## Supplier Document Review Cover Sheet

| PROJECT TITLE | Mulga Downs Feasibility Study |
|---|---|

| CONTRACT/PO NUMBER | PO-9000001549 | SUPPLIER/CONTRACTOR | AQ2 |
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| G17 | 2 | MDM-32200-OM-PHL-0002 | 0 | 05-May-2025 |

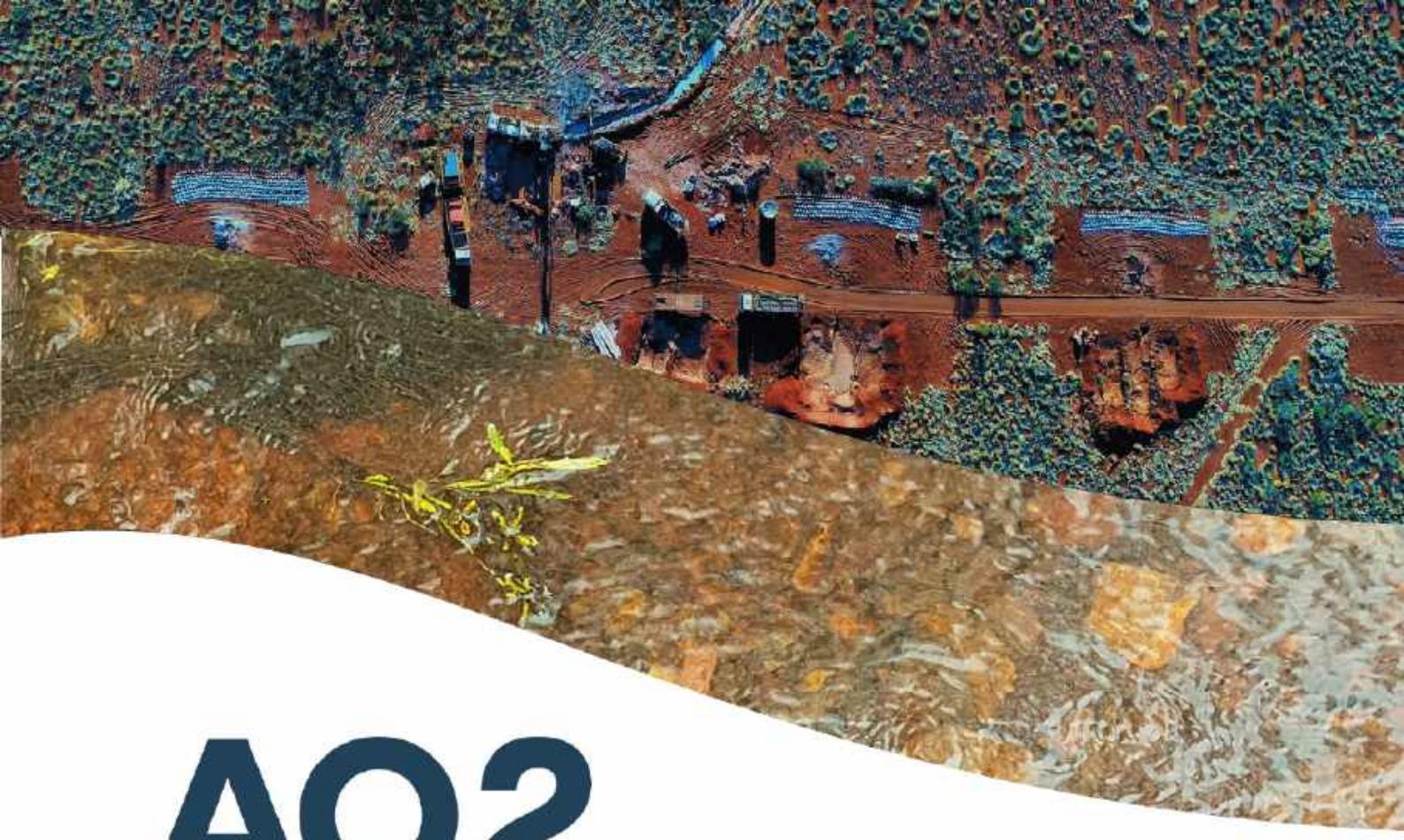
| DOCUMENT TITLE |
|---|
| Mulga Downs: Groundwater Operating Strategy |

# ***Document Review Status***

| | | |
|---|---|---|
| **S1** | **No Comments** | ☐ |
| **S2** | **Comments as Noted,<br>Revise & Resubmit Within 10 Working Days** | ☐ |
| **S3** | **Not Reviewed, Information Only** | ☐ |
| **S4** | **Not suitable for Review,<br>Revise & Resubmit Within 10 Working Days** | ☐ |

*Review of the document does not relieve the Contractor/Supplier of its responsibility for the due and proper performance of the Works in accordance with the Contract.*

**ADDITIONAL COMMENTS**



# Groundwater Operating Strategy
# Mulga Downs Iron Ore Project

Prepared for:

HanRoy Iron Ore Pty Ltd

May 2025

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| | | | |
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| Date: | 5 May 2025 | | |
| AQ2 Ref: | F:\171\3.C&R\Reports\532_GWOS\Rev 0\171W_532c.docx | | |

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## Tables



## Figures

# APPROVAL OF OPERATING STRATEGY

This Groundwater Operating Strategy details management commitments for Groundwater Licence (GWL) ##### and any subsequent amendments.

Name of water licence applicant/licensee: HanRoy Iron Ore Pty Ltd

Name of development project or purpose: Mulga Downs Iron Ore Mine

Legal description and address of land where (a) water is taken, and (b) water is used (if different):

a) Water Taken: currently Retention Licence R47/12, with Mining Lease M47/1621 pending.
b) Water Used: Mining Lease M47/1621 (pending), Misc Licence L45/380 (pending)

"I understand that the commitments given in the attached operating strategy will be a condition of an associated water licence if approved and that a breach of a commitment or any licence condition may be an infringement of the Rights in Water and Irrigation Act 1914":

[redacted]

Approved by Department of Water and Environmental Regulation delegated authority:

_____ Date: _____
Printed Name:
Title:

# PREAMBLE

HanRoy Iron Ore Projects Pty Ltd (HanRoy) on behalf of Hancock Prospecting Pty Ltd (HPPL) is proposing to develop the Mulga Downs Iron Ore Mine (the Project) located approximately 210 km south of Port Hedland and 180 km northwest of Newman, in the Pilbara Region of Western Australia. The Project is currently under assessment for Environmental Protection Authority (EPA), Part IV approval.

The Project encompasses the Murray's Hill and Mulga East Deposits within the Mulga East tenement (currently Retention Licence R47/12, with Mining Lease M47/1621 pending. A location plan is provided in Figure A, showing these tenements.

The proposed open cut pit footprints, referenced as MDE_LOM_20_F_20240805 (MDE_LOM_20), are shown in Figure B, together with the indicative Project layout. The pit footprints comprise seven mining areas (from west to east): Murray's Hill, Anticline Hill, Fridge West, Fridge Central, Fridge Hill, Horseshoe West and Horseshoe Hill. Approximately 20 of the pits are proposed to extend (to varying depths) below the groundwater level and will therefore require dewatering (refer Figure C). The lowest estimated pit elevation is 388 mRL (i.e., ~12 to 16 m below the groundwater level).

Water supply requirements during the LOM will preferentially be sourced from the dewatering discharge, with water treated, if required, to meet operational water quality criteria. As dewatering exceeds water demands, excess water will be disposed of by Managed aquifer Recharge (MAR) through re-injection within the Study Area. MAR is proposed on the slopes of the valley (i.e., in, and along strike of, the proposed mining areas). Initially, MAR is proposed via re-injection bores, with the potential for repurposing dewatering bores and / or in-pit infiltration, once mining of a pit is complete.

AQ2 was commissioned by HanRoy to prepare this Groundwater Operating Strategy (GWOS) to meet the Department of Water and Environmental Regulation (DWER) requirements to support HanRoy's 5C groundwater licence application. HanRoy will be required to comply with the GWOS after 5C licence approval by DWER, and with any modifications to the GWOS that are made and approved during the term of the licence.

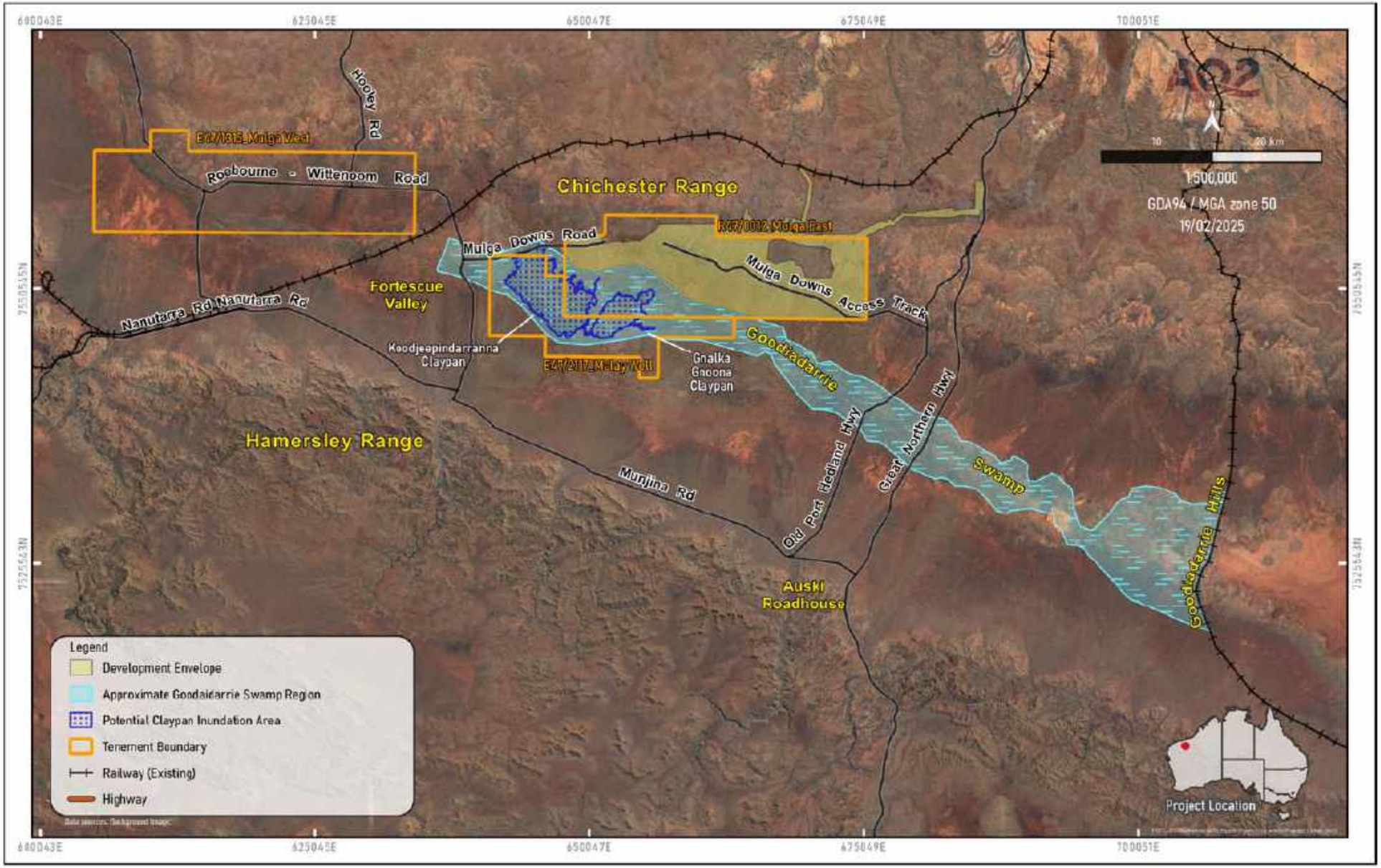



Figure A Location Plan

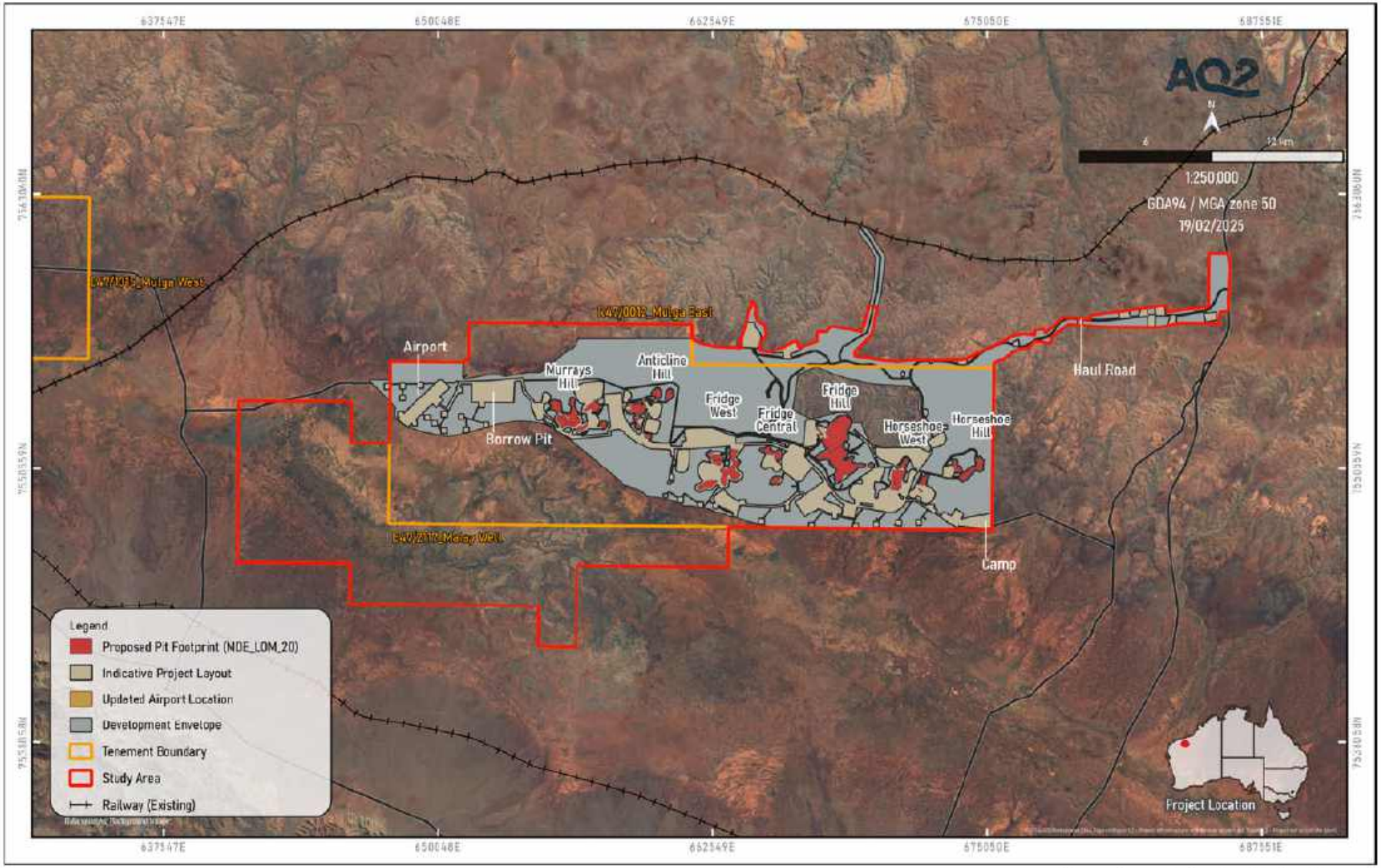



Figure B Indicative Project Layout

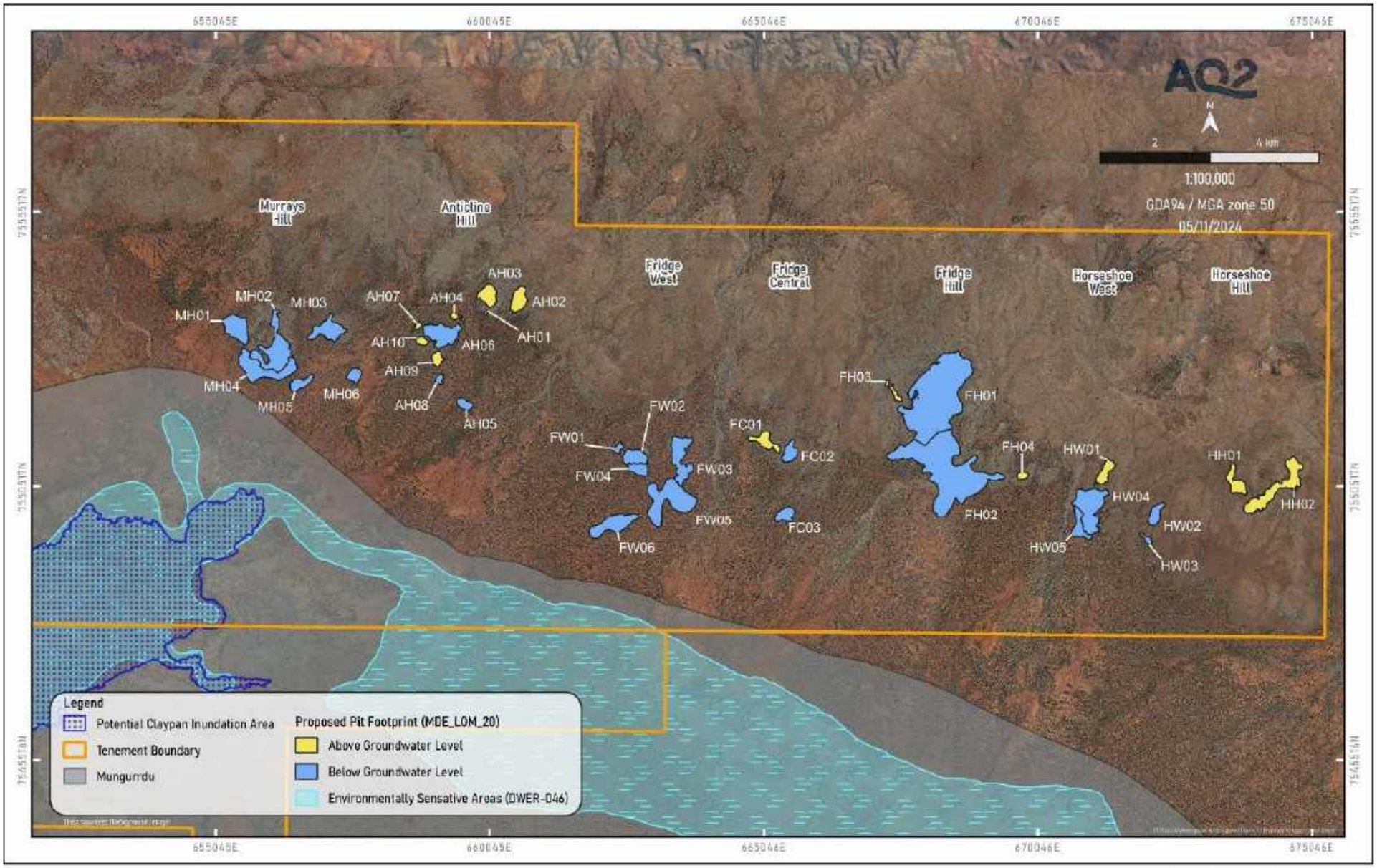



Figure C Pit Locations

# 1. ADMINISTRATIVE REQUIREMENTS

## 1.1 Existing Groundwater Licenses

None - There are no other groundwater licenses already issued by DWER that are relevant to this GWOS. Existing groundwater licences for the Mulga Downs site will be superseded.

## 1.2 Factors Requiring Detailed Operating Strategy

Table 1.1 summarises the requirement for a detailed operating strategy, based on DWER's guidelines (DWER 2020).

A groundwater abstraction allocation of 12 GL/yr is required for the Mulga Downs Project, for the purposes of dewatering and water supply for the life of mine (inclusive of the construction period). In addition, the Project is located near to the culturally and environmentally sensitive wetlands of the Fortescue Valley, inclusive of the Gnalka Gnoona and Koodjeepindarranna Claypans (Priority 1 PECs). This wetland area is mapped as an Environmentally Sensitive Area (ESA) by DWER and a DPLH Aboriginal Cultural Heritage Lodged Place (ID:40484) named Mungurrdu (refer Figure 1.1 and Figure 1.2).

Existing groundwater users in the Study Area include the local and nearby stations (Mulga Downs, Hooley and Mt Florance Stations), for stock watering as well as the Wirrilimurra and Youngaleena Communities and licenced water supplies associated with the construction of the existing FMG (Solomon) railway and RTIO (Goodiadarrie) railway (refer Figure 1.3).

Table 1.1 Decision Table Summarising Requirement for Detailed Operating Strategy

| Volume of water to be taken (kL/year) | Level of allocation | Potential for impacting other users | Potential for impacting ecosystems | Existing salinity (milligrams per litre) |
|---|---|---|---|---|
| 0–499,999<br>(0 points) | 0 to <30% C1<br>(0 points) | Impacts unlikely<br>(0 points) | Impacts unlikely<br>(0 points) | Fresh <1,500 mg/L<br>(4 points) |
| 500,000–2,000,000<br>(2 points) | 30 to <70% C2<br>(1 point) | Impacts possible<br>(2 points) | Impacts possible<br>(2 points) | Brackish<br>TDS 1,501–5,000 mg/L<br>(2 points) |
| 2,000,001–5,000,000<br>(5 points) | 70 to <100% C3<br>(2 points) | Impacts likely<br>(5 points) | Impacts likely<br>(5 points) | Saline<br>TDS 5,001–50,00 mg/L<br>(1 point) |
| 5,000,001 and above<br>(8 points) | 100% and over C4<br>(3 points) | | | Hypersaline<br>>50,001 mg/L<br>(0 points) |
| Points assigned = 8 | Points assigned = 0 | Points assigned = 5 | Points assigned = 2 | Points assigned = 4 |
| Total Points= 19<br>>12 points likely requires a detailed operating strategy | | | | |

## 1.3 Staged Development of Water Licenses

The groundwater license application does not involve a staged development of the proposed Mulga Downs Project.

## 1.4 Previous Investigations of Water Source and Environment

HPPL / HanRoy have completed a series of environmental investigations including comprehensive groundwater, surface water and ecohydrological studies to assess the dewatering / water supply requirements and the potential effects that groundwater abstraction may have on the aquifer, the environment and other groundwater users. A summary of previous environmental investigations is provided in Table 1.2.

Table 1.2 Summary of Previous Environmental Investigations

| Report Year | Author | Survey / Study Name |
|---|---|---|
| **Surface Water, Groundwater and Ecohydrology** | | |
| 2009 | MWH | Murray's Hill Groundwater Investigation – Stage 2 |
| 2012 | MWH | Hydrogeological Assessment of the Fenceline Road Borefield Area |
| 2014 | MWH | Conceptual Hydrogeology of the Mulga East Deposit |
| 2020 | AQ2 | Mulga Downs Ecohydrology Study |
| 2020 | AQ2 | Mulga East Baseline Water Studies |
| 2021 | AQ2 | Mulga East Preliminary Groundwater Management Assessment |
| 2021 | AQ2 | Mulga East PFS Desktop Study |
| 2022 | PSM | Mulga Downs PFS Geotechnical Assessment and Pit Slope Design |
| 2022 | AQ2 | Mulga Downs Interim Surface Water Impact Assessment |
| 2022 | AQ2 | Mulga Downs Site Water Management (Hydrology and Hydrogeology) Pre-feasibility Study |
| 2023 | GWC | Mulga Downs Groundwater Modelling |
| 2024 | AQ2 | Mulga Downs Water Studies, Groundwater & Surface Water Impact Assessment |
| 2024 | AQ2 | Mulga Downs Baseline Ecohydrological Assessment |
| 2024 | AQ2 | Mulga Downs Iron Ore Project: Assessment of Surface Water Change on Vegetation of the Fortescue Valley |
| 2024 | GWC | Mulga Downs Groundwater Modelling |
| 2024 | AQ2 | Mulga Downs Groundwater, Surface Water & Ecohydrological Studies Baseline Assessment |
| 2024 | AQ2 | Mulga Downs Groundwater, Surface Water and Ecohydrological Impact Assessment |
| **Subterranean Fauna** | | |
| 2024 | Bennelongia | Mulga Downs Subterranean Fauna Survey |
| 2024 | Bennelongia | Stygofauna salinity tolerances |
| 2024 | AQ2 | Mulga Downs Iron Ore Mine –Troglofauna Habitat Assessment |
| 2024 | AQ2 | Mulga Downs Iron Ore Mine – Stygofauna Habitat Assessment |
| **Flora and Vegetation** | | |
| 2021 | Maia | Mulga East Iron Ore Project, Mine Study Area Detailed Flora and Vegetation Assessment 2019-2020 |
| 2021 | Maia | Mulga Downs West Flora and Vegetation Desktop Study |
| 2022 | Maia | Mulga Downs Iron Ore Project, Mine and Borefield Study Area Detailed Flora and Vegetation Assessment 2019-2022 |

| Report Year | Author | Survey / Study Name |
|---|---|---|
| Terrestrial Fauna | | |
| 2020 | ecologia | Baseline Terrestrial Invertebrate Fauna (SRE) Level 2 Assessment |
| 2021 | ecologia | Mulga East Baseline Terrestrial Vertebrate Fauna Assessment |
| 2021 | ecologia | Letter: Targeted Pilbara Leaf-nosed Bat Gap Analysis |
| 2022 | Biologic | Mulga Downs Iron Ore Project: Transport Corridor to Great Northern Hwy Terrestrial Fauna Survey |
| 2022 | Biologic | Mulga East Iron Ore Project: Mulga West Borefield and Mulga East Corridors Terrestrial Fauna Survey. |
| 2023 | Biologic | Mulga Downs Iron Ore Mine: Freshwater Claypans Desktop Assessment. |
| 2023 | Attexo | Consolidated Terrestrial Fauna Report |
| 2023 | Spectrum | Mulga Downs Iron Ore Project (MDIOP) Solar Farm, Haul Road and Pipeline (ASA) |
| 2023 | Spectrum | Memo: Mulga Downs Iron Ore Mine, Targeted Grey Falcon Survey |
| 2024 | Spectrum | Targeted Bilby & Night Parrot Survey |
| 2024 | Spectrum | Supplementary Targeted Fauna Survey |

* Report has been superseded by AQ2, 2024d & AQ2, 2024e.

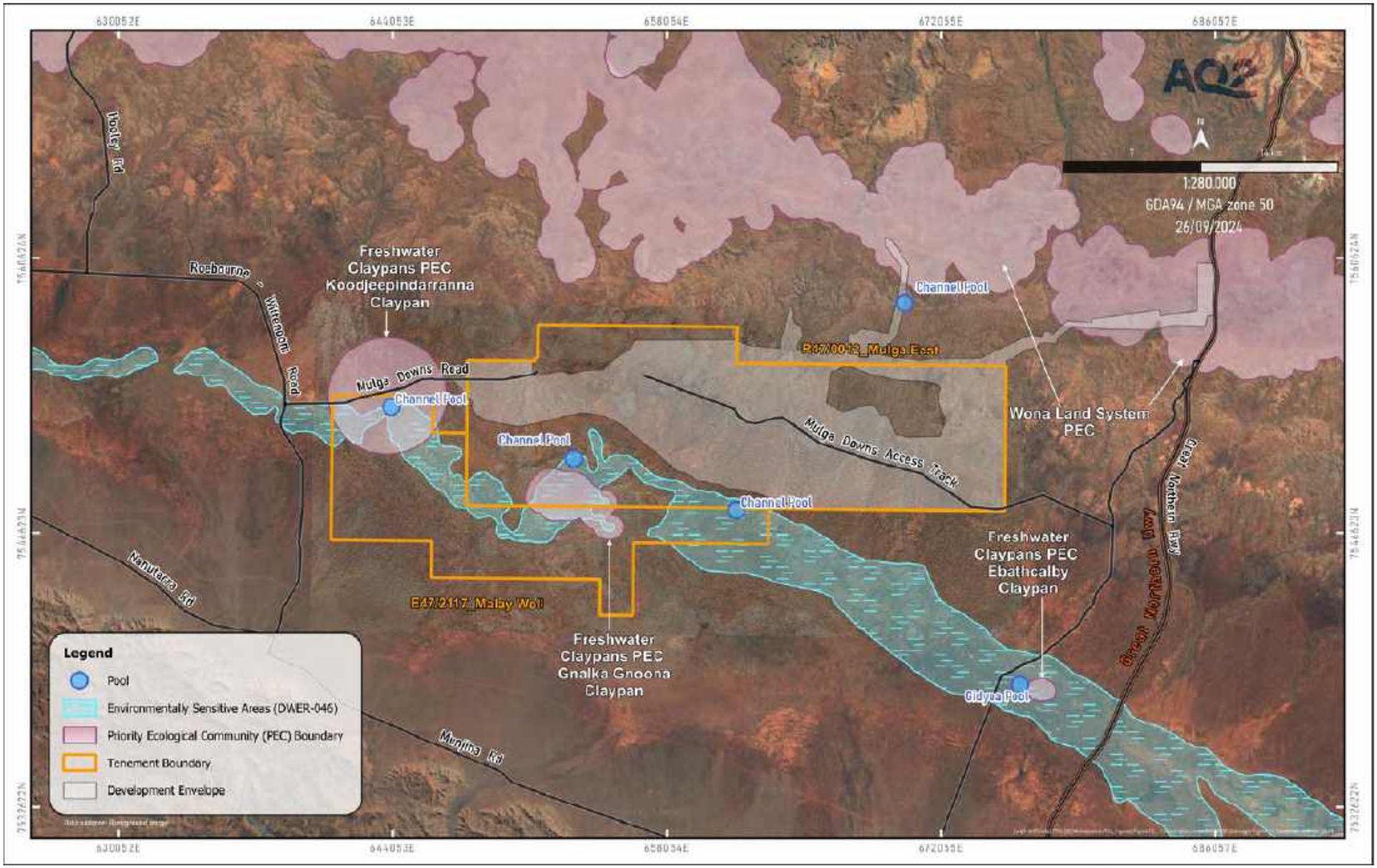



Figure 1.1 Conservation Areas

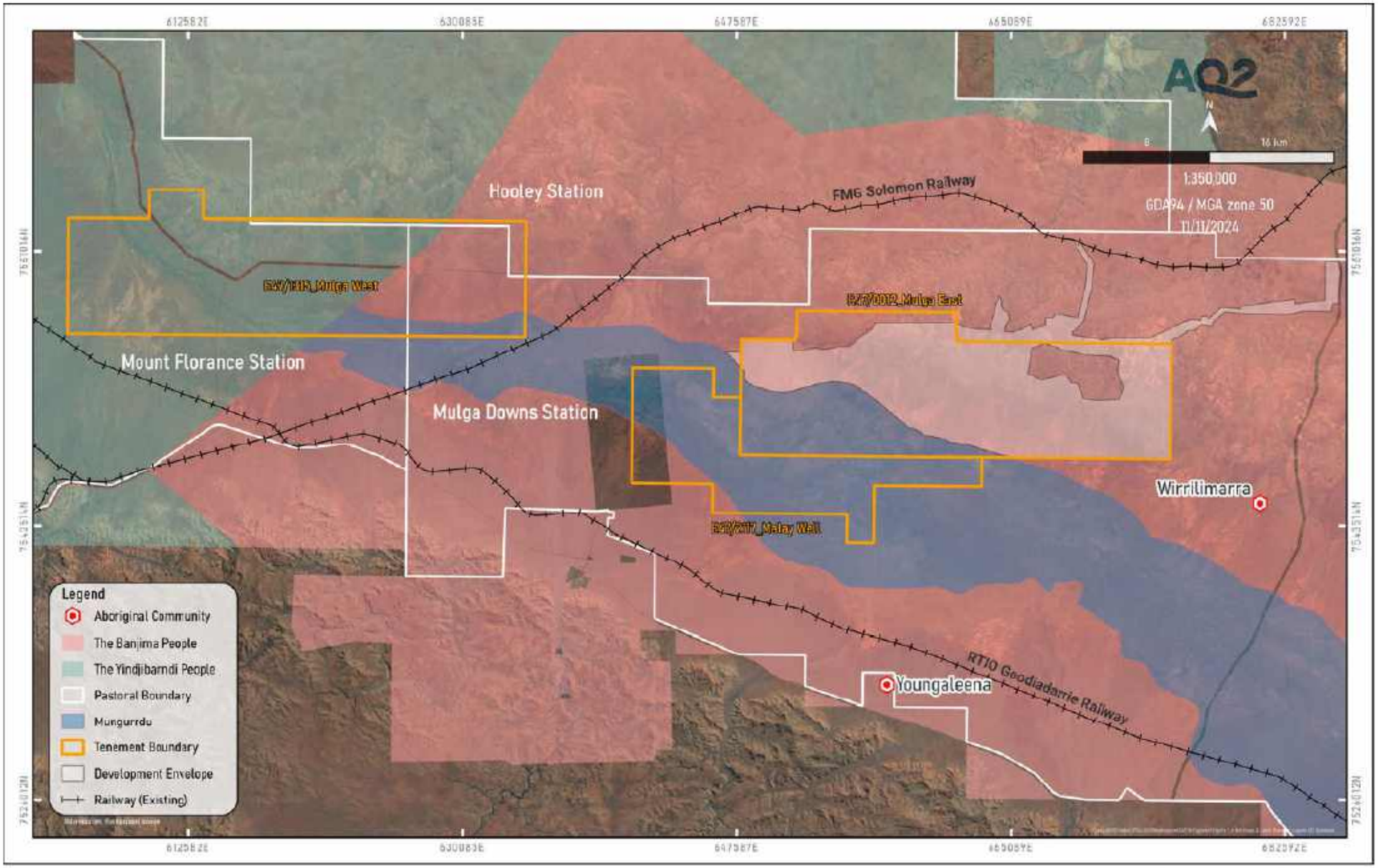



Figure 1.2 Pastoral & Native Title Boundaries

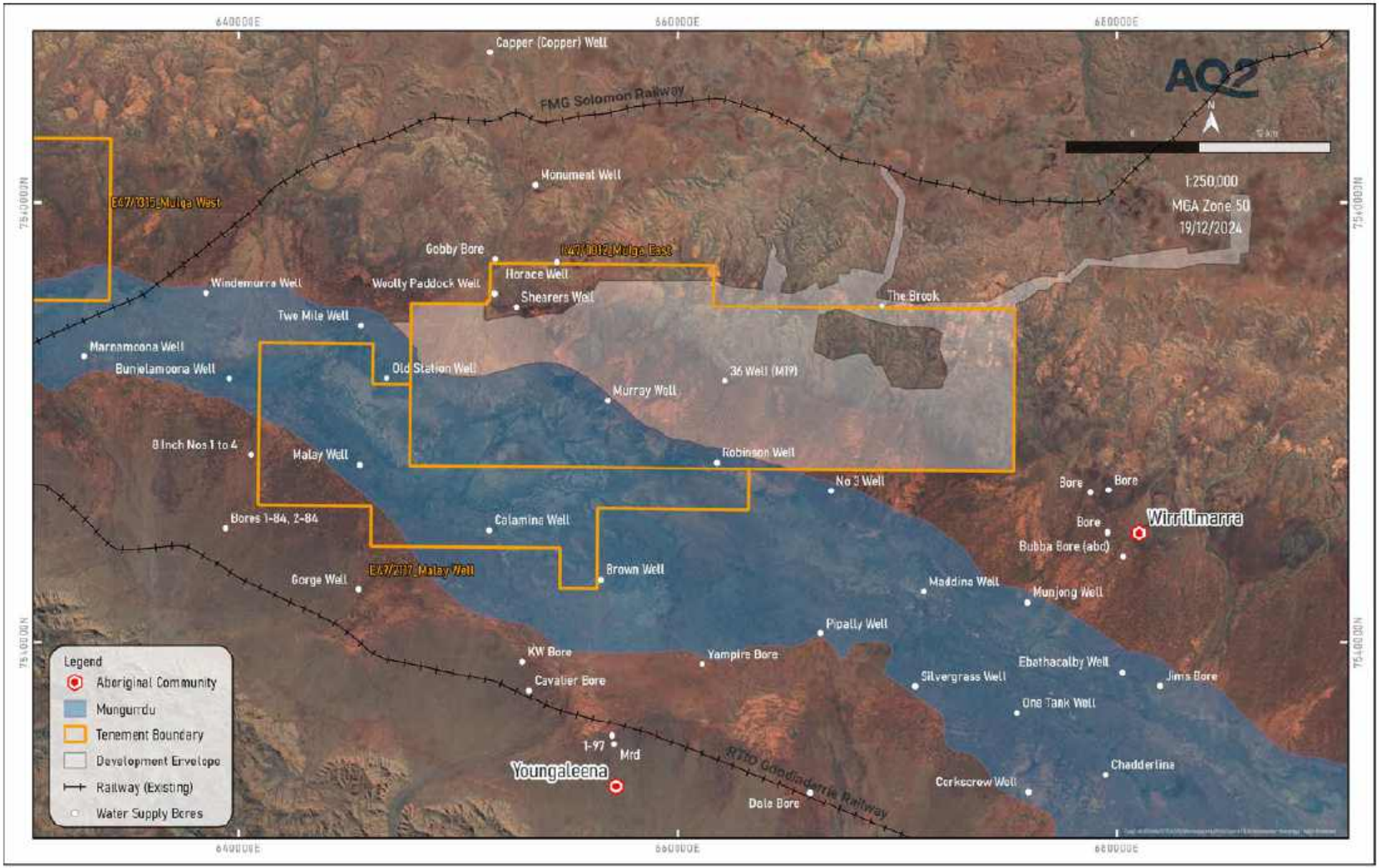



Figure 1.3 Groundwater Users

## 1.5 Water Resource Management / Allocation Plan

The project is situated within the Pilbara Groundwater Allocation Plan Area, although none of the nine 'Target' aquifers will be impacted from the proposed groundwater abstraction.

## 1.6 Responsible Person / Position

Contact details for the person/position responsible for implementation of the GWOS are listed in Table 1.

Table 1.3 Responsible Person / Position

| | |
|---|---|
| Name | |
| Position | |
| Phone Number | |
| Postal Address | |

## 1.7 Reporting

The licensee will provide an annual Groundwater Monitoring Summary (GMS) report, covering monitoring data recorded during the water year. Although the water year has not yet been defined, it is currently assumed to be from 1 January to 31 December. The GMS will be prepared in accordance with guidelines in DWER Operational Policy 5.12 Hydrogeological reporting associated with a Groundwater Well License (DWER, 2009).

The annual groundwater monitoring summary report will include:

- A location plan showing production and monitoring bores.
- Details of any bores which have been drilled, commissioned or decommissioned.
- Current and historical rainfall data to compare long-term averages and variations.
- Tabulated meter readings and abstraction / re-injection volumes for each production bore over the reporting year.
- Tabulated chemistry data for production and monitoring bores.
- Tabulated water level data in metres (m) below reference point (top of casing, toc), below ground level (bgl) and m AHD from production and monitoring bores for the reporting period.
- Plots of the data collected from each bore (including historical data to determine trend-lines) comprising abstraction / re-injection volumes (production bores), water levels (production and monitoring bores), and water chemistry (production and monitoring bores).
- An assessment of the effects of the licensee's draw on the groundwater resource as determined from the monitoring data.
- A comment on the licensee's compliance with the license and associated monitoring commitments.
- An assessment of the monitoring programme and recommendations for any changes to the program.
- Provision of any information or evidence needed to update information provided in the GWOS.

This summary report will be submitted to the DWER within three months of the close of the water year, i.e., by 31 March each year based on assumed water year above.

Every three years, the licensee will provide a Groundwater Monitoring Review (GMR) prepared in accordance with guidelines in DWER Operational Policy 5.12 Hydrogeological reporting associated with a Groundwater Well License. The review will provide a complete history of groundwater monitoring over the life of the mine, including a detailed analysis of the aquifer response to groundwater abstraction / re-injection; comparison with analytically modelled predictions and effects on groundwater from its use, as monitored each year in groundwater production and monitoring bores.

The review will be submitted to the DWER within three months of the close of the water year. An annual groundwater monitoring summary report will not be required in the year a triennial review is due.

Table 1.4 Summary of Reporting Dates

| Item | Reporting Dates |
|---|---|
| Water use (metering) data | tbc |
| Annual - Groundwater Monitoring Summary (GMS) | tbc |
| Triennial - Groundwater Monitoring Review (GMR) | tbc |

## 1.8 GWOS Review

A full review of this GWOS will be completed as follows:

- Prior to the commencement of mining operations.
- Prior to the expiry of the GWL.
- If / when any further changes are required.

# 2. WATER SOURCE DESCRIPTION

## 2.1 Hydrogeology

Five main hydrogeologic units have been identified as part of the hydrogeologic investigations:

- Tertiary / Quaternary Cover (comprising Basal "Crete", CID/Pisolite, Undifferentiated Tertiary and Upper Calcrete).
- Fresh Jeerinah and Marra Mamba Iron Formations.
- Altered Marra Mamba Iron Formation and West Angela Member.
- Fresh West Angela Member (Wittenoom Formation).
- Dolomite of the Wittenoom Formation.

Bedrock Units

The conceptual hydrogeological model is summarised in Figure 2.1 and outlined below.

The Tertiary overburden forms a highly transmissive and continuous aquifer within the valley. Maximum thicknesses up to approximately 60 metres (m) occur in the middle of the valley, thinning on the valley slopes.

The low permeability Jeerinah Formation and unmineralised Marra Mamba Iron Formation form a basement aquitard with a minor local fractured aquifer. A highly transmissive and continuous aquifer (referred to as "Altered Marra Mamba") is hosted in the mineralised, fractured and weathered Marra Mamba Iron Formation. The overlying West Angela Member of the Wittenoom Formation forms a moderately permeable aquifer unit with localised (discontinuous) zones. These two formations are in hydraulic connection.

Groundwater across the Study Area ranges from fresh (180 mg/L TDS) in the upper reaches of the groundwater system, to saline (17,000 mg/L TDS) across the valley area, with salinity profiling data confirming saline groundwater originating from the claypans and extending along the valley as well as beneath the proposed pit areas.

Recharge to the groundwater system occurs as diffuse recharge from rainfall events, both on the valley flanks where the Marra Mamba outcrops and as infiltration into the Tertiary / Quaternary overburden where runoff is focused on the valley floor.

The water table elevation ranges between approximately 385 metres Reduced Level (mRL) and 420 mRL, with groundwater flowing from the topographically higher areas into the valley and then in a north-westerly direction along the valley.

In the Mulga East / Malay Well tenement area the depth to groundwater is shallow in the lower lying, valley areas at approximately 3 and 5 metres below ground level (mbgl) and increases with elevation, to depths of up to 45 mbgl in the more elevated areas (north of the inferred resource areas)

The derived depth to water in the vicinity of the claypans and channel pools indicate these features are not groundwater related and ecohydrological studies to date have found that the vegetation is disconnected from the groundwater system under baseline conditions, therefore a reduction in groundwater levels is not predicted to impact the terrestrial environment.

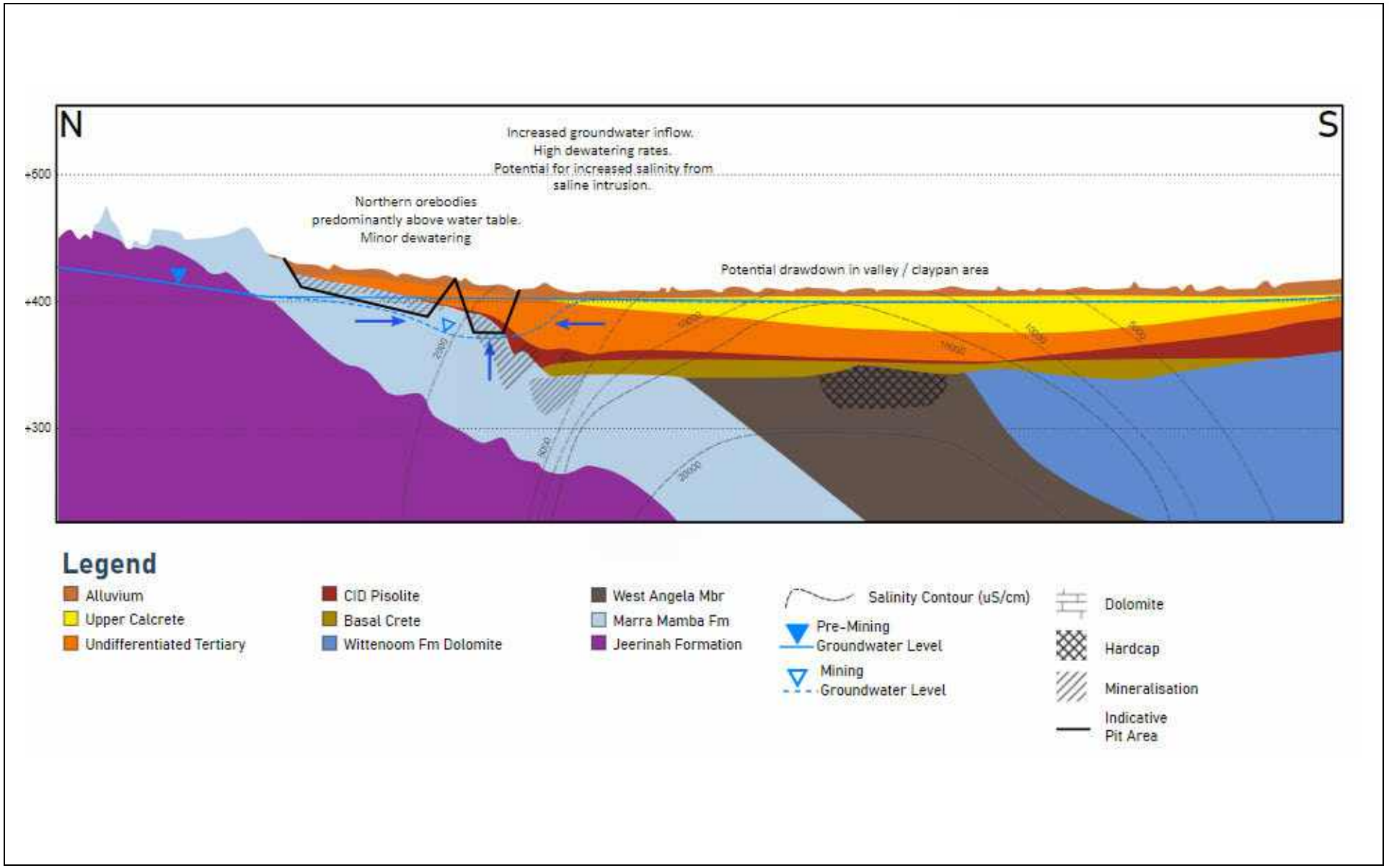



Figure 2.1 Conceptual Hydrogeological Cross-Section Showing Potential Impact of Mining

## 2.2 Groundwater Abstraction for Dewatering

Open cut pits are proposed in seven mining areas referred to as Murray's Hill, Anticline Hill, Fridge West, Fridge Central, Fridge Hill, Horseshoe West and Horseshoe Hill. All but 13 of the pits extend (to varying depths) below the groundwater level and will therefore require dewatering. The lowest estimated pit elevation is 388 mRL (i.e., -12 to 16 m below the groundwater level).

The preferred approach to dewatering is via ex-pit dewatering bores with in-pit bores only used where additional abstraction is required to achieve required drawdown levels. In-pit sumps may be used towards the end of mining a pit to access the deepest part of the pit. Dewatering bores are proposed to be completed with 300 mmND PVC blank and slotted casing.

The notional locations of proposed dewatering bores are presented in Figure 2.2). Table 2.1 summarises the proposed bore locations and staged timing of bore installation / operation, based on the current mine plan (MDE_LOM_20).

Table 2.1 Proposed Dewatering Bores

| Mine Area | Stage ID (Proposed Year of Commissioning) | Proposed Bore ID | Nominal Easting MGA94 Z50 | Nominal Northing MGA94 Z50 | Nominal Ground Level (mAHD) | Nominal Depth (m) |
|---|---|---|---|---|---|---|
| Murray's Hill | MDE_MH_A (2027) | MDE_MH_A_1 | 655129 | 7553541 | 410.46 | 36 |
| | | MDE_MH_A_2 | 655338 | 7553235 | 409.83 | 35 |
| | | MDE_MH_A_3 | 655560 | 7553069 | 410.30 | 44 |
| | | MDE_MH_A_4 | 655453 | 7552745 | 406.64 | 60 |
| | MDE_MH_B (2029) | MDE_MH_B_5 | 656478 | 7552242 | 408.09 | 68 |
| | | MDE_MH_B_6 | 656196 | 7552443 | 407.92 | 73 |
| | | MDE_MH_B_7 | 657488 | 7552460 | 412.02 | 71 |
| | | MDE_MH_B_8 | 656853 | 7552499 | 409.94 | 75 |
| | MDE_MH_C (2029) | MDE_MH_C_9 | 655656 | 7552424 | 405.6 | 61 |
| | | MDE_MH_C_10 | 656495 | 7552845 | 410.88 | 55 |
| Anticline Hill | MDE_AH_A (2032) | MDE_AH_A_1 | 659216 | 7553062 | 428.29 | 68 |
| | | MDE_AH_A_2 | 659420 | 7553158 | 429.00 | 68 |
| Horseshoe West | MDE_HW_A (2032) | MDE_HW_A_1 | 670668 | 7550203 | 427.97 | 46 |
| | | MDE_HW_A_2 | 670649 | 7549609 | 426.22 | 69 |
| | | MDE_HW_A_3 | 671038 | 7549613 | 425.98 | 63 |
| Fridge West | MDE_FW_A (2035) | MDE_FW_A_1 | 662007 | 7549553 | 409.76 | 69 |
| | | MDE_FW_A_2 | 662446 | 7549683 | 411.84 | 69 |
| | | MDE_FW_A_3 | 662282 | 7549987 | 412.16 | 72 |
| | | MDE_FW_A_4 | 662765 | 7549982 | 413.68 | 70 |
| | | MDE_FW_A_5 | 662201 | 7549703 | 410.10 | 75 |
| | MDE_FW_B (2037) | MDE_FW_B_6 | 663013 | 7550588 | 416.99 | 70 |
| | | MDE_FW_B_7 | 663054 | 7549785 | 413.63 | 77 |
| | | MDE_FW_B_8 | 663609 | 7550033 | 415.89 | 88 |
| | | MDE_FW_B_9 | 663432 | 7550693 | 418.46 | 58 |

| Mine Area | Stage ID (Proposed Year of Commissioning) | Proposed Bore ID | Nominal Easting MGA94 Z50 | Nominal Northing MGA94 Z50 | Nominal Ground Level (mAHD) | Nominal Depth (m) |
|---|---|---|---|---|---|---|
| Fridge Hill | MDE_FH_A (2038) | MDE_FH_A_1 | 667291 | 7551072 | 426.07 | 68 |
| | | MDE_FH_A_2 | 668218 | 7550464 | 424.72 | 90 |
| | | MDE_FH_A_3 | 668210 | 7549968 | 423.70 | 77 |
| | | MDE_FH_A_4 | 668547 | 7550283 | 425.05 | 95 |
| | | MDE_FH_A_5 | 668787 | 7550321 | 425.15 | 59 |

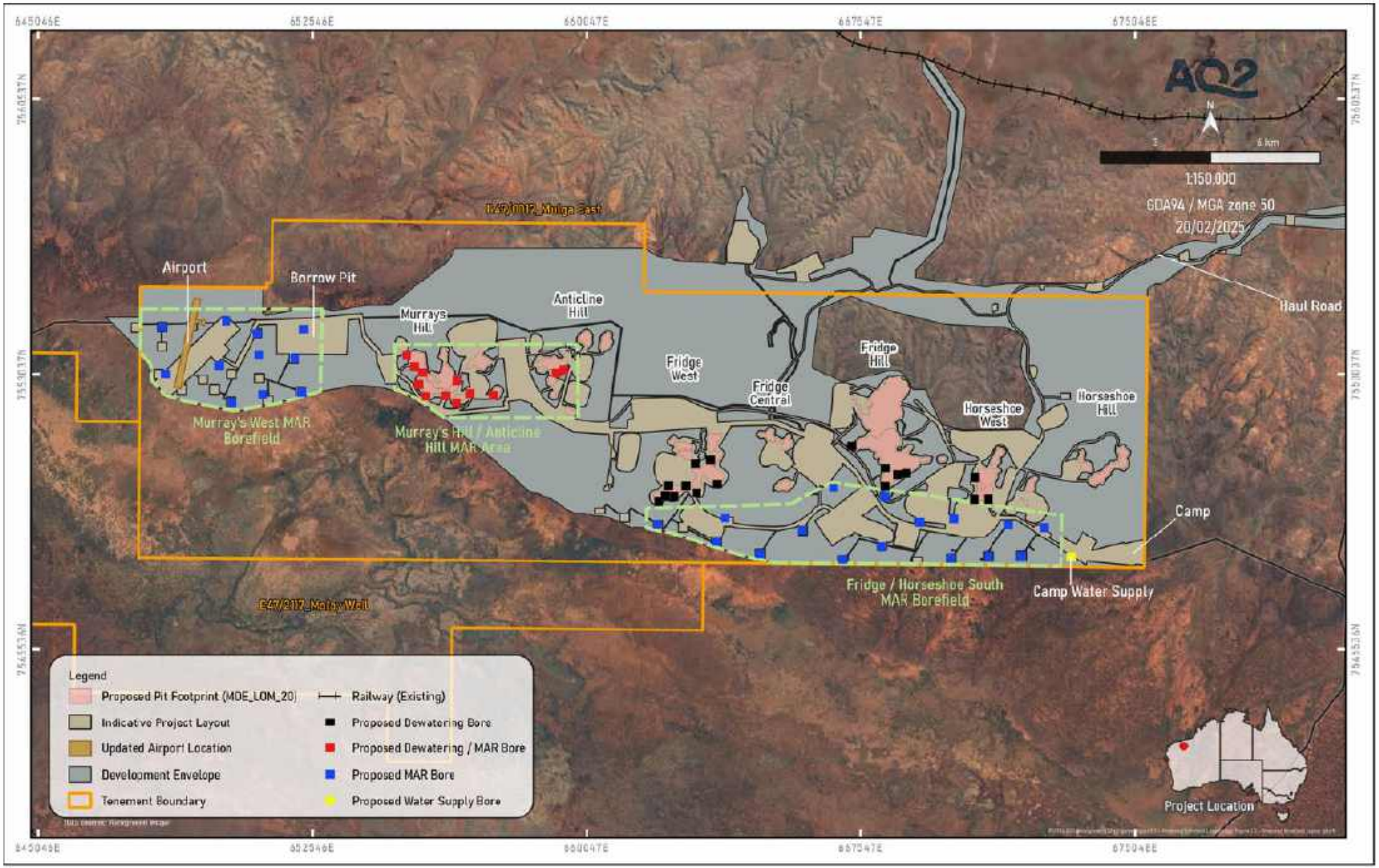



Figure 2.2 Notional Locations of Dewatering, Water Supply and MAR Bores During Operations

## 2.3 Water Use and Water Supply Abstraction

HanRoy estimates an approximate average water demand of 0.73 GL/yr (~2,000 kL/d) over the construction period (i.e., a period of 1 to 2 years prior to mining) and throughout the life of mine.

The proposed water supply bores for use during the construction phase are presented in Figure 2.3 and summarised in Table 2.2 As these bores are in the mining and / or MAR areas they will either provide advance dewatering and / or increased aquifer capacity for the disposal of excess water, dependent on the source area.

Throughout the mining period water demands will be preferentially met by dewatering volumes and, if required, water treatment will ensure that the water quality criteria are met. Dedicated water supply bores (i.e., duty and standby) for the Camp are currently proposed, adjacent to existing bore MDPB004.

Table 2.2 Proposed Construction Water Supply Bores

| Bore | Easting | Northing | Ground Level (mAHD) | Diameter (mm) | Cased Depth (m) | Bore Yield (L/s) | Status |
|---|---|---|---|---|---|---|---|
| MDPB0011 | 652204 | 7552525 | 406 | 250 | 23.5 | 8 | Existing |
| MDPB009 | 656853 | 7552499 | 410 | 254 | 59.5 | 15-20 | Existing |
| MDPB0019 | 661999 | 7552117 | 426 | 250 | 77 | 40 | Existing |
| MDPB005 | 663703 | 7551462 | 423 | 200 | 62 | 20 | Existing |
| MDE_MAR-E_B_12 | 671570 | 7548909 | 423 | 300 | ~70 | 20-30 | New |
| MDPB004* | 673338 | 7548057 | 422 | 200 | 54.5 | 20 | Existing |

*Camp water supply during construction

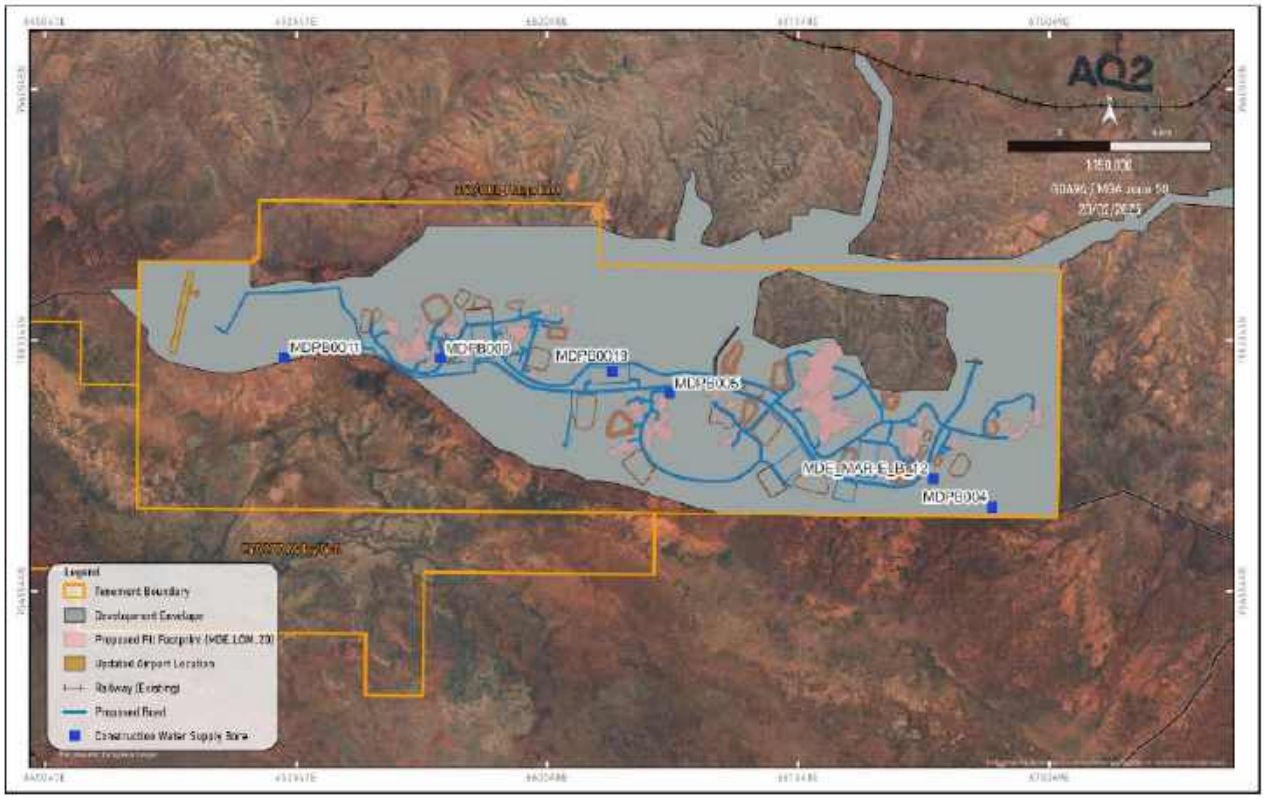



Figure 2.3 Location of Proposed Construction Water Supply Bores

## 2.4 Managed Aquifer Recharge

The dewatering of the below water table (BWT) open-cut pits will produce large volumes of surplus water which needs to be managed responsibly on site. Disposal of surplus water, by way of managed aquifer recharge (MAR), is proposed for the Project.

MAR is proposed on the slopes of the valley (i.e., in, and along strike of, the proposed mining areas). Initially, MAR is proposed via re-injection bores, with the potential for using repurposed dewatering bores and / or in-pit infiltration, once mining of a pit is complete.

The notional locations of proposed (modelled) MAR bores are presented in Figure 2.2. Table 2.3 summarises the proposed bore locations and staged timing of bore installation / operation, based on the current mine plan (MDE_LOM_20).

MAR bores (including dewatering bores which may be repurposed for MAR) are proposed to be completed with 300 mmND blank PVC casing and stainless-steel, wire-wound screens.

Table 2.3 Proposed MAR Bores

| MAR Area | Stage ID (Proposed Year of Commissioning) | Proposed Bore ID | Nominal Easting MGA94 Z50 | Nominal Northing MGA94 Z50 | Nominal Ground Level (mAHD) | Nominal Depth (m) |
|---|---|---|---|---|---|---|
| Fridge / Horseshoe South MAR Borefield | MDE_MAR-East_A (2027) | MDE_MAR-E_A_1 | 671936 | 7548063 | 417.79 | 61 |
| | | MDE_MAR-E_A_2 | 670013 | 7547999 | 418.89 | 93 |
| | | MDE_MAR-E_A_3 | 669154 | 7548975 | 421.06 | 80 |
| | | MDE_MAR-E_A_4 | 668202 | 7549679 | 422.52 | 94 |
| | | MDE_MAR-E_A_5 | 668104 | 7548313 | 417.13 | 81 |
| | | MDE_MAR-E_A_6 | 665936 | 7548764 | 412.62 | 118 |
| | | MDE_MAR-E_B_7 | 664780 | 7548126 | 408.1 | 94 |
| | MDE_MAR-East_B (2029) | MDE_MAR-E_B_8 | 666796 | 7549922 | 418.87 | 78 |
| | | MDE_MAR-E_B_9 | 667059 | 7547962 | 413.4 | 101 |
| | | MDE_MAR-E_B_11 | 671041 | 7548054 | 419.48 | 77 |
| | | MDE_MAR-E_B_10 | 670092 | 7549073 | 422.69 | 76 |
| | | MDE_MAR-E_B_12 | 671570 | 7548909 | 422.98 | 70 |
| Murray's West MAR Borefield | MDE_MAR-MW_A (2032) | MDE_MAR-MW_A_1 | 648438 | 7554312 | 407.59 | 86 |
| | | MDE_MAR-MW_A_2 | 648536 | 7553035 | 405.33 | 90 |
| | | MDE_MAR-MW_A_3 | 650192 | 7554481 | 409.74 | 69 |
| | | MDE_MAR-MW_A_4 | 650002 | 7553264 | 407.03 | 82 |
| | | MDE_MAR-MW_A_5 | 651041 | 7554131 | 409.54 | 65 |
| | | MDE_MAR-MW_A_6 | 651089 | 7553555 | 408.61 | 90 |
| | | MDE_MAR-MW_A_7 | 650341 | 7552266 | 405.81 | 118 |
| | | MDE_MAR-MW_A_8 | 651190 | 7552480 | 406.72 | 98 |
| | | MDE_MAR-MW_A_9 | 652253 | 7552528 | 405.91 | 78 |
| | | MDE_MAR-MW_A_10 | 652063 | 7553466 | 407.79 | 86 |

| MAR Area | Stage ID (Proposed Year of Commissioning) | Proposed Bore ID | Nominal Easting MGA94 Z50 | Nominal Northing MGA94 Z50 | Nominal Ground Level (mAHD) | Nominal Depth (m) |
|---|---|---|---|---|---|---|
| | | MDE_MAR-MW_A_11 | 652312 | 7554256 | 408.65 | 78 |
| Fridge / Horseshoe South MAR Borefield | MDE_MAR-East_C (2032) | MDE_MAR-E_C_13 | 661980 | 7548921 | 407.82 | 79 |
| | | MDE_MAR-E_C_14 | 663586 | 7548459 | 408.21 | 89 |
| | | MDE_MAR-E_C_15 | 663835 | 7549097 | 411.53 | 83 |
| Murray's Hill / Anticline Hill MAR Area | MDE_MH_D (2034) | MDE_MH_A_1 | 655129 | 7553541 | 410.46 | 36 |
| | | MDE_MH_A_2 | 655338 | 7553235 | 409.83 | 35 |
| | | MDE_MH_A_3 | 655560 | 7553069 | 410.3 | 44 |
| | | MDE_MH_A_4 | 655453 | 7552745 | 406.64 | 60 |
| | | MDE_MH_B_5 | 656478 | 7552242 | 408.09 | 68 |
| | | MDE_MH_B_6 | 656196 | 7552443 | 407.92 | 73 |
| | | MDE_MH_B_7 | 657488 | 7552460 | 412.02 | 71 |
| | | MDE_MH_B_8 | 656853 | 7552499 | 409.94 | 75 |
| | | MDE_MH_C_9 | 655656 | 7552424 | 405.6 | 61 |
| | | MDE_MH_C_10 | 656495 | 7552845 | 410.88 | 55 |
| | MDE_AH_B (2035) | MDE_AH_A_1 | 659216 | 7553062 | 428.29 | 68 |
| | | MDE_AH_A_2 | 659420 | 7553158 | 429 | 68 |
| Fridge / Horseshoe South MAR Borefield | MDE_MAR-East_D (2037) | MDE_MAR-E_D_16 | 672562 | 7548837 | 425.54 | 53 |

## 2.5 Water Distribution Network

- The proposed water distribution network is summarised as follows: A pipe network is to be developed to connect dewatering to water demand locations and disposal (MAR) locations.
- Two large buffer storage ponds are nominally proposed to provide emergency storage, buffering of flow variability and system controls.
- The proposed buffer storage ponds are to be located at each end of the mine area (west and east).
- A large capacity trunk main connects the ponds to allow water to be transferred between eastern and western ends of the site as the focus of dewatering and MAR changes.

A series of schematics showing the nominal evolution of the water transfer network through 6 different stages is shown in Figure 2.4 and summarised in Table 2.4.

Table 2.4 Proposed Distribution Stages

| Stage | Dewatering | MAR |
|---|---|---|
| Stage 1 - 2027 to 2031 | Murrays Hill (western end of mine) | Fridge/Horseshoe (eastern end of mine) |
| Stage 2 - 2032 to 2034 | Murrays Hill (west) | Murrays West (west) |
| | Anticline Hill (west) | |
| | Horseshoe West (east) | |
| Stage 3 - 2034 | Horseshoe West (east) | Murrays Hill (west) |
| | | Anticline Hill (west) |
| Stage 4 - 2035 | Horseshoe West (east) | Murrays Hill (west) |
| | Fridge West (central) | Anticline Hill (west) |
| Stage 5 - 2035 to 2038 | Fridge West (central) | Fridge/Horseshoe (east) |
| Stage 6 - 2038 onwards | Fridge West (central) | Fridge/Horseshoe (east) |
| | Fridge Hill (east) | |

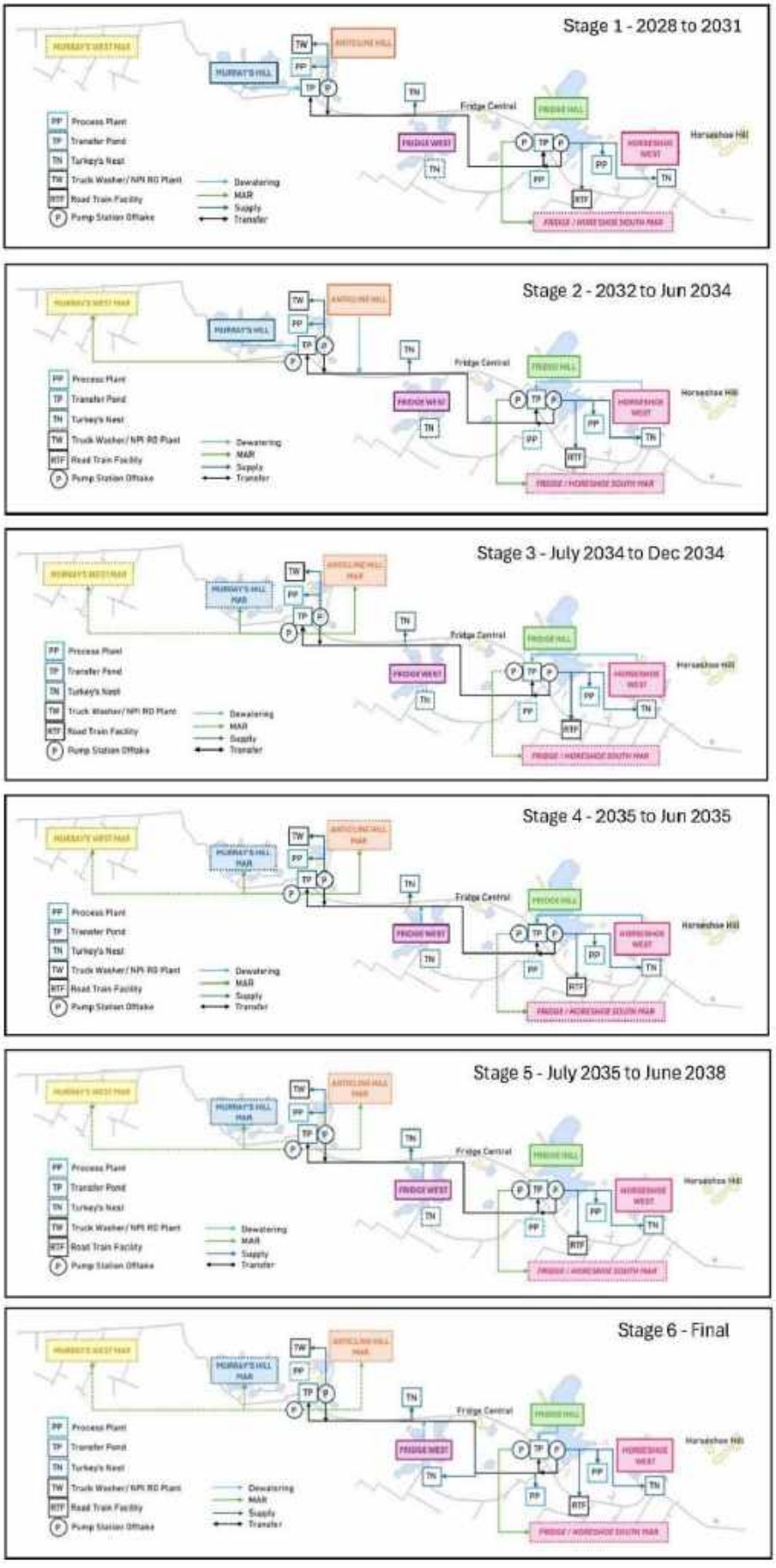



Figure 2.4 Water Distribution Schematic Diagrams

# 3. IDENTIFYING AND MANAGING IMPACTS

A summary of the Project's key issues relating to the proposed groundwater abstraction are presented in Table 3.1, together with the associated management objectives, measurements and responses.

If impacts are identified from the monitoring programs (outlined in Section 5), Contingency Plans will be activated (as outlined in Section 6).

Table 3.1 Potential Issue and Management Summary

| Potential Issue / Risk | Management Objective | Measurement | Management Response |
|---|---|---|---|
| **Production** | | | |
| Reliability of process water supply | Maintain an optimal raw water supply for ore processing operations | • Install water meters at each dewatering bore with bulk flow meters on transfer pipelines. All flow meters to have real time data availability and monitoring via a telemetry system.<br>• Close monitoring of abstraction to ensure within allocation limits. | • Forecast dewatering demand required by mine operations.<br>• Commission additional dewatering bores to achieve timely advanced dewatering of future mining areas. |
| Reliability of process water quality | Maintain a water supply with a combined TDS of less than 5,000 mg/L to the raw water tanks for ore processing. | • Install EC sensors and telemetry at each dewatering bore and on transfer pipelines to allow for continuous monitoring and identification of potential trends of increasing salinity<br>• Annual sampling of operational dewatering and water supply bores for full laboratory analysis. | If required, segregate ore processing water from dust suppression water with higher salinity water used for dust suppression. |
| Dewatering | Maintain the water level below the base of the pit floor to ensure dry mining conditions. | • Monitoring of water levels at temporary in-pit piezometers, specified ex-pit monitoring bores and pumping water levels at active dewatering bores; data for operational use and site-wide drawdown contouring. | • Commission additional dewatering bores, if required<br>• Commence advanced dewatering prior to mining activities. |
| **Environment** | | | |
| Drawdown Extent | Mitigate impact to other groundwater users / stygofauna | • Monitoring of water levels at specified drawdown extent monitoring bores and comparison to forecast drawdown from numerical modelling<br>• Track progressive extent of drawdown with site-wide drawdown contouring (as above). | • Continuous monitoring via transducer / logger units<br>• If required, undertake modelling to reforecast groundwater drawdown extent and assess potential impact to other groundwater users / stygofauna.<br>Refer below with respect to Third Party Issues. |
| Extent of Increase to Groundwater Salinity | Mitigate impact to other groundwater users / stygofauna | • Monitoring of salinity at specified salinity monitoring bores | • Salinity profiling quarterly when MAR is being undertaken in the vicinity<br>• If required, undertake modelling to reforecast increases in groundwater salinity and assess potential impact to other groundwater users / stygofauna.<br>Refer below with respect to Third Party Issues. |
| Vegetation Water Logging | Mitigate impact to vegetation | • Monitoring of water levels at specified mounding monitoring bores<br>• Track progressive extent of mounding | • Continuous monitoring via transducer / logger units with telemetry<br>• Adjust the distribution of MAR to reduce mounding<br>• Reduce dewatering rates (and associated surplus water) where safe to do so |

| Potential Issue / Risk | Management Objective | Measurement | Management Response |
|---|---|---|---|
| **Third Parties** | | | |
| Station Bores | Do not impact on other users water availability | • Monitoring of water levels and water quality at specified drawdown and salinity monitoring bores (as outlined above) . | • Liaison with key stakeholders<br>• Provision of water supply to "unduly affected" groundwater users |
| Community Water Supplies | Do not impact on other users water availability | • Monitoring of water levels and water quality at specified drawdown and salinity monitoring bores (as outlined above) | • Liaison with key stakeholders<br>• Provision of water supply to "unduly affected" groundwater users |

# 4. OPERATING RULES

## 4.1 Dewatering

Dewatering bores will be operated continuously at abstraction rates that achieve the pit dewatering schedules. Once the proposed dewatering bores (refer Table 2.1) have been installed, pumping capacities and annual abstraction rates will be provided for each bore. Individual bore pumping rates are anticipated to range between 30 to 50 L/s, with yields at some bores declining as the aquifer units are dewatered, particularly the northernmost bores. Predicted dewatering rates by mining area, for the current mine plan (MDE_LOM_20), are presented in Figure 4.1.

The individual pit dewatering schedules will be reviewed on a regular basis in conjunction with forecast mine plans to ensure alignment between mining and dewatering activities. These reviews may trigger adjustments to groundwater abstraction schedules, potentially requiring installation of additional dewatering bores and/or commissioning and decommissioning of existing bores / in-pit sumps.

Forecasts of the dewatering abstraction will be undertaken regularly and checked against both the annual allocation limit of 12 GL/a and the mine water demand (to ensure there is sufficient supply).

The salinity of the dewatering abstraction will be reviewed on a regular basis to identify any increasing trends. If required, ore processing water will be segregated from dust suppression water, with higher salinity water used for dust suppression.

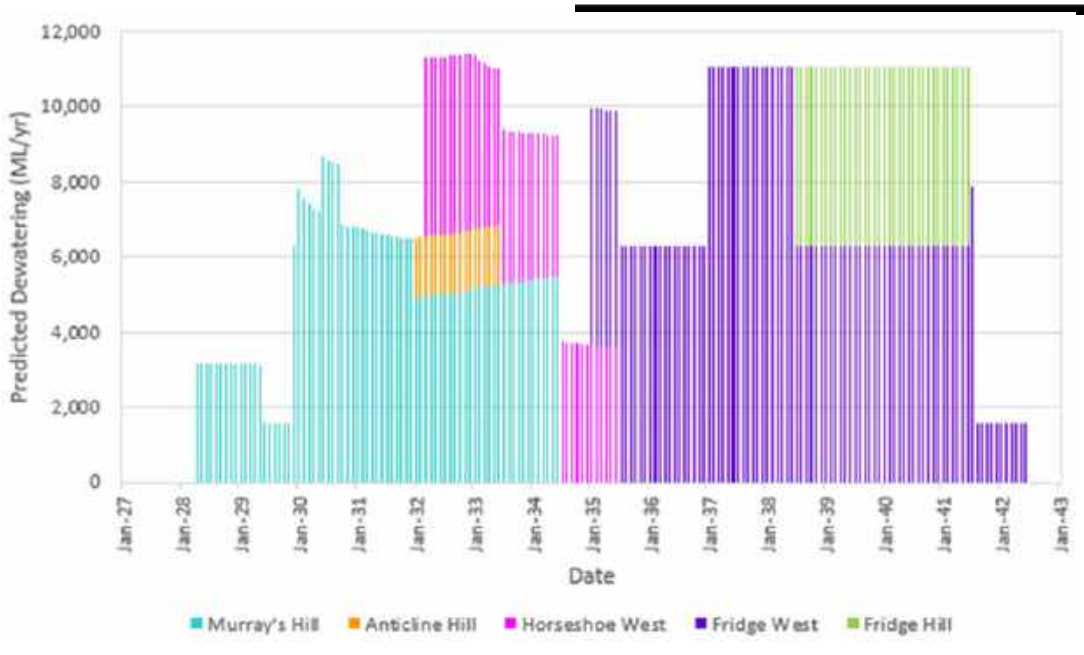
## 4.2 MAR

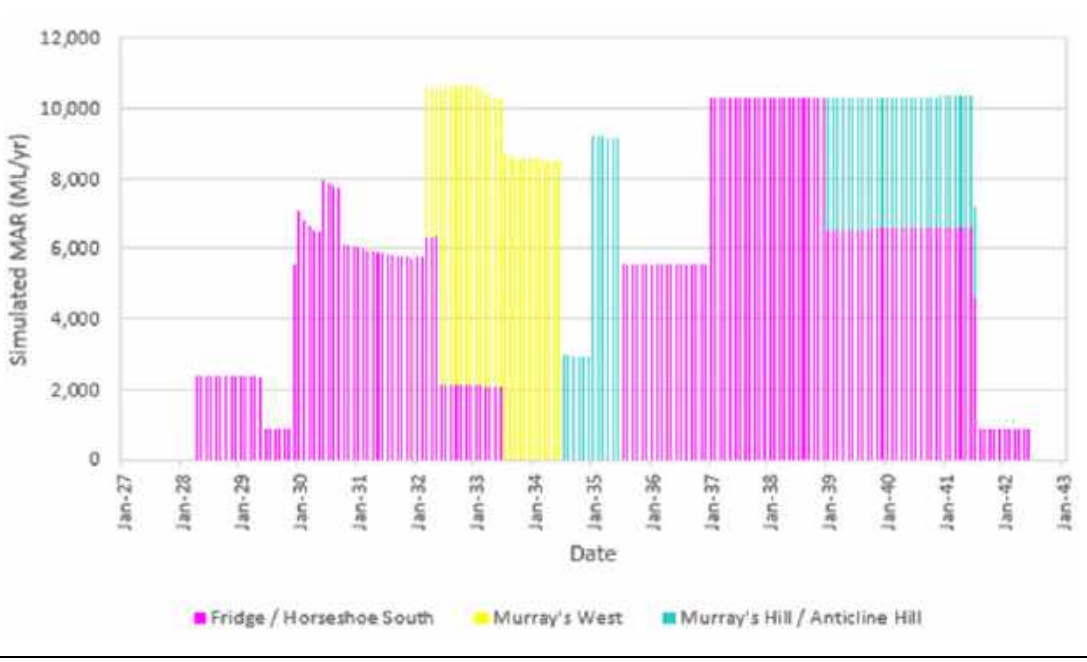
Once the proposed MAR bores (refer Table 2.3) have been installed, injection capacities / annual rates will be provided for each bore. Predicted re-injection rates by mining area, for the current mine plan (MDE_LOM_20), are presented in Figure 4.1.

MAR borefields will be operated for the sole purpose of disposing of surplus mine water. From an operational perspective, re-injection will be prioritised into areas furthest from active dewatering areas to reduce re-circulation. However, in line with HanRoy's environmental objectives, the distribution of MAR and individual bore injection rates will be managed under a general operating rule that aims to mitigate detrimental impact to vegetation, resulting from mounding.

The injection rates will be automated according to real-time water levels at monitoring bores on each MAR bore pad and in areas identified as having an increased risk of potential water logging, such that injection can be shut-off remotely and automatically if trigger / threshold criteria are reached.

As above, regular reviews of dewatering and mine planning will be undertaken such that surplus water forecasts are reviewed in conjunction with MAR borefield performance / aquifer response.



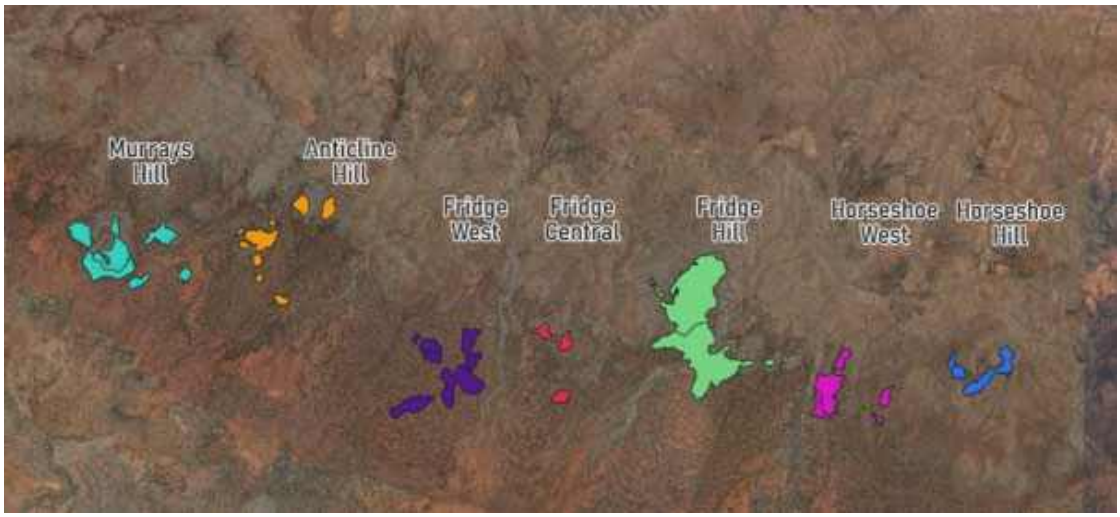




Figure 4.1 Predicted Dewatering and MAR for the Adopted Mine Schedule (reproduced from GWC 2024)

# 5. MONITORING AND REPORTING

Monitoring to be carried out under the GWOS is described in the sections below and includes recording abstraction and injection volumes and measuring groundwater level and quality. Data obtained from this monitoring will be compiled and reported annually in the GMS / GMR (refer Section 1.7) to comply with the requirements of the groundwater licence.

The objective of the monitoring is to collect adequate data to identify:

- Changes to the groundwater system occurring as a result of the Project.
- Trends that indicate potential future impacts such that appropriate management actions can be implemented in a timely manner.

## 5.1 Water Balance Measurements

A totalising (cumulative) flow meter will be installed at each active dewatering and MAR bore and will be recorded monthly. In addition, flow meters will be installed on key water transfer pipelines / offtakes such that monthly water use is recorded and can be categorised (i.e., for ore processing, dust suppression, potable use). As the details of all flow meters are not yet known, this data will be provided to DWER once meters have been installed.

The water meters will be inspected regularly for faults, maintenance will be undertaken as required and calibration will be carried out according to the manufacturer's specifications. Details of any significant meter maintenance and replacement will be collated throughout the water year and incorporated into the annual monitoring summary.

## 5.2 Groundwater Monitoring

The groundwater monitoring programme outlined below has been designed to collect adequate data to:

- Monitor groundwater levels in the pit areas in advance of mining, to allow for appropriate management actions to maintain dry mining conditions.
- Identify changes to the hydrogeological system, resulting from groundwater management activities (i.e., abstraction and re-injection) during mining.
- Identify trends, such that potential future impacts can be identified early to allow appropriate management actions to be implemented and detrimental impacts mitigated.

A summary of the proposed groundwater monitoring timing and frequency is provided in Table 5.1. Proposed environmental groundwater monitoring bores (i.e., for drawdown extent, increased salinity extent and mounding) are shown in Figure 5.1 and tabulated in Table 5.2.

Table 5.1 Proposed Monitoring Programme

| Bore Type | Monitoring Action | Frequency |
|---|---|---|
| Operational MAR Bores | Groundwater Quality - Laboratory Analysis[1] | Quarterly |
| | Groundwater Quality - Field Readings[1] | Monthly[2] |
| | Bore Water Levels – Production Bores | n/a[3] |
| | Groundwater Levels- Adjacent Monitoring Bores | Monthly[3] |
| | Salinity (EC) Profiles - Adjacent Monitoring Bores | Quarterly |
| Operational Dewatering Bores | Groundwater Quality - Laboratory Analysis | Annual |
| | Groundwater Quality - Field Readings | Monthly[2] |
| | Bore Water Levels | n/a[3] |
| Camp / Construction Water Supply Bores | Groundwater Quality - Laboratory Analysis | Quarterly |
| | Groundwater Quality - Field Readings | Monthly |
| | Bore Water Levels – Production Bores | n/a[3] |
| | Groundwater Levels- Adjacent / Nearby Monitoring Bores | Monthly |
| Mine Area Monitoring Bores (refer Section 5.2.1) | Groundwater Levels | Monthly[3] |
| Environmental Monitoring Bores for Drawdown Extent (refer Section 5.2.2 & Table 5.4) | Groundwater Levels | Continuous groundwater level measurements via loggers. Minimum of monthly readings. |
| Environmental Monitoring Bores for Mounding (refer Section 5.2.2 & Table 5.5) | Groundwater Levels | Continuous groundwater level measurements via loggers. Telemetry at high-risk mounding areas. |
| Environmental Monitoring Bores for Salinity (refer Section 5.2.2 & Table 5.6) | Groundwater Quality – Salinity Profiles | Quarterly when MAR is being undertaken in the vicinity |
| | Groundwater Quality – Laboratory Analysis (Basic Suite) & Field Readings | Bi-annually when MAR is being undertaken in the vicinity |
| | Groundwater Quality – EC Sensor | Continuous EC measurements via loggers. |

Notes:
Groundwater quality monitoring requirements are detailed in Section 5.2.4.
1 This may be from the MAR transfer pipeline(s) if the same water is going to all MAR bores
2 Continuous EC measurements for operational purposes only (not required for groundwater licence compliance)
3 Continuous water level measurements for operational purposes only (not required for groundwater licence compliance)

### 5.2.1 Mine Area Monitoring Bores

The monitoring bore network in the mining area will comprise in-pit and ex-pit bores, with many being sacrificial / temporary due to the progressive development of the various pits and mining areas. Changes to the monitoring bore network will be reported in the annual monitoring summary.

Groundwater level monitoring in the mine area will be used for the interpolation of monthly groundwater level elevation surfaces to assess dewatering progress and hydraulic connection across the wider area. This data will be compared with short and long-term mine plans. Groundwater level elevation contour surfaces for individual water years will be presented in the annual monitoring summary.

### 5.2.2 Environmental Monitoring Bores

To monitor and identify changes and trends associated with the environmental issues / risks identified in Section 3, specific bores have been nominated to monitor:

- The extent of groundwater drawdown (refer Table 5.4).
- The mounding of groundwater (refer Table 5.5).
- The extent of increases to groundwater salinity (refer Table 5.6).

Table 5.2 Summary of Proposed Environmental Groundwater Monitoring Bores

| Bore / Site | Easting | Northing | Stressor | Key Monitoring Parameter(s) | Receptor | Status | Tenement Status |
|---|---|---|---|---|---|---|---|
| MDE_MON_1 | 645718 | 7556531 | MAR / Dewatering | Salinity / Level - Drawdown | Other GW Users | Proposed | Tenement Required |
| MDE_MON_2 | 654703 | 7551910 | MAR | Salinity / Level - Mounding | Other GW Users / Vegetation | Proposed | On Tenement |
| MDE_MON_4 | 665185 | 7546959 | MAR | Salinity / Level - Mounding | Other GW Users / Vegetation | Proposed | Tenement Pending |
| MDE_MON_5 | 667964 | 7545368 | MAR | Salinity / Level - Mounding | Other GW Users / Vegetation | Proposed | Tenement Granted |
| MDE_MON_6 | 669255 | 7543432 | MAR | Salinity / Level – Mounding | Other GW Users / Vegetation | Proposed | Tenement Required |
| MDE_MON_7 | 671873 | 7543379 | MAR / Dewatering | Level – Mounding / Drawdown | Vegetation / Other GW Users | Proposed | Tenement Granted |
| MDE_MON_8 | 666653 | 7542993 | MAR | Level - Mounding | Vegetation | Proposed | Tenement Pending |
| MDE_MON_9 | 675125 | 7547815 | MAR / Dewatering | Salinity / Level - Drawdown | Other GW Users - Wirrilimurra | Proposed | On Tenement |
| MDE_MON_10 | 676395 | 7546188 | MAR | Salinity | Other GW Users - Wirrilimurra | Proposed | Tenement Required |
| MDE_MON_11 | 669636 | 7547030 | MAR | Salinity | Other GW Users | Proposed | Tenement Required |
| MDE_MON_12 | 671595 | 7545400 | MAR | Salinity | Other GW Users | Proposed | Tenement Required |
| MDE_MON_13 | 658610 | 7537800 | Dewatering | Level - Drawdown | Other GW Users - Youngaleena | Proposed | On Tenement |
| MDPZ7449A, B, C | 655657 | 7551787 | MAR | Salinity / Level - Mounding | Other GW Users / Vegetation | Existing | On Tenement |
| MDPZ7450A, B, C | 652219 | 7552541 | MAR | Level - Mounding | Vegetation | Existing | On Tenement |
| MDPZ7451A, B, C | 651347 | 7550579 | MAR | Level - Mounding | Vegetation / Claypans | Existing | On Tenement |
| MDPZ7456A, B, C | 665851 | 7547907 | MAR | Salinity / Level - Mounding | Other GW Users / Vegetation | Existing | On Tenement |
| MDPZ7460A, B, C | 663202 | 7547987 | MAR | Level - Mounding | Vegetation | Existing | On Tenement |
| MDPZ7461 | 656010 | 7542996 | Dewatering | Level - Drawdown | Other GW Users - Youngaleena | Existing | On Tenement |
| MDPZ7462A, B, C | 644800 | 7548089 | Dewatering | Level - Drawdown | Other GW Users | Existing | On Tenement |
| MDPZ7463 | 642867 | 7553588 | Dewatering | Level - Drawdown | Other GW Users | Existing | On Tenement |
| MDPZ7464 | 649944 | 7552428 | MAR | Salinity / Level – Mounding | Other GW Users / Vegetation | Existing | On Tenement |
| MDPZ7465, MDPZ0757 | 670005 | 7547881 | MAR | Salinity / Level – Mounding | Other GW Users / Vegetation | Existing | On Tenement |

| Bore / Site | Easting | Northing | Stressor | Key Monitoring Parameter(s) | Receptor | Status | Tenement Status |
|---|---|---|---|---|---|---|---|
| MDPZ7468A, B, C | 647191 | 7551524 | MAR | Level - Mounding | Vegetation / Koodjeepindarranna Claypan | Existing | On Tenement |
| MDPZ7469A, B, C | 657312 | 7550011 | MAR | Level - Mounding | Vegetation | Existing | On Tenement |
| MDPZ7470A, B, C | 661399 | 7546377 | MAR | Level - Mounding | Vegetation | Existing | On Tenement |
| MDPZ7471A, B, C | 646686 | 7549394 | MAR | Level - Mounding | Vegetation / Koodjeepindarranna Claypan | Existing | On Tenement |
| MDPZ7472 | 670921 | 7555275 | Dewatering | Level - Drawdown | Other GW Users | Existing | On Tenement |
| MDWB0011 | 660244 | 7557808 | Dewatering | Level - Drawdown | Other GW Users | Existing | On Tenement |
| MDWB0013 | 665270 | 7556265 | Dewatering | Level - Drawdown | Other GW Users | Existing | On Tenement |
| MDWB0034 | 652853 | 7555585 | MAR | Salinity | Other GW Users | Existing | On Tenement |

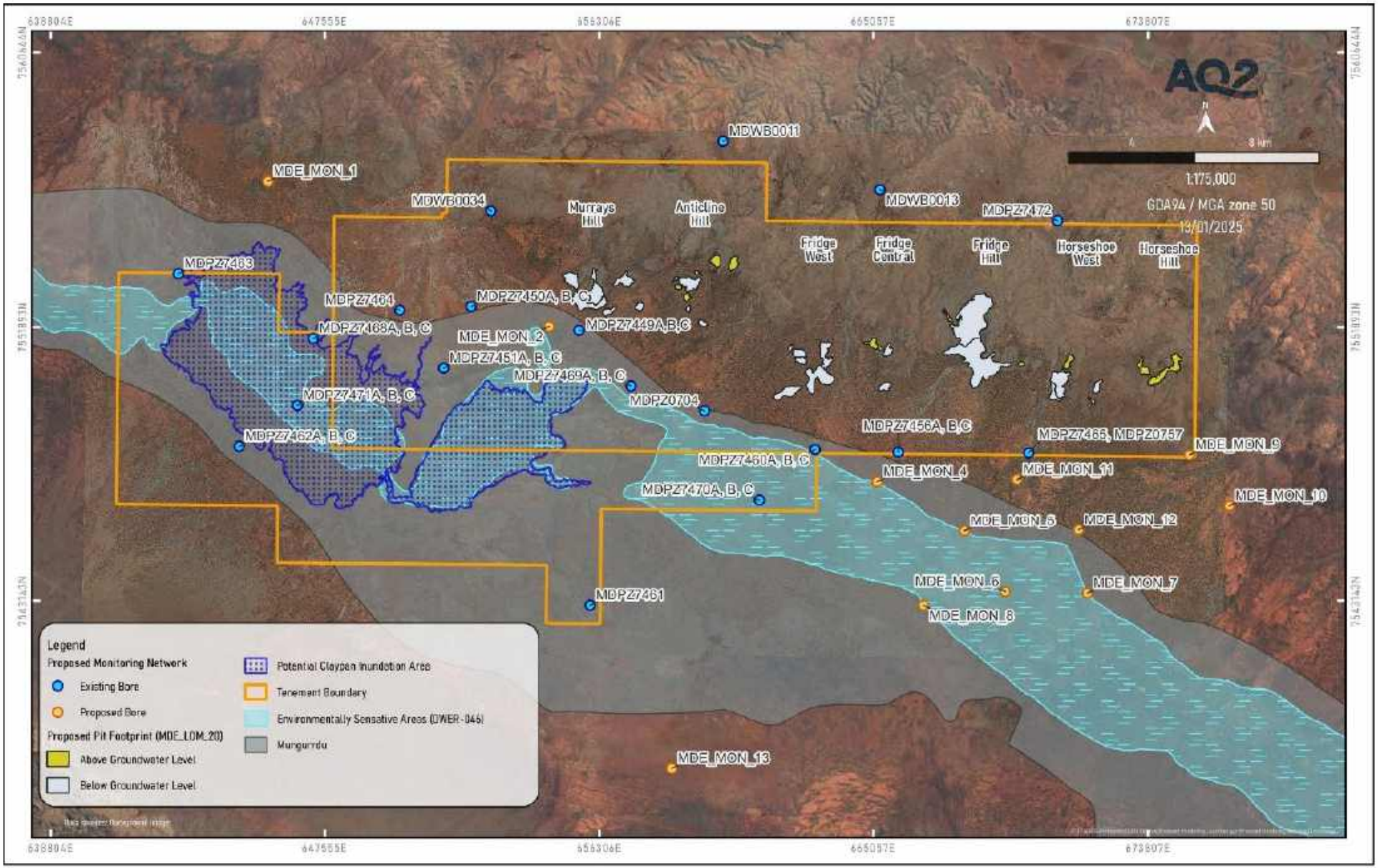



Figure 5.1 Environmental Monitoring Bore Locations

### 5.2.3 Groundwater Level Monitoring Approach

Groundwater level monitoring will be conducted as follows:

- Water levels will be measured from a standard measuring point (e.g., top of casing). Any change in the position of the reference point will be recorded and previous measurements adjusted accordingly.
- Water levels will be reported as metres below the standard reference point (m toc), below ground level (m bgl) and (if surveyed) metres above the Australian Height Datum (m AHD).

Field equipment used for manual water level readings will be well maintained and checked before each use and according to manufacturers' recommendations.

### 5.2.4 Groundwater Quality Monitoring Approach

As per Table 5.1, water samples will be collected for field measurements of pH and electrical conductivity (EC). Additional samples will be collected quarterly (i.e., every three months) for full chemical analysis (as per list in Table 5.3) by a reputable NATA-accredited laboratory. HanRoy may elect to analyse additional chemical parameters over the duration of the project, but this should not be considered standard and will be in addition to the suite of analysis outlined in Table 5.3.

Field test analysis methods shall be conducted in accordance with the equipment manufacturer instructions. The calibration of field pH/EC meters shall be conducted each time prior to sampling in accordance with manufacturer's instructions.

All methods and equipment used in water quality sampling should be undertaken in accordance with the Australian Standard AS/NZS 5667 (1998).

Table 5.3 Proposed Groundwater Chemistry Monitoring Suite

| Parameter | Reference | LOR (µg/L) |
|---|---|---|
| pH | APHA 4500 H | 0.1 pH units |
| Conductivity (EC) | APHA 2510B | 2 µS/cm |
| Ca, K, Mg, Na | USEPA 6020 | 1 µg/L |
| Alkalinity | APHA 2320B | 5 mg CaCO3/L |
| Sulfate (SO4) | APHA 4500 SO42- | 1 mg/L |
| Chloride (Cl) | APHA 4500 Cl- | 1 mg/L |
| Hardness by Calc | - | - |
| Solids, total dissolved (TDS, 180°C) | APHA 2540 C | 10 mg/L |
| Solids, total suspended (TSS, 103°C) | APHA 2540 D | 5 mg/L |
| Fluoride in Water | APHA 4500 F- | 0.1 mg/L |
| Silica (Reactive) | APHA 4500SiO2 | 0.05 mg/L |
| Nitrate as N | APHA 4500 NO3- | 0.05 mg/L |
| Nitrite as N | APHA 4500 NO2- | 0.05 mg/L |
| Dissolved Metals (Al, As, Ba, Be, Bi, B, Cd, Cr, Co, Cu, Hg, Pb, Mn, Mo, Ni, Sb, Se, Si, Ag, Sr, S, Tl, Sn, Ti, U, V, Zn) | USEPA 200.8/3050/6010B | 0.01 - 5 µg/L |

## 5.3 Trigger Levels

Provisional trigger and threshold levels relating groundwater level and quality have been documented in the Project Water Management Plan (HanRoy 2024) and are subject to approval by the Environmental Protection Authority (EPA).

### 5.3.1 Abstraction Trigger Levels

To prevent the exceedance of the GWL annual allocation limit, monthly abstraction volumes will be assessed together with mine plans and dewatering forecasts. In addition, a warning trigger level will be set when the cumulative abstraction reaches 80% of the annual allocation limit.

On any exceedance of a warning dewatering abstraction trigger value, HanRoy will conduct an internal review to determine the cause of the warning trigger breach and reassesses dewatering / abstraction forecasts.

### 5.3.2 Water Level Trigger Values

Provisional trigger levels for groundwater levels have been developed bespoke to mine development progression, modelled hydrogeologic regime responses to dewatering and MAR and available ecohydrological data to date. Provisional bore-specific triggers and monitoring bore locations are presented in Table 5.4, Table 5.5 and Figure 5.1.

### 5.3.3 Groundwater Quality Trigger Values

Provisional trigger levels for groundwater salinity concentrations have been developed bespoke to mine development progression and modelled hydrogeologic regime responses to dewatering and MAR. Provisional bore-specific triggers and monitoring bore locations for assessing the extent of groundwater salinity increase resulting from MAR are presented in Table 5.6 and Figure 5.1.

Additional water quality trigger and threshold values are likely to be adopted upon EPA approval of the Project Water Management Plan.

Table 5.4 Proposed Drawdown Extent Monitoring Bores with Provisional Trigger Values

| Bore / Site | Easting | Northing | Stressor | Monitoring Parameter | Receptor | Status | Tenement Status | Baseline Groundwater Level (mbgl)* | Groundwater Level Trigger** | Groundwater Level Threshold |
|---|---|---|---|---|---|---|---|---|---|---|
| MDE_MON_1 | 645718 | 7556531 | Dewatering | Water Level – Drawdown Extent | Other GW Users | Proposed | Tenement Required | 9.5 | 1 m ddn | tbc |
| MDE_MON_7 | 671873 | 7543379 | Dewatering | Water Level – Drawdown Extent | Other GW Users | Proposed | Tenement Granted | 3.5 | 1 m ddn | tbc |
| MDE_MON_9 | 675125 | 7547815 | Dewatering | Water Level – Drawdown Extent | Other GW Users | Proposed | On Tenement | 20 | 1 m ddn | tbc |
| MDE_MON_13 | 658610 | 7537800 | Dewatering | Water Level – Drawdown Extent | Other GW Users - Youngaleena | Proposed | On Tenement | 4.5 | 1 m ddn | tbc |
| MDPZ7462A, B, C | 644800 | 7548089 | Dewatering | Water Level – Drawdown Extent | Other GW Users | Existing | On Tenement | 4.67 | 1 m ddn | tbc |
| MDPZ7461 | 656010 | 7542996 | Dewatering | Water Level – Drawdown Extent | Other GW Users - Youngaleena | Existing | On Tenement | 4.41 | 2.5 m ddn | tbc |
| MDPZ7463 | 642867 | 7553588 | Dewatering | Water Level – Drawdown Extent | Other GW Users | Existing | On Tenement | 5.36 | 1 m ddn | tbc |
| MDPZ7472 | 670921 | 7555275 | Dewatering | Water Level - Drawdown Extent | Other GW Users | Existing | On Tenement | 15.18 | 1 m ddn | tbc |
| MDWB0011 | 660244 | 7557808 | Dewatering | Water Level – Drawdown Extent | Other GW Users | Existing | On Tenement | 22.6 | 1 m ddn | tbc |
| MDWB0013 | 665270 | 7556265 | Dewatering | Water Level – Drawdown Extent | Other GW Users | Existing | On Tenement | 17.08 | 1 m ddn | tbc |

ddn = drawdown

tbc = to be confirmed based on trigger level assessment

* Groundwater levels for proposed bores are estimates

** Groundwater level depth (as opposed to drawdown) will be identified prior to operation, based on complete set of baseline data

Table 5.5 Proposed Mounding Monitoring Bores with Provisional Trigger & Threshold Values

| Bore / Site | Easting | Northing | Stressor | Monitoring Parameter | Receptor | Status | Tenement Status | Baseline Groundwater Level (mbgl)* | Groundwater Level Trigger | Groundwater Level Threshold |
|---|---|---|---|---|---|---|---|---|---|---|
| MDE_MON_4 | 665185 | 7546959 | MAR | Water Level - Mounding | Mounding at break of slope | Proposed | Tenement Pending | 4.5 | 3 mbgl | 2.5 mbgl |
| MDE_MON_5 | 667964 | 7545368 | MAR | Water Level - Mounding | Mounding at break of slope | Proposed | Tenement Pending | 4 | 3 mbgl | 2.5 mbgl |
| MDE_MON_6 | 669255 | 7543432 | MAR | Water Level - Mounding | Mounding on valley floor | Proposed | Tenement Pending | 3.5 | min baseline DTW | min baseline DTW less 0.5m |
| MDE_MON_7 | 671873 | 7543379 | MAR | Water Level - Mounding | Mounding at break of slope | Proposed | Tenement Pending | 3.5 | min baseline DTW | min baseline DTW less 0.5m |
| MDE_MON_8 | 666653 | 7542993 | MAR | Water Level - Mounding | Mounding on valley floor | Proposed | Tenement Pending | 3.5 | min baseline DTW | min baseline DTW less 0.5m |
| MDPZ0704 | 659649 | 7549220 | MAR | Water Level - Mounding | Mounding at break of slope | Existing | On Tenement | 4.43 | 3 mbgl | 2.5 mbgl |
| MDPZ7449A,B,C | 655657 | 7551787 | MAR | Water Level - Mounding | Mounding at break of slope | Existing | On Tenement | 4.71 | 3 mbgl | 2.5 mbgl |
| MDPZ7450A, B, C | 652219 | 7552541 | MAR | Water Level - Mounding | Tracking mounding for break of slope | Existing | On Tenement | 5.78 | 3 mbgl | 2.5 mbgl |
| MDPZ7451A, B, C | 651347 | 7550579 | MAR | Water Level - Mounding | Mounding near Claypans | Existing | On Tenement | 4.34 | 3 mbgl | 2.5 mbgl |
| MDPZ7456A, B,C | 665851 | 7547907 | MAR | Water Level - Mounding | Tracking mounding for break of slope | Existing | On Tenement | 7.91 | 3 mbgl | 2.5 mbgl |
| MDPZ7460A, B, C | 663202 | 7547987 | MAR | Water Level - Mounding | Mounding at break of slope | Existing | On Tenement | 4.68 | 3 mbgl | 2.5 mbgl |
| MDPZ7464 | 649944 | 7552428 | MAR | Water Level - Mounding | Tracking mounding for break of slope | Existing | On Tenement | 6.47 | 3 mbgl | 2.5 mbgl |
| MDPZ7465, MDPZ0757 | 670005 | 7547881 | MAR | Water Level - Mounding | Tracking mounding for break of slope | Existing | On Tenement | 15.48 | 3 mbgl | 2.5 mbgl |
| MDPZ7468A, B, C | 647191 | 7551524 | MAR | Water Level - Mounding | Koodjeepindarranna Claypan | Existing | On Tenement | 4.49 | 3 mbgl | 2.5 mbgl |
| MDPZ7469A, B, C | 657312 | 7550011 | MAR | Water Level - Mounding | Mounding at break of slope | Existing | On Tenement | 2.96 | min baseline DTW | min baseline DTW less 0.5m |
| MDPZ7470A, B, C | 661399 | 7546377 | MAR | Water Level - Mounding | Mounding on valley floor | Existing | On Tenement | 3.61 | min baseline DTW | min baseline DTW less 0.5m |
| MDPZ7471A, B, C | 646686 | 7549394 | MAR | Water Level - Mounding | Koodjeepindarranna Claypan | Existing | On Tenement | 3.86 | 3 mbgl | 2.5 mbgl |

DTW = Depth to water

* Groundwater levels for proposed bores are estimates

Table 5.6 Proposed Salinity Monitoring Bores with Provisional Trigger Values

| Bore / Site | Easting | Northing | Stressor | Monitoring Parameter | Receptor | Status | Tenement Status | Baseline EC (uS/cm)* | Salinity Trigger (TDS as mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| MDE_MON_1 | 645718 | 7556531 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Proposed | Tenement Required | 1,000 | 4,500 |
| MDE_MON_2 | 654703 | 7551910 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Proposed | On Tenement | 3,500 | 4,500 |
| MDE_MON_4 | 665185 | 7546959 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Proposed | Tenement Pending | 4,500 | 4,500 |
| MDE_MON_5 | 667964 | 7545368 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Proposed | Tenement Granted | 4,500 | 4,500 |
| MDE_MON_7 | 671873 | 7543379 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Proposed | Tenement Pending | 4,300 | 4,500 |
| MDE_MON_9 | 675125 | 7547815 | MAR | Water Quality - Salinity | Other GW Users - Wirrilimarra | Proposed | On Tenement | 1,000 | 4,500 |
| MDE_MON_10 | 676395 | 7546188 | MAR | Water Quality - Salinity | Other GW Users - Wirrilimarra | Proposed | Tenement Required | 1,500 | 4,500 |
| MDE_MON_11 | 669636 | 7547030 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Proposed | Tenement Required | 3,500 | 4,500 |
| MDE_MON_12 | 671595 | 7545400 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Proposed | Tenement Required | 3,500 | 4,500 |
| MDE_MON_6 | 669255 | 7543432 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Proposed | Tenement Required | 5,000 | 4,500 |
| MDPZ7449B | 655657 | 7551787 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Existing | On Tenement | 2,000 | 4,500 |
| MDPZ7456C | 665851 | 7547907 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Existing | On Tenement | 4,400 | 4,500 |
| MDPZ7464 | 649944 | 7552428 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Existing | On Tenement | 2,200 | 4,500 |
| MDPZ7465, MDPZ0757 | 670005 | 7547881 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Existing | On Tenement | 1,700 | 4,500 |
| MDPZ7469C | 657312 | 7550011 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Existing | On Tenement | 3,200 | 4,500 |
| MDWB0034 | 652853 | 7555585 | MAR | Water Quality - Salinity | Shallow Fresher GW - Other GW Users | Existing | On Tenement | 1,500 | 4,500 |

*EC for proposed bores are estimates

# 6. CONTINGENCY PROGRAMME

The monitoring outlined in this GWOS and additional monitoring outlined in the Project's Water Management Plan and Subterranean Fauna Monitoring and Management Plan will allow the on-going assessment of changes to the groundwater system and early detection of potential adverse impacts.

In the event that drawdown, mounding or salinity triggers are reached as a result of the Project operations and the trends / re-forecasted changes indicate an increased risk of potential adverse impacts, contingency actions may include:

- Adjust the distribution of MAR to mitigate drawdown or reduce mounding.
- Reduce dewatering rates / modify mine plan to reduce surplus water for MAR.

In the event that a third party water supply availability is impacted, HanRoy will provide a water supply.

# 7. WATER USE EFFICIENCY

HanRoy will make every effort to maximise water recycling, minimise water use and effectively manage and dispose of surplus water by MAR injection.

The delivery system for groundwater pumped and reinjected will be designed using best practice methods to minimise the likelihood of uncontrolled water loss. Telemetry and cut-off switches will be used to prevent overfilling of containment structures and water tanks whilst visual inspections of bore headworks and water pipelines will be carried out routinely to ensure that potential leaks are identified as soon as possible and corrected efficiently.

HanRoy will continually attempt to improve water use efficiency as part of the ongoing water management programme.

# 8. SUMMARY OF COMMITMENTS

As described in this document, HanRoy make the following commitments with respect to managing groundwater at the Mulga Downs Project:

- HanRoy will submit an annual monitoring report (GMS/GMR) to the DWER by the required due date (yet to be determined) each year. The report will detail the results of monitoring for the preceding water year.
- As part of the annual reporting and on-going operational assessments, HanRoy will review groundwater / aquifer trends. Should these indicate potentially adverse impacts, HanRoy will investigate measures to avoid such impacts, such as reprioritisation / rescheduling of dewatering or injection alternative MAR bores or borefields.
- HanRoy will review the GWOS on an annual basis and revise as required. Major revisions will be submitted to the DWER for approval.
- The total borefield abstraction volume (Dewatering and Water Supply) will not exceed the proposed licence allocation of 12 GL/a. If this limit is to be exceeded, prior notification will be made to the DWER outlining the reasons for exceedance and assess potential impacts associated with the increased abstraction.

HanRoy will monitor the following:

- Water Balance Monitoring:
  - Monthly abstraction volumes for individual dewatering and water supply bores.
  - Monthly injection volumes for individual MAR bores.
  - Monthly water use volumes.
- Production Bore Monitoring (Dewatering, Water Supply and MAR):
  - Monthly water quality sampling for field measurements (pH & EC) at all operational bores.
  - Annual water quality sampling for full laboratory analysis of operational dewatering and water bores.
  - Quarterly water quality sampling for full laboratory analysis of operational MAR bores (this may be from the MAR transfer pipeline(s) if the same water is going to all MAR bores).
- Mine Area and MAR Borefield Monitoring:
  - Monthly groundwater levels in designated monitoring bores in active mining areas.
  - Monthly groundwater levels in monitoring bores adjacent to operational MAR bores.
  - Quarterly salinity (EC) profiles in monitoring bores adjacent to operational MAR bores.
- Drawdown Extent Monitoring Bores:
  - Monthly groundwater levels.
- Mounding Monitoring Bores:
  - Monthly groundwater levels.
- Salinity Monitoring Bores:
  - Quarterly salinity (EC) profiles.
  - Bi-annual sampling, field readings and laboratory analysis.
  - Continuous EC measurements via data loggers.

# 9. REFERENCES

DWER 2020. Use of operating strategies in the water licensing process. October 2020. Formerly operational policy 5.08.

Groundwater Consulting (GWC) 2024. Mulga Downs Groundwater Modelling. Unpublished report to Darkwater Consulting. November 2024.