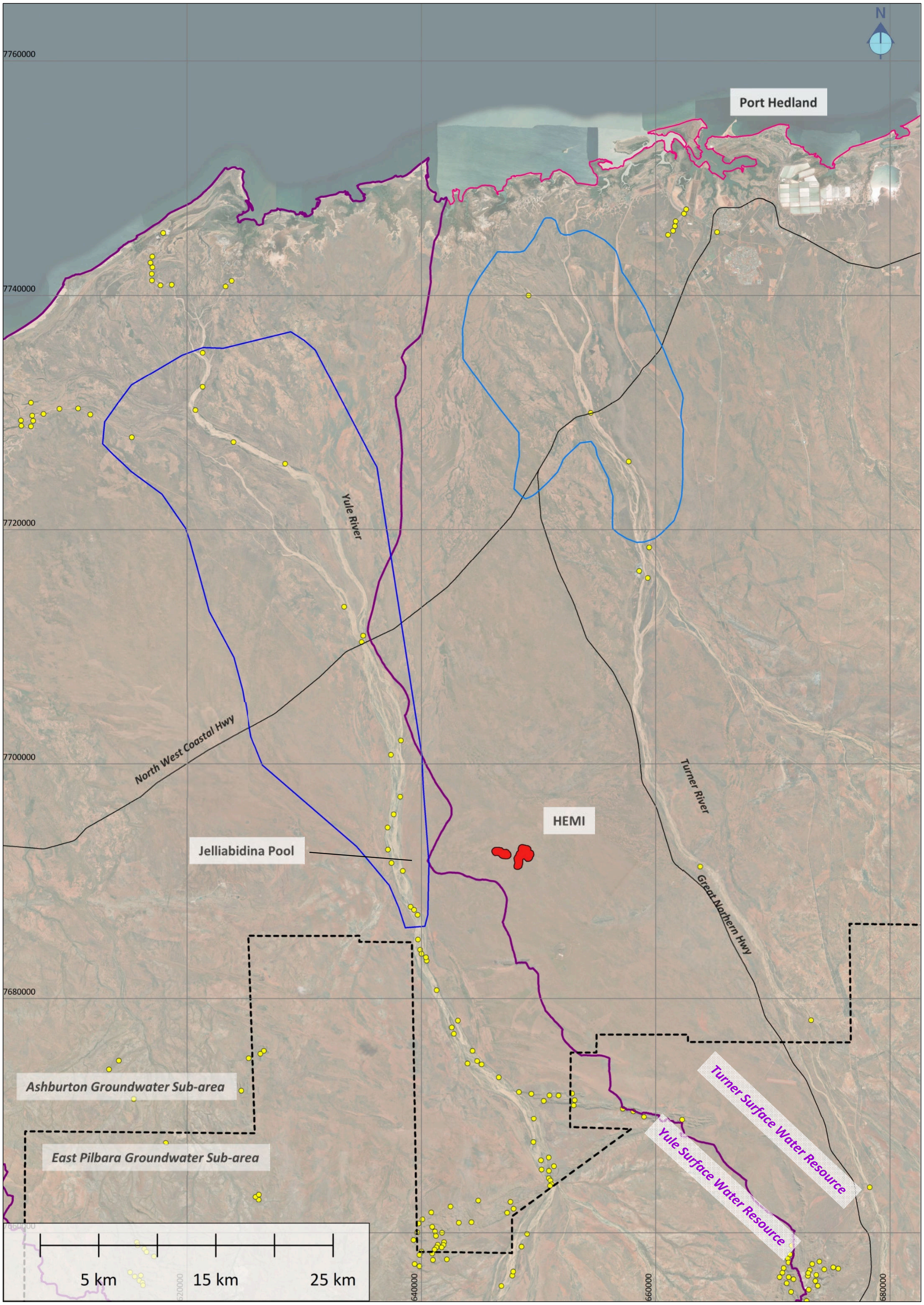
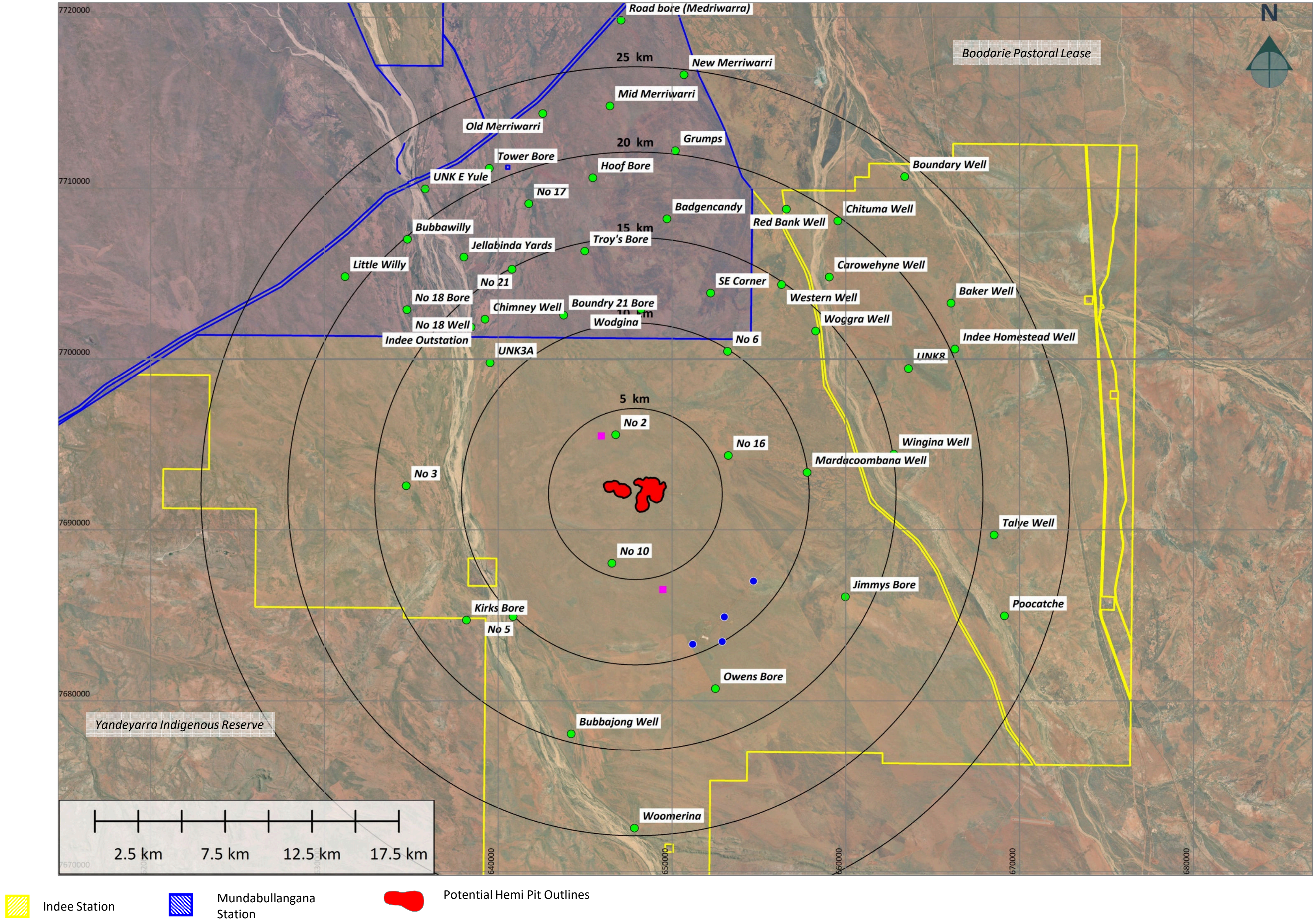


Lower Yule Alluvial Aquifer Resource

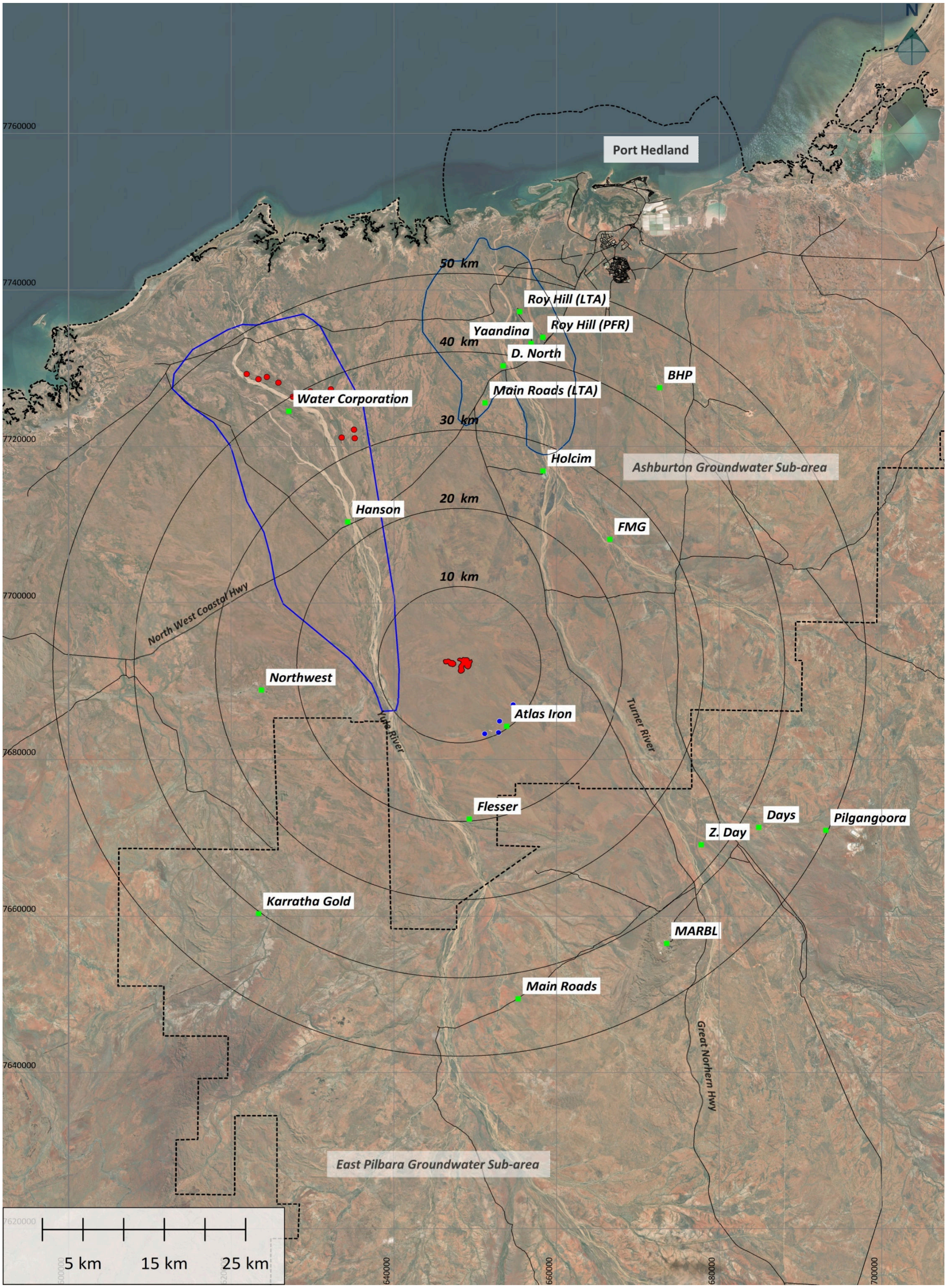
Lower Turner Alluvial Aquifer Resource

Water Pools (DOW, 2008)

Client	*DE GREY MINING LTD*	**DWER WATER RESOURCE AND MANAGEMENT BOUNDARIES**	Plan Title
Project	*HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT*	**3-1**	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference



Client	DE GREY MINING LTD	Active Pastoral Bores and Wells	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	3-2	Plan Number
Geowater Consulting	A4L		
	Project # 1006-001		File reference



Lower Yule Alluvial Aquifer Resource

Lower Turner Alluvial Aquifer Resource

GWL Licensee

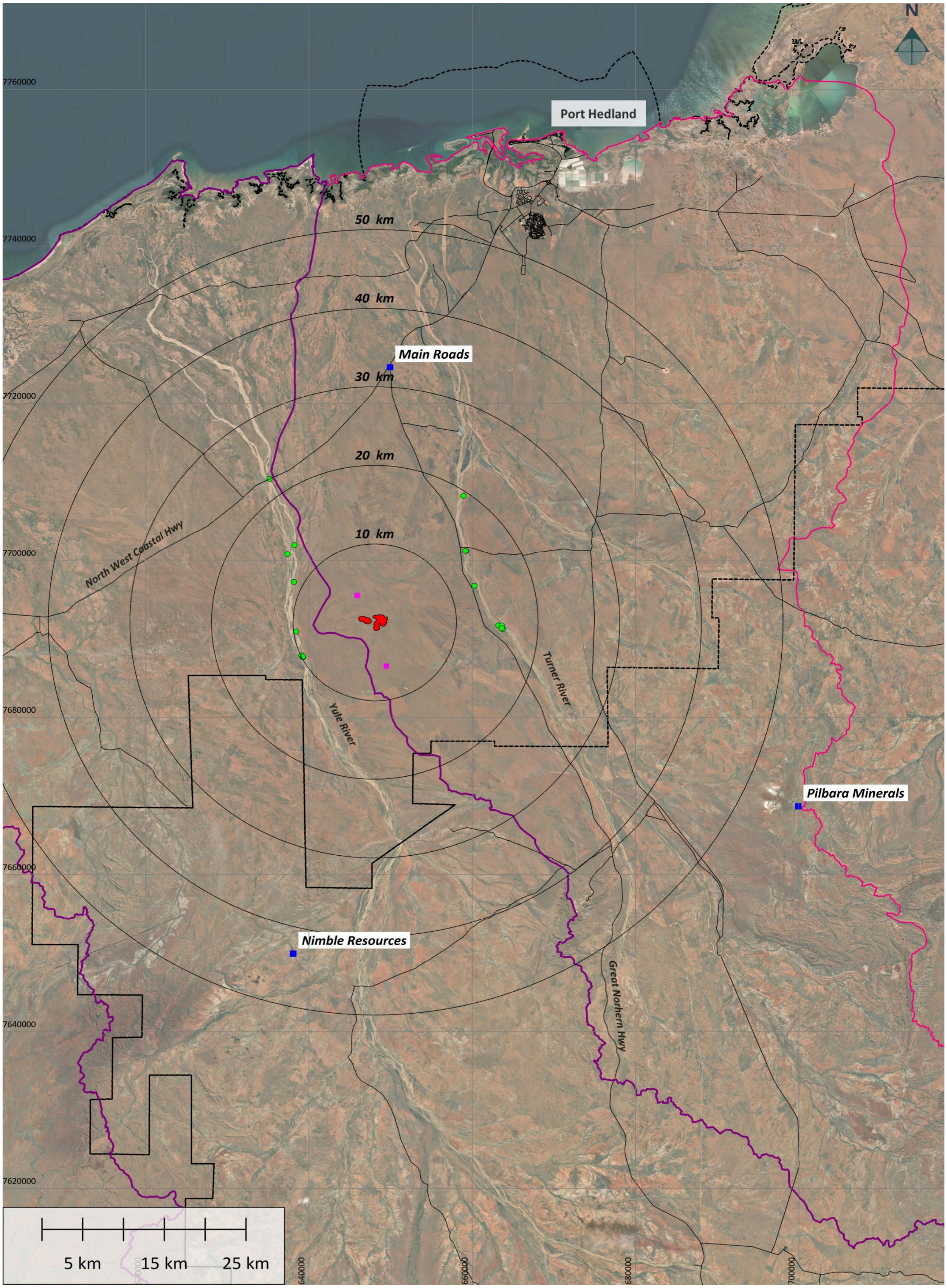
Atlas Iron Mt Dove Production Bores

Potential Pit Outlines

Groundwater Sub-Area boundary

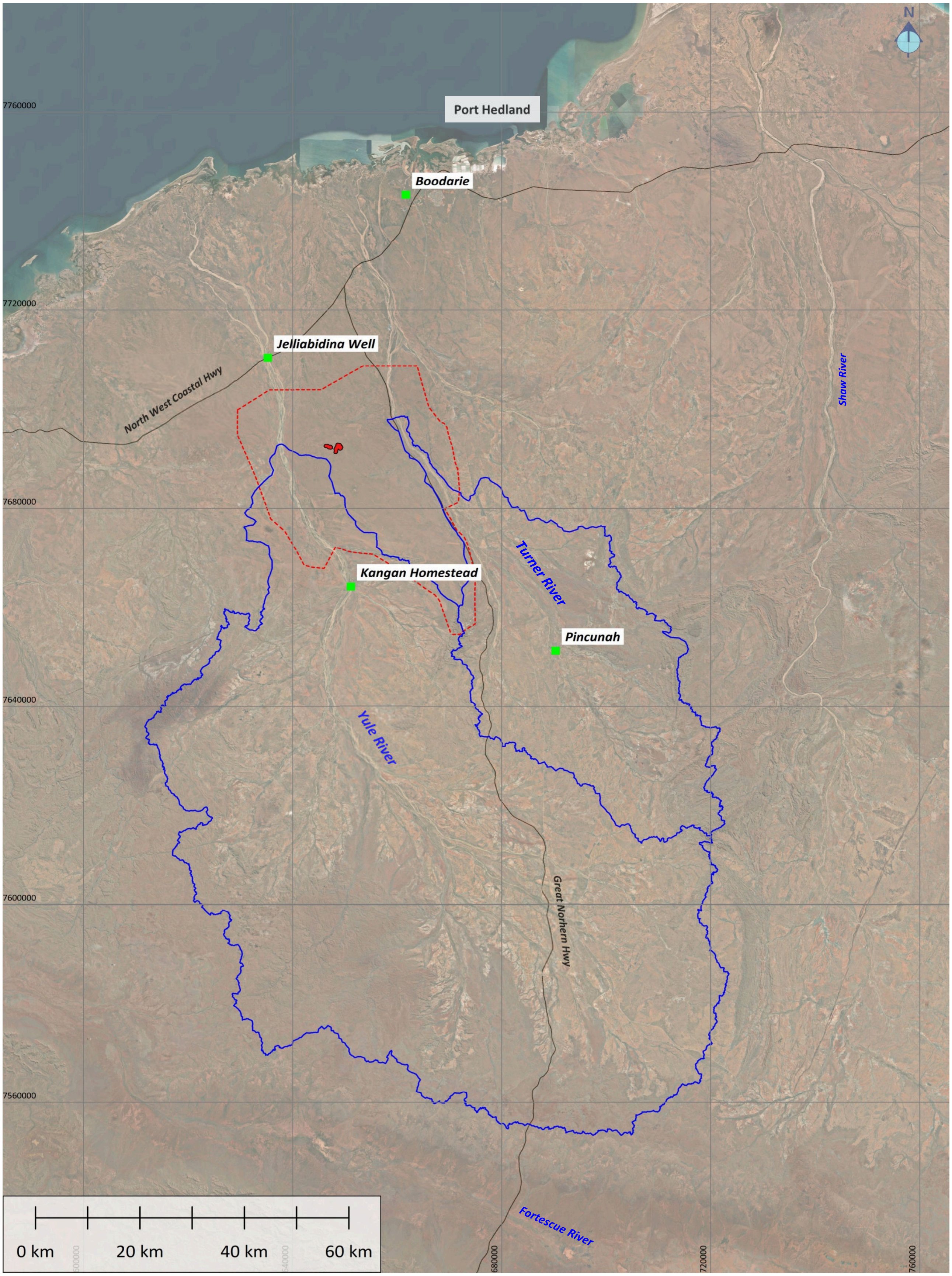
Water Corporation Yule River Production Bores

Client	*DE GREY MINING LTD*	**Groundwater Licences**	Plan Title
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**3-3**	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference



Yule Resource | Turner Resource | SWL Licensee | Potential Pit Outlines | De Grey Rain Gauge | De Grey Surface Water Monitoring Site

Client	DE GREY MINING LTD	Surface Water Licences	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	3-4	Plan Number
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference



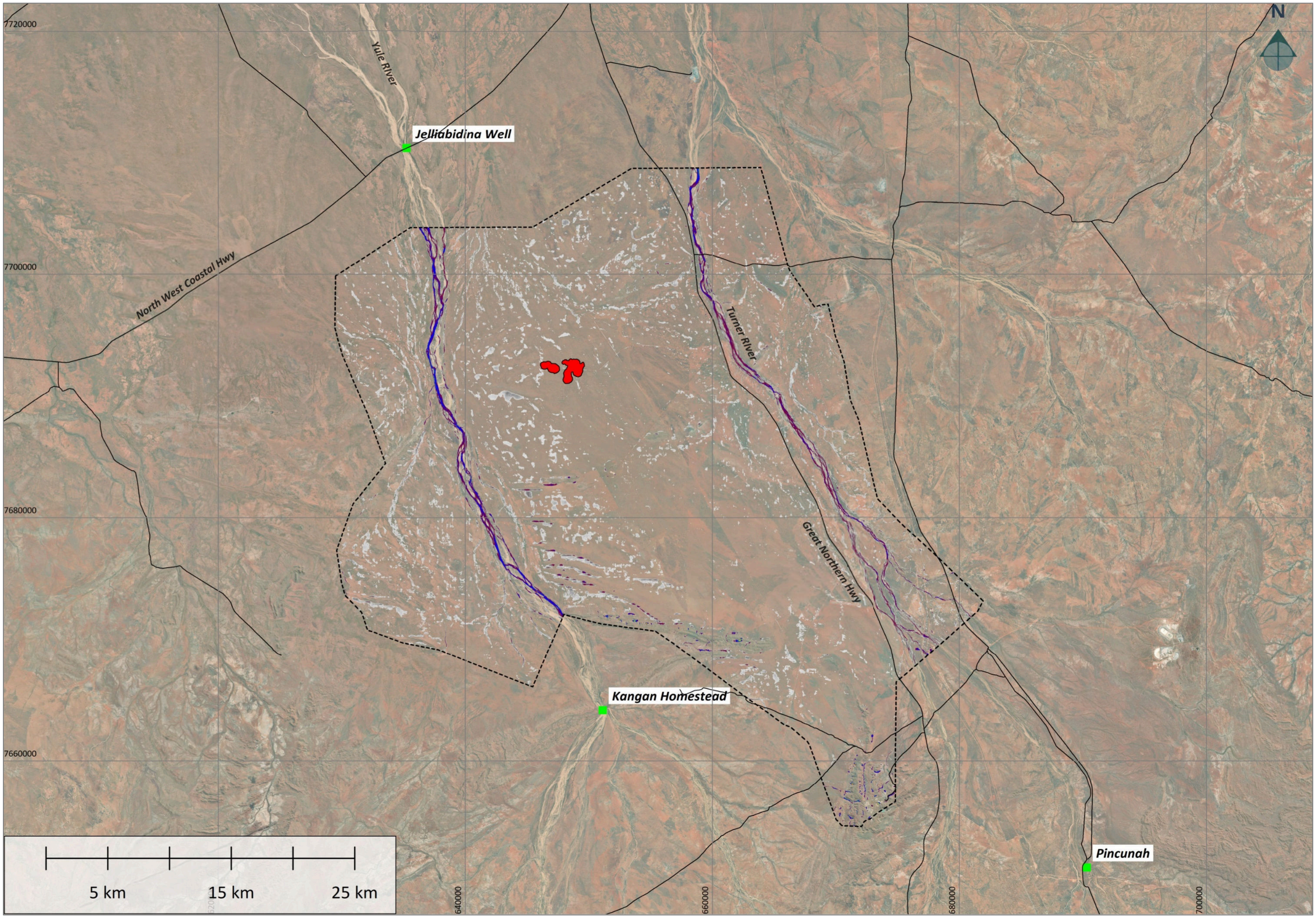
Study Catchment Boundaries

SWS Flood Model Extent

Government Gauging Station

Potential Pit Outlines

Client	*DE GREY MINING LTD*	**Surface Water Catchment Areas**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**5-1**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference



Modelled Flood Depths (m)

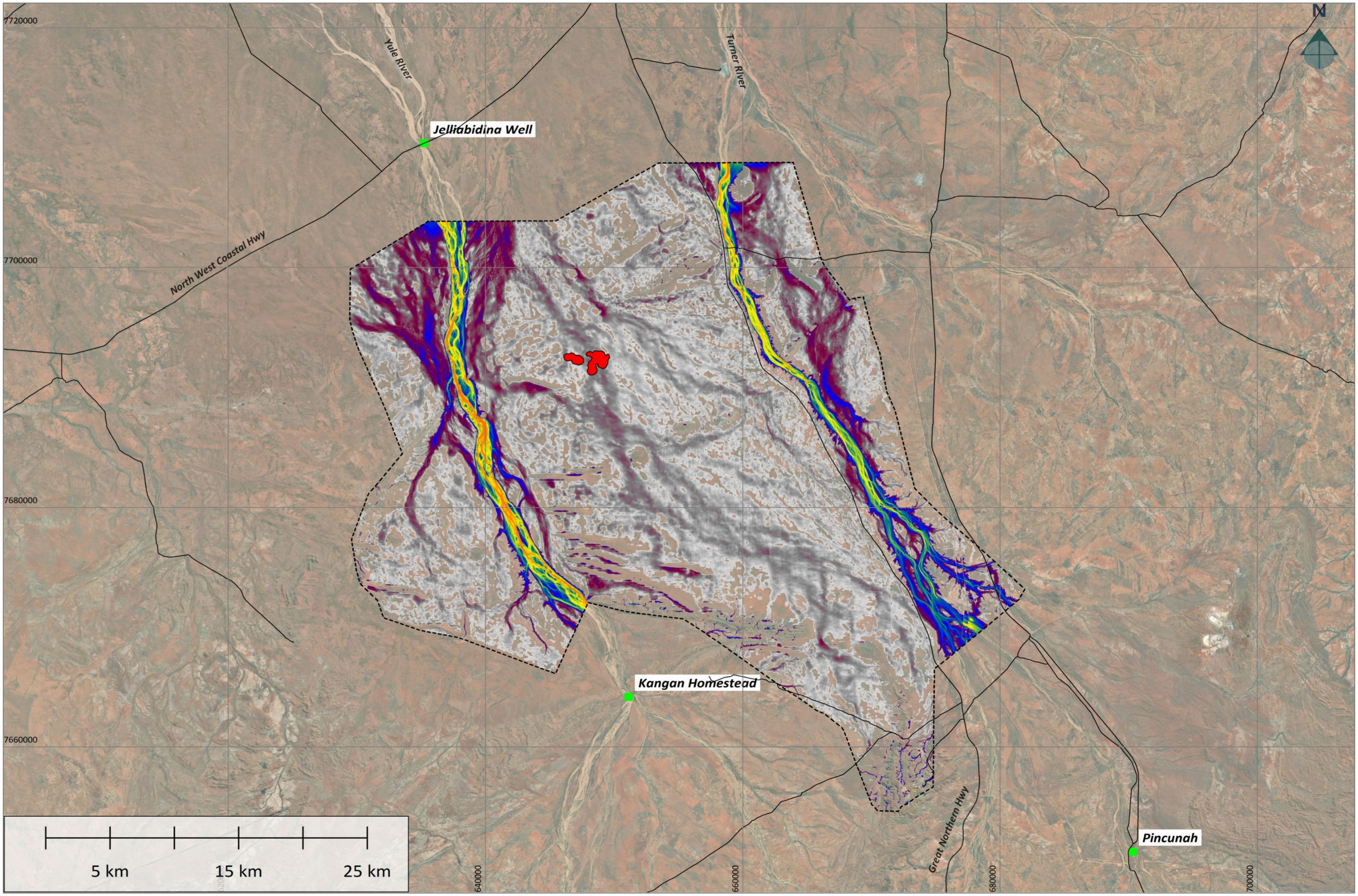
- < 0.1
- 0.25
- 0.5
- 1
- 2
- 4
- 6
- 8
- 20

Potential Hemi Pit Outlines

Government gauging station

SWS Flood Model Extent

Client	DE GREY MINING LTD	20% AEP (1 in 5 year) Flood Event - Maximum Flood Depth	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	5-2	Plan Number
Geowater Consulting	A4L		
	Project # 1006-001		File reference



Modelled Flood Depths (m)

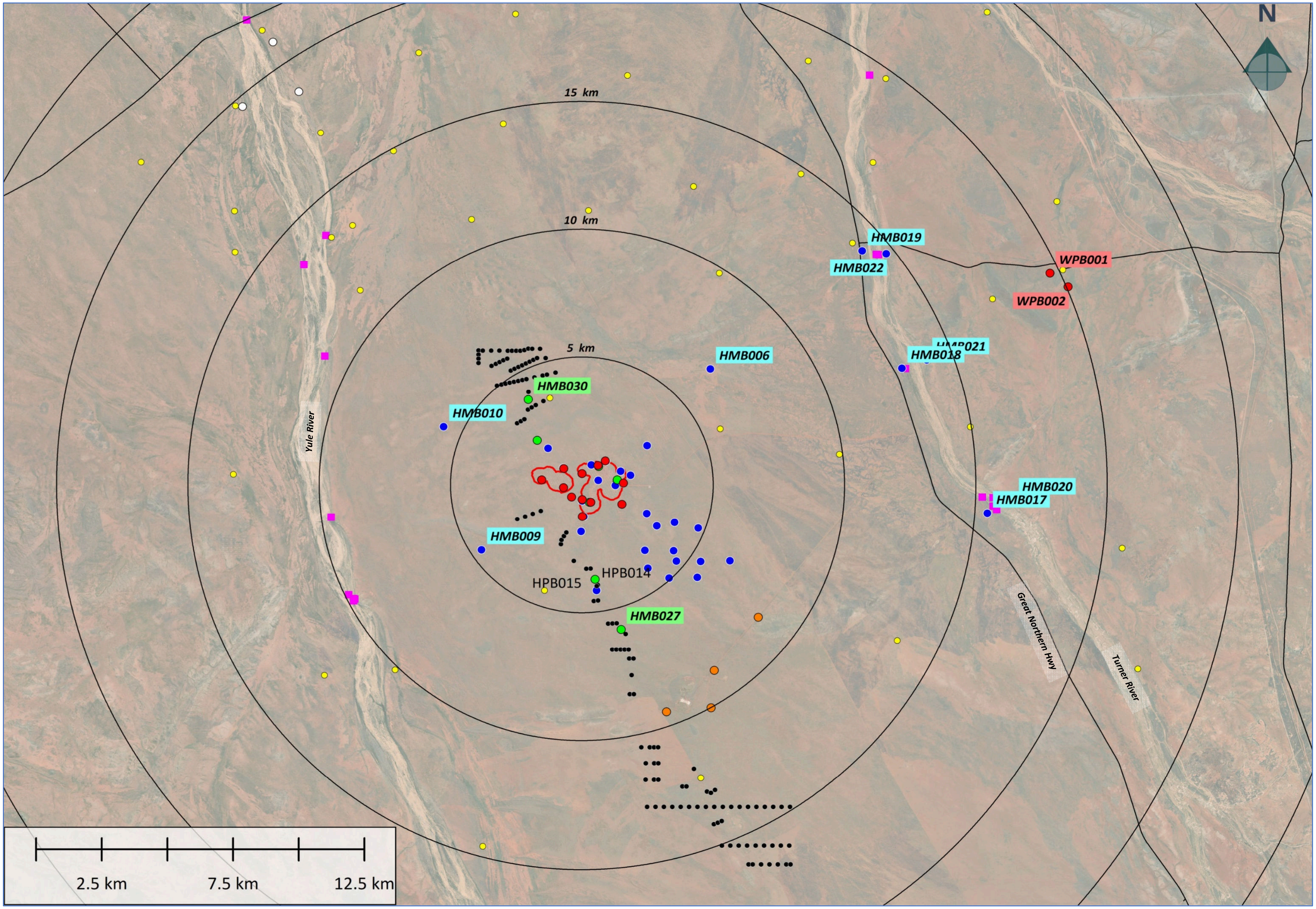
- < 0.25
- 0.25
- 0.5
- 1
- 2
- 4
- 6
- 8
- 20

Potential Hemi Pit Outlines

Goverment Gauging Station

SWS Flood Model Extent

Client	DE GREY MINING LTD	1% AEP (1 in 100 year) Flood Event - Maximum Flood Depth	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	5-3	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



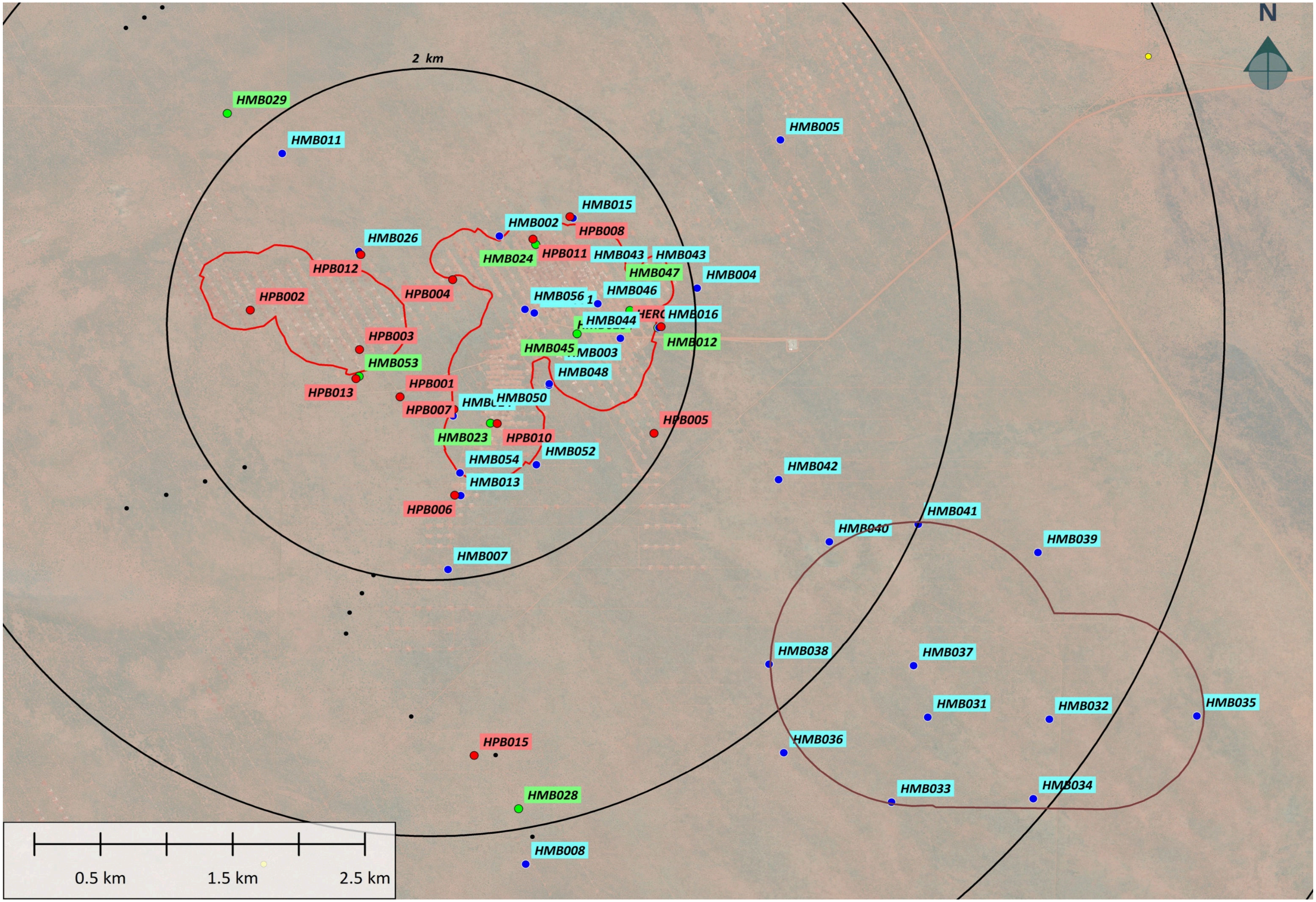
- Active Pastoral Bore / Well
- Atlas Iron production bore
- De Grey palaeochannel drill hole Feb-Apr 2023
- Watercorp monitoring bore
- De Grey surface water monitoring site

De Grey Water Bores

- Production bore
- Monitor bore
- Multi-piezometer monitoring bore

Potential Hemi Pit Outlines

Client	DE GREY MINING LTD	De Grey Bores - Semi-Regional Areas	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	6-1	Plan Number
Geowater Consulting	A4L		
	Project # 1006-001		File reference



Active Pastoral Bore / Well

De Grey palaeochannel drill hole Feb-Apr 2023

Potential TSF outline

De Grey Water Bores

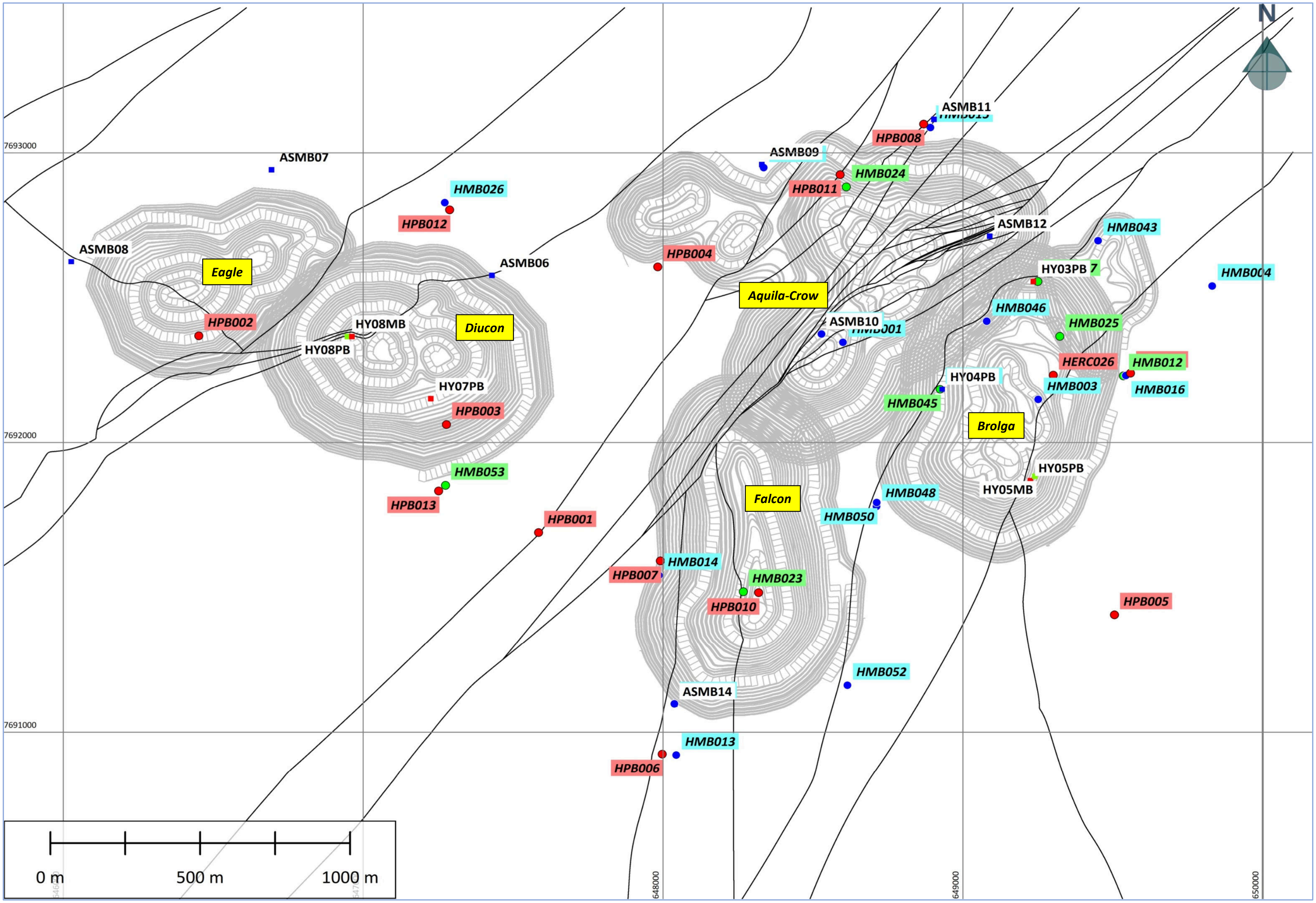
Production bore

Monitor bore

Multi-piezometer monitoring bore

Potential Hemi Pit Outlines

Client	*DE GREY MINING LTD*	**De Grey Bores - Hemi Area**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**6-2**	**Plan Number**
Geowater CONSULTING	A4L		
	Project #	1006-001	File reference



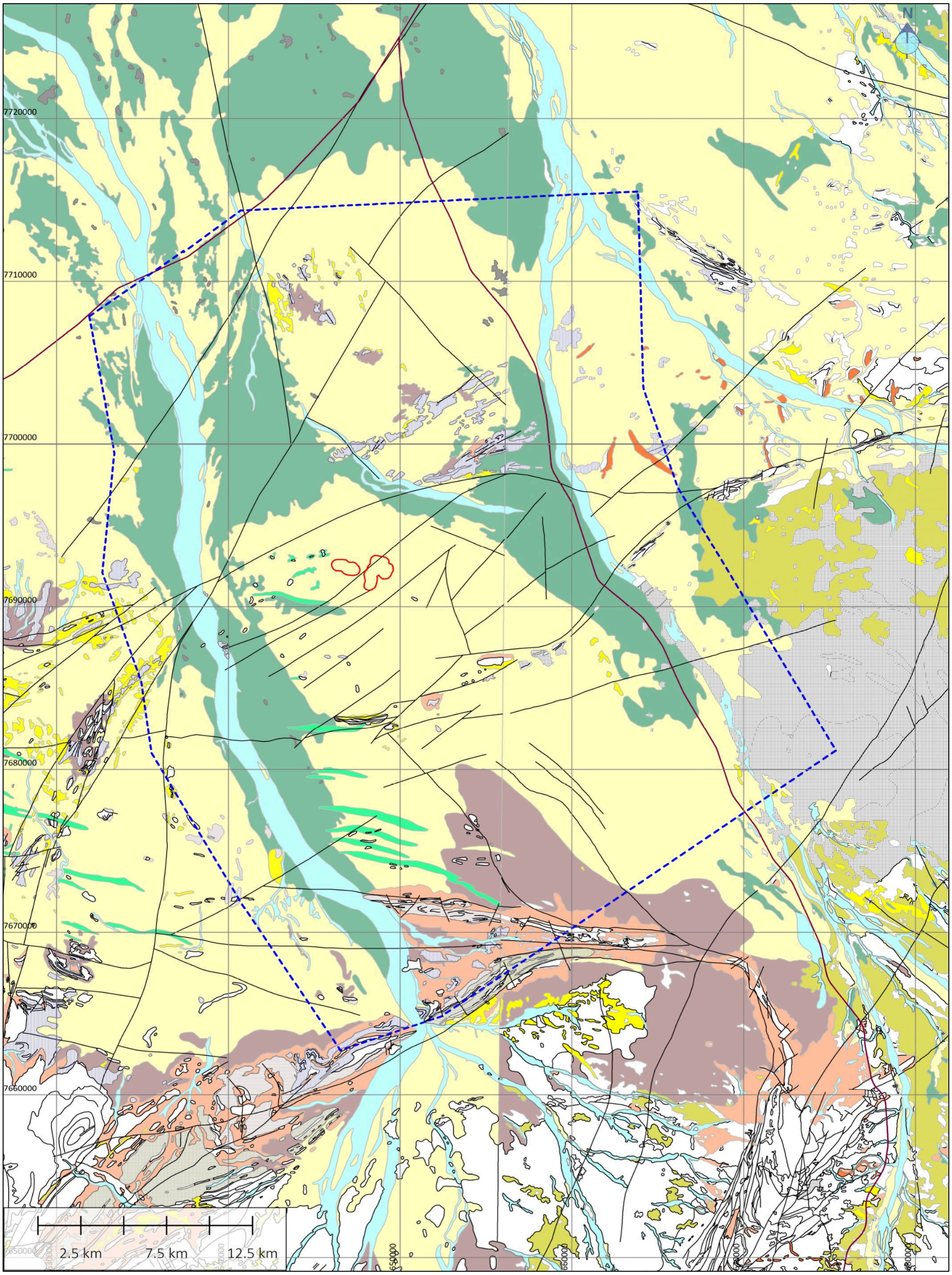
De Grey Water Bores

	Installed	Planned
Production bore	●	■
Monitor bore	●	■
Multi-piezometer monitoring bore	●	■

DFS Pit designs

De Grey major structures (at top of bedrock elevation)

Client	DE GREY MINING LTD	De Grey Bores - Installed and Planned in Pit Area	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	6-3	Plan Number
Geowater CONSULTING	A4L		
	Project #	1006-001	File reference



Cainozoic

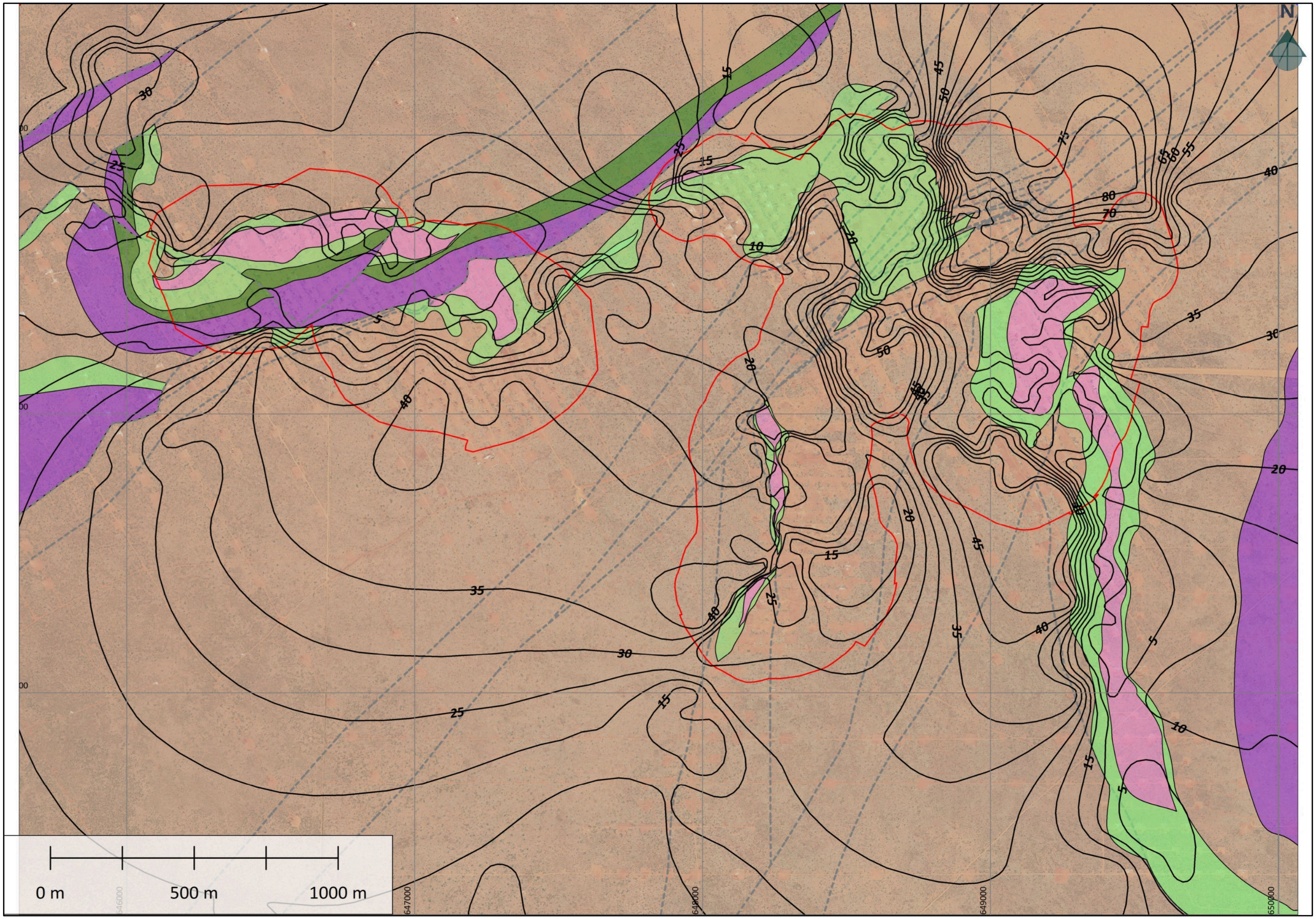
- Alluvial sands, silt and clay on floodplains
- Mixed floodplain deposits with numerous small claypans
- Alluvial sand and gravel in rivers and creeks
- Colluvium in scree and outwash fans
- Quartzo-feldspathic sands, low-gradient sheetwash deposits
- Residual calcrete
- Ferruginous Colluvium
- Eolian sand
- Residual quartzo-feldspathic sand

Archaean bedrock

- Granites and granodiorites
- Banded Iron Formations
- Sedimentary units
- Ultramafic and mafics
- Undifferentiated bedrock

- Potential Pit Outlines
- Groundwater model / study area

Client	DE GREY MINING LTD	Regional Surface Geology Plan	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-1	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference

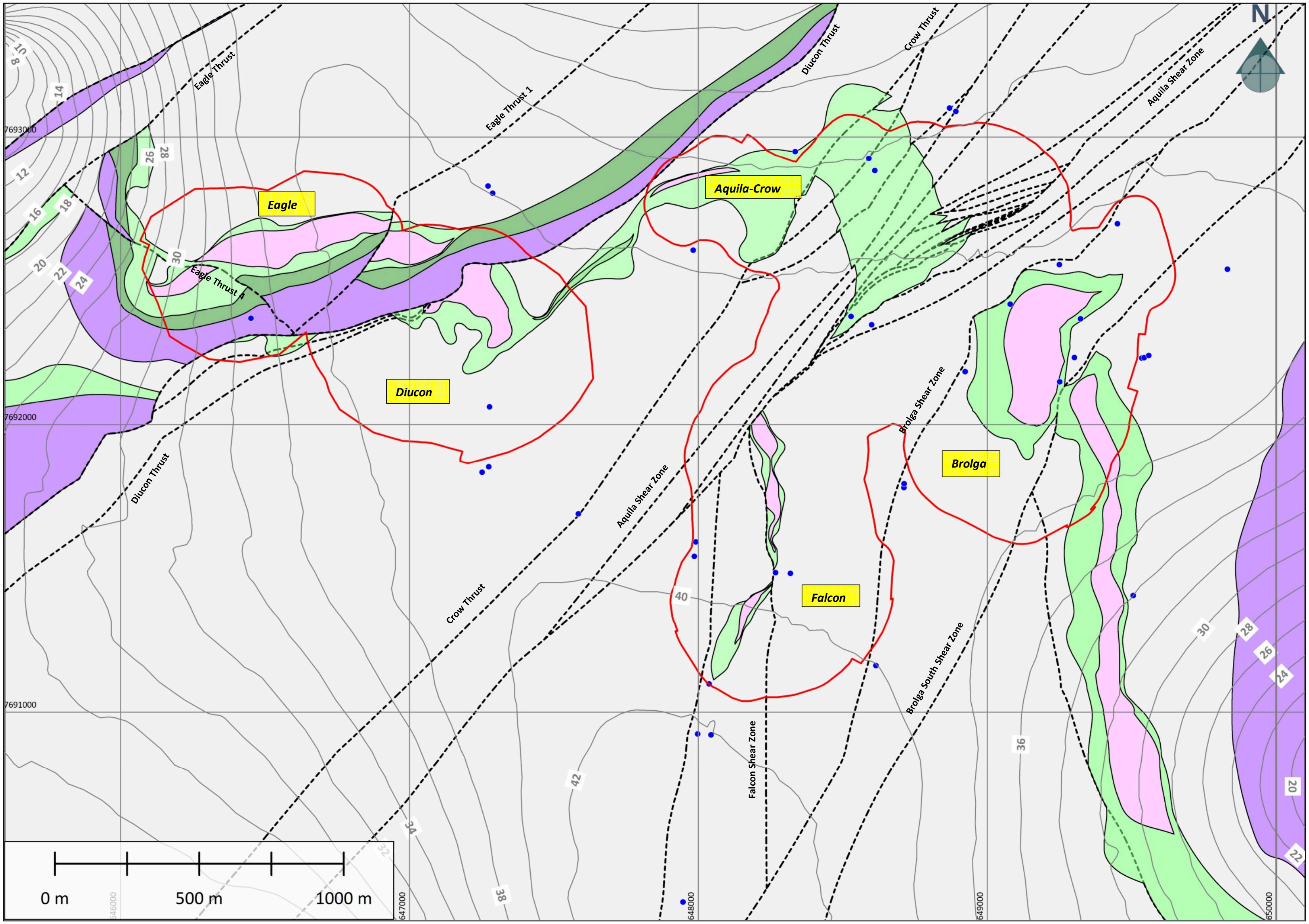


De Grey Bedrock Lithologies

- Sedimentary units
- Felsic Intrusives
- Mafics
- Ultramafics
- Quartz-Diorite and Diorite Intrusions

- Potential Hemi Pit Outlines
- 10 Saprock thickness contours (m)
- Major Structures (at top of bedrock elevation) [by De Grey]

Client	*DE GREY MINING LTD*	**Thickness of Saprock Profile in Hemi Area**	Plan Title
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**7-6**	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



De Grey Bedrock Lithologies

- Sedimentary units
- Felsic Intrusives
- Mafics
- Ultramafics
- Quartz-Diorite and Diorite Intrusions

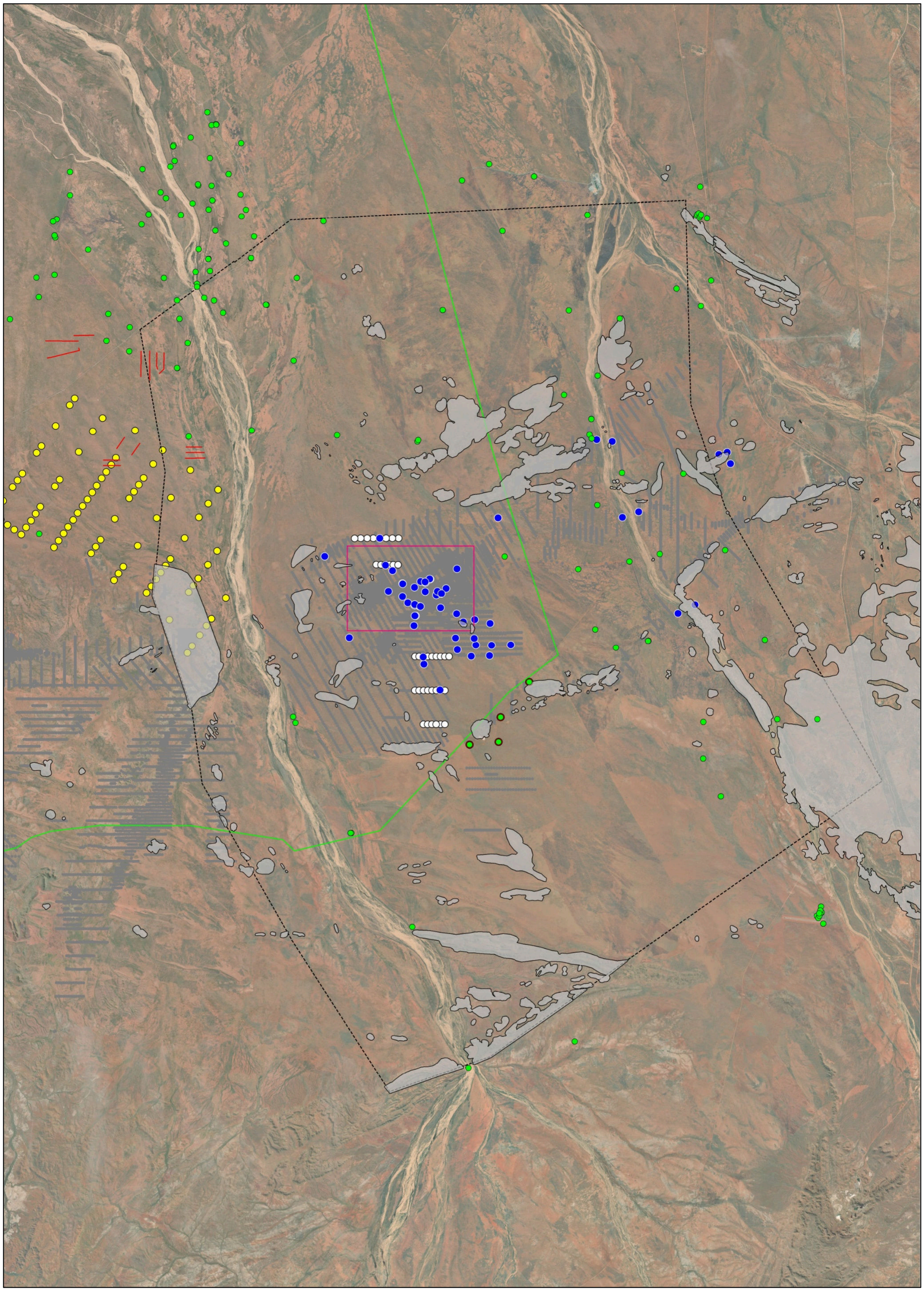
30 m Depth to base of Alluvium contours (m) [by Geowater]

Major Structures (at top of bedrock elevation) [by De Grey]

De Grey water bores

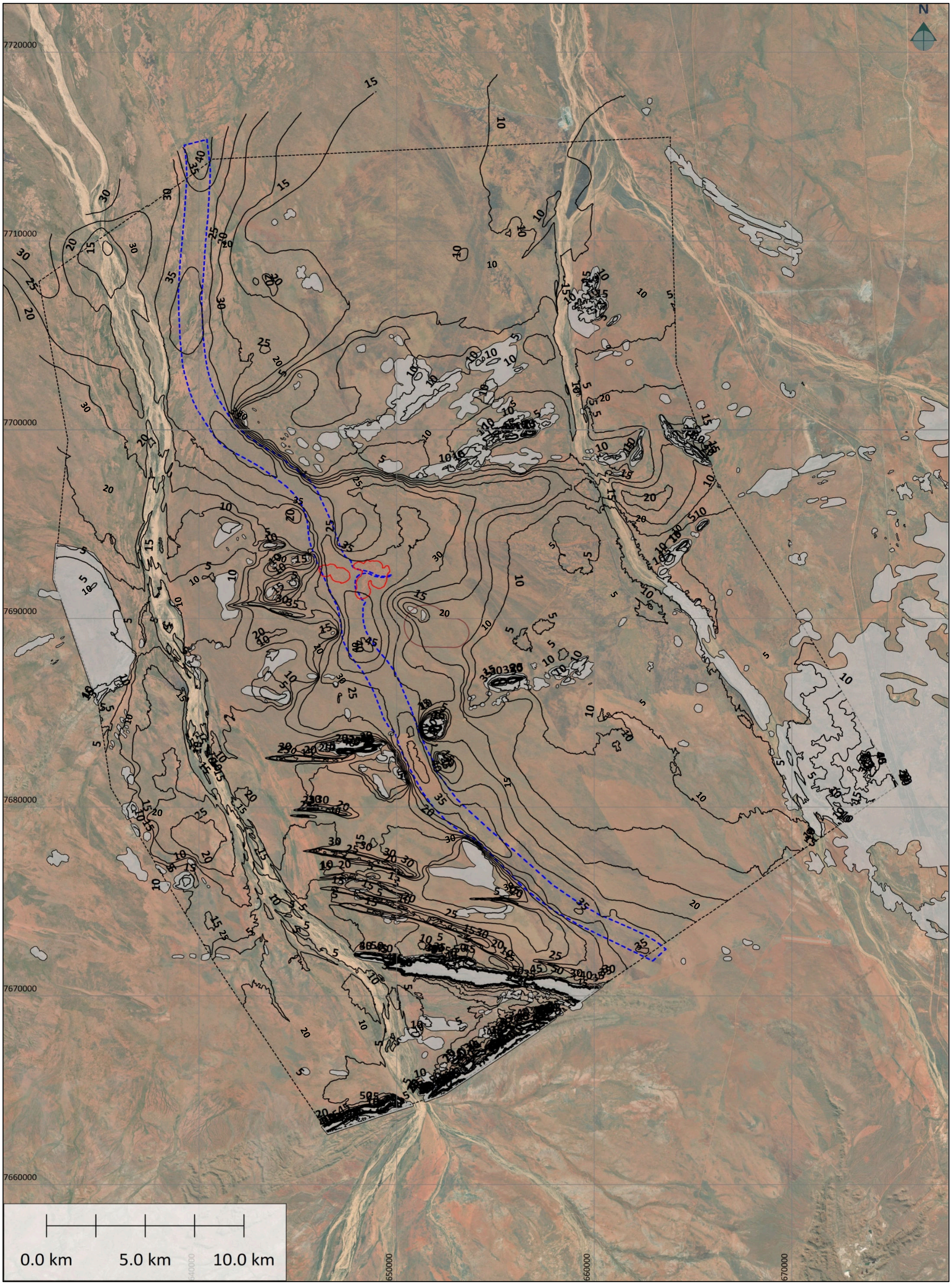
Potential Pit Outlines

Client	*DE GREY MINING LTD*	**Hemi Bedrock Geology Plan**	Plan Title
Project	***HEMI GOLD PROJECT PFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**7-2**	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



Legend	
Bedrock outcrop and shallow subcrop	Groundwater model area
2021 palaeochannel aircore holes	De Grey regolith model area
	MWH Yule groundwater model area
Golden State Mining Ltd drilling transects	De Grey mineral resource drill holes (to Nov 2022)
Texas Gulf drilling, 1982	De Grey bores
DWER WIN sites (includingvDMP Yule Investigation bores/holesv1960's - 1970's	Atlas Iron Mt Dove bores

Client	*DE GREY MINING LTD*	**Alluvium Mapping Datasets**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**7-3**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference



Potential pit outlines

Potential TSF outline

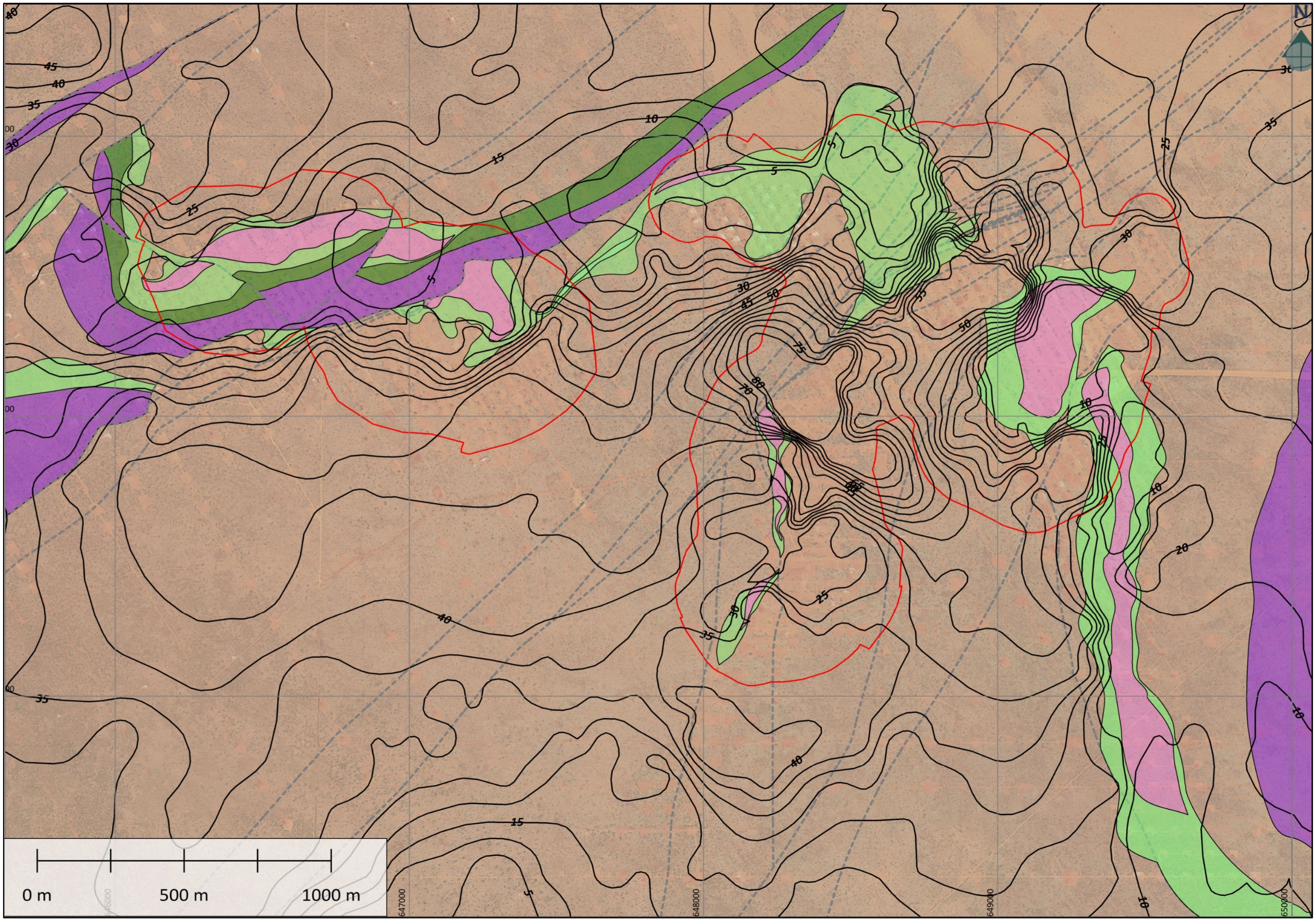
Groundwater model area

Bedrock outcrop and shallow subcrop within model area

Interpreted lateral extent of main palaeochannel

20 Interpreted thickness of alluvium (m)

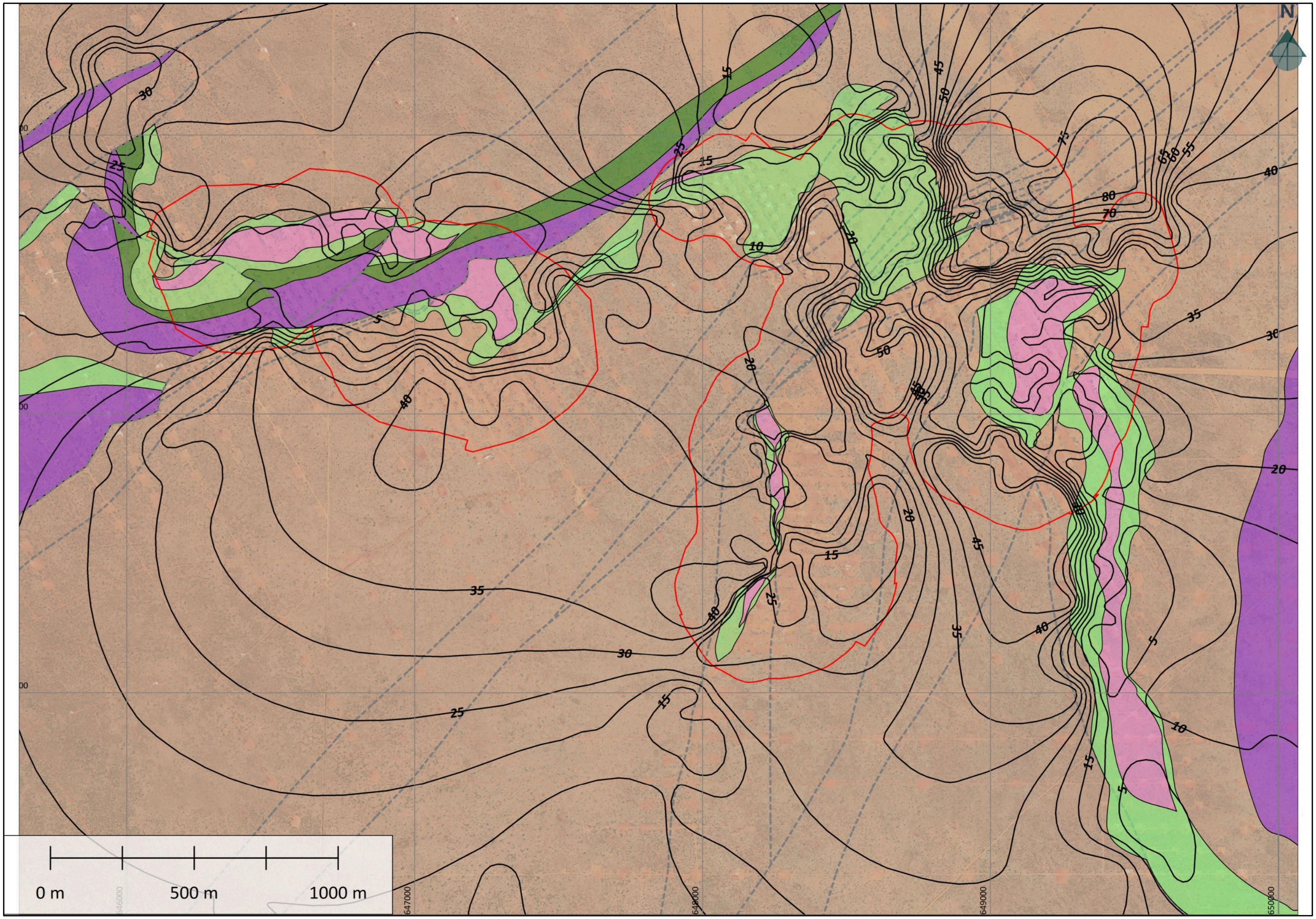
Client	DE GREY MINING LTD	Alluvium Thickness	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-4	Plan Number
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference



De Grey Bedrock Lithologies

- Sedimentary units
- Felsic Intrusives
- Mafics
- Ultramafics
- Quartz-Diorite and Diorite Intrusions
- Potential Hemi Pit Outlines
- Saprolite thickness contours (m)
- Major Structures (at top of bedrock elevation) [by De Grey]

Client	DE GREY MINING LTD	Thickness of Saprolite Profile in Hemi Area	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-5	Plan Number
Geowater CONSULTING	A4L		
	Project #	1006-001	File reference

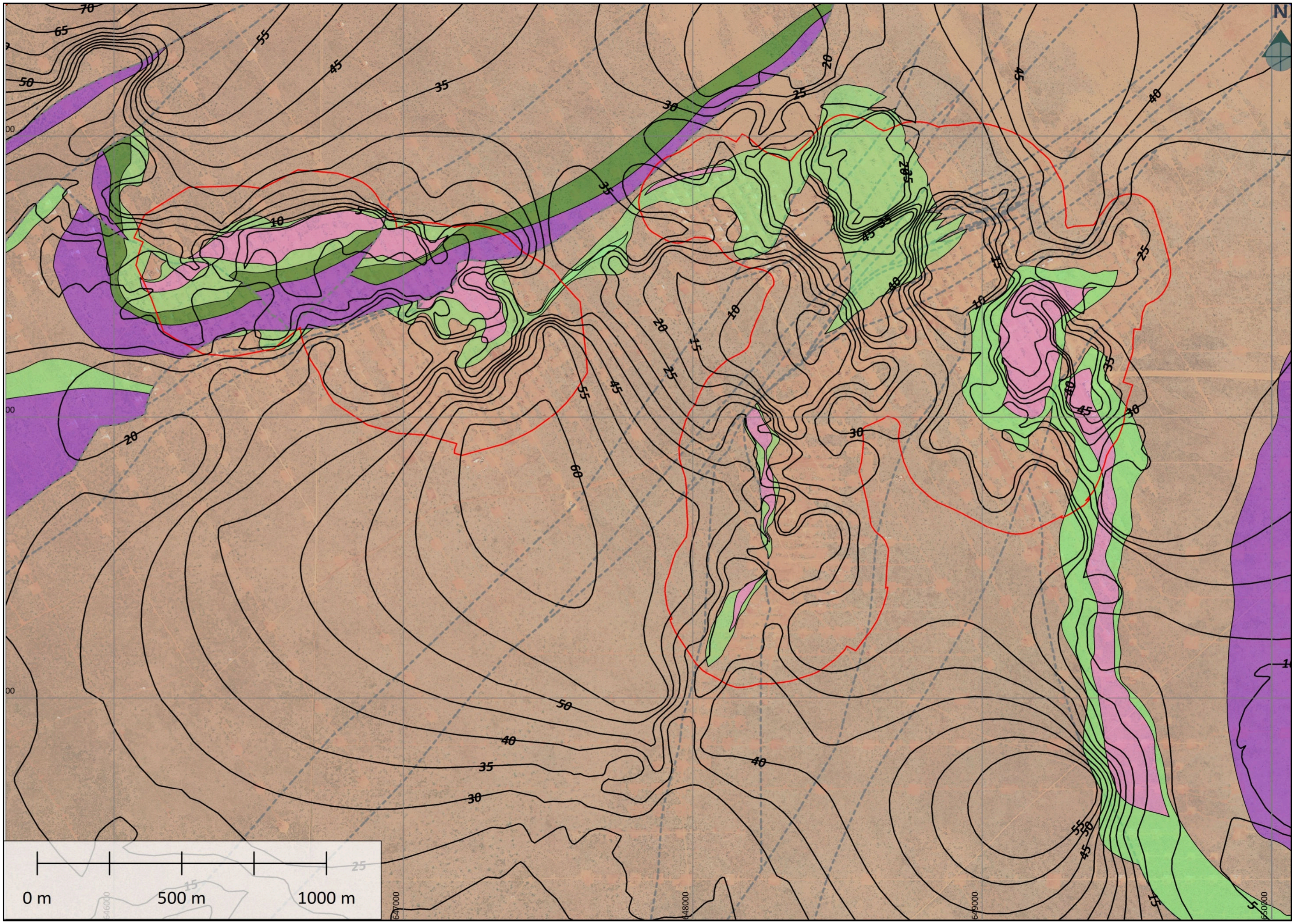


De Grey Bedrock Lithologies

- Sedimentary units
- Felsic Intrusives
- Mafics
- Ultramafics
- Quartz-Diorite and Diorite Intrusions

- Potential Hemi Pit Outlines
- 10 Saprock thickness contours (m)
- Major Structures (at top of bedrock elevation) [by De Grey]

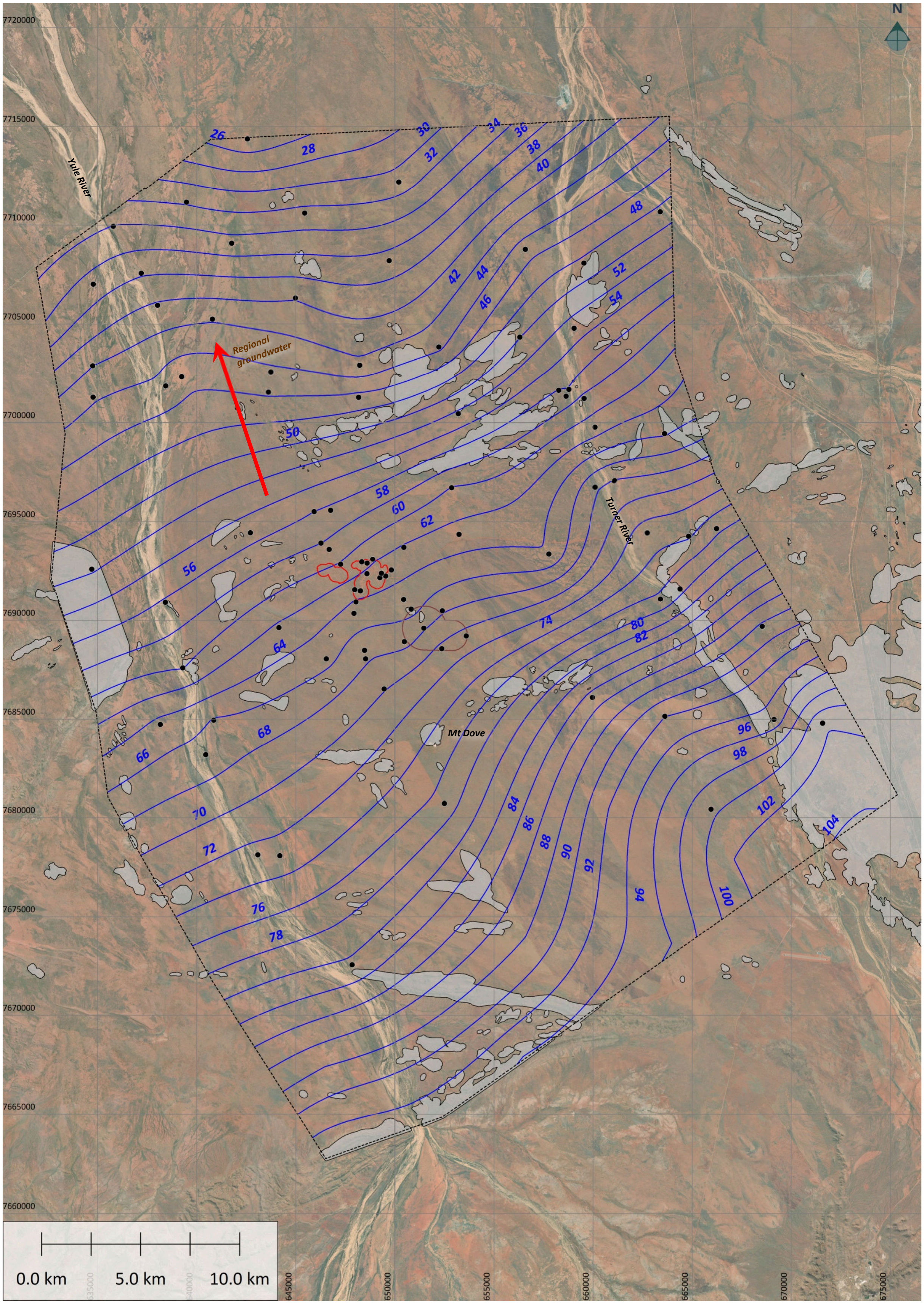
Client	DE GREY MINING LTD	Thickness of Saprock Profile in Hemi Area	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-6	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



De Grey Bedrock Lithologies

- Sedimentary units
- Felsic Intrusives
- Mafics
- Ultramafics
- Quartz-Diorite and Diorite Intrusions
- Potential Hemi Pit Outlines
- Saprock thickness contours (m)
- Major Structures (at top of bedrock elevation) [by De Grey]

Client	DE GREY MINING LTD	Thickness of Slightly Weathered Rock Profile in Hemi Area	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-7	Plan Number
Geowater Consulting	A4L		
	Project # 1006-001		File reference



Proposed open pit outlines

Proposed TSF outline

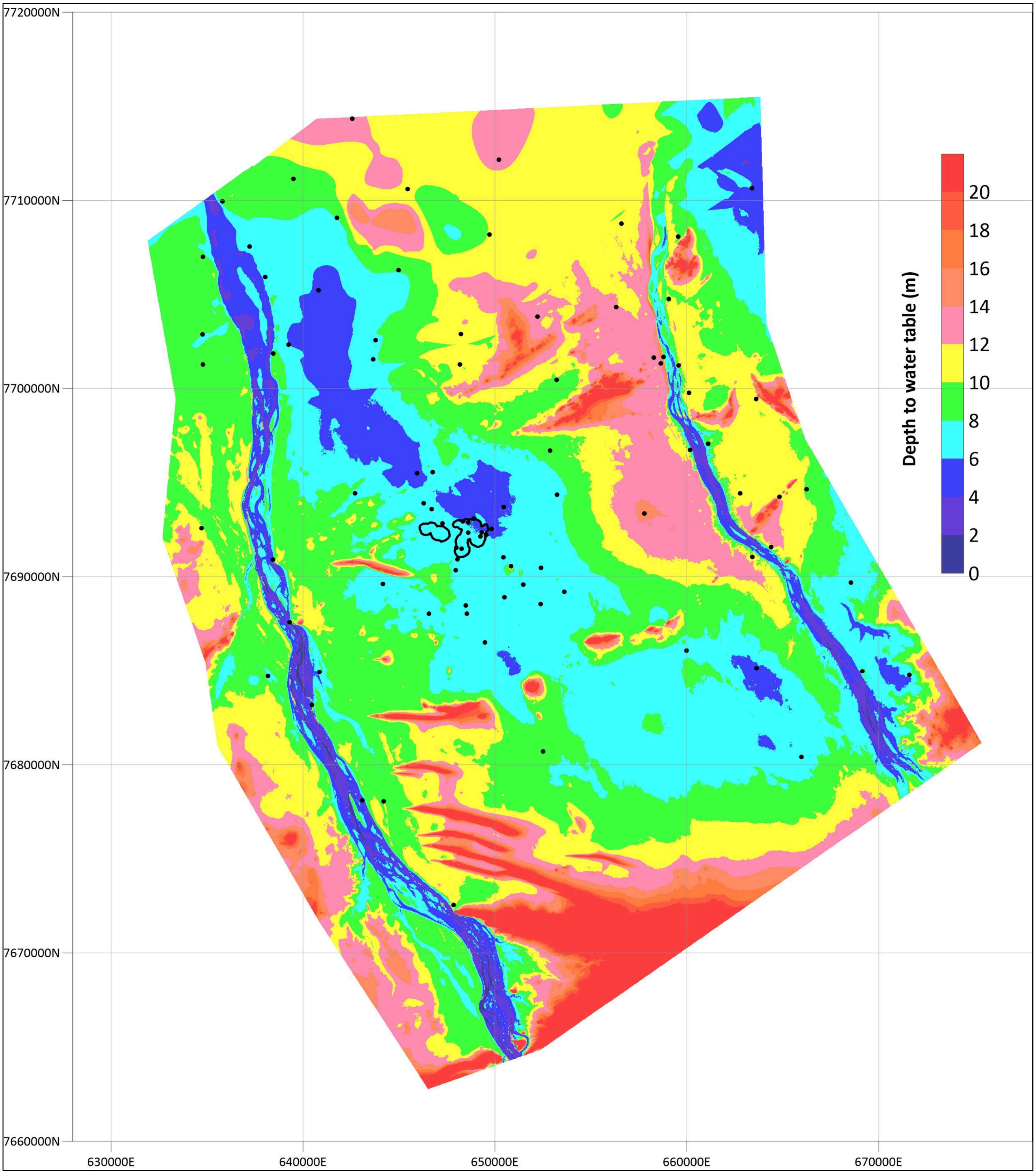
Groundwater Model extent

Bedrock outcrop and shallow

Water table contours (mAHD)

Water observation point

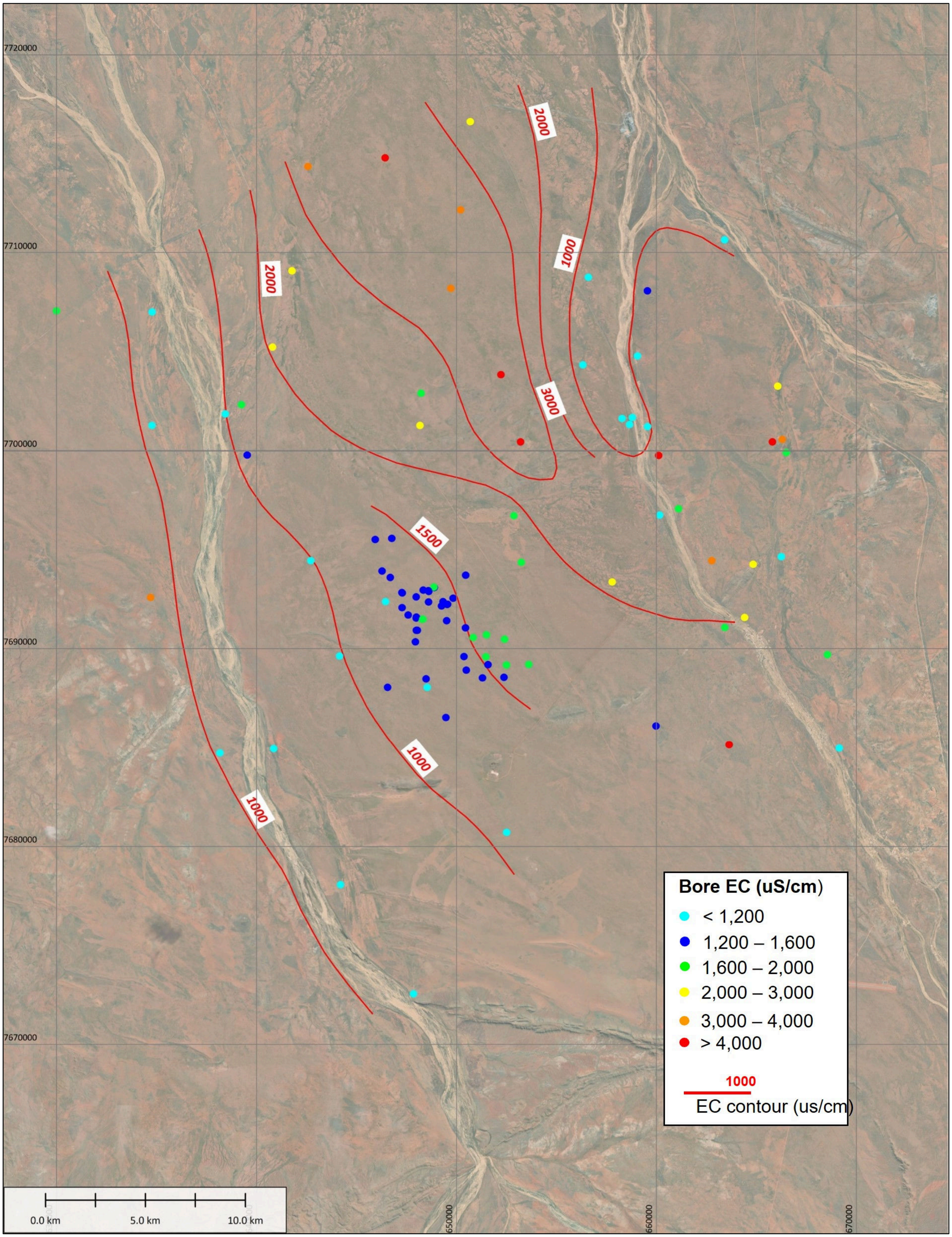
Client	DE GREY MINING LTD	Water Table Contours - November 2022	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-8	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference



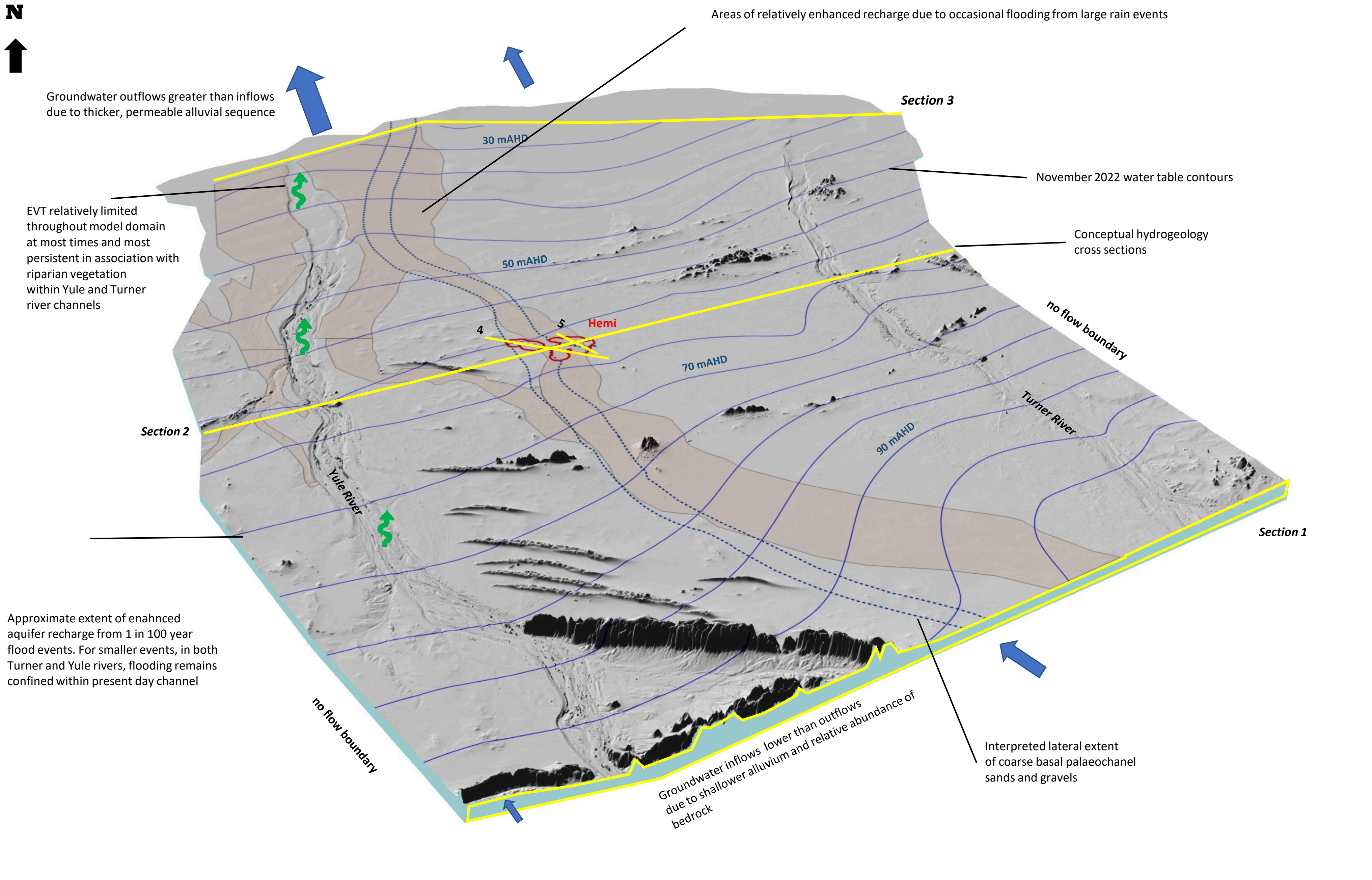
Proposed open pit outlines

Water swl observation point

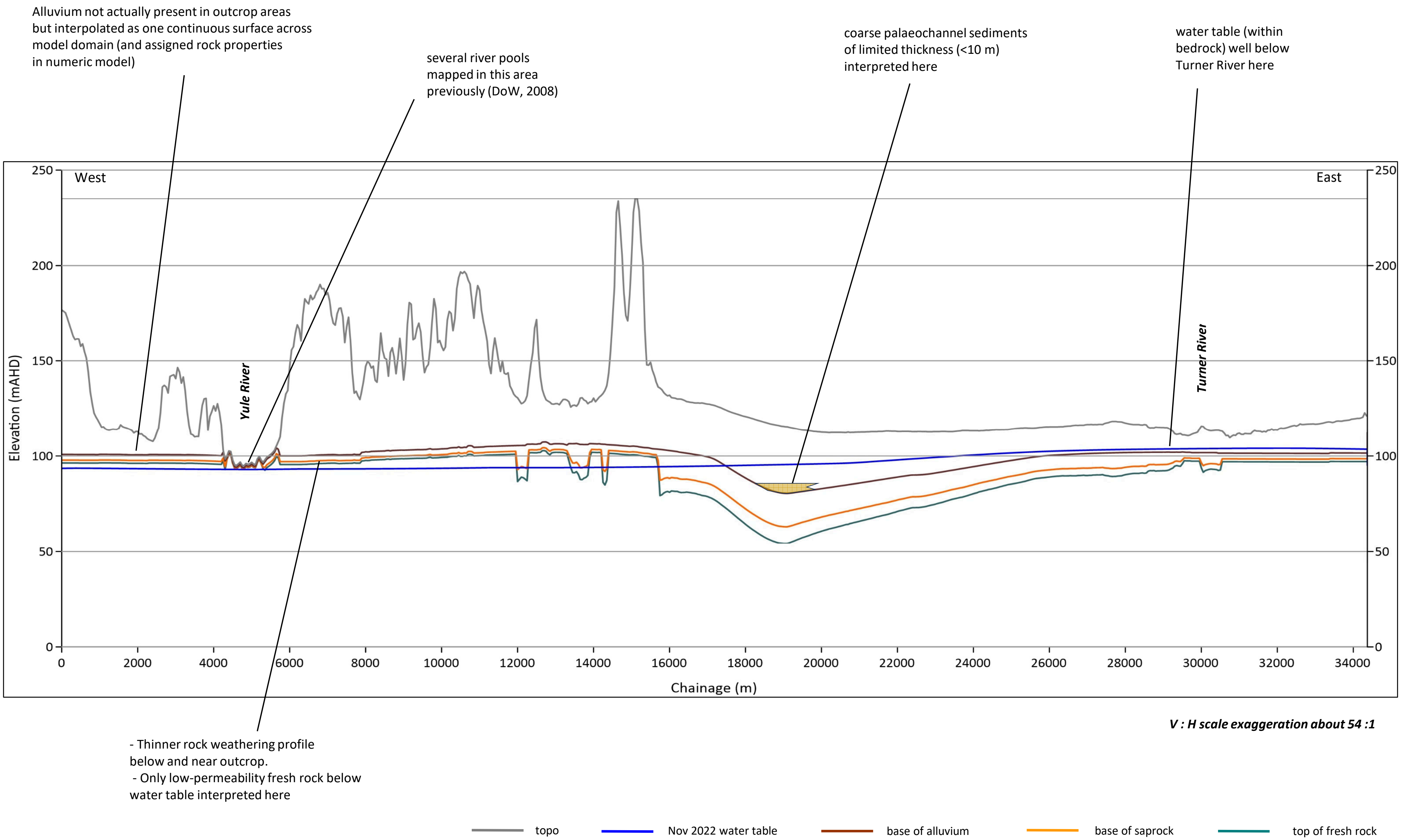
Client	DE GREY MINING LTD	Depth to Water Table - November 2022	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-9	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference



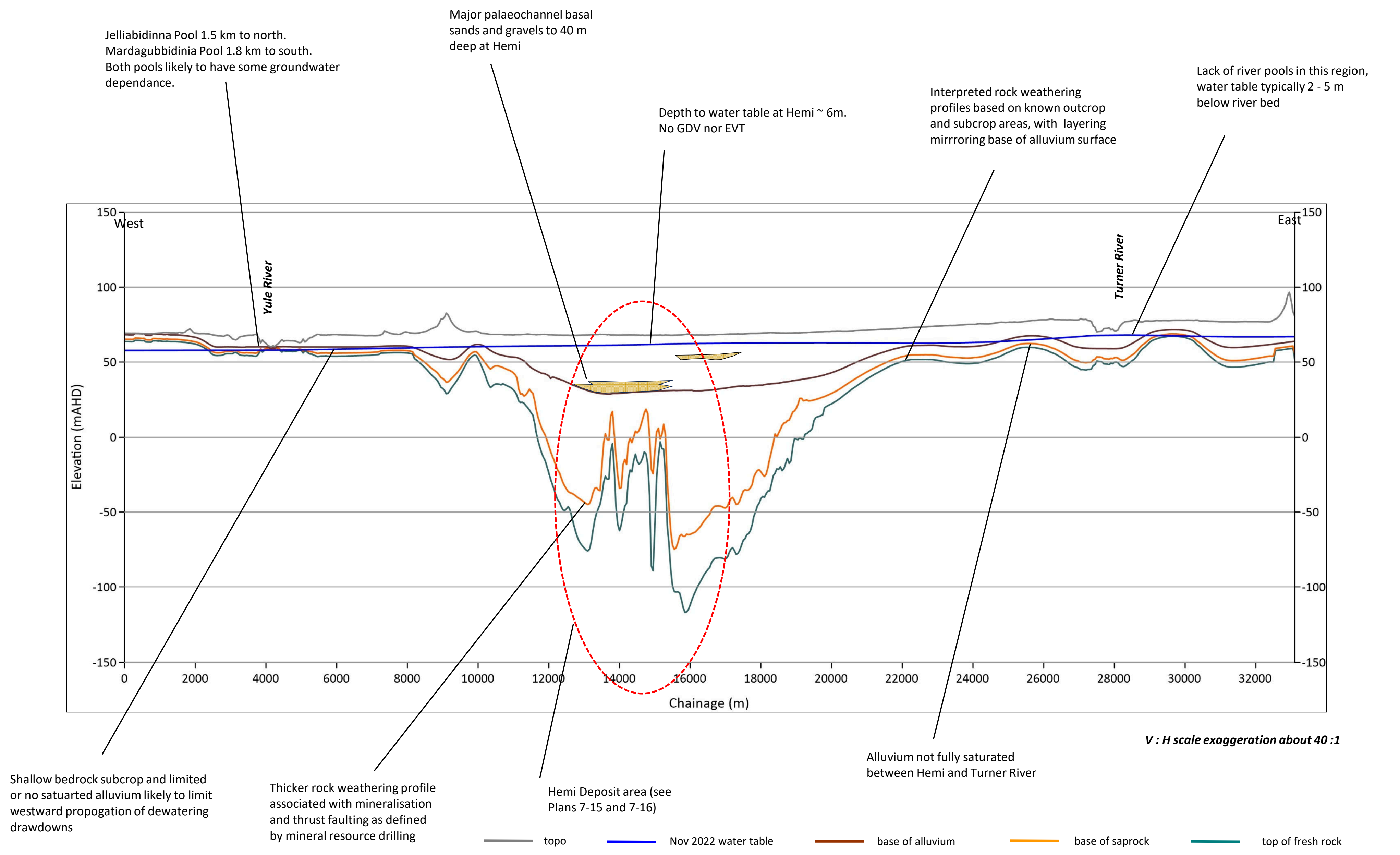
Client	*DE GREY MINING LTD*	**Water Table Salinity (as Electrical Conductivity)**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT*** **7-10**		**Plan Number**
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference



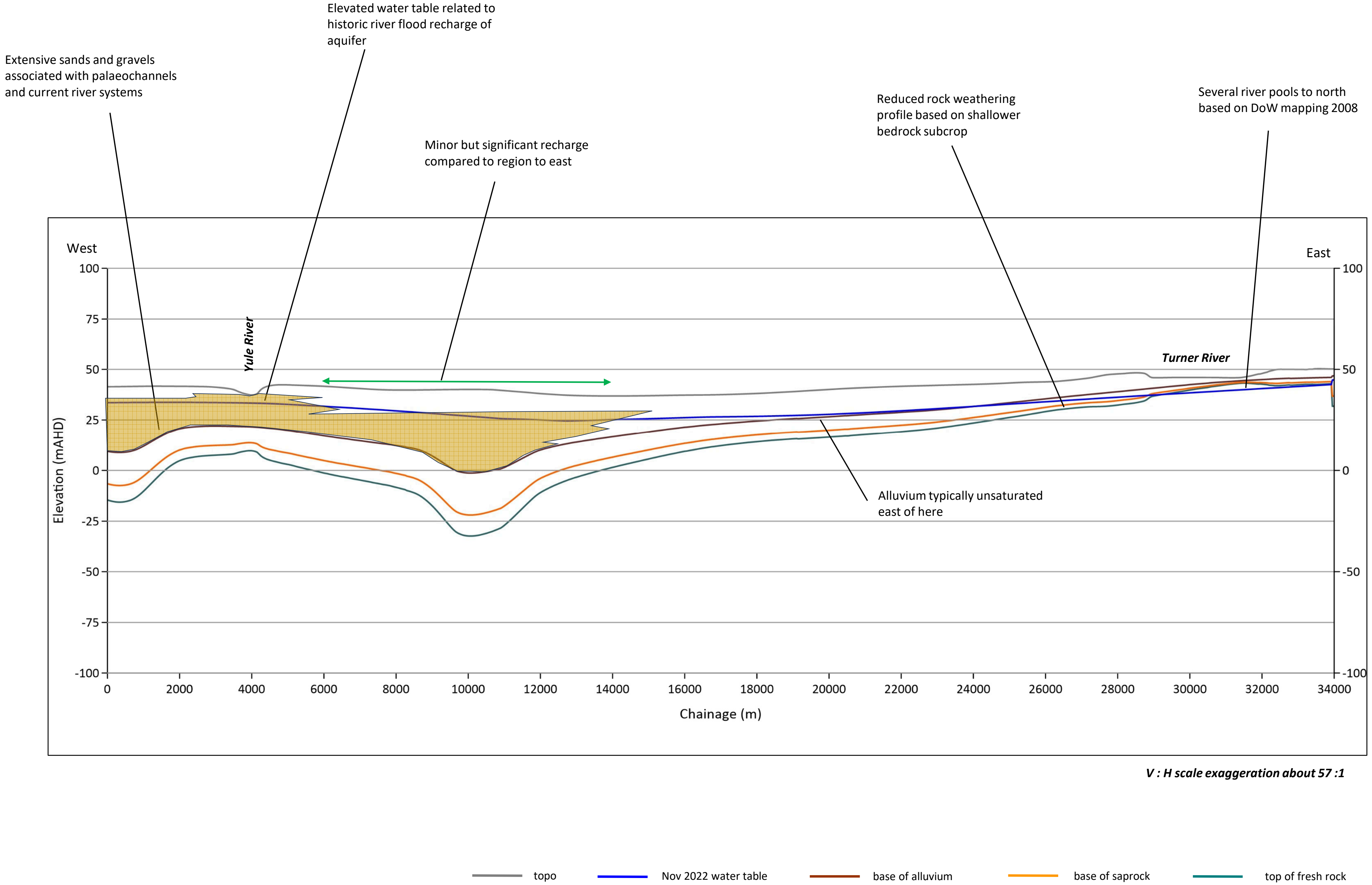
Client	DE GREY MINING LTD	Conceptual Hydrogeology Plan	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-11	Plan Number
Geowater Consulting	A4L		
	Project # 1006-001		File reference



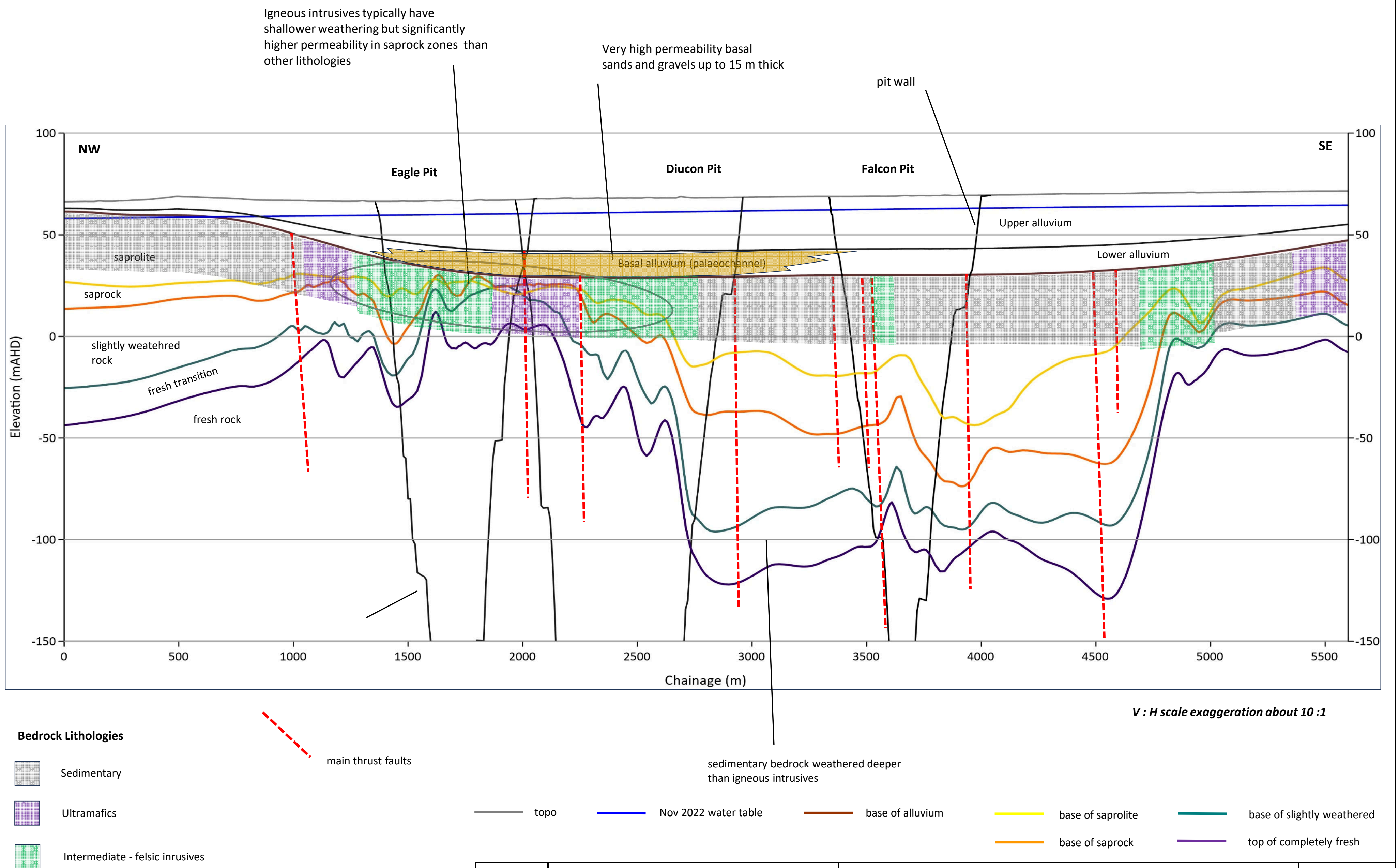
Client	*DE GREY MINING LTD*	**Conceptual Hydrogeology Section 1 - Southern Model Boundary**	Plan Title
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**7-12**	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



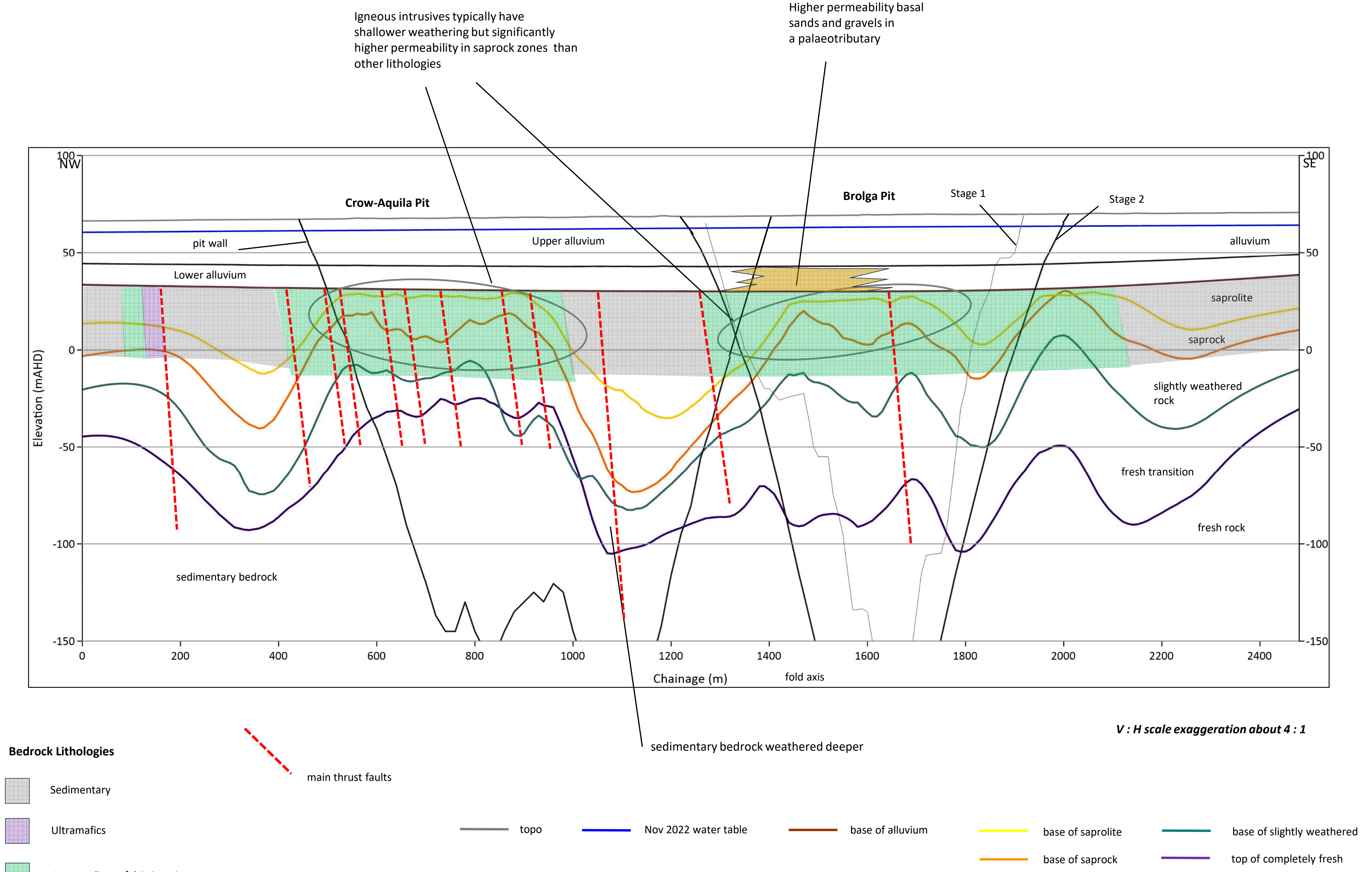
Client	DE GREY MINING LTD	Conceptual Hydrogeology Section 2 - Regional Hemi Section	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-13	Plan Number
Geowater Consulting	A4L		
	Project # 1006-001		File reference



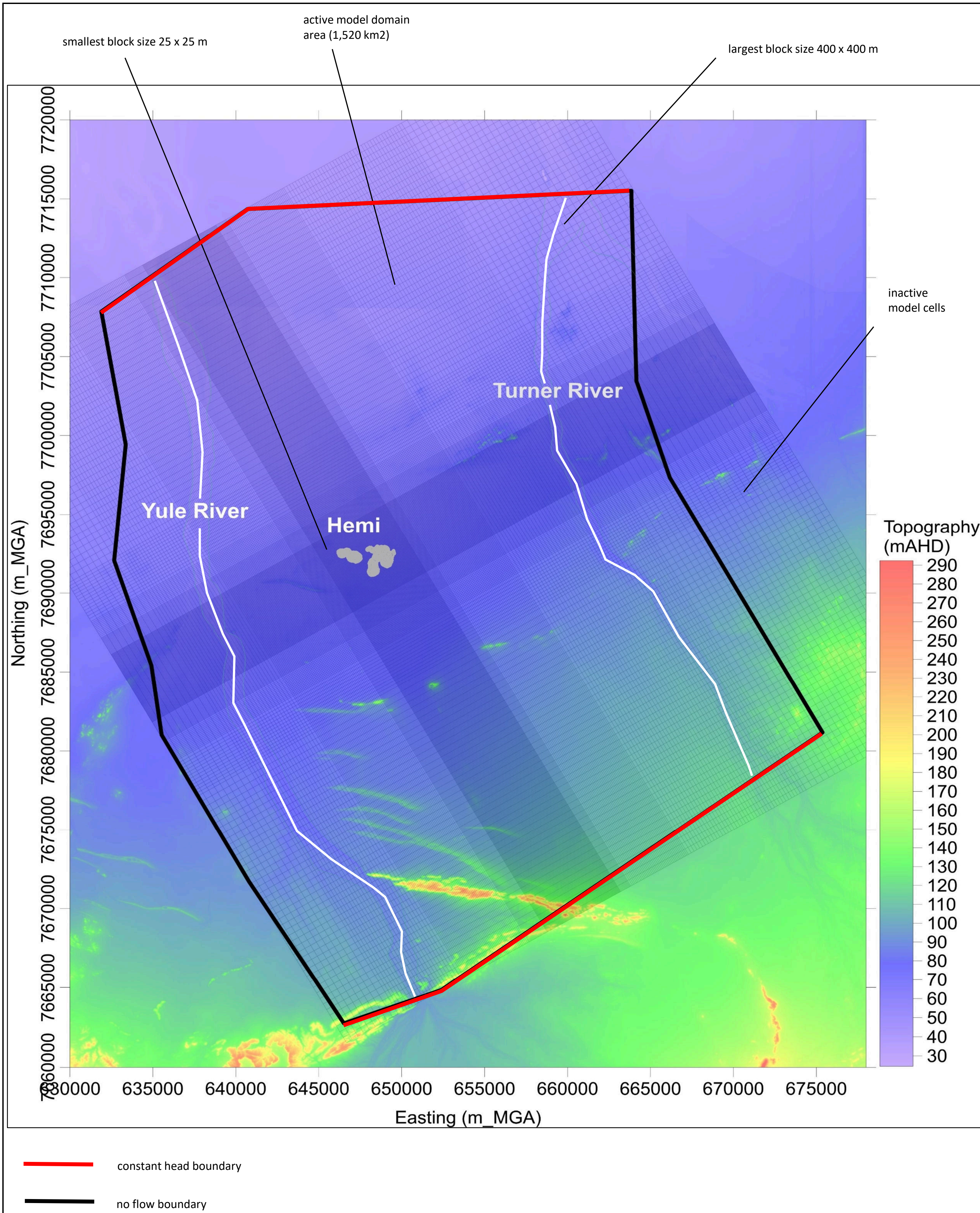
Client	DE GREY MINING LTD	Conceptual Hydrogeology Section 3 - Northern Model Boundary	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-14	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



Client	DE GREY MINING LTD	Conceptual Hydrogeology Section 4 - Eagle-Diucon-Falcon	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	7-15	Plan Number
Geowater CONSULTING	A4L		
	Project #	1006-001	File reference



Client	*DE GREY MINING LTD*	**Conceptual Hydrogeology Section 5 - Crow-Aquila-Brolga**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**7-16**	**Plan Number**
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

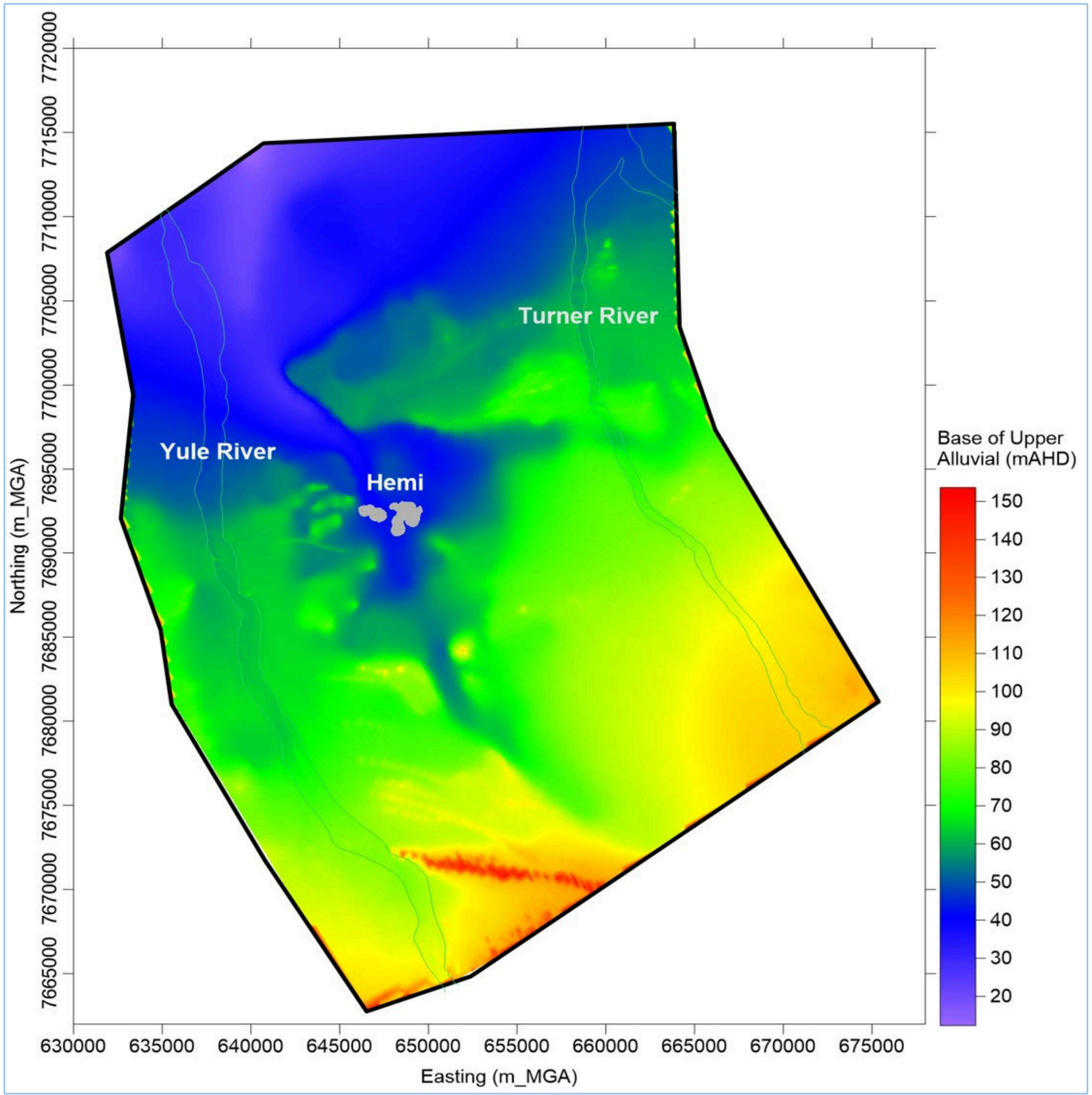


Client	*DE GREY MINING LTD*	**Numeric Model Extent and Grid**	**Plan Title**
Project	*HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT*	**8-1**	**Plan Number**

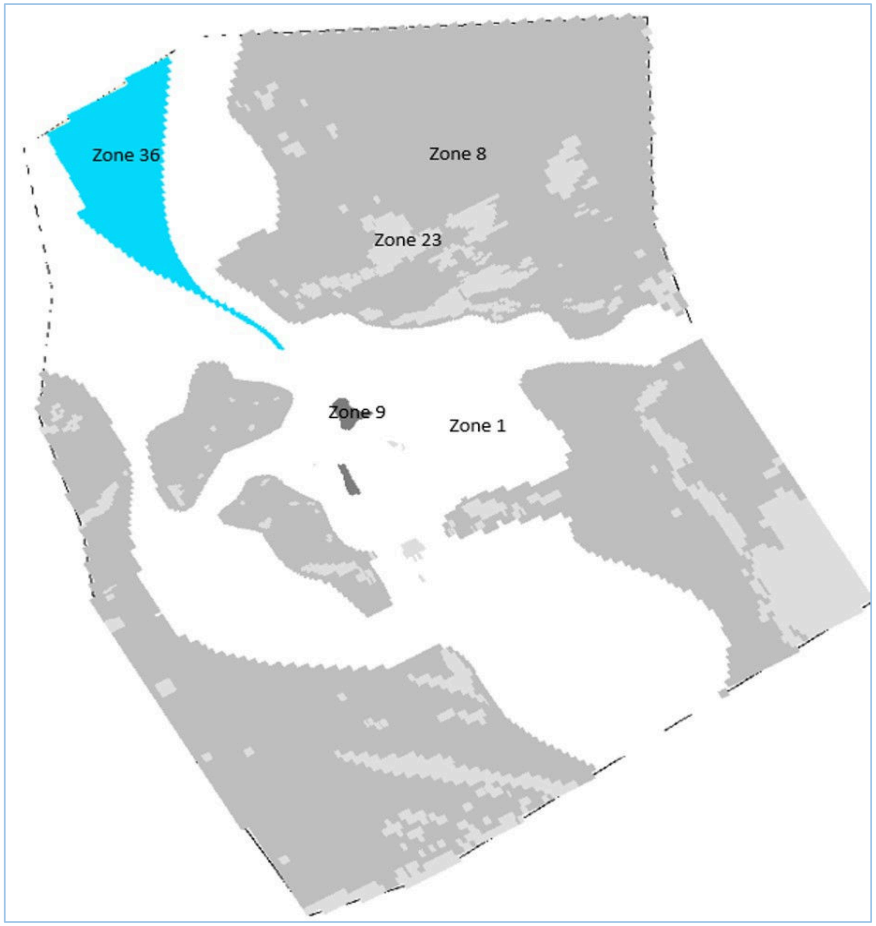
Geowater CONSULTING

A4P			
Project #	1006-001		File reference

Base of Upper Alluvium Surface in Numeric Model



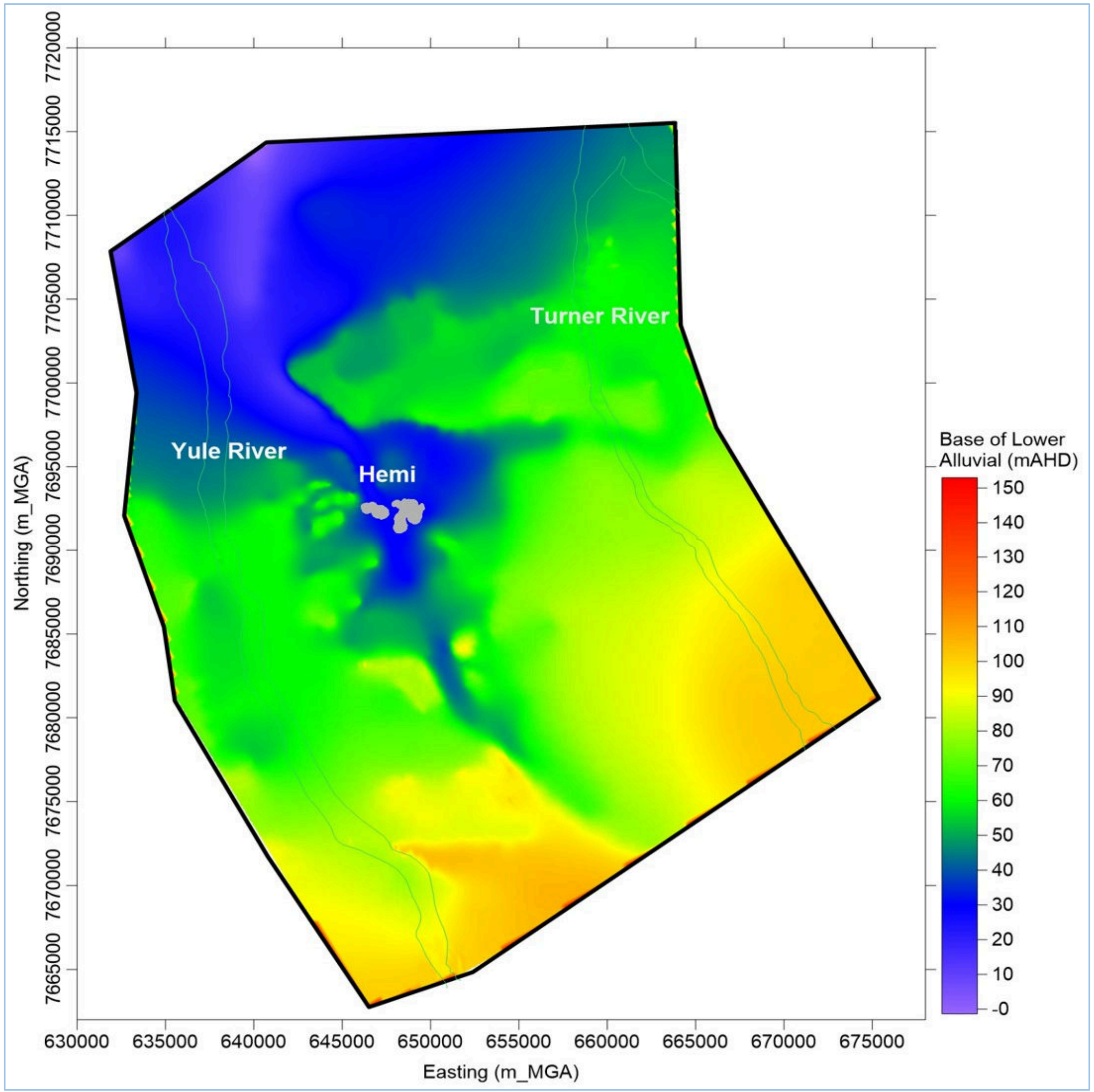
Hydraulic Property Zones within Upper Alluvium layers



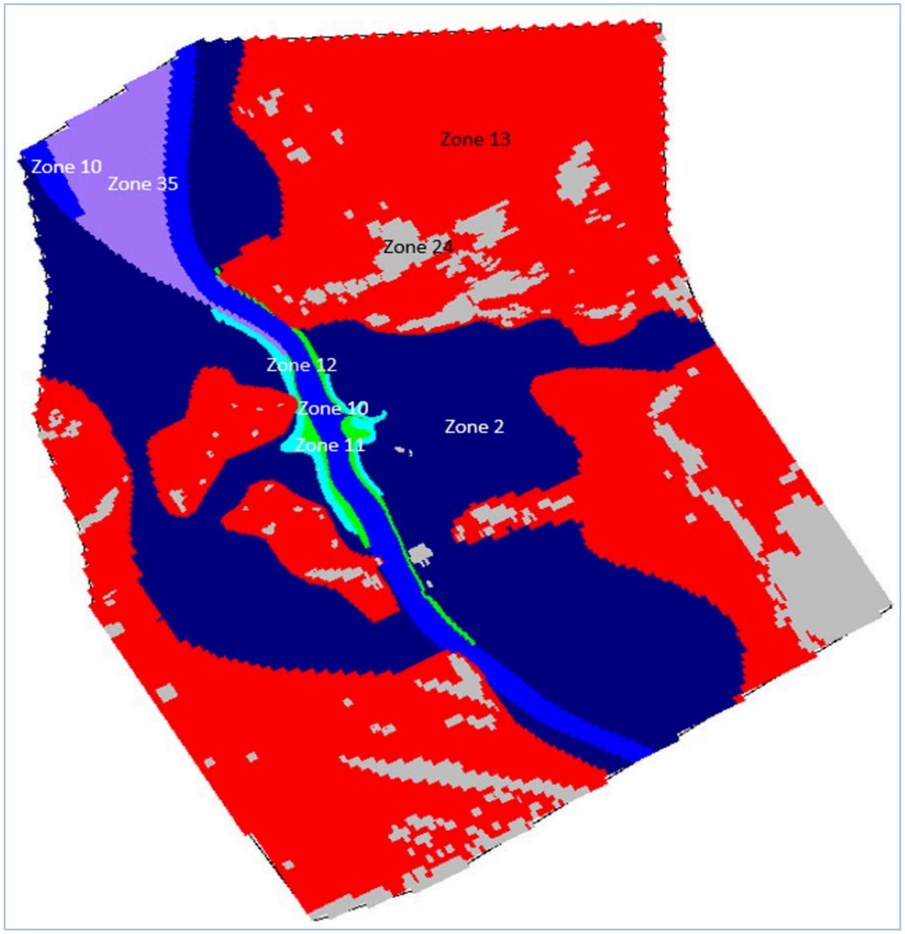
Zone	Kx (m/d)	Ky (m/d)	Kz (m/d)	Sy	Ss
1	3	3	1.5	0.075	1.00E-06
8	0.5	0.5	0.1	0.05	1.00E-06
9	15	15	3	0.1	1.00E-06
23	0.01	0.01	0.01	0.01	1.00E-06
36	15	15	3	0.15	1.00E-06

Client	*DE GREY MINING LTD*	**Upper Alluvium - Basal Surface and Property Zones**		**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***		**8-2**	**Plan Number**
Geowater CONSULTING	A4L			
	Project #	1006-001		File reference

Base of Lower Alluvium Surface in Numeric Model



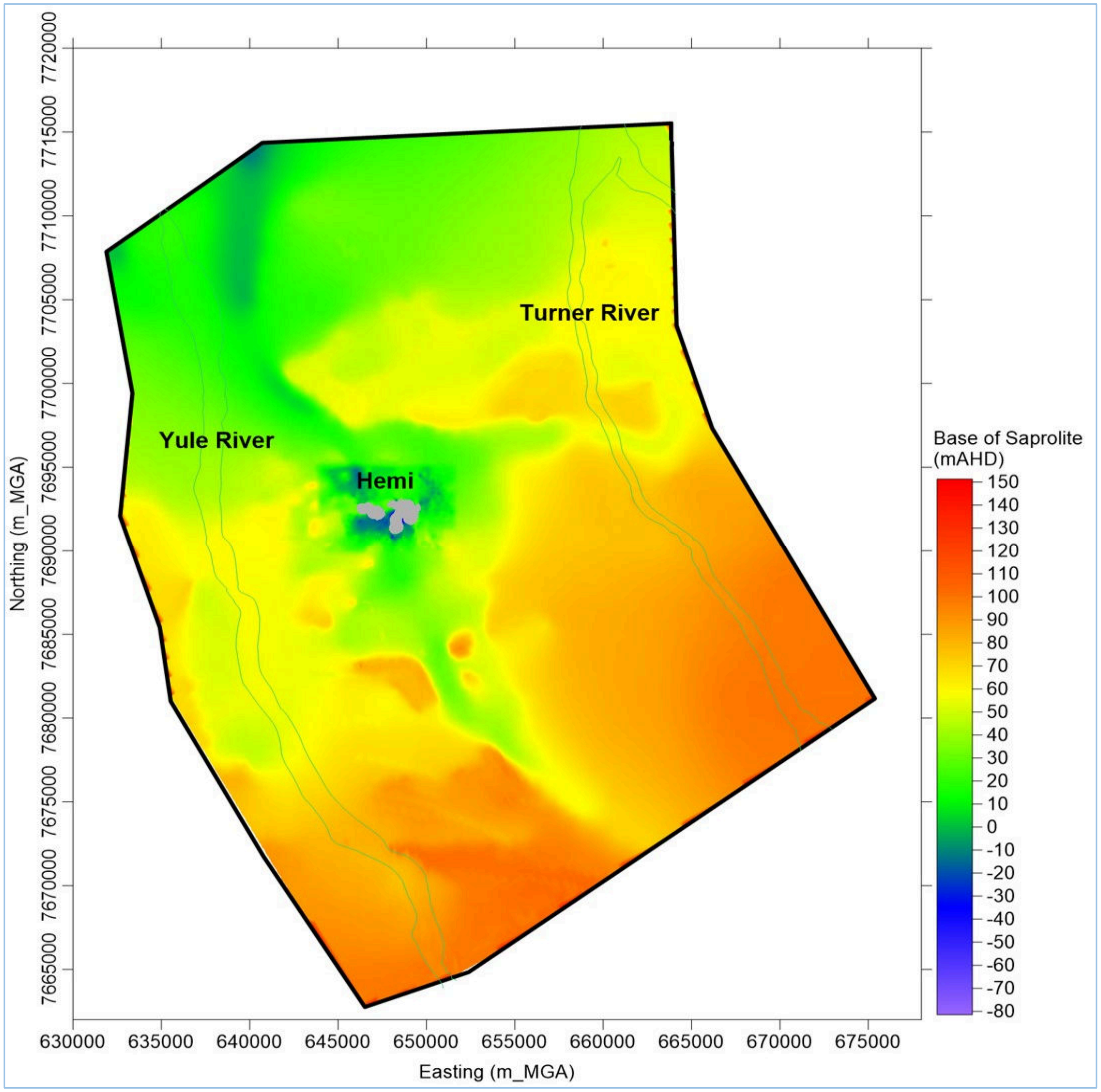
Hydraulic Property Zones within Lower Alluvium Layers



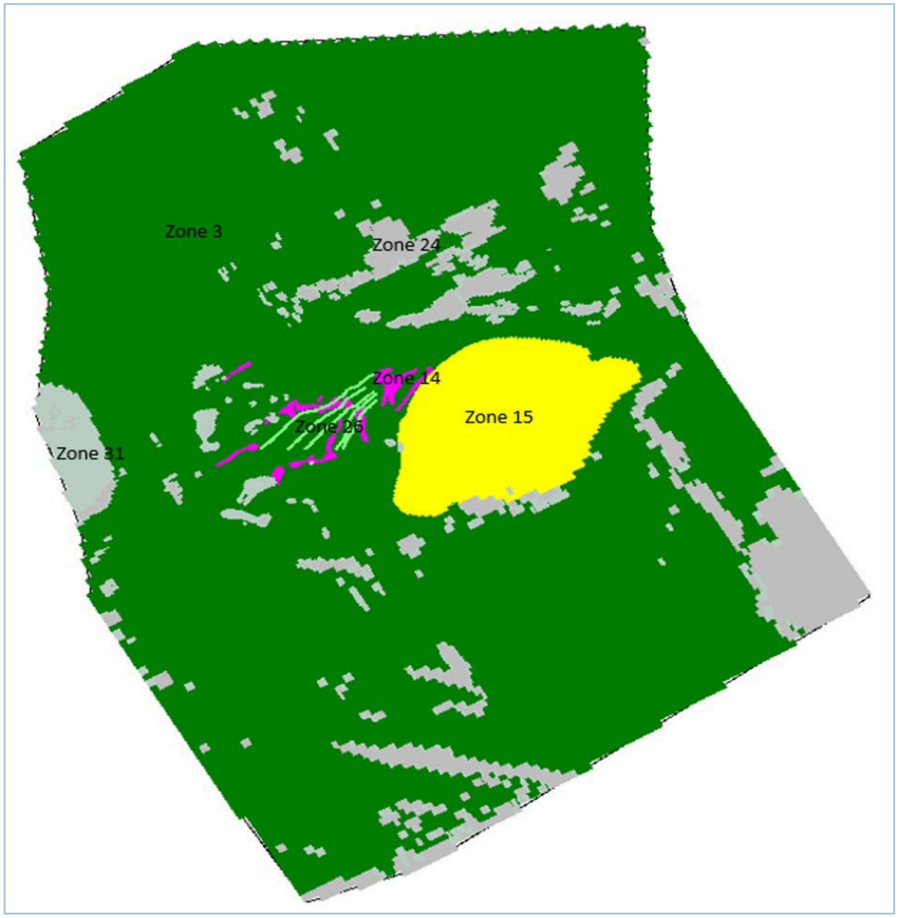
Zone	Kx (m/d)	Ky (m/d)	Kz (m/d)	Sy	Ss
2	3	3	1.5	0.075	1.00E-06
10	75	75	15	0.20	1.00E-06
35	25	25	5	0.10	1.00E-06
12	15	15	3	0.10	1.00E-06
13	0.5	0.5	0.1	0.05	1.00E-06
24	0.001	0.001	0.001	0.01	1.00E-06
11	15	15	3	0.15	1.00E-06

Client	*DE GREY MINING LTD*	**Lower Alluvium - Basal Surface and Property Zones**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-3**	**Plan Number**
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

Base of Saprolite Surface in Numeric Model



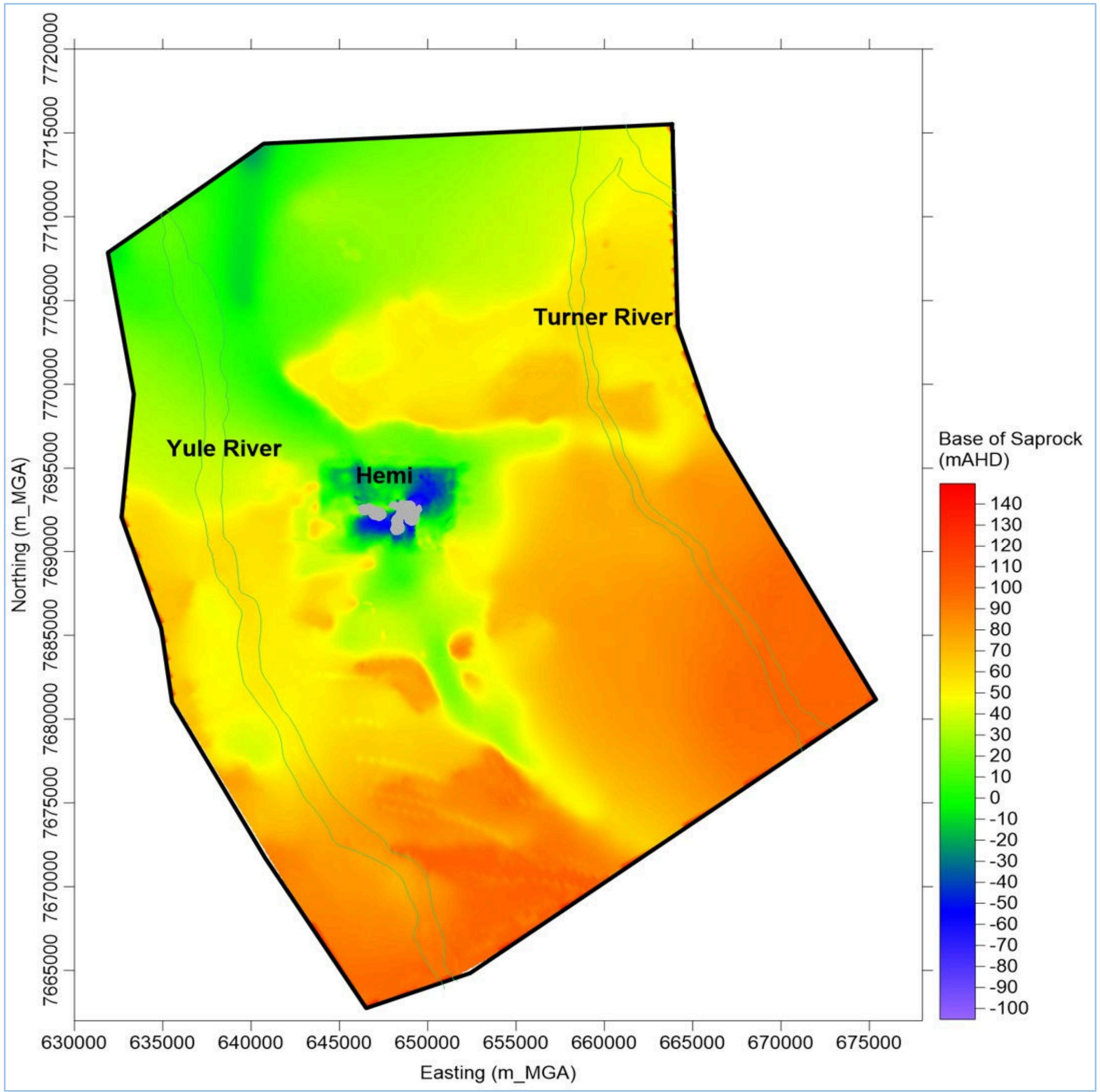
Hydraulic Property Zones within Saprolite Layers



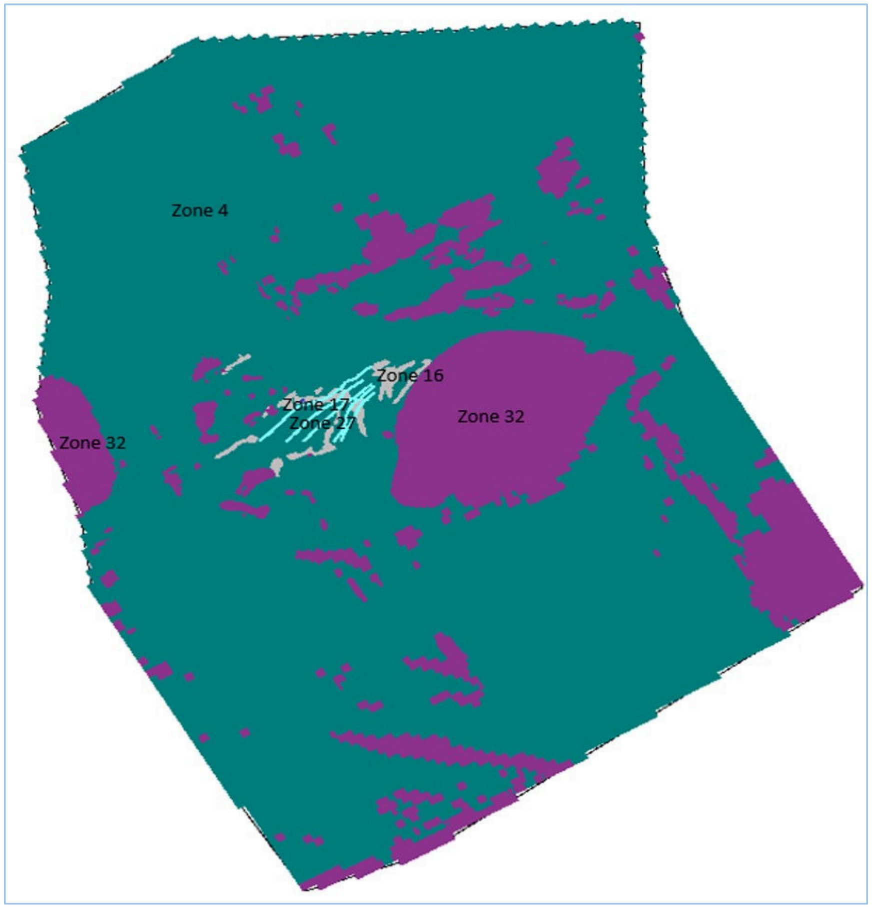
Zone	Kx (m/d)	Ky (m/d)	Kz (m/d)	Sy	Ss
3	0.01	0.01	0.01	0.05	1.00E-06
31	0.01	0.01	0.01	0.03	1.00E-06
14	0.50	0.50	0.50	0.05	1.00E-06
15	0.01	0.01	0.01	0.05	1.00E-06
24	0.001	0.001	0.001	0.01	1.00E-06
26	1	1	1	0.05	1.00E-06

Client	*DE GREY MINING LTD*	**Saprolite - Basal Surface and Property Zones**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-4**	**Plan Number**
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

Base of Saprock Surface in Numeric Model



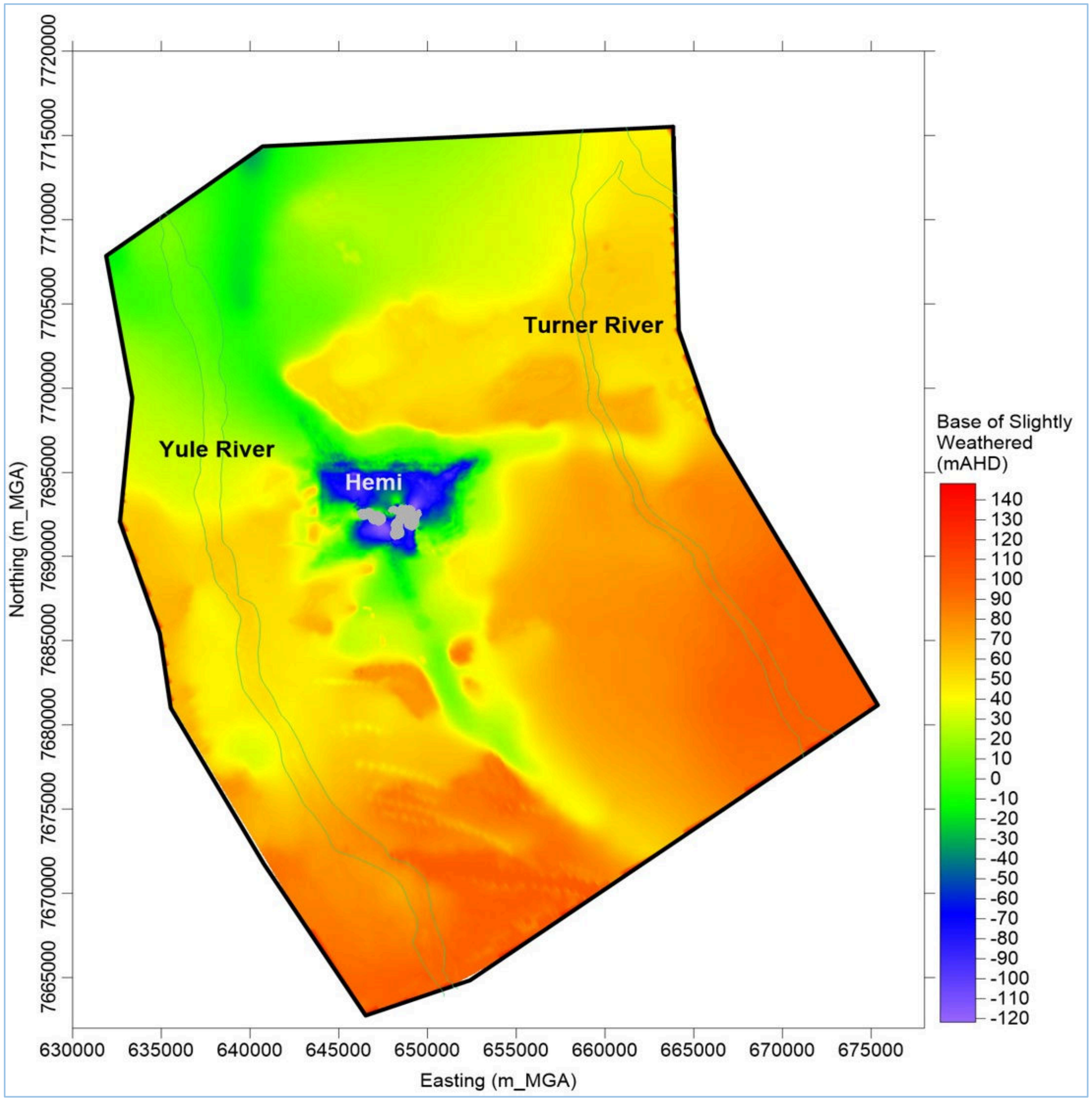
Hydraulic Property Zones within Saprock Layers



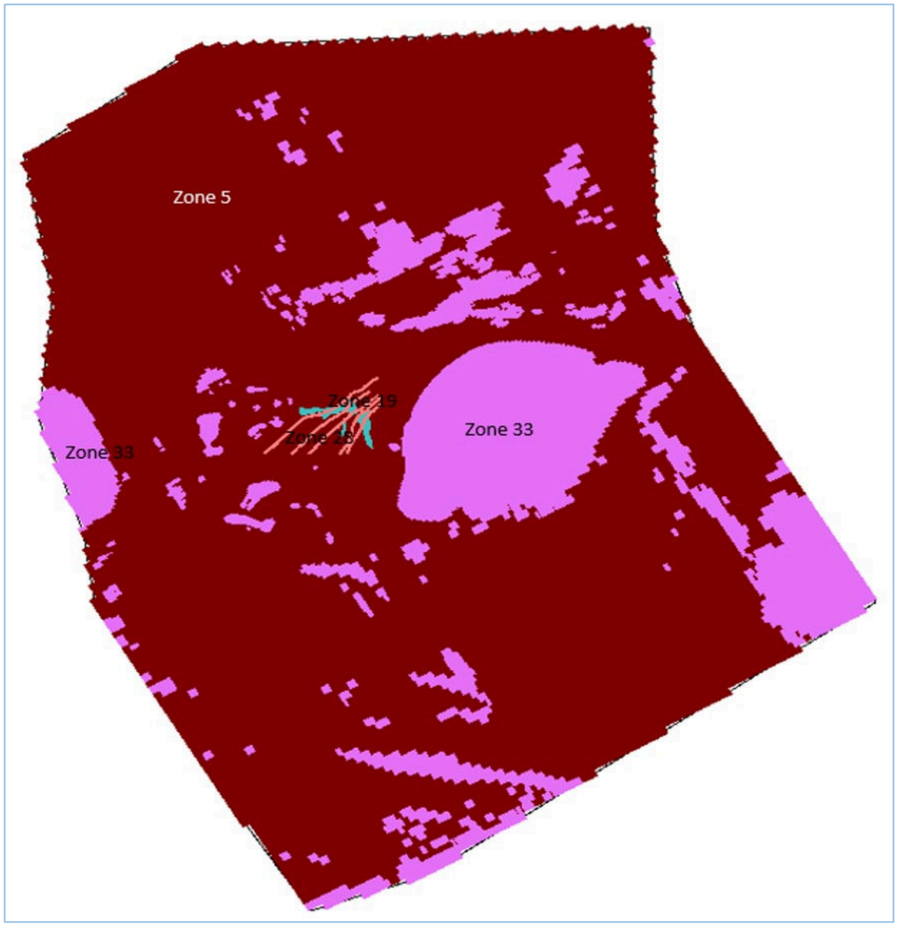
Zone	Kx (m/d)	Ky (m/d)	Kz (m/d)	Sy	Ss
4	0.1	0.1	0.1	0.03	1.00E-06
32	0.01	0.01	0.01	0.03	1.00E-06
16	2	2	2	0.03	1.00E-06
17	15	15	15	0.03	1.00E-06
27	5	5	5	0.03	1.00E-06

Client	*DE GREY MINING LTD*	**Saprock - Basal Surface and Property Zones**	Plan Title
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-5**	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

Base of Slightly Weathered Bedrock in Numeric Model



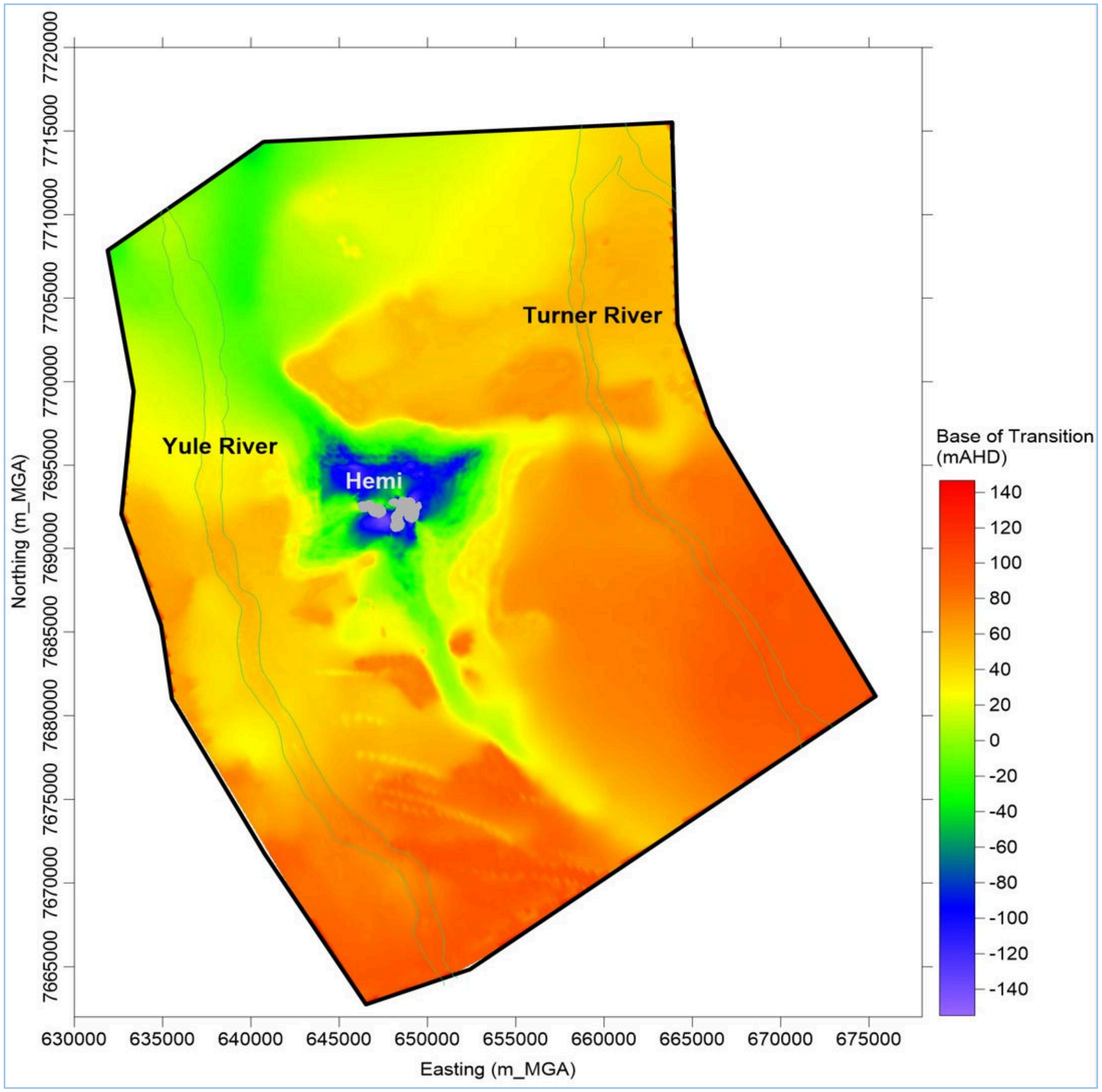
Hydraulic Property Zones within Slightly Weathered Bedrock Layers



Zone	Kx (m/d)	Ky (m/d)	Kz (m/d)	Sy	Ss
5	0.01	0.01	0.01	0.03	1.00E-06
33	0.001	0.001	0.001	0.02	1.00E-06
19	1	1	1	0.04	1.00E-06
28	5	5	5	0.03	1.00E-06

Client	*DE GREY MINING LTD*	**Slightly Weathered Bedrock - Basal Surface and Property Zones**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-6**	**Plan Number**
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

Base of Transitional Weathered Bedrock in Numeric Model
(= top of fresh bedrock surface)

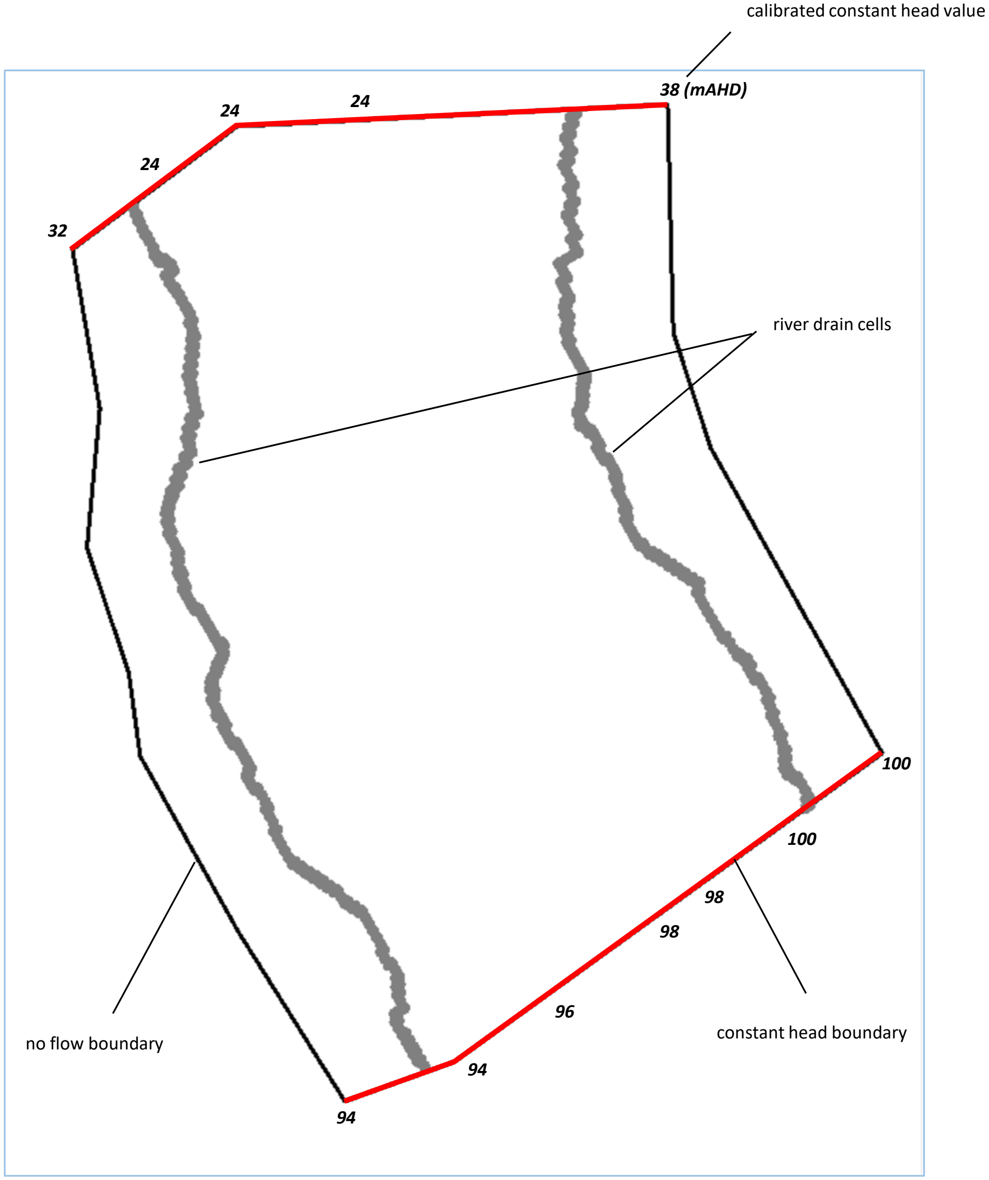


Hydraulic Property Zones within Transitional Weathered Bedrock Layers

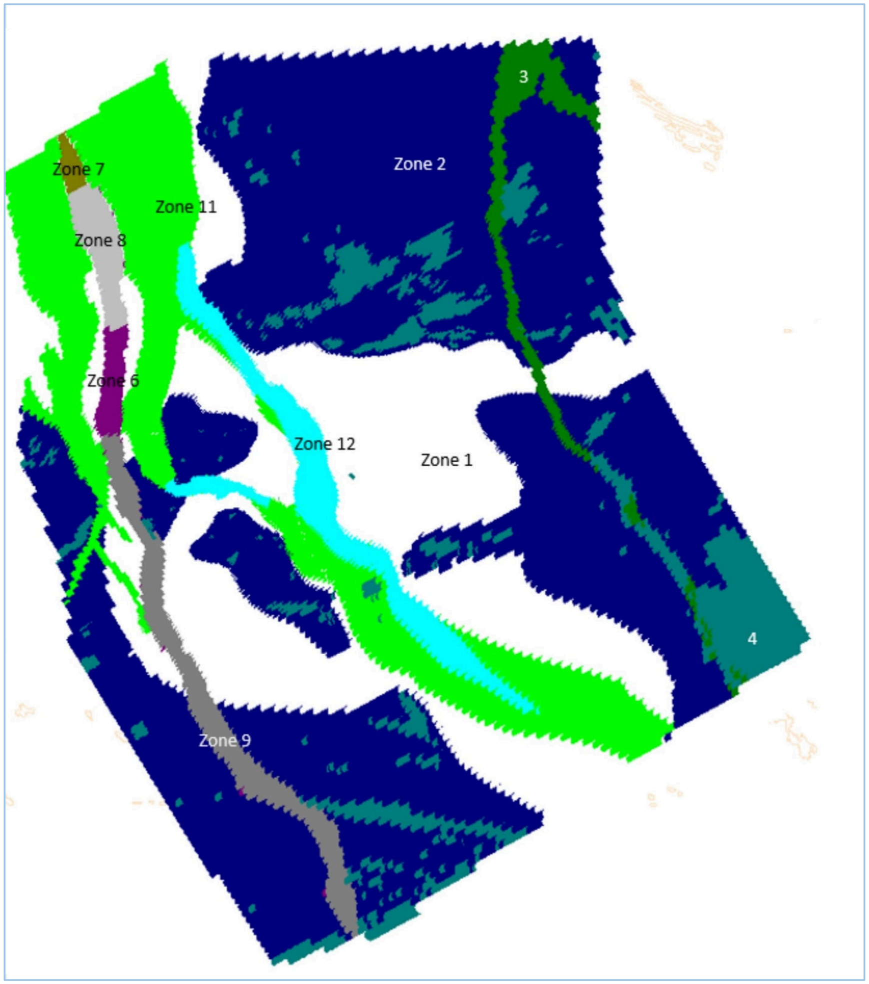
Zone	Kx (m/d)	Ky (m/d)	Kz (m/d)	Sy	Ss
6	0.001	0.001	0.001	0.02	1.00E-06
34	0.0001	0.0001	0.0001	0.02	1.00E-06
21	0.1	0.1	0.1	0.03	1.00E-06
29	1	1	1	0.03	1.00E-06

Client	*DE GREY MINING LTD*	**Transitional Weathered Bedrock - Basal Surface & Property Zones**	Plan Title
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-7**	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

External Boundaries and River Drain Cells



Recharge Domains



Recharge Zone / Averaged Steady State Rate

1 (Plains) / 0 mm/yr

2 (Plains, shallow bedrock) / 0 mm/yr

4 (Outcrop) / 0 mm/yr

11 (Floodplain areas) / 8 mm/yr

12 (weak drainage area during large rain events) / 12 mm/yr

3 (River bed) / 55 mm/yr

6 (River bed) / 55 mm/yr

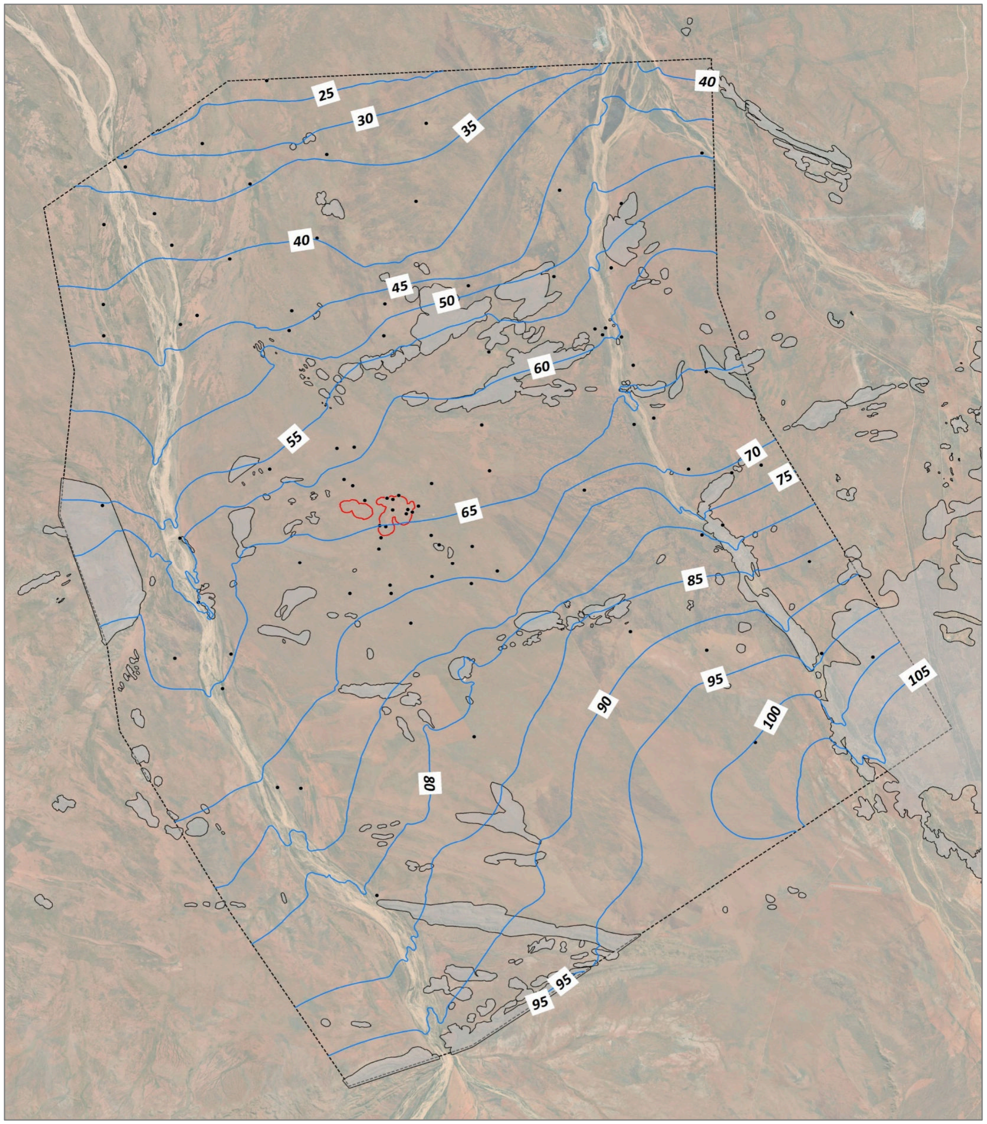
7 (River bed) / 220 mm/yr

8 (River bed) / 110 mm/yr

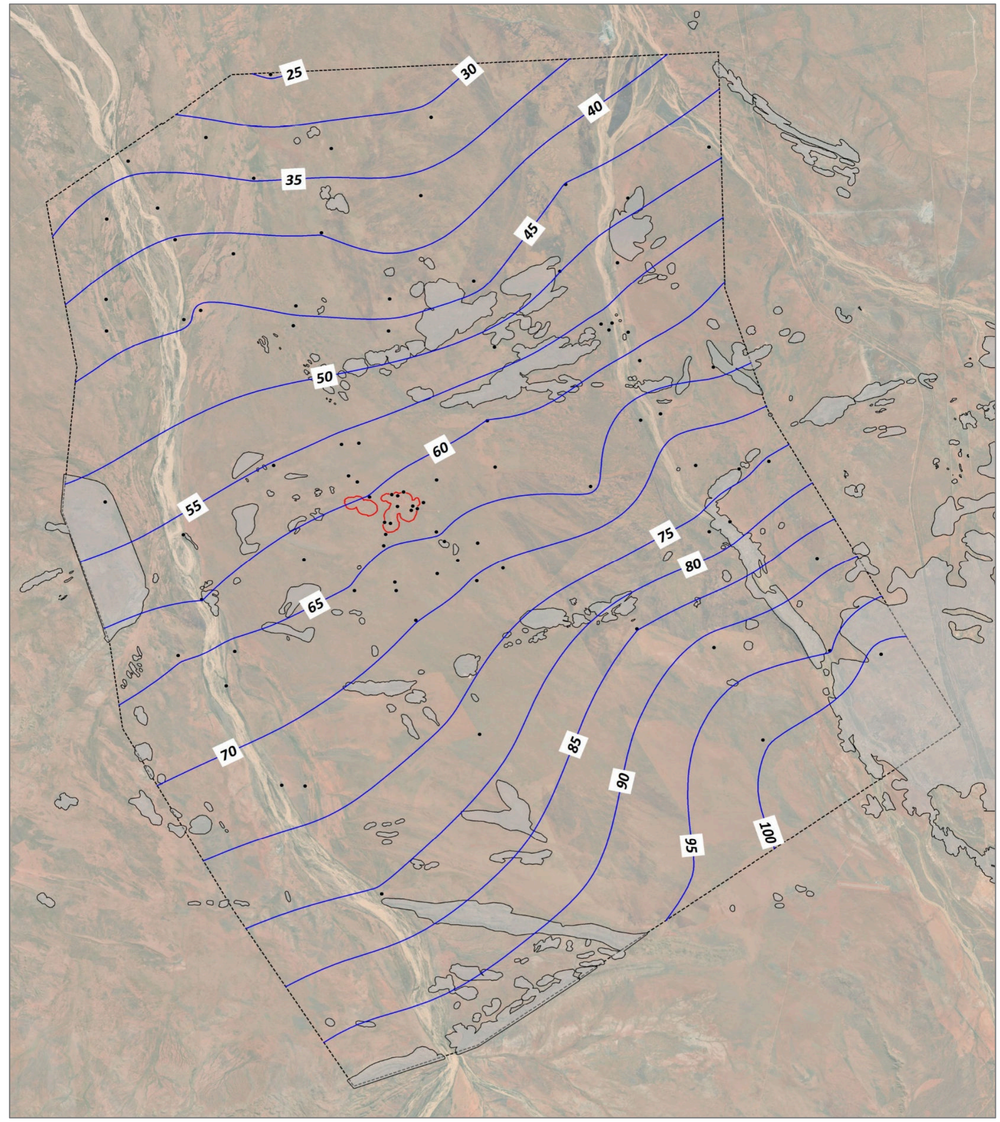
9 (River bed) / 55 mm/yr

Client	DE GREY MINING LTD	Steady State Model Boundary Conditions	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	8-8	Plan Number
Geowater Consulting	A4L		
	Project # 1006-001		File reference

Simulated



Observed / Interpreted



Potential pit outlines

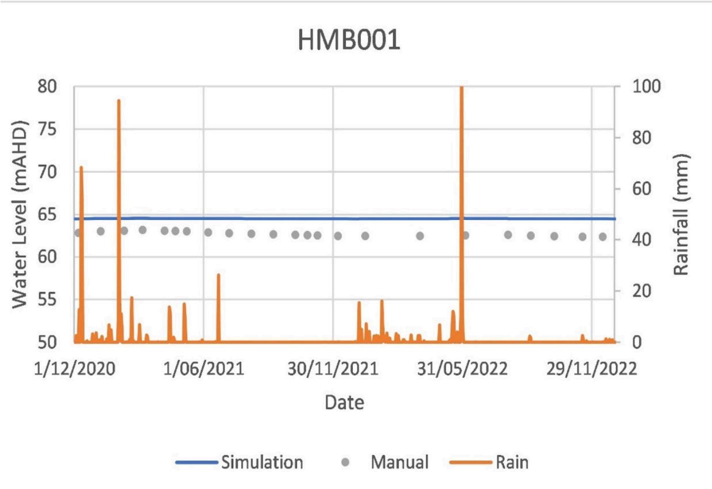
Observed water level location

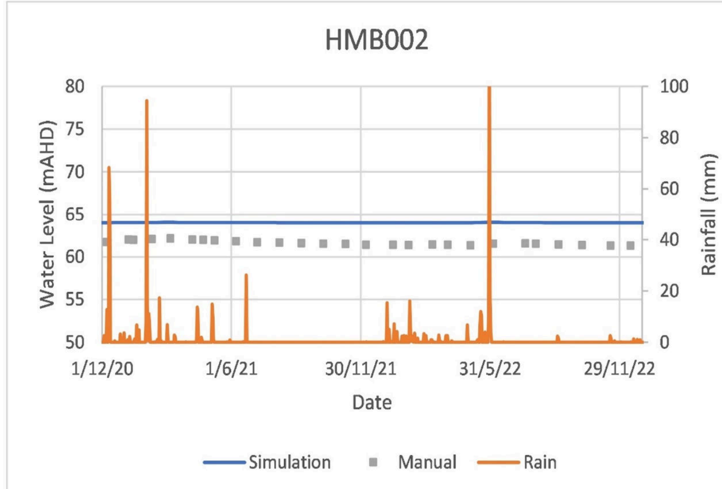
Groundwater model extent

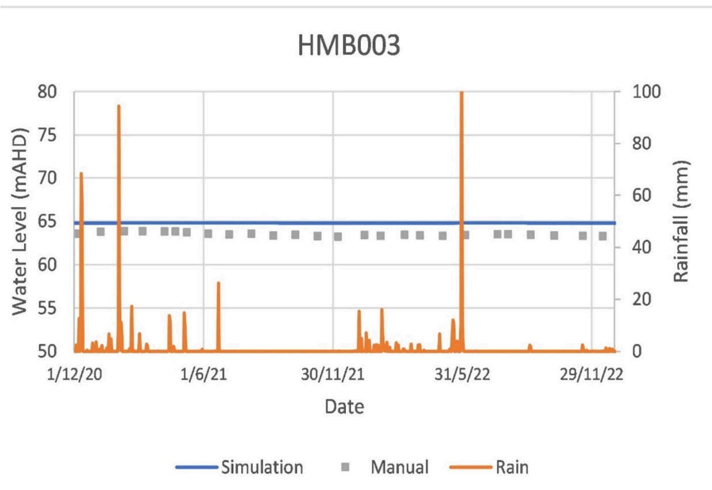
Bedrock outcrop/subcrop areas

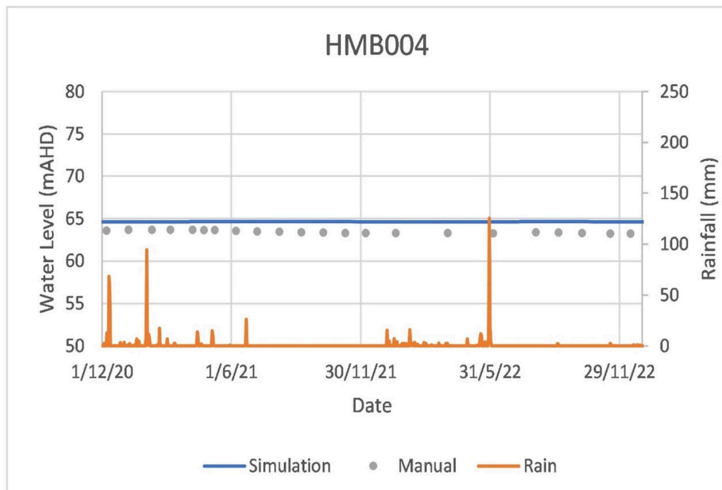
Client	*DE GREY MINING LTD*	**Simulated vs Interpreted Nov 2022 Water Table Contours (mAHD)**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-9**	**Plan Number**

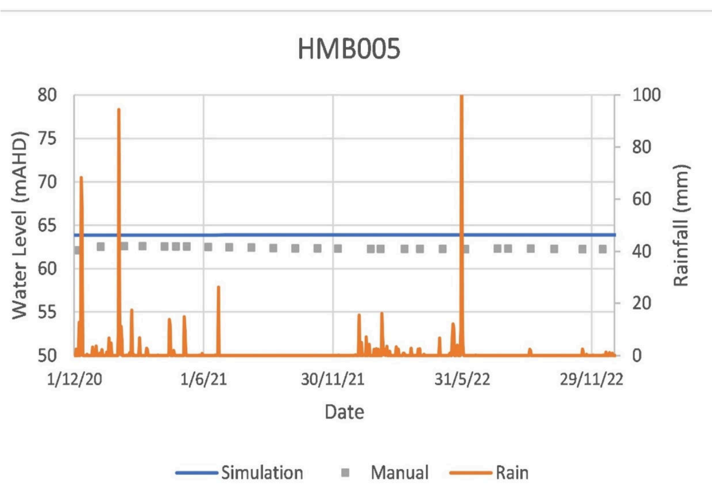
Geowater CONSULTING	A4L		
	Project #	1006-001	File reference

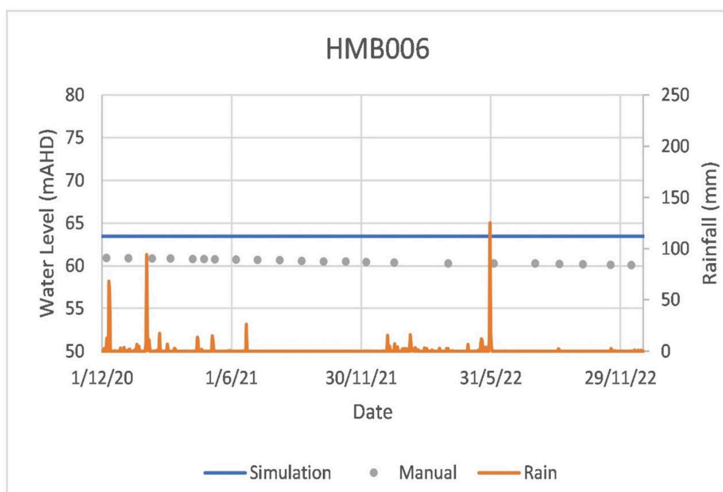




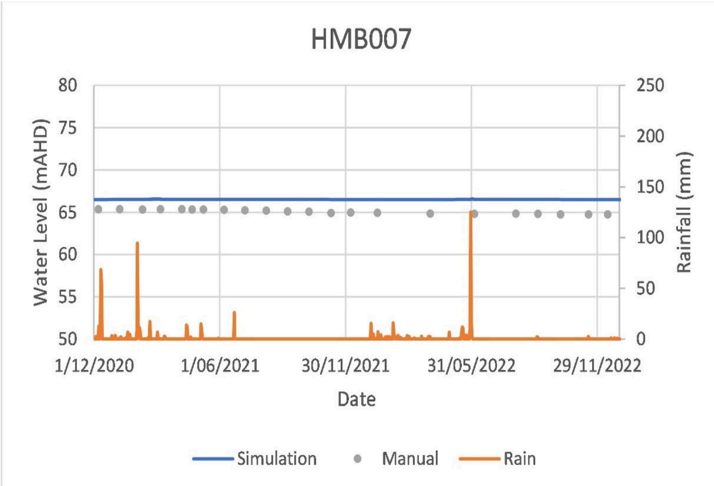


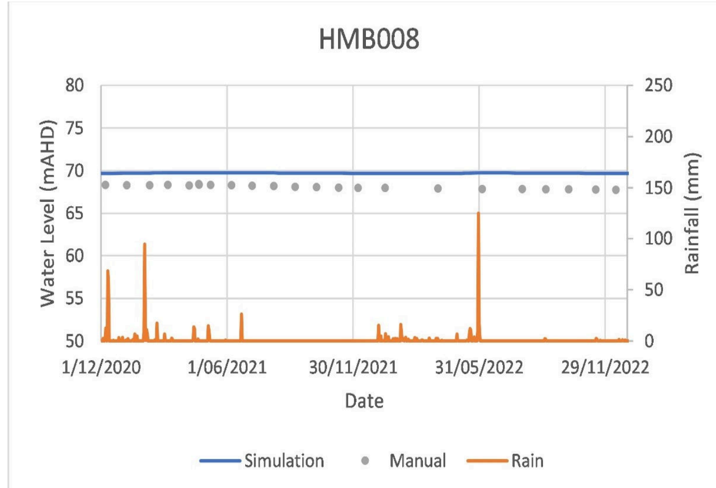


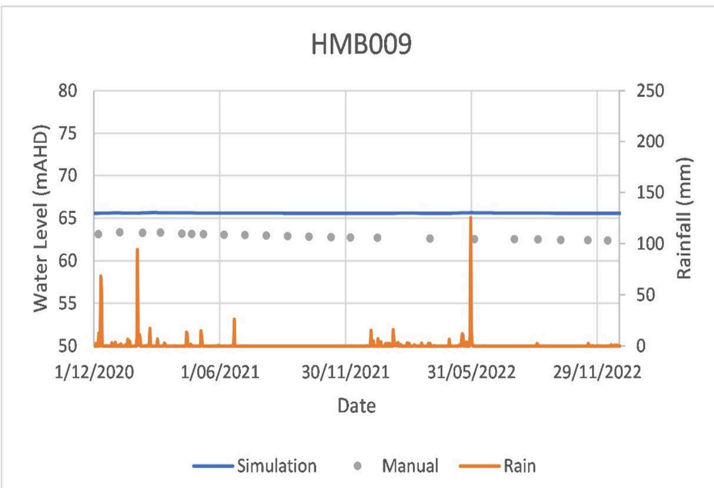


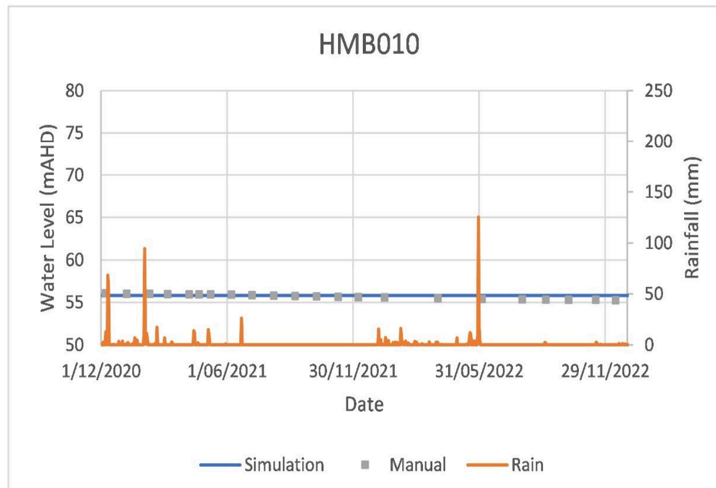


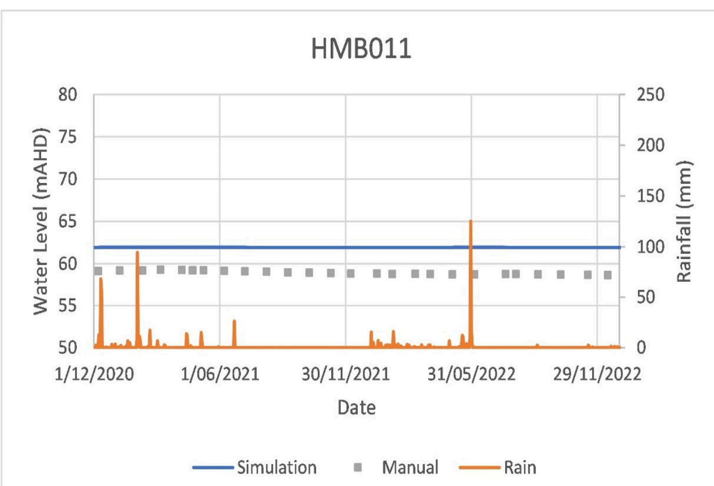
Client	*DE GREY MINING LTD*	**Transient Calibration Hydrographs HMB001 - HMB006**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-10**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference



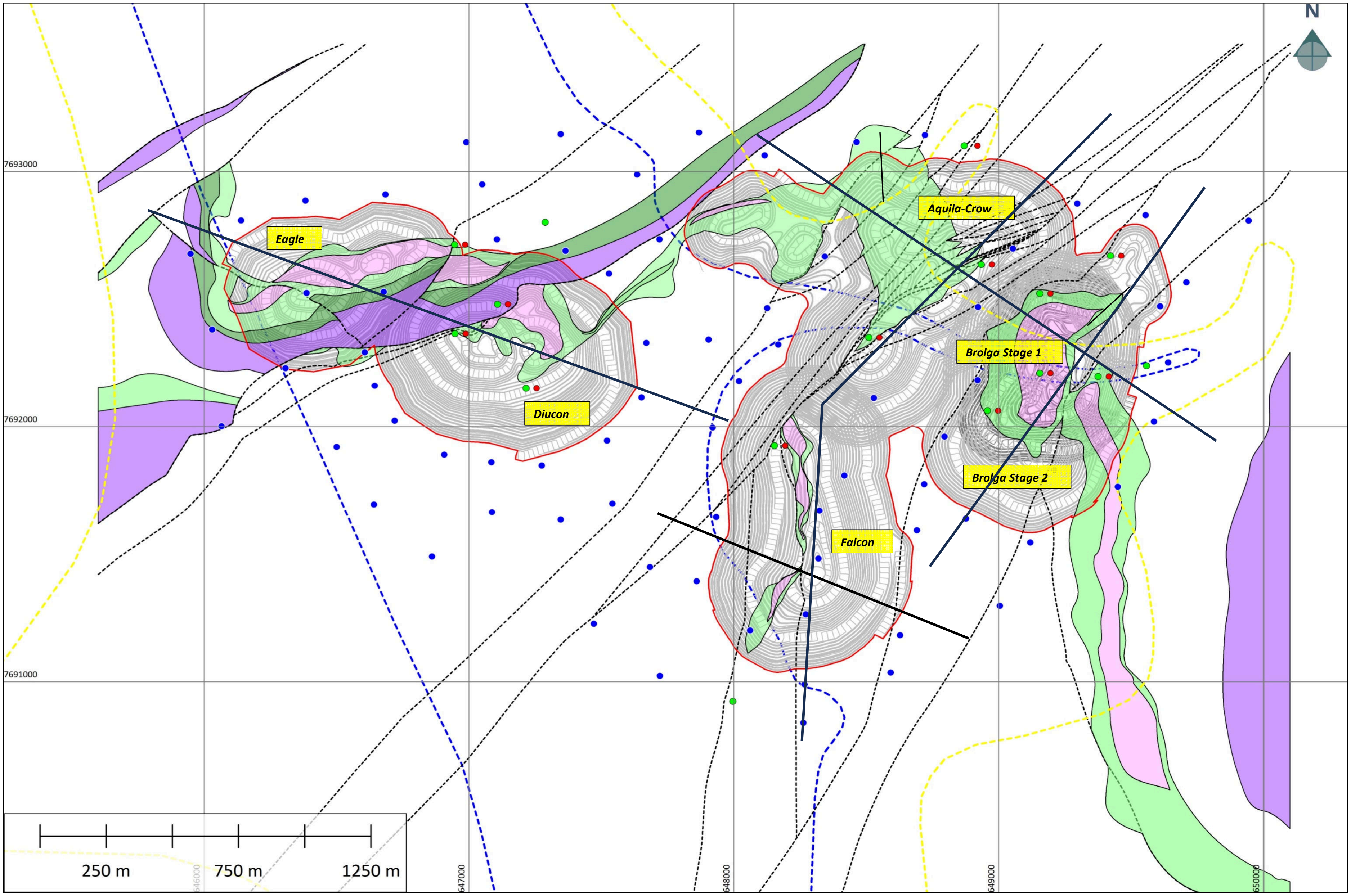








Client	*DE GREY MINING LTD*	**Transient Calibration Hydrographs HMB007 - HMB011**		**Plan Title**
Project	*HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT*		**8-11**	**Plan Number**
Geowater CONSULTING	A4P			
	Project #	1006-001		File reference



De Grey Bedrock Lithologies

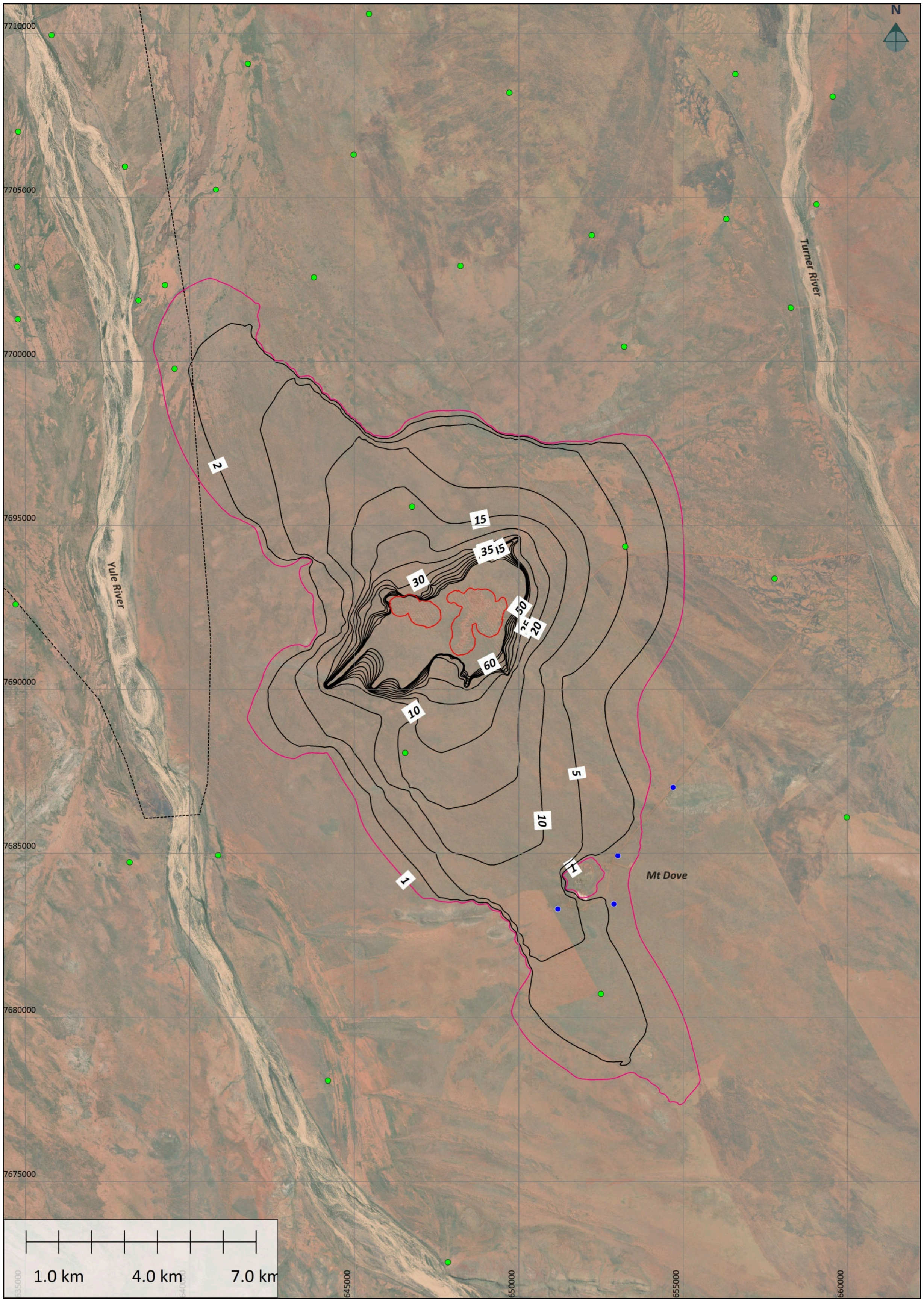
- Sedimentary units
- Felsic Intrusives
- Mafics
- Ultramafics
- Quartz-Diorite and Diorite Intrusions
- Major Structures (at top of bedrock elevation) [by De Grey]

Planned Dewatering Bores

- Alluvium and bedrock bore
- Alluvium only bore
- Bedrock only bore

- Lateral extent of main palaeochannel zone
- Lateral extent of elevated permeability in lower allluvium
- Dewatering Section Traces

Client	*DE GREY MINING LTD*	**Dewatering Bore Locations**	Plan Title
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-12**	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



Active Pastoral Bore / Well

Atlas Iron production bore

Yule PDWSA

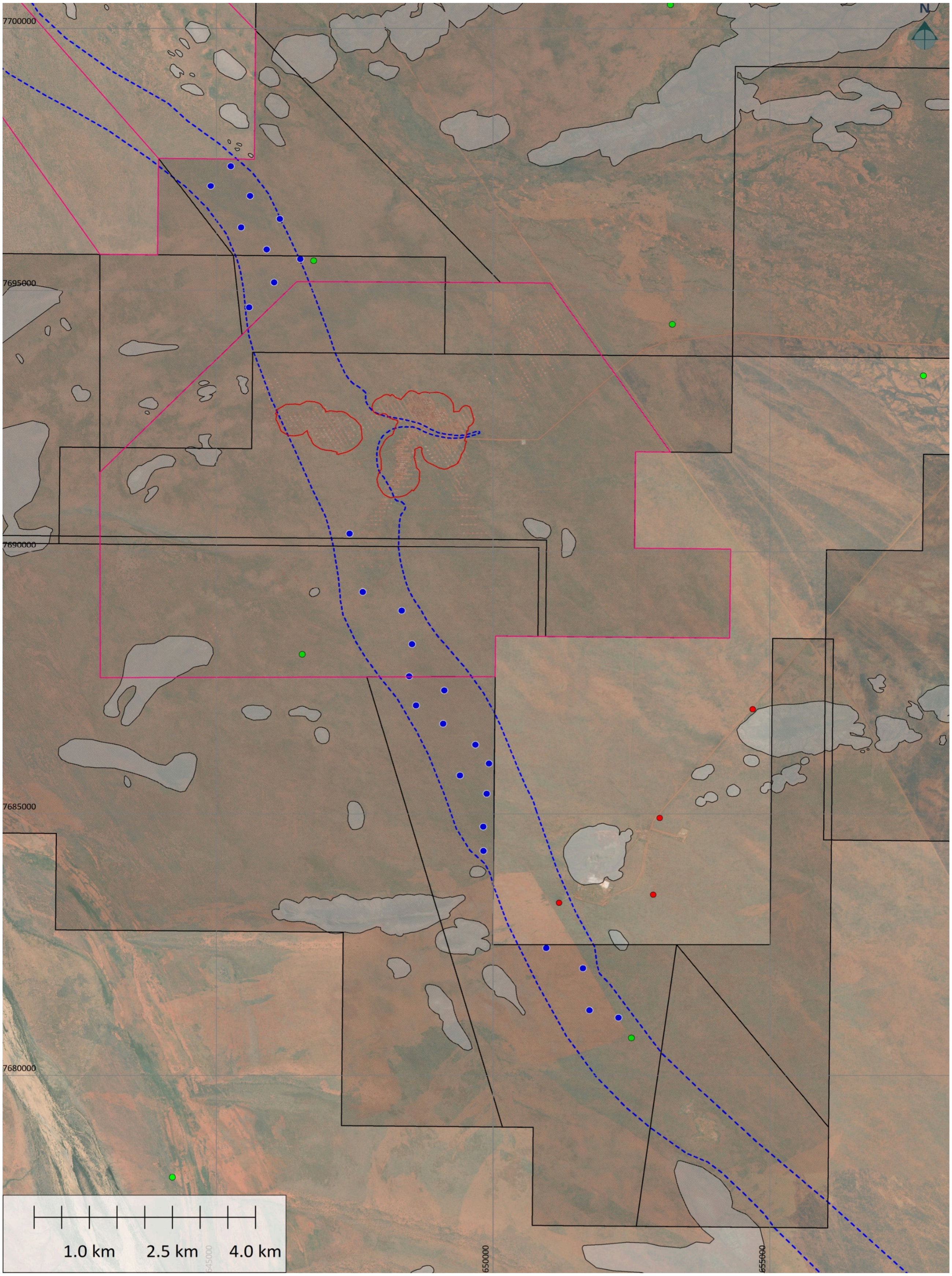
Potential Hemi Pit Outlines

1m

5m

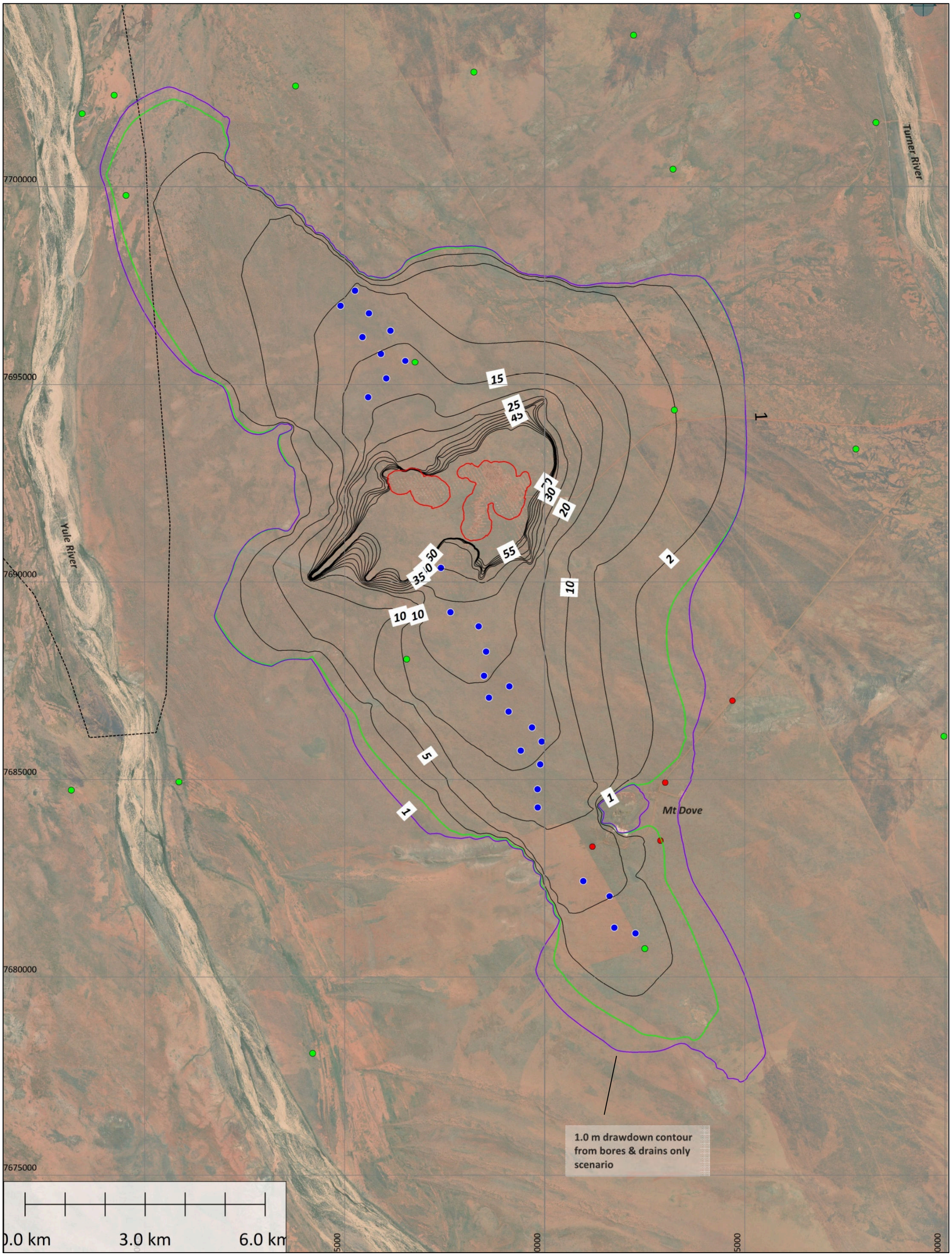
Water table drawdown contours (m) (at end of project)

Client	DE GREY MINING LTD	Maximum Drawdown - No Aquifer Reinjection Scenario	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	8-13	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference



Atlas Iron production bore	Proposed Reinjection Bore	Existing De Grey tenure	Bedrock outcrop / shallow subcrop
Active pastoral bore/well	Potential Hemi Pit Outlines	Pending De Grey tenure	Main palaeochannel extent

Client	*DE GREY MINING LTD*	**Simulated Reinjection Bore Locations**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**8-14**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference



De Grey Proposed Reinjection Bores

Active Pastoral Bore / Well

Potential Hemi Pit Outlines

Atlas Iron production bore

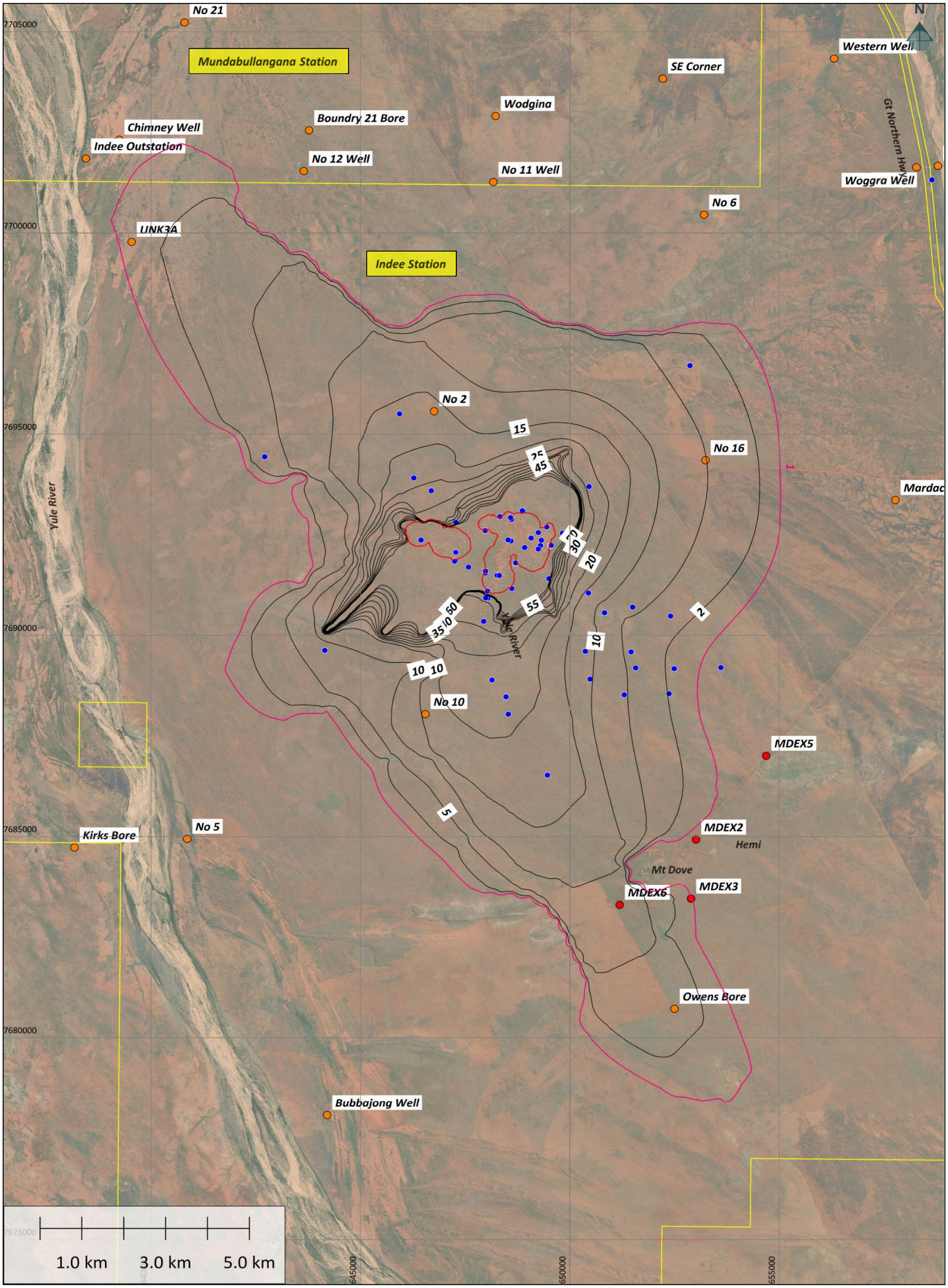
Yule PDWSA

1m

5m

Water table drawdown contours (at end of project)

Client	DE GREY MINING LTD	Maximum Drawdown - with Aquifer Reinjection Scenario	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	8-15	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference



Active pastoral bore / well

Atlas Iron production bore

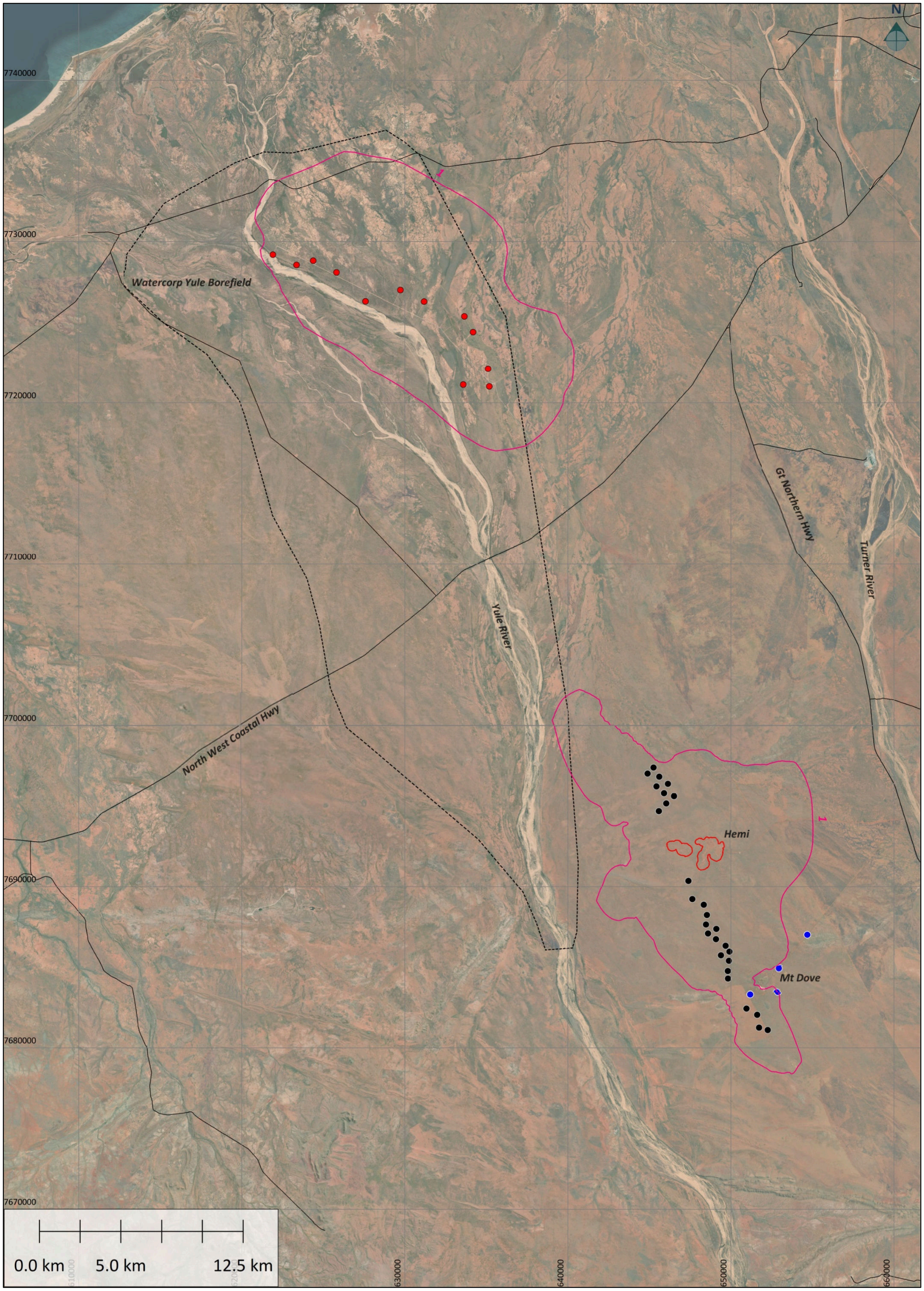
De Grey water bore

Potential Hemi pit outlines

Indee pastoral lease boundary

Maximum drawdown (m) at end of Operations

Client	DE GREY MINING LTD	Hemi Drawdown and Other Bore Users	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	10-1	Plan Number
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference



Watercorp production bore

De Grey reinjection bore

Potential Hemi pit outlines

1m

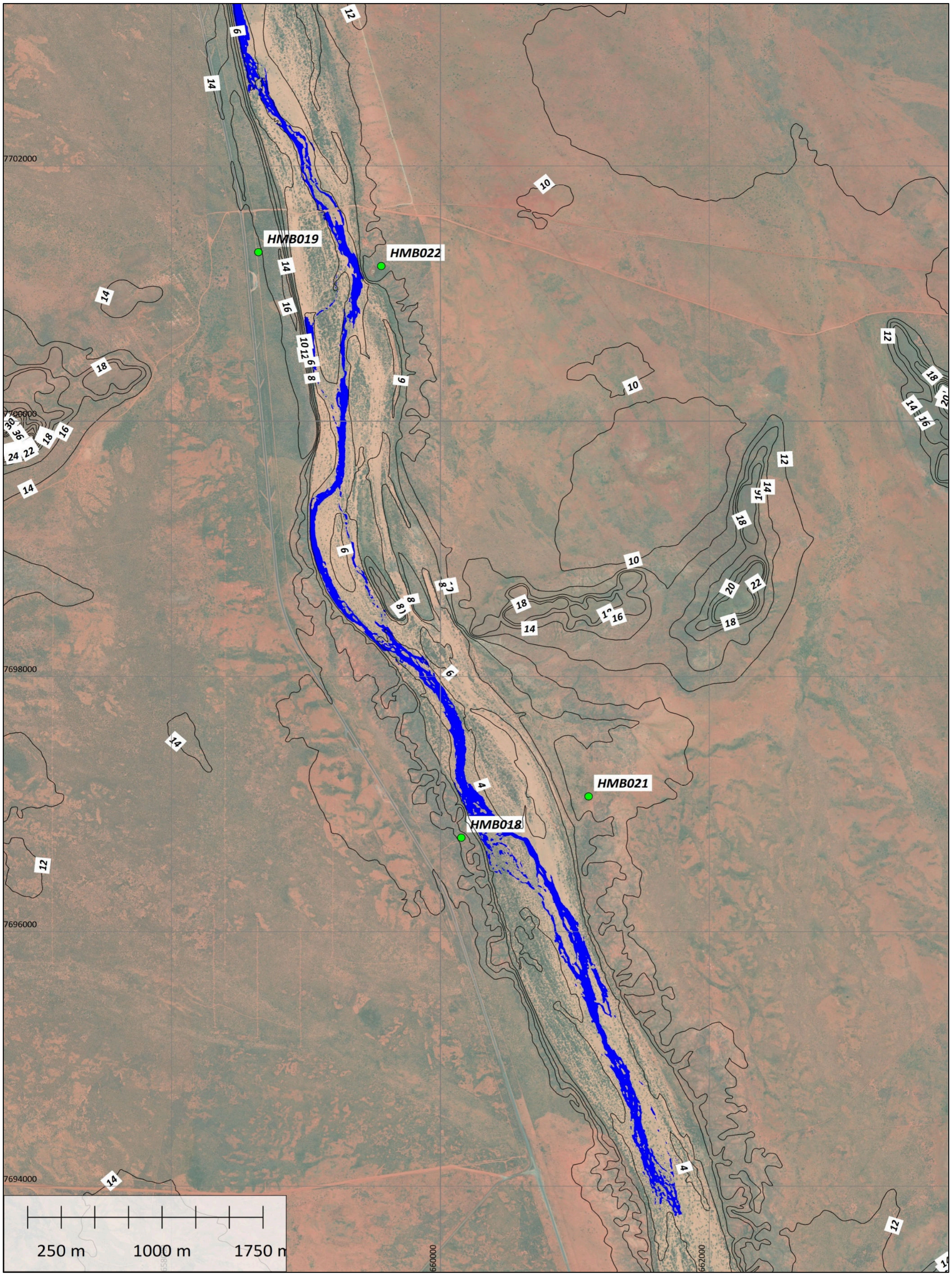
Water table - maximum extent of 1 m drawdown

(Hemi by Geowater, Yule by MWH [2010])

Atlas Iron production bore

Yule PDWSA

Client	*DE GREY MINING LTD*	**Hemi and Yule River Borefields - Drawdown Extents**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**10-2**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference



Proposed discharge location

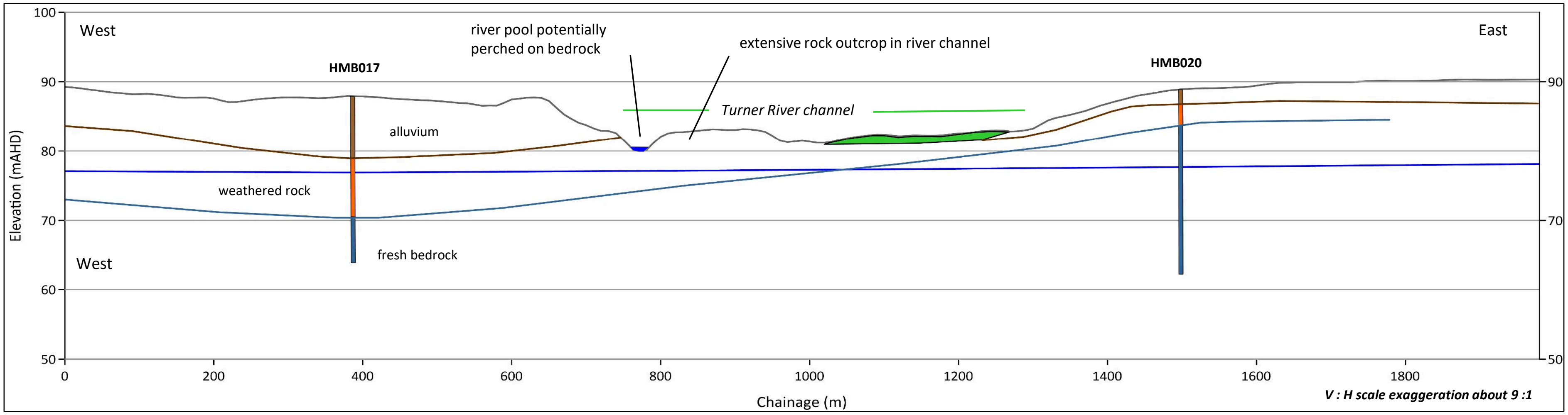
De Grey monitoring bore

Peak inundation extent (month 12)

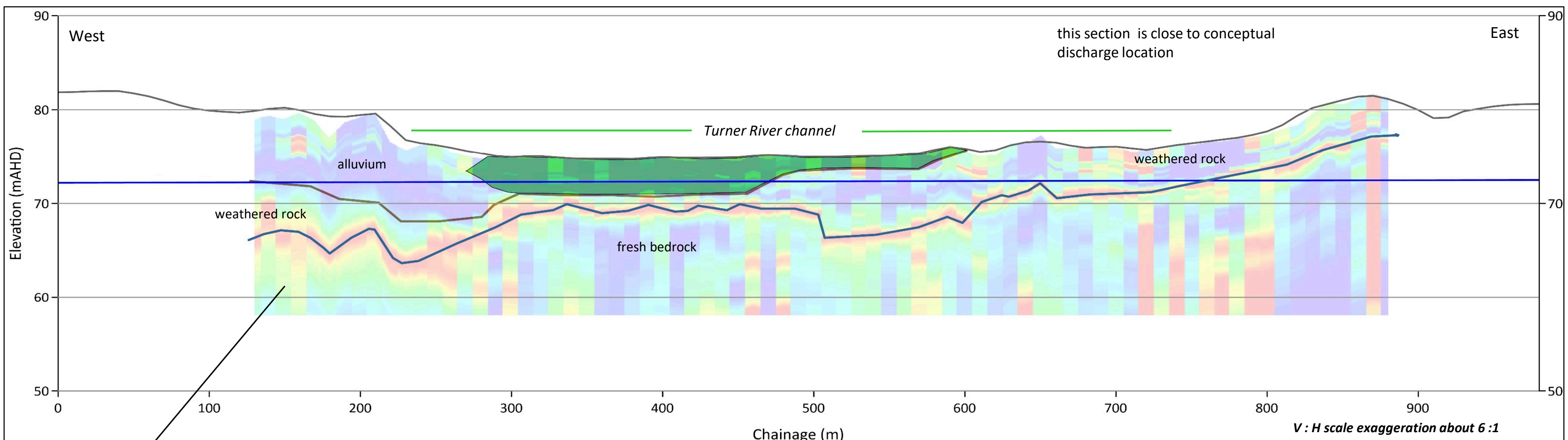
2 Depth to Nov 2022 water table (m)

Client	*DE GREY MINING LTD*	**Turner River Discharge - Modelled Peak Inundation**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**10-3**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference

Turner River Section HMB017-020



Turner River Section TRS



unconsolidated sand and gravel in river channel

topo

Dec 2021 water table

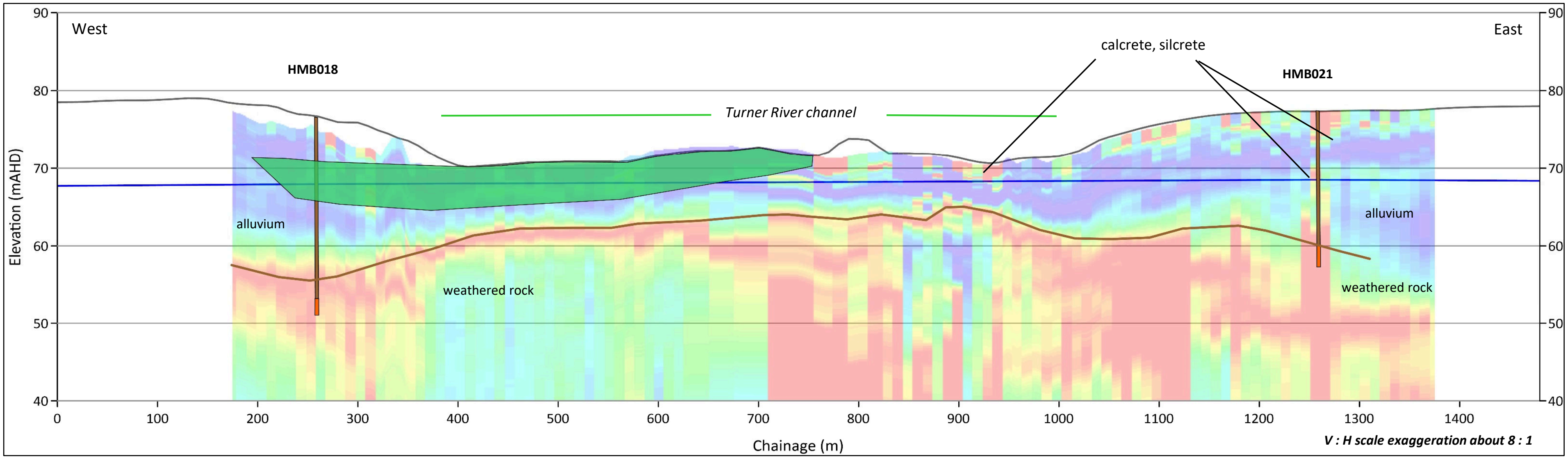
base of alluvium

top of fresh rock

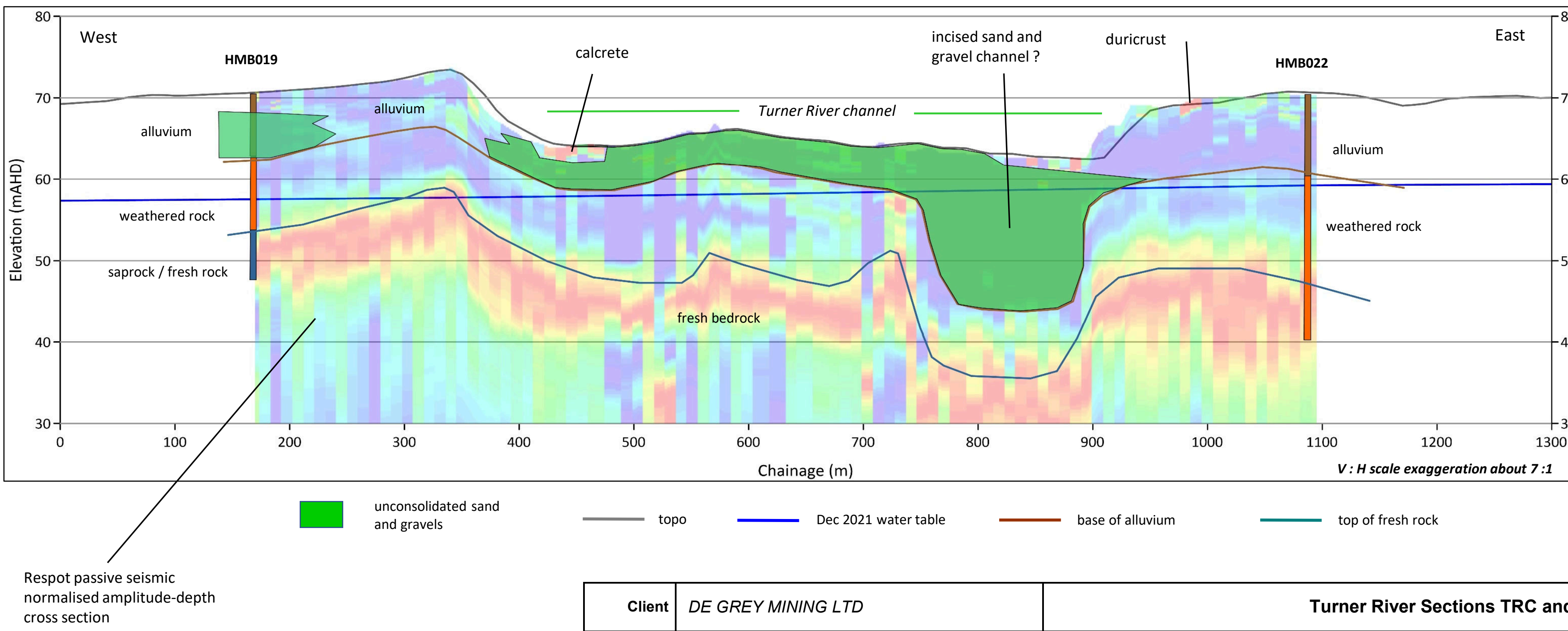
Respot passive seismic normalised amplitude-depth cross section

Client	*DE GREY MINING LTD*	**Turner River Sections HMB017- 020 and TRS**	Plan Title
Project	*HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT*	**10-4**	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

Turner River Section TRC

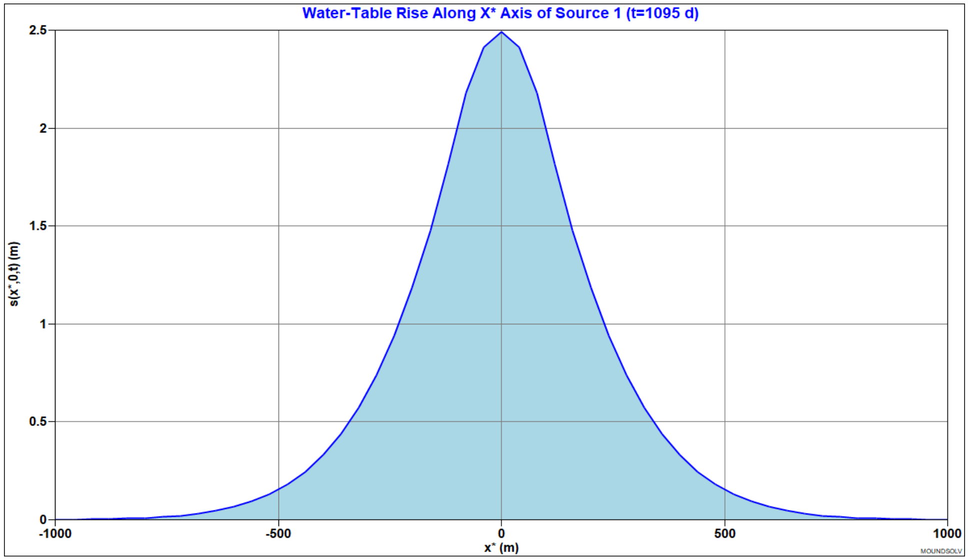


Turner River Section TRN

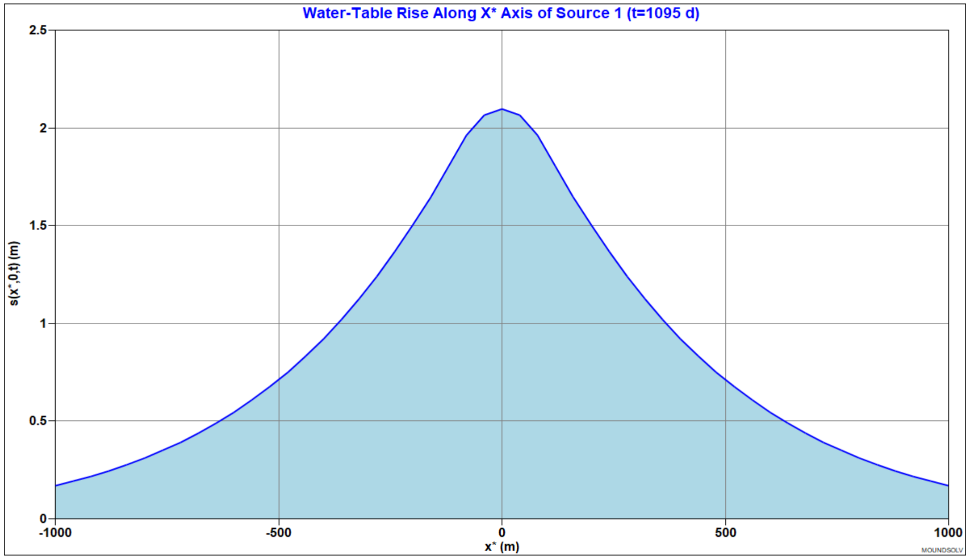


Client	*DE GREY MINING LTD*	**Turner River Sections TRC and TRN**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**10-5**	**Plan Number**
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

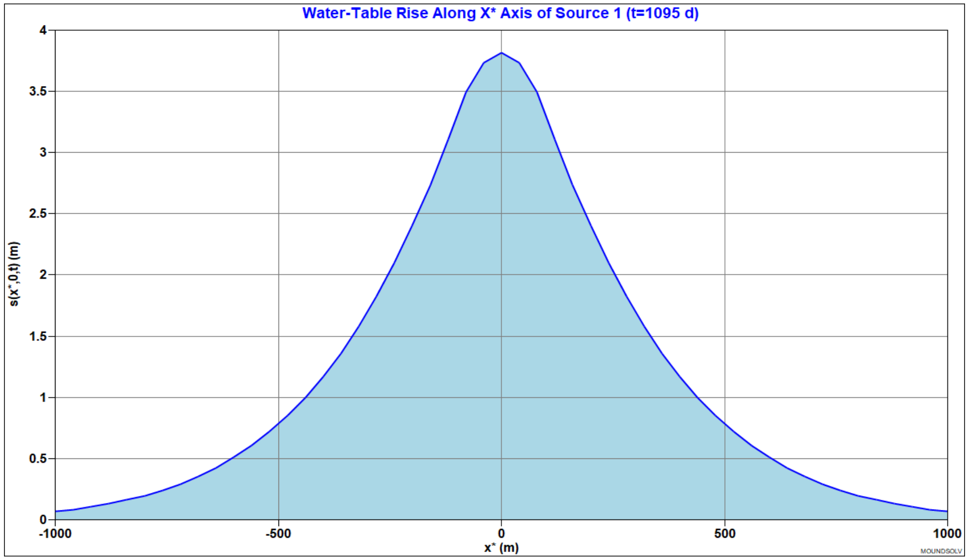
Water table mounding across river 0 - 2 km downstream of discharge location



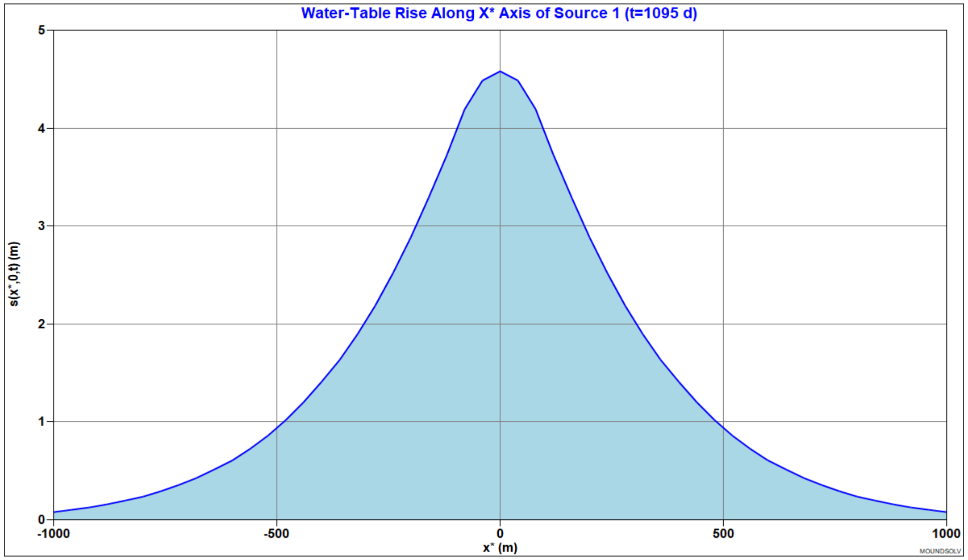
Water table mounding across river 2 - 6 km downstream of discharge location



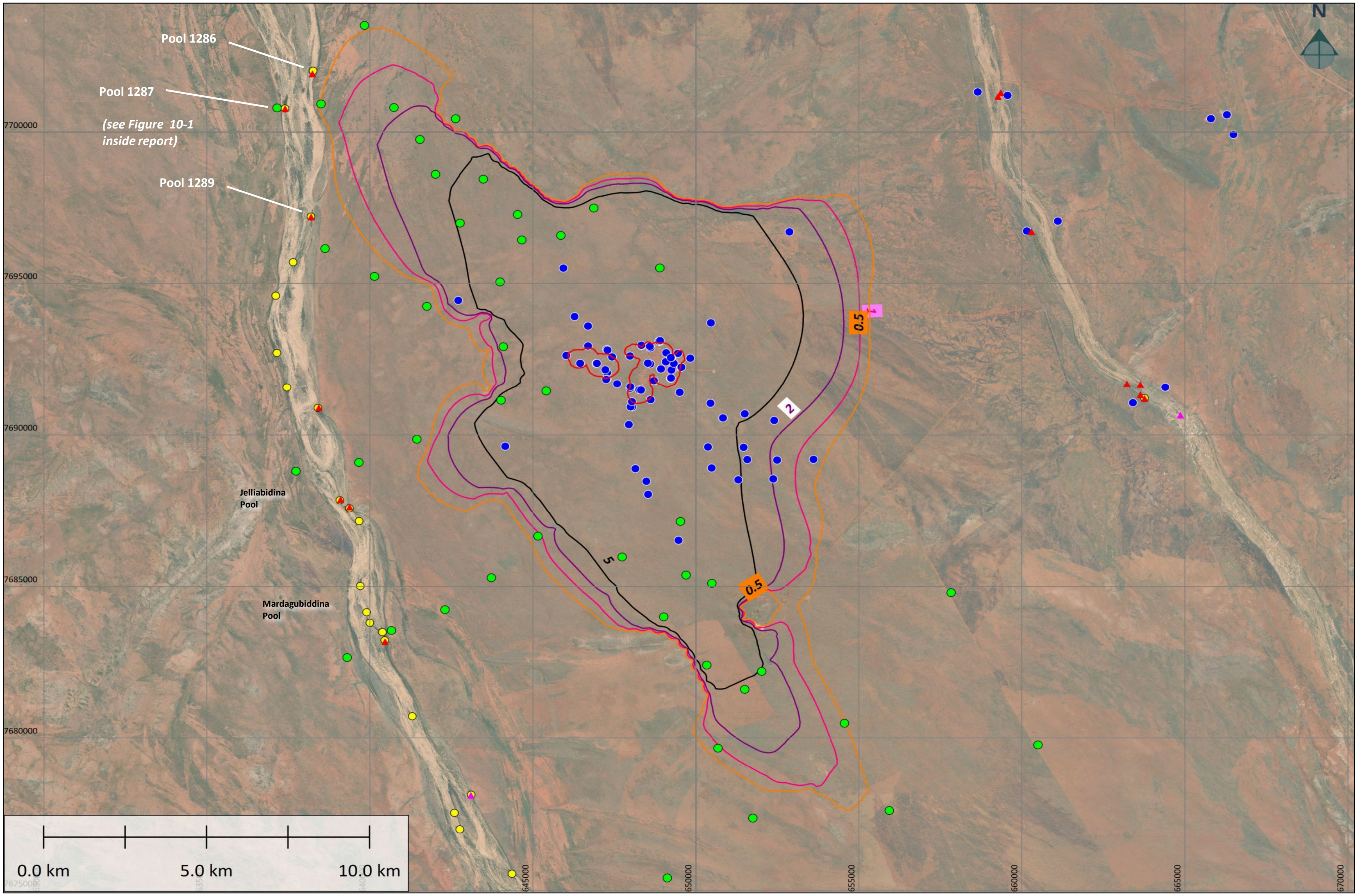
Water table mounding across river 6 - 10 km downstream of discharge location



Water table mounding across river > 10 km downstream of discharge location



Client	*DE GREY MINING LTD*	**Turner River Discharge - Predicted Water Table Mounding**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**10-6**	**Plan Number**
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



Water Pool (DoW, 2011)

De Grey Existing surface water sample site

De Grey Proposed surface water sample site

5 m Maximum (extent) drawdown contours for dewatering base case scenario

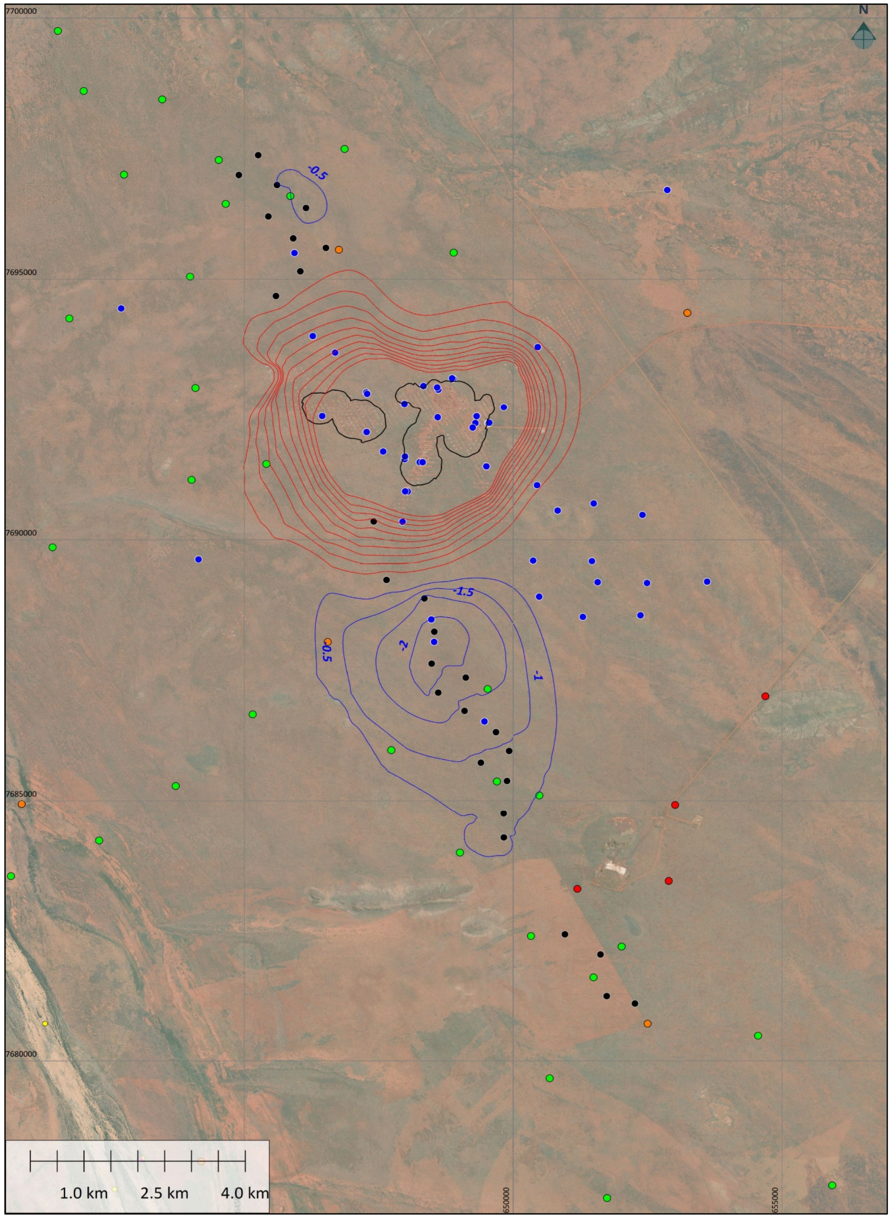
De Grey Existing water bores

De Grey Proposed monitoring bores

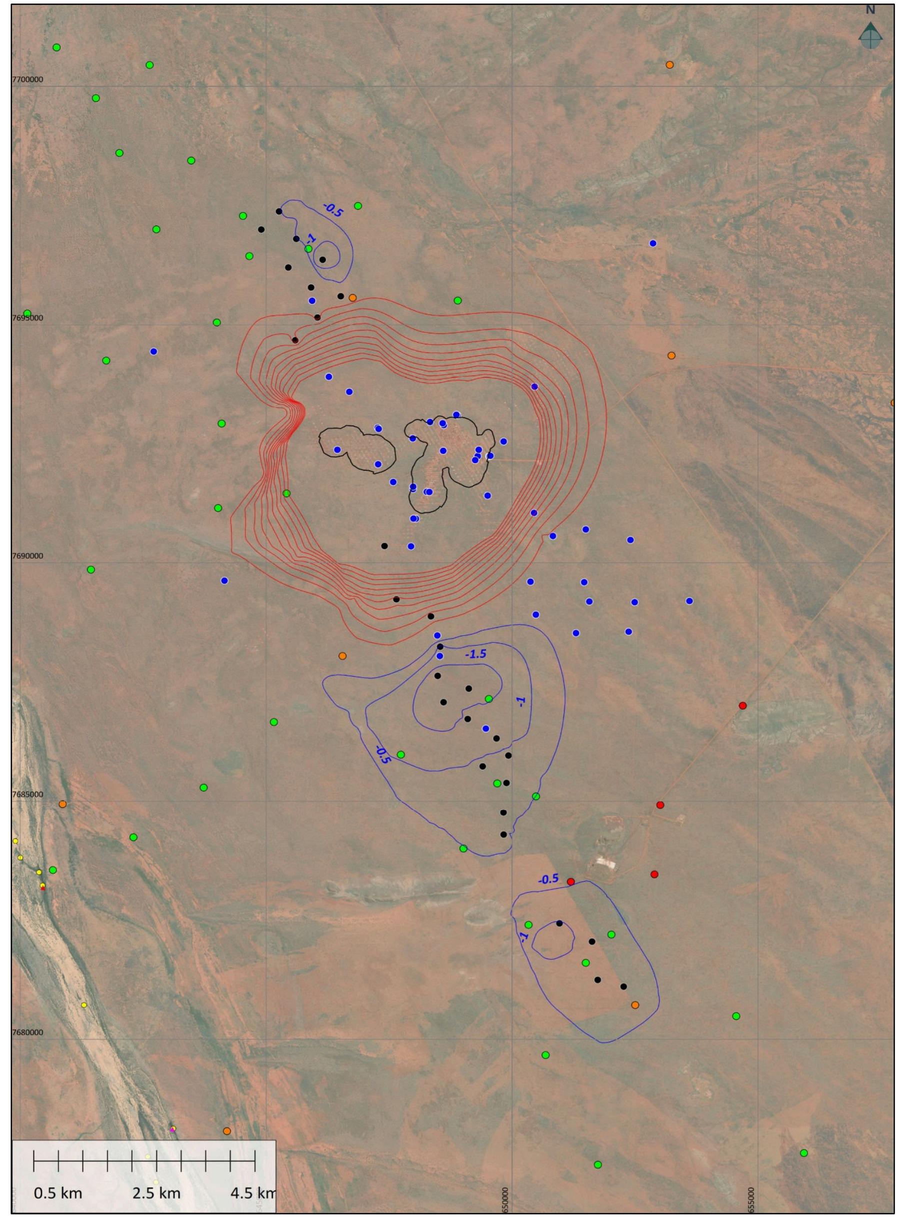
Proposed open pit outlines

Client	DE GREY MINING LTD	Maximum Drawdown Extent and River Pools	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	10-7	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

end Year 1



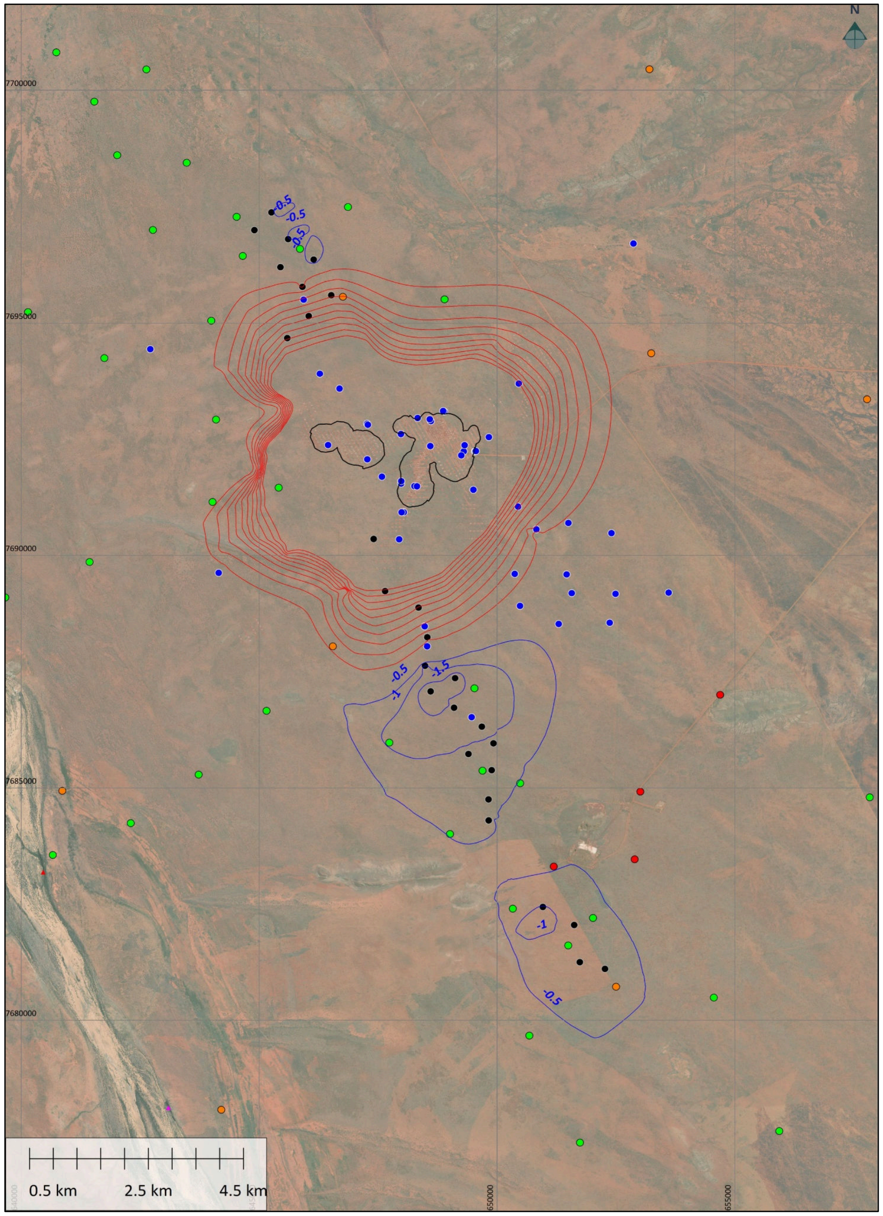
end Year 2



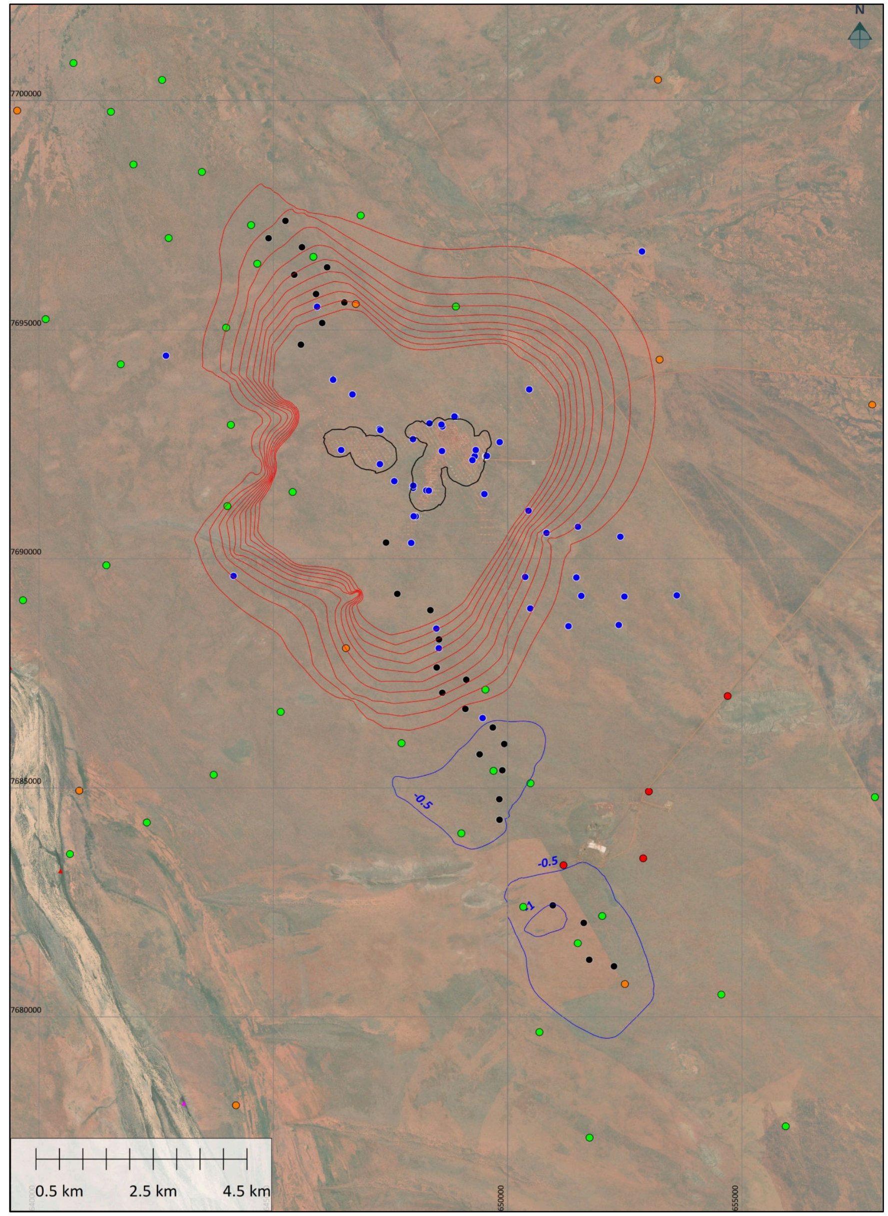
- Existing De Grey bore
- Proposed monitoring bore
- Proposed reinjection bore
- Active pastoral bore / well
- Atlas Iron bore
- Potential Hemi Pit Outlines
- Drawdown contours (1 - 10 m)
- -1m Mounding ("drawup") contours

Client	DE GREY MINING LTD	Water Table Mounding from Reinjection - Yr 1 and Yr 2	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	10-8	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference

end Year 3

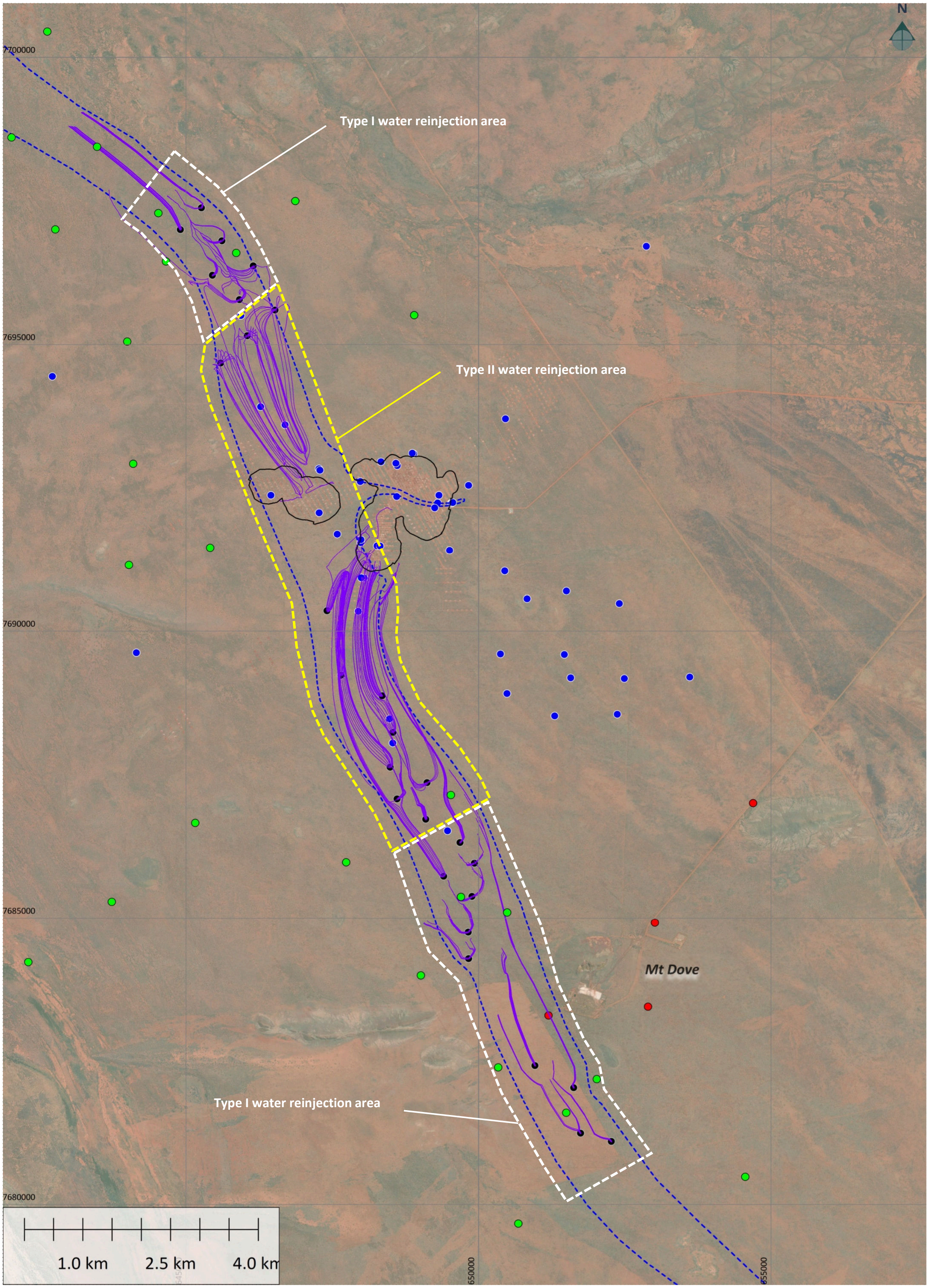


end Year 5

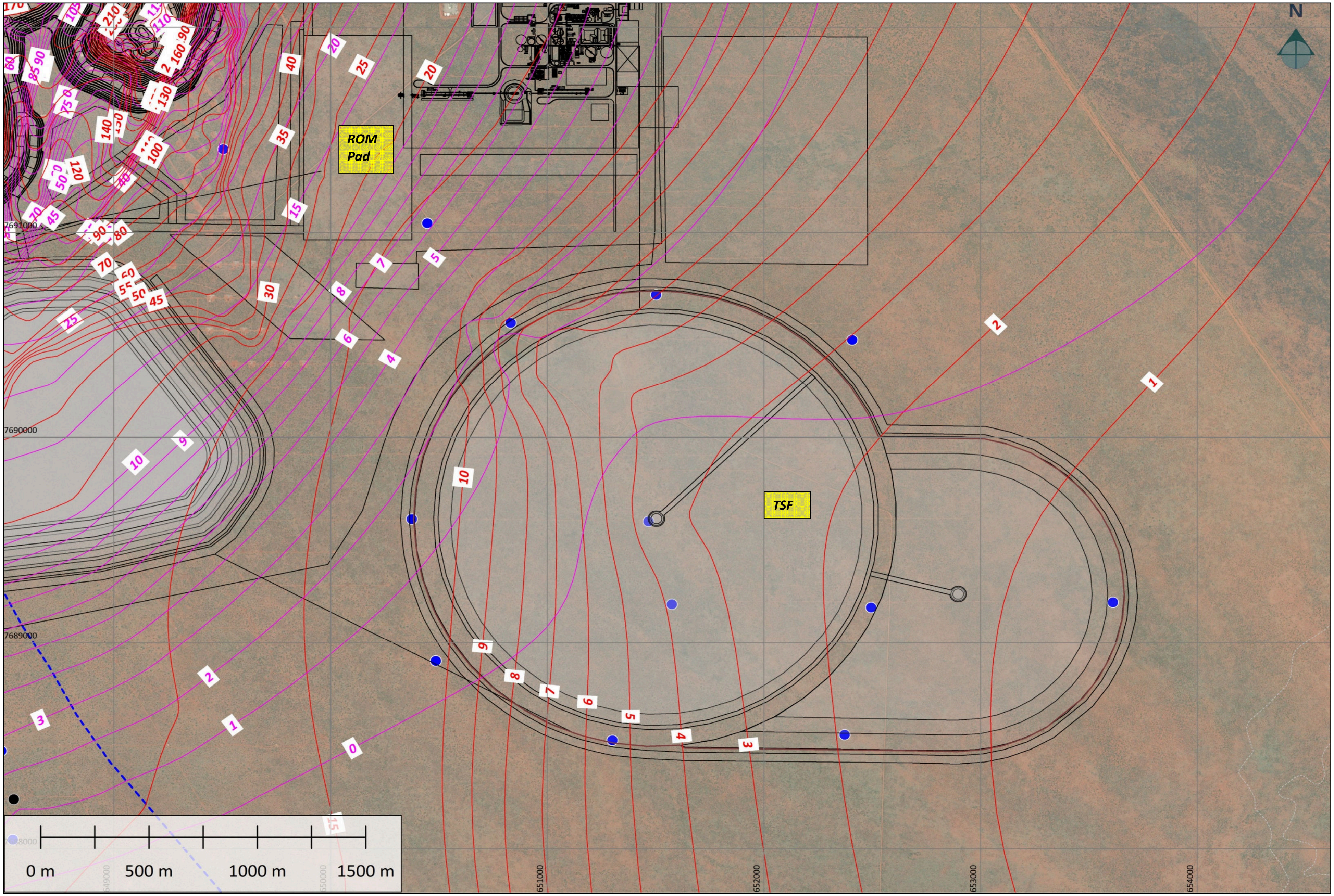


- Existing De Grey bore
- Proposed monitoring bore
- Proposed reinjection bore
- Active pastoral bore / well
- Atlas Iron bore
- Potential Hemi Pit Outlines
- Drawdown contours (1 - 10 m)
- -1m Mounding ("drawup") contours

Client	*DE GREY MINING LTD*	**Water Table Mounding from Reinjection - Yr 3 and Yr 5**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**10-9**	**Plan Number**
Geowater CONSULTING	A4L		
	Project #	1006-001	File reference



Client	DE GREY MINING LTD	Reinjection Bore Particle Tracking	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	10-10	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference

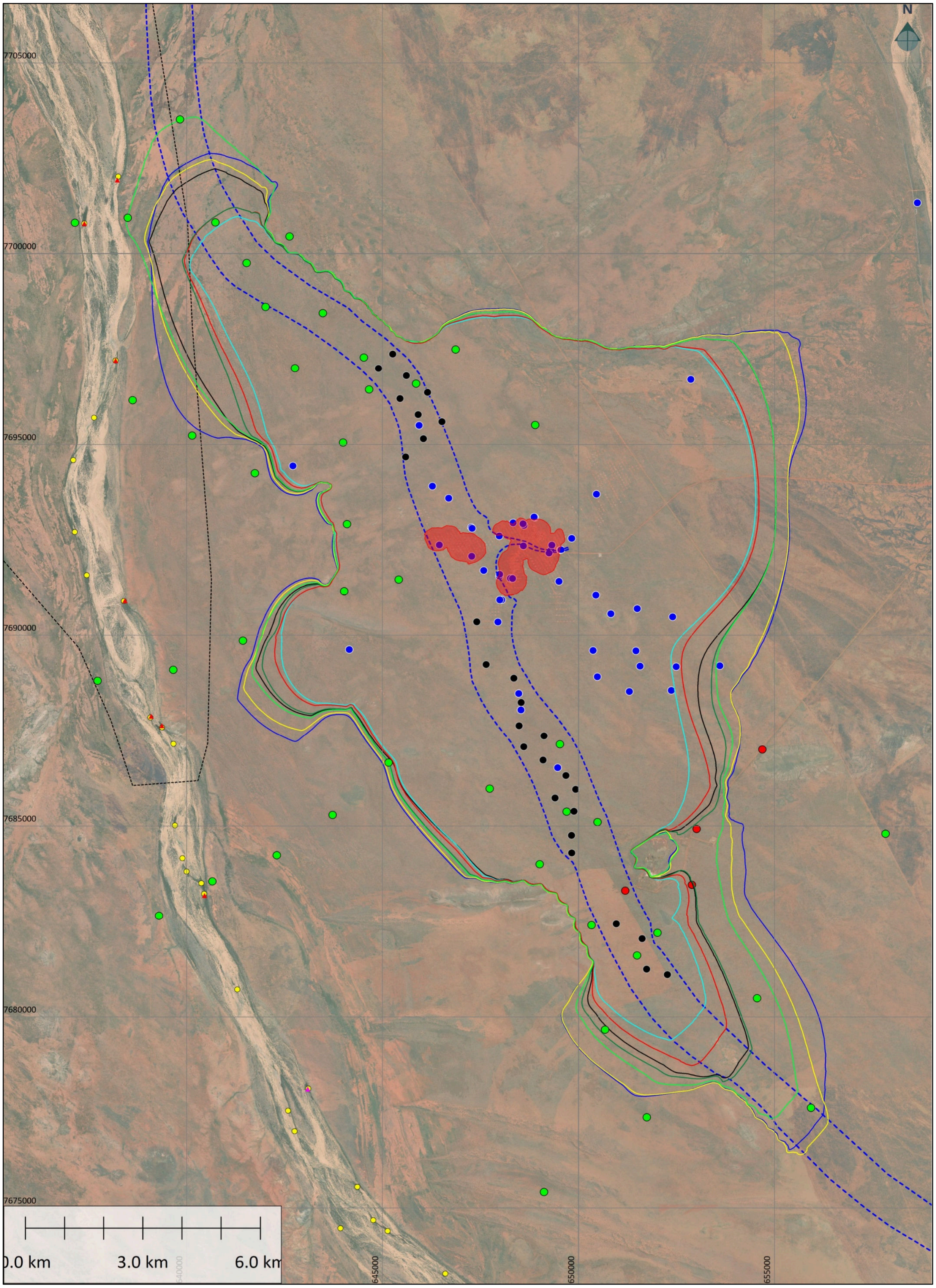


Current De Grey bores

3 m — Predicted water table drawdown 1 year after ore processing starts

3 m — Predicted water table drawdown at end of ore processing

Client	DE GREY MINING LTD	Maximum Drawdown Beneath TSF	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	10-11	Plan Number
Geowater CONSULTING	A4L		
	Project # 1006-001		File reference



Potential Hemi Pit Outlines

Yule PDWSA

Main palaeochannel extent

Existing De Grey bore

Proposed reinjection bore

Proposed monitoring bore

1 m drawdown - base case (no model change)

DoW mapped pool

De Grey surface water monitoring site

1 m drawdown contours - sensitivity models

Increased hydraulic conductivity

Decreased hydraulic conductivity

Increased specific yield

Decreased specific yield

Increased recharge

Decreased recharge

Client	*DE GREY MINING LTD*	**Model Sensitivity Results - Maximum 1 m drawdown contours**	**Plan Title**
Project	***HEMI GOLD PROJECT PFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**11-1**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference

Appendix A

Pastoral Bores and Wells Summary

ID	Owner	Status at Nov 2022	Surveyed Easting (GDA94 MGA Z50)	Surveyed Northing (GDA94 MGA Z50)	Surveyed Reference Point Elevation (mAHD)	Ground elevation (mAHD)	Reference Point Stickup (m above ground level)	Reference Point Description	base of well / bore (m below reference point)	EC/pH/Water Level Date	water level (m below reference point)	EC (us/cm)	pH
Baker Well	Indee	active	666061.21	7703252.56	69.08	68.88	0.20	top of ABN well	nr	15-Dec-21	5.02	2,450	6.6
Boundary Well	Indee	active	663402.12	7710658.50	55.31	55.11	0.20	top of concrete ring	11.9	10-Nov-22	6.82	777	7.9
Bubbajong Well	Indee	active	644207.05	7678069.09	80.23	79.9	0.35	top of concrete ring	8.9	09-Nov-22	7.48	959	7.9
Carowehyne Well	Indee	active	659056.73	7704776.19	63.40	63.1	0.25	top of concrete ring	12.7	08-Nov-22	10.36	1,003	7.4
Chituma Well	Indee	active	659552.02	7708066.73	58.10	57.4	0.70	top of 150 mm PVC	nr	08-Nov-22	9.60	1,110	7.1
Granite Well	Indee	abandoned	663638.05	7685135.58	97.43	97.1	0.30	top of concrete ring	10.9	09-Nov-22	5.44		
Indee Homestead Well	Indee	active	666289.50	7700574.46	75.22	75.2	0.00	top of well	19.6	15-Dec-21	10.52	3,530	7.2
Indee Outstation	Indee	active	638445.28	7701853.43	53.35	53.30	0.05	top of 150 mm PVC	nr	10-Nov-22	9.78	894	7.5
Jimmys Bore	Indee	active	659980.24	7686088.21	91.47	91.3	0.20	top of 100 mm PVC	nr	09-Nov-22	6.60	1,460	7.0
Kirks Bore	Indee	active	638177.46	7684724.63	72.63	72.15	0.48	top of 100 mm PVC	nr	09-Nov-22	7.96	1,021	7.7
Mardacoombana Well	Indee	active	657781.16	7693360.85	77.50	77.5	0.00	top rail track on top of well	16.5	10-Nov-22	13.32	2,720	8.0
No 10	Indee	active	646554.28	7688043.13	72.24	72.2	0.00	top of concrete ring	9.8	09-Nov-22	6.68	1,375	8.0
No 11 Well	Indee	abandoned	648176.15	7701271.55	57.23	56.6	0.65	top of 150 mm PVC	17.3	10-Nov-22	10.60		
No 12 Well	Indee	abandoned	643650.82	7701539.54	52.75	52.3	0.43	top of 150 mm PVC	nr	10-Nov-22	7.04		
No 16	Indee	active	653243.42	7694350.76	70.90	70.5	0.40	top of 150 mm PVC	nr	10-Nov-22	8.08	1,839	7.9
No 18 Well	Indee	active	634775.53	7701278.40	51.86	51.63	0.23	Lip of corrugated iron	8.7	09-Nov-22	8.13	720	7.8
No 2	Indee	active	646762.68	7695562.38	63.41	62.8	0.65	top of 100 mm PVC	nr	10-Nov-22	6.96	1,486	7.5
No 3	Indee	active	634709.77	7692578.34	63.00	62.52	0.48	top of 150 mm PVC	nr	09-Nov-22	11.24	3,500	7.3
No 5	Indee	active	640865.03	7684936.98	74.10	73.7	0.35	top of 150 mm PVC	nr	10-Nov-22	7.90	1,111	7.4
No 6	Indee	active	653209.25	7700447.59	61.86	61.6	0.30	top of 100 mm PVC	nr	10-Nov-22	9.45	4,780	7.5
Owens Bore	Indee	active	652505.26	7680713.11	84.54	84.19	0.35	Notch in 150mm (between bolts)	nr	09-Nov-22	7.73	1,054	7.8
Poocatche	Indee	active	669141.11	7684972.34	102.32	101.92	0.40	lowest groove in PVC	nr	09-Nov-22	7.51	670	7.8
Port 20 Observation Bore	Indee	abandoned	630004.57	7707054.29	41.12	40.87	0.25	top of concrete ring	15.0	09-Nov-22	8.11	nr	nr
Red Bank Well	Indee	active	656592.73	7708755.56	56.52	56.0	0.50	top of 100 mm PVC	nr	10-Nov-22	11.34	810	8.0
Talye Well	Indee	active	668546.51	7689687.99	96.21	96.1	0.15	top of corrugated iron	10.9	09-Nov-22	7.76	1,443	7.3
Talyebinya Well	Indee	abandoned	660112.61	7699763.19	73.06	73.1	0.00	top of concrete ring	13.1		12.07	6,470	7.6
Top Well	Indee	abandoned	665965.46	7680420.28	106.45	106.55	-0.10	Metal pipe above iron grid	nr		6.85		
UNK11	Indee	abandoned	666244.57	7694638.77	85.47	85.47	0.00	Edge of concrete well	10.9	09-Nov-22	9.93		
UNK12	Indee	abandoned	671587.50	7684783.58	108.90	108.10	0.80	Edge of concrete well	24.9	15-Dec-21	6.62	28	6.8
UNK3A	Indee	active	639539.91	7699775.11	53.83	53.4	0.40	top of 100 mm PVC	nr		nr		
UNK4	Indee	inactive	658794.03	7701673.33	65.67	65.5	0.20	top of 150 mm PVC	54.9	08-Nov-22	9.55		
UNK8	Indee	active	663614.13	7699434.11	74.52	74.1	0.45	top of concrete ring	12.5	08-Nov-22	10.73	5,250	7.5
Western Well	Indee	active	656317.15	7704330.62	62.45	62.1	0.40	top of concrete ring	12.9	10-Nov-22	12.47	786	7.7
Wingina Well	Indee	active	662769.11	7694431.95	84.18	83.8	0.35	top of concrete ring	14.2	08-Nov-22	10.98	3,510	7.9
Woggra Well	Indee	active	658281.43	7701628.90	67.53	67.5	0.00	top of 150 mm PVC	nr	10-Nov-22	11.41	810	7.1
Woomerina	Indee	active	647850.43	7672545.72	91.68	91.38	0.30	Top of steel casing (Between bolts)	nr	09-Nov-22	11.22	690	7.5
WWB1	Indee	inactive	664832.37	7694254.43	85.62	85.2	0.45	top of 150 mm PVC	49.1	09-Nov-22	11.87		
Badgencandy	Mundabullangana	active	649717.00	7708187.13	46.97	46.72	0.25	top of 150 mm PVC	nr	10-Nov-22	10.20	3,420	8.4
Boundry 21 Bore	Mundabullangana	active	643776.91	7702552.79	52.21	51.71	0.50	top of 150 mm PVC		10-Nov-22	7.80	1,455	8.2
Bubbawilly	Mundabullangana	active	634787.11	7706998.05	45.06	44.71	0.35	Top of steel casing	nr	09-Nov-22	8.16	581	7.9
Chimney Well	Mundabullangana	active	639247.05	7702319.17	51.40	50.85	0.55	top of 150 mm PVC	nr	10-Nov-22	5.85	1,395	8.0
Grumps	Mundabullangana	active	650203.05	7712171.12	44.31	43.81	0.50	top of 150 mm PVC	nr	10-Nov-22	13.48	3,790	8.2
Hoof Bore	Mundabullangana	active	645452.69	7710586.94	42.95	42.45	0.50	top of 150 mm PVC		10-Nov-22	10.27	2,770	7.3
Jellabinda Yards	Mundabullangana	active	638035.21	7705939.79	48.55	47.55	1.00	top of 125 mm PVC		10-Nov-22	8.31	540	8.0
Little Willy	Mundabullangana	active	631200.00	7704793.40	45.05	44.75	0.30	top of 150 mm PVC		09-Nov-22	10.34	804	7.8
Mid Merriwarri	Mundabullangana	active	646435.24	7714804.02	37.70	37.04	0.66	top of 150 mm PVC	nr	10-Nov-22	11.54	4,550	8.3
New Merriwarri	Mundabullangana	active	650691.68	7716624.95	38.82	38.06	0.76	top of concrete ring	19.24	10-Nov-22	12.44	2,288	8.2
No 17	Mundabullangana	active	641772.90	7709070.65	43.07	42.32	0.75	top of 150 mm PVC	nr	10-Nov-22	8.34	1,955	8.1
No 18 Bore	Mundabullangana	active	634756.85	7702876.59	50.03	49.58	0.45	top of 150 mm PVC		09-Nov-22	8.03	766	8.0
No 21	Mundabullangana	active	640802.21	7705232.19	48.05	47.40	0.65	top of corrugated iron	8.75	10-Nov-22	6.26	2,112	8.2
Old Merriwarri	Mundabullangana	active	642572.48	7714356.53	37.39	36.64	0.75	top of concrete ring	nr	15-Dec-21	12.30	3,260	7.4
Road bore (Medriwarra)	Mundabullangana	active	647077.96	7719807.99	30.34	29.64	0.70	top of 150 mm PVC		10-Nov-22	11.84	4,970	8.0
SE Corner	Mundabullangana	active	652225.99	7703835.55	56.39	55.82	0.57	top of 150 mm PVC	nr	10-Nov-22	12.84	4,800	8.7
Tower Bore	Mundabullangana	active	639494.20	7711145.00	41.63	41.03	0.60	top of 150 mm PVC		10-Nov-22	9.84	1,495	7.9
Troy's Bore	Mundabullangana	active	644988.11	7706298.27	47.64	47.24	0.40	top of 150 mm PVC		10-Nov-22	7.76	1,860	8.2
UNK E Yule	Mundabullangana	active	635804.13	7709941.46	44.39	43.69	0.70	top of 125 mm steel		10-Nov-22	10.31	489	7.4
Wodgina	Mundabullangana	active	648232.71	7702904.33	54.49	53.84	0.65	top of 150 mm PVC	nr	10-Nov-22	11.98	2,147	8.5

Appendix B

Surface Water Quality Summary Results

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	YR01 02/01/2022	YR02 02/01/2022	YR03 02/01/2022	YR04 02/01/2022	TR01 03/01/2022	YR01 10/02/2022	YR02 10/02/2022	YR03 10/02/2022	TR01 11/02/2022	YR01 13/03/2022	YR02 13/03/2022	YR03 13/03/2022	TR01 13/03/2022	TR08 13/03/2022	TR01 26/04/2022	TR south 03/06/2022	TR North 03/06/2022	TR South 06/06/2022	TR North 06/06/2022
pH Value		pH Unit	0.01	8.63	8.15	8.92	8.38	9.27	8.23	8.43	8.9	9.41	8.26	8	8.9	8.91	8.49	8.07	7.94	7.74	7.97	8.04
Electrical Conductivity @ 25°C		µS/cm	1	1290	459	3140	658	3200	1300	478	3280	3030	1740	525	3200	269	888	236	235	225	234	258
Total Dissolved Solids @180°C		mg/L	10	788	258	1820	460	1800	738	264	1880	1690	1040	294	1850	165	663	146	155	143	158	158
Suspended Solids (SS)		mg/L	5	6	17	9	27	147	14	<5	19	53	7	<5	<5	<5	128	13	<5	<5	<5	<5
Hydroxide Alkalinity as CaCO3		mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		mg/L	1	35	<1	170	9	193	<1	6	169	172	<1	<1	165	15	25	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3		mg/L	1	389	170	592	285	272	398	168	624	251	475	193	575	77	302	112	53	48	53	79
Total Alkalinity as CaCO3		mg/L	1	424	170	762	294	465	398	174	793	422	475	193	740	92	327	112	53	48	53	79
Silicon as SiO2		mg/L	0.1	38.3	28.6	32.2	49.5	15.1	37.9	31.8	31.8	22.4	39.2	31.1	29	20.9	22.7	16.0	11.6	11.3	12.6	13.2
Sulfate as SO4 - Turbidimetric		mg/L	1	<1	<1	53	<1	61	2	4	39	25	<1	5	42	3	<5	2	16	15	15	17
Chloride		mg/L	1	225	50	661	50	798	212	53	687	786	366	52	695	28	112	11	33	30	31	34
Calcium		mg/L	1	30	24	17	25	8	32	23	15	7	43	37	21	20	50	26	10	9	10	11
Magnesium		mg/L	1	34	12	76	16	71	30	10	74	60	41	14	87	9	30	7	5	5	6	6
Sodium		mg/L	1	189	60	557	95	531	180	62	557	478	296	67	599	28	113	13	30	28	30	33
Potassium		mg/L	1	8	3	11	10	24	8	3	14	22	11	4	15	6	17	4	2	2	2	3
Mercury	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
Aluminium	Dissolved	µg/L	5	<5	<5	<5	8	<5	<5	<5	<5	<5	<5	<5	<5	9	5	<5	11	<5	6	7
Iron	Dissolved	µg/L	2	29	20	9	600	17	50	23	6	8	52	56	9	17	5	13	10	8	9	8
Antimony	Dissolved	µg/L	0.2	<0.2	<0.2	0.8	<0.2	0.4	<0.2	<0.2	1	0.5	<0.2	<0.2	0.8	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	Dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	0.4	<0.2	<0.2	0.2	<0.2	0.6	<0.2	0.4	0.2	0.3	0.3
Arsenic	Dissolved	µg/L	0.2	2.1	0.4	5.8	4.2	8	2.9	0.7	5.4	9.8	3.2	0.4	5.8	2.8	7.7	1.4	0.7	0.7	0.6	0.7
Barium	Dissolved	µg/L	0.5	186	75.7	99.2	183	101	205	86.6	86.8	155	222	66.9	88.1	78.8	202	106	92.9	73.7	83.8	62.3
Beryllium	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	Dissolved	µg/L	5	265	105	836	315	740	338	130	918	807	495	94	895	68	440	39	55	45	44	44
Bismuth	Dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	Dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	Dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	0.5	0.7	0.5	0.6
Cobalt	Dissolved	µg/L	0.1	0.2	0.1	0.2	0.6	0.2	0.3	0.2	0.3	0.4	0.2	<0.1	0.2	0.3	2.7	0.3	<0.1	<0.1	<0.1	<0.1
Copper	Dissolved	µg/L	0.5	0.6	0.6	0.9	2.7	1.4	<0.5	0.5	<0.5	1.4	<0.5	<0.5	<0.5	1.2	4.5	0.7	1	0.8	0.7	0.7
Lead	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lithium	Dissolved	µg/L	0.5	1.7	0.9	2.9	1.1	10.2	1.4	0.9	3	9.6	2.1	1	3.1	1.8	2.1	1	1.8	1.4	1.7	1.5
Manganese	Dissolved	µg/L	0.5	64.7	4.8	6.5	886	16	98.8	36.7	1.3	3.4	45.8	68.4	2.2	6.3	132	42.5	3.7	2.3	2.4	1.8
Molybdenum	Dissolved	µg/L	0.1	0.6	0.8	3.6	1	3.4	1	1	3.9	3.5	1	0.7	3.9	1	5.5	0.8	0.9	0.9	0.8	0.8
Nickel	Dissolved	µg/L	0.5	<0.5	<0.5	1	1.3	1.6	<0.5	<0.5	1	1.4	0.5	<0.5	0.8	1.7	19.2	1.6	0.6	<0.5	<0.5	<0.5
Silver	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	Dissolved	µg/L	1	423	177	420	416	75	348	181	296	62	523	237	328	181	490	171	64	59	61	66
Tellurium	Dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	Dissolved	µg/L	0.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	Dissolved	µg/L	0.2	<0.2	<0.2	<0.2	0.4	0.2	<0.2	0.5	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	0.6	<0.2	<0.2
Titanium	Dissolved	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Uranium	Dissolved	µg/L	0.05	0.5	2.22	18.2	1.13	4.84	0.77	2.29	18.8	5.65	0.68	2.07	19.3	1.39	8.45	1.37	0.65	0.52	0.71	0.74
Vanadium	Dissolved	µg/L	0.2	2.2	1.6	9.8	3.1	8.6	1.4	4.7	10.4	9.8	0.5	0.3	8.5	4.8	11.2	2.3	1.9	1.9	2.3	2.4
Zinc	Dissolved	µg/L	1	10	9	10	21	9	11	8	8	8	12	1	9	4	17	15	30	18	12	8
Nitrate as N		mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.09	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.02	1.08	1	1.2	1.12
Total Anions		meq/L	0.01	14.8	4.81	35	7.28	33.1	14	5.05	36	31.1	19.8	5.43	35.3	2.69	9.69	2.59	2.32	2.12	2.24	2.89
Total Cations		meq/L	0.01	12.7	4.87	31.6	6.95	30	12.1	4.74	31.4	26.6	18.7	6.02	34.6	3.11	10.3	2.54	2.27	2.13	2.35	2.55
Ionic Balance		%	0.01	7.62	0.67	5.05	2.33	4.95	7.19	3.17	6.83	7.76	2.96	5.14	0.88	7.23	3.1	0.94	1.23	0.28	2.24	6.18
Bromide		mg/L	0.01	0.557	0.154	1.78	0.174	2.25	0.521	0.016	2.14	2.51	0.774	0.016	1.89	0.012	0.399	0.01	0.071	0.064	0.065	0.076
Aluminium	Total	µg/L	5						206	9	333	85	26	----	----	----	5810	521	2970	2460	1600	1160
Iron	Total	µg/L	2						985	57	546	266	490	----	----	----	7570	666	1620	1390	879	616
Antimony	Total	µg/L	0.2						<0.2	<0.2	1.1	0.5	<0.2	----	----	----	0.4	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	Total	µg/L	0.2						<0.2	<0.2	<0.2	0.2	<0.2	----	----	----	0.4	<0.2	0.4	0.2	0.3	0.3
Arsenic	Total	µg/L	0.2						3.1	0.7	6.1	11.1	3.2	----	----	----	9.2	1.7	1	1	0.9	0.9
Barium	Total	µg/L	0.5						187	39.1	85.4	60.3	206	----	----	----	208	73.4	24.4	22.6	20.7	28
Beryllium	Total	µg/L	0.1						<0.1	<0.1	<0.1	<0.1	<0.1	----	----	----	0.4	<0.1	<0.1	<0.1	<0.1	<0.1

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	YR01 02/01/2022	YR02 02/01/2022	YR03 02/01/2022	YR04 02/01/2022	TR01 03/01/2022	YR01 10/02/2022	YR02 10/02/2022	YR03 10/02/2022	TR01 11/02/2022	YR01 13/03/2022	YR02 13/03/2022	YR03 13/03/2022	TR01 13/03/2022	TR08 13/03/2022	TR01 26/04/2022	TR south 03/06/2022	TR North 03/06/2022	TR South 06/06/2022	TR North 06/06/2022
Boron	Total	µg/L	5						328	107	885	739	518	----	----	----	416	37	25	21	21	23
Bismuth	Total	µg/L	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	----	----	----	0.08	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	Total	µg/L	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	----	----	----	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	Total	µg/L	0.2						0.8	<0.2	1.2	0.6	0.2	----	----	----	36	1.3	6.1	5.9	3.6	2.7
Cobalt	Total	µg/L	0.1						0.4	0.1	0.6	0.4	0.2	----	----	----	9.2	0.6	0.4	0.4	0.2	0.2
Copper	Total	µg/L	0.5						0.8	<0.5	2.2	1.5	<0.5	----	----	----	12.8	1.1	1.8	1.6	1.2	1.6
Lead	Total	µg/L	0.1						0.1	<0.1	0.4	0.2	<0.1	----	----	----	4.5	0.3	0.5	0.4	0.3	0.2
Lithium	Total	µg/L	0.5						1.6	0.8	3.5	9.9	2.1	----	----	----	5.6	1.4	5.6	3.8	3.2	2.7
Manganese	Total	µg/L	0.5						341	31	51.2	157	266	----	----	----	715	114	16.3	13.1	8.9	7.6
Molybdenum	Total	µg/L	0.1						1.4	1.4	5.6	4.8	1.5	----	----	----	2.8	1	1.2	1.2	1	1.1
Nickel	Total	µg/L	0.5						1.2	<0.5	2.6	2.6	0.7	----	----	----	39.6	2.4	3.2	2.9	1.9	1.6
Silver	Total	µg/L	0.1						<0.1	<0.1	<0.1	<0.1	<0.1	----	----	----	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	Total	µg/L	1						392	202	358	76	465	----	----	----	453	192	64	59	62	69
Thallium	Total	µg/L	0.02						<0.02	<0.02	<0.02	<0.02	<0.02	----	----	----	0.08	<0.02	0.02	<0.02	<0.02	<0.02
Thorium	Total	µg/L	0.1						<0.1	<0.1	<0.1	<0.1	<0.1	----	----	----	1.6	<0.1	0.5	0.3	0.2	0.2
Tin	Total	µg/L	0.2						<0.2	<0.2	1	<0.2	<0.2	----	----	----	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium	Total	µg/L	1						4	<1	7	2	<1	----	----	----	89	5	73	63	30	23
Uranium	Total	µg/L	0.05						1.06	2.79	23.4	6.74	0.76	----	----	----	9.79	1.63	1.09	0.8	0.95	0.9
Vanadium	Total	µg/L	0.2						1.9	4.4	11.5	9.9	0.7	----	----	----	25.5	3.3	4.9	4.6	3.8	3.6
Zinc	Total	µg/L	1						2	<1	8	2	<1	----	----	----	13	<1	2	2	<1	5
Tellurium	Total	µg/L	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	----	----	----	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Mercury	Total	µg/L	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	YR04 19/06/2022	YR05 21/06/2022	YR06 21/06/2022	YR07 19/06/2022	DL1 19/09/2022	TR03 20/09/2022	YR08 21/09/2022	YR01 21/09/2022	YR09 21/09/2022	TR FLOW 08/02/2023	TR CROSSING 08/02/2023	TR01 29/03/2023	YR05 29/03/2023	TR06 R551 30/03/2023
pH Value		pH Unit	0.01	8.59	8.72	8.81	8.3	8.65	8.82	8.2	8.18	8.19	7.94	8.1	9.11	9.26	7.75
Electrical Conductivity @ 25°C		µS/cm	1	224	343	337	405	641	442	1560	586	529	276	274	308	309	316
Total Dissolved Solids @180°C		mg/L	10	136	180	182	221	356	257	860	291	276	175	166	143	142	156
Suspended Solids (SS)		mg/L	5	10	5	<5	11	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide Alkalinity as CaCO3		mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		mg/L	1	6	14	17	<1	16	17	<1	<1	<1	<1	<1	16	30	<1
Bicarbonate Alkalinity as CaCO3		mg/L	1	70	104	99	153	139	97	471	203	176	86	90	54	60	88
Total Alkalinity as CaCO3		mg/L	1	76	118	116	153	155	114	471	203	176	86	90	70	90	88
Silicon as SiO2		mg/L	0.1	12.9	13.9	13.6	19.3	22.8	13.3	26.4	26.1	26.2	18.4	18.3	16.9	25.6	17.7
Sulfate as SO4 - Turbidimetric		mg/L	1	9	11	11	19	30	18	<1	7	14	15	10	6	3	11
Chloride		mg/L	1	24	39	37	33	107	75	270	77	69	34	34	45	38	36
Calcium		mg/L	1	14	17	13	26	18	12	48	33	25	13	12	5	6	9
Magnesium		mg/L	1	4	9	7	8	14	10	36	14	13	8	7	3	2	6
Sodium		mg/L	1	32	58	41	50	91	65	227	73	70	35	35	45	48	36
Potassium		mg/L	1	3	3	2	2	7	4	6	3	2	4	4	2	3	5
Mercury	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	Dissolved	µg/L	5	7	<5	<5	<5	5	<5	<5	<5	<5	6	6	5	<5	<5
Iron	Dissolved	µg/L	2	9	4	3	18	<2	7	23	28	38	9	7	36	8	2
Antimony	Dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	Dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	0.4	0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2
Arsenic	Dissolved	µg/L	0.2	0.6	0.5	0.4	0.5	1.7	1.7	1.4	0.6	0.7	0.8	0.8	2.1	1	1
Barium	Dissolved	µg/L	0.5	69.9	69.4	59.5	113	60.2	72	202	167	139	26.3	26.5	66.2	65.3	89.4
Beryllium	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	Dissolved	µg/L	5	16	23	28	22	140	106	225	94	98	73	76	93	62	111
Bismuth	Dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	Dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	Dissolved	µg/L	0.2	0.4	<0.2	<0.2	<0.2	1.5	0.3	<0.2	<0.2	<0.2	0.5	0.4	<0.2	<0.2	0.4
Cobalt	Dissolved	µg/L	0.1	0.2	<0.1	<0.1	<0.1	0.2	0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1
Copper	Dissolved	µg/L	0.5	1.7	0.6	<0.5	0.5	1.7	1	<0.5	<0.5	<0.5	0.5	0.5	0.6	<0.5	6.7
Lead	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lithium	Dissolved	µg/L	0.5	0.8	0.7	0.6	0.6	0.8	2.7	1.2	0.7	0.8	2.3	2.4	2	0.8	2.9
Manganese	Dissolved	µg/L	0.5	1.8	1.6	1.5	10.6	2	1.8	110	104	63.1	<0.5	<0.5	1.6	47.5	<0.5
Molybdenum	Dissolved	µg/L	0.1	0.8	1.1	1.1	1	2.7	1.3	0.8	0.7	0.9	0.8	0.8	0.5	0.4	1.1
Nickel	Dissolved	µg/L	0.5	0.6	<0.5	<0.5	<0.5	1.3	0.7	0.6	<0.5	<0.5	0.6	0.6	0.6	<0.5	1.6
Silver	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	Dissolved	µg/L	1	112	145	147	166	305	175	548	289	231	104	104	85	111	105
Tellurium	Dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	Dissolved	µg/L	0.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	Dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	Dissolved	µg/L	0.2	0.3	<0.2	<0.2	<0.2	1.6	1.5	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	39.4
Titanium	Dissolved	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Uranium	Dissolved	µg/L	0.05	1.72	2.44	2.26	1.89	6.36	3.02	1.26	1.7	1.73	1.25	1.3	0.64	0.31	0.58
Vanadium	Dissolved	µg/L	0.2	6.3	4.9	4.7	3	10	3.1	0.4	0.3	0.4	2.9	2.9	3.8	6.1	3.2
Zinc	Dissolved	µg/L	1	3	7	6	26	11	8	15	27	22	<1	<1	4	4	64
Nitrate 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	<0.01	<0.01	<0.01	0.02
Total Anions		meq/L	0.01	2.38	3.69	3.59	4.38	6.74	4.77	17	6.37	5.75	2.99	2.96	2.79	2.93	3
Total Cations		meq/L	0.01	2.5	4.19	3.06	4.18	6.19	4.35	15.4	6.05	5.41	2.93	2.8	2.5	2.63	2.64
Ionic Balance		%	0.01	2.33	6.37	7.99	2.35	4.27	4.57	5.06	2.6	3.05	0.98	2.88	5.44	5.47	6.49
Bromide		mg/L	0.01	0.055	0.106	0.108	0.087	0.151	0.15	0.605	0.225	0.171	0.085	0.083	0.135	0.132	0.078
Aluminium	Total	µg/L	5	523	15	23	54										203
Iron	Total	µg/L	2	484	19	33	198										207
Antimony	Total	µg/L	0.2	<0.2	<0.2	<0.2	<0.2										<0.2
Selenium	Total	µg/L	0.2	0.2	0.2	<0.2	<0.2										<0.2
Arsenic	Total	µg/L	0.2	0.6	0.5	0.5	0.6										1.1
Barium	Total	µg/L	0.5	26.7	30.3	25.1	72.8										40
Beryllium	Total	µg/L	0.1	<0.1	<0.1	<0.1	<0.1										<0.1

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	YR04 19/06/2022	YR05 21/06/2022	YR06 21/06/2022	YR07 19/06/2022	DL1 19/09/2022	TR03 20/09/2022	YR08 21/09/2022	YR01 21/09/2022	YR09 21/09/2022	TR FLOW 08/02/2023	TR CROSSING 08/02/2023	TR01 29/03/2023	YR05 29/03/2023	TR06 R551 30/03/2023
Boron	Total	µg/L	5	38	61	57	53										177
Bismuth	Total	µg/L	0.05	<0.05	<0.05	<0.05	<0.05										<0.05
Cadmium	Total	µg/L	0.05	<0.05	<0.05	<0.05	<0.05										<0.05
Chromium	Total	µg/L	0.2	1.5	0.2	0.2	0.3										1.4
Cobalt	Total	µg/L	0.1	0.5	<0.1	<0.1	0.2										<0.1
Copper	Total	µg/L	0.5	2.6	1	0.7	0.6										8.3
Lead	Total	µg/L	0.1	0.3	<0.1	<0.1	0.1										0.4
Lithium	Total	µg/L	0.5	1.6	0.8	0.8	0.8										3.2
Manganese	Total	µg/L	0.5	35.7	8	10.8	73.3										3.6
Molybdenum	Total	µg/L	0.1	1.2	1.4	1.4	1.3										1.4
Nickel	Total	µg/L	0.5	1.1	<0.5	<0.5	<0.5										2.2
Silver	Total	µg/L	0.1	<0.1	<0.1	<0.1	<0.1										<0.1
Strontium	Total	µg/L	1	114	149	146	174										106
Thallium	Total	µg/L	0.02	<0.02	<0.02	<0.02	<0.02										<0.02
Thorium	Total	µg/L	0.1	0.1	<0.1	<0.1	<0.1										<0.1
Tin	Total	µg/L	0.2	<0.2	<0.2	<0.2	<0.2										42.5
Titanium	Total	µg/L	1	11	<1	<1	<1										3
Uranium	Total	µg/L	0.05	2.03	2.62	2.62	2.22										0.84
Vanadium	Total	µg/L	0.2	7.7	5.6	5.2	3.8										3.7
Zinc	Total	µg/L	1	3	2	<1	<1										59
Tellurium	Total	µg/L	0.2	<0.2	<0.2	<0.2	<0.2										<0.2
Mercury	Total	µg/L	0.1	<0.2	<0.3	<0.4	<0.5										<0.1

Appendix C

De Grey Bore Summary

Bore ID	Surveyed Easting (GDA94 MGA Z50)	Surveyed Northing (GDA94 MGA Z50)	Ground elevation (mAHD)	Top of casing elevation (mAHD)	Drilled depth (mbgl)	Cased depth (mbgl)	Casing stick up (magl)	Started	Completed	Hole diameter production zone (mm)	Minimum casing ID (mm)	Slotted interval (mbgl)	Lithology of Slotted Interval	Slot aperture (mm)	initial swl (mbtoc)	Max Airlift yield (L/sec) - development	Max EC (uS/cm) - development	Minimum pH - development	Drilling Company	Drill method
PRODUCTION BORES																				
HERC026	649302	7692232	69.00	nr	60.0	60.00	nr	13-Apr-20	13-Apr-20	143	102	nr	nr	1.0	nr	na	nr	nr	Topdrill	RC
HPB001	647585.34	7691688.31	67.842	69.29	36.0	27.00	0.60	01-Dec-20	02-Dec-20	205	154	3.0 - 27.0	alluvium	1.0	6.06	4.0	1,385	8.2	Topdrill	RC
HPB002	646452.08	7692367.61	66.78	67.35	30.0	29.00	0.57	30-Aug-21	31-Aug-21	216	154	17.0 - 29.0	alluvium	1.0	5.95	4.0	1,151	8.15	Topdrill	MR
HPB003	647278.04	7692060.93	67.69	68.19	47.2	46.70	0.50	28-Aug-21	29-Aug-21	216	154	28.7 - 46.7	alluvium	1.0	6.03	4.0	1,227	8.08	Topdrill	MR
HPB004	647982.57	7692605.38	66.79	67.11	36.0	35.33	0.32	31-Aug-21	01-Sep-21	216	154	17.33 - 35.33	alluvium	1.0	5.95	4.0	1,447	8.21	Topdrill	MR
HPB005	649505.74	7691404.98	69.88	70.43	36.0	35.35	0.55	02-Sep-21	03-Sep-21	216	154	17.35 - 35.35	alluvium	1.0	6.45	5.0	1,530	8.06	Topdrill	MR
HPB006	647997.90	7690923.57	70.91	71.26	60.0	54.90	0.35	22-Aug-21	29-Aug-21	375	254	24.9 - 54.9	alluvium (palaeochannel)	1.0	6.52	40-50	1,265	7.95	Austral	MR
HPB007	647991.44	7691591.23	69.32	69.72	60.0	22.56	0.40	29-Aug-21	01-Sep-21	375	203	4.56 - 22.56	alluvium	1.0	6.64	20-25	1,391	7.99	Austral	MR
HPB008	648869.81	7693099.93	67.16	67.62	47.0	45.34	0.46	01-Sep-21	06-Sep-21	375	254	9.34 - 15.34 & 21.34 - 33.34	alluvium	1.0	5.78	10.0	1,659	8.07	Austral	MR
HPB009	649559.35	7692238.84	69.05	69.41	49.0	47.19	0.36	06-Sep-21	10-Sep-21	311	203	23.9 - 29.9 & 35.9 - 41.9	alluvium	1.0	6.12	35.0	1,583	8.03	Austral	MR
HPB010	648319.35	7691481.77	69.51	69.99	131.0	119.00	0.48	29-Sep-21	16-Oct-21	311	203	94-118?	saprock-bedrock (MIIRK-sedimens)	1.0	6.70	8.0	1,800	8.44	Austral	MR/AR
HPB011	648590.74	7692924.28	67.20	67.45	47.0	46.25	0.25	22-Oct-21	30-Oct-21	311	203	28.2 - 46.2	saprock (MIRK)	1.0	5.70	nr	nr	nr	Austral	MR
HPB012	647288.63	7692802.89	66.67	67.15	48.0	41.93	0.48	01-Nov-21	03-Nov-21	375	254	17.93 - 35.93	alluvium (palaeochannel)	1.0	6.70	40.0	1,267	8.09	Austral	MR/AR
HPB013	647252.02	7691832.80	68.42	68.72	136.0	131.00	0.30	07-Jun-23	18-Jul-23	375	253	29.5-47.5; 113.5-131.5	transported, sparolite & saprock	2.0	6.85	55.0	1,464	8.13	Foraco	MR
HPB014	648540.46	7688209.74	74.87	75.32	48.0	43.81	0.45	19-Jun-23	26-Jun-23	444.5	305	32-44	alluvium (palaeochannel)	1.0 + 2.0	7.39	35.0	1,285	8.43	Foraco	MR
MONITORING BORES																				
HMB001	648600.56	7692345.56	68.45	69.15	42.0	40.80	0.70	27-Nov-20	27-Nov-20	143	54	4.8 - 34.8	alluvium	1.0	6.37	nr	1,588	8.3	Topdrill	RC
HMB002	648336.01	7692948.86	67.00	67.70	36.0	35.90	0.70	27-Nov-20	28-Nov-20	143	54	5.9 - 29.9	alluvium	1.0	5.98	nr	1,563	8.5	Topdrill	RC
HMB003	649251.43	7692147.85	68.94	69.59	42.0	29.25	0.65	28-Nov-20	28-Nov-20	143	54	5.25 - 29.25	alluvium	1.0	6.02	nr	1,632	8.4	Topdrill	RC
HMB004	649831.62	7692539.50	68.69	69.49	36.0	32.50	0.80	28-Nov-20	28-Nov-20	143	54	2.5 - 26.5	alluvium	1.0	5.92	nr	1,744	8.5	Topdrill	RC
HMB005	650461.80	7693698.63	67.78	68.48	42.0	38.50	0.70	28-Nov-20	28-Nov-20	143	54	2.7 - 32.7	alluvium	1.0	5.88	nr	1,887	8.5	Topdrill	RC
HMB006	652870.01	7696703.95	68.78	69.53	30.0	27.75	0.75	29-Nov-20	29-Nov-20	143	54	3.75 - 21.75	alluvium	1.0	8.61	nr	1,880	8.6	Topdrill	RC
HMB007	647947.36	7690342.24	71.80	72.50	48.0	26.70	0.70	29-Nov-20	29-Nov-20	143	54	2.7 - 26.7	alluvium	1.0	7.13	nr	1,322	8.5	Topdrill	RC
HMB008	648534.77	7688043.01	74.50	75.25	36.0	27.00	0.75	29-Nov-20	29-Nov-20	143	54	3.0 - 27.0	alluvium	1.0	6.94	nr	1,294	8.5	Topdrill	RC
HMB009	644154.43	7689622.14	68.50	69.25	25.0	24.55	0.75	30-Nov-20	30-Nov-20	143	54	6.55 - 24.55	alluvium	1.0	6.15	nr	996	8.5	Topdrill	RC
HMB010	642715.99	7694436.91	62.68	63.58	30.0	12.36	0.90	30-Nov-20	30-Nov-20	143	54	0.36 - 12.36	alluvium	1.0	7.54	nr	1,046	8.5	Topdrill	RC
HMB011	646693.76	7693592.19	64.34	65.19	42.0	36.60	0.85	30-Nov-20	01-Dec-20	143	54	6.6 - 36.6	alluvium	1.0	6.07	nr	1,422	8.5	Topdrill	RC
HMB012D	649535.35	7692229.93	69.12	69.67	49.0	26.15	0.55	10-Sep-21	13-Sep-21	216	54	37.7 - 43.7	alluvium (basal)	2.0	6.21	0.5-1	1,638	8	Austral	AC
HMB012S	649535.31	7692229.97	69.09	69.64	49.0	43.70	0.55	10-Sep-21	13-Sep-21	216	54	23.15 - 26.15	alluvium (intermediate)	2.0	6.21	0.5-1	1,640	8.07	Austral	AC
HMB013	648044.11	7690920.47	70.86	71.49	37.0	35.80	0.63	15-Sep-21	16-Sep-21	127	54	23.2 - 35.2	alluvium (basal)	2.0	6.75	nr	1,267	7.85	Austral	AC
HMB014	647986.31	7691541.07	69.23	69.86	29.0	26.12	0.63	16-Sep-21	17-Sep-21	127	54	2.1 - 26.1	alluvium	2.0	6.53	nr	1,320	8.23	Austral	AC
HMB015	648892.09	7693088.18	67.31	67.92	35.0	33.04	0.61	17-Sep-21	18-Sep-21	138	54	3.04 - 33.04	alluvium	2.0	6.00	1.0	1,470	8.29	Austral	AC
HMB016	649543.45	7692230.91	69.03	69.65	11.0	10.78	0.62	18-Sep-21	18-Sep-21	138	54	4.78 - 10.78	alluvium (shallow)	2.0	6.20	0.3	1,610	8.31	Austral	AC
HMB017	663410.55	7691061.03	87.75	88.32	24.0	23.88	0.57	19-Sep-21	20-Sep-21	132	54	11.88 - 23.88	saprock-bedrock	2.0	11.10	0.2	1,910	8.18	Austral	AC/AR
HMB018	660156.48	7696734.69	75.99	76.62	24.0	23.22	0.63	20-Sep-21	21-Sep-21	132	54	11.22 - 23.22	alluvium	2.0	8.68	0.4	907	7.98	Austral	AR
HMB019	658648.67	7701322.66	69.74	70.41	23.2	23.20	0.67	22-Sep-21	22-Sep-21	138	54	11.23 - 23.23	saprolite-saprock	2.0	12.18	<0.1	640	8.44	Austral	AC
HMB020	664401.32	7691571.72	88.48	89.03	28.0	28.00	0.55	22-Sep-21	23-Sep-21	132	54	10.0 - 28.0	bedrock (schist)	2.0	11.02	0.0	nr	nr	Austral	AR
HMB021	661103.91	7697057.97	77.08	77.57	20.0	19.86	0.49	23-Sep-21	24-Sep-21	138	54	7.86 - 19.86	alluvium-saprolite	2.0	8.50	0.2	1,750	8.18	Austral	AC
HMB022	659561.97	7701213.71	70.35	70.88	30.0	28.28	0.53	24-Sep-21	24-Sep-21	138	54	10.28 - 28.28	saprolite-saprock	2.0	10.80	0.5	960	8.14	Austral	AC/AR
HMB023D	648267.91	7691484.36	69.53	70.08	113.0	112.10	0.55	26-Sep-21	29-Sep-21	216	54	100.1 - 112.1	saprolite-saprock (siltstone)	2.0	6.66	1.5	1,430	7.8	Austral	MR
HMB023S	648267.91	7691484.40	69.52	70.06	113.0	22.10	0.54	26-Sep-21	29-Sep-21	216	54	4.1 - 22.1	alluvium	2.0	6.65	1	1,349	8.1	Austral	MR
HMB024D	648611.46	7692882.12	67.17	67.82	38.0	37.00	0.65	18-Oct-21	19-Oct-21	216	54	31.0 - 37.0	saprock (IIRK)	2.0	5.99	nr	nr	nr	Austral	MR
HMB024S	648611.50	7692882.15	67.14	67.79	38.0	16.90	0.65	18-Oct-21	19-Oct-21	216	54	4.9 - 16.90	alluvium	2.0	6.06	nr	nr	nr	Austral	MR
HMB025D	649323.58	7692365.87	68.73	69.38	51.0	49.75	0.65	28-Oct-21	31-Oct-21	216	54	43.75 - 49.75	saprock (IIRK)	2.0	6.51	0.05	1757	8.69	Austral	MR
HMB025S	649323.60	7692365.86	68.68	69.33	51.0	21.00	0.66	28-Oct-21	31-Oct-21	216	54	3.0 - 21.0	alluvium	2.0	6.45	0.5	1597	8.5	Austral	MR
HMB026	647272.64	7692827.92	66.61	67.20	44.0	39.58	0.59	6-Nov-21	6-Nov-21	216	54	3.58 - 39.58	alluvium	2.0	6.82	nr	1,277	8.28	Austral	MR
HMB027D	649470.60	7686519.84	75.90	76.48	47.0	43.92	0.58	08-Nov-21	09-Nov-21	216	54	37.92 - 43.92	alluvium (basal)	2.0	6.55	nr	1,270	7.95	Austral	MR
HMB027S	649470.67	7686519.84	75.91	76.50	47.0	18.22	0.59	08-Nov-21	09-Nov-21	216	54	6.22-18.22	alluvium (upper)	2.0	6.41	nr	1,350	8.18	Austral	MR
HMB028D	648481.12	7688471.36	74.45	75.18	51.0	45.28	0.73	10-Nov-21	12-Nov-21	216	54	39.28 - 45.28	alluvium (basal)	2.0	7.46	nr	1,245	8.06	Austral	MR
HMB028S	648481.12	7688471.45	74.56	75.27	51.0	25.98	0.71	10-Nov-21	12-Nov-21	216	54	4.98-25.98	alluvium (upper)	2.0	7.41	0.6	1,260	8.14	Austral	MR
HMB029D	646278.13	7693908.12	64.17	64.81	40.5	39.40	0.64	12-Nov-21	14-Nov-21	216	54	33.4-39.4	alluvium (basal)	2.0	6.57	1.7	1,291	7.83	Austral	MR

Bore ID	Surveyed Easting (GDA94 MGA Z50)	Surveyed Northing (GDA94 MGA Z50)	Ground elevation (mAHD)	Top of casing elevation (mAHD)	Drilled depth (mbgl)	Cased depth (mbgl)	Casing stick up (magl)	Started	Completed	Hole diameter production zone (mm)	Minimum casing ID (mm)	Slotted interval (mbgl)	Lithology of Slotted Interval	Slot aperture (mm)	initial swl (mbtoc)	Max Airlift yield (L/sec) - development	Max EC (uS/cm) - development	Minimum pH - development	Drilling Company	Drill method
HMB029S	646278.07	7693908.09	64.18	64.81	40.5	16.82	0.64	12-Nov-21	14-Nov-21	216	54	4.82- 16.82	alluvium (upper)	2.0	6.58	0.7	1,336	8.10	Austral	MR
HMB030D	645938.96	7695499.41	61.34	61.98	50.0	44.93	0.64	16-Nov-21	18-Nov-21	216	54	35.93 - 44.93	alluvium (basal)	2.0	5.77	nr	1,285	7.53	Austral	MR
HMB030S	645939.02	7695499.48	61.36	61.98	50.0	15.86	0.62	16-Nov-21	18-Nov-21	216	54	5.86 - 15.86	alluvium (upper)	2.0	5.90	approx 0.5	1,334	7.95	Austral	MR
HMB031	651575.73	7689185.89	75.13	75.99	15.0	14.79	0.86	10-Mar-22	10-Mar-22	143	54	8.79 - 14.79	alluvium	2.0	6.97	0.2	1,375	8.01	Topdrill	RC
HMB032	652495.41	7689170.74	75.95	76.80	15.0	15.00	0.85	10-Mar-22	10-Mar-22	143	54	9.0 - 15.0	alluvium	2.0	6.80	0.2	1,657	8.12	Topdrill	RC
HMB033	651302.08	7688522.86	75.84	76.69	15.2	15.20	0.85	10-Mar-22	11-Mar-22	143	54	9.2 - 15.2	alluvium	2.0	7.43	0.2	1,479	8.21	Topdrill	RC
HMB034	652373.01	7688550.16	76.80	77.65	20.1	20.05	0.85	11-Mar-22	11-Mar-22	143	54	8.05 - 20.05	alluvium and weathered bedrock	2.0	6.93	0.4	1,623	8.07	Topdrill	RC
HMB035	653611.12	7689196.00	77.67	78.32	20.0	19.98	0.65	11-Mar-22	11-Mar-22	143	54	8.0 - 20.0	alluvium and weathered bedrock	2.0	7.42	0.2	2,001	8.31	Topdrill	RC
HMB036	650487.02	7688909.30	73.84	74.39	24.0	23.25	0.55	17-May-22	17-May-22	143	54	5.25 - 23.25	alluvium	2.0	6.92	~0.5	1465	7.69	Topdrill	RC
HMB037	651468.37	7689588.25	74.30	75.00	23.0	22.70	0.70	18-May-22	18-May-22	143	54	7.7 - 22.7	alluvium and weathered bedrock	2.0	7.04	<=0.2	1606	8.09	Topdrill	RC
HMB038	650375.71	7689599.53	72.98	73.48	17.5	17.50	0.50	18-May-22	18-May-22	143	54	5.5 - 17.5	alluvium	2.0	6.76	<=0.2	1478	8.08	Topdrill	RC
HMB039	652408.25	7690475.00	74.00	74.45	17.0	17.00	0.45	19-May-22	19-May-22	143	54	5.0 - 17.0	alluvium and weathered bedrock	2.0	6.52	<=0.1	1631	8.35	Topdrill	RC
HMB040	650831.92	7690557.45	73.30	73.80	17.2	17.20	0.50	19-May-22	19-May-22	143	54	5.2 - 17.2	weathered bedrock	2.0	8.39	~0.2 - 0.3	1601	8.08	Topdrill	RC
HMB041	651503.35	7690694.42	72.26	72.86	15.0	14.65	0.60	19-May-22	19-May-22	143	54	8.65 - 14.65	alluvium	2.0	6.91	<=0.2	1636	8.21	Topdrill	RC
HMB042	650447.82	7691044.27	71.19	71.79	21.0	20.20	0.60	19-May-22	19-May-22	143	54	6.2 - 20.2	alluvium and weathered bedrock	2.0	6.85	~0.1	1560	8.37	Topdrill	RC
HMB043	649450.59	7692696.97	98.89	68.89	160.0	159.50	0.59	11-May-23	18-May-23	149/96	50	148 - 160	saprock and jointed bedrock	1.0	6.29	1	1,937	7.90	Topdrill	MR/DD
HMB044	649099.67	7692095.33	68.68	69.48	90.5	90.00	0.80	20-May-23	23-May-23	149/96	50	14-32 + 38-90	Transported, saprolite	1.0	6.78	4.0	1,652	7.38	Topdrill	MR
HMB045D	648924.41	7692182.77	68.94	69.49	94.0	86.00	0.55	18-May-23	24-May-23	215	54	62-68 + 74-86	SPRK MIRK & FRJW Seds	1.0	6.45	nr	1,516	8.37	Foraco	MR
HMB045S	648924.37	7692182.81	68.47	69.02	94.0	40.00	0.55	18-May-23	24-May-23	215	54	34-40	Quartz-rich sands, JT zone?	1.0	6.61	nr	1,566	7.93	Foraco	MR
HMB046	649079.73	7692418.20	68.41	69.21	132.4	131.10	0.80	22-May-23	27-May-23	149/96	50	8.1-26.1 and 108.1-131.1	Trans & SPRK-Fresh seds.	1.0	6.54	1.4	1,877	7.9	Topdrill	MR/DD
HMB047D	649249.85	7692554.86	68.28	69.09	138.0	115.00	0.81	24-May-23	07-Jun-23	215	54	106-115	SPRK seds.	1.0	6.31	1.3	1,447	7.95	Foraco	AR
HMB047S	649249.76	7692554.78	68.27	69.08	138.0	52.00	0.81	24-May-23	07-Jun-23	215	54	40.25-52.25	Transported	1.0	6.48	1.0	1,464	8.04	Foraco	AR
HMB048	648712.00	7691780.28	69.22	70.05	40.0	31.50	0.83	28-May-23	29-May-23	149	50	19.5-31.5	Trans	1.0	7.03			nr	Topdrill	MR
HMB050	648712.80	7691792.90	69.24	70.05	129.5	tba	0.81	30-May-23	03-Jun-23	149	50	tba	tba	1.0	6.99	0.0	1,900	nr	Topdrill	MR
HMB052	648615.00	7691161.34	70.25	70.416	129.6	tba	0.17	03-Jun-23	12-Jun-23	na	na	111.5-129.5	saprolite & saprock (RSR & FRJS)	1.0	na	na	na	na	Topdrill	MR/DD
HMB053D	647275.24	7691852.05	68.55	69.362	134.0	tba	0.81	31-May-23	07-Jun-23	215	54	tba	saprolite & saprock	1.0	7.48	0.3	2,482	nr	Foraco	MR
HMB053S	647275.13	7691852.00	68.54	69.35	134.0	44.00	0.81	31-May-23	06-Jun-23	215	54	tba	transported	1.0	7.27	1.7	1,258	nr	Foraco	MR
HMB054	648038.33	7691096.58	70.21	70.568	147.1	146.50	0.36	12-Jun-23	17-Jun-23	140	50	98.6-146.6	mafic intrustive & sediments	1.0	7.03	na	na	na	Topdrill	MR/DD
HMB055	648534.71	7688201.64	75.03	75.72	16.0	15.00	0.69	26-Jun-23	28-Jun-23	215	50	8.93 - 14.93	Transported	1.0	7.59	0.8			Topdrill	MR/DD
HMB056	648528.79	7692373.71	69.18	70.09	161.7	161.10	0.91	18-Jun-23	20-Jun-23	149/96	50	17.1-161.1	Transported, weathered bedrock	1.0	7.15	2.0	1,668	7.59	Topdrill	MR/DD

Appendix D

Groundwater Quality Summary Results

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	HMB001 02/12/2020	HMB002 02/12/2020	HMB003 03/12/2020	HMB004 03/12/2020	HMB005 03/12/2020	HMB006 04/12/2020	HMB007 03/12/2020	HMB008 03/12/2020	HMB009 03/12/2020	HMB010 03/12/2020	HMB011 04/12/2020	HPB001 02/12/2020	WPB001 05/12/2020	HMB001 22/04/2021	HMB002 22/04/2021	HMB003 22/04/2021	HMB004 23/04/2021	HMB005 23/04/2021	HMB005D 23/04/2021	HMB006 23/04/2021	HMB007 22/04/2021	HMB008 21/04/2021	HMB009 21/04/2021	HMB010 21/04/2021	HMB011 22/04/2021	HMB011D 23/04/2021	INDEE HOMESTEAD 22/04/2021	HERC026 22/04/2021	UNK1 23/04/2021	UNK2 23/04/2021
pH Value		pH Unit	0.01	8.35	8.44	8.43	8.48	8.48	8.38	8.47	8.44	8.45	8.47	8.40	8.30	8.34	8.04	8.02	8.06	7.98	7.94	7.94	7.93	8.04	8.08	8.08	8.07	8.05	8.05	7.89	8.26	8.41	8.41
Electrical Conductivity @ 25°C		µS/cm	1	1470	1500	1500	1530	1670	1780	1280	1260	989	1030	1250	1280	11400	1310	1450	1440	1490	1600	1600	2100	1220	1190	1020	996	1270	1180	3420	1450	1750	1580
Total Dissolved Solids @180°C		mg/L	10	890	898	898	929	1030	1070	794	768	598	661	754	798	6920	746	829	865	1030	985	956	1240	760	732	614	616	768	688	1950	872	1070	1010
Suspended Solids (SS)		mg/L	5	15	118	49	173	754	304	117	93	257	224	58	60	206	<5	5	<5	<5	49	48	<5	72	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		mg/L	1	8	19	19	24	23	14	22	18	15	18	14	3	11	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	22	16
Bicarbonate Alkalinity as CaCO3		mg/L	1	358	346	353	354	351	345	340	314	265	281	311	331	456	348	361	369	374	370	374	442	325	316	286	304	335	348	377	369	423	278
Total Alkalinity as CaCO3		mg/L	1	366	365	372	378	373	359	362	332	281	300	325	335	468	348	361	369	374	370	374	442	325	316	286	304	335	348	377	369	445	295
Silicon as SiO2		mg/L	0.1	91.0	88.6	93.1	86.9	78.2	102.0	90.3	93.7	80.0	82.1	81.0	91.2	26.1	89.9	86.5	93.2	83.1	66.8	66.8	98.2	93.9	95.7	77.6	76.6	90.7	76.2	50.2	85.5	110.0	100.0
Sulfate as SO4 - Turbidimetric		mg/L	1	63	66	62	65	77	43	39	36	22	26	43	42	740	46	61	53	62	79	78	45	40	34	23	23	43	42	178	60	42	44
Chloride		mg/L	1	233	238	241	245	284	350	191	183	126	125	183	187	3160	204	245	248	259	290	289	473	198	185	145	125	205	187	861	253	333	296
Calcium		mg/L	1	32	30	30	34	32	42	34	35	33	31	36	36	91	26	30	28	30	30	29	41	34	33	33	29	32	33	66	29	28	56
Magnesium		mg/L	1	56	54	53	58	53	61	44	43	30	30	44	44	190	46	56	52	56	56	55	64	45	41	32	30	44	43	114	54	66	49
Sodium		mg/L	1	196	197	195	202	232	225	160	155	126	140	157	161	2180	183	189	195	194	225	223	296	157	157	128	134	165	151	469	188	243	199
Potassium		mg/L	1	13	14	13	14	16	19	13	13	10	10	13	13	32	12	12	12	13	15	15	22	12	13	10	9	12	12	13	12	19	13
Mercury	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	dissolved	µg/L	5	<5	6	<5	6	<5	<5	<5	5	<5	9	5	26	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5
Iron	dissolved	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5	3	29	12	<2	<2	<2	5	<2	<2	<2	4	<2	<2	2	<2	<2	<2	<2	<2	5
Antimony	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	dissolved	µg/L	0.2	3.0	3.1	3.1	3.6	4.2	5.5	3.0	2.9	2.1	2.0	3.0	2.9	2.3	2.8	3.1	3.2	3.8	3.8	3.9	6.7	3.0	2.7	2.1	2.0	3.0	2.8	2.6	3.2	4.9	5.8
Arsenic	dissolved	µg/L	0.2	15.8	**51.8**	**30.2**	9.9	**54.4**	5.0	6.1	5.5	4.7	6.2	3.4	6.5	1.1	10.3	**56.0**	11.3	10.1	**47.7**	**48.2**	4.3	5.8	4.7	4.4	4.9	6.7	9.5	2.4	31.3	5.6	3.1
Barium	dissolved	µg/L	0.5	122.0	116.0	126.0	140.0	186.0	257.0	170.0	157.0	172.0	214.0	124.0	163.0	52.3	117.0	128.0	139.0	136.0	122.0	109.0	210.0	141.0	180.0	212.0	224.0	159.0	148.0	98.2	136.0	216.0	291.0
Beryllium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	dissolved	µg/L	5	490	504	506	592	695	716	488	494	342	341	475	497	856	539	545	595	666	752	761	860	513	497	352	344	492	443	396	546	823	407
Bismuth	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.36	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	dissolved	µg/L	0.2	3.6	3.7	2.9	3.2	3.5	1.7	3.0	2.8	3.1	2.7	3.1	1.8	<0.2	2.0	3.6	2.4	3.1	3.6	3.6	1.0	3.0	2.2	2.5	2.4	2.8	3.6	<0.2	2.7	0.7	0.9
Cobalt	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	2.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Copper	dissolved	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.7	9.5	12.7
Lead	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
Lithium	dissolved	µg/L	0.5	17.8	18.1	18.6	18.6	15.6	18.5	20.6	21.0	5.0	4.6	14.9	22.0	52.7	20.0	20.6	21.6	22.2	19.2	19.2	20.6	24.6	18.1	6.0	5.4	21.9	19.8	20.9	20.4	23.0	11.9
Manganese	dissolved	µg/L	0.5	1.2	0.9	0.9	<0.5	48.7	1.6	4.1	2.2	0.7	6.0	13.8	8.9	121.0	<0.5	<0.5	<0.5	<0.5	0.6	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	dissolved	µg/L	0.1	6.7	6.6	7.0	6.3	6.2	1.9	5.7	5.4	3.7	5.2	5.3	5.6	7.9	6.0	6.5	6.9	6.5	6.2	6.2	1.6	5.6	4.4	3.0	4.1	5.6	5.3	4.9	6.7	3.1	2.0
Nickel	dissolved	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	3.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	dissolved	µg/L	1	614	624	614	664	606	804	581	597	483	521	509	586	3130	590	638	605	663	633	653	835	582	617	520	525	596	555	1490	625	908	834
Tellurium	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	dissolved	µg/L	0.0	<0.02	<0.02	<0.02	<0.02	0.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium	dissolved	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	<1	<1	<1	<1	<1	<1	<1
Uranium	dissolved	µg/L	0.05	42.80	47.50	44.60	47.60	36.70	16.80	25.30	23.30	7.37	8.26	19.30	27.70	35.80	34.20	45.50	39.40	46.20	41.50	41.10	19.00	27.50	19.30	7.70	8.53	30.50	28.00	84.10	43.90	40.90	7.29
Vanadium	dissolved	µg/L	0.2	30.8	30.8	34.3	32.8	22.7	20.4	25.0	28.9	24.0	30.0	17.9	27.1	1.0	34.0	31.3	35.7	33.7	26.3	26.6	21.8	29.3	28.1	25.4	30.0	28.8	26.2	5.3	33.9	31.6	20.0
Zinc	dissolved	µg/L	1	8	10	8	8	13	12	10	8	10	10	52	15	18	13	13	14	13	16	16	14	10	14	14	13	14	12	17	18	10	12
Nitrate as N		mg/L	0.01	6.53	6.20	6.75	6.52	6.28	7.14	7.86	8.47	7.13	8.58	7.07	7.62	1.58	7.12	6.76	7.51	7.01	6.31	6.32	8.07	8.55	11.30	8.05	9.33	8.05	7.66	3.46	7.16	7.87	32.80
Total Anions		meq/L	0.01	15.20	15.40	15.50	15.80	17.10	17.90	13.40	12.50	9.63	10.10	12.60	12.80	114.00	13.70	15.40	15.50	16.10	17.20	17.20	23.10	12.90	12.20	10.30	10.10	13.40	13.10	35.50	15.80	19.20	15.20
Total Cations		meq/L	0.01	15.10	14.90	14.70	15.60	16.40	17.40	12.60	12.40	9.85	10.40	12.60	12.80	116.00	13.40	14.60	14.50	14.90	16.30	16.00	20.80	12.50	12.20	10.10	9.98	12.70	12.10	33.40	14.40	17.90	15.80
Ionic Balance		%	0.01	0.44	1.69	2.81	0.64	1.81	1.56	3.16	0.74	1.16	1.47	0.11	0.35	0.84	1.17	2.53	3.36	3.85	2.81	3.58	5.38	1.48	0.24	0.88	0.52	2.57	4.14	3.07	4.59	3.44	2.12
Bromide		mg/L	0.01	0.67	0.60	0.58	0.61	0.71	0.97	0.47	0.43	0.30	0.29	0.45	0.43	7.51	0.60	0.73	0.74	0.77	0.87	0.86	1.57	0.59	0.53	0.45	0.40	0.62	0.57	2.81	0.76	1.13	0.79
Gross beta		Bq/L	0.1																														
Gross alpha		Bq/L	0.05																														
Gross beta activity - 40K		Bq/L	0.1																														
Radium 226		Bq/L	0.01																														
Radium 228		Bq/L	0.08																														
Iron	dissolved	mg/L	0.05																														
Arsenobetaine (ASB)	dissolved	µg/L	1																														
Arsenious Acid (As (III))	dissolved	µg/L	0.5																														
Dimethylarsenic Acid (DMA)	dissolved	µg/L	1																														
Monomethylarsonic Acid (MMA)	dissolved	µg/L	1																														
Arsenic Acid (As (V))	dissolved	µg/L	0.5																														
Trivalent Chromium	dissolved	mg/L	0.001																														
Hexavalent Chromium	dissolved	mg/L	0.001																														
Ferrous Iron	dissolved	mg/L	0.05																														
Ferric Iron	dissolved	mg/L	0.05																														
Mercury	total	mg/L	0.0001																														
Aluminium	total	µg/L	5																														
Iron	total	µg/L	2																														
Antimony	total	µg/L	0.2																														
Selenium	total	µg/L	0.2																														
Arsenic	total	µg/L	0.2																														
Barium	total	µg/L	0.5																														
Beryllium	total	µg/L	0.1																														
Boron	total	µg/L	5																														
Bismuth	total	µg/L	0.05																														
Cadmium	total	µg/L	0.05																														
Chromium	total	µg/L	0.2																														
Cobalt	total	µg/L	0.1																														
Copper	total	µg/L	0.5																														
Lead	total	µg/L	0.1																														
Lithium	total	µg/L	0.5																														
Manganese	total	µg/L	0.5																														
Molybdenum	total	µg/L	0.1																														
Nickel	total	µg/L	0.5																														
Silver	total	µg/L	0.1																														
Strontium	total	µg/L	1																														
Thallium	total	µg/L	0.02																														
Thorium	total	µg/L	0.1																														
Tin	total	µg/L	0.2																														
Titanium	total	µg/L	1																														
Uranium	total	µg/L	0.05																														
Vanadium	total	µg/L	0.2																														
Zinc	total	µg/L	1																														
Tellurium	total	µg/L	0.2																														

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	NO 10 WELL 23/04/2021	CAMP_D 23/04/2021	HMB001 20/10/2021	HMB002 20/10/2021	HMB003 20/10/2021	HMB003 20/10/2021	HMB004 20/10/2021	HMB005 20/10/2021	HMB006 20/10/2021	HMB007 20/10/2021	HMB008 21/10/2021	HMB009 21/10/2021	HMB010 21/10/2021	HMB011 21/10/2021	HPB001 21/10/2021	HERC026 21/10/2021	Colins Well 21/10/2021	HPB008 28/10/2021	HPB009 08/11/2021	HPB006 08/11/2021	HPB007 13/11/2021	HPB010 17/11/2021	HPB011 23/11/2021	HPB012 22/11/2021	HMB026 01/12/2021	HMB016 02/12/2021	HMB012S 02/12/2021	HMB018 21/12/2021	HMB019 21/12/2021	HMB019 21/12/2021
pH Value		pH Unit	0.01	8.21	5.79	8.21	8.17	8.24	8.16	8.15	8.13	8.09	8.23	8.25	8.17	8.24	8.27	8.19	8.35	8.00	8.18	8.27	8.29	8.13	8.31	9.10	8.40	8.00	8.09	8.00	8.1	8	7.96
Electrical Conductivity @ 25°C		µS/cm	1	1410	2	1340	1440	1450	1460	1490	1610	2020	1230	1160	995	997	1290	1220	1460	3460	1480	1500	1260	1270	1320	1560	1250	1220	1500	1480	803	626	627
Total Dissolved Solids @180°C		mg/L	10	854	<10	828	866	881	872	907	957	1160	756	734	618	629	761	750	874	2010	882	886	766	780	749	871	742	752	926	920	470	362	370
Suspended Solids (SS)		mg/L	5	<5	<5	<5	<5	<5	<5	7	<5	<5	26	<5	<5	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	7	<5	<5	158	211	1210
Hydroxide Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	8	<1	<1	<1	<1	<1	3	84	14	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3		mg/L	1	368	<1	376	375	392	382	393	394	424	340	335	306	323	352	347	392	397	394	395	346	357	336	251	336	349	394	406	201	284	278
Total Alkalinity as CaCO3		mg/L	1	368	<1	376	375	392	382	393	394	424	340	335	306	323	352	347	400	397	394	395	346	357	338	335	350	349	394	406	201	284	278
Silicon as SiO2		mg/L	0.1	86.0	4.2	95.2	83.5	95.7	96.5	84.3	74.0	101.0	89.0	99.4	81.5	84.4	91.5	87.8	87.2	51.9	88.0	95.7	94.1	93.4	69.8	33.5	90.8	87.4	95.7	86.9	49.5	32.9	32.5
Sulfate as SO4 - Turbidimetric		mg/L	1	55	<1	45	58	50	51	58	75	46	40	32	22	22	42	52	66	167	63	67	45	56	60	86	48	51	55	54	12	9	10
Chloride		mg/L	1	230	<1	210	235	240	235	248	278	425	192	170	139	129	199	189	244	788	249	250	191	197	226	302	205	202	276	266	153	41	42
Calcium		mg/L	1	30	<1	24	27	24	25	28	25	41	28	27	30	25	29	28	26	62	24	23	26	28	32	13	30	29	26	28	46	46	50
Magnesium		mg/L	1	51	<1	42	49	48	49	52	48	62	38	35	29	27	39	38	50	107	52	52	40	41	47	12	42	40	55	53	37	34	33
Sodium		mg/L	1	191	<1	174	174	186	190	189	210	260	147	144	124	128	155	148	180	448	198	198	160	162	176	289	168	161	199	212	63	33	37
Potassium		mg/L	1	12	<1	11	11	12	12	13	14	20	11	12	9	8	12	11	11	12	13	14	13	12	12	28	12	12	14	13	4	2	3
Mercury	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	dissolved	µg/L	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	27	<5	<5	<5	<5	<5	<5
Iron	dissolved	µg/L	2	2	<2	<2	<2	<2	<2	<2	<2	4	13	<2	13	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	6	<2	4	5	<2	<2	19	<2
Antimony	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	dissolved	µg/L	0.2	2.9	<0.2	2.7	2.8	3.0	2.9	3.4	3.5	6.2	2.6	2.5	1.9	2.0	2.6	2.6	2.8	2.2	2.9	2.9	2.6	2.5	2.5	2.2	3.2	2.8	3.3	2.4	0.4	0.6	0.6
Arsenic	dissolved	µg/L	0.2	21.5	<0.2	13.4	**72.7**	14.1	14.0	12.8	**65.5**	5.0	7.4	5.6	5.6	6.0	8.4	8.5	**40.4**	3.0	**59.0**	13.4	8.9	8.3	27.2	**705.0**	12.3	8.0	9.1	12.8	1.8	1	0.9
Barium	dissolved	µg/L	0.5	124.0	21.7	122.0	126.0	141.0	145.0	133.0	111.0	254.0	152.0	178.0	203.0	237.0	161.0	158.0	129.0	85.2	133.0	135.0	145.0	129.0	88.8	11.7	136.0	129.0	142.0	147.0	194	161	206
Beryllium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	dissolved	µg/L	5	586	830	495	484	514	503	564	669	734	466	495	258	270	469	464	489	329	776	690	603	476	484	414	510	490	573	555	114	117	121
Bismuth	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	dissolved	µg/L	0.2	2.9	<0.2	2.3	3.4	2.3	2.3	2.8	3.3	1.1	2.9	1.9	2.4	2.3	2.6	3.0	2.8	0.2	2.9	2.5	2.8	3.0	3.3	3.6	3.1	3.1	2.1	0.5	1.1	1.2	1
Cobalt	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.7	2.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	dissolved	µg/L	0.5	23.3	4.0	<0.5	0.5	<0.5	<0.5	1.2	<0.5	127.0	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	1.4	6.9	0.5	0.7	<0.5	0.9	2.2	1.6	1.8	0.7	2.1	<0.5	0.5	<0.5	0.6
Lead	dissolved	µg/L	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1
Lithium	dissolved	µg/L	0.5	20.5	<0.5	20.6	19.6	21.3	21.0	21.1	18.8	20.9	23.6	18.6	5.5	5.2	22.6	24.0	20.2	21.5	25.2	22.9	25.2	22.1	17.3	70.5	22.6	18.4	17.1	18.7	11.5	4.3	4.2
Manganese	dissolved	µg/L	0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.6	0.5	0.7	<0.5	<0.5	<0.5	<0.5	3.6	<0.5	0.6	5.4	54.7	32.3	<0.5	1.2	1.0	99.5	2.4	1	2.3
Molybdenum	dissolved	µg/L	0.1	6.0	<0.1	6.2	6.6	6.8	6.8	6.5	6.0	3.6	5.6	3.9	3.1	4.0	5.6	5.5	6.9	4.9	5.9	5.9	5.4	5.2	6.0	19.2	5.4	4.9	5.2	6.0	0.9	0.8	0.9
Nickel	dissolved	µg/L	0.5	<0.5	1.1	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.6	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	3.6	<0.5	<0.5	<0.5	<0.5	2.5	2.1	<0.5	0.8	0.7	0.8	<0.5	<0.5	1.1
Silver	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	dissolved	µg/L	1	628	1	697	773	748	746	803	797	1100	720	777	639	650	715	711	755	1860	738	752	680	642	662	174	613	534	649	628	569	488	481
Tellurium	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	dissolved	µg/L	0.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.1	<0.02	<0.02	<0.02	<0.02	0.0	<0.02	<0.02	<0.02
Thorium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	0.6	0.5	<0.2	0.8	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium	dissolved	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	<1	<1	<1	<1	<1	<1	<1
Uranium	dissolved	µg/L	0.05	40.00	<0.05	34.20	42.20	38.30	38.50	44.00	40.00	18.20	24.60	18.20	7.16	7.71	26.60	25.90	40.50	77.80	46.20	44.10	29.40	32.40	31.80	20.50	26.60	31.30	40.40	40.00	6.07	9.01	8.97
Vanadium	dissolved	µg/L	0.2	30.9	<0.2	33.4	29.7	33.8	33.8	31.4	26.7	19.7	27.5	26.3	23.1	27.8	27.9	27.7	31.8	5.0	35.5	36.6	30.5	30.8	21.1	45.6	27.8	28.8	33.1	30.5	8.6	5	5.1
Zinc	dissolved	µg/L	1	17	23	16	19	17	16	17	18	40	16	16	21	17	16	19	31	35	15	15	15	13	15	4	14	11	17	15	15	28	34
Nitrate as N		mg/L	0.01	7.84	<0.01	7.10	6.56	7.35	7.35	6.86	6.36	7.68	8.37	10.70	7.82	9.01	7.85	8.03	6.99	3.23	6.66	7.10	8.09	7.08	6.96	0.01	8.07	6.88	6.20	4.07	0.82	1.79	1.78
Total Anions		meq/L	0.01	15.00	<0.01	14.40	15.30	15.60	15.30	16.00	17.30	21.40	13.00	12.20	10.50	10.60	13.50	13.30	16.20	33.60	16.20	16.30	13.20	13.80	14.40	17.00	13.80	13.70	16.80	16.70	8.58	7.02	6.95
Total Cations		meq/L	0.01	14.30	<0.01	12.50	13.20	13.50	13.80	14.20	14.70	19.00	11.20	10.80	9.51	9.24	11.70	11.20	13.50	31.70	14.40	14.40	11.90	12.10	13.40	14.90	12.60	12.00	14.80	15.30	8.18	6.58	6.9
Ionic Balance		%	0.01	2.31	<0.01	6.95	7.35	7.19	5.04	6.02	8.09	6.06	7.60	5.91	4.93	6.61	7.19	8.55	9.15	2.97	5.83	6.32	5.40	6.66	3.42	6.51	4.58	6.53	6.21	4.45	2.38	3.22	0.36
Bromide		mg/L	0.01	0.68	<0.010	0.68	0.79	0.79	0.79	0.82	0.94	1.57	0.62	0.52	0.40	0.36	0.63	0.63	0.71	2.71	0.67	0.68	0.60	0.02	0.57	0.63	0.61	0.19	0.31	0.29	0.428	0.131	0.132
Gross beta		Bq/L	0.1																														
Gross alpha		Bq/L	0.05																														
Gross beta activity - 40K		Bq/L	0.1																														
Radium 226		Bq/L	0.01																														
Radium 228		Bq/L	0.08																														
Iron	dissolved	mg/L	0.05																														
Arsenobetaine (ASB)	dissolved	µg/L	1																														
Arsenious Acid (As (III))	dissolved	µg/L	0.5																														
Dimethylarsenic Acid (DMA)	dissolved	µg/L	1																														
Monomethylarsonic Acid (MMA)	dissolved	µg/L	1																														
Arsenic Acid (As (V))	dissolved	µg/L	0.5																														
Trivalent Chromium	dissolved	mg/L	0.001																														
Hexavalent Chromium	dissolved	mg/L	0.001																														
Ferrous Iron	dissolved	mg/L	0.05																														
Ferric Iron	dissolved	mg/L	0.05																														
Mercury	total	mg/L	0.0001																														
Aluminium	total	µg/L	5																														
Iron	total	µg/L	2																														
Antimony	total	µg/L	0.2																														
Selenium	total	µg/L	0.2																														
Arsenic	total	µg/L	0.2																														
Barium	total	µg/L	0.5																														
Beryllium	total	µg/L	0.1																														
Boron	total	µg/L	5																														
Bismuth	total	µg/L	0.05																														
Cadmium	total	µg/L	0.05																														
Chromium	total	µg/L	0.2																														
Cobalt	total	µg/L	0.1																														
Copper	total	µg/L	0.5																														
Lead	total	µg/L	0.1																														
Lithium	total	µg/L	0.5																														
Manganese	total	µg/L	0.5																														
Molybdenum	total	µg/L	0.1																														
Nickel	total	µg/L	0.5																														
Silver	total	µg/L	0.1																														
Strontium	total	µg/L	1																														
Thallium	total	µg/L	0.02																														
Thorium	total	µg/L	0.1																														
Tin	total	µg/L	0.2																														
Titanium	total	µg/L	1																														
Uranium	total	µg/L	0.05																														
Vanadium	total	µg/L	0.2																														
Zinc	total	µg/L	1																														
Tellurium	total	µg/L	0.2																														

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	HMB022 21/12/2021	HMB022 18/12/2021	HMB024D 20/12/2021	HMB028D 20/12/2021	HMB025D 18/01/2022	HMB023D 18/01/2022	HMB022 low flow 18/01/2022	HMB022 Hydrasleeve 18/01/2022	HMB022 QA/QC 18/01/2022	HMB021 18/01/2022	HMB020 18/01/2022	HMB017 19/01/2022	HMB023S 19/01/2022	HMB013 19/01/2022	HMB030S 20/01/2022	HMB030D 20/01/2022	HMB029D 20/01/2022	HMB029S 20/01/2022	HPB004 14/01/2022	HPB002 17/01/2022	HPB003 20/01/2022	HMB014 20/01/2022	HMB014 20/01/2022	HMB020 21/01/2022	HMB020 21/01/2022	HMB001 23/04/2022	HMB002 25/04/2022	HMB003 23/04/2022	HMB004 23/04/2022	HMB005 25/04/2022
pH Value		pH Unit	0.01	7.9	7.87	8.01	8.29	8.23	8.06	7.95	7.92	6.23	7.96	7.89	7.75	8.18	8.21	8.31	8.22	8.21	8	8.3	8.24	8.23	8.04	8.18	7.87	7.87	7.93	7.94	7.97	7.87	8.18
Electrical Conductivity @ 25°C		µS/cm	1	902	901	1970	1250	1660	1440	965	921	1	1850	2370	1880	1600	1290	1310	1260	1210	2960	1440	1140	1220	1290	1300	2310	2320	1220	1450	1490	1520	1600
Total Dissolved Solids @180°C		mg/L	10	519	554	1210	740	1030	847	530	514	<10	1220	1360	1120	968	760	763	755	734	1920	856	673	727	851	788	1310	1350	731	842	882	885	924
Suspended Solids (SS)		mg/L	5	558	1320	34	<5	14	6	9	452	<5	<5	274	8	1850	<5	<5	<5	<5	<5	<5	<5	<5	1900	<5	85	66	12	8	14	22	40
Hydroxide Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3		mg/L	1	324	325	582	339	509	408	329	323	<1	253	408	328	368	350	367	346	336	426	381	315	337	366	359	409	413	361	380	379	390	383
Total Alkalinity as CaCO3		mg/L	1	324	325	582	339	509	408	329	323	<1	253	408	328	368	350	368	346	336	426	381	315	337	366	359	409	413	361	380	379	390	383
Silicon as SiO2		mg/L	0.1	27.8	27.4	42.1	87.1	92.5	41.6	28.7	28.7	<0.1	82.8	42.1	42.7	108	94.1	67.7	89	89.3	71.5	94.8	84.5	88.6	88.1	87.3	41.3	39.6	95.7	88	98.3	88.8	74.1
Sulfate as SO4 - Turbidimetric		mg/L	1	26	24	96	40	41	55	27	23	<1	60	73	82	58	44	57	43	38	80	60	32	37	51	50	74	80	41	60	53	62	78
Chloride		mg/L	1	112	108	279	193	252	222	116	109	<1	443	547	408	283	183	195	187	184	723	228	169	184	203	203	558	564	174	240	246	257	282
Calcium		mg/L	1	41	40	34	35	34	36	68	66	<1	63	88	92	28	33	37	34	35	82	30	40	35	32	30	84	85	22	30	29	31	31
Magnesium		mg/L	1	43	42	51	47	50	47	41	40	<1	70	74	61	38	43	45	43	43	115	51	41	43	46	44	73	73	36	53	51	55	55
Sodium		mg/L	1	68	67	322	155	234	189	70	68	<1	196	273	192	227	154	164	152	146	324	179	135	144	176	173	280	283	169	177	191	186	210
Potassium		mg/L	1	3	3	10	11	18	12	3	3	<1	8	9	6	12	11	12	11	11	19	11	10	11	12	12	10	10	12	13	13	13	15
Mercury	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	dissolved	µg/L	5	21	<5	<5	<5	<5	20	7	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5	<5	8	<5	<5	<5
Iron	dissolved	µg/L	2	64	81	1240	2	48	154	208	684	<2	<2	469	2	20	<2	257	5	<2	1580	<2	<2	<2	<2	<2	<2	<2	<2	3	<2	<2	<2
Antimony	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5	0.4	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	dissolved	µg/L	0.2	0.5	0.3	<0.2	3.1	0.2	<0.2	0.9	<0.2	<0.2	2	0.5	0.5	3.2	2.9	0.4	2.8	3	0.3	3	2.6	2.8	2.6	2.7	0.8	0.7	2.3	3	3.3	3.5	3.9
Arsenic	dissolved	µg/L	0.2	1.7	2.6	**290**	7.1	**52.6**	**818**	4.9	9	<0.2	5.2	2.2	0.6	9.2	8.3	7.2	10	9	6.3	16.6	5.5	7.6	8.2	8.2	1.4	1.3	8	**52.8**	10.5	10.1	**55.6**
Barium	dissolved	µg/L	0.5	250	258	258	124	143	198	196	250	<0.5	440	447	146	302	150	474	148	163	1150	153	175	178	120	69.6	420	428	130	108	128	133	101
Beryllium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	dissolved	µg/L	5	121	120	559	503	536	455	95	99	<5	279	652	373	597	533	546	531	540	536	576	520	538	446	444	574	598	484	412	467	500	561
Bismuth	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	dissolved	µg/L	0.2	0.2	<0.2	<0.2	2.9	<0.2	<0.2	<0.2	<0.2	<0.2	1.6	<0.2	<0.2	1.9	3.1	0.6	2.4	2.9	0.2	3	2.6	2.6	4.1	3.4	<0.2	<0.2	1.1	3.2	2.2	2.9	3.8
Cobalt	dissolved	µg/L	0.1	1.4	1.3	2.5	<0.1	<0.1	0.2	1.2	0.9	<0.1	<0.1	8.6	0.3	<0.1	<0.1	0.8	<0.1	<0.1	1.3	<0.1	<0.1	<0.1	<0.1	<0.1	4.6	3.7	<0.1	0.1	<0.1	<0.1	<0.1
Copper	dissolved	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	<0.5	0.5	1	<0.5	<0.5	<0.5	0.6	2.4	2	3.6	<0.5	<0.5	2.4	5.5	1.3	2	1	0.6	<0.5
Lead	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lithium	dissolved	µg/L	0.5	7.5	7.8	57.4	25.5	49.3	25.7	12.1	19.2	<0.5	21.4	63.5	49.6	19.2	23.7	23.1	22.8	22.5	50.4	21	21.2	23.1	18.1	18.5	60.7	62.1	12.2	17.3	16.9	18.1	16.4
Manganese	dissolved	µg/L	0.5	326	469	2930	1.5	206	1240	409	921	<0.5	0.5	2350	116	1.7	0.7	1040	10.4	2.3	3100	8.7	<0.5	<0.5	<0.5	0.8	2010	2100	<0.5	8.5	<0.5	<0.5	2
Molybdenum	dissolved	µg/L	0.1	1.3	1.2	10.5	5.5	5.3	6.6	1.2	1.5	<0.1	1	5.5	2.8	4	5	6.3	4.8	4.4	4.3	5.6	3.7	4.5	4.9	5.1	7.3	7.5	4.9	5.3	5.8	5.5	5.3
Nickel	dissolved	µg/L	0.5	5.7	1.1	1.5	<0.5	<0.5	0.5	1.4	<0.5	<0.5	<0.5	15.2	0.6	2	<0.5	1	<0.5	<0.5	2.1	<0.5	<0.5	<0.5	1.5	0.6	8.6	7.1	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	dissolved	µg/L	1	528	517	739	622	770	763	586	586	<1	1120	907	840	639	687	708	700	689	1940	729	679	707	638	628	829	834	453	579	547	602	576
Tellurium	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	dissolved	µg/L	0.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	0.8	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	2.1	<0.2	<0.2	<0.2
Titanium	dissolved	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	<1	<1	<1	<1	<1	<1	<1
Uranium	dissolved	µg/L	0.05	7.85	7.9	8.15	26.8	44.9	18.6	8.61	7.1	<0.05	20.4	18.7	27	25.6	31.4	34.9	26.5	23.8	16.8	40.5	18.9	23.7	32.1	31.7	26.1	26	23.6	40.4	35.3	43.7	37.2
Vanadium	dissolved	µg/L	0.2	2.4	2.4	0.7	26.7	6.8	2	2.1	0.6	<0.2	13	2.7	7.2	25.3	26.4	0.8	23.4	25.1	1.6	31.3	23.3	26.2	27.1	27.2	3.4	2.2	32.3	31	35	32.8	26.6
Zinc	dissolved	µg/L	1	38	34	2	8	2	6	8	4	2	13	15	11	74	12	13	10	8	12	17	17	18	4	1	17	17	20	40	17	21	20
Nitrate as N		mg/L	0.01	0.2	0.08	<0.01	7.32	0.12	<0.01	0.65	0.01	<0.01	3.39	0.14	0.38	6.71	6.69	0.65	6.16	6.82	0.38	6.57	7.34	7.5	6.51	6.67	0.08	0.05	7.34	6.13	6.98	6.53	5.8
Total Anions		meq/L	0.01	10.2	10	21.5	13	18.1	15.6	10.4	10	<0.01	18.8	25.1	19.8	16.5	13.1	14	13.1	12.7	30.6	15.3	11.7	12.7	14.1	13.9	25.4	25.8	13	15.6	15.6	16.3	17.2
Total Cations		meq/L	0.01	8.62	8.44	20.2	12.6	16.4	14.2	9.89	9.62	<0.01	17.6	22.6	18.1	14.7	12.2	13	12.1	11.9	28.1	13.8	11.5	11.8	13.3	13	22.6	22.8	11.7	13.9	14.3	14.5	15.6
Ionic Balance		%	0.01	8.27	8.63	3.22	1.6	4.86	4.59	2.55	1.97	<0.01	3.2	5.27	4.36	5.88	3.59	3.88	3.79	3.16	4.15	5.27	0.98	3.52	2.75	3.68	5.86	6.19	5.09	5.83	4.45	5.96	5
Bromide		mg/L	0.01	0.323	0.322	0.864	0.613	0.63	0.611	0.301	0.287	<0.010	1.25	1.55	1.06	0.721	0.503	0.539	0.515	0.499	2.03	0.625	0.466	0.508	0.535	0.533	1.51	1.52	<0.020	<0.050	<0.050	0.708	0.802
Gross beta		Bq/L	0.1																										----	----	----	----	----
Gross alpha		Bq/L	0.05																										----	----	----	----	----
Gross beta activity - 40K		Bq/L	0.1																										----	----	----	----	----
Radium 226		Bq/L	0.01																										----	----	----	----	----
Radium 228		Bq/L	0.08																										----	----	----	----	----
Iron	dissolved	mg/L	0.05																										----	----	----	----	----
Arsenobetaine (ASB)	dissolved	µg/L	1																										----	<1	----	----	<1
Arsenious Acid (As (III))	dissolved	µg/L	0.5																										----	<0.5	----	----	<0.5
Dimethylarsenic Acid (DMA)	dissolved	µg/L	1																										----	<1	----	----	<1
Monomethylarsonic Acid (MMA)	dissolved	µg/L	1																										----	<1	----	----	<1
Arsenic Acid (As (V))	dissolved	µg/L	0.5																										----	49.8	----	----	51
Trivalent Chromium	dissolved	mg/L	0.001																										----	<0.001	----	----	<0.001
Hexavalent Chromium	dissolved	mg/L	0.001																										----	0.004	----	----	0.004
Ferrous Iron	dissolved	mg/L	0.05																										----	<0.05	----	----	<0.05
Ferric Iron	dissolved	mg/L	0.05																										----	----	----	----	----
Mercury	total	mg/L	0.0001																										----	----	----	----	<0.0001
Aluminium	total	µg/L	5																										----	----	----	----	1240
Iron	total	µg/L	2																										----	----	----	----	1710
Antimony	total	µg/L	0.2																										----	----	----	----	<0.2
Selenium	total	µg/L	0.2																										----	----	----	----	3.6
Arsenic	total	µg/L	0.2																										----	----	----	----	58.8
Barium	total	µg/L	0.5																										----	----	----	----	77.6
Beryllium	total	µg/L	0.1																										----	----	----	----	<0.1
Boron	total	µg/L	5																										----	----	----	----	607
Bismuth	total	µg/L	0.05																										----	----	----	----	<0.05
Cadmium	total	µg/L	0.05																										----	----	----	----	<0.05
Chromium	total	µg/L	0.2																										----	----	----	----	8.8
Cobalt	total	µg/L	0.1																										----	----	----	----	1.2
Copper	total	µg/L	0.5																										----	----	----	----	1.7
Lead	total	µg/L	0.1																										----	----	----	----	0.9
Lithium	total	µg/L	0.5																										----	----	----	----	19.1
Manganese	total	µg/L	0.5																										----	----	----	----	91.1
Molybdenum	total	µg/L	0.1																										----	----	----	----	6.4
Nickel	total	µg/L	0.5																										----	----	----	----	3.3
Silver	total	µg/L	0.1																										----	----	----	----	<0.1
Strontium	total	µg/L	1																										----	----	----	----	693
Thallium	total	µg/L	0.02																										----	----	----	----	<0.02
Thorium	total	µg/L	0.1																										----	----	----	----	0.4
Tin	total	µg/L	0.2																										----	----	----	----	<0.2
Titanium	total	µg/L	1																										----	----	----	----	25
Uranium	total	µg/L	0.05																										----	----	----	----	46.8
Vanadium	total	µg/L	0.2																										----	----	----	----	31.2
Zinc	total	µg/L	1																										----	----	----	----	4
Tellurium	total	µg/L	0.2																										----	----	----	----	<0.2

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	HMB006 23/04/2022	HMB007 23/04/2022	HMB008 23/04/2022	HMB009 23/04/2022	HMB010 23/04/2022	HMB011 23/04/2022	HMB012D 23/04/2022	HMB012S 23/04/2022	HMB013 23/04/2022	HMB014 24/04/2022	HMB016 23/04/2022	HMB017 23/04/2022	HMB018 23/04/2022	HMB019 24/04/2022	HMB020 23/04/2022	HMB021 24/04/2022	HMB022 24/04/2022	HMB023D 25/04/2022	HMB023S 24/04/2022	HMB024D 25/04/2022	HMB024S 24/04/2022	HMB025D 25/04/2022	HMB025S 24/04/2022	HMB026 24/04/2022	HMB027D 24/04/2022	HMB027S 24/04/2022	HMB028D 24/04/2022	HMB028S 24/04/2022	HMB029D 24/04/2022	HMB029S 24/04/2022
pH Value		pH Unit	0.01	7.81	7.91	7.97	7.89	7.95	7.93	7.95	7.95	7.96	7.93	7.93	7.44	7.8	7.85	7.64	7.75	7.74	7.86	8	7.91	8.32	7.84	8.21	8	7.99	8.08	8	8.03	7.91	7.93
Electrical Conductivity @ 25°C		µS/cm	1	1840	1220	1090	995	992	1270	1510	1500	1240	1310	1520	1680	741	629	2360	1800	929	1380	1590	1680	1510	1570	1560	1250	1230	1200	1240	1240	1210	1280
Total Dissolved Solids @180°C		mg/L	10	1090	770	702	596	612	760	899	893	720	805	916	1000	488	359	1340	1130	523	806	888	961	910	955	940	797	755	740	730	732	745	747
Suspended Solids (SS)		mg/L	5	17	226	34	32	56	21	10	110	<5	9	60	51	222	371	56	414	259	<5	18	133	20	350	313	20	6	136	9	28	20	71
Hydroxide Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3		mg/L	1	398	338	333	295	315	350	401	384	343	356	399	309	194	280	428	252	317	376	357	416	365	437	418	348	338	352	340	337	338	345
Total Alkalinity as CaCO3		mg/L	1	398	338	333	295	315	350	401	384	343	356	399	309	194	280	428	252	317	376	357	416	370	437	418	348	338	352	340	337	338	345
Silicon as SiO2		mg/L	0.1	100	92.6	105	86	87.3	93.5	83.4	93.2	88.4	86.6	95	38.2	52.7	35.2	37.4	81.7	27.5	44.6	105	55.6	75.2	62.1	48.2	92.2	95.7	97.8	92.9	99.9	86.6	66.4
Sulfate as SO4 - Turbidimetric		mg/L	1	45	40	29	23	23	44	57	52	46	52	55	70	12	10	77	61	32	57	61	115	95	71	55	48	40	38	40	40	38	58
Chloride		mg/L	1	380	202	156	141	124	199	254	251	189	207	267	394	138	44	583	472	123	232	294	273	257	257	258	182	185	169	184	180	176	192
Calcium		mg/L	1	44	34	31	33	34	33	30	30	33	32	29	84	44	53	88	60	67	35	32	39	37	34	32	33	33	34	34	33	35	36
Magnesium		mg/L	1	59	43	38	31	32	42	55	61	42	44	56	54	33	32	73	65	40	42	42	56	40	49	30	42	43	40	43	40	41	41
Sodium		mg/L	1	227	150	136	121	123	156	183	207	151	164	194	179	61	34	265	185	70	204	217	229	208	240	242	155	149	150	148	147	144	163
Potassium		mg/L	1	32	12	12	10	9	12	13	13	12	12	15	6	4	3	10	8	4	10	14	9	12	12	19	12	12	12	12	13	12	12
Mercury	dissolved	µg/L	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	dissolved	µg/L	5	<5	<5	<5	<5	<5	<5	8	61	<5	<5	<5	<5	<5	<5	<5	<5	<5	16	<5	<5	68	<5	24	<5	<5	11	<5	<5	6	<5
Iron	dissolved	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	4	<2	<2	621	<2	1200	139	<2	<2	47	16	<2	<2	<2	<2	<2	<2	<2	42
Antimony	dissolved	µg/L	0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	0.6	0.4	0.7	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	0.2
Selenium	dissolved	µg/L	0.2	5.9	2.9	2.4	2	1.9	2.8	2.1	2.8	2.6	2.6	3.4	0.4	0.3	0.6	<0.2	1.9	0.3	<0.2	2.9	2	1.6	2.1	2.7	2.7	2.9	2.8	2.7	2.5	2.4	1.2
Arsenic	dissolved	µg/L	0.2	4.2	6	4.2	4.6	4.4	6.8	10	12.3	7.3	7.6	7.7	0.6	1.7	0.9	2.2	4.4	4	**671**	8.6	**408**	**192**	**52.7**	**51.4**	8.2	6.6	5.3	6.4	5.2	7.8	5.3
Barium	dissolved	µg/L	0.5	198	145	152	190	241	143	142	104	137	98.2	137	102	196	102	491	385	222	179	138	152	204	408	178	135	117	174	129	146	146	502
Beryllium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	dissolved	µg/L	5	627	416	398	297	258	417	438	432	406	406	493	304	84	77	526	208	81	399	448	445	439	463	459	411	413	432	412	430	410	448
Bismuth	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	dissolved	µg/L	0.2	1.4	3.1	1.4	2.5	2.2	2.7	<0.2	1.5	3.4	3.5	2.2	<0.2	1.2	1	<0.2	1.6	<0.2	<0.2	2.1	<0.2	<0.2	<0.2	<0.2	3.2	2.9	1.9	2.9	2.4	1.8	<0.2
Cobalt	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	<0.1	1.5	0.1	<0.1	<0.1	0.2	1.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	1.4
Copper	dissolved	µg/L	0.5	2.1	<0.5	0.6	1.4	<0.5	1.1	0.8	0.6	<0.5	<0.5	0.8	<0.5	0.8	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	2	0.8	<0.5	1	<0.5	<0.5	1	<0.5
Lead	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1
Lithium	dissolved	µg/L	0.5	18.2	20.1	13.1	5.3	4.4	19.4	17	15.2	20.1	17.1	15.8	40.6	9.8	3.8	50.6	19.6	12.2	22.2	18.1	18.9	21	23.7	20.7	19.9	22	21.3	21.3	16.9	19.4	22.7
Manganese	dissolved	µg/L	0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.8	237	11.7	<0.5	1.6	<0.5	28.3	1.4	0.6	2610	0.7	688	956	0.6	33.5	462	592	21.1	0.6	0.6	7.4	1.3	<0.5	35.4	1250
Molybdenum	dissolved	µg/L	0.1	3.5	4.6	2.8	2.7	2.8	4.6	5.6	4.8	4.9	5.1	5	2.8	1	0.9	5	1.1	2	7.4	4.1	7.8	12.8	9.7	13.8	5.4	5.3	4.6	5	4	4.5	7.4
Nickel	dissolved	µg/L	0.5	4.3	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.7	<0.5	<0.5	0.8	0.9	1.8	1.2	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	1.8
Silver	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	dissolved	µg/L	1	712	533	560	467	529	535	571	421	513	513	584	583	451	419	717	844	451	547	518	619	528	700	438	513	527	512	520	545	502	539
Tellurium	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	dissolved	µg/L	0.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	dissolved	µg/L	0.2	0.3	0.3	<0.2	<0.2	<0.2	<0.2	0.3	0.2	<0.2	<0.2	<0.2	3.8	2.4	1.6	0.9	0.9	0.6	<0.2	<0.2	0.5	<0.2	2.7	1.1	1.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium	dissolved	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	<1	<1	<1	<1	<1	<1	<1
Uranium	dissolved	µg/L	0.05	17	24.1	16.4	6.94	7.6	26	39	27.5	26.4	31.7	33.7	24.6	5.19	8.4	18.9	19.8	14.6	17.1	25.4	36.8	31.3	43.3	45.9	28.7	25.2	24.1	24.4	20.7	22.6	25.6
Vanadium	dissolved	µg/L	0.2	20.8	29	26.2	25.6	29.2	29.3	25.9	28	27.9	27.9	32.4	8.5	8.9	5.1	0.5	13.8	1.9	2.6	27.5	25.2	3.3	22.5	33.3	28.5	29.9	32.5	29.4	29.8	25.7	2.5
Zinc	dissolved	µg/L	1	22	16	16	20	19	20	21	13	17	15	18	14	22	15	10	21	24	4	27	20	12	42	10	21	14	22	14	14	24	38
Nitrate as N		mg/L	0.01	7.2	7.93	9.15	7.43	8.84	7.41	2.4	6.53	7.21	6.94	6.52	0.32	0.82	1.8	<0.01	3.58	0.24	<0.01	7.2	1.6	0.01	1.38	3.14	6.96	7.62	7.5	8.02	8.24	6.34	1.18
Total Anions		meq/L	0.01	19.6	13.3	11.6	10.4	10.3	13.5	16.4	15.8	13.1	14	16.6	18.7	8.02	7.04	26.6	19.6	10.5	15.2	16.7	18.4	16.6	17.4	16.8	13.1	12.8	12.6	12.8	12.6	12.5	13.5
Total Cations		meq/L	0.01	17.7	12.1	10.9	9.72	9.91	12.2	14.3	15.8	12	12.6	14.9	16.6	7.67	6.83	22.2	16.6	9.78	14.3	14.8	16.7	14.5	16.5	15.1	12.2	12	11.8	12	11.7	11.7	12.6
Ionic Balance		%	0.01	4.99	4.8	3.37	3.16	1.78	5.16	6.67	0.06	4.63	5.16	5.62	6.14	2.24	1.51	9.06	8.35	3.39	3.08	5.85	4.72	6.84	2.9	5.32	3.7	3.35	3.16	3.37	4.02	3.38	3.64
Bromide		mg/L	0.01	1.27	0.544	0.454	0.446	0.403	0.646	0.713	0.71	0.617	0.571	0.755	1.08	0.411	0.14	1.64	1.47	0.364	0.641	0.82	0.781	0.744	0.689	0.709	0.627	0.65	0.58	0.646	0.601	0.602	0.549
Gross beta		Bq/L	0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.64	----	----	----	1.08	----	----	----	----	----	----	----	----
Gross alpha		Bq/L	0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.84	----	----	----	1.72	----	----	----	----	----	----	----	----
Gross beta activity - 40K		Bq/L	0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.35	----	----	----	0.63	----	----	----	----	----	----	----	----
Radium 226		Bq/L	0.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.01	----	----	----	0.05	----	----	----	----	----	----	----	----
Radium 228		Bq/L	0.08	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.08	----	----	----	<0.08	----	----	----	----	----	----	----	----
Iron	dissolved	mg/L	0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.13	----	<0.05	----	<0.05	----	----	----	----	----	----	----	----
Arsenobetaine (ASB)	dissolved	µg/L	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<5	----	<10	----	<1	----	----	----	----	----	----	----	----
Arsenious Acid (As (III))	dissolved	µg/L	0.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	248	----	<1.0	----	<0.5	----	----	----	----	----	----	----	----
Dimethylarsenic Acid (DMA)	dissolved	µg/L	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<5	----	<10	----	<1	----	----	----	----	----	----	----	----
Monomethylarsonic Acid (MMA)	dissolved	µg/L	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<5	----	<10	----	<1	----	----	----	----	----	----	----	----
Arsenic Acid (As (V))	dissolved	µg/L	0.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2.6	----	390	----	48.8	----	----	----	----	----	----	----	----
Trivalent Chromium	dissolved	mg/L	0.001	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.001	----	<0.001	----	<0.001	----	----	----	----	----	----	----	----
Hexavalent Chromium	dissolved	mg/L	0.001	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.001	----	<0.001	----	<0.001	----	----	----	----	----	----	----	----
Ferrous Iron	dissolved	mg/L	0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----	<0.05	----	<0.05	----	----	----	----	----	----	----	----
Ferric Iron	dissolved	mg/L	0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.13	----	<0.05	----	<0.05	----	----	----	----	----	----	----	----
Mercury	total	mg/L	0.0001	----	<0.0001	----	----	----	----	----	<0.0001	----	----	----	----	<0.0001	----	----	<0.0001	<0.0001	----	----	<0.0001	----	<0.0001	----	<0.0001	----	<0.0001	----	----	----	<0.0001
Aluminium	total	µg/L	5	----	6560	----	----	----	----	----	1750	----	----	----	----	2820	----	----	1990	2400	----	----	723	----	11000	----	3190	----	3420	----	----	----	2160
Iron	total	µg/L	2	----	7350	----	----	----	----	----	1350	----	----	----	----	3250	----	----	2770	4580	----	----	847	----	14800	----	2420	----	4470	----	----	----	2860
Antimony	total	µg/L	0.2	----	<0.2	----	----	----	----	----	0.4	----	----	----	----	<0.2	----	----	0.2	<0.2	----	----	0.6	----	0.7	----	0.2	----	0.4	----	----	----	0.3
Selenium	total	µg/L	0.2	----	2.6	----	----	----	----	----	3	----	----	----	----	0.3	----	----	1.7	0.3	----	----	1.9	----	1.7	----	2.6	----	2.6	----	----	----	1.3
Arsenic	total	µg/L	0.2	----	7.7	----	----	----	----	----	13.4	----	----	----	----	2.6	----	----	6.2	4.9	----	----	450	----	71.6	----	9.4	----	6.5	----	----	----	7
Barium	total	µg/L	0.5	----	139	----	----	----	----	----	178	----	----	----	----	157	----	----	427	226	----	----	171	----	551	----	116	----	178	----	----	----	584
Beryllium	total	µg/L	0.1	----	0.3	----	----	----	----	----	<0.1	----	----	----	----	0.1	----	----	<0.1	<0.1	----	----	<0.1	----	0.4	----	<0.1	----	0.2	----	----	----	0.1
Boron	total	µg/L	5	----	417	----	----	----	----	----	482	----	----	----	----	74	----	----	200	74	----	----	472	----	418	----	434	----	422	----	----	----	454
Bismuth	total	µg/L	0.05	----	0.06	----	----	----	----	----	<0.05	----	----	----	----	<0.05	----	----	<0.05	<0.05	----	----	<0.05	----	0.07	----	<0.05	----	<0.05	----	----	----	<0.05
Cadmium	total	µg/L	0.05	----	<0.05	----	----	----	----	----	0.05	----	----	----	----	<0.05	----	----	<0.05	<0.05	----	----	<0.05	----	<0.05	----	<0.05	----	0.07	----	----	----	<0.05
Chromium	total	µg/L	0.2	----	25.6	----	----	----	----	----	8.6	----	----	----	----	12.1	----	----	10.7	14.2	----	----	3.4	----	128	----	12	----	15.7	----	----	----	5.2
Cobalt	total	µg/L	0.1	----	4.8	----	----	----	----	----	6.2	----	----	----	----	1.6	----	----	1.6	5	----	----	3.8	----	17.9	----	1.3	----	3.7	----	----	----	3.5
Copper	total	µg/L	0.5	----	14.9	----	----	----	----	----	6.4	----	----	----	----	3.4	----	----	3.2	2.2	----	----	3	----	29.6	----	3.3	----	6.7	----	----	----	3.4
Lead	total	µg/L	0.1	----	4	----	----	----	----	----	1.3	----	----	----	----	1.4	----	----	0.9	0.8	----	----	0.9	----	3.9	----	0.9	----	3.3	----	----	----	2.1
Lithium	total	µg/L	0.5	----	28	----	----	----	----	----	19.3	----	----	----	----	11.4	----	----	21.1	13.1	----	----	20	----	34.7	----	22.5	----	22.8	----	----	----	24.2
Manganese	total	µg/L	0.5	----	104	----	----	----	----	----	1790	----	----	----	----	59.9	----	----	47.5	762	----	----	437	----	1070	----	53.4	----	151	----	----	----	1390
Molybdenum	total	µg/L	0.1	----	2.9	----	----	----	----	----	6.1	----	----	----	----	0.9	----	----	1.3	2.2	----	----	10.2	----	10.6	----	6.1	----	5.3	----	----	----	9.6
Nickel	total	µg/L	0.5	----	13.4	----	----	----	----	----	7.1	----	----	----	----	7.2	----	----	7.1	18	----	----	4.2	----	57.7	----	5.9	----	10.3	----	----	----	5.9
Silver	total	µg/L	0.1	----	<0.1	----	----	----	----	----	<0.1	----	----	----	----	<0.1	----	----	<0.1	<0.1	----	----	<0.1	----	<0.1	----	<0.1	----	<0.1	----	----	----	<0.1
Strontium	total	µg/L	1	----	648	----	----	----	----	----	670	----	----	----	----	547	----	----	1010	543	----	----	735	----	865	----	601	----	613	----	----	----	656
Thallium	total	µg/L	0.02	----	0.09	----	----	----	----	----	0.02	----	----	----	----	0.03	----	----	<0.02	<0.02	----	----	0.05	----	0.19	----	<0.02	----	0.05	----	----	----	0.03
Thorium	total	µg/L	0.1	----	2.5	----	----	----	----	----	0.5	----	----	----	----	0.9	----	----	0.4	0.4	----	----	0.2	----	2.8	----	0.6	----	1.8	----	----	----	1.6
Tin	total	µg/L	0.2	----	0.3	----	----	----	----	----	<0.2	----	----	----	----	3.2	----	----	1.2	0.8	----	----	0.7	----	0.5	----	2.6	----	0.2	----	----	----	<0.2
Titanium	total	µg/L	1	----	142	----	----	----	----	----	46	----	----	----	----	48	----	----	22	27	----	----	21	----	377	----	53	----	58	----	----	----	40
Uranium	total	µg/L	0.05	----	30.7	----	----	----	----	----	44.8	----	----	----	----	6.36	----	----	23	15.9	----	----	43.3	----	52.1	----	33	----	27.8	----	----	----	31.1
Vanadium	total	µg/L	0.2	----	46.1	----	----	----	----	----	40.4	----	----	----	----	14.9	----	----	18.2	8.6	----	----	26.8	----	57.9	----	34.4	----	40.3	----	----	----	6.9
Zinc	total	µg/L	1	----	19	----	----	----	----	----	24	----	----	----	----	8	----	----	10	18	----	----	18	----	45	----	8	----	23	----	----	----	11
Tellurium	total	µg/L	0.2	----	<0.2	----	----	----	----	----	<0.2	----	----	----	----	<0.2	----	----	<0.2	<0.2	----	----	<0.2	----	<0.2	----	<0.2	----	<0.2	----	----	----	<0.2

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	HMB030D 24/04/2022	HMB030S 24/04/2022	HMB034 25/04/2022	HMB035 25/04/2022	HPB001 24/04/2022	HPB011 25/04/2022	HMB036 12/06/2022	HMB037 12/06/2022	HMB039 12/06/2022	HMB040 12/06/2022	HMB042 12/06/2022	HMB040 29/06/2022	Chimney Well 24/07/2022	No 21 Well 24/07/2022	UNK 13 24/07/2022	UNK 2 24/07/2022	Indee Outpost 13/11/2022	No. 17 Bore 13/11/2022	Boundary 21 13/11/2022	Troys Bore 13/11/2022	Jel Yards 13/11/2022	HMB006 15/11/2022	HMB030S 15/11/2022	HMB030D 15/11/2022	HMB011 15/11/2022	HMB029S 15/11/2022	HMB029D 15/11/2022	HMB010 15/11/2022	HMB009 15/11/2022	HMB028S 15/11/2022
pH Value		pH Unit	0.01	8.07	7.9	8.09	7.94	8.16	8.86	8.05	8.13	8.02	7.97	8.02	7.96	8.41	8.32	8.24	8.28	8.03	8.03	8.46	8.44	8.44	7.82	7.95	7.87	7.98	7.98	7.88	7.95	7.99	8.03
Electrical Conductivity @ 25°C		µS/cm	1	1240	1270	1510	1970	1250	1340	1360	1400	1570	1430	1460	1420	1290	2440	900	1370	834	1880	1390	1800	505	1980	1210	1190	1280	1200	1140	992	945	1130
Total Dissolved Solids @180°C		mg/L	10	844	762	938	1170	771	750	832	851	922	842	918	770	816	1490	576	886	476	1100	836	1060	304	1160	742	740	777	743	668	611	576	701
Suspended Solids (SS)		mg/L	5	21	220	<5	42	<5	36	<5	<5	39	186	168	20	<5	<5	<5	<5	<5	20	<5	<5	<5	20	34	<5	24	42	36	14	<5	8
Hydroxide Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		mg/L	1	<1	<1	<1	<1	<1	48	<1	<1	<1	<1	<1	<1	14	4	<1	<1	<1	<1	22	22	11	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3		mg/L	1	339	341	396	460	343	255	381	416	372	384	412	426	316	295	270	296	355	523	372	433	232	478	370	372	399	372	384	355	315	344
Total Alkalinity as CaCO3		mg/L	1	339	341	396	460	343	303	381	416	372	384	412	426	331	299	270	296	355	523	395	455	244	478	370	372	399	372	384	355	315	344
Silicon as SiO2		mg/L	0.1	86.1	87.2	115	87.7	93.8	24.5	96.2	107	91.4	57.9	94.8	67.9	87.4	99.6	89.6	106	54.3	92.6	85.6	100	49.3	101	86	82.4	96.5	87.9	71.9	86.2	81.9	106
Sulfate as SO4 - Turbidimetric		mg/L	1	44	48	54	67	40	59	50	41	56	65	51	53	44	92	23	38	27	69	51	77	12	49	44	43	43	38	29	23	22	33
Chloride		mg/L	1	186	192	241	354	183	238	238	238	270	238	245	240	235	636	127	248	71	352	238	333	30	422	189	181	200	182	177	119	126	167
Calcium		mg/L	1	34	35	30	39	34	26	31	26	34	31	32	35	22	59	31	51	35	44	28	22	18	42	29	28	28	28	27	23	29	27
Magnesium		mg/L	1	43	42	64	66	43	25	52	58	69	51	63	57	35	70	32	44	26	61	46	59	13	61	40	39	41	38	34	26	28	36
Sodium		mg/L	1	151	156	177	289	151	230	184	176	188	176	190	186	213	331	110	178	100	244	184	242	71	273	163	157	172	160	155	133	129	152
Potassium		mg/L	1	12	12	15	13	12	10	13	17	16	14	14	15	9	15	11	12	5	16	14	19	2	20	12	12	13	12	11	9	9	13
Mercury	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	dissolved	µg/L	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	19	<5	<5	9	<5	<5	<5
Iron	dissolved	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5	<2	<2	<2	<2	<2	<2	<2	3	<2	<2	4	<2	<2	<2
Antimony	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	dissolved	µg/L	0.2	2.8	3.2	3.3	5.5	2.8	0.5	3	3.5	4.1	3.3	3.5	3.2	2.3	6.8	1.3	3.6	1.1	3.7	3.1	4.4	0.3	7.3	3	3.1	3.1	2.8	2.2	2.2	2	2.5
Arsenic	dissolved	µg/L	0.2	10	8.8	8.6	6	7	**636**	6.5	9.9	6	3.7	14.3	4.3	6	6.2	3.5	3.9	0.9	28.6	10.6	22	2.2	4.7	11.6	11.3	7	7	7.6	5	5.1	5.6
Barium	dissolved	µg/L	0.5	142	192	134	122	144	25.4	142	122	136	125	165	119	139	230	149	257	224	164	130	99.4	288	247	150	160	173	187	205	252	204	164
Beryllium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	dissolved	µg/L	5	404	420	461	664	379	298	473	528	565	530	550	490	415	463	342	402	187	495	446	550	132	862	544	527	599	558	512	352	365	503
Bismuth	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	dissolved	µg/L	0.2	2.6	2.1	1.1	1.2	3	<0.2	2.4	1.1	1.9	<0.2	1.8	<0.2	3.2	7.6	1.3	1.1	0.7	1	3.1	2.2	1.2	1.3	3.3	2.8	2.5	2.4	2.2	2.4	2.5	2.3
Cobalt	dissolved	µg/L	0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	0.2	<0.1	<0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Copper	dissolved	µg/L	0.5	0.7	1	<0.5	2.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	18.4	6.5	0.8	1.2	1.2	<0.5	2.4	<0.5	0.8	<0.5	1.3	<0.5	0.6	1.3	<0.5	<0.5
Lead	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lithium	dissolved	µg/L	0.5	20	18.8	17.3	30.8	21.6	26.4	22.2	20.6	23.1	14.8	24.7	14.1	8.5	17.5	17.9	13.1	2.8	18.2	17.4	10.5	5.4	23.9	25.5	25.2	26.4	25.6	25	5.3	6.3	18.5
Manganese	dissolved	µg/L	0.5	12.3	29.7	1.2	13.1	<0.5	28.6	<0.5	0.8	<0.5	22.5	1	20.7	<0.5	<0.5	4.7	<0.5	3.2	<0.5	<0.5	<0.5	<0.5	1	<0.5	1.3	<0.5	9.4	157	0.7	<0.5	<0.5
Molybdenum	dissolved	µg/L	0.1	4.9	5.1	5.1	6.7	4.8	13	5.6	3.9	3.7	5	5.3	4.8	3.1	4.1	2.4	1.8	2.3	4	4.4	5.8	1.7	1.7	4.7	5	5	4.8	4.5	3.2	3	4
Nickel	dissolved	µg/L	0.5	<0.5	1.4	<0.5	0.8	<0.5	0.6	<0.5	<0.5	<0.5	0.9	<0.5	0.7	<0.5	<0.5	2.4	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	dissolved	µg/L	1	527	525	666	797	594	382	598	680	796	556	670	617	531	1140	486	801	480	800	524	609	252	942	623	615	672	623	584	609	544	633
Tellurium	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	dissolved	µg/L	0.0	<0.02	0.04	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	dissolved	µg/L	0.2	<0.2	0.4	3.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium	dissolved	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	<1	<1	<1	<1	<1	<1	<1
Uranium	dissolved	µg/L	0.05	25.7	26.6	30.2	53.3	25.9	8.93	30.3	30.6	34.2	17.1	40.1	23.5	10.1	20.1	9.12	7.94	14.8	34.2	29.3	38.2	5.26	19.8	26.5	28.8	30.2	24.1	20.5	8.81	7.79	22
Vanadium	dissolved	µg/L	0.2	28.6	39.7	34.8	31.2	27.9	4.4	32	39.2	32	15.7	35	21.2	27.3	23.8	22.4	26	13.1	22.4	24.5	37.1	10.2	21.4	27.6	27.9	28.7	27.5	21.4	27.3	24	28.4
Zinc	dissolved	µg/L	1	14	35	16	23	15	2	57	18	37	1270	22	841	20	17	20	26	40	20	22	13	19	17	18	27	33	15	27	22	20	10
Nitrate as N		mg/L	0.01	7.07	7.09	6.57	7.27	7.67	0.1	7.43	6.21	8.09	3.48	6.2	3.81	5.11	5.67	5.76	21.1	1.4	5.04	7.29	7.17	0.43	6.11	6.56	6.26	6.46	5.49	2.89	7.94	6.46	7.37
Total Anions		meq/L	0.01	12.9	13.2	15.8	20.6	12.8	14	15.4	15.9	16.2	15.7	16.2	16.4	14.2	25.8	9.46	13.7	9.66	21.8	15.7	20.1	5.97	22.5	13.6	13.4	14.5	13.4	13.3	10.9	10.3	12.3
Total Cations		meq/L	0.01	12.1	12.3	14.8	20.3	12.1	13.6	14.2	14.2	16	13.8	15.4	14.9	13.5	23.5	9.25	14.2	8.36	18.2	13.5	17	5.11	19.5	12.1	11.7	12.6	11.8	11.2	9.3	9.59	11.2
Ionic Balance		%	0.01	3.3	3.65	3.22	0.71	2.95	1.38	4.08	5.72	0.78	6.72	2.53	4.71	2.48	4.75	1.12	1.84	7.18	8.93	7.27	8.42	7.8	7.08	5.83	6.71	7.1	6.23	8.59	8.04	3.58	4.32
Bromide		mg/L	0.01	0.638	0.56	0.786	1.22	<2.00	0.737	0.632	0.659	0.835	0.733	0.713	0.708	0.614	1.67	0.375	0.589	0.242	4.85	1.75	1.02	0.116	1.22	0.481	0.477	0.515	0.487	0.503	0.336	0.307	0.439
Gross beta		Bq/L	0.1	----	----	----	1.04	----	0.46																								
Gross alpha		Bq/L	0.05	----	----	----	3.21	----	0.43																								
Gross beta activity - 40K		Bq/L	0.1	----	----	----	0.66	----	0.16																								
Radium 226		Bq/L	0.01	----	----	----	0.02	----	<0.01																								
Radium 228		Bq/L	0.08	----	----	----	<0.08	----	<0.08																								
Iron	dissolved	mg/L	0.05	----	----	----	<0.05	----	<0.05																								
Arsenobetaine (ASB)	dissolved	µg/L	1	----	----	----	<1	----	<10																								
Arsenious Acid (As (III))	dissolved	µg/L	0.5	----	----	----	<0.5	----	665																								
Dimethylarsenic Acid (DMA)	dissolved	µg/L	1	----	----	----	<1	----	<10																								
Monomethylarsonic Acid (MMA)	dissolved	µg/L	1	----	----	----	<1	----	<10																								
Arsenic Acid (As (V))	dissolved	µg/L	0.5	----	----	----	5.7	----	9.2																								
Trivalent Chromium	dissolved	mg/L	0.001	----	----	----	<0.001	----	<0.001																								
Hexavalent Chromium	dissolved	mg/L	0.001	----	----	----	0.002	----	<0.001																								
Ferrous Iron	dissolved	mg/L	0.05	----	----	----	<0.05	----	<0.05																								
Ferric Iron	dissolved	mg/L	0.05	----	----	----	<0.05	----	<0.05																								
Mercury	total	mg/L	0.0001	----	<0.0001	----	----	----	----	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001																		
Aluminium	total	µg/L	5	----	2750	----	----	----	----	32	9	932	3300	3060	765										----	----	----	----	947	1260	----	----	----
Iron	total	µg/L	2	----	3490	----	----	----	----	49	10	1080	6850	3900	1450										----	----	----	----	1570	1660	----	----	----
Antimony	total	µg/L	0.2	----	0.2	----	----	----	----	<0.2	<0.2	<0.2	0.2	<0.2	0.2										----	----	----	----	<0.2	<0.2	----	----	----
Selenium	total	µg/L	0.2	----	3	----	----	----	----	2.7	2.9	3.5	2.7	2.8	2.7										----	----	----	----	2.5	2	----	----	----
Arsenic	total	µg/L	0.2	----	9.9	----	----	----	----	5.9	9.1	5.8	4.5	14	4.4										----	----	----	----	7.7	8.1	----	----	----
Barium	total	µg/L	0.5	----	187	----	----	----	----	123	96.2	129	126	142	102										----	----	----	----	365	250	----	----	----
Beryllium	total	µg/L	0.1	----	0.1	----	----	----	----	<0.1	<0.1	<0.1	<0.1	0.1	<0.1										----	----	----	----	<0.1	0.1	----	----	----
Boron	total	µg/L	5	----	418	----	----	----	----	526	600	612	578	548	484										----	----	----	----	608	535	----	----	----
Bismuth	total	µg/L	0.05	----	<0.05	----	----	----	----	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05										----	----	----	----	<0.05	<0.05	----	----	----
Cadmium	total	µg/L	0.05	----	<0.05	----	----	----	----	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05										----	----	----	----	0.07	<0.05	----	----	----
Chromium	total	µg/L	0.2	----	11.7	----	----	----	----	**2.6**	**1.3**	**5.2**	**67.1**	**18.1**	13.7										----	----	----	----	5.7	7.2	----	----	----
Cobalt	total	µg/L	0.1	----	3.5	----	----	----	----	**<0.1**	**<0.1**	**0.6**	**9.7**	**2.9**	2.1										----	----	----	----	5.3	1.7	----	----	----
Copper	total	µg/L	0.5	----	5.2	----	----	----	----	<0.5	<0.5	0.9	29.4	3.5	6.6										----	----	----	----	4	2.8	----	----	----
Lead	total	µg/L	0.1	----	2.1	----	----	----	----	<0.1	<0.1	0.4	2	1.7	0.4										----	----	----	----	1.8	1.6	----	----	----
Lithium	total	µg/L	0.5	----	21	----	----	----	----	19.6	18.2	19.7	13.8	21.6	13.7										----	----	----	----	30.2	28.9	----	----	----
Manganese	total	µg/L	0.5	----	147	----	----	----	----	2.8	1	15.1	188	85.1	52.9										----	----	----	----	2050	876	----	----	----
Molybdenum	total	µg/L	0.1	----	5.7	----	----	----	----	7.6	5.1	4.7	5.6	5.5	5.9										----	----	----	----	5.9	5	----	----	----
Nickel	total	µg/L	0.5	----	8.5	----	----	----	----	<0.5	<0.5	2.2	88.4	12	19.2										----	----	----	----	6.8	3.9	----	----	----
Silver	total	µg/L	0.1	----	<0.1	----	----	----	----	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1										----	----	----	----	<0.1	<0.1	----	----	----
Strontium	total	µg/L	1	----	587	----	----	----	----	606	696	783	550	692	638										----	----	----	----	630	579	----	----	----
Thallium	total	µg/L	0.02	----	0.08	----	----	----	----	<0.02	<0.02	<0.02	0.05	0.04	0.03										----	----	----	----	0.07	<0.02	----	----	----
Thorium	total	µg/L	0.1	----	1.6	----	----	----	----	<0.1	<0.1	0.2	1.5	1.4	0.2										----	----	----	----	0.8	1	----	----	----
Tin	total	µg/L	0.2	----	<0.2	----	----	----	----	<0.2	<0.2	<0.2	0.2	<0.2	<0.2										----	----	----	----	<0.2	<0.2	----	----	----
Titanium	total	µg/L	1	----	42	----	----	----	----	<1	<1	11	100	63	23										----	----	----	----	23	27	----	----	----
Uranium	total	µg/L	0.05	----	32.6	----	----	----	----	36	37.6	41.4	21.7	47.5	27.9										----	----	----	----	34.7	29.6	----	----	----
Vanadium	total	µg/L	0.2	----	47.5	----	----	----	----	33	40.9	35.7	30.6	43.8	24.8										----	----	----	----	38.7	29.8	----	----	----
Zinc	total	µg/L	1	----	18	----	----	----	----	133	11	79	3630	16	1380										----	----	----	----	12	12	----	----	----
Tellurium	total	µg/L	0.2	----	<0.2	----	----	----	----	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2										----	----	----	----	<0.2	<0.2	----	----	----

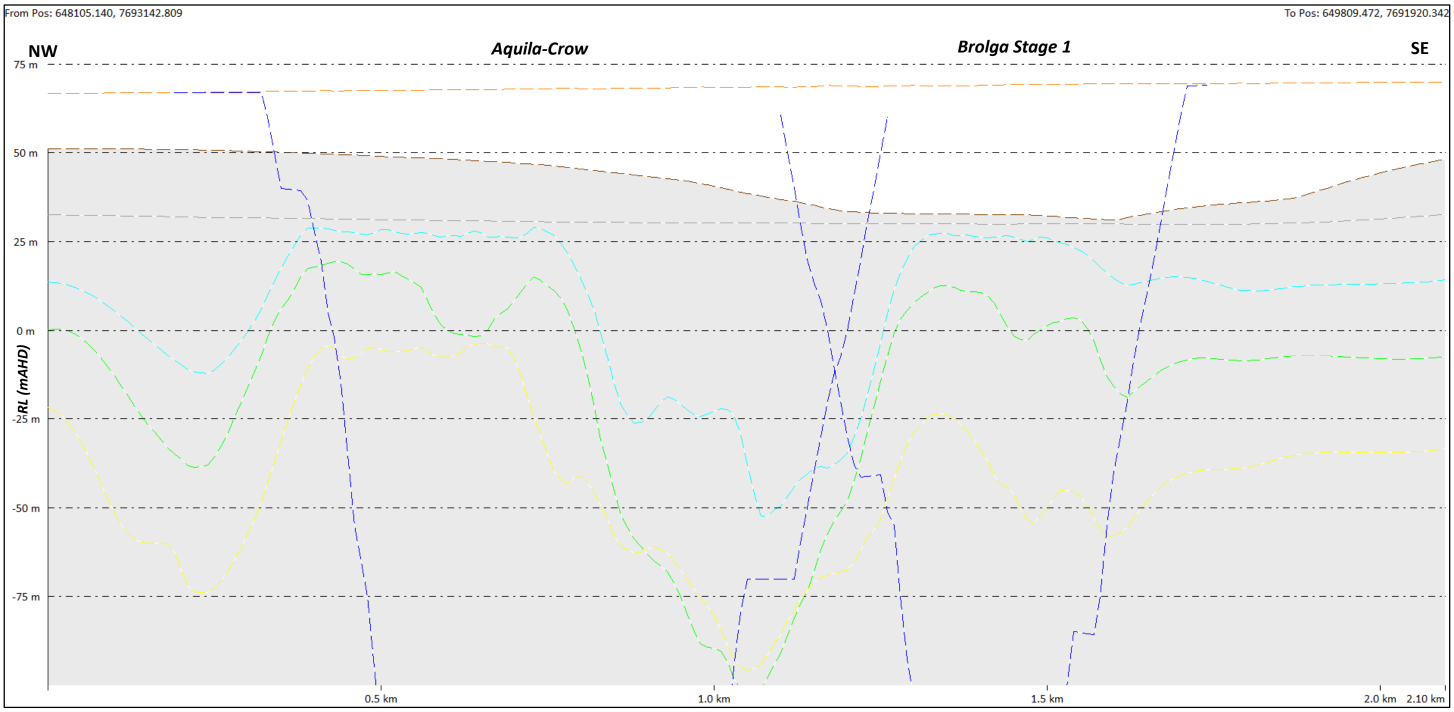
Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	HMB028D 15/11/2022	HMB027S 15/11/2022	HMB027D 15/11/2022	HMB008 15/11/2022	HMB042 15/11/2022	HMB040 15/11/2022	HMB039 15/11/2022	HMB037 15/11/2022	HMB035 15/11/2022	HMB036 15/11/2022	HMB034 15/11/2022	HMB034B 15/11/2022	HMB016 16/11/2022	HMB012S 16/11/2022	HMB012D 16/11/2022	HMB004 16/11/2022	HMB005 16/11/2022	HMB025S 16/11/2022	HMB025D 16/11/2022	HMB015 16/11/2022	HMB024S 16/11/2022	HMB024D 16/11/2022	HMB002 16/11/2022	HMB001 16/11/2022	HMB026 16/11/2022	HMB014 16/11/2022	HMB013 16/11/2022	HMB007 16/11/2022	HMB023S 16/11/2022	HMB023D 16/11/2022
pH Value		pH Unit	0.01	8.02	8	8.05	8.05	7.9	7.94	8.03	8.05	7.94	8.03	8.08	8.08	8.11	8.06	8.03	8.02	8	8.12	7.83	7.99	8.04	7.96	8.1	8.13	8.02	8.07	8.15	8.13	8.06	7.97
Electrical Conductivity @ 25°C		µS/cm	1	1190	1180	1220	1100	1440	1400	1540	1400	1910	1320	1490	1490	1490	1190	1440	1480	1600	1480	1520	1450	1470	1530	1420	1270	1230	1280	1210	1220	1700	1310
Total Dissolved Solids @180°C		mg/L	10	738	734	750	696	903	858	944	883	1160	778	936	916	886	691	863	872	931	868	870	848	880	902	850	744	818	766	738	743	999	753
Suspended Solids (SS)		mg/L	5	11	114	12	5	510	16	28	6	10	<5	34	50	9	<5	8	32	14	422	160	<5	13	65	66	<5	45	<5	<5	91	20	8
Hydroxide Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3		mg/L	1	374	389	382	368	439	443	442	446	506	401	438	444	440	342	425	424	427	437	501	427	432	442	416	401	384	391	375	373	399	391
Total Alkalinity as CaCO3		mg/L	1	374	389	382	368	439	443	442	446	506	401	438	444	440	342	425	424	427	437	501	427	432	442	416	401	384	391	375	373	399	391
Silicon as SiO2		mg/L	0.1	88.2	93.9	91.2	102	95.7	88.2	95.3	104	85	99.2	117	117	99.4	71.8	85.2	84.8	72	85	49.6	78.2	87.4	53.3	86.5	96.6	88.8	85.7	85.8	89.7	98.2	36.6
Sulfate as SO4 - Turbidimetric		mg/L	1	38	34	39	30	53	50	51	42	64	47	55	54	57	42	59	62	78	59	64	69	79	93	62	44	48	54	44	39	69	76
Chloride		mg/L	1	184	164	188	152	236	232	274	221	365	209	256	258	254	210	244	249	278	237	226	237	243	251	231	191	181	202	184	180	307	210
Calcium		mg/L	1	28	26	28	26	26	26	24	21	29	25	25	26	24	17	23	26	25	26	26	27	28	30	24	17	25	28	28	29	29	28
Magnesium		mg/L	1	40	37	40	36	54	52	58	52	67	44	60	62	52	36	48	52	50	48	46	53	51	53	48	34	36	42	39	40	42	40
Sodium		mg/L	1	158	158	159	146	194	189	189	187	254	186	187	192	203	163	190	199	222	202	216	195	194	204	185	180	161	176	162	158	237	178
Potassium		mg/L	1	12	12	12	12	13	14	15	16	16	12	15	16	15	10	12	13	15	14	15	13	12	11	12	12	12	12	12	12	14	13
Mercury	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	dissolved	µg/L	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	13	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	8
Iron	dissolved	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	1800	<2	<2	10	<2	<2	<2	<2	<2	<2	<2	57
Antimony	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	dissolved	µg/L	0.2	2.9	2.8	2.9	2.4	3.3	3.1	3.9	3.3	5.6	2.9	3.4	3.6	3.3	3.3	3.6	3.8	4	3.1	0.3	2.8	2.7	0.4	2.9	2.5	2.5	2.5	2.7	2.8	3	<0.2
Arsenic	dissolved	µg/L	0.2	7.4	6.1	6.3	4.7	14.3	7.9	7.5	9.8	7	7.8	8.3	8.4	10.3	11.8	7.4	11.3	56	17	69.2	39.9	108	239	59	9	8.6	8.5	8.2	6.4	8	634
Barium	dissolved	µg/L	0.5	148	178	146	196	188	121	183	178	158	166	156	147	128	116	130	128	102	231	410	137	136	248	117	131	149	112	146	153	155	234
Beryllium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	dissolved	µg/L	5	533	543	488	486	563	574	627	603	815	528	557	560	598	566	540	604	689	589	555	563	562	560	539	581	512	520	525	495	487	433
Bismuth	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	dissolved	µg/L	0.2	2.8	2.4	2.9	1.7	2.1	1	1.8	1.3	1.4	2.5	1.2	1.2	2.1	2.1	0.3	3.1	3.8	1.4	<0.2	2.8	2	<0.2	3.5	1.7	3.3	3.5	3.3	3.1	2.1	<0.2
Cobalt	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.1	<0.1	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
Copper	dissolved	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.6	<0.5	<0.5	0.6	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.5	<0.5
Lead	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lithium	dissolved	µg/L	0.5	27.9	25	27.4	17.1	23.2	19.2	23.2	21.6	38.8	23	20.8	20.8	22.6	22.4	20.4	22.3	20.3	23	25.7	21.5	23.8	23.3	22.6	17.7	25.1	22.6	26.6	25.5	21	19.4
Manganese	dissolved	µg/L	0.5	1.4	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.3	44.3	<0.5	<0.5	4	1210	1.1	7.1	1180	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	966
Molybdenum	dissolved	µg/L	0.1	5.6	4.5	5.3	3.1	5.6	5.1	4.1	4.2	6.1	6.5	5.4	5.2	5.3	5.8	5.3	5.6	5.4	6.5	6.8	6.6	5.2	8.8	5.1	5	4.7	4.9	4.8	4.8	4	22.8
Nickel	dissolved	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.6
Silver	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	dissolved	µg/L	1	607	601	596	660	664	647	822	701	926	610	818	806	705	650	628	660	647	649	722	664	683	718	644	540	587	588	595	577	650	628
Tellurium	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	dissolved	µg/L	0.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.16
Thorium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium	dissolved	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	<1	<1	<1	<1	<1	<1	<1
Uranium	dissolved	µg/L	0.05	28.1	25.9	28.1	19.3	42.6	29.7	40.3	36.7	60.8	34.8	33.8	33	39.3	38.6	40.9	43.2	39.9	38.6	11.8	46.6	39.4	18.6	38.4	26.5	26.7	30.2	26.7	26.6	33.1	15
Vanadium	dissolved	µg/L	0.2	28.4	30.5	30	26.4	35.8	28.4	35.4	38.6	31.9	33	33.7	33.8	35.9	34.1	33.4	33.9	28.2	36.1	5	30.1	33.4	6.8	31.1	33.1	28.3	28	27.8	30.4	25.8	2.8
Zinc	dissolved	µg/L	1	14	13	15	25	55	49	26	25	15	24	13	15	4	5	9	10	13	25	20	10	20	16	12	15	13	14	17	14	12	10
Nitrate as N		mg/L	0.01	6.5	6.87	7.21	9.76	5.6	5.41	7.04	5.74	6.86	6.62	6.48	7.52	6.35	3.52	4.64	6.29	5.81	5.76	0.15	5.54	4.4	0.75	6.19	6.2	6.93	6.83	7.12	7.71	7.13	0.05
Total Anions		meq/L	0.01	13.4	13.1	13.7	12.3	16.5	16.4	17.6	16	21.7	14.9	17.1	17.3	17.1	13.6	16.6	16.8	18	16.6	17.7	16.6	17.1	17.8	16.1	14.3	13.8	14.6	13.6	13.3	18.1	15.3
Total Cations		meq/L	0.01	11.9	11.5	11.9	10.9	14.5	14.2	14.6	13.9	18.4	13.3	14.7	15.2	14.7	11.2	13.7	14.6	15.4	14.4	14.9	14.5	14.3	15	13.5	11.8	11.5	12.8	12	11.9	15.6	12.8
Ionic Balance		%	0.01	6.26	6.43	7.15	5.81	6.5	7.45	9.46	7.19	8.27	5.75	7.59	6.51	7.7	9.98	9.69	7.08	7.77	7.26	8.76	6.83	8.87	8.62	8.83	9.7	8.92	6.62	6.41	5.63	7.42	9.09
Bromide		mg/L	0.01	0.487	0.438	0.492	0.381	0.598	0.634	0.73	0.569	0.939	0.571	0.712	0.702	0.681	0.579	0.625	0.627	0.706	0.627	0.552	0.583	0.571	0.647	0.526	0.477	0.476	0.466	0.494	0.497	0.748	0.505
Gross beta		Bq/L	0.1																														
Gross alpha		Bq/L	0.05																														
Gross beta activity - 40K		Bq/L	0.1																														
Radium 226		Bq/L	0.01																														
Radium 228		Bq/L	0.08																														
Iron	dissolved	mg/L	0.05																														
Arsenobetaine (ASB)	dissolved	µg/L	1																														
Arsenious Acid (As (III))	dissolved	µg/L	0.5																														
Dimethylarsenic Acid (DMA)	dissolved	µg/L	1																														
Monomethylarsonic Acid (MMA)	dissolved	µg/L	1																														
Arsenic Acid (As (V))	dissolved	µg/L	0.5																														
Trivalent Chromium	dissolved	mg/L	0.001																														
Hexavalent Chromium	dissolved	mg/L	0.001																														
Ferrous Iron	dissolved	mg/L	0.05																														
Ferric Iron	dissolved	mg/L	0.05																														
Mercury	total	mg/L	0.0001																														
Aluminium	total	µg/L	5	----	2260	1870	----	11200	----	----	----	----	----	----	----	----	----	----	2040	----	7150	3050	----	----	360	----	----	1840	----	----	1600	----	----
Iron	total	µg/L	2	----	3400	2070	----	17000	----	----	----	----	----	----	----	----	----	----	2260	----	11100	7140	----	----	15200	----	----	2160	----	----	2400	----	----
Antimony	total	µg/L	0.2	----	<0.2	<0.2	----	0.2	----	----	----	----	----	----	----	----	----	----	<0.2	----	0.3	0.7	----	----	0.7	----	----	<0.2	----	----	0.7	----	----
Selenium	total	µg/L	0.2	----	2.4	2.6	----	2.5	----	----	----	----	----	----	----	----	----	----	3	----	2.6	0.4	----	----	0.5	----	----	2.3	----	----	2.5	----	----
Arsenic	total	µg/L	0.2	----	6.1	6.4	----	16	----	----	----	----	----	----	----	----	----	----	11.4	----	24	64.9	----	----	1550	----	----	9.3	----	----	6.7	----	----
Barium	total	µg/L	0.5	----	192	136	----	217	----	----	----	----	----	----	----	----	----	----	123	----	391	513	----	----	517	----	----	138	----	----	142	----	----
Beryllium	total	µg/L	0.1	----	0.2	0.2	----	0.6	----	----	----	----	----	----	----	----	----	----	<0.1	----	0.4	0.1	----	----	<0.1	----	----	<0.1	----	----	<0.1	----	----
Boron	total	µg/L	5	----	565	589	----	580	----	----	----	----	----	----	----	----	----	----	688	----	610	578	----	----	570	----	----	529	----	----	549	----	----
Bismuth	total	µg/L	0.05	----	<0.05	<0.05	----	0.2	----	----	----	----	----	----	----	----	----	----	<0.05	----	0.08	<0.05	----	----	<0.05	----	----	<0.05	----	----	<0.05	----	----
Cadmium	total	µg/L	0.05	----	<0.05	<0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	<0.05	----	0.06	<0.05	----	----	<0.05	----	----	<0.05	----	----	<0.05	----	----
Chromium	total	µg/L	0.2	----	11.6	10.1	----	68.5	----	----	----	----	----	----	----	----	----	----	13.7	----	83.1	38.9	----	----	1	----	----	12	----	----	10.1	----	----
Cobalt	total	µg/L	0.1	----	3.1	1.4	----	13.6	----	----	----	----	----	----	----	----	----	----	1.7	----	10.5	9.3	----	----	1.6	----	----	1.5	----	----	1.4	----	----
Copper	total	µg/L	0.5	----	6.8	2.4	----	18.8	----	----	----	----	----	----	----	----	----	----	3.1	----	22.2	10.2	----	----	3.1	----	----	2.2	----	----	4.3	----	----
Lead	total	µg/L	0.1	----	2.2	1.2	----	9.5	----	----	----	----	----	----	----	----	----	----	1.3	----	4.1	1.6	----	----	1.3	----	----	0.9	----	----	1.3	----	----
Lithium	total	µg/L	0.5	----	29.9	34.3	----	35.4	----	----	----	----	----	----	----	----	----	----	27.5	----	35.1	32.8	----	----	24.1	----	----	27.6	----	----	31	----	----
Manganese	total	µg/L	0.5	----	221	48	----	443	----	----	----	----	----	----	----	----	----	----	36.1	----	2040	1360	----	----	1500	----	----	81	----	----	35.2	----	----
Molybdenum	total	µg/L	0.1	----	4.3	6.2	----	3.5	----	----	----	----	----	----	----	----	----	----	6.6	----	7.1	10	----	----	11.9	----	----	5.3	----	----	4.3	----	----
Nickel	total	µg/L	0.5	----	6.6	4.6	----	49.2	----	----	----	----	----	----	----	----	----	----	6.8	----	35	18.4	----	----	1.3	----	----	6	----	----	3.4	----	----
Silver	total	µg/L	0.1	----	<0.1	<0.1	----	0.2	----	----	----	----	----	----	----	----	----	----	0.2	----	<0.1	<0.1	----	----	<0.1	----	----	<0.1	----	----	<0.1	----	----
Strontium	total	µg/L	1	----	576	578	----	691	----	----	----	----	----	----	----	----	----	----	660	----	679	708	----	----	724	----	----	558	----	----	582	----	----
Thallium	total	µg/L	0.02	----	0.04	<0.02	----	0.21	----	----	----	----	----	----	----	----	----	----	<0.02	----	0.16	0.08	----	----	0.03	----	----	0.02	----	----	0.03	----	----
Thorium	total	µg/L	0.1	----	1.2	1.2	----	8.4	----	----	----	----	----	----	----	----	----	----	1.2	----	2.6	0.8	----	----	0.2	----	----	0.7	----	----	0.9	----	----
Tin	total	µg/L	0.2	----	<0.2	<0.2	----	0.3	----	----	----	----	----	----	----	----	----	----	<0.2	----	0.3	0.2	----	----	0.4	----	----	<0.2	----	----	<0.2	----	----
Titanium	total	µg/L	1	----	40	28	----	142	----	----	----	----	----	----	----	----	----	----	26	----	254	126	----	----	4	----	----	24	----	----	35	----	----
Uranium	total	µg/L	0.05	----	35	38.7	----	63.4	----	----	----	----	----	----	----	----	----	----	63.7	----	54.6	20.2	----	----	28.2	----	----	40.3	----	----	35.6	----	----
Vanadium	total	µg/L	0.2	----	40.1	36.9	----	67.1	----	----	----	----	----	----	----	----	----	----	41.7	----	66.3	20.5	----	----	17.4	----	----	35.4	----	----	38.1	----	----
Zinc	total	µg/L	1	----	10	8	----	38	----	----	----	----	----	----	----	----	----	----	8	----	37	32	----	----	35	----	----	7	----	----	6	----	----
Tellurium	total	µg/L	0.2	----	<0.2	<0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	<0.2	----	<0.2	<0.2	----	----	<0.2	----	----	<0.2	----	----	<0.2	----	----

Analyte grouping/Analyte	Dissolved or Total Metals	Unit	LOR	HMB003 16/11/2022	HMB022 16/11/2022	HMB021 16/11/2022	HMB021B 16/11/2022	HMB020 16/11/2022	HMB019 17/11/2022	HMB018 17/11/2022	HMB018B 17/11/2022	HMB017 17/11/2022	HMB012S 28/03/2023	HMB012D 28/03/2023	HMB025S 28/03/2023	HMB025D 28/03/2023	HMB022 28/03/2023	HMB019 29/03/2023	HMB018 29/03/2023	HMB017 29/03/2023	HMB034 29/03/2023	HMB035 29/03/2023	HMB036 29/03/2023	HMB037 29/03/2023	HMB021 29/03/2023	HMB020 29/03/2023	HMB040 30/03/2023	HMB024S 30/03/2023	HMB024D 30/03/2023	HMB013 30/03/2023	HMB013B 30/03/2023	HMB023S 30/03/2023	HMB023D 30/03/2023
pH Value		pH Unit	0.01	8.1	7.84	7.9	7.89	7.75	8.01	8.03	8.05	7.6	7.99	7.95	7.94	7.89	7.72	7.86	7.82	7.45	8.04	7.92	8.01	8	7.77	7.46	7.91	8.01	7.89	8.01	8	8.02	7.94
Electrical Conductivity @ 25°C		µS/cm	1	1440	897	1770	1760	2250	622	839	853	1610	1680	1660	1680	1680	1030	712	958	1640	1690	2130	1560	1610	1970	6060	1640	1660	1740	1410	1410	2030	1530
Total Dissolved Solids @180°C		mg/L	10	866	497	1060	1060	1310	352	562	554	923	860	834	892	840	482	342	520	816	866	1110	812	812	1070	3940	848	828	872	738	724	1040	734
Suspended Solids (SS)		mg/L	5	<5	74	132	676	33	58	76	227	44	<5	9	781	72	56	60	41	160	6	<5	<5	19	600	17	51	7	10	<5	<5	<5	<5
Hydroxide Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3		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	<1	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3		mg/L	1	422	355	274	269	460	302	221	220	337	408	407	413	450	330	288	212	297	408	465	384	485	258	478	416	403	420	348	356	377	363
Total Alkalinity as CaCO3		mg/L	1	422	355	274	269	460	302	221	220	337	408	407	413	450	330	288	212	297	408	465	384	485	258	478	416	403	420	348	356	377	363
Silicon as SiO2		mg/L	0.1	96.8	27.4	77.7	78.9	56.2	33.2	52.5	52	39.4	89.7	84.9	90	46.9	26.9	32	50.2	37.7	113	83.1	97	104	75.2	54.3	96.2	88.5	55.1	85.3	85.9	102	34.7
Sulfate as SO4 - Turbidimetric		mg/L	1	56	27	62	60	82	9	12	12	74	57	59	57	60	26	10	14	66	51	70	44	39	62	492	53	68	95	40	40	68	73
Chloride		mg/L	1	234	109	437	441	504	39	169	164	349	238	243	242	240	116	38	165	296	246	357	219	223	431	1500	235	232	258	187	185	374	216
Calcium		mg/L	1	22	59	55	58	87	50	47	47	73	20	22	22	21	56	43	41	53	22	27	21	19	51	284	21	23	27	24	24	27	24
Magnesium		mg/L	1	46	37	63	63	73	31	37	37	48	48	50	48	44	39	31	36	40	59	68	42	51	64	249	51	49	55	38	38	45	39
Sodium		mg/L	1	198	70	195	194	260	36	69	69	182	210	215	221	231	68	34	66	184	202	281	201	202	215	636	202	210	220	177	176	286	189
Potassium		mg/L	1	12	3	7	8	6	3	4	4	5	11	11	12	13	3	2	4	4	13	14	11	14	7	8	12	10	11	10	10	13	11
Mercury	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminium	dissolved	µg/L	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	14	5	<5	20	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	10	<5	<5	<5	6
Iron	dissolved	µg/L	2	<2	8	<2	<2	<2	<2	<2	<2	<2	2	<2	<2	1030	<2	<2	<2	<2	4	<2	<2	<2	<2	19	<2	<2	4	<2	<2	<2	43
Antimony	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	dissolved	µg/L	0.2	3.1	<0.2	1.8	1.8	1.8	0.5	0.4	0.4	0.4	2.8	3.8	3.5	<0.2	0.9	0.6	0.4	0.4	3.3	5.6	2.9	3.3	1.8	5.5	3.1	3	0.6	2.7	2.6	3	<0.2
Arsenic	dissolved	µg/L	0.2	11.5	1.4	4.9	4.8	0.9	1	1.7	1.7	0.6	13.3	8.2	13.4	56.3	0.6	1	1.9	0.8	8.5	7.8	7.7	10.2	5	1.1	13.9	94.7	409	8.6	8.5	7.5	671
Barium	dissolved	µg/L	0.5	139	171	434	443	297	130	226	224	109	129	150	264	301	178	134	226	59.8	103	121	120	89.1	392	298	118	118	191	149	147	166	232
Beryllium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	dissolved	µg/L	5	536	113	259	263	564	127	118	116	336	504	539	569	524	115	117	118	302	501	732	485	545	236	2070	562	509	514	466	460	485	429
Bismuth	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	dissolved	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	0.17	<0.05	<0.05	<0.05	<0.05	<0.05	0.19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	dissolved	µg/L	0.2	2.4	<0.2	1.7	1.7	<0.2	1.1	1	1	<0.2	1.3	1.9	2.4	<0.2	0.3	1	1	<0.2	1	1.4	2.4	1.2	1.7	<0.2	1.5	2.5	<0.2	3.3	3.3	1.7	<0.2
Cobalt	dissolved	µg/L	0.1	<0.1	1.1	<0.1	<0.1	1.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.6	<0.1	<0.1	0.7	<0.1	<0.1	<0.1	2.4
Copper	dissolved	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	1.2	0.8	0.6	<0.5	<0.5	0.6	1	0.7	<0.5	0.7	0.7	<0.5	0.8	1.6	0.7	0.7	0.6	0.5	<0.5	<0.5	<0.5
Lead	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lithium	dissolved	µg/L	0.5	21.5	7.3	21.5	21.5	72.3	4.8	12.2	12.3	50.3	18.8	19.5	21.9	20.6	5.7	4.2	12.4	42.5	18.7	34.1	19.7	19	21.2	134	21.8	21.3	19.8	23.6	23.4	21.6	18.8
Manganese	dissolved	µg/L	0.5	0.5	240	<0.5	<0.5	879	<0.5	<0.5	4.9	19.1	4.2	1	3.8	1000	32.7	<0.5	0.5	11	1.2	<0.5	<0.5	<0.5	<0.5	1870	0.9	3.6	788	<0.5	<0.5	<0.5	891
Molybdenum	dissolved	µg/L	0.1	6.4	1.2	1.2	1.1	4.7	1	1	1	2.8	5.6	5.9	6	8.5	1	1	1	3.2	5.4	6.4	6.5	4.3	1.1	6.8	6	5.7	8.5	5.5	5.5	3.9	26.3
Nickel	dissolved	µg/L	0.5	<0.5	4.6	<0.5	<0.5	2.8	<0.5	<0.5	<0.5	<0.5	0.6	2.2	0.9	0.6	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10.8	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	2.7
Silver	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	dissolved	µg/L	1	599	484	940	937	784	440	567	556	610	570	685	681	700	517	472	585	548	800	975	620	719	960	2810	668	653	705	577	576	711	657
Tellurium	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	dissolved	µg/L	0.0	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	0.07	<0.02	0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.02	<0.02	<0.02	<0.02	0.1	<0.02	0.02	0.03	<0.02	<0.02	<0.02	0.08
Thorium	dissolved	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	dissolved	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	1.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Titanium	dissolved	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	<1	<1	<1	<1	<1	<1	<1
Uranium	dissolved	µg/L	0.05	39.4	9.11	21.9	21.4	43.9	10.2	6.86	6.91	26	38.6	46.7	41.8	8.02	9.38	9.86	6.66	19.4	33.5	61	36.1	36.4	21.1	126	38.3	42.9	25	29.3	29	32.2	14.6
Vanadium	dissolved	µg/L	0.2	36.8	3	14.3	14.2	13.3	5.3	9.2	9.2	9.5	30.9	35.2	39	1.1	3.9	4.9	8.1	9.4	33.5	32	32.1	38	13.7	9.8	34.6	34.1	11.7	27.8	28.2	25.3	2.8
Zinc	dissolved	µg/L	1	14	11	24	18	14	16	13	14	8	39	29	93	13	24	22	31	6	4	10	9	5	3	18	20	18	30	23	21	25	25
Nitrate as N		mg/L	0.01	6.88	0.07	3.51	3.52	0.85	1.63	0.88	0.88	0.34	5.89	5.55	6.86	0.03	0.8	1.77	0.94	0.48	7.74	8.49	8.15	6.98	4.12	1.24	6.59	6.13	0.42	7.91	7.53	7.49	0.38
Total Anions		meq/L	0.01	16.2	10.7	19.1	19.1	25.1	7.32	9.43	9.27	18.1	16	16.2	16.3	17	10.4	7.03	9.18	15.6	16.2	20.8	14.8	16.8	18.6	62.1	16	16	17.6	13.1	13.2	19.5	14.9
Total Cations		meq/L	0.01	13.8	9.11	16.6	16.7	21.8	6.69	8.49	8.49	15.6	14.4	14.8	15	15	9.04	6.23	7.98	14	15.1	19.5	13.5	14.3	17.3	62.5	14.3	14.6	15.7	12.3	12.2	17.8	12.9
Ionic Balance		%	0.01	7.98	8.16	7.01	6.54	7.04	4.51	5.24	4.38	7.35	5.55	4.41	4.15	6.12	7.04	6.09	6.99	5.44	3.46	3.21	4.37	8.05	3.51	0.34	5.61	4.71	5.76	3.08	3.65	4.49	7.04
Bromide		mg/L	0.01	0.632	0.311	1.26	1.22	1.42	0.117	0.407	0.442	0.824	0.636	0.738	0.747	0.624	0.332	0.125	0.466	0.84	0.712	1.35	0.612	0.696	1.55	6.34	0.67	0.739	0.668	0.518	0.56	1.05	0.766
Gross beta		Bq/L	0.1																														
Gross alpha		Bq/L	0.05																														
Gross beta activity - 40K		Bq/L	0.1																														
Radium 226		Bq/L	0.01																														
Radium 228		Bq/L	0.08																														
Iron	dissolved	mg/L	0.05																														
Arsenobetaine (ASB)	dissolved	µg/L	1																														
Arsenious Acid (As (III))	dissolved	µg/L	0.5																														
Dimethylarsenic Acid (DMA)	dissolved	µg/L	1																														
Monomethylarsonic Acid (MMA)	dissolved	µg/L	1																														
Arsenic Acid (As (V))	dissolved	µg/L	0.5																														
Trivalent Chromium	dissolved	mg/L	0.001																														
Hexavalent Chromium	dissolved	mg/L	0.001																														
Ferrous Iron	dissolved	mg/L	0.05																														
Ferric Iron	dissolved	mg/L	0.05																														
Mercury	total	mg/L	0.0001																														
Aluminium	total	µg/L	5	----	691	2630	12500	----	----	----	----	----	----	----	20000	----	----	----	----	3910	----	----	----	----	9030	----	----	----	----	----	----	----	----
Iron	total	µg/L	2	----	3940	4060	19100	----	----	----	----	----	----	----	30300	----	----	----	----	6470	----	----	----	----	13100	----	----	----	----	----	----	----	----
Antimony	total	µg/L	0.2	----	<0.2	0.2	0.4	----	----	----	----	----	----	----	0.2	----	----	----	----	0.2	----	----	----	----	0.3	----	----	----	----	----	----	----	----
Selenium	total	µg/L	0.2	----	0.2	1.6	1.4	----	----	----	----	----	----	----	2.9	----	----	----	----	0.4	----	----	----	----	1.4	----	----	----	----	----	----	----	----
Arsenic	total	µg/L	0.2	----	7.2	6.2	11.7	----	----	----	----	----	----	----	36	----	----	----	----	2.2	----	----	----	----	10.9	----	----	----	----	----	----	----	----
Barium	total	µg/L	0.5	----	181	490	565	----	----	----	----	----	----	----	298	----	----	----	----	69.8	----	----	----	----	494	----	----	----	----	----	----	----	----
Beryllium	total	µg/L	0.1	----	<0.1	<0.1	0.4	----	----	----	----	----	----	----	1	----	----	----	----	0.6	----	----	----	----	0.3	----	----	----	----	----	----	----	----
Boron	total	µg/L	5	----	133	288	257	----	----	----	----	----	----	----	552	----	----	----	----	302	----	----	----	----	231	----	----	----	----	----	----	----	----
Bismuth	total	µg/L	0.05	----	<0.05	<0.05	0.16	----	----	----	----	----	----	----	0.24	----	----	----	----	0.22	----	----	----	----	0.13	----	----	----	----	----	----	----	----
Cadmium	total	µg/L	0.05	----	<0.05	<0.05	<0.05	----	----	----	----	----	----	----	0.13	----	----	----	----	0.21	----	----	----	----	<0.05	----	----	----	----	----	----	----	----
Chromium	total	µg/L	0.2	----	5.6	14.4	61.3	----	----	----	----	----	----	----	233	----	----	----	----	11.7	----	----	----	----	41.4	----	----	----	----	----	----	----	----
Cobalt	total	µg/L	0.1	----	6.7	2.1	11.2	----	----	----	----	----	----	----	30.7	----	----	----	----	1	----	----	----	----	7	----	----	----	----	----	----	----	----
Copper	total	µg/L	0.5	----	1.1	3.5	13.9	----	----	----	----	----	----	----	60.1	----	----	----	----	5.6	----	----	----	----	12	----	----	----	----	----	----	----	----
Lead	total	µg/L	0.1	----	0.3	1.2	5.9	----	----	----	----	----	----	----	10.5	----	----	----	----	1.9	----	----	----	----	3.8	----	----	----	----	----	----	----	----
Lithium	total	µg/L	0.5	----	8.8	28.5	34.4	----	----	----	----	----	----	----	50.6	----	----	----	----	52.2	----	----	----	----	27.8	----	----	----	----	----	----	----	----
Manganese	total	µg/L	0.5	----	728	74.6	338	----	----	----	----	----	----	----	1250	----	----	----	----	55.2	----	----	----	----	156	----	----	----	----	----	----	----	----
Molybdenum	total	µg/L	0.1	----	1.2	1.2	1	----	----	----	----	----	----	----	6.5	----	----	----	----	3.6	----	----	----	----	1.1	----	----	----	----	----	----	----	----
Nickel	total	µg/L	0.5	----	7.8	8.4	41.8	----	----	----	----	----	----	----	109	----	----	----	----	7.3	----	----	----	----	32.3	----	----	----	----	----	----	----	----
Silver	total	µg/L	0.1	----	<0.1	<0.1	0.3	----	----	----	----	----	----	----	<0.1	----	----	----	----	0.4	----	----	----	----	<0.1	----	----	----	----	----	----	----	----
Strontium	total	µg/L	1	----	492	909	969	----	----	----	----	----	----	----	778	----	----	----	----	549	----	----	----	----	1040	----	----	----	----	----	----	----	----
Thallium	total	µg/L	0.02	----	<0.02	0.02	0.09	----	----	----	----	----	----	----	0.36	----	----	----	----	0.11	----	----	----	----	0.06	----	----	----	----	----	----	----	----
Thorium	total	µg/L	0.1	----	0.1	0.7	3.8	----	----	----	----	----	----	----	9.9	----	----	----	----	2.7	----	----	----	----	3.3	----	----	----	----	----	----	----	----
Tin	total	µg/L	0.2	----	<0.2	0.6	0.3	----	----	----	----	----	----	----	0.4	----	----	----	----	<0.2	----	----	----	----	0.3	----	----	----	----	----	----	----	----
Titanium	total	µg/L	1	----	8	29	106	----	----	----	----	----	----	----	494	----	----	----	----	61	----	----	----	----	107	----	----	----	----	----	----	----	----
Uranium	total	µg/L	0.05	----	11.7	27.6	28.8	----	----	----	----	----	----	----	48.6	----	----	----	----	22.2	----	----	----	----	24.4	----	----	----	----	----	----	----	----
Vanadium	total	µg/L	0.2	----	9.7	21.1	42.9	----	----	----	----	----	----	----	114	----	----	----	----	20.1	----	----	----	----	34	----	----	----	----	----	----	----	----
Zinc	total	µg/L	1	----	8	12	37	----	----	----	----	----	----	----	119	----	----	----	----	26	----	----	----	----	35	----	----	----	----	----	----	----	----
Tellurium	total	µg/L	0.2	----	<0.2	<0.2	<0.2	----	----	----	----	----	----	----	<0.2	----	----	----	----	<0.2	----	----	----	----	<0.2	----	----	----	----	----	----	----	----

Appendix E

Transient Dewatering Cross Sections

Groundwater Level 1 year after start dewatering



progressive pit outline

ground surface

base of saprolite

water table

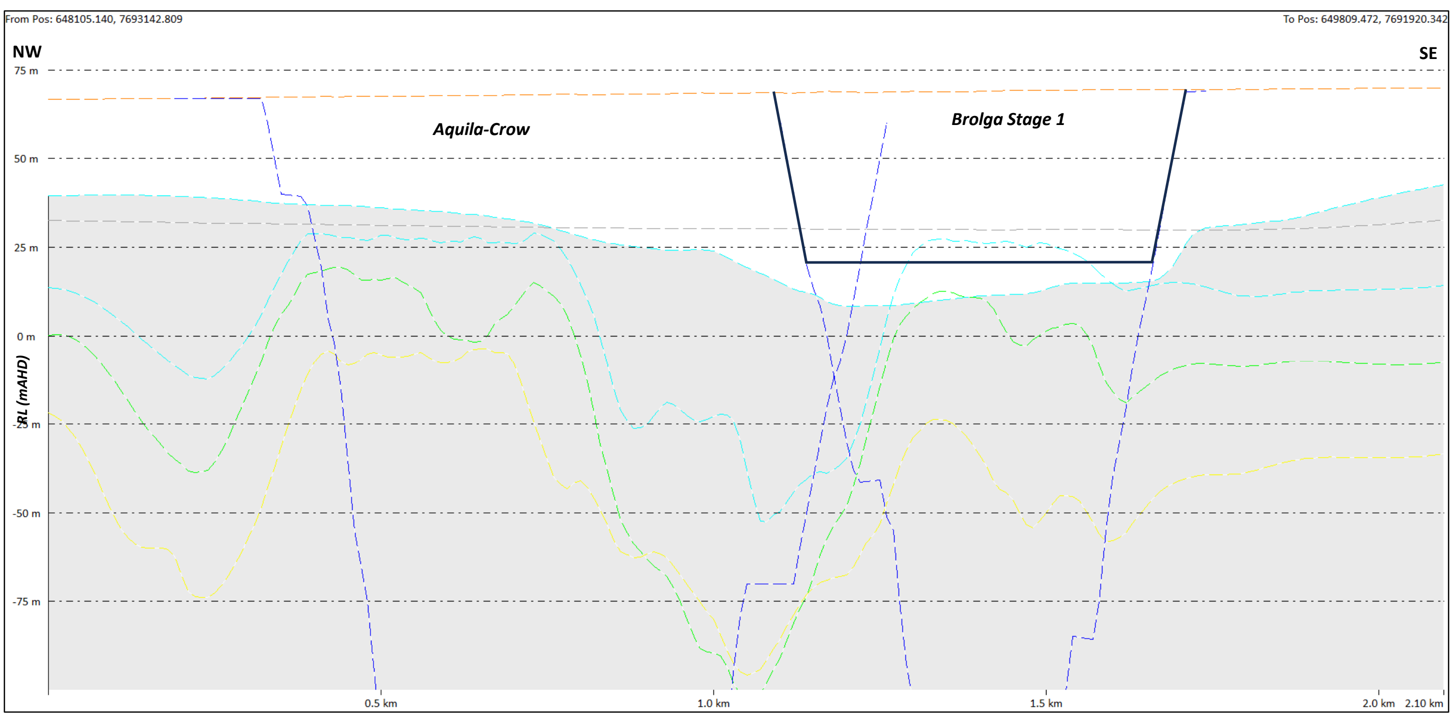
base of saprock

saturated zone

base of alluvium

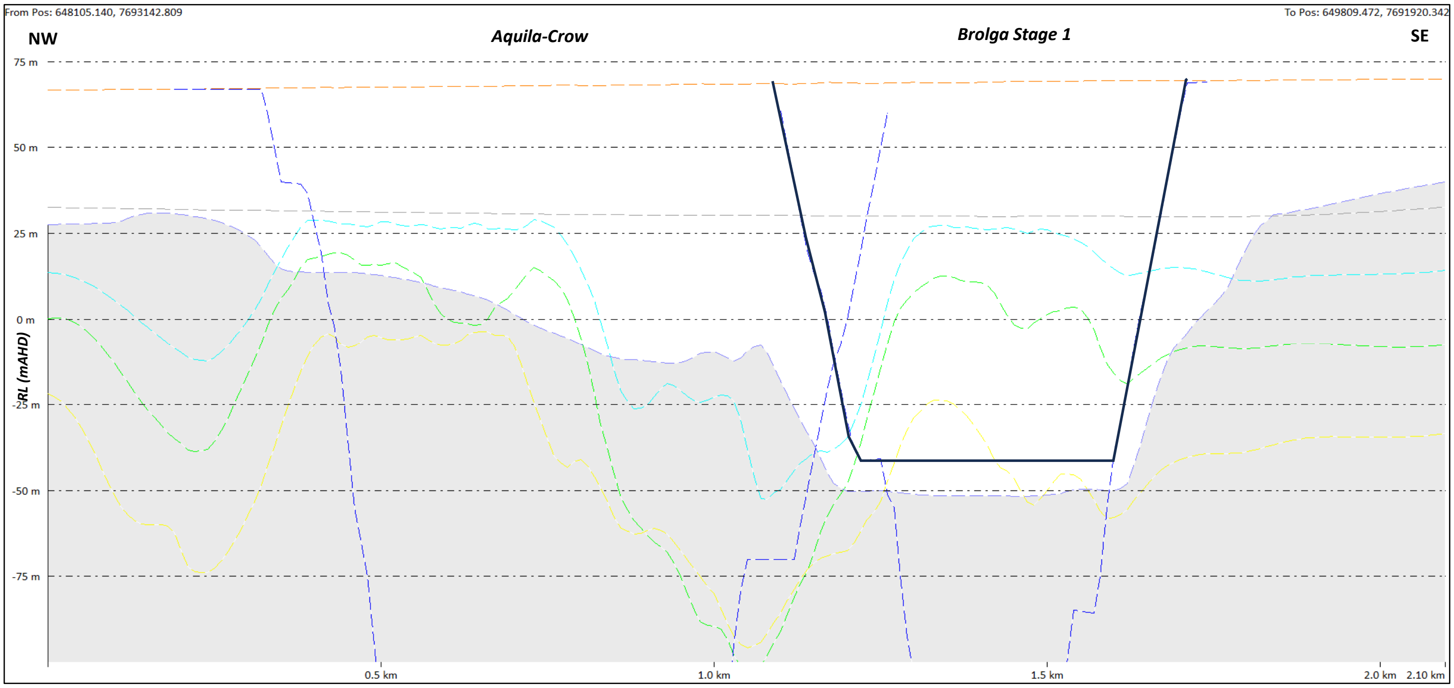
base of slightly weathered (top of fresh) rock

Groundwater Level 2 years after start dewatering



Client	DE GREY MINING LTD	Brolga Stage 1 - Crow Dewatering Section Yr 1 & Yr 2	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	E-1	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference

Groundwater Level 3 years after start dewatering



progressive pit outline

ground surface

base of saprolite

water table

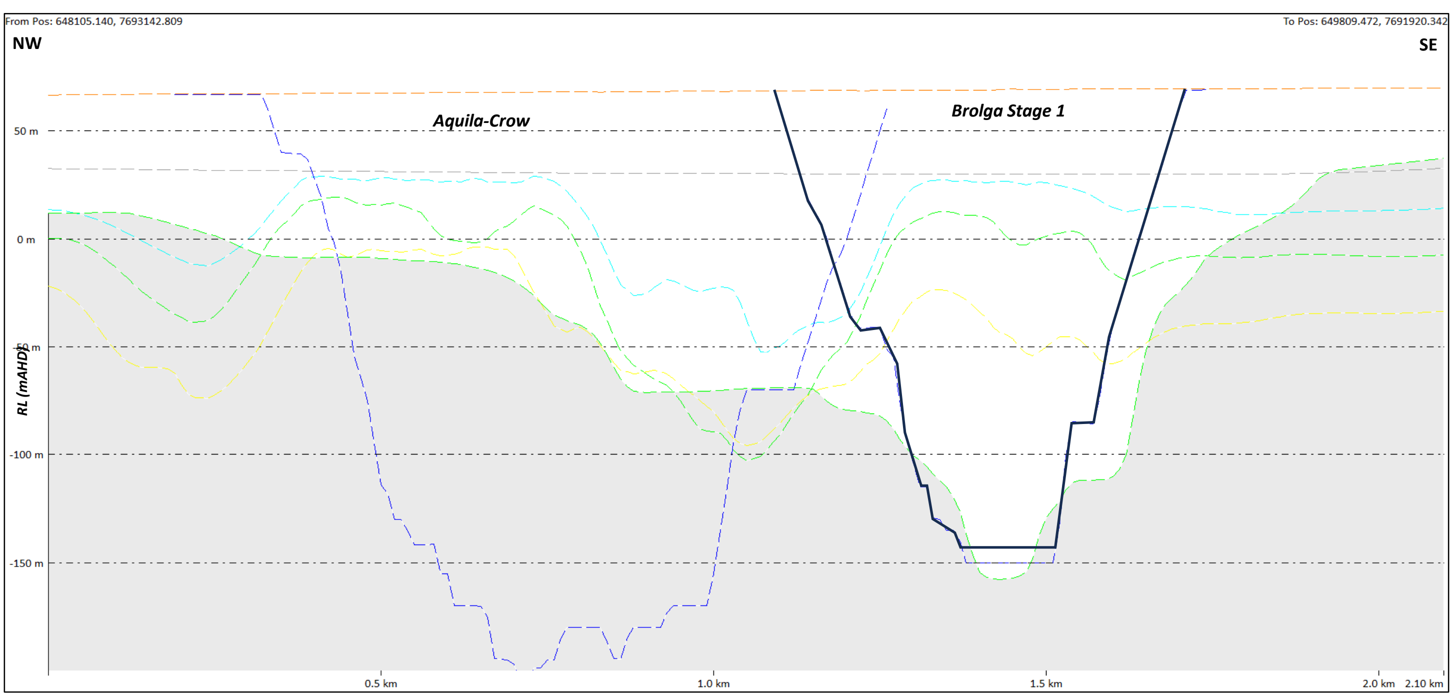
base of saprock

saturated zone

base of alluvium

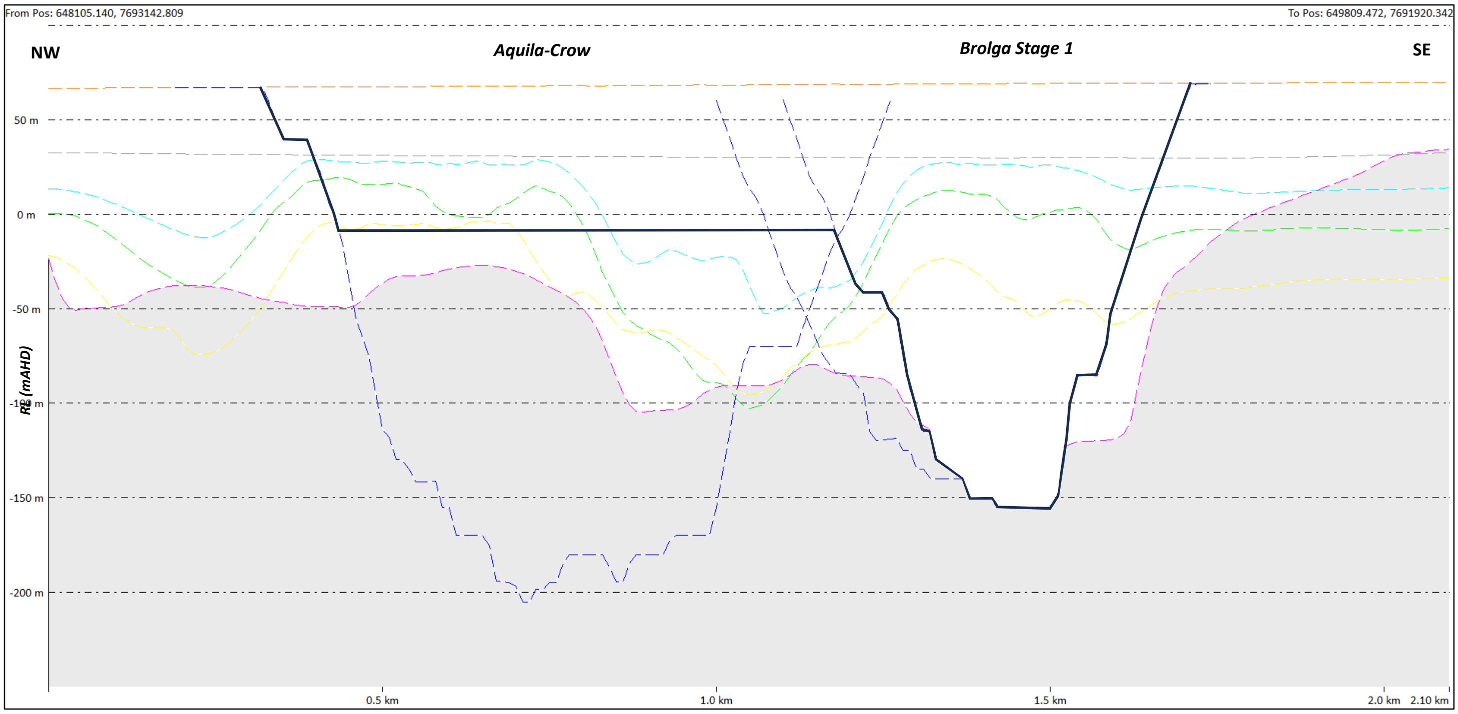
base of slightly weathered (top of fresh) rock

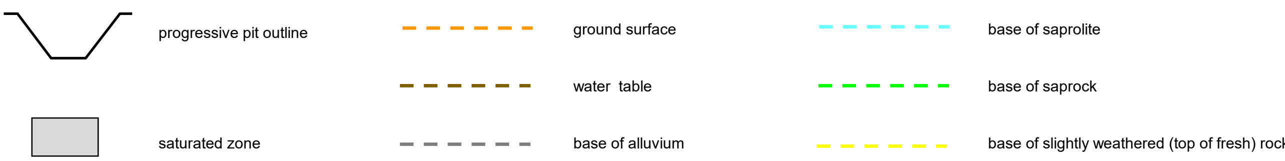
Groundwater Level 5 years after start dewatering



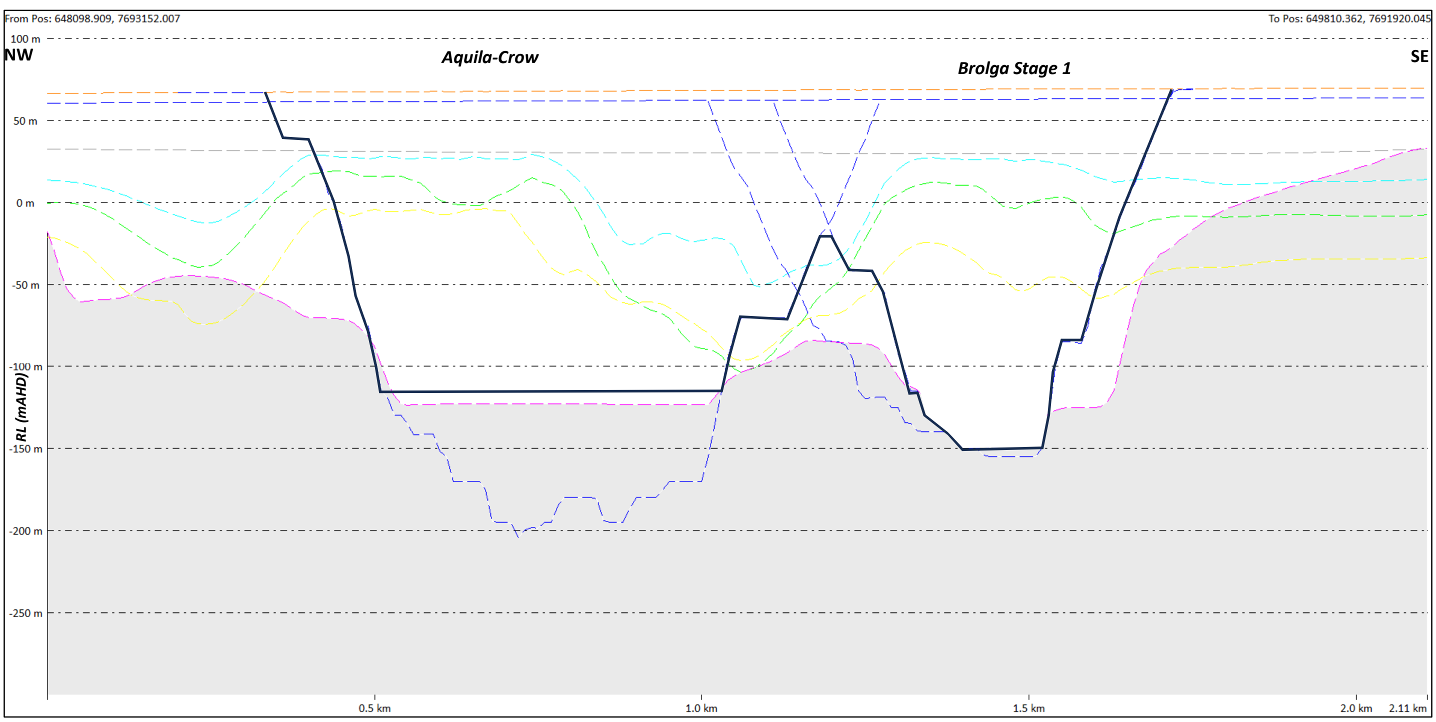
Client	*DE GREY MINING LTD*	**Brolga Stage 1 - Crow Dewatering Section Yr 3 & Yr 5**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**E-2**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference

Groundwater Level 9 years after start dewatering



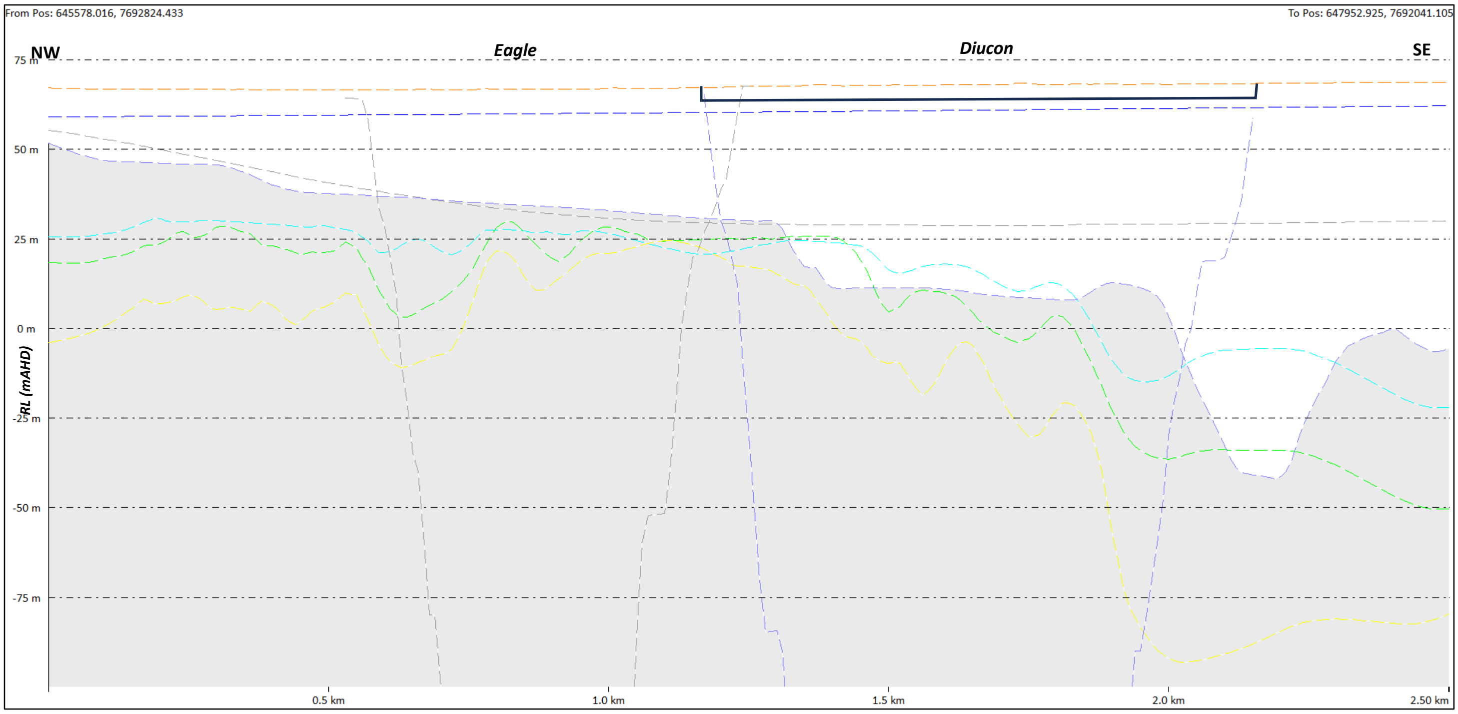


Groundwater Level 11 years after start dewatering



Client	*DE GREY MINING LTD*	**Brolga Stage 1 - Crow Dewatering Section Yr 9 & Yr 11**		Plan Title
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***		**E-3**	Plan Number
Geowater CONSULTING	A4P			
	Project #	1006-001		File reference

Groundwater Level 3 years after start dewatering



progressive pit outline

ground surface

base of saprolite

water table

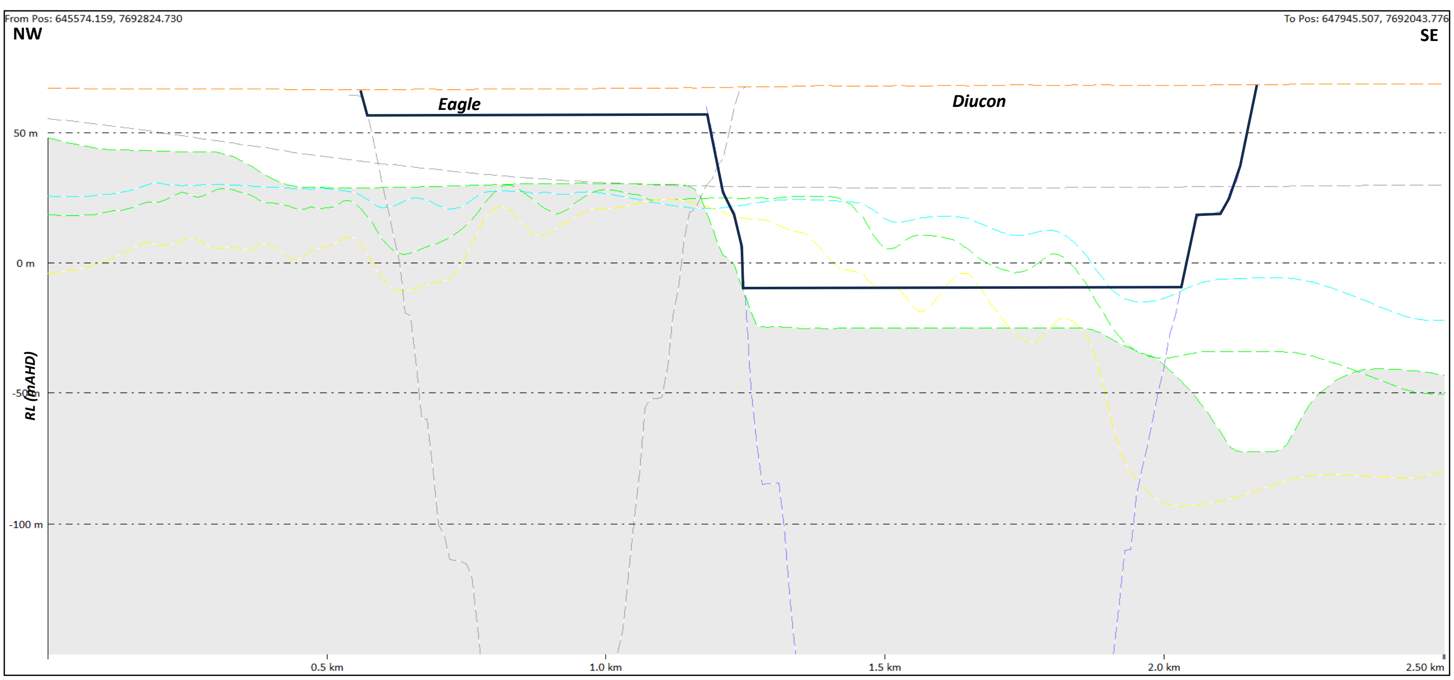
base of saprock

saturated zone

base of alluvium

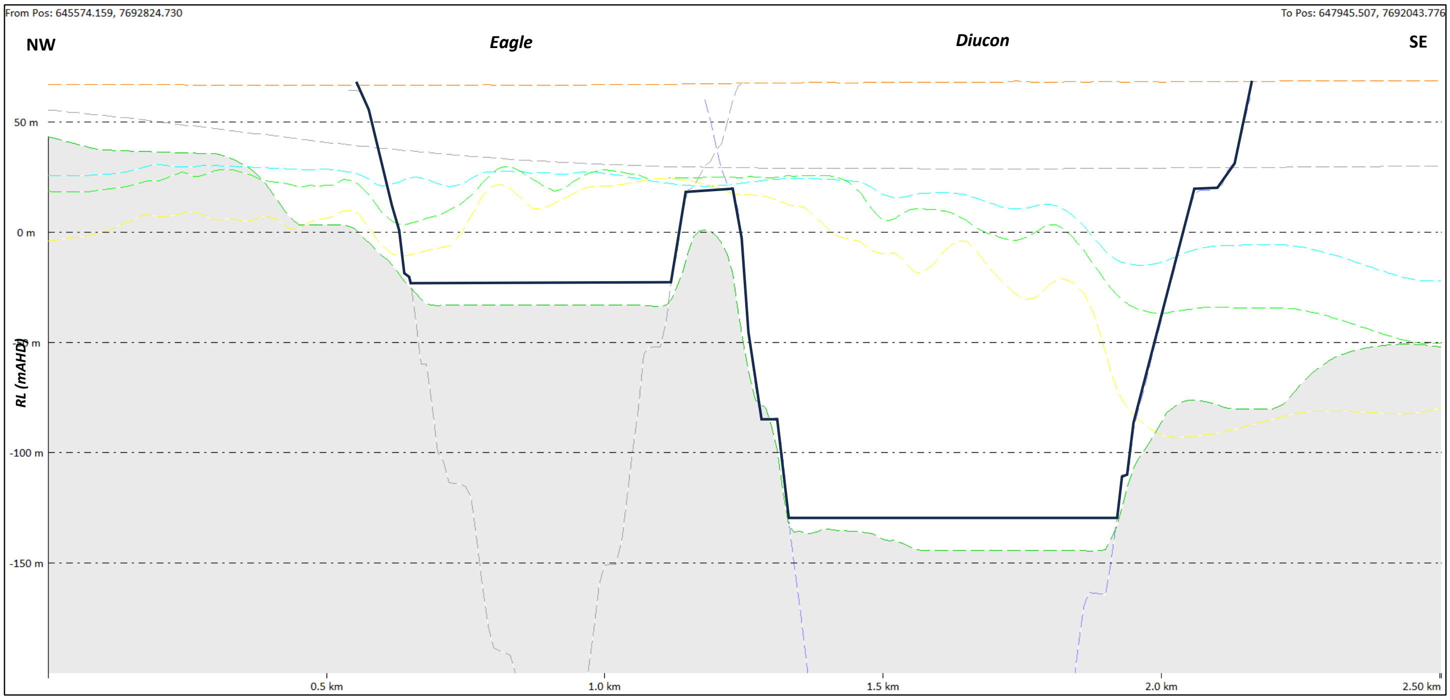
base of slightly weathered (top of fresh) rock

Groundwater Level 5 years after start dewatering



Client	*DE GREY MINING LTD*	**Diucon - Eagle Dewatering Section Yr 3 & Yr 5**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**E-4**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference

Groundwater Level 7 years after start dewatering



progressive pit outline

ground surface

base of saprolite

water table

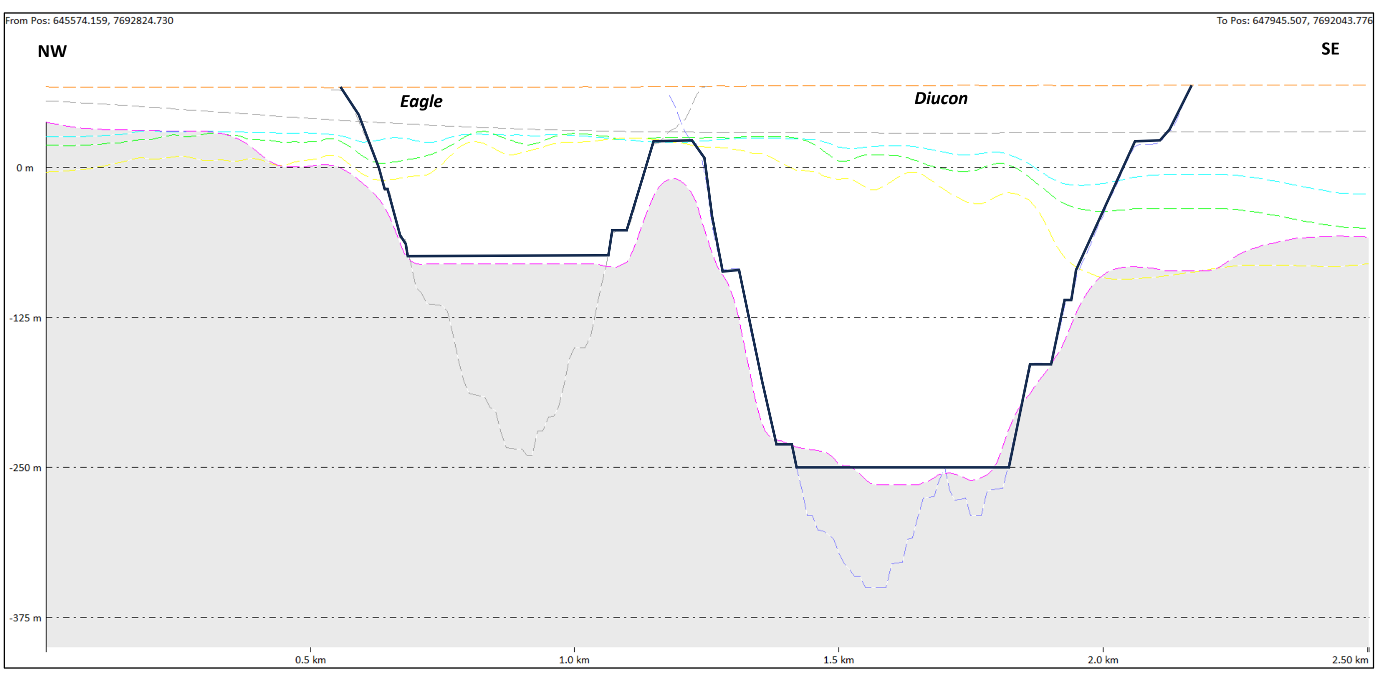
base of saprock

saturated zone

base of alluvium

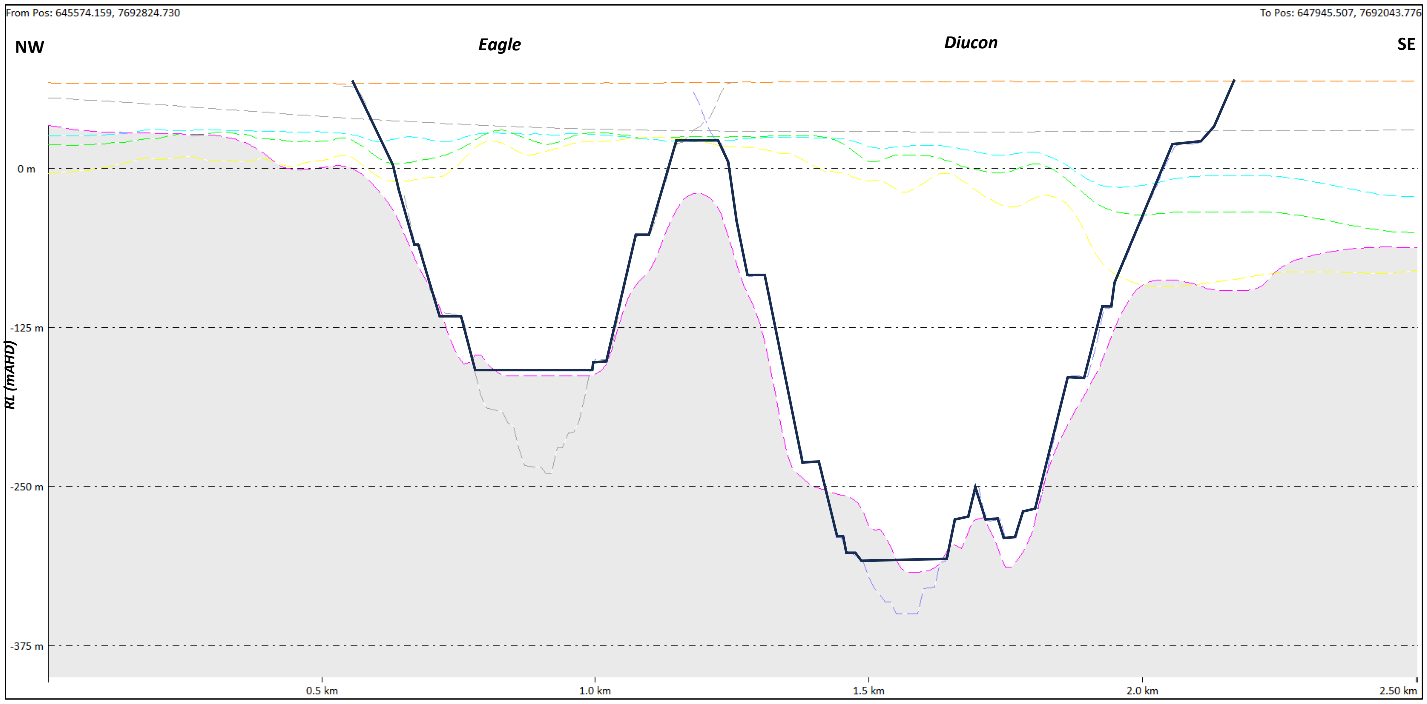
base of slightly weathered (top of fresh) rock

Groundwater Level 9 years after start dewatering



Client	*DE GREY MINING LTD*	**Diucon - Eagle Dewatering Section Yr 7 & Yr 9**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**E-5**	**Plan Number**
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference

Groundwater Level 11 years after start dewatering



progressive pit outline

ground surface

base of saprolite

water table

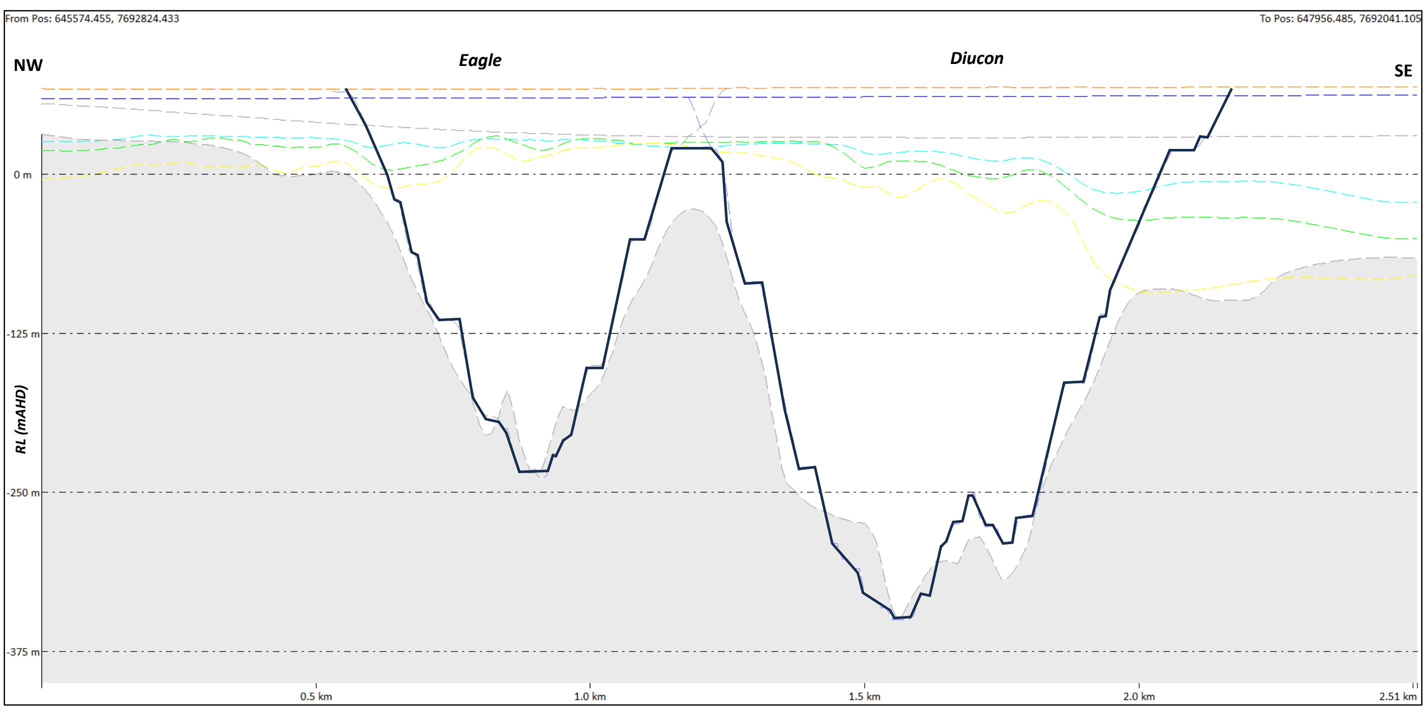
base of saprock

saturated zone

base of alluvium

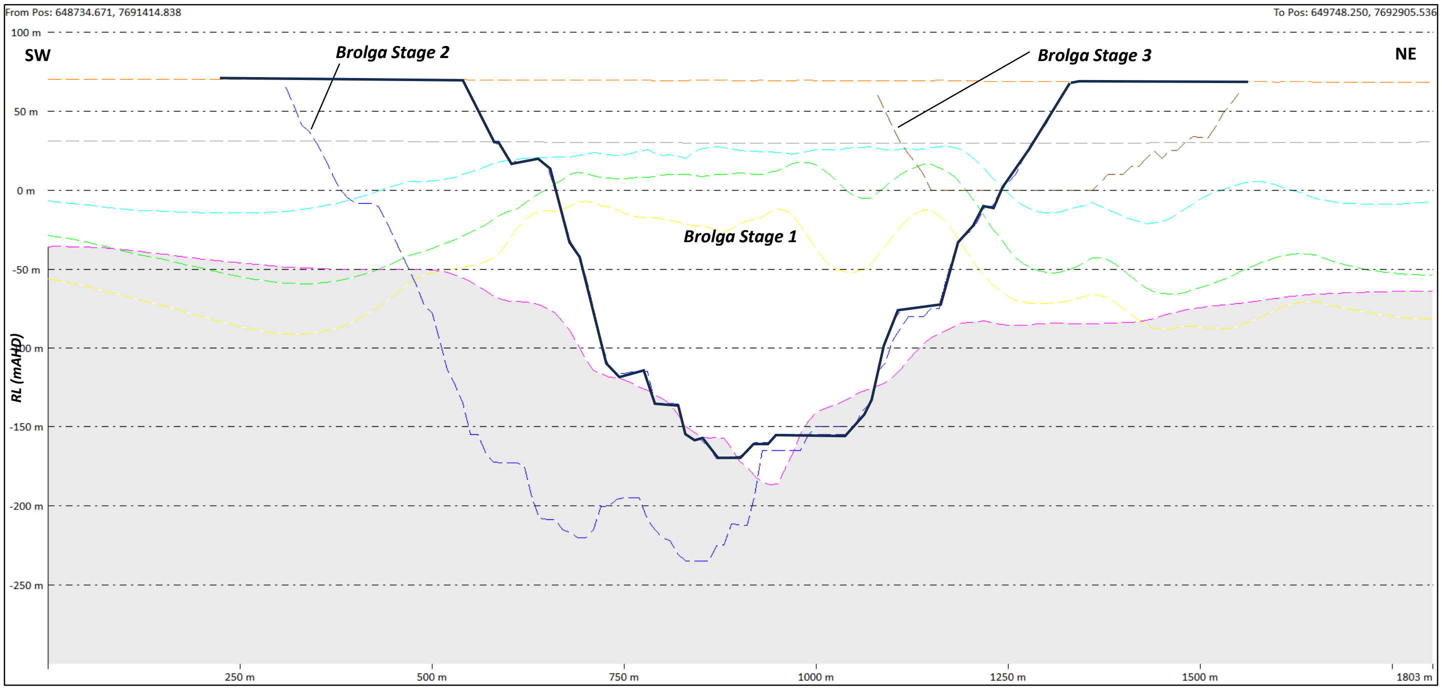
base of slightly weathered (top of fresh) rock

Groundwater Level 13 years after start dewatering



Client	*DE GREY MINING LTD*	**Diucon - Eagle Dewatering Section Yr 11 & Yr 13**	Plan Title
Project	*HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT*	**E-6**	Plan Number
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference

Groundwater Level 9 years after start dewatering



progressive pit outline

saturated zone

ground surface

water table

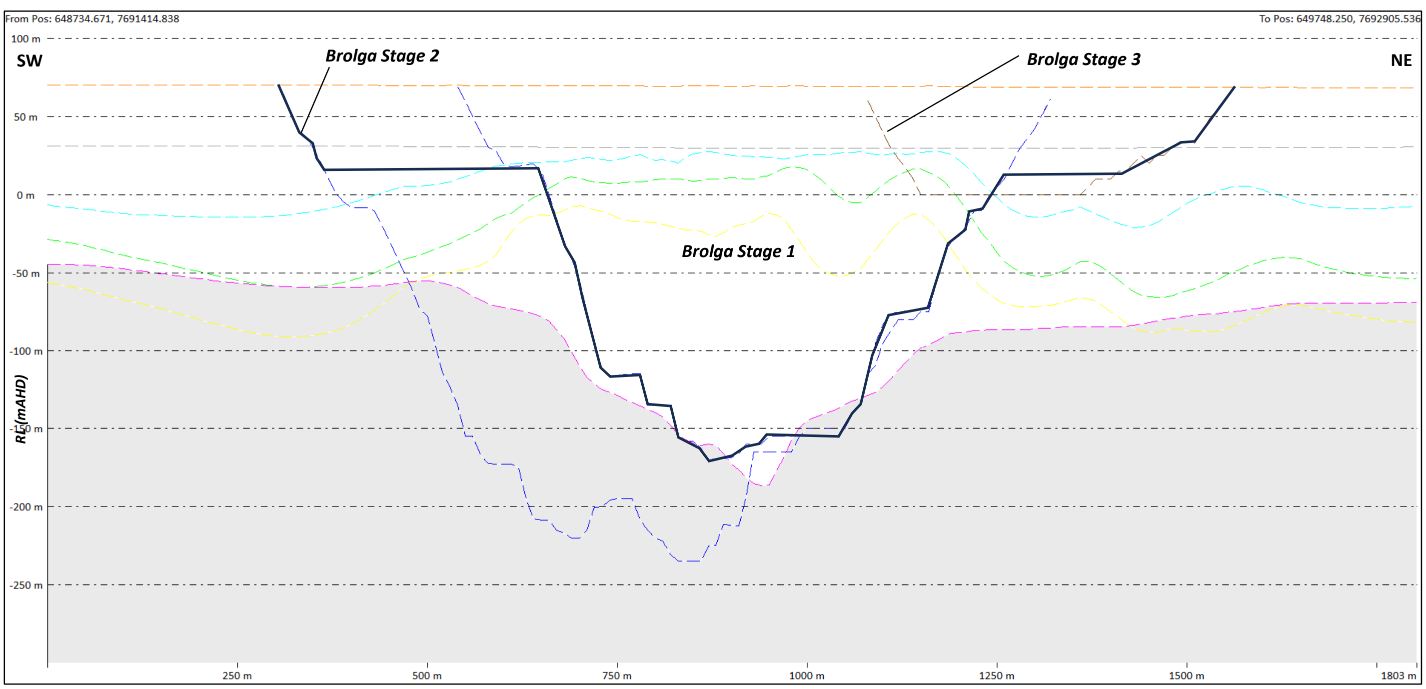
base of alluvium

base of saprolite

base of saprock

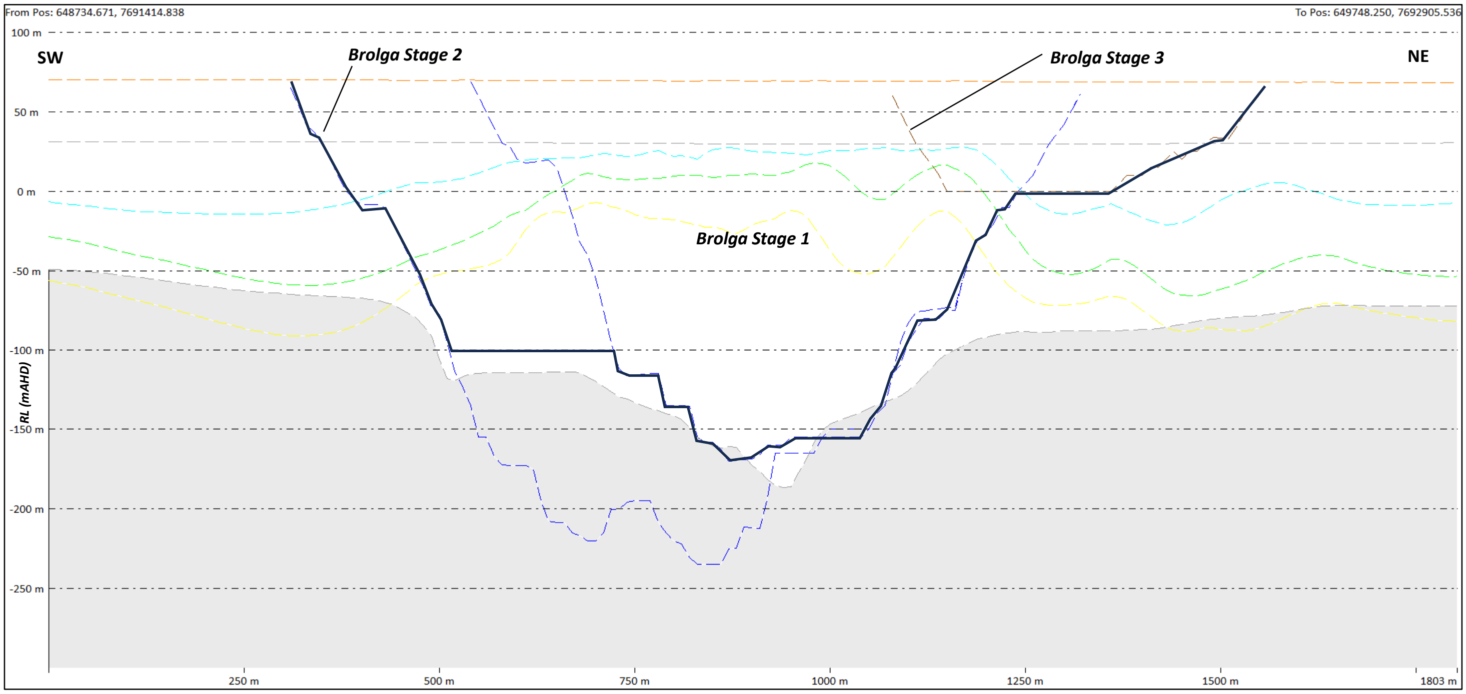
base of slightly weathered (top of fresh) rock

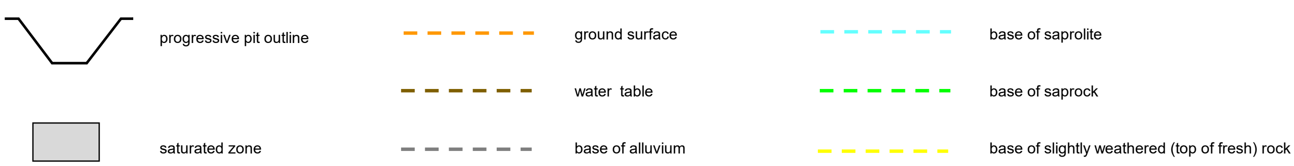
Groundwater Level 11 years after start dewatering



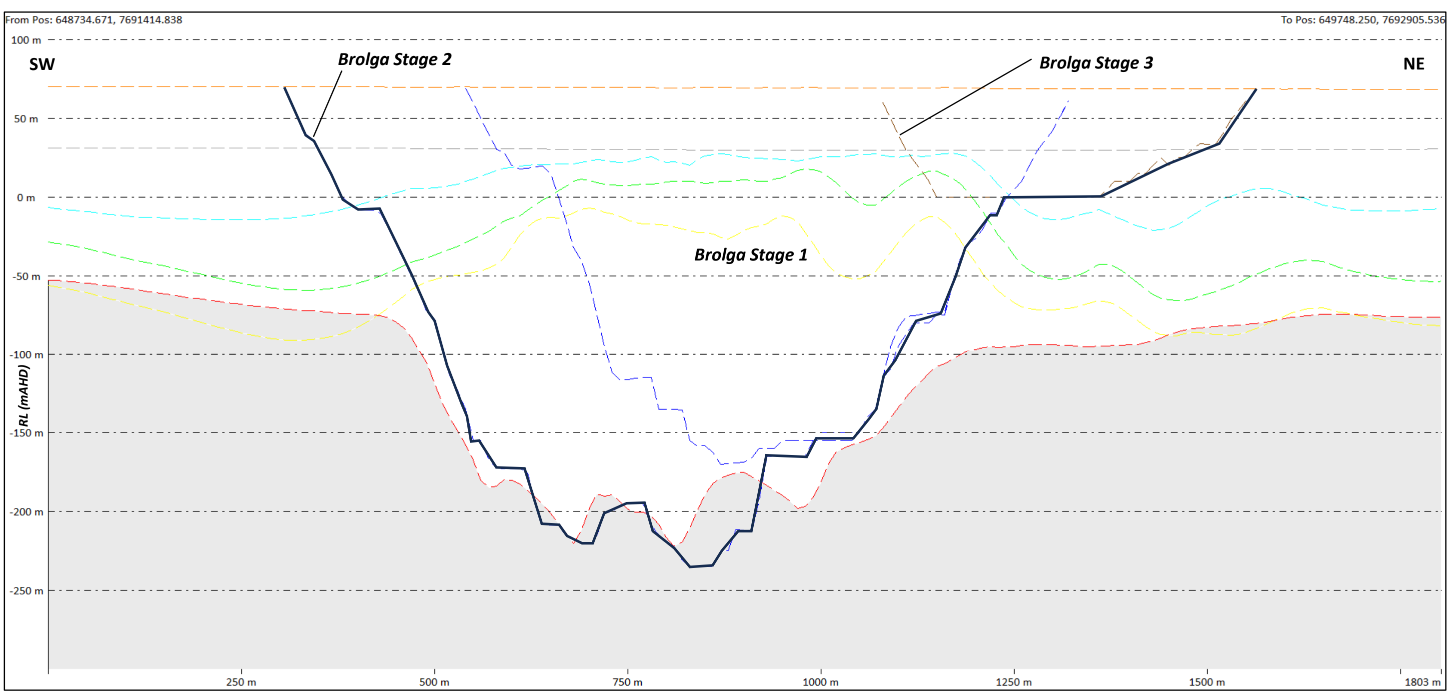
Client	DE GREY MINING LTD	Brolga Stages 1-2-3 Yr 9 & Yr 11	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	E-7	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference

Groundwater Level 13 years after start dewatering



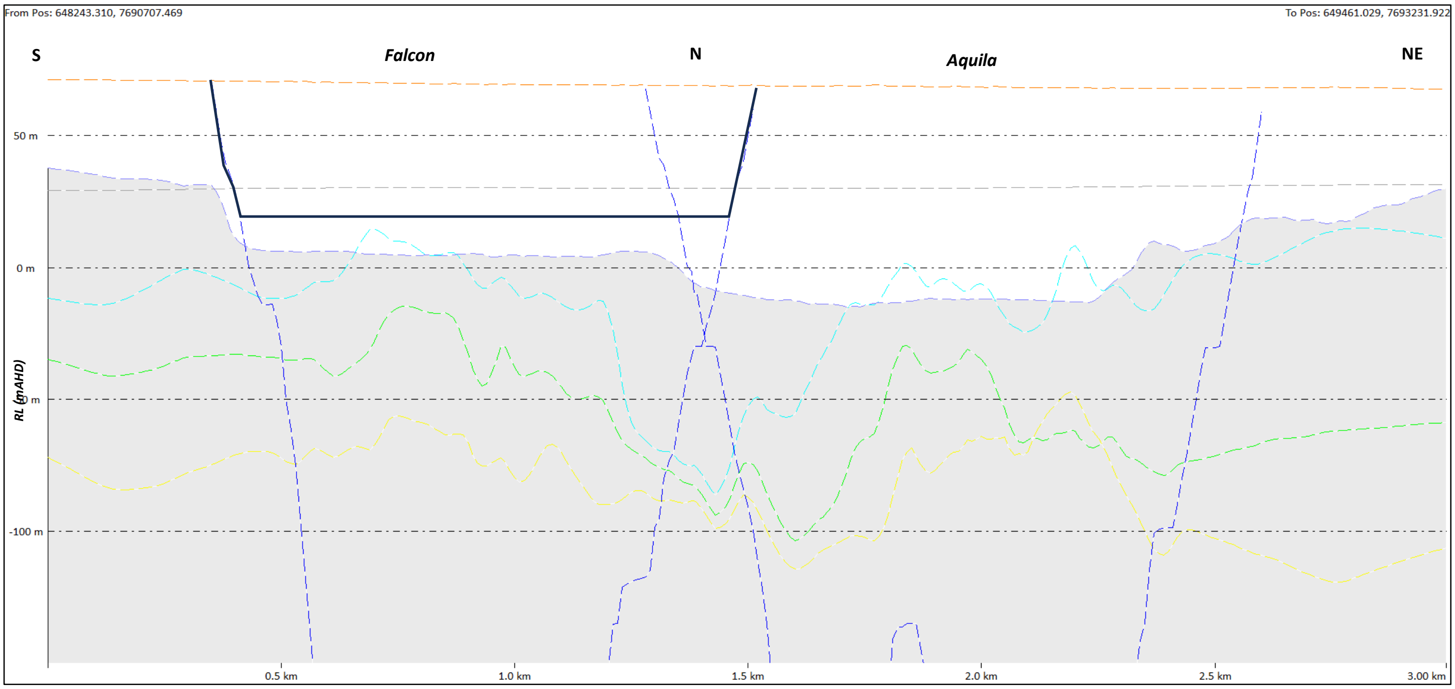


Groundwater Level 15.5 years after start dewatering



Client	*DE GREY MINING LTD*	**Brolga Stages 1-2-3 Yr 13 & Yr 15.5**	Plan Title
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***	**E-8**	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference

Groundwater Level 3 years after start dewatering



progressive pit outline

ground surface

base of saprolite

water table

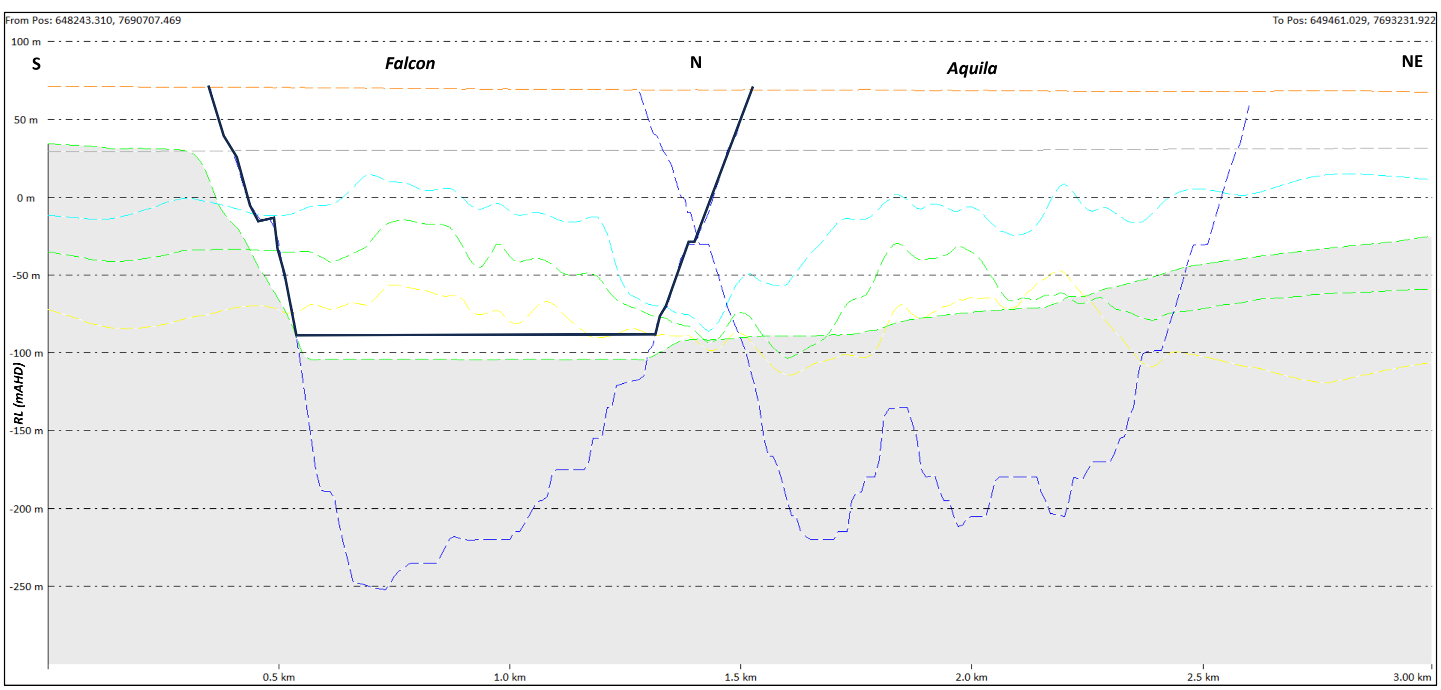
base of saprock

saturated zone

base of alluvium

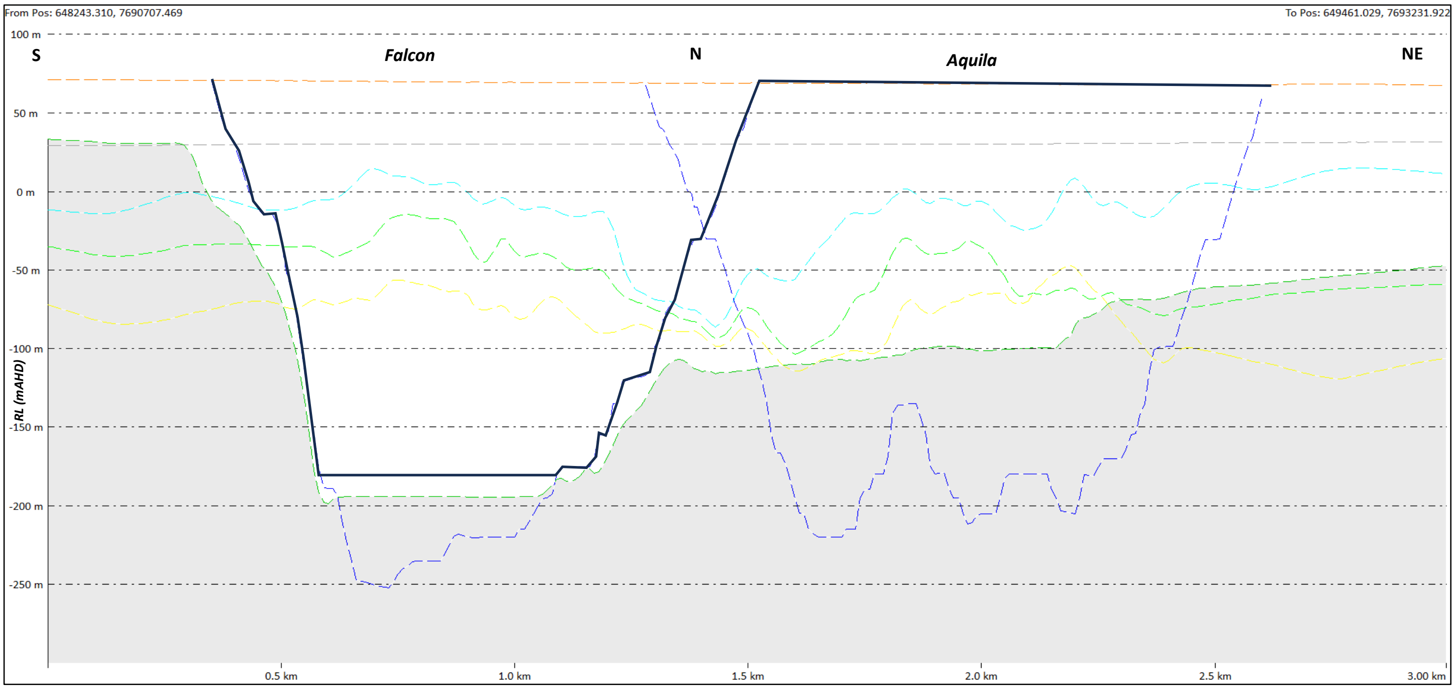
base of slightly weathered (top of fresh) rock

Groundwater Level 5 years after start dewatering



Client	*DE GREY MINING LTD*			**Falcon - Aquila Yr 3 & Yr 5**	**Plan Title**
Project	***HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT***			**E-9**	**Plan Number**
Geowater CONSULTING	A4P				
	Project #	1006-001			File reference

Groundwater Level 7 years after start dewatering

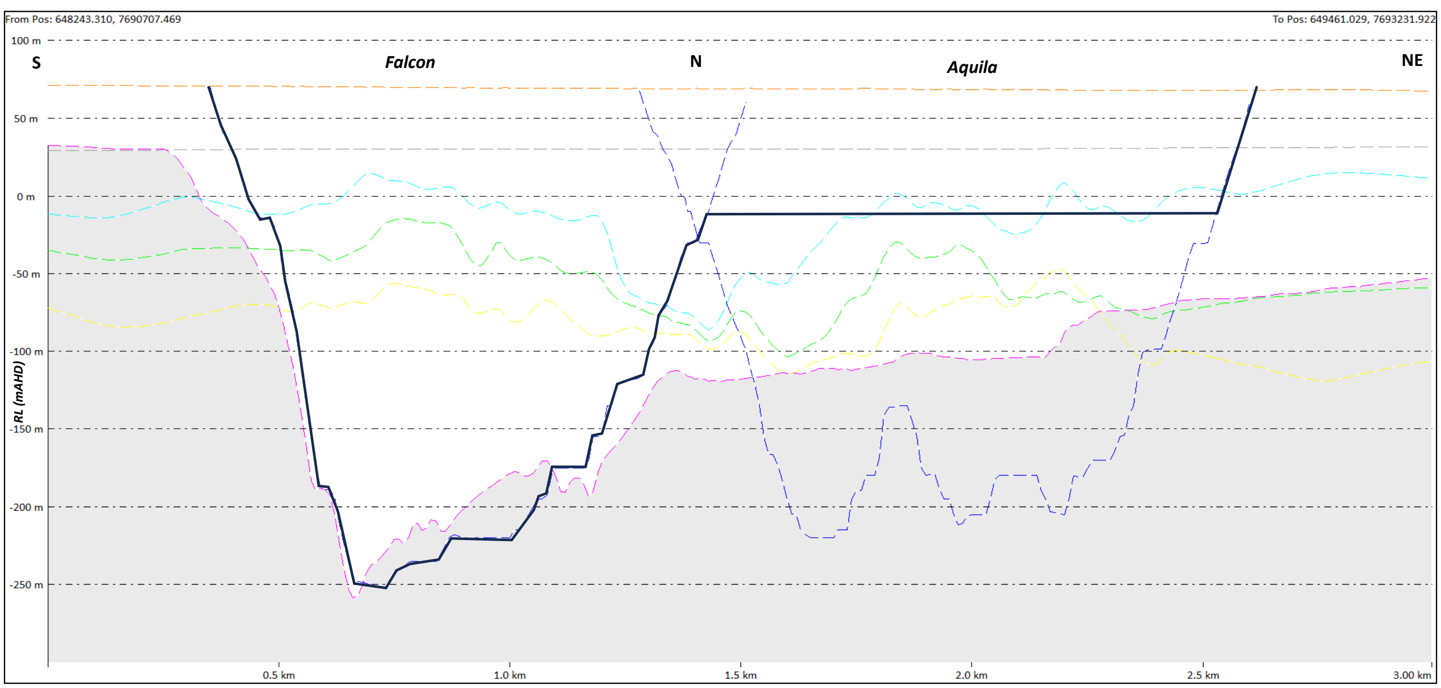


progressive pit outline | ground surface | base of saprolite

water table | base of saprock

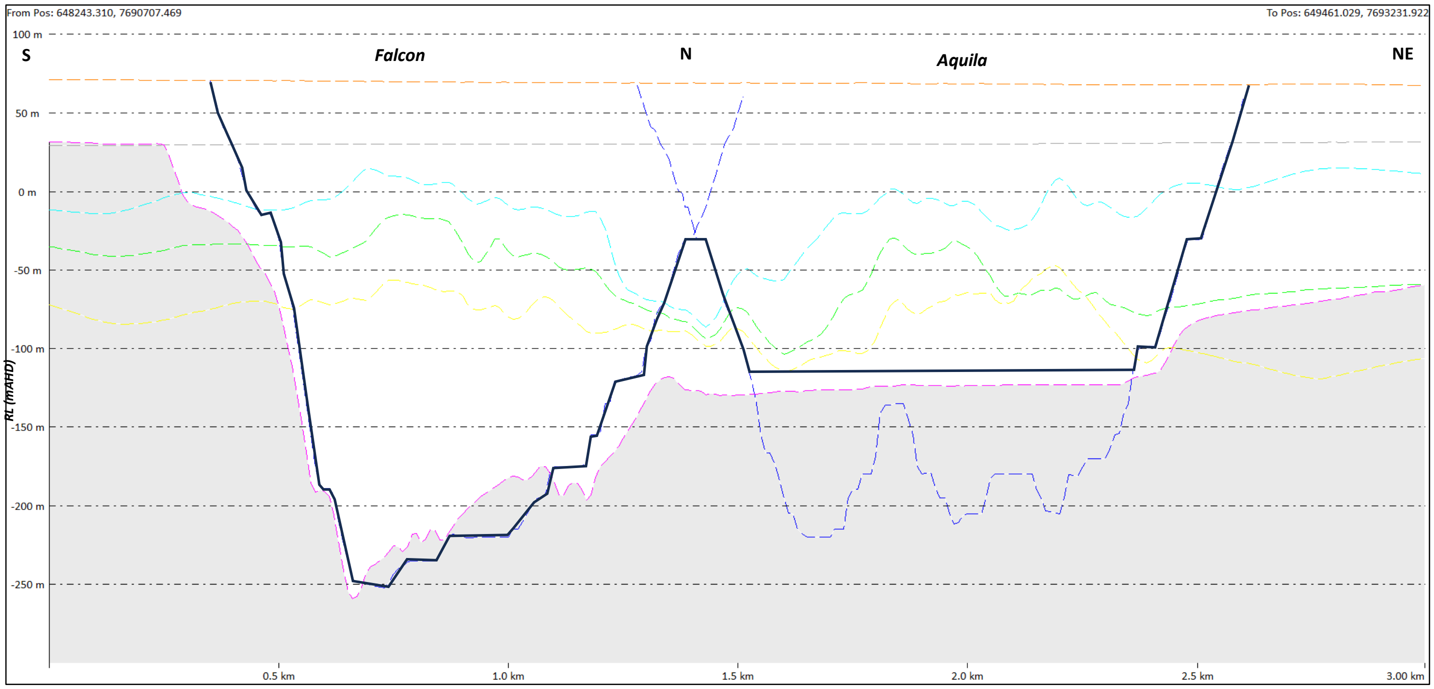
saturated zone | base of alluvium | base of slightly weathered (top of fresh) rock

Groundwater Level 9 years after start dewatering



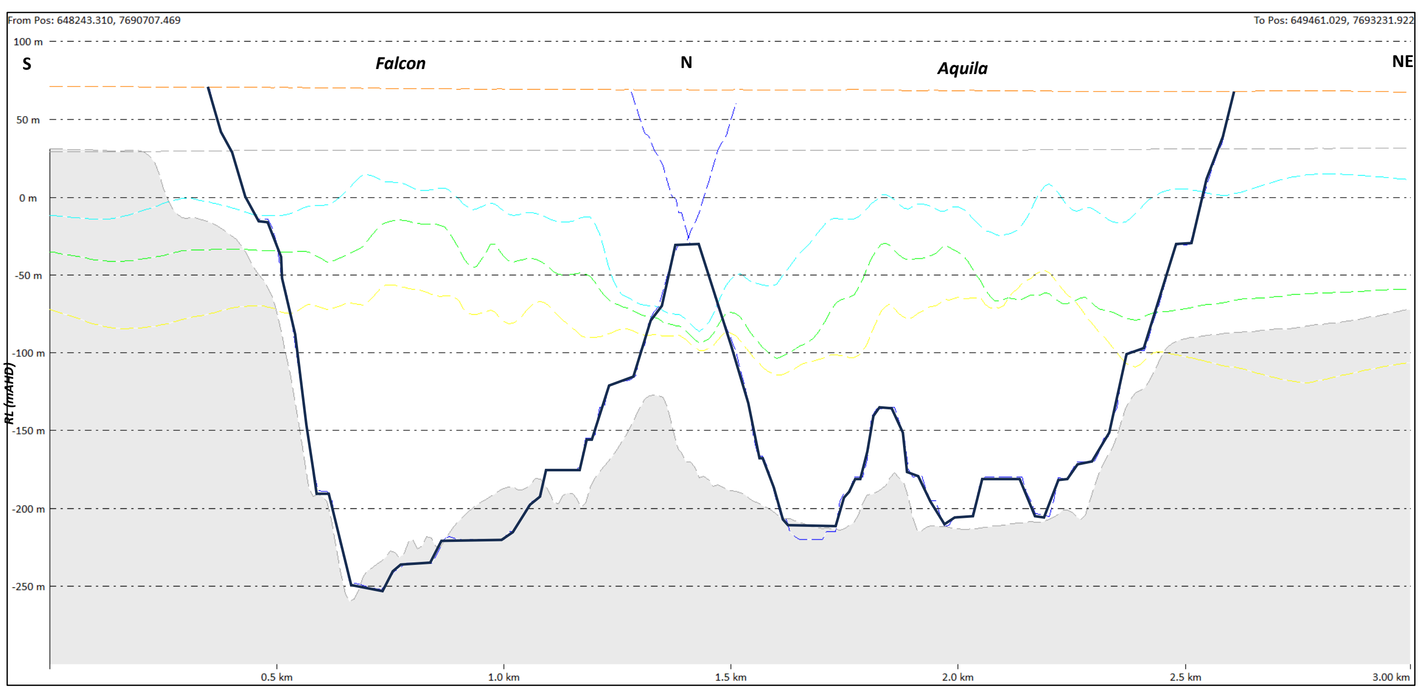
Client	DE GREY MINING LTD	Falcon - Aquila Yr 7 & Yr 9	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	E-10	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference

Groundwater Level 11 years after start dewatering



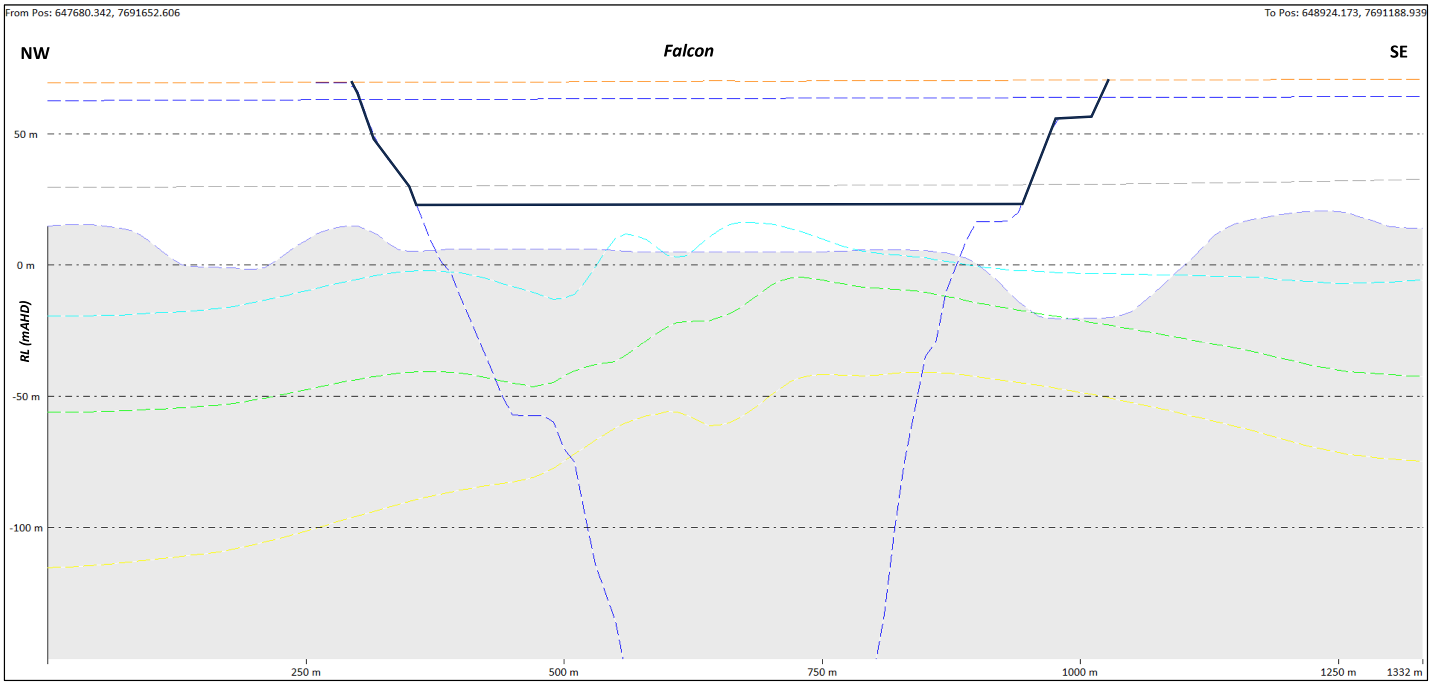
progressive pit outline	ground surface	base of saprolite
	water table	base of saprock
saturated zone	base of alluvium	base of slightly weathered (top of fresh) rock

Groundwater Level 13 years after start dewatering



Client	DE GREY MINING LTD	Falcon - Aquila Yr 11 & Yr 13	Plan Title
Project	HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT	E-11	Plan Number
Geowater CONSULTING	A4P		
	Project # 1006-001		File reference

Groundwater Level 3 years after start dewatering



progressive pit outline

ground surface

base of saprolite

water table

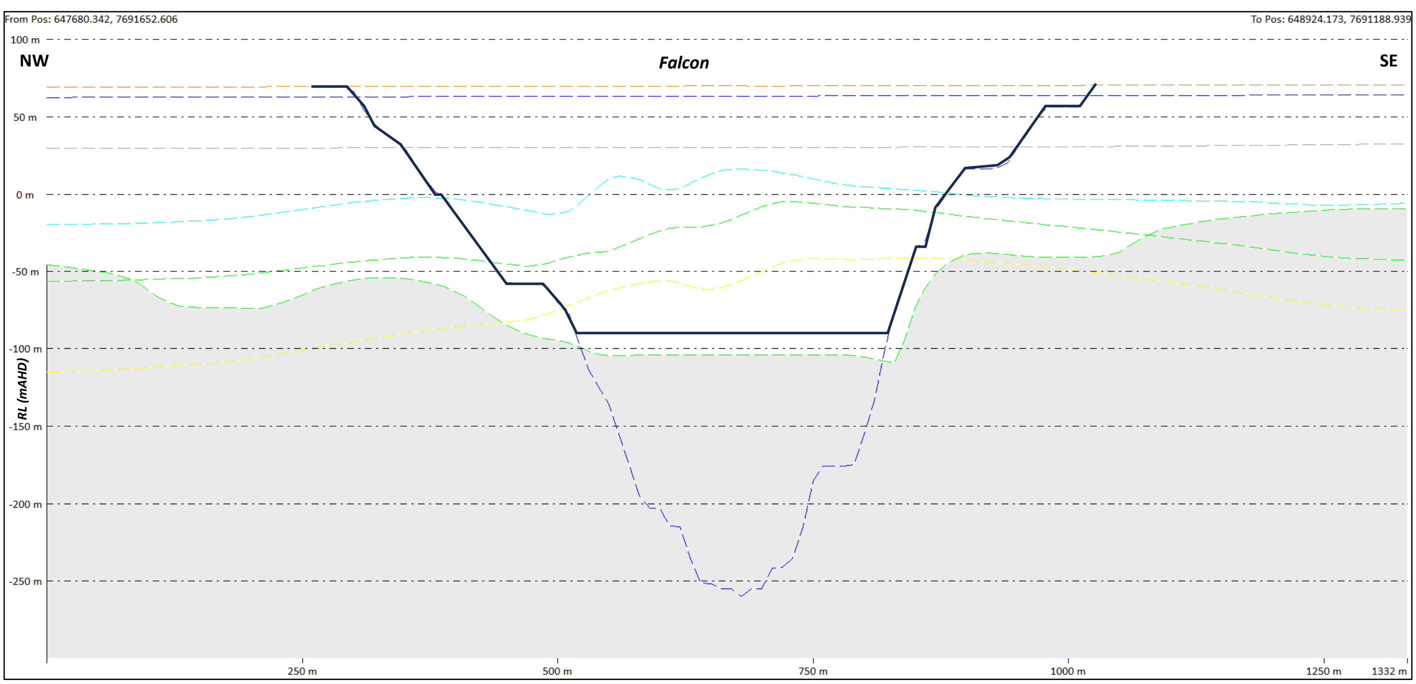
base of saprock

saturated zone

base of alluvium

base of slightly weathered (top of fresh) rock

Groundwater Level 5 years after start dewatering



Client	*DE GREY MINING LTD*	**Falcon - Yr 3 & Yr 5**	Plan Title
Project	*HEMI GOLD PROJECT DFS - CONCEPTUAL AND NUMERICAL GROUNDWATER MODELLING REPORT*	**E-12**	Plan Number
Geowater CONSULTING	A4P		
	Project #	1006-001	File reference