



**KATANNING GOLD PROJECT**  
**Integrated Hydrogeological Report**  
**Version D**  
**November 2025**

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## Executive Summary

Ausgold Limited's (Ausgold) proposes to develop its Katanning Gold Project (KGP; the Project) located approximately 275 km southeast of Perth and 37 km northeast of Katanning, in the Great Southern Region of Western Australia (Figure 1-1). The Project consists of a series of open pit mines namely Jinkas, Jackson, Olympia and Dingo and associated infrastructure. The Project is designed to treat gold ore at an average rate of 3.6 Mtpa from the abovementioned Katanning Gold Mineral Reserves through a conventional Carbon in Leach (CIL) circuit to produce 1.14 Moz of gold doré over a 10-year mine life.

As part of the range of environmental impact assessments for the Project, Ausgold commissioned a series of hydrogeological investigations including a detailed draft *H3 Hydrogeological Assessment*.

This report consolidates the series of investigations conducted and offers a singular source of collated information on the investigations undertaken to date, as well as outlining applied methodologies, data, key findings and proposed additional investigations to fully characterise potential hydrogeological effects and management thereof.

It is anticipated that this Report will support a referral under Section 38 of the *Environmental Protection Act 1986* (EP Act) as well as an application for a groundwater licence or amendment to the existing licence in accordance with the *Rights in Water and Irrigation Act 1914* (RiWI Act).

## Completed Investigations

Ausgold commissioned SRK Consulting (Australasia) Pty Ltd (SRK) to undertake hydrogeological field investigations, aquifer testing, and associated assessments for the hydrogeological assessment for the Project to meet the requirements of Operational Policy No. 5.12 Hydrogeological reporting associated with a groundwater licence (DWER, 2009) (SRK, 2025).

Rockwater was subsequently engaged to conduct a technical review of SRK's hydrogeological report and produce a numerical groundwater model for the Project and predict pit dewatering rates (Rockwater, 2025a). A memorandum outlining the outcomes of calibrated and verified groundwater modelling is provided in Appendix 2.

In order to more-fully characterise salinity gradients within the hydrogeological profile within and surrounding the proposed mine pits for the Project, Ausgold commissioned Hydrobiology WA (HBWA) to assess the distribution of groundwater salinity with depth, elevation and aquifer type (HBWA, 2025b) and the potential presence of Groundwater Dependent Ecosystems (GDEs) in the region (Hydrobiology, 2025a). Baseline salinity conditions in nearby surface water systems, potential receptors for any future discharge, were also evaluated. The findings are intended to inform operating opportunities associated with lower salinity groundwater generated through dewatering activities (Appendix 3).

WSP were engaged to undertake the Site-wide Water Balance (WSP, 2025b) with the report provided in Appendix 4. Ausgold also commissioned WSP Australia Pty Ltd (WSP) to develop the Surface Water Management Plan (SWMP) and design of a surface water management structures for the Project (WSP, 2025a). The SWMP report is provided in Appendix 5.

## Key Outcomes

The site's annual water demand would be largely at the processing plant and it is estimated at approximately 3.6 GL/year. After inbounding water in the earliest operational years, this annual demand is forecast to be primarily met through return water from the Tailings Storage Facility (TSF) and inflows from pit dewatering below the water table.

Regional groundwater flow generally follows surface topography, trending from elevated zones near Central Pit (~356 m RL) toward creeks and drainage lines. Dingo Pit (southern mining zone) appears to act as a local groundwater sink, likely due to evaporative losses. The lowest observed groundwater level is 265 m RL to the north of the site. Regional bores intersecting major structures (e.g., WERC007, WERC006A) exhibit shallow water levels and likely confined to artesian conditions. Groundwater levels show subdued seasonal variability, with typical fluctuations of 1–2 m and isolated changes up to 4 m. A lag of 1–2 months between peak rainfall and water level response suggests the presence of low-permeability cover enabling recharge.

Groundwater quality is highly variable; electrical conductivity (EC) values range from ~900 to over 100,000  $\mu\text{S}/\text{cm}$ , with increasing salinity observed at lower elevations. Most water samples are classified as saline, and total dissolved solids (TDS) often exceed livestock water guidelines. pH ranges from 4.0 to 9.6. Major ions are dominated by sodium-chloride facies. Several samples exceed guideline values for chloride, sodium, sulphate, iron, manganese, selenium, vanadium, and nitrate. These exceedances highlight the importance of continued groundwater monitoring and further characterisation of aquifer geochemistry to inform future water management and environmental approvals.

Groundwater inflow estimates over the life of mine vary considerably, with numerical modelling undertaken by both SRK (2025) and Rockwater (2025a) highlighting uncertainty in predicted pit inflows. A detailed comparison of the modelling approaches and outcomes is provided in Section 5. The work of Rockwater (2025a) underpins the forecasts for the site water supply and its dynamic balance.

SRK (2025) constructed a detailed numerical model with a 12 year, linear bench progression schedule and predicted base case pit inflows that varied significantly. As part of a peer review process, Rockwater (2025a) developed a simplified, alternative numerical model to assess the sensitivity of these initial model predictions. Using a quarterly bench progression over a 10-year mine life, Rockwater's model estimated significantly lower average inflows of approximately 0.4 GL/year.

Initially, a divergence in modelled outcomes was primarily due to differing assumptions regarding the extent and hydraulic connectivity of geologic fault zones in fractured and country rock. SRK's model had assumed regionally extensive, vertically continuous, and hydraulically connected faults that act as preferential flow paths, whereas Rockwater, based on its review of core logs and in consultation with Ausgold geologists, adopted a model framework that fault transmissivity significantly diminishes below 150 m AHD in the vicinity of the proposed below water table in surface pits once in country rock, and is considered more realistic of known field conditions and finer-scaled geologic mapping.

Both modelling approaches acknowledge uncertainty in key input parameters, particularly fault geometry and hydraulic conductivity. Accordingly, further hydrogeological investigations, including additional drilling, extended aquifer testing, and targeted fault zone characterisation, is scheduled to improve the site conceptual model. This will support the development of a refined, fit for purpose numerical model in line with Australian Groundwater Modelling Guidelines.

An initial mine site-wide water balance was conducted by WSP (2025b) which determined that additional makeup water will be required to initially supplement supply here will be a water deficit during dry months of the year and borefield make up is therefore required at an average of approximately 300 ML/yr.

Rockwater (2025a) revised the WSP detailed water balance model for the site based on updated pit inflow modelling and updated pit void storage volumes, from which recalculated supply borefield makeup volumes surplus water volumes were made. The revised water balance forecasts that additional makeup water will only be required in Year 1. Balanced out surplus water from Year 2 onwards of the mine operations will be managed such as to avoid effects to downstream surface waters or groundwater levels (i.e., through direct recharge or infiltration or discharge back into the aquifer via creeks, or bores).

Ausgold commissioned HBWA (2025a) to conduct a desktop risk assessment of potential GDEs near the proposed groundwater production zones which used national GDE mapping (as sourced from the Bureau of Meteorology (BoM) GDE Atlas), groundwater drawdown zones, and satellite-derived vegetation and climate data. Normalised Difference Vegetation Index (NDVI) and Aridity Index (AI) were analysed to assess vegetation responses during drought periods. Vegetation that remained relatively healthy during drought was considered more likely to access groundwater, while vegetation with low or seasonal NDVI was excluded as groundwater dependent. NDVI declined significantly between 2020–2021 and 2022–2024, consistent with increased aridity.

A total of 21 terrestrial (1,14.91 ha) and 10 aquatic GDEs (137.67 ha) were identified and assessed. Of these, all terrestrial GDE were classified as Low Potential. Four aquatic GDEs were classified as High Potential, four Moderate Potential and one Low Potential. HBWA (2025a) determined that of the four High Potential aquatic GDEs, only one was assessed to be an obligate GDE; however, its location on the boundary of the area meeting the assessment criteria (where predicted drawdown is >1.0 m after 10 years extraction, and where depth to groundwater <10 m)) reduces the risk. Most terrestrial and aquatic GDEs across the study area were in close proximity to intensive agricultural operations or infrastructure.

The distribution of potential aquatic and terrestrial GDEs proximal to the Project, relative to test production bores (potential supply sites), is shown in Figure 5-7.

Modelled drawdown extents of pit dewatering indicate that adverse effects on GDEs are very unlikely when considering the following factors:

- It is anticipated that there is little connection between the bedrock aquifer and shallow surficial aquifer systems, where GDEs will be drawing groundwater from, due to aquitards. Therefore, drawdown response within the bedrock aquifer should not transmit significantly through to surficial aquifers.
- Some of the potential GDEs identified reside in upper-catchment settings, reducing the susceptibility to widespread drawdown impact. The higher rates of natural freshwater recharge in upper catchments can also help mitigate the potential effects of groundwater fluctuations.
- The local watercourses are largely ephemeral and degraded, meaning they are naturally resilient to intermittent often-salty water availability.
- Groundwater drawdown due to dewatering could also have a positive influence on ecosystems or farm land already impacted by clearing and associated dryland salinity.

Subject to further evaluation of potential drawdown effects and the likelihood of impacting known GDEs, the study concluded that risks from groundwater abstraction were rated between moderate to low.

Rockwater's (2025a) mapped intersections provide a useful screening tool for identifying and prioritising the need for and focus of additional ground truthing to refine the GDE occurrence. Project design and implementation will therefore adopt a precautionary approach to managing potential ecological impact as far as practicable and commensurate with identified risks to these systems.

## Conclusions

Ausgold has committed substantial resources to defining, investigating, assessing and quantifying the range of potential surface hydrological and groundwater hydrogeological constraints associated with its proposed operations at the KGP.

The body of work completed to date as summarised in this document has drawn from an iterative approach to the range of studies to enable progressive refinement of assumptions, conclusions and quantification of the nature and scale of potential environmental risks.

Whilst further work will continue to expand the knowledge base of the hydrogeological regime and how this may influence the overall site water balance, sufficient information is in hand to demonstrate that the project can be designed and managed to ensure adverse hydrological and hydrogeological risks will be adequately mitigated to meet the Environmental Protection Authority's key environmental objectives for Inland Waters.

Ausgold is therefore confident that assessment of pending applications under the RiWI Act and Part V of the EP Act enables all necessary mitigation measures and controls to be adequately and comprehensively regulated by respective agencies and that potential impacts will be adequately mitigated to achieve desired environmental outcomes and objectives.

# Table of Contents

**Executive Summary..... i**

    Completed Investigations..... i

    Key Outcomes..... ii

    Conclusions..... iv

**List of Abbreviations ..... viii**

**1. Introduction ..... 1**

    1.1 Purpose of Report ..... 1

    1.2 Applicant Details..... 1

        1.2.1 Contact Details..... 1

**2. Katanning Gold Project Background and Overview ..... 4**

    2.1 Project History ..... 4

    2.2 Katanning Gold Project Overview ..... 4

**3. Receiving Environment Descriptions ..... 6**

    3.1 Regional Setting..... 6

    3.2 Climate..... 6

    3.3 Flora and Vegetation ..... 7

        3.3.1 Flora ..... 7

        3.3.2 Vegetation Associations..... 8

        3.3.3 Priority and Threatened Ecological Communities..... 8

        3.3.4 Groundwater Dependent Ecosystems ..... 9

    3.4 Fauna ..... 10

        3.4.1 Conservation Significant Fauna..... 10

    3.5 Hydrology ..... 11

        3.5.1 Regional Groundwater Conditions..... 12

        3.5.2 Water Quality Assessment Methodology ..... 14

        3.5.3 Water Quality Results ..... 16

        3.5.4 Water Quality Assessment – Conclusions and Recommendations..... 19

        3.5.5 Groundwater Users and Management ..... 19

        3.5.6 Other Groundwater Users ..... 19

        3.5.7 Permits Held under the *Rights In Water and Irrigation Act 1914* ..... 20

    3.6 Geology..... 20

    3.7 Soils..... 25

    3.8 Materials Characterisation ..... 27

    3.9 Acidic and/or Metalliferous Drainage (AMD)..... 28

**4. Project Development and Implementation Overview ..... 30**

    4.1 Water Requirements ..... 32

    4.2 Raw Water Supply ..... 32

    4.3 Bores and Pipelines ..... 34

    4.4 Dewatering..... 34

    4.5 Site Water Conceptualisation..... 34

    4.6 Site Water Balance ..... 36

4.7 Proposal Development Schedule .....38

**5. Hydrological and Hydrogeological Assessments.....39**

5.1 Refinement in Predicted Pit Dewatering Volumes.....40

5.2 Basis of Hydrogeological Assessment .....41

5.3 Numerical Groundwater Model .....42

5.4 Rockwater Model Results.....43

5.5 Modelled Drawdown and Recovery .....43

5.6 Identified Groundwater Risks.....51

5.6.1 GDEs within Drawdown Extent ..... 51

5.6.2 Water Supply Availability ..... 58

5.6.3 Uncontrolled Release of Groundwater to Environment ..... 58

5.7 Risk Assessment Matrix.....59

5.8 Hydrogeological Assessments – Conclusions and Recommendations.....60

5.8.1 Conclusions – Groundwater Assessment..... 60

**6. Site-Wide Water Balance (WSP, 2025a) .....62**

6.1 Model Overview .....62

6.1.1 Objectives and Considerations ..... 62

6.1.2 Software..... 62

6.1.3 Conceptualisation ..... 63

6.1.4 Model Input Data ..... 64

6.2 Water Balance Model Results .....67

6.3 Site Water Balance Recommendations ..... 68

**7. Surface Water Management Plan (WSP, 2025b) .....69**

7.1 SWMP Basis of Design .....69

7.2 Hydrologic and Hydraulic Modelling .....70

7.3 Model Results .....70

**8. References.....73**

List of Tables

Table 1-1: Applicant Details.....1

Table 1-2: Authorised Representatives .....1

Table 3-1: Vegetation condition ratings for a preliminary version of development envelope .....9

Table 3-2: Surface Water and Groundwater Salinity in TDS (mg/L) .....18

Table 3-3: Stratigraphy and Aquifer Potential of the Blackwood Catchment .....22

Table 4-1: Updated Water Balance Table (modified from Table 4.28 from WSP, 2025) .....37

Table 4-2: Forecast Project Milestones .....38

Table 5-1: Model Parameters .....42

Table 5-2: Predicted Dewatering Rates for each Pit Area .....43

Table 5-3: Drawdown and Recovery Statistics for each Pit and Supply Borefield .....44

Table 5-4: Calculated area after 10 year’s groundwater extraction .....51

Table 5-5: GDE Risk Assessment.....57

Table 5-6: Risk Assessment Matrix .....59

Table 6-1: TSF Inflows and Outflows .....	65
Table 6-2: Pit Inflows and Outflows .....	66
Table 6-3: Sediment Pond Inflows and Outflows .....	67
Table 7-1: Surface Water TUFLOW Modelling Scenarios .....	70

## List of Figures

Figure 1-1: Regional Location .....	2
Figure 1-2: Proposed Premises Layout and Tenements .....	3
Figure 3-1: Average annual climate data for Badgebup weather station (2010–2024).....	7
Figure 3-2: Regional Baseline Conditions Groundwater Contours.....	13
Figure 3-3: Location of Groundwater and Surface Water Sampling Sites within and around the Project area	15
Figure 3-4: Groundwater Salinity vs. Depth across various aquifer types .....	17
Figure 3-5: Groundwater Salinity vs. Elevation across various aquifer types .....	17
Figure 3-6: Medians and 20th to 80th percentile ranges for Surface Water and Groundwater Salinity.....	18
Figure 3-7: Regional Topography .....	21
Figure 3-8: Regional Bedrock Geology (GSWA) .....	23
Figure 3-9: Mapped Surface Geology (Ausgold) (adopted by Rockwater (2025a)).....	24
Figure 3-10: Indicative Mine General Arrangement over Baseline Soils.....	26
Figure 3-11: SRK (2025) Waste Rock Screening Results Summary.....	29
Figure 4-1: Ore Processing Flow Diagram .....	31
Figure 4-2: Test Production Bore Locations .....	33
Figure 4-3: Conceptual Project Water Sources and Sinks .....	35
Figure 5-1: Groundwater Drawdowns at end of Year 3 .....	45
Figure 5-2: Groundwater Drawdowns at end of Year 5 .....	46
Figure 5-3: Groundwater Drawdowns at end of Year 7 .....	47
Figure 5-4: Groundwater Drawdowns at end of Year 10 .....	48
Figure 5-5: Groundwater Drawdowns at end of Year 20 .....	49
Figure 5-6: Simulated Groundwater Drawdowns and Recoveries .....	50
Figure 5-7: Potential GDEs relative to Test Production Bores (potential supply sites) .....	53
Figure 5-8: Potential Terrestrial GDEs within 10 m depth to water where > 1.0 m drawdown (purple area) ..	54
Figure 5-9: Potential Aquatic GDEs within 10 m depth to water where > 1.0 m drawdown (purple area).....	55
Figure 6-1: Simplified Process Flow Diagram for KGP .....	63
Figure 7-1: Maximum Flooding Depth with Without Mitigations .....	71
Figure 7-2: Maximum Flooding Depth with Mitigations .....	72

## List of Appendices

Appendix 1: Groundwater Dependent Ecosystems (HBWA, 2025a).....	75
Appendix 2: Groundwater Modelling Summary, Katanning Gold Project. (Rockwater, 2025a) .....	76
Appendix 3: Assessment of Groundwater Salinity (Hydrobiology, 2025) .....	77
Appendix 4: Site-Wide Water Balance (WSP, 2025b) .....	78
Appendix 5: Surface Water Management Plan (WSP, 2025a) .....	79
Appendix 6: Katanning Gold Project – Review of Model-derived Pit Dewatering Estimates (EMM, 2025) .....	80

## List of Abbreviations

Term	Definition
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AI	Aridity Index
AMD	Acidic and/or Metalliferous Drainage
ANC	Acid Neutralising Capacity
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASC	Australian Soil Classification
Ausgold	Ausgold Limited
BC Act	<i>Biodiversity Conservation Act 2016 (WA)</i>
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
CCIA	Climate Change in Australia
CIL	Carbon in Leach processing method
DBCA	Department of Biodiversity, Conservation and Attractions
DEM	Digital Elevation Model
DEMIRS	Department of Mines, Energy, Industry Regulation and Safety (former)
DFS	Definitive Feasibility Study
DIWA	Directory of Important Wetlands in Australia
DMIRS	Department of Mines, Industry Regulation and Safety (former)
DMP	Department of Mines and Petroleum (former)
DMPE	Department of Mines, Petroleum and Exploration
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EC	Electrical Conductivity
EF	Evaporation Factor
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
EWTEC	Eucalypt Woodlands of the Western Australian Wheatbelt Threatened Ecological Community
g/t	grams per tonne
GDE	Groundwater Dependent Ecosystem
GDE Atlas	Groundwater Dependent Ecosystems Atlas
GWL	Groundwater Well Licence
HBWA	Hydrobiology WA
HDPE	High-density Polyethylene
IRR	Internal Rate of Return
KGP	Katanning Gold Project

<b>Term</b>	<b>Definition</b>
km	kilometre
koz	thousand ounces
LLDPE	Linear Low-density Polyethylene
LOM	Life of Mine
m	metres
MAR	Managed Aquifer Recharge
MODIS	Moderate Resolution Imaging Spectroradiometer
MPA	Maximum Potential Acidity
mRL	Metres Relative Level / Metres above Sea Level
Mt	Million tonnes
Mtpa	Million tonnes per annum
NAPP	Net Acid Production Potential
NDVI	Normalised Difference Vegetation Index
NORM	Naturally Occurring Radioactive Material
NPV	Net Present Value
oz	Troy ounce
PAF	Potential Acid Forming
PAR	Population at Risk
PEC	Priority Ecological Community
ppm	parts per millions
Project, the	Katanning Gold Project
PV	Photovoltaic
RC	Reverse Circulation
RiWI Act	<i>Rights in Water and Irrigation Act 1914 (WA)</i>
RO	Reverse Osmosis
ROM	Run-of-Mine
SF	Salinity Factor
SG	Specific Gravity
SI	International System of Units
SILO	Department of Science, Information Technology and Innovation
SMU	Soil Management Unit
SRK	SRK Consulting (Australasia) Pty Ltd
t	tonne (metric)
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
TSF	Tailings Storage Facility
WA	Western Australia
WIR	Water Information Reporting
WRD	Waste Rock Dump
WRL	Waste Rock Landform
WSP	WSP Australia Pty Ltd

# 1. Introduction

Ausgold Limited (Ausgold) proposes to develop its Katanning Gold Project (KGP; the Project) located approximately 275 km southeast of Perth and 40 km northeast of Katanning, in the Great Southern Region of Western Australia (Figure 1-1). The Project consists of a series of open pit mines namely Jinkas, Jackson, Olympia and Dingo and associated mining infrastructure. The Project is designed to treat gold ore at an average rate of 3.6 Mtpa from the abovementioned Katanning Gold Mineral Reserves through a conventional Carbon in Leach (CIL) processing circuit to produce 1.14 Moz of gold doré over a 10-year mine life. The applicant for all future permits and licences is Ausgold Exploration Pty Ltd.

## 1.1 Purpose of Report

In order to support the environmental impact assessments for the Project, Ausgold commissioned a series of hydrogeological investigations through H3 level of hydrogeological assessment to meet the requirements of Operational Policy No. 5.12 – *Hydrogeological reporting associated with a groundwater licence* (DWER, 2009).

An H3-level assessment requires a field hydrogeological assessment, including drilling and test pumping to characterise the groundwater regime, and numerical groundwater modelling to evaluate the potential for impacts on surrounding groundwater and surface water systems, users and ecosystems.

This report consolidates the series of hydrogeological investigations conducted to date and offers a singular source of summaries of investigations undertaken to date, methodologies, data, key findings and proposed additional investigations to fully characterise potential hydrogeological impacts and management thereof.

## 1.2 Applicant Details

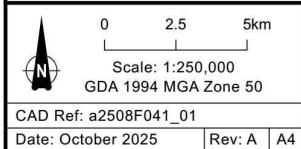
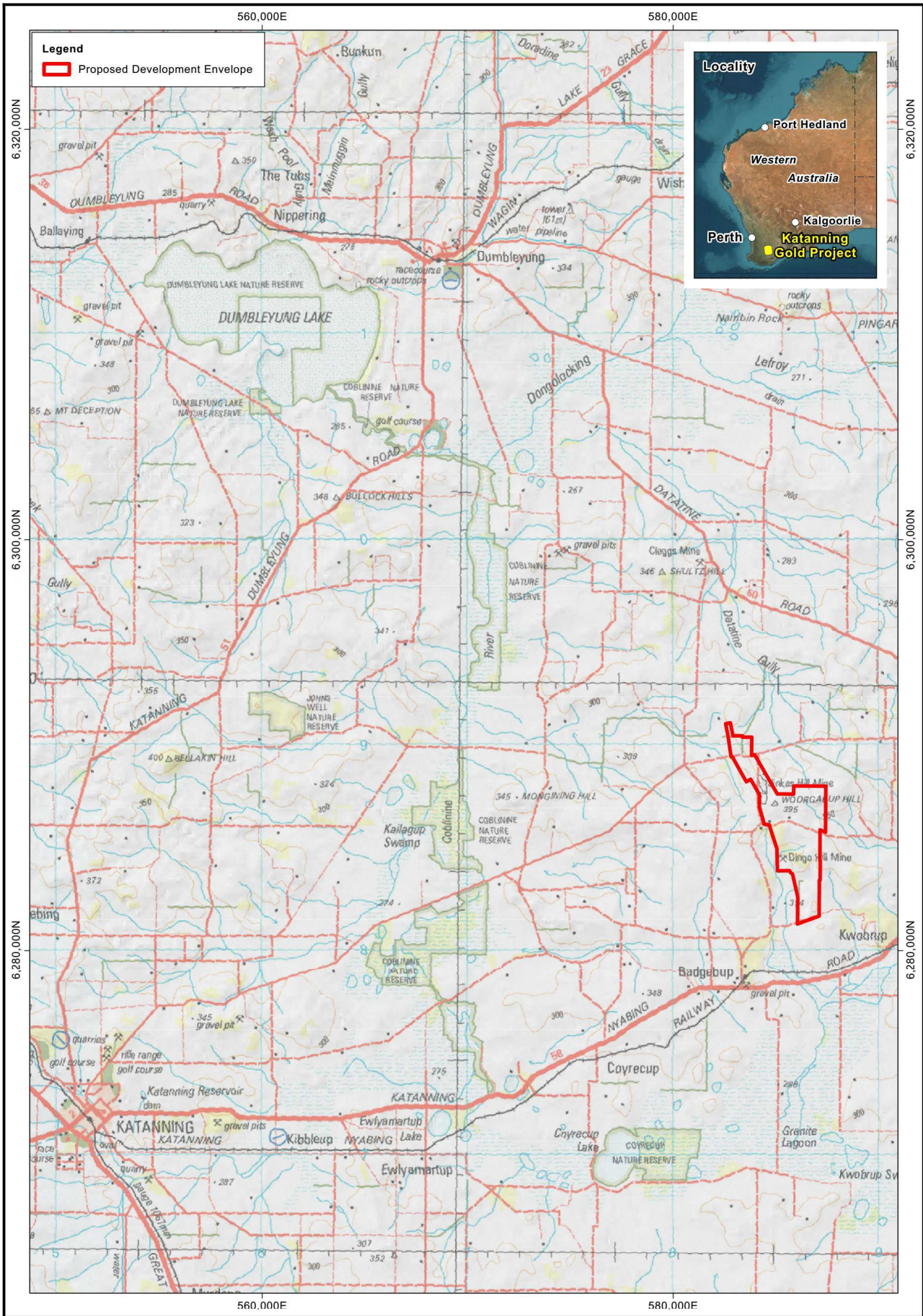
### 1.2.1 Contact Details

**Table 1-1: Applicant Details**

<b>Name:</b>	Ausgold Exploration Pty Ltd
<b>ACN:</b>	140 164 496
<b>ABN:</b>	67 140 164 496
<b>Head Office Address:</b>	Level 1/307 Murray St, Perth WA 6000

**Table 1-2: Authorised Representatives**

<b>Contact Person:</b>	<b>Troy Collie</b> Title: General Manager – Planning, Environment & Approvals E-mail: tcollie@ausgoldlimited.com
<b>Alternate Contact Person:</b>	<b>Mark Mitchell</b> Title: Chief Operating Officer E-Mail: mmitchell@ausgold.com



  
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 LIMITED

Author: T. Collie  
 Drawn: CAD Resources ~ www.cadresources.com.au

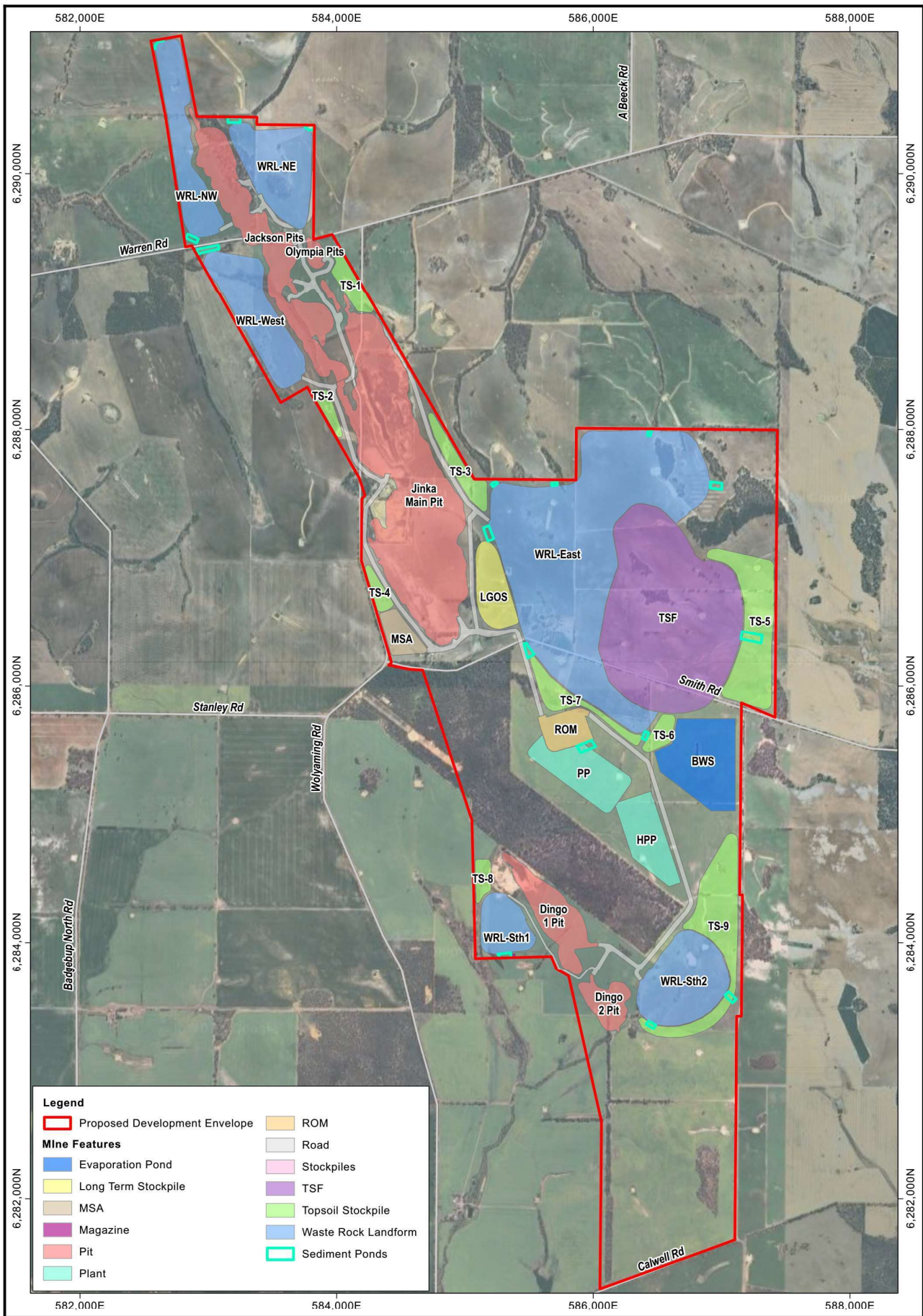
## Regional Location

Figure:  
1.1

Imagery:

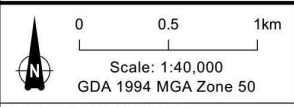
CAD Ref: a2508F041\_01  
 Date: October 2025

Rev: A A4



**Legend**

<span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px;"></span> Proposed Development Envelope	<span style="background-color: #f4a460; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> ROM
<span style="background-color: #4a90e2; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Evaporation Pond	<span style="background-color: #d3d3d3; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Road
<span style="background-color: #ffff00; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Long Term Stockpile	<span style="background-color: #ffb6c1; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Stockpiles
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<span style="background-color: #800000; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Magazine	<span style="background-color: #90ee90; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Topsoil Stockpile
<span style="background-color: #ff0000; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Pit	<span style="background-color: #add8e6; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Waste Rock Landform
<span style="background-color: #00ffff; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Plant	<span style="border: 1px solid cyan; display: inline-block; width: 15px; height: 10px;"></span> Sediment Ponds



## Proposed Premises Layout and Tenements

Figure:  
**1.2**

CAD Ref: a2508F041_02	Author: T. Collie	
Date: October 2025	Rev: A A4	Drawn: CAD Resources ~ www.cadresources.com.au

Imagery: © OpenStreetMap (and) contributors, CC-BY-SA

## 2. Katanning Gold Project Background and Overview

The Katanning Gold Project is located approximately 275 km southeast of Perth and 40 km northeast of Katanning, in the Great Southern Region of Western Australia (Figure 1-1). The Project is within the 'Wheat Belt', a region of Western Australia primarily focused on agriculture and sheep/cattle grazing.

### 2.1 Project History

Ausgold has had a 100% interest in the mining and exploration leases since August 2011 (Figure 1-2). The KGP leases encompass the Central (Jackson, Jinkas and Olympia) and Dingo (southern) areas. The Project is brownfield, with previous mining undertaken by Glengarry Mining NL in 1995 at the Jinkas Hill (or Jinkas) and Dingo open cut operations which were mined between 1995 and 1997. Having produced approximately 20,000 oz Au, both pits were placed in care and maintenance. Across the entirety of the KGP, high-grade zones are focussed within fold hinge zones of tightly folded and metamorphosed rocks. These high-grade zones plunge broadly NNW in the Central Zone, SSE in the Southern Zone, and to the ENE at Datatine in the Northern Zone (Ausgold Limited, 2025).

In 2009, Ausgold acquired a large holding of tenements in the area, including the Project, with a view to redeveloping the Project. In 2017, Ausgold reinterpreted the geological model and is currently drilling to expand the defined Mineral Resource and Ore Reserve to form a key component of a definitive feasibility study.

The Definitive Feasibility Study (DFS) released 20 June 2025 incorporated an updated Ore Reserve of 35.2 Mt grading at 1.11 g/t Au and describes a 10-year Life of Mine (LOM) plan to produce a total of 1.14 Moz of gold from the open pit at the central and southern zones. The project demonstrates excellent key financial metrics including a LOM revenue of A\$4.9 billion and a net present value (NPV<sub>5%</sub>) after tax of A\$953.6 million at the adopted gold price. Higher gold grades in the initial four years of production deliver, on average per year, 140 koz of gold and generating A\$946 million of undiscounted cashflow after tax, which contributes to an early payback of 1.1 years and a post-tax internal rate of return (IRR) of 53.2%.

### 2.2 Katanning Gold Project Overview

The Katanning Gold Project will consist of a series of open pits at Jinkas, Jackson, Olympia and Dingo and its associated infrastructure. The Project is designed to treat gold ore at an average rate of 3.6 Mtpa from the abovementioned Katanning Gold Mineral Reserves through a conventional Carbon in Leach (CIL) circuit to produce 1.14 Moz of gold doré over a 10-year mine life.

The project scope is summarised as:

- Mine: Jinkas Pit, which is by far the largest, augmented by the smaller Jackson, Olympia and Dingo open pit mines with waste dumps, pit dewatering and mine infrastructure including offices and workshops. Mining will be undertaken by mining contractors using conventional mining equipment such as haul trucks, excavators, drill rigs, graders, bulldozers and water trucks.
- Process plant: 3.6 Mtpa average capacity which includes:
  - Crushing: jaw crusher, conveyors and a crushed ore stockpile.
  - Milling: SAG mill, pebble crusher, ball mill, cyclone cluster and trash screen.
  - Gravity recovery: centrifugal concentrator, intensive cyanidation and electrowinning.
  - Leaching: cyanide leaching and carbon adsorption tanks.
  - Gold recovery: Split between AARL elution, electrowinning and smelting to produce gold doré
  - Tailings handling: carbon safety screen, cyanide recovery thickener, cyanide detoxification, tailings pumps and pipe.

- Tailings storage facility: engineered embankment to store up to approximately 40.6 Mt of tailings, linear low-density polyethylene (LLDPE) lined basin to reduce seepage, emergency spillway, downstream construction which includes underdrainage recovery, seepage interception as well as decant recovery and pumping of tailings return solution back to the process plant for re-use.
- Raw water supply from three bores at the southern borefield bores and onsite water storage.
- Power supply: a hybrid power station consisting of a split of gas generators, solar PV capacity, 20 MW of Battery Energy Storage System (BESS) and 3.0 MW of diesel (backup) generators.
- General infrastructure: such as offices, workshops, water storage ponds, warehouse with day storage areas at the process plant and mining services areas, control rooms, and laboratory.

## 3. Receiving Environment Descriptions

### 3.1 Regional Setting

The Project area occurs in part of the southern section of the Western Australian Wheatbelt which has been almost entirely cleared for agricultural activities. The proposed Project lies within the Avon Botanical District in the South-West Province (Beard 1990). The natural vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia (IBRA), with the Project footprint being designated as within the Avon Wheatbelt 2 (AW2 – Re-juvenated Drainage) subregion of the Avon Wheatbelt region.

The Project area is well-established farming country, with reliable rainfall and numerous cropping and grazing options for dryland farming operations. The farming community is generally quite cohesive and is well-connected because of the historical dominance of farming as a land use since European habitation. The region has long been affected by dryland salinity and especially in lower lying topographic areas has limited to productivity of significant areas of the valley floors.

### 3.2 Climate

The Project area has a Mediterranean climate characterised by mild, wet winters and hot, dry summers.

The Badgebup weather recording station is the closest active Bureau of Meteorology (BoM) weather station to the Project area (approximately 6 km away) that records rainfall; it does not record temperature. The Katanning weather station is the closest (approximately 25 km away) BoM weather station to the Project that records temperature. Since 2023, a weather station has also been installed to operate at KGP and it monitors weather conditions which can be interrogated in real-time.

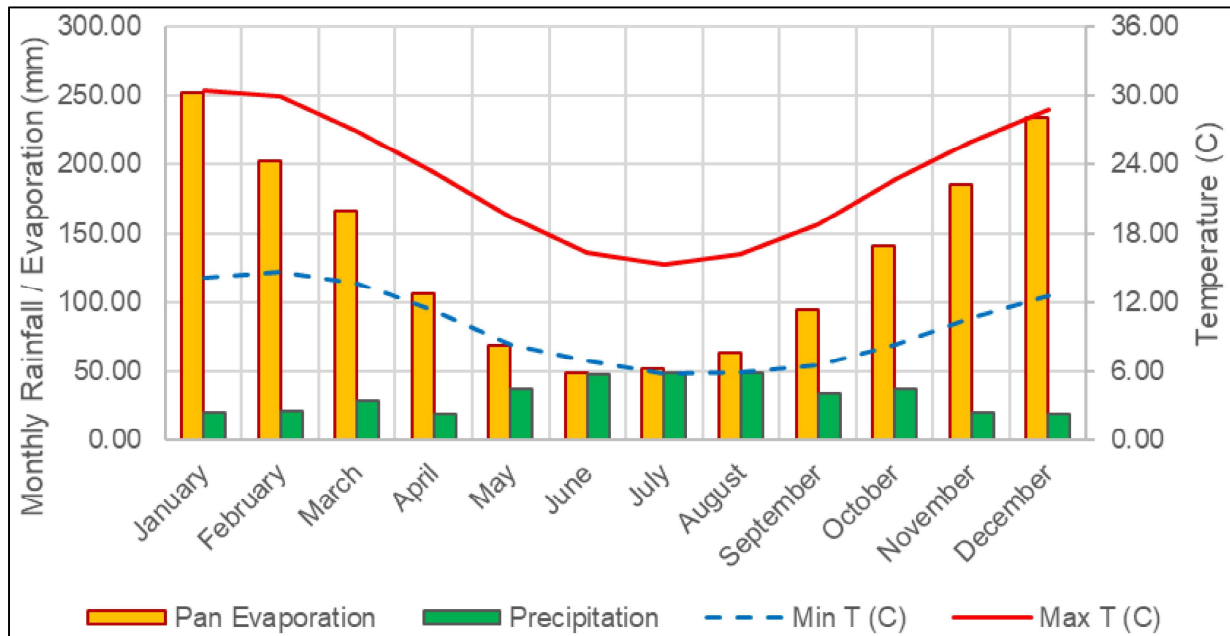
The Project area experiences moderate wind speeds throughout the year, with occasional gusts during storm events, predominantly coming from the east and south. The area enjoys ample sunshine, especially in summer, contributing to warm temperatures and dry conditions.

Average climate conditions for the Project (Figure 3-1) have been projected from the Badgebup weather station (station number 10508) (SILO, 2024) located approximately 10 km to the south of the Project's mining. The weather station has rainfall data available from 1915.

The annual average rainfall is 390 mm, with highest rainfall typically occurring between May and September.

The average annual pan evaporation measured exceeds 2,000 mm and is highest between October and March, peaking in January.

Figure 3-1: Average annual climate data for Badgebup weather station (2010–2024)



### 3.3 Flora and Vegetation

#### 3.3.1 Flora

A total of 292 vascular plant taxa which are representative of 149 genera and 57 families were recorded within the Katanning Gold survey area and these observational data were collected from foot traverses and detailed plots counted by botanists (Mattiske, 2025). The majority of taxa recorded were representative of Myrtaceae (65 taxa), Asteraceae (27 taxa), Fabaceae (26 taxa), Poaceae (25 taxa) and Proteaceae (21 taxa) families and were widespread both locally and more broadly within the associated biogeographical subregion; although some occurred as representative of the Southern Wheatbelt and nearby southern coastal and mallee communities.

The records indicate the botanical richness of the region which has been heavily cleared for agriculture.

On the basis of a desktop assessment (within a 20 km radius of the project area) of State and Federal databases there is the potential for 10 threatened and 17 priority flora taxa pursuant to Schedule 1 of the *Biodiversity Conservation Act 2016* (WA) (BC Act) and 10 threatened flora taxa pursuant to Section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). Despite active searching, no threatened or priority flora taxa were recorded in the Katanning Gold survey area.

### 3.3.2 Vegetation Associations

The Project lies within the Avon Botanical District in the South-West Province (Beard, 1990). Typical vegetation of the Avon Botanical District includes Eucalyptus woodlands comprising *E. loxophleba*, *E. salmonophloia* and *E. wandoo* on loams, scrub-heath on sandplains, *Acacia-Casuarina* thickets on ironstone and halophytes on saline soils (Beard, 1990). Beard (1980) described the general vegetation type occurring in the area as Eucalyptus Woodlands of various species, specifically York gum (*E. loxophleba*), Salmon gum (*E. salmonophloia*), and Wandoo (*E. wandoo*), with small patches of Mallee (common species of Eucalyptus). These species are large iconic trees that can successfully grow individually often along farm's fencelines and within road verges.

A total of 13 Eucalypt woodland communities and 4 mixed Proteaceous – *Myrtaceae* heath communities were recorded within the Katanning Gold survey area. The vegetation communities were separated by Mattiske (2025) on the range of overstorey and understorey species utilizing the Primer 7 software and clustering techniques, field observations and aerial photograph interpretations.

### 3.3.3 Priority and Threatened Ecological Communities

The listing of the "Eucalypt woodlands of the Western Australian Wheatbelt" in December 2015 at the national level under the EPBC Act raises the conservation significance of certain stands of woodlands on the Katanning Gold survey area. It should be noted that large areas of the survey area have been used for historical agricultural activities and most remnants of bushland are narrow and linear (less than 5 m wide) and also lacking understorey species. This has likely arisen through vastly altered natural processes of changed fire, weed invasion, light and dust effects and animal grazing which has degraded the quality and condition of the understorey floristic composition.

The principal issues – at this juncture – with respect to the flora and vegetation surveyed is in relation to the presence of the heath communities that also support a variety of flora and the Eucalypt woodland communities that fall within the definition of the "Eucalypt woodlands of the Western Australian Wheatbelt (EWTEC) (critically endangered; DotEE, 2015). It should be noted that the maps of the listed Eucalypt woodlands supplied by government are very broad in scale, generalised and do not account for the nature of the agriculture nor of condition remnant areas as defined by the Department of Primary Industries and Regional Development (2025a). In the local context there also remains other stands of some of the woodlands and heaths in nearby reserves (e.g., Badegbup; Kwobrup) and on some private lands.

There are no State of WA Threatened Ecological Communities (TECs) that occur within a 20 km buffer of the KGP. There are four State Priority Ecological Communities (PECs) listed by the Department of Biodiversity, Conservation and Attractions (DBCA) that occur in the Avon Wheatbelt IBRA region and could potentially occur in/within the 20 km buffer of the project (DBCA, 2018). In effect, these equate to the mapped extent prospective as EWTEC. That is, the diversity of Eucalypts associated with the EWTEC highlights the range of Eucalypt species in this community. As the State PECs listed above are a subset of the nationally listed TEC it is apparent the State PECs cover the EWTEC in the Project area.

The proposed mine footprint will, as far as practicable, avoid the largest stands of native vegetation of highest natural value.

The listed woodland types are then to be considered on the basis of their habitat condition (DotEE, 2015) which delineates the extent of exotic species (as opposed to native species) which may be in the understorey. An assessment of vegetation condition completed by Mattiske (2025) found a large portion of the Survey Area (both within the proposed development envelope and the other survey areas) was either Degraded or Completely degraded and the values in these areas are less than for the mapped Eucalypt woodlands. There were however substantial areas rated as Good or Very Good and little in the survey area rated as Excellent condition. Note that the five condition ratings categories are standardised for use in Western Australia known as the Keighery (1994) Condition Scale.

Over 90% of the land had condition ratings of Degraded or less condition.

**Table 3-1: Vegetation condition ratings for a preliminary version of development envelope**

Vegetation Condition Rating	Area within Development Envelope (ha)	% Total Development Envelope Area
Cleared Land	1,398.53	93.8
Completely Degraded	12.92	0.86
Degraded	60.42	4.05
Good	9.16	0.61
Very Good	9.16	0.61
<b>Total</b>	<b>1,490.19</b>	<b>100.0</b>

Despite the proximity of agricultural operations, many of the areas of heath, shrublands and Eucalypt woodlands on the slopes and ridges within the survey area and mine development envelope remain relatively undisturbed, intact as habitat and as a result the largest and best condition of these remnants could be identified for avoidance when it came to clearing by any proposed mine infrastructure design. These were, in the most part, within two large, uncleared vegetation parcels carried in polygons known as:

- State Reserves comprised of Wurgubup Rifle Range (Reserve 12423) and Woorgabup Nature Reserve (Reserve 24072).
- Ausgold's North-east bushland on M70/1426.

Approximately 67 ha of vegetation occurs coincidentally with the mine disturbance footprint. This vegetation would not necessarily be cleared immediately, but sequentially over the mine's ten years of development and operations. There is 234 ha of native vegetation within the development envelope with the majority sitting within the Wurgubup Reserves and the NE bushland (on M70/1426), and 122.76 ha within the MDE is representative of the Eucalypt Woodlands TEC (EWTEC). None of the bushland in the Wurgubup Reserves nor the NE bushland (on M70/1426) will be cleared; they were identified as essential exclusion areas during Ausgold's design leading to the assigned general arrangement (Figure 1-1).

Of the native vegetation to be cleared, approximately 9 ha of EWTEC would be cleared given the current site layout. Furthermore, after detailed botanical and environmental assessment, all of this area is contained in one parcel being in the north of the KGP atop Jackson Deposit. Not all of the vegetation proposed to be cleared at Jackson Deposit maps is mapped as EWTEC. The project development strategy is of avoidance by design, with the vast majority of the mapped EWTEC (114.1 ha) within the MDE to be avoided; the 9 ha atop Jackson deposit is unavoidable because it is situated above the mineralised ore which expresses just below terrain surface.

### 3.3.4 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) are defined as 'complex dynamic natural ecosystems that require access to groundwater to meet all or some of their water requirements on a permanent or intermittent basis, so as to maintain their communities of plants and animals, ecosystem processes and ecosystem services' (Doody et al., 2018; Richardson et al., 2011).

An understanding of the distribution of GDEs proximal to the Project was initially obtained through *the Groundwater Dependent Ecosystems Atlas* (GDE Atlas) a national dataset of Australian GDEs.

The GDE atlas separates GDEs into the following three categories:

- Aquatic ecosystems that rely on the surface expression of groundwater, e.g., springs, wetlands and rivers;
- Terrestrial ecosystems that rely on the subsurface presence of groundwater, e.g., vegetation; and
- Subterranean ecosystems caves and aquifer ecosystems.

The GDE Atlas categorises data by the ‘potential of an ecosystem to be a DGE. It classifies as potential as high, moderate or low. It should be noted that the GDE dataset originates from a combination of remote sensing using Moderate Resolution Imaging Spectroradiometer (MODIS) satellite timeseries data between 2000 and 2021, and calculations of water balance dynamic and greenness of vegetated land using Landsat Imagery (Van Dijk et al., 2015). Therefore, data reflected within the GDE Atlas may be outdated or at a coarse scale.

As stated previously, Ausgold commissioned HBWA (2025a) (refer Appendix 1) to conduct a desktop risk assessment and site inspection of potential GDEs near the proposed groundwater production zones which used national GDE mapping, groundwater drawdown zones, and satellite-derived vegetation and climate data. Normalised Difference Vegetation Index (NDVI) and Aridity Index (AI) were analysed to assess vegetation responses during drought periods. Vegetation that remained relatively healthy during drought was considered more likely to access groundwater, while vegetation with low or seasonal NDVI was excluded as groundwater dependent.

The distribution of aquatic and terrestrial GDEs proximal to the Project and drawdown zones are shown in Figure 5-8 and Figure 5-9. Modelled drawdown extents from groundwater abstraction indicate that extensive adverse impacts on high potential GDEs are unlikely. Refer to Section 5.6.1 for further discussion on risks to GDE.

## 3.4 Fauna

Ausgold’s consultant Terrestrial Ecosystems conducted a detailed series of basic and targeted field surveys to assemble evidence of conservation significant fauna species, in order to describe terrestrial fauna present within the Survey Area. The collated fauna survey report was issued as Terrestrial Ecosystems (2025) which included searches of available literature and databases (a ‘desktop’ study), and field surveys over the many parts of the Survey Area.

The remnants of native vegetation typically represent refuges of habitat for a number of fauna species that used to occur more commonly throughout the region before its broadscale clearing. Many abundant fauna species were found to be ferals including foxes, cats and rabbits. Other animals recorded and captured by camera traps were kangaroos, black cockatoos, phascogales and goannas. In terms of relative abundance, in November-December 2024, animals were recorded as follows:

- Western Grey Kangaroos (*Macropus fuliginosus*) at 23 camera traps;
- Foxes (*Vulpes vulpes*) at 13 camera traps;
- Rabbits (*Oryctolagus cuniculus*) at eight camera traps;
- Cats (*Felis catus*) at four camera traps; and
- Red-tailed Phascogale (*Phascogale calura*) at two camera traps.

### 3.4.1 Conservation Significant Fauna

Terrestrial Ecosystem (2025) identified that many marsupial and bird species, and two reptile species listed with conservation significance have the potential to occur within 25 km of the Project.

The Survey Area contains some foraging habitat for Carnaby’s Black-Cockatoo, with patches of Banksia heath providing favoured food plants, evidence of foraging was noted in locations nearby the layout of the KGP and generally within the Wurgubup Reserves (Western Wildlife, 2017). After a series of more recent field surveys by Terrestrial Ecosystem (2025), it was evident that, of the conservation significant fauna, Carnaby’s Black-Cockatoo and Red-tailed Phascogale were present in the survey area within the district.

The amounts of good and poor quality nesting habitat within a 12 km radius shows approximately 6,706.9 ha of habitat that provides mature Eucalypt trees, some of which would be suitable nesting hollows (and another 5,673.3 ha that provides poorer quality nesting habitat). In addition, in excess of 350 ha of vegetation that would provide suitable foraging habitat.

A desktop study and field screening survey by Bennelongia Environmental Consultants (2025) indicated that the likelihood of suitable subterranean fauna habitat was unlikely for either troglofauna or stygofauna (typically crustaceans which inhabit aquifer systems). Neither the host geology nor the salinity of deep groundwaters are suitable and no samples of animals were collected upon field sampling.

### 3.5 Hydrology

The topography of the Project area consists of low hills and plateaus with broad and shallow valleys (Figure 3-7). Elevations range between 219 m AHD and 433 m AHD (DataWA, 2024). The Project is located within the upper reaches of the Upper Blackwood River drainage basin. Locally, the Project area is straddling a catchment divide between two sub-catchments. The southern end of the Project drains to the Coblinine River located approximately 20 km west and south of the site. The northern end of the Project drains to the Datatine Gully, which runs approximately 1.5 km to the northeast of the Jinkas and Dingo pits. Both catchments drain into the Dumbleyung Lake that discharges into the Blackwood River with its estuary at Augusta. Large-scale agriculture is the dominant industry within the region. The use of artificial contour drains and earthen dams (turkey nests) are commonplace across the region (DWER, 2024).

In the vicinity of the Project, there are three identified wetlands serving as sinks for surface water drainage, all located a substantial distance from the proposed area for mining activities:

- **Coyrecup Lake** – located approximately 15 km southwest of the Project area within the Coblinine River drainage system. The lake receives only a minor portion of total surface water drainage from the Project area. It is a near-permanent saline lake located in a riverine floodplain with smaller lakes and areas of saline marshes to its northwest and east that covers an area of 572 ha. It is a listed wetland under the Directory of Important Wetlands in Australia (DIWA). At times, the lake is a major drought refuge area for waterfowl, and it provides habitat for migrating water birds and the threatened Freckled Duck (DEC, 2009).
- **Dumbleyung Lake** – located approximately 25 km northwest of the Project area and covers an area of 5,630 ha. This forms the main discharge point for the majority of surface water drainage from the Project area. Like Coyrecup Lake, this salt lake is a DIWA-listed wetland and provides habitat for migrating water birds.
- **Lake Grace System** – located approximately 40 km east of the Project area and covers an area of 53,121 ha. The Lake Grace System is a DIWA-listed wetland and consists of four lakes: Lake Grace North, Lake Grace South, Lake Altham and Lake Cemetery. No surface water discharge from the Blackwood River drainage basin is known to enter this system.

Although subject of other studies, it is worth noting that no discharge of contact waters occur from the KGP proposal area into any of the (minor) tributaries of these surface systems.

### 3.5.1 Regional Groundwater Conditions

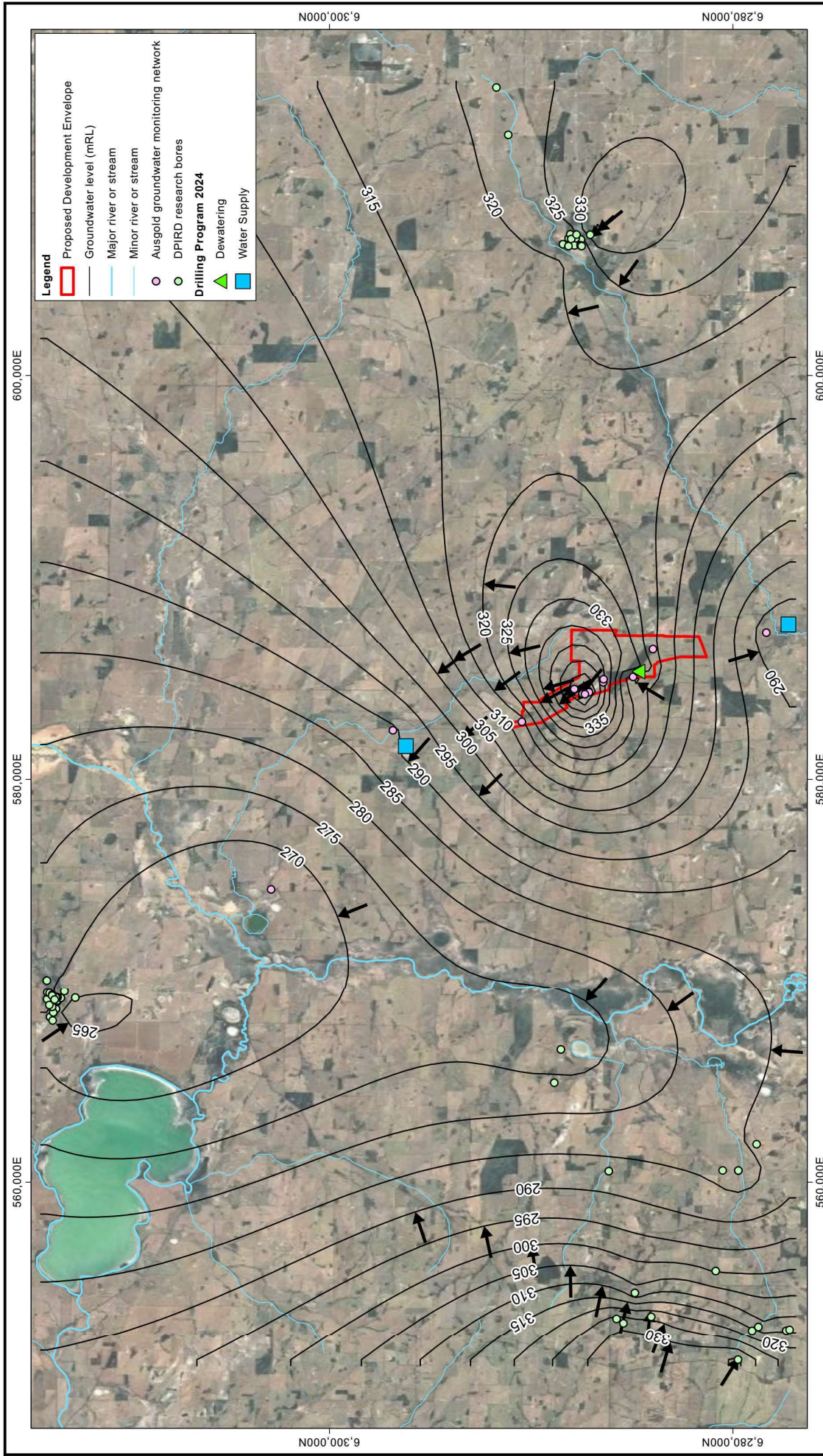
The Project area located in the distant upper reaches within the Karri groundwater resources catchment that is defined as a combined fractured rock and alluvium aquifer.

Correlation between recent (2022–2024) precipitation data (Badgebup weather station #10508) and groundwater level data (collected manually) demonstrated subdued groundwater responses following seasonal rainfall patterns. Groundwater levels tend to have a range of 1–2 m but outliers (BSMB006 in September 2023, for example) suggest the range may, on occasion, be as much as 4 m. Peak groundwater elevations tend to lag peak rainfall periods by approximately 1–2 months, indicating the presence of a low permeability zone that overlays the screened aquifers in the monitored boreholes. Recent data from 2023 and 2024 groundwater programs show bores intersecting regional east–west trending structures (including BSMB008, WERC004, WERC006A, and WERC007) have shallow groundwater depths. These bores have a thick semi-confining layer above them suggesting the fractured/faulted rock aquifer is pressurised. WERC007 has a water level of 2.1 m above ground level highlighting the artesian nature of the system locally.

Figure 3-2 displays modelled regional groundwater level contours, using manual measurements taken in January 2023. The elevation of the current pit lake, as obtained from topography digital elevation model (DEM) files, was incorporated during the creation of the water level isolines.

Additionally, data from the Department of Primary Industries and Regional Development (DPIRD) database were used to complete the conceptual model. The database includes groundwater level measurements from 101 bores located approximately 20 km to the north, west and east of the Project area. Surface water levels have only been collected once from each location between 2021 and 2023. These data have been used to improve the spatial distribution of data points used to create groundwater contours. An additional 23 DPRID bores with data from the late 1990s are clustered within a 2 km radius of the location of WERC007 (northern water supply bore). The average water levels from this period are 0.68 mbgl. This provides an interesting insight into the groundwater dynamics over time and the general increasing recharge to regional groundwater levels being experienced over the last 25 years.

Groundwater flow direction largely aligns with the topographic gradient and corresponds with the direction of surface water flow, moving from higher to lower elevations. Near the Central pit (Jinka), at an elevation of 356 m above sea level (mRL) atop the catchment, groundwater flows from the pit lake drain towards discharge zones in the creek lines to the south, north and west of the Project site. The southern pit lake at Dingo shows lower groundwater levels, suggesting its role as a groundwater sink, possibly due to its more exposed location and higher susceptibility to evaporation. The lowest recorded water level of 265 mRL was observed at a distant bore to the north of the project area.



		<b>Regional baseline conditions groundwater contours</b>		Figure: <b>3.2</b>
Scale: 1:260,000 GDA 1994 MGA Zone 50		Author: T. Collie Drawn: CAD Resources ~ www.cadresources.com.au		
CAD Ref: a2508F041_03 Date: October 2025		Rev: A A4		

An assessment was undertaken to characterise salinity gradients within the hydrogeological profile within and surrounding the proposed mine pits for the Project. The assessment focused on describing the distribution of groundwater salinity with depth, elevation and aquifer type. Baseline salinity conditions in nearby surface water systems, potential receptors for any future discharge, were also evaluated. The findings are intended to support discussions with regulatory authorities regarding the potential discharge of lower salinity groundwater generated through dewatering activities.

According to SRK (2025), the site is underlain by a sequence of geological units that influence groundwater occurrence and behaviour. These units correspond to the layers used in the groundwater model developed for the site and provide a framework for a simple aquifer classification relevant to our analysis. The units, listed in order of increasing depth, include:

- Alluvial and colluvial sediments near the surface (~0–13 m), representing an unconfined aquifer.
- Interbedded clay and sand deposits (~13–30 m), which may behave as partially confined or unconfined aquifers depending on local conditions.
- Bedrock and high-permeability fractured bedrock (dykes and faults) at approximately 50 m depth, considered confined aquifers.
- Deeper bedrock and fractured zones near 100 m depth, also confined.
- Basement bedrock devoid of faults or dykes at ~110 m depth, representing a confined aquifer with low permeability.

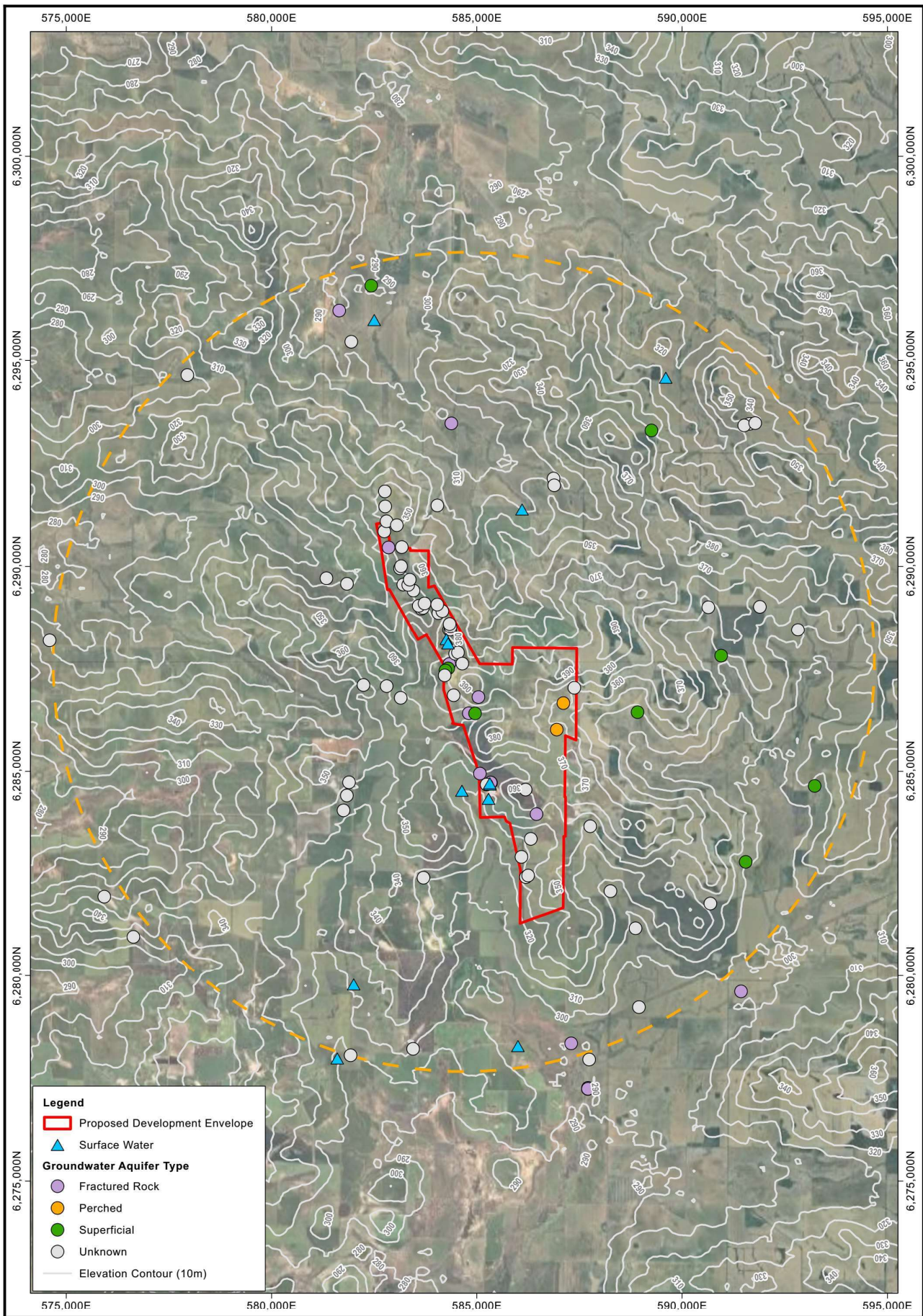
Saline groundwater occurs in fractured rock aquifers in the project area due to dissolution of salts from marine-derived sediments or mineralised bedrock, a natural source of primary salinity (George et al. 2006; DWER 2019). The Wheatbelt region has also experienced significant land clearing for agriculture, leading to rising water tables and secondary salinisation, especially in shallow, unconfined aquifers in low-lying areas where saline discharge and waterlogging occur (DPIRD 2002; South Coast NRM 2020; UWA 2024).

Surface water drainage in the local Badgebup area and Katanning-Dumbleyung region is highly modified by agriculture, with artificial contour drains and earthen dams altering natural flows (SRK, 2025). Salinity now affects many wetlands and streams regionally, driven largely by secondary salinisation. However, the area also contains natural salt lakes formed by regional processes of evaporation causing salt accumulation in low-lying discharge zones. The project area drains primarily into Dumbleyung Lake, a natural salt lake typical of the Wheatbelt's semi-arid landscape, where evaporation and limited outflow concentrate salts. Coyrecup Lake, a near-permanent saline lake on the floodplain of the upper Coblinine River, receives minor drainage from the site. Dumbleyung Lake discharges into the Blackwood River, which flows to its estuary at Augusta (SRK, 2025).

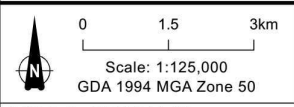
### 3.5.2 Water Quality Assessment Methodology

Groundwater and surface water salinity data, including electrical conductivity (EC) and total dissolved solids (TDS), were compiled and reported by HBWA (2025b) from datasets and reports provided by Ausgold for the KGP, and from the Department of Water and Environmental Regulation's (DWER) Water Information Reporting (WIR) database. Only data within an approximately 10 km buffer around the mining tenement were included, as shown on Figure 3-3. Where TDS measurements were not available, EC values were converted to TDS. Where both field and laboratory measurements were available, field readings were prioritised.

For groundwater records the bore depth, elevation, and aquifer type were attributed where possible. Bore depth was derived from field notes or bore logs. Elevation was derived from DEMs available through Geoscience Australia (2008, 2020).



Imagery: © OpenStreetMap (and) contributors, CC-BY-SA



## Location of Groundwater and Surface Water Sampling Sites

Figure:  
**3.3**

CAD Ref: a2508F041_04	Author: T. Collie
Date: October 2025	Rev: A A4 Drawn: CAD Resources ~ www.cadresources.com.au

For the purposes of analysis, bores were grouped into the following categories based on depth and geology:

- **Perched** — Shallow bores intersecting isolated groundwater above clay-rich layers.
- **Superficial** — Bores screened within the near-surface alluvial and colluvial sediments, representing unconfined aquifers.
- **Fractured rock** — Bores intercepting groundwater within deeper fractured or basement bedrock, under confined conditions.
- **Unknown** — Bores with insufficient geological logging or bore construction data, mostly drilled using reverse circulation methods for mineral exploration, preventing confident aquifer classification as above.

After applying the spatial buffer and excluding records lacking sufficient attribute information, there were a total of 554 groundwater samples and 39 surface water samples.

Groundwater and surface water salinities were compared to livestock water quality guidelines. Ecosystem protection trigger values from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000) were not applied as salinity in the Katanning region, driven by both natural processes and secondary salinisation, commonly exceeds even the upper end of default values for slightly disturbed systems, as demonstrated by the data presented in this study. Instead, livestock water quality guidelines from ANZECC & ARMCANZ (2000) were considered a more appropriate benchmark, given the already saline nature of local surface water bodies and their relevance as potential receptors in an agricultural landscape. A conservative threshold of 2000 mg/L TDS was used to highlight potential areas of elevated salinity, while 10,000 mg/L TDS represents a higher level of salinity commonly associated with reduced livestock water quality. These values provide context for understanding salinity variation and potential implications, without constituting a formal risk assessment.

### 3.5.3 Water Quality Results

Figure 3-4 and Figure 3-5 illustrate the relationship between groundwater salinity (TDS) and depth, elevation and aquifer type. The scatter plots show TDS plotted against elevation and bore depth, with data points colour-coded by aquifer category.

Groundwater in the perched aquifers is fresh, while salinity in the superficial and fractured rock aquifers varies widely from fresh to saline. Regarding depth trends, groundwater salinity in the superficial aquifer generally increases with bore depth, while in the fractured rock aquifer, it tends to decrease with depth Figure 3-4.

The most pronounced pattern is that groundwater salinity in both the superficial and fractured rock aquifer decreases with increasing elevation Figure 3-5) (HBWA, 2025b), reflecting fresher conditions at higher ground and higher salinity in lower drainage valleys. This analysis is consistent with observations made by SRK Consulting (2025).

Figure 3-4: Groundwater Salinity vs. Depth across various aquifer types

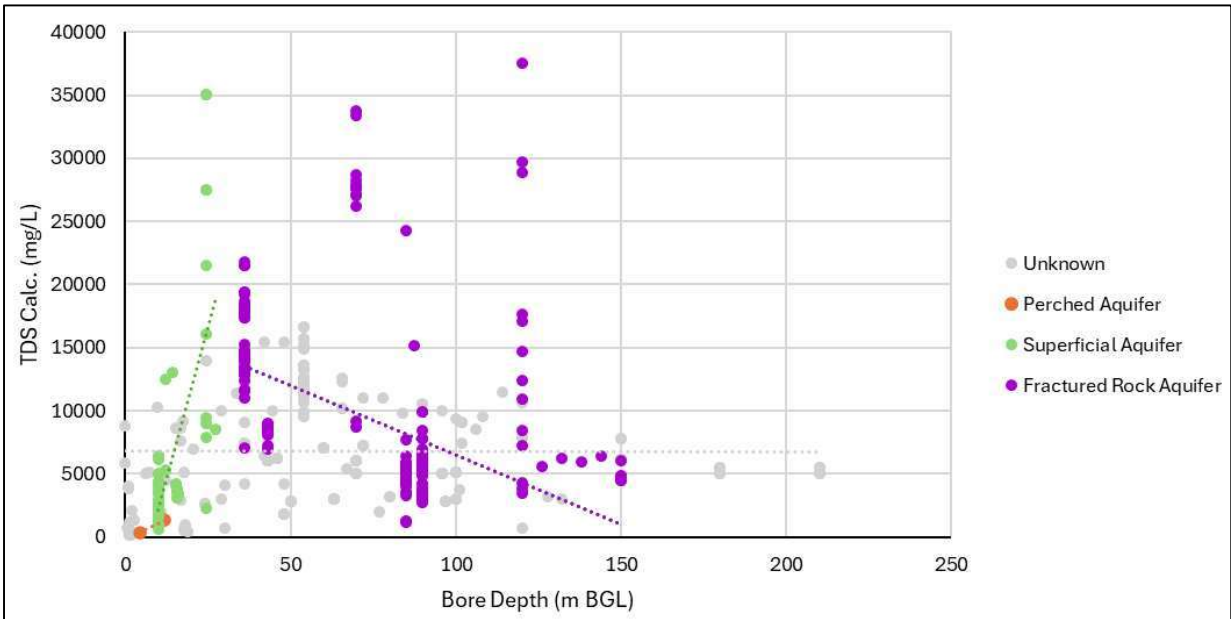
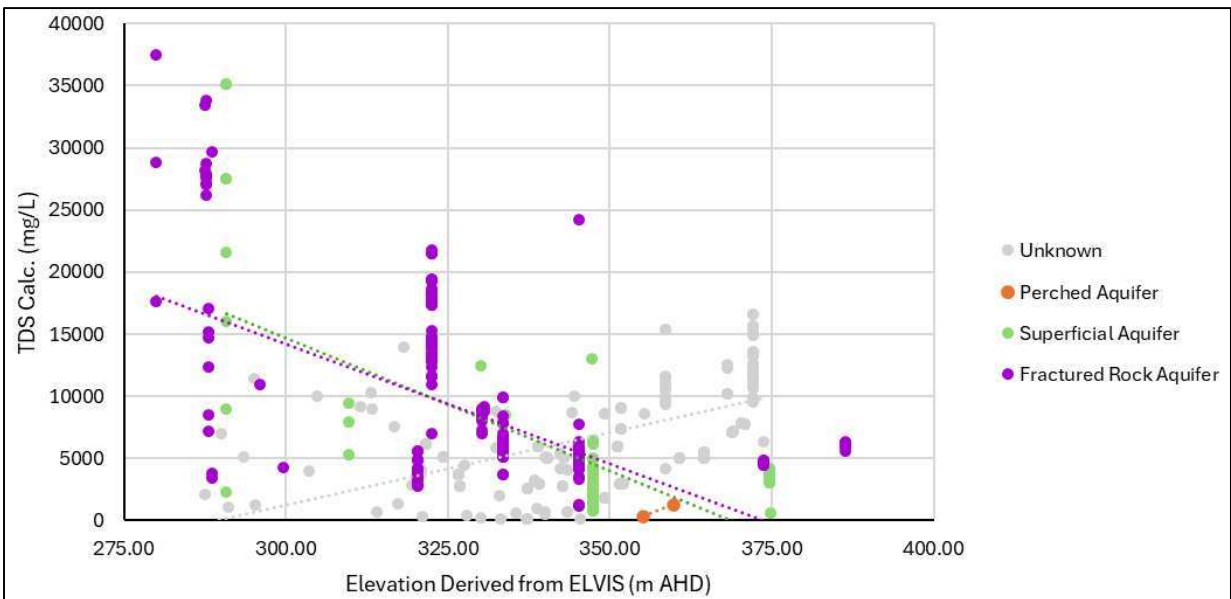


Figure 3-5: Groundwater Salinity vs. Elevation across various aquifer types



As shown on Table 3-2, groundwater salinity in bores located at elevations greater than 300 m AHD is generally lower than surface water, with both the medians and 80<sup>th</sup> percentiles below those of surface water and below the upper livestock guideline of 10,000 mg/L TDS. This indicates that groundwater is fresher than surface water at these elevations.

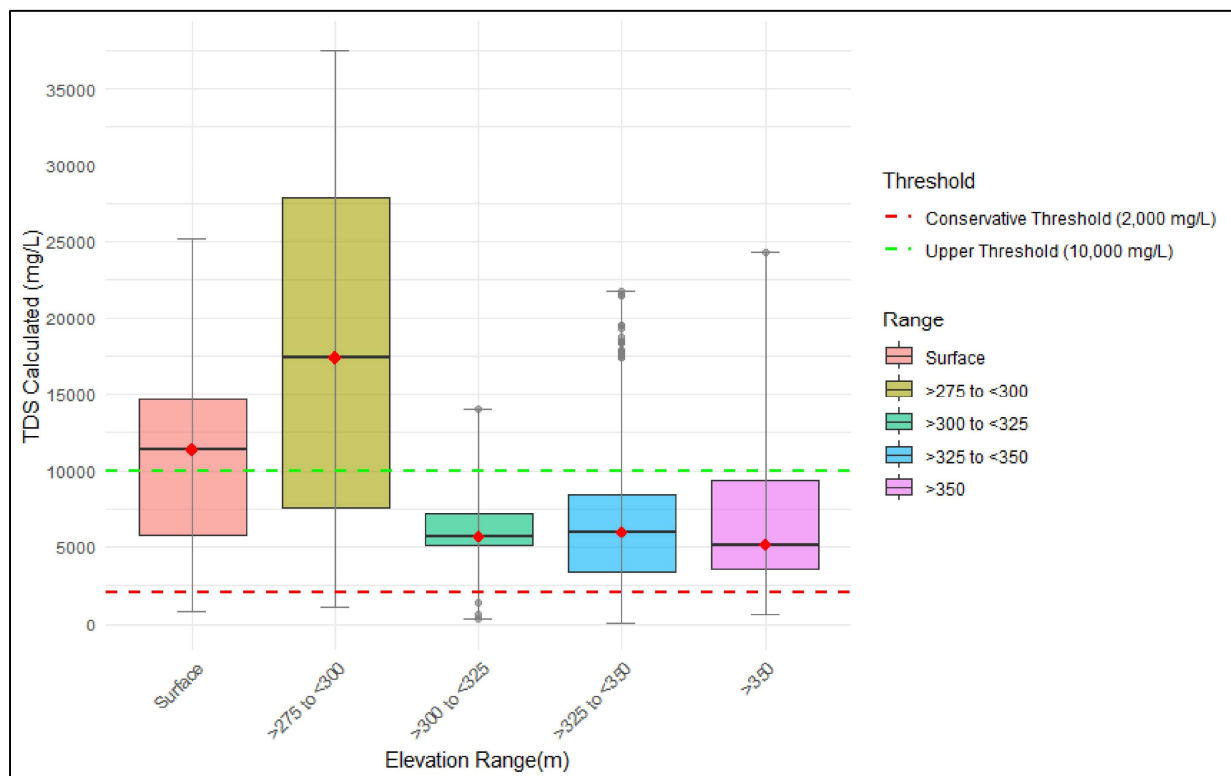
Table 3-2: Surface Water and Groundwater Salinity in TDS (mg/L)

Parameter	TDS (mg/L)			
	Median	80 <sup>th</sup> percentile	Minimum	Maximum
Surface	11,400	15,629	838	25,208
>275 to <300 m	17,378	28,512	1,117	37,500
>300 to <325 m	5,715	8,120	305	14,000
>325 to <350 m	5,995	9,955	105	21,800
>350 m	5,140	10,802	618	24,255

Note: Results higher than the ANZECC & ARMCANZ (2000) livestock water quality guideline (10,000 mg/L) are bolded.

The median salinity for both surface water and groundwater from bores located at elevations below 300 m AHD exceeds the livestock guideline. While part of the central range of groundwater salinity overlaps with that of surface water, a substantial portion extends above it, and the groundwater has a higher median salinity.

Figure 3-6: Medians and 20th to 80th percentile ranges for Surface Water and Groundwater Salinity



### 3.5.4 Water Quality Assessment – Conclusions and Recommendations

The HBWA (2025) analysis indicated that:

- At bore locations above 300 m elevation, that are high in the catchment including the KGP footprint, the groundwater from the superficial and fractured rock aquifers is generally fresher than surface water and below livestock guidelines – discharge is unlikely to pose a salinity risk to the receiving environment. In fact, it could slightly dilute existing surface water salinity in some areas.
- At bore locations below 300 m elevation, in the location of 26D/5C test bores, groundwater from the superficial and fractured rock aquifers is generally more saline than surface water and exceeds livestock guidelines – discharge may increase salinity levels in surface waters and could be unsuitable for livestock use downstream unless managed or treated.

Given the nature of this assessment, Ausgold will:

- Continue to collect and refine groundwater and surface water data, including new bore construction details, lithology, and updated field measurements, to underpin further spatial and vertical salinity trends;
- Conduct statistical and spatial analyses as the dataset expands, to validate observed relationships between salinity, elevation, depth, and aquifer type; and
- Use updated results to inform site-specific risk assessments for groundwater discharge, particularly where more saline groundwater from lower elevations may pose a risk to receiving surface water environments.

### 3.5.5 Groundwater Users and Management

The Project is situated within the Karri subarea of the Karri Groundwater Area proclaimed under the *Country Areas Water Supply Act 1947* (WA). The Project is located 40 km west of a Priority 1 public drinking water source area. Katanning drinking water comes from Great Southern Towns Water Supply Scheme, managed by the Water Corporation.

### 3.5.6 Other Groundwater Users

Records of bores within the region suggest there may be other stakeholders accessing groundwater. Proximal to the Project area, the DWER WIR presents publicly available bore records. In addition, the DPRID salinity map also has research bores within the area. A review of these datasets indicates that:

- Many bores (listed on WIR) within 5 km of the Project area are terminated at bedrock and contain no information on their usage or current functionality.
- There are bores listed as ‘Crown land’ in the region, although none are within 5 km of the Project area.
- The closest pastoral bore is approximately 20 km northwest of site.
- The DPIRD database has five bores (measuring EC) within 5 km of the Project area, and 25 more that are close to the northern test bore (WERC007).
- A Priority 1 public drinking water source area is located 40 km to the east which supplies water for the Great Southern Towns Water Supply Scheme, managed by the Water Corporation.

### 3.5.7 Permits Held under the *Rights In Water and Irrigation Act 1914*

Currently, Ausgold holds an approval for each of a 26D and 5C for installation and test production for newly-constructed bores. Specifically, Ausgold held a 26D Licence to 'Construct a Well' for the development of up to five test production bores (CAW208099(1)) of which, as of Q4 2025, it has developed three. As of September 2025, a new 26D permit was under application because Ausgold also proposes to drill and target installation of additional production bores to test groundwater conditions near to the mine pits and to supplement potential bores for long-term sustainable production.

Ausgold also holds a valid 5C licence (GWL 210294(1)) to abstract water for the purposes of investigating the district's groundwater in order to provide a sustainable yield water source to the KGP. This is proposed to be deep groundwaters taken from two (or three) production wells on freehold land south of the KGP and raw water piped through a pipeline corridor running approximately 3 km through predominantly private land.

In late 2025, the company plans to submit to DWER seeking to amend its Licence to Take Water (GWL 210294) or to apply for an additional abstraction permission to increase the volume amounts from the test production levels (50,000 kLpa), in order to sustainably yield saline water from up to five licensed production wells.

## 3.6 Geology

The regional bedrock geology is comprised of basement rocks of the Yilgarn Craton. The Yilgarn Craton is mainly composed of heterogeneous Archaean gneiss complexes and less intensely deformed Archaean granitoid rocks (De Silva et al., 2000).

The geological units from the State Interpreted Bedrock Geology 1:500,000 Map, from the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS, former), are described as:

- Yilgarn Craton granites unit (A-mgss-Y): foliated metagranite, locally gneissic, may include amphibolite lenses, includes deeply weathered rock;
- Yilgarn Craton granites unit (A-g-Y): granitic rock, undivided, metamorphosed; and
- Yilgarn Craton metamorphic unit (A-mn-Y): gneiss, undivided.

Regional west east trending faults are prominent features within this region of the Yilgarn Craton along with predominantly east west (and occasionally north south) trending Proterozoic mafic dykes.

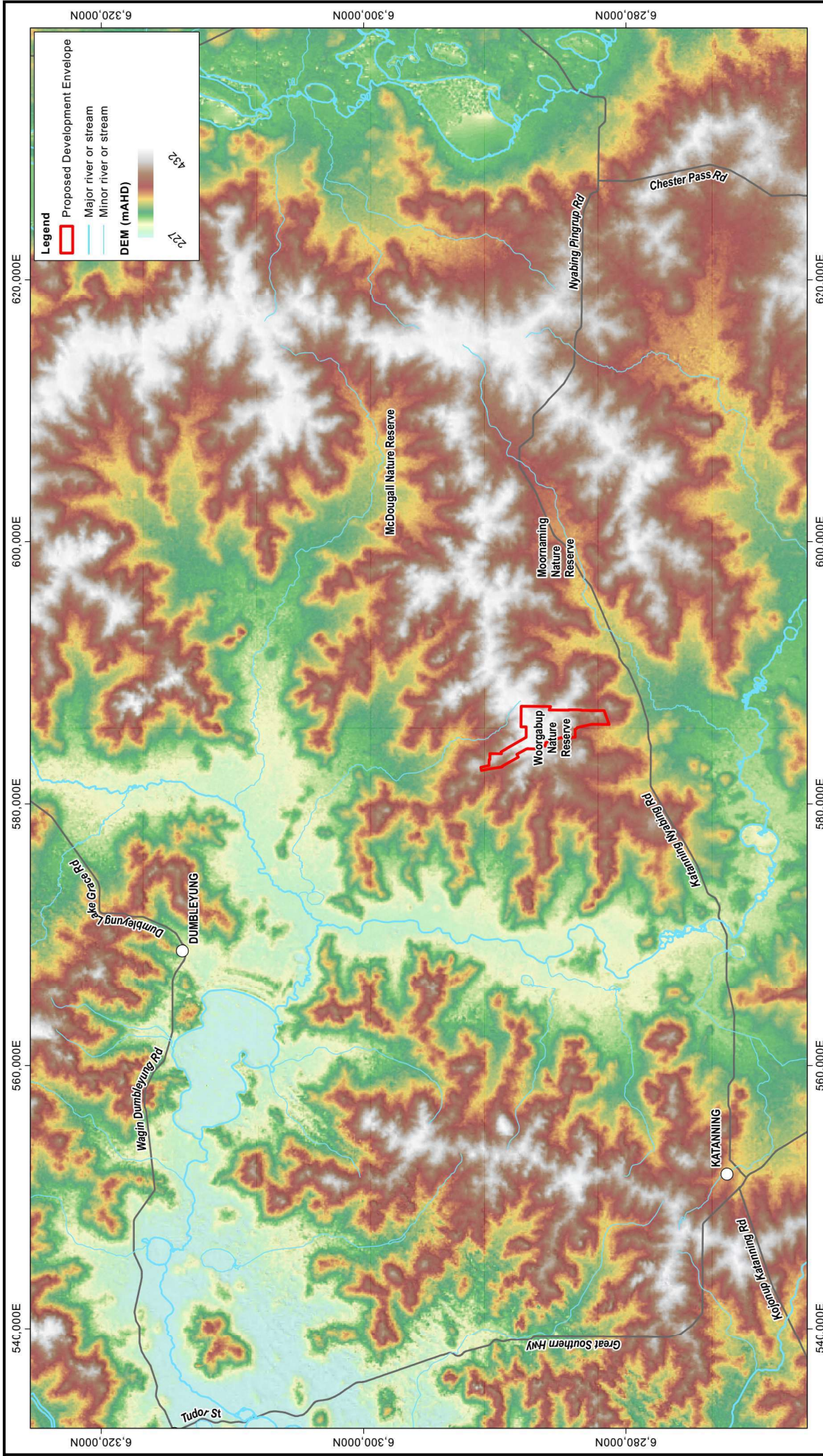
Cainozoic cover sediments and lateritic regolith overlie the Yilgarn Craton, with exposed bedrock areas noted.

The geological units from the Regolith of WA 1:500,000 Map (from DEMIRS (former)) are describe as:

- Alluvial/fluvial unit: clay, silt, sand and gravel on alluvial plains;
- Colluvial unit: colluvium derived from different rock types, includes gravel, sand and silt;
- Exposed unit: exposed bedrock; and
- Residual or relict unit: ferruginous duricrust, massive to rubbly, includes iron-cemented reworked products.

The regional stratigraphy of the area is summarised in Table 3-3.

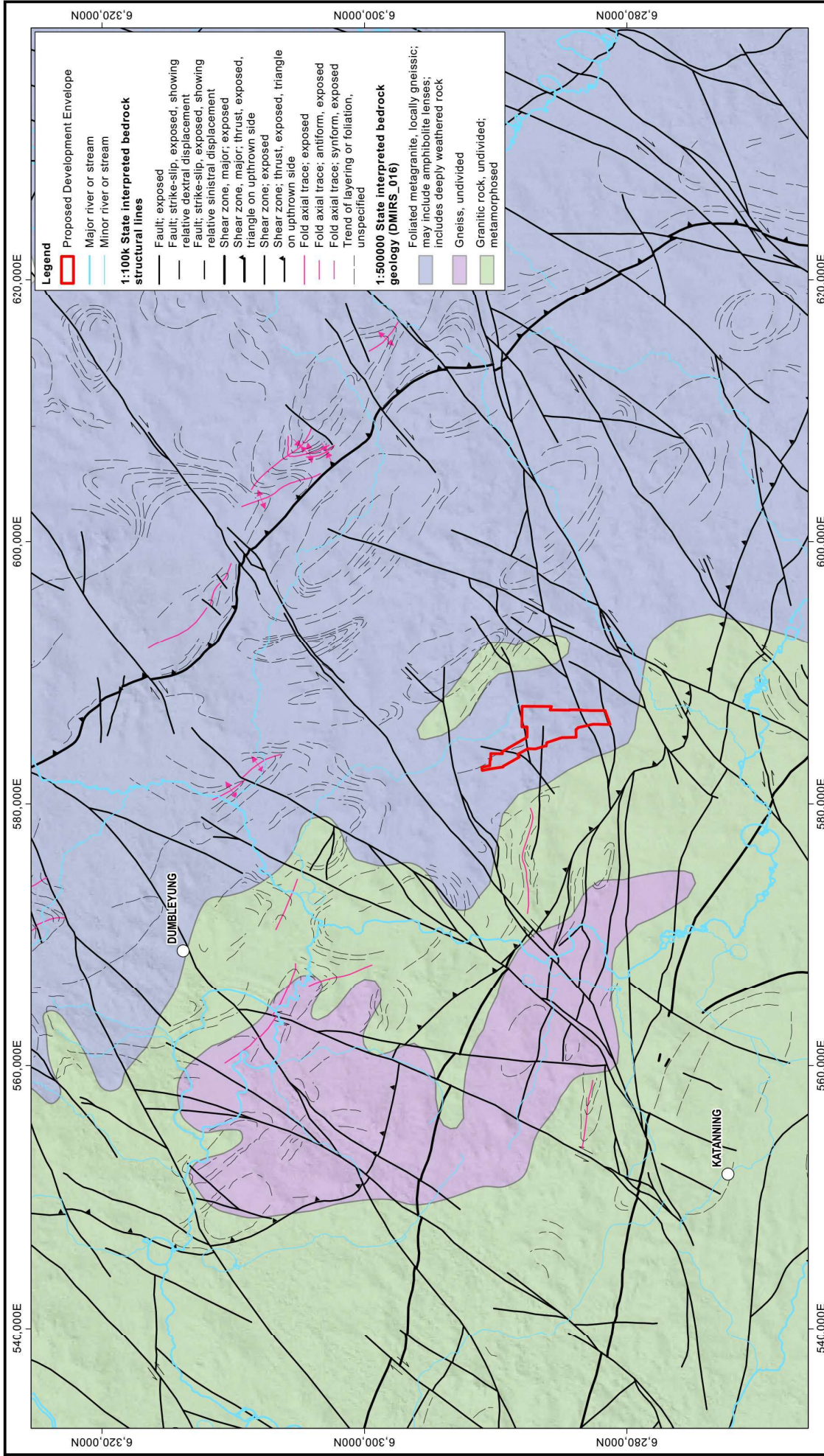
Imagery:



		Author: T. Collie Drawn: CAD Resources - www.cadresources.com.au	
Date: October 2025		Rev: A4	
		<b>Regional Topography</b>	
Figure:		<b>3.7</b>	

**Table 3-3: Stratigraphy and Aquifer Potential of the Blackwood Catchment**

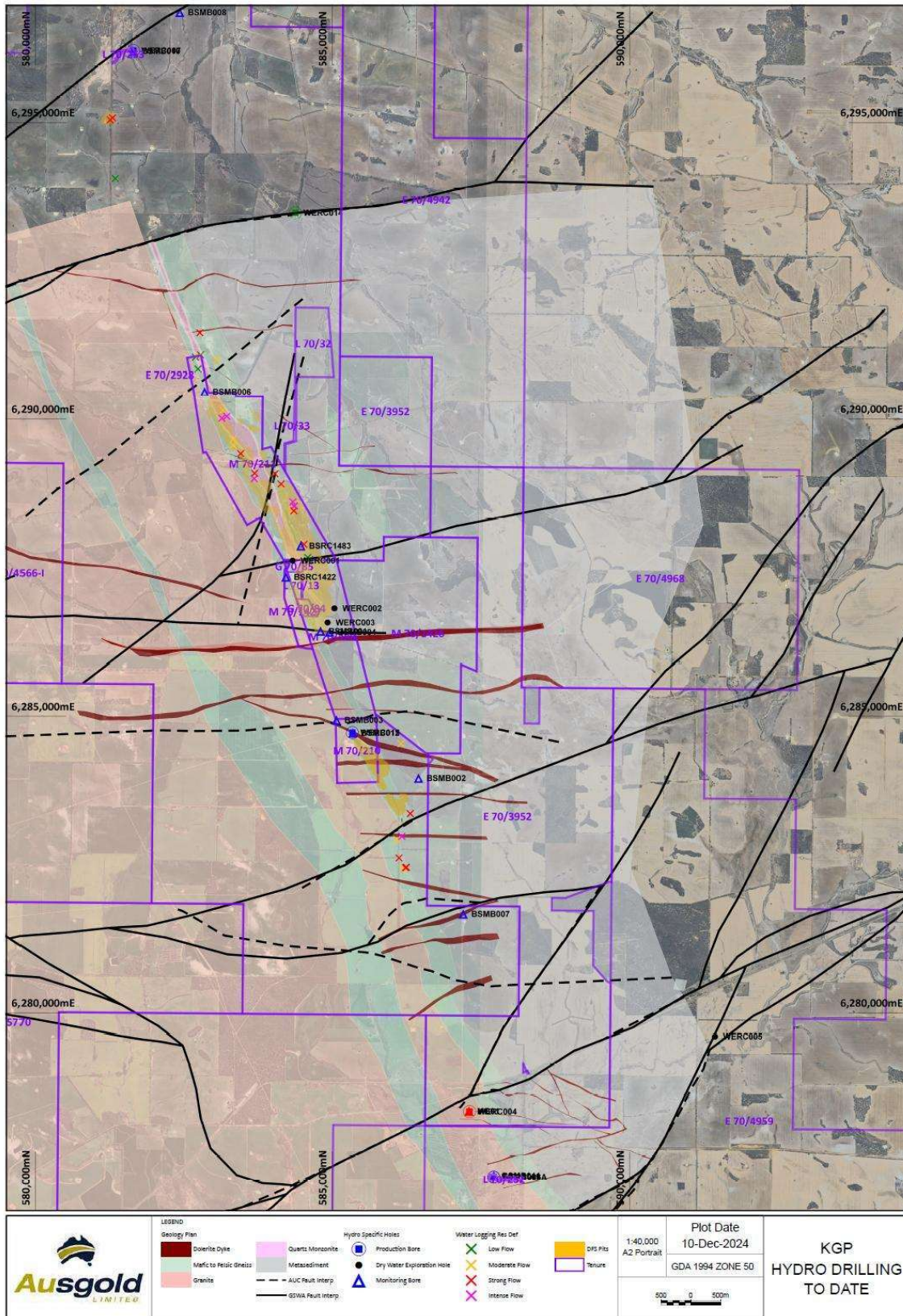
Age	Formation	Lithology
Cainozoic Tertiary – Quaternary	Alluvium (Qa)	Sand, silt and clays
	Safety Bay Sand/Tamala Limestone (Qs)	Eolian and beach sand/eolian calcarenite
	Guildford Formation (sand/clay member) (Qs)	Sand, clay and gravel
	Alluvial and colluvial sediments (Czv)	Sand, silt, clay, gravel and minor laterite
	Alluvium (Cze)	Sand, clay, silt and gravel
	Fluvial and lacustrine deposits (palaeochannels) and Greenbushes Formation (Ts)	Sand, silt, clay, lignite and gravel
Mesozoic Jurassic – Cretaceous	Warnbro Group (Kw), (including the Leederville Formation)	Sandstone, siltstone and shale
	Bunbury Basalt (Kbb)	Basalt
	Yarragadee Formation (Juy)	Sandstone, siltstone and shale
	Cockleshell Gully Formation (Jlo)	Shale and Sandstone
	Lesueur Sandstone (Tru)	Sandstone
	Sabina Sandstone (Trs)	Sandstone and clay
Palaeozoic Permian	Sue Coal Measures (Ps)	Siltstone, shale, sandstone and coal
	Boyup Coal Measures and Barron Sandstone (Pcm)	Coal, sandstone and shale
Proterozoic	Mafic dyke and sill (Prd)	Dolerite and gabbro
	Quartz dyke (Prq)	Quartz
	Leeuwin Complex (Prn)	Gneissic rocks and granulites
Archaean	Granitoid basement rocks (Ag)	Granitic rocks
	Gneissic complexes (An)	Granitoid gneiss, migmatite and schist
	Quartzite (Aq)	Quartzite



**Regional Bedrock Geology**

Figure: **3.8**

Figure 3-9: Mapped Surface Geology (Ausgold) (adopted by Rockwater (2025a))



### 3.7 Soils

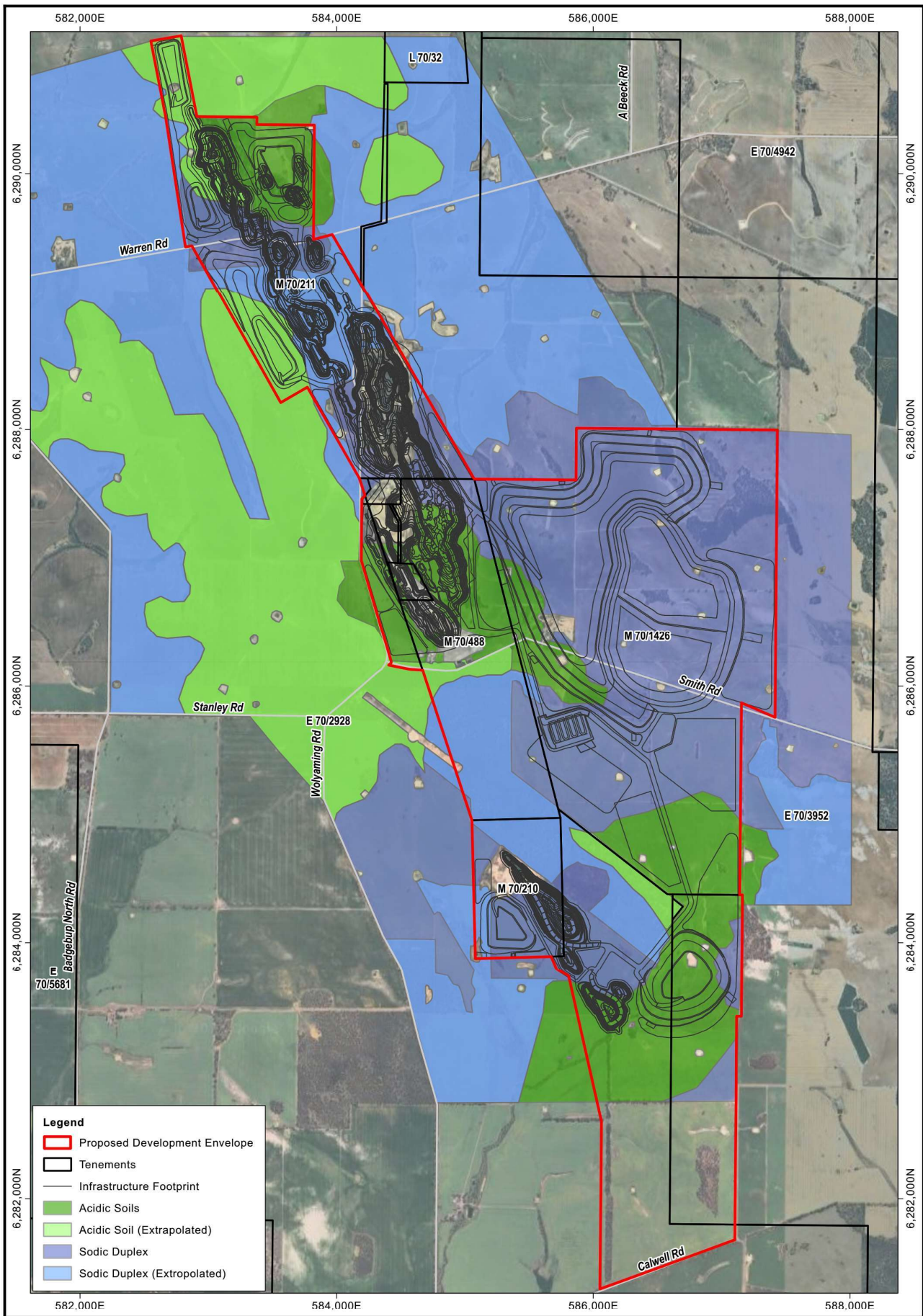
The KGP sits largely in the East Katanning System with gently undulating to undulating rises, in the South-western Zone of Ancient Drainage. At surface, it is found with sandy gravels, grey sandy duplex soils and alkaline grey sandy duplex, often with hardsetting surfaces occupied by Wandoo and sheoak woodland mix with mallee.

Within the survey area, soil inspection sites were classified to the Australian Soil Classification (ASC) system, with four classes identified:

- Sodosol;
- Dermosol;
- Kurosol; and
- Rudosol.

The ASC enhanced by the Soil Groups of WA classification systems provides a high-level understanding of the soils. Landloch (2024) adopted and augmented these classification systems to understand the soils, in situ, to give better guidance on the mining land use that actively will strip, invert and/or stockpile soils, in order that such media are used for cover systems at closure. Three main soil management units (SMUs) were identified by Landloch (2024) at the KGP as:

- **Sodic Duplex:** Soils characterised by the contrast between sandy topsoils and well-structured yet highly sodic subsoils. Topsoils are typically dominated by loamy sands so does include loams. Clay content typically increases significantly and abruptly with depth. The Sodic Duplex soils are located in various landscape positions, from crests and upper slopes to the lower slopes and drainage lines.
- **Acidic Soils:** Soils where both the topsoils and subsoils are typically acidic. Topsoils are sand-dominated but can include loams. The subsoils have an increased clay content compared to the topsoils, ranging from loams to medium heavy clays. Coarse fragment abundance is variable. Acidic Soils are prone to low structural stability so not useful on sloping lands.
- **Shallow Sands:** Sandy soils that are restricted to a single area, with shallow structureless sands laying atop a cemented lateritic layer. Although these sands are considered to be sodic, they are prone to structural stability so useful in construction but not rehabilitation as a cover system.



**Legend**

- Proposed Development Envelope
- Tenements
- Infrastructure Footprint
- Acidic Soils
- Acidic Soil (Extrapolated)
- Sodic Duplex
- Sodic Duplex (Extrapolated)

0 0.5 1km  
 Scale: 1:40,000  
 GDA 1994 MGA Zone 50



**Indicative Mine General Arrangement over Baseline Soils**

Figure:  
**3.10**

CAD Ref: a2508F041_08		Author: T. Collie
Date: October 2025	Rev: A A4	Drawn: CAD Resources ~ www.cadresources.com.au

Imagery: © OpenStreetMap (and) contributors, CC-BY-SA

Figure 3-10 shows the mine's general arrangement, largely over sodic duplex and acidic soils. Further work continues in refining the mapping and measurement of soils to future rehabilitation purposes. Generally, stored soils would be used as post-closure surface covers for:

- flat areas, not prone to rainfall-runoff, including former mining domains such as the processing plant, mine services area, low grade ore stockpile, flat tops of the waste rock landforms (WRLs);
- as a final cover above the earthen blanket atop the tailings storage facility (TSF); and
- WRL flat berms which are retained as constructed benches sited within the outer faces.

### 3.8 Materials Characterisation

Materials refers to all soil and rock that will be removed or mined by mining activities, including material that will be physically or chemically processed on site (e.g., plant tailings from processed ore). Materials characterisation identifies the typical physical and geochemical properties of each main class of those materials (soils; waste rock; ore) and whether they have potential to cause become hostile, form pollution, and/or contribute to, or detract from, the success of rehabilitation and closure.

In accordance with the Statutory Guidelines for Mining Proposals (DMIRS, 2020), materials characterisation programs address risk factors potentially associated with:

- Acidic and/or metalliferous drainage (AMD) inclusive of acidic drainage, metalliferous drainage, and saline materials and/or drainage;
- Erosive, sodic and/or dispersive material, especially soils or weatherable rocks;
- Fibrous minerals;
- Naturally occurring radioactive material (NORM), and
- Material with other chemical/physical properties that will affect stability or success of rehabilitation (e.g., low pH, low fertility, poor structural integrity, water holding capacity).

Ausgold has conducted materials characterisation testwork on soil, waste rock and ore materials planned to be mined at the Project. The waste characterisation program will be developed in accordance with Draft Guidance: Materials characterisation baseline data requirements for mining proposal (DMP, 2016).

The Project is comprised of several defined resources within the mining zones. Overall, the zone is thrust fault bound block comprising of a folded sequence of granite/monzonites, granulite ranging from felsic to mafic and metasediments.

Detailed analysis has been done informed by SRK (2024) which used a Sampling Analysis Plan to target the relative proportion of each lithology planned to be mined. Preliminarily, Knight Piésold (2022) identified the major lithologies for testing as:

- Metasediments
- Felsic Granulites
- Intermediate Granulites (Minor host rock)
- Mafic Granulites (Main host rock)
- Speckled Granulites
- Quartz Monzonite
- Granites.

### 3.9 Acidic and/or Metalliferous Drainage (AMD)

Generally, sulphide minerals were typically noted within the mafic granulites with both sulphur-containing pyrite and pyrrhotite noted as being associated with the gold mineralisation. Sulphide grade generally increases with increasing gold grade, so is totally associated with ore feeding into the processing plant and it ultimately residing in the engineered TSF.

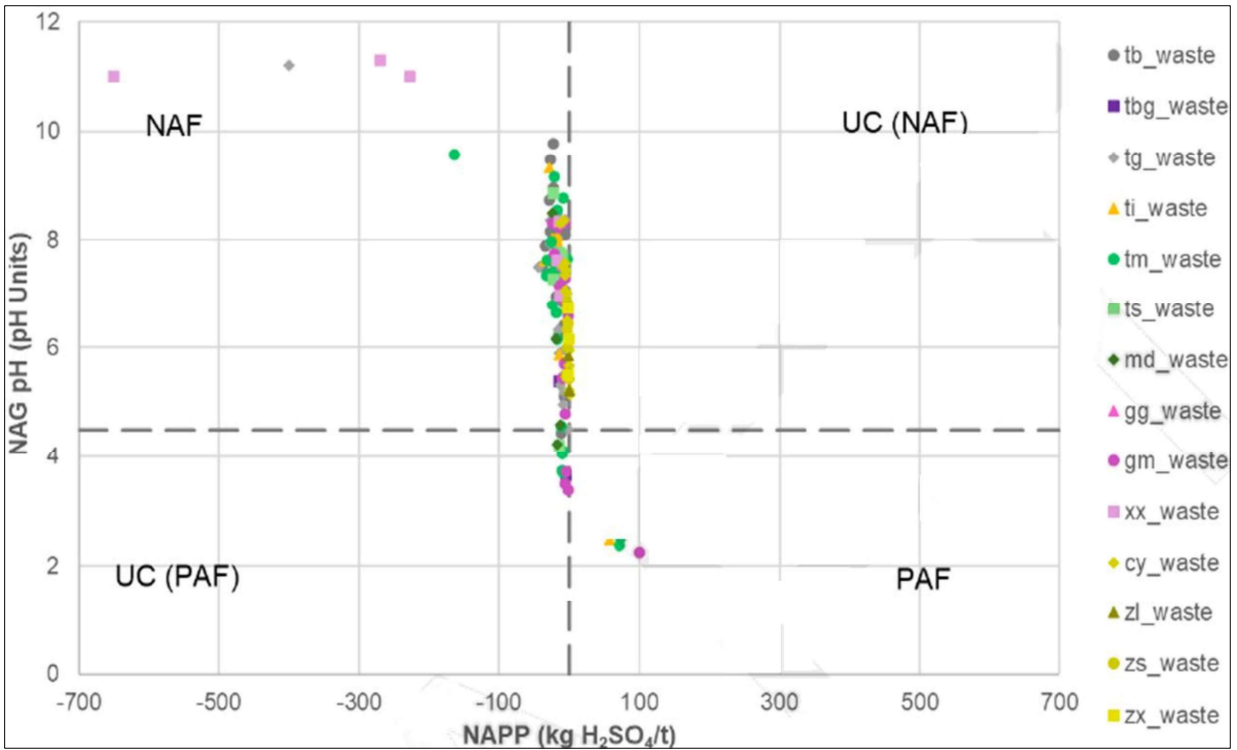
Knight Piésold (2022) initially reported results to indicate that the total sulphur content varied from <0.01% to 1.35% at an average of 0.2% which is very low. With most samples (79%) having a total sulphur content less than 0.3%, which is a limit sometimes adopted for preliminary screening and identification of Potentially Acid Forming rock material. The maximum potential acidity (MPA) was calculated from the total sulphur contents and was minor for most samples with the highest being 39 kg H<sub>2</sub>SO<sub>4</sub>/t at an average of 5.4 kg H<sub>2</sub>SO<sub>4</sub>/t. The acid neutralising capacity (ANC) of the samples was determined along with the estimated carbonate content (based on total carbon in the absence of inorganic carbon test data). The ANC was measured from 13 to 177 kg H<sub>2</sub>SO<sub>4</sub>/t at an average of 30 kg H<sub>2</sub>SO<sub>4</sub>/t with the majority of the ANC attributable to the carbonate minerals in waste rocks; this indicates a significant amount of ANC material which should be readily soluble to counter acidity upon oxidation.

Further to the screening work of Landloch (2023), SRK (2024) and then SRK (2025) indicated the following for KGP waste rocks (approximately 300 test samples analysed):

- Over 90% of the test rock samples recorded total % S << 0.3% and were therefore classified as NAF (Landloch 2023).
- Only three of 111 rock samples had characteristics likely to be potential acid forming (PAF) low capacity and an ANC:MPA ratio of <2 (Landloch 2023).
- More targeted materials testing after a stratified sampling of rocks and ore from the optimised pit proportional to their representation in rock and ore feed to WRLs or the TSF (SRK, 2024).
- Total sulphur content of waste rock had a median value of 0.047% S (Landloch 2023).
- All waste rock lithologies have median sulphur content < 0.1% S, except for dolerites which have a maximum sulphur content of 0.4% S and a median of 0.2%.
- A slightly higher but small proportion of waste rock test samples (<10%) with > 0.3% S. Host lithologies are known to include mafic granulites (tm, gneiss), intermediate granulites (ti, gneiss) and monzogranites (gm) which are relatively abundant. Sixteen of the samples (<10%) generated acidic NAGG solutions with S content being slightly higher (ranging from 0.25% to 3.4%).
- Net acid production potential (NAPP) values of waste rock ranged from -650 kg H<sub>2</sub>SO<sub>4</sub>/t to 99 kg H<sub>2</sub>SO<sub>4</sub>/t with a median -11 kg H<sub>2</sub>SO<sub>4</sub>/t. Most test samplers generated negative NAPP values meaning an excess of neutralising capacity overall.

The SRK (2025) findings are summarised as shown in Figure 3-11. The low proportion of slightly PAF waste rock and a higher proportion of NAF with propensity to alkaline pH levels upon weathering and oxidation. Only 2.5% of the samples (four out of the 161) test samples had total S > 2% as shown below (SRK 2025).

Figure 3-11: SRK (2025) Waste Rock Screening Results Summary



In general, the PAF potential is typically low to very low with net neutralising potential within the waste rocks. For those shown to have elevated sulphur content and/or high alkalinity, these are of small volumes inasmuch as they can be interred in dedicated cells in WRLs upon construction. Further static tests are in-train for a selection of prospective “hostile” rock types (those >1% S) in order that speciation and leach yield test work provides further information on site based management. Kinetic test work will be conducted later in 2025 to provide details of weathering and leaching rates, even in this case of limited suspect sulphur-laden waste rock materials.

## 4. Project Development and Implementation Overview

The Katanning Gold Project processing facility has been designed to process 3.6 Mtpa of open pit ore. The processing plant will be designed to operate seven days per week at a nominal treatment rate of 450 dry t/h at a grinding circuit utilisation rate of 91.3%.

The proposed processing facility design has been based on proven technology for gold recovery and comprises the unit processes outlined below:

- Single stage crushing using a primary jaw crusher to yield a final product of 80% passing 144 mm.
- Two stages of grinding in a primary SAG mill and secondary ball mill closed with hydro-cyclones to achieve a product size of 80% passing 75 µm.
- Treatment of a partial mill discharge stream by centrifugal gravity concentration, followed by batch intensive leaching of the gravity concentrate and electrowinning of the resulting pregnant solution.
- Thickening of the leach feed stream to 48% solids w/w prior to leaching.
- Leaching and adsorption in a hybrid carbon-in-leach (CIL) circuit comprising two leach tank and six CIL adsorption tanks.
- Acid washing and elution of the loaded carbon in a split AARL elution circuit, and thermal regeneration of the barren carbon prior to its return to the CIL circuit.
- Smelting of cathode sludge from electrowinning to produce a final product of gold doré.
- Thickening of the final tailings followed by cyanide detoxification using the INCO Air/SO<sub>2</sub> method and pumping the tailings to the TSF. Supernatant water will be recovered from the surface of the TSF for recycling back to the process plant.



## 4.1 Water Requirements

The site's annual water demand is estimated at approximately 3.6 GL/year. This demand is expected to be primarily met through return water from the TSF and inflows from pit dewatering below the water table. Inbound original water will be required early in site processing and then afterwards only make-up water to balance the water demand at site.

Groundwater inflow estimates into mine pits over the life of mine vary considerably, with numerical initial modelling undertaken by SRK highlighting significant uncertainty in predicted pit inflows. The model was subsequently refined through more granular geological data and definition that was adopted by Rockwater (2025a) in providing a more accurate forecast in estimated dewatering production and drawdown extents. As an additional internal verification process, a third source of pit dewatering forecast estimates was generated by EMM Consulting in 2025 which enables the preceding work of Rockwater to be confidently adopted by Ausgold.

For the purposes of the site-wide water balance, Rockwater's mine pit dewatering rates have been adopted by WSP (2025) as the most likely input, pending further field drilling and empirical data to support a more robust modelling in future updates. Based on these inputs, additional makeup water will be required to supplement site demands, particularly during the summer and autumn months; these are estimated annual borefield makeup ranging from 53 ML to 1.006 GL depending on climatic and operational conditions.

Rockwater (2025) pit dewatering schedules over the ten year life of mine provided the quotient of water abstracted at site from below the floor of mined pits, in order that other sources of water could be forecast including, importantly, water to be abstracted and inbound from the regional borefield.

## 4.2 Raw Water Supply

In 2023, a drilling campaign was conducted to identify optimal locations for production bores for water supply and dewatering. The campaign comprised 16 bores and includes two monitoring bores, three pilot holes for dewatering bores, and 11 pilot holes for water production bores.

In 2024, based in airlift yields from the pilot drilling and data from the groundwater monitoring, three sites were selected for test production and associated monitoring bores:

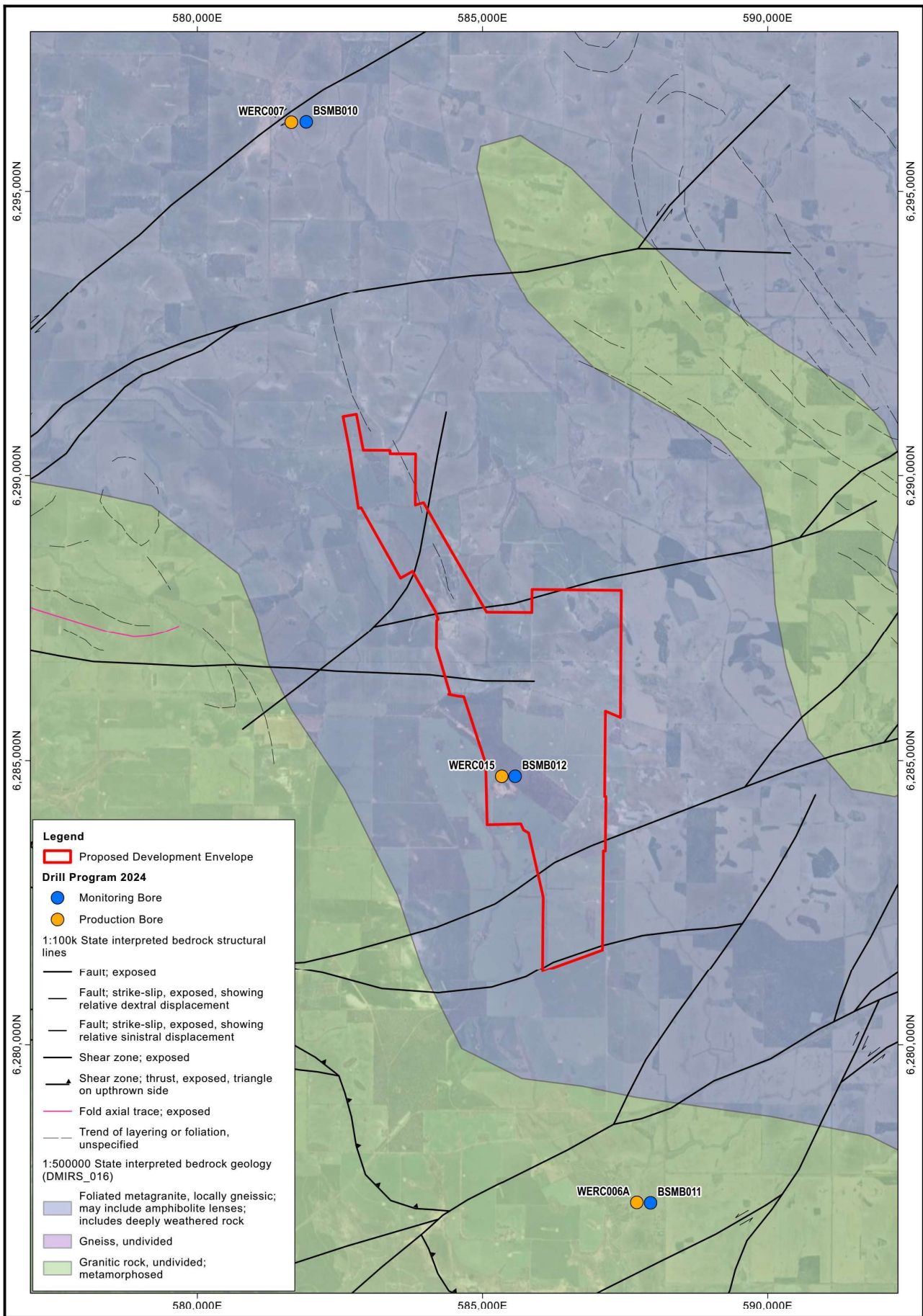
1. The southern area, comprising test production bore WERC006A and monitoring bore BSMB011;
2. The north area, comprising test production bore WERC007 and monitoring bore BSMB010; and
3. The central area, comprising test production bore WERC015 and monitoring bore BSMB012.

The locations of the CAW208099(1) bores are shown in Figure 4-2. Note, only a select number of bores will be used; at this stage, WERC007 is not anticipated to be used for supply.

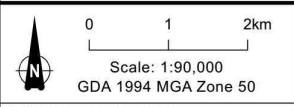
At steady state, the process plant will require approximately 3.60 GL/year of water, assuming that, for years other than the first year, approximately 3GL/year of water is returned from the TSF to the processing plant. Water for mine dust suppression will be additional to this quantity.

Initially in Year 1, the amount of water returned from the TSF will be significantly less than the steady-state rate of recovery. Consequently, the water supply system will need to be capable of providing water to the process plant at a rate equivalent of up to 2.487 GL/year in Year 1.

Further detail on the overall site water balance is presented in Section 4.6.



Imagery: © OpenStreetMap (and) contributors, CC-BY-SA



## Test Production Bore Locations

Figure:  
**4.2**

CAD Ref: a2508F041_10		Author: T. Collie
Date: October 2025	Rev: A A4	Drawn: CAD Resources ~ www.cadresources.com.au

### 4.3 Bores and Pipelines

Up to three bores located at the southern borefield will be used to extract ground water. One of these production bores (WER006A) was installed in 2024. Two of the three bores will typically be required to operate to meet the initial water demand at KGP in order to draw from one in Year 1 and one furloughed. The pumps will be powered by diesel generators and remotely operated via telemetry controls. Water will be delivered to the raw water pond at the process plant by high-density polyethylene (HDPE) pipelines, routed along a private corridor on freehold land.

### 4.4 Dewatering

Water extracted from the mine pit dewatering program will be piped to the raw water dam at the processing facility. Minor inflows into the pits will be the responsibility of the mining contractor with any salinized water optimally used for dust suppression.

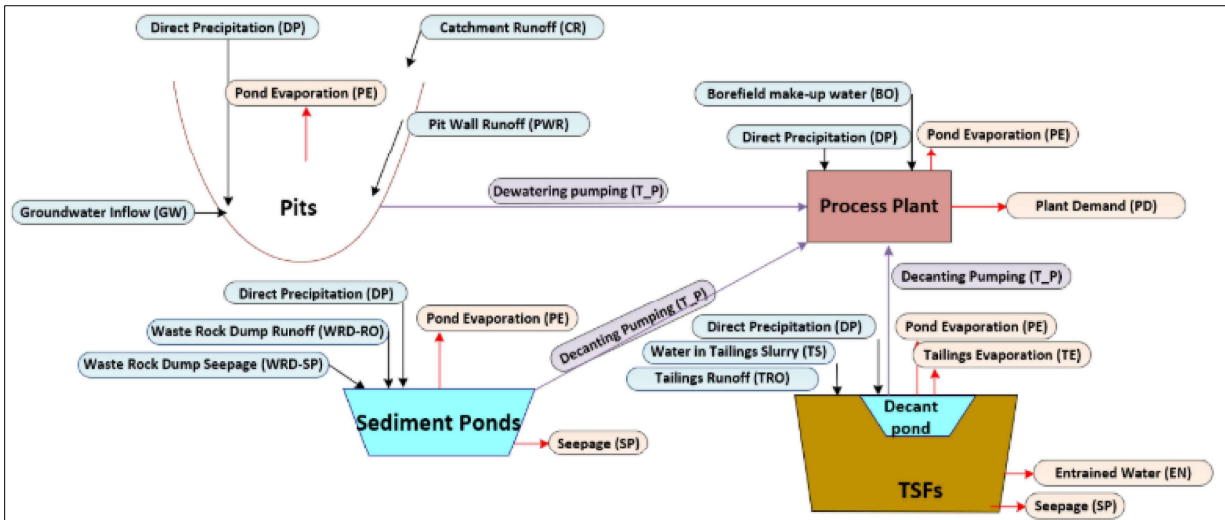
Reference should be made to Sections 4.6 and 5.2 to Section 7 relating to the range of hydrogeological and surface water assessments for further details regarding the nature and fate of dewatering waters in the context of the site wide water balance.

### 4.5 Site Water Conceptualisation

A simplified version of the process flow diagram for the water balance is presented in Figure 4-3 showing the general interactions between the main storages. In general, the contact water flow during operations is as follows:

- **Pits:** There are four main pits on site (Jackson, Jinkas, Dingo, and Olympia), with each pit developed in stages. Pits in general receive water from direct precipitation, catchment runoff, pit wall runoff and groundwater inflow, the latter as a result of the pit being mined below the regional groundwater level (except Olympia). Water ponding within a pit is mainly lost through dewatering pumping to the process plant.
- **Sediment Ponds and Storm Water Pond:** 16 Sediment ponds are expected to collect runoff and seepage from the WRDs across the mine area, and one Storm Water pond is expected to collect runoff from the run-of-mine (ROM) pad. Operational rules governing pumping from the sediment ponds to the process plant are applied. The sediment ponds are expected to be clay lined, and therefore only minimal seepage is expected.
- **Tailings Storage Facility:** The TSF comprises two cells (Northern cell and Southern cell). The TSF cells receive water from direct precipitation, water released from the tailings slurry, and runoff from the tailings surface. The main outflow from the TSF cells is decanting pumping directed to the process plant. Minimal seepage is expected to be captured via an underdrainage system. The models consider this seepage as a loss in the water balance.
- **Process Plant:** The process plant receives water from the pits, sediment ponds, and TSF cells. It has an annual water demand of approximately 3,700 ML and if the inflow is insufficient, borefields are used to supplement the water supply.

Figure 4-3: Conceptual Project Water Sources and Sinks



Raw water will be supplied by from a number of bores. The bore pumps will pump directly to a raw water tank onsite. Gland water pumps (duty and standby) will draw water from the raw water tank to supply gland seal water to centrifugal slurry pumps. A reverse osmosis (RO) feed pump will draw water from the raw water tank the RO plant. The RO plant will treat the water to produce permeate to provide fresh water and potable water (with chlorine sterilisation). The brine will flow to the process water pond.

Overflow from the raw water tank will flow to the HDPE lined raw water pond, which also acts as the fire water reserve. Raw water pumps (duty and standby) will draw water from the raw water pond and supply a range of plant uses.

Thickener overflow water will report to the settlement pond, which will discharge into the process water pond. Process water pumps will draw from the process water pond to supply the following plant users:

- Service points throughout the plant.
- Grinding area dilution.
- Gravity area dilution.
- Tailings flushing water.

A site drainage pond will be installed to capture site run-off. A pontoon pump will return water to the settlement pond.

The borefield will be operated by telemetry to permit the remote starting and stopping of pumps.

The borefield transfer pumps will stop and start based on level in the raw water tank. The bores will be started and stopped based on an operator selected priority.

## 4.6 Site Water Balance

The focus of the site water balance is to track the contact water and estimate the annual water surplus that will require management (WSP, 2025b). Non-contact water will be diverted and managed according to the site Surface Water Management Plan (SWMP). This approach prevents mixing of contact and non-contact water generated at the active mine site.

The site-wide water balance model was developed by WSP using the GoldSim software. The model operates on a daily time step to predict the water storage volumes for key structures. The predictive simulations incorporate a probabilistic (stochastic) climate generator to account for uncertainties related to future climatic conditions and variability in selected model inputs and parameters. This approach enables the prediction of the likely long-term interactive performance of the site's infrastructure under alternative climatic sequences.

The objective of the site water balance was to establish a base model to inform the strategic planning for the operational phase focusing on:

- Understanding fluxes: Analysing the inflows and outflows of the main infrastructure under stochastic climate time series.
- Quantifying the yearly water surplus that will require management.

Rockwater (2025a) revised the WSP detailed water balance model for the site based on updated pit inflow modelling and updated pit void storage volumes, from which recalculated supply borefield makeup volumes surplus water volumes were made. The revised water balance shows that additional makeup water will only be required in Years 1 and 10. The revised water balance (Table 4-1) shows that additional makeup water will only be required in Years 1 and 10. Surplus water from Years 2 to 9 is assumed to be managed in a way that will not impact downstream surface waters or groundwater levels (i.e., through direct recharge or infiltration or discharge back into the aquifer via creeks, or bores). In most likelihood, the estimated demand assumes that all available pit water at site is not used (as non-mined pit groundwater rebounds), but if it was to be, the need for bore make-up water would be reduced or eliminated.

The preferred makeup water supply strategy will focus extraction on up to three bores within the "southern borefield" (Figure 3-3). It is assumed in the base case that these bores would be operated at equal extraction rates of 29 L/s in Year 1, and 7.6 L/s in Year 10 (Rockwater, 2025a).

Table 4-1: Updated Water Balance Table (modified from Table 4.28 from WSP, 2025)

Year	Input (ML/a)						Output (ML/a)				Balance (ML/a)	
	Rainfall	Transfer From Pit Lakes	Transfer from TSF	Pit Inflow	Sed. Pond	Supply Borefield Makeup	Pan Evap	Plant Demand	Unmanaged Surplus	Total In	Total Out	In - Out
Y1	1.4	150.0	0.0	323.7	304.4	2487.8	3.9	3263.4	0.0	3267.3	3267.3	0.0
Y2	1.3	0.0	3100.6	255.5	299.6	0.00	3.9	3652.2	0.9	3657.0	3657.0	0.0
Y3	1.4	0.0	3137.3	199.6	480.5	0.00	3.9	3779.1	35.8	3818.8	3818.8	0.0
Y4	1.4	0.0	3196.8	310.6	459.1	0.00	3.9	3823.7	140.3	3967.9	3967.9	0.0
Y5	1.4	0.0	3087.7	409.4	457.3	0.00	3.9	3811.3	140.6	3955.8	3955.8	0.0
Y6	1.4	0.0	3047.5	566.4	473.5	0.00	3.9	3704.9	380.0	4088.8	4088.8	0.0
Y7	1.4	0.0	3055.0	786.7	536.7	0.00	3.9	3766.1	609.8	4379.8	4379.8	0.0
Y8	1.3	0.0	3004.9	881.9	523.3	0.00	3.9	3679.2	728.3	4411.4	4411.4	0.0
Y9	1.3	0.0	3015.2	383.4	533.3	0.00	3.9	3839.8	89.5	3933.2	3933.2	0.0
Y10	1.4	0.0	2323.5	158.2	552.7	654.6*	3.9	3686.5	0.0	3690.4	3690.4	0.0

\* The estimated demand assumes that all available pit water at site is not used (as non-mined pit waters rebound), so reducing or eliminating the need for bore make-up water.

## 4.7 Proposal Development Schedule

Indicative Project milestones are shown in Table 4-2 below.

**Table 4-2: Forecast Project Milestones**

<b>Milestone</b>	<b>Timeframe</b>
H3 Report and application for 5C licence	Before end H2 CY25
Ausgold's KGP Financial Investment Decision	Before end H1 CY26
Commencement of KGP construction Installation of borefield and pipeline	Before end H2 CY26
Provision of bore water for abstraction to KGP	By H1 CY27

## 5. Hydrological and Hydrogeological Assessments

In order to characterise the nature and scale of surface and sub-surface hydrogeological impacts resulting from the Project Ausgold has commissioned a series of investigations that has iteratively refined the knowledge base and informed the significance of potential impacts associated with surface and groundwater resources within and in proximity to the Projects zone of influence.

The series of hydrogeological assessments conducted to date allow definition of proposed management and mitigation measures that could be adopted to minimise adverse impacts on the local and regional aquifer as well as surface water regimes over the Project life.

Data and reports from public databases and previously completed geological and hydrogeological studies for the Project were reviewed for this assessment, including:

- Geological mapping (DEMIRS).
- Water level data from regional bores available on the WIR government database (DWER).
- Government digital elevation modelling.

Subsequent to the above, assessments undertaken to date include:

**SRK Consulting (2024)** – Conduct of hydrogeological field investigations, aquifer testing, and associated assessments, including the development of a numerical groundwater flow model for the Project which was intended to support a H3 assessment to satisfy permitting requirements for the estimated groundwater abstraction needed to support the Project. The basis of the model construct was based on GSWA geology that was inferred and not informed by hundreds of thousands of metres of in-field drilling and empirical observations.

**Rockwater (2025a)** – Completion of an independent technical assessment of SRK’s hydrogeological report and create a newly constructed numerical groundwater model in particular to verify the basis of assumptions applied in resultant predictions on dewatering volumes and to determine revised dewatering predictions on the basis of fine-scale field based geologic mapping and an updated numerical groundwater model developed by Rockwater. The Rockwater Technical Memos are provided as Appendix 2.

**EMM Consulting (2025)** – evaluation of the reasonableness of pit dewatering estimates produced using the two existing numerical groundwater models developed for Ausgold. Key findings were that SRK (2025) reported model-derived dewatering estimates yield an average of 4.8 GL/yr and a maximum of 8.4 GL/yr for a 11 year mine life. EMM considers this to be an overestimate and unlikely when benchmarked against dewatering data from existing mine operations located in similar hydrogeological settings in Western Australia. Rockwater (2025a) dewatering estimates provide an average of 0.4 GL/yr with a maximum of 0.5 GL/yr for a 10 year mine life, which are reasonable in comparison to the range of measured values gathered from existing projects. EMM considered that, by reducing the long-term drainable capacity of the SRK model to 0.1% (as performed by EMM), the modelled dewatering estimates significantly decrease with an average of 1.5 GL/yr and a maximum value of 2.3 GL/yr, which are more reasonable values compared to benchmarked data and to the maximum values reported by Rockwater (2025a)). Lastly, EMM noted that there is an identified risk from relying on pit dewatering volumes as a primary water supply source for the Project and recommended that a conservative approach on pit dewatering volume is taken (as per Rockwater), unless there is clear evidence of the existence of high-yield water bearing zones connected to the pits.

**HBWA (2025a)** – Completion of a desktop assessment of potential GDE adjacent to the Project location to assess the potential risk of impacts from dewatering drawdown effects on potential GDEs. A total of 21 terrestrial (114.91 ha) and 10 aquatic GDE (137.67 ha) instances were identified across the four discrete GDE Assessment Units. The GDE classification was derived solely from the national level assessment (BoM, 2025). The study concluded that risks from groundwater abstraction were rated between moderate to low. The GDE Risk Assessment is provided as Appendix 1.

On the basis of the Rockwater (2025a) and HBWA (2025a) assessments, project design and implementation will adopt a precautionary approach to managing potential ecological impact as far as practicable and commensurate with identified risks to these systems. The need for ground truthing to refine the GDE distribution on site will be determined and implemented as necessary.

**HBWA (2025b)** – Completion of an assessment to characterise salinity gradients within the hydrogeological profile within and surrounding the proposed mine pits for the Project focussing on describing the distribution of groundwater salinity with depth, elevation and aquifer type. Baseline salinity conditions in nearby surface water systems, potential receptors for any future discharge, were also evaluated. The findings inform subsequent considerations for the potential discharge of lower salinity groundwater generated through dewatering activities. The HBWA Technical Review is provided as Appendix 3.

**WSP Australia Pty Ltd (WSP) (2025a)** – Development of a Site-wide Water Balance to provide a general understanding on the site water management requirements, delineation of contact and non-contact waters and how each stream can be tracked and quantified and how the estimated the annual water surplus can be managed, e.g., through site based evaporator system. Non-contact water will be diverted and segregated from contact water and managed according to the site SWMP discussed below. It adopts the mine pit inflow volumes to input to the GoldSim model. The full Site-Wide Water Balance report is provided as Appendix 4 and should be read in conjunction with updated results derived by Rockwater (2025a).

**WSP (2025b)** – Development of a site-based SWMP and design of surface water management structures for the Project. The SWMP is provided as Appendix 5.

## 5.1 Refinement in Predicted Pit Dewatering Volumes

Two independent groundwater models have been developed to estimate pit dewatering volumes for the Project. SRK (2025) constructed a detailed numerical model over the life of mine with a linear bench progression schedule over the GSWA spatial framework with certain expansive assumptions made; the predicted base case pit inflows ranging from 2.9 to 8.0 GL/year. Separately, Rockwater was engaged to conduct an independent technical review of the SRK hydrogeological and numerical groundwater model. Preliminary findings from Rockwater’s review suggest that the SRK model predictions were likely to have been overestimated. A key contributing factor appears to be the structural configuration based on GSWA spatial framework in the local district and the resultant parameterisation of faults within the model domain. These structural elements have a significant influence on groundwater flow dynamics and, consequently, the estimated dewatering volumes as stated above.

In response to these findings, and following consultation with Ausgold, Rockwater (2025a) was further engaged to evaluate the influence of the existing model’s structural framework on predicted dewatering volumes. While this initial scope of work commenced as a sensitivity assessment of SRK’s model structure, it subsequently evolved into the development of a robust numerical groundwater model aimed at producing more realistic dewatering predictions based specifically to generate a local spatial geologic framework based on Ausgold’s empirical drilling data of faults, fractures and dykes. A simplified, alternative numerical model to assess the sensitivity of the original predictions. Using a quarterly bench progression over a 10-year mine life, Rockwater’s model estimated significantly lower average inflows to pits of approximately 0.4 GL/year.

The divergence in modelled outcomes is primarily due to differing assumptions regarding the extent and hydraulic connectivity of fault zones. SRK's model assumed regionally extensive, vertically continuous, and hydraulically connected faults that may notionally act as preferential flow paths, whereas Rockwater, based on its review of core logs and in consultation with Ausgold geologists, adopting fault transmissivity significantly diminishes below 150 m AHD in the vicinity of the proposed below water table pits, and is considered a more realistic reflection of field conditions as its based on over 200,000 m of drill core logs. As a result of the divergent findings, Ausgold sought a third party review by EMM Consulting (EMM, 2025) to contemplate each of SRK and Rockwater. As previously stated, EMM Consulting's review (Appendix 6) concluded that the Rockwater (2025) dewatering estimates provide an average of 0.4 GL/yr with a maximum of 0.5 GL/yr for a 10 year mine life, which are reasonable in comparison to the range of measured values gathered from similar existing mining projects. A sensitivity analysis of increased permeability resulted in maximum dewatering rates of near 1.0 GL/yr, which can be thought of as feasible flows.

Both modelling approaches acknowledge uncertainty in key input parameters, particularly fault geometry and hydraulic conductivity. Accordingly, both SRK and Rockwater recommend that further hydrogeological investigations, including additional drilling, extended aquifer testing, and targeted fault zone characterisation, are required to improve the site conceptual model. This will support the development of a refined, fit for purpose numerical model in line with Australian Groundwater Modelling Guidelines.

The following chapters summarise the assumptions, methodology, conclusions and recommendations of each of the above studies.

## 5.2 Basis of Hydrogeological Assessment

Early hydrogeological assessments were conducted by SRK since 2022:

- Groundwater quality sampling of monitoring bores in the Project vicinity between 2022 and 2024. Completed monthly between September 2022 and December 2023, and quarterly in 2024.
- A preliminary hydrogeological assessment and targeting technical memorandum (SRK, 2022).
- Two groundwater investigation pilot bore drilling programs (2022 and 2023) to establish potential bore yields across the Project area.
- A groundwater investigation drilling and pumping test program.
- A hydrogeological conceptual model and design basis memorandum for the numerical modelling (SRK, 2024).
- A draft H3 report (SRK, 2025).

As previously stated, in order to improve the robustness of predicted groundwater impacts and to characterise the nature and scale of surface and sub-surface hydrogeological effects resulting from the Project, Ausgold's iterative approach lead to the most recent assessment by Rockwater (2025a) independent technical review of SRK's hydrogeological report and newly constructed numerical groundwater modelling. This review resulted in revised predictions on dewatering volumes and dewatering predictions on the basis of fine-scale field based geologic mapping and an updated numerical groundwater model developed by Rockwater (2025a).

Key elements of the modelling approach and assumptions are summarised below.

### 5.3 Numerical Groundwater Model

Rockwater (2025a) developed a groundwater model with the following settings and assumptions:

- **Type and domain:** The model is a two-layer, confined groundwater model which was set up in Processing Modflow 11, covering an area 30 km E-W by 40 km N-S, centred over the mine area.
- **Topography:** The top of the model was derived from the local DEM.
- **Cell size:** Model cell size was set at 100 m by 100 m.
- **Layer description:**
  - Layer 1 – Superficial alluvium and clay (up to 30 m thick).
  - Layer 2 – Weathered and fractured rock (90–205 m thick, including faults and dykes).
  - Layer 3 – Fresh bedrock (150 m thick).
- **Boundaries:**
  - Surface drainage lines are represented along the western boundary with river bed conductance set at 1.42 m/d;
  - Recharge zones are applied, with higher rates on topographic highs.
  - No-flow boundaries are assigned to the north, south, and east model limits.
- **Recharge:** This was calibrated within realistic ranges for the Wheatbelt climate, and consistent with the low infiltration expected under semi-arid conditions and high evaporation losses. The base case was assigned  $2.0 \times 10^{-6}$  and  $5.0 \times 10^{-5}$ .
- **Timesteps:** The model was temporally discretised into 41 stress periods, each of three months duration spanning the period of mine operations (i.e., 10 years), followed by a 100-year post-closure period.
- **Calibration:** Steady-state calibration was undertaken using PEST, with Kh/Kv values of superficial and fractured units, recharge, and river-bed conductance adjusted. Fault and dyke Kh values were fixed at 1.5 m/d and 0.5 m/day respectively. Weighting favoured measured groundwater level data derived from the project area. The calibration achieved an SRMS error of approximately 8.38 %, meeting adopted criteria for predictive simulations. The calibrated parameters adopted for the dewatering simulations are summarised in Table 5-1.

**Table 5-1: Model Parameters**

Layer and Description		Kh, Kv (m/day)	Specific Storage (SS)	Specific Yield (Sy)
1	Tertiary clay and alluvium	0.007	$5.0 \times 10^{-4}$	0.02
2	Weathered bedrock	0.009	$5.0 \times 10^{-5}$	0.02
	Faults	1.50	$1.0 \times 10^{-4}$	0.02
	Dykes	0.50	$5.0 \times 10^{-4}$	0.02
3	Fresh bedrock	0.0001	$1.0 \times 10^{-5}$	0.02

## 5.4 Rockwater Model Results

Pit inflow volumes for each year have been simulated using the calibrated model and are presented in Table 5-2. The model predicts that despite being mined below baseline water levels, the Olympia pits are not predicted to require dewatering due to being passively dewatered through the advancement of nearby Jinkas and Jackson pits. There may be minor inflows if perched groundwater is encountered in the weathered zone or if the dewatering schedule is changed (i.e., if the nearby Jinkas and Jackson dewatering is reduced due a mine plan change).

**Table 5-2: Predicted Dewatering Rates for each Pit Area**

Year	Dingo	Jackson	Jinkas	Olympia	Total
Y1	0.0	0.0	323.7	0.0	323.7
Y2	0.0	0.0	255.5	0.0	255.5
Y3	0.0	0.0	199.6	0.0	199.6
Y4	0.0	159.3	151.3	0.0	310.6
Y5	0.0	272.5	137.0	0.0	409.4
Y6	0.0	195.6	370.8	0.0	566.4
Y7	472.3	0.0	314.4	0.0	786.7
Y8	789.8	61.8	30.2	0.0	881.9
Y9	133.0	250.4	0.0	0.0	383.4
Y10	0.0	0.0	158.2	0.0	158.2

The above assessment and analysis allowed a refinement to the initial site-wide water balance previously discussed in Section 4.6.

## 5.5 Modelled Drawdown and Recovery

Based on the assumptions and methods outlined in Section 5.3, Rockwater (2025a) simulated composite drawdowns over a 110-year period (including 10-years of mine operations and 100-years of closure) to quantify the impact that the proposed dewatering, water supply and TSF activities would have on the groundwater levels. The results are summarised in Table 5-3, leading to the following findings:

- Drawdown is mainly centred on the proposed dewatering pits and to a lesser extent the southern borefield.
- Drawdown propagates where hydraulic conductivity is higher preferentially along the faults and to a lesser degree dykes. Drawdown contours for Years 3, 5, 7, 10 and Year 20 (10 years post mining) are presented in Figure 5-1 through to Figure 5-5.
- After 100 years post-operations, pit lakes recover to on average of 99.2% of baseline water levels, noting that full recovery will never be reached in the pit lakes due to evaporative losses. Drawdown and recovery hydrographs for each draw point are in Figure 5-6.
- Seepage from the wet TSF is negligible, with no observable mounding because of its planned design.

Table 5-3: Drawdown and Recovery Statistics for each Pit and Supply Borefield

Pit stage / Bore	Initial simulated WL (m AHD)	Minimum simulated WL (m AHD)	Maximum simulated drawdown (m)	Minimum simulated WL / Maximum simulated drawdown (Year)	95% recovered WL (m AHD)	95% (Recovery Year)
Jinka 3 pit	355.51	150.10	205.41	Year 4	345.24	~Year 13
Jackson 1 pit	331.54	234.16	97.38	Year 5	326.67	~Year 24
Dingo 1 pit	332.12	210.01	122.11	Year 8	326.02	~Year 15
Southern Borefield (average)	293.38	274.28	19.10	Year 1	292.42	~Year 30

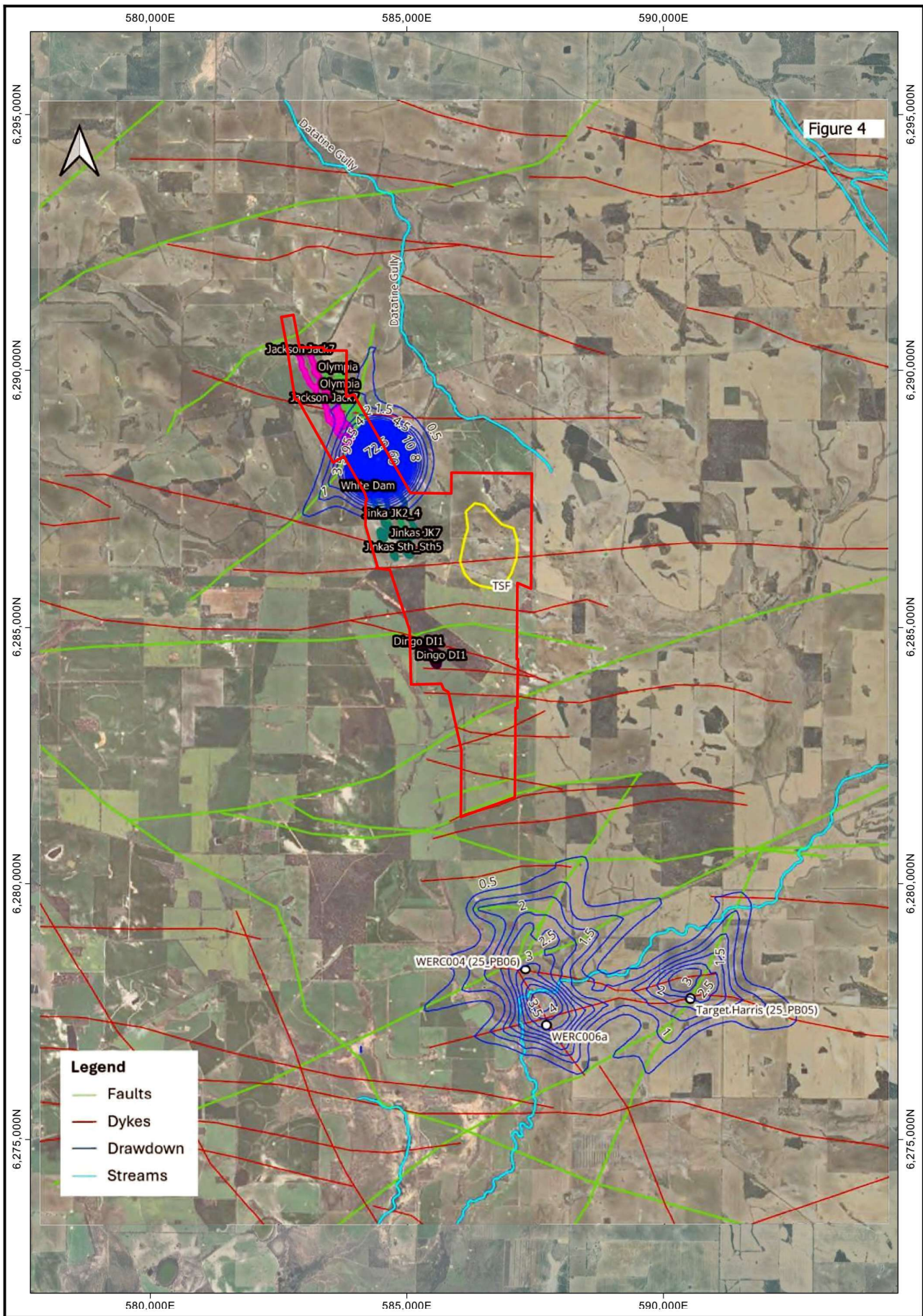
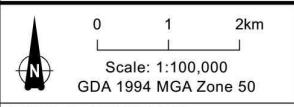


Figure 4

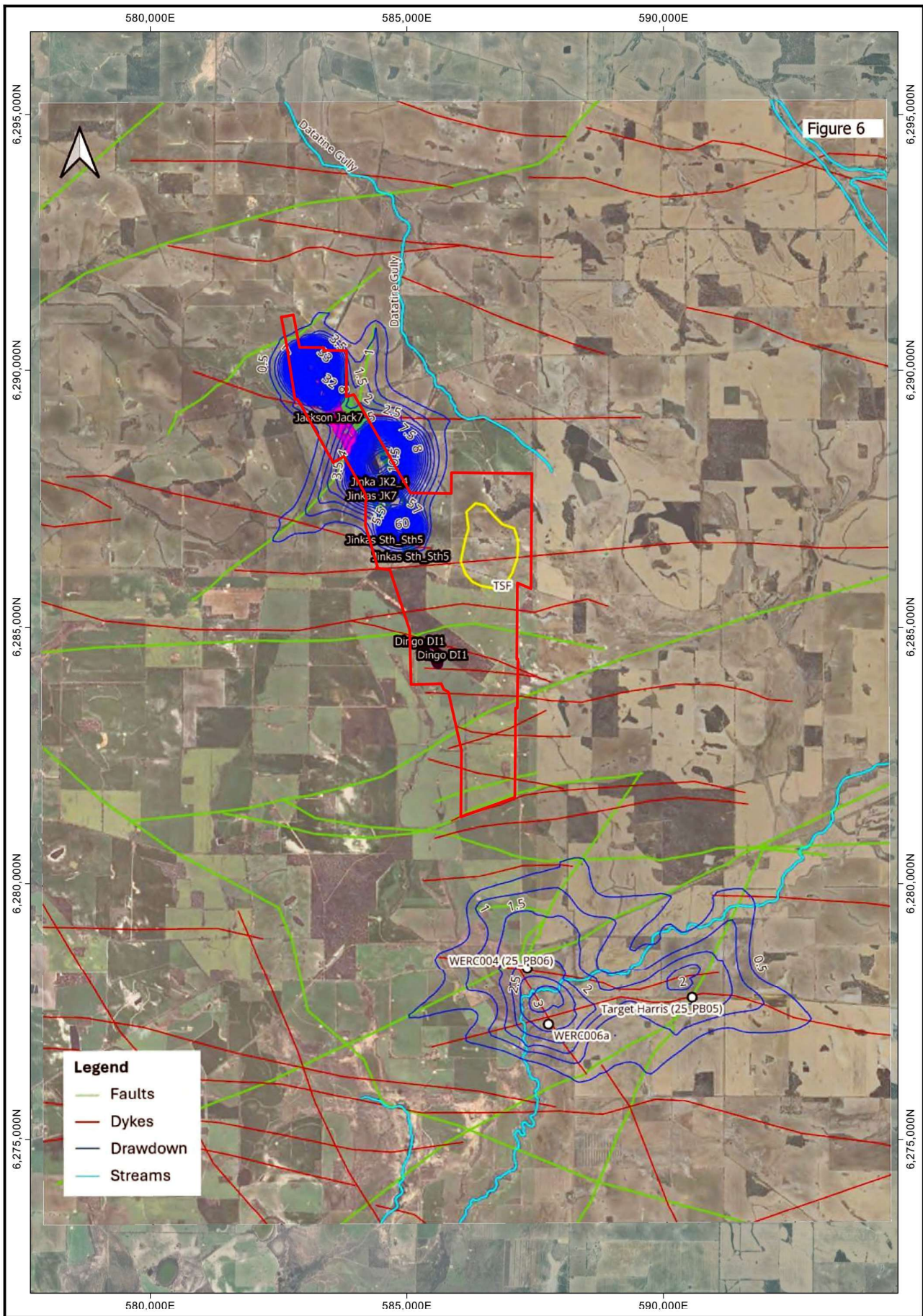
- Legend**
- Faults
  - Dykes
  - Drawdown
  - Streams



**Groundwater Drawdowns at  
end of Year 3**

Figure:  
**5.1**

Imagery: © OpenStreetMap (and) contributors, CC-BY-SA; Source: Rockwater



**Legend**

- Faults
- Dykes
- Drawdown
- Streams

0 1 2km  
 Scale: 1:100,000  
 GDA 1994 MGA Zone 50

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Author: T. Collie  
 Date: October 2025  
 Rev: A A4  
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**Groundwater Drawdowns at  
 end of Year 5**

Figure:  
**5.2**

Imagery: © OpenStreetMap (and) contributors, CC-BY-SA; Source: Rockwater

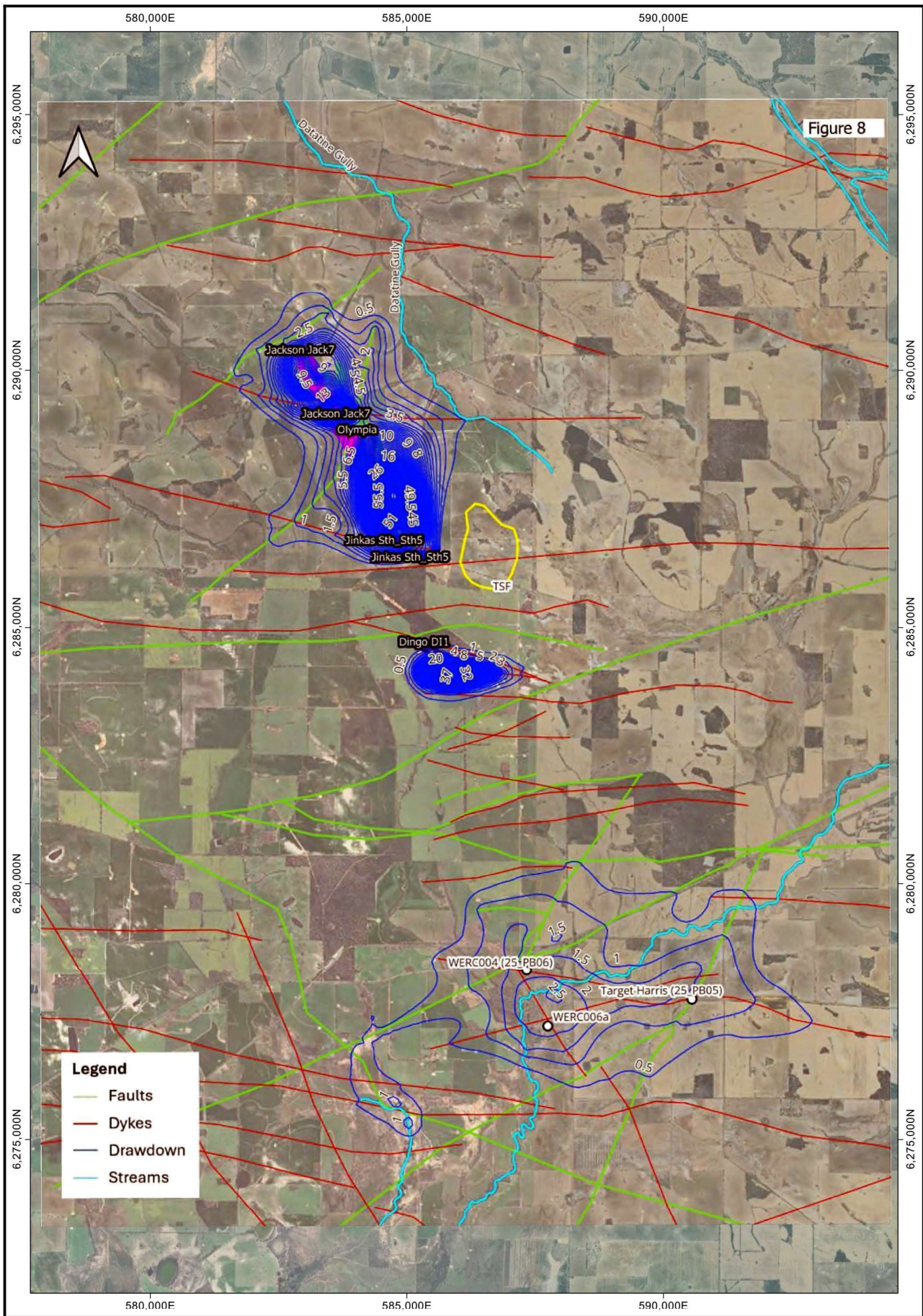


Figure 8

Imagery: © OpenStreetMap (and) contributors, CC-BY-SA; Source: Rockwater

0 1 2km  
 Scale: 1:100,000  
 GDA 1994 MGA Zone 50

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 Date: October 2025

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**Groundwater Drawdowns at  
 end of Year 7**

Figure:  
**5.3**

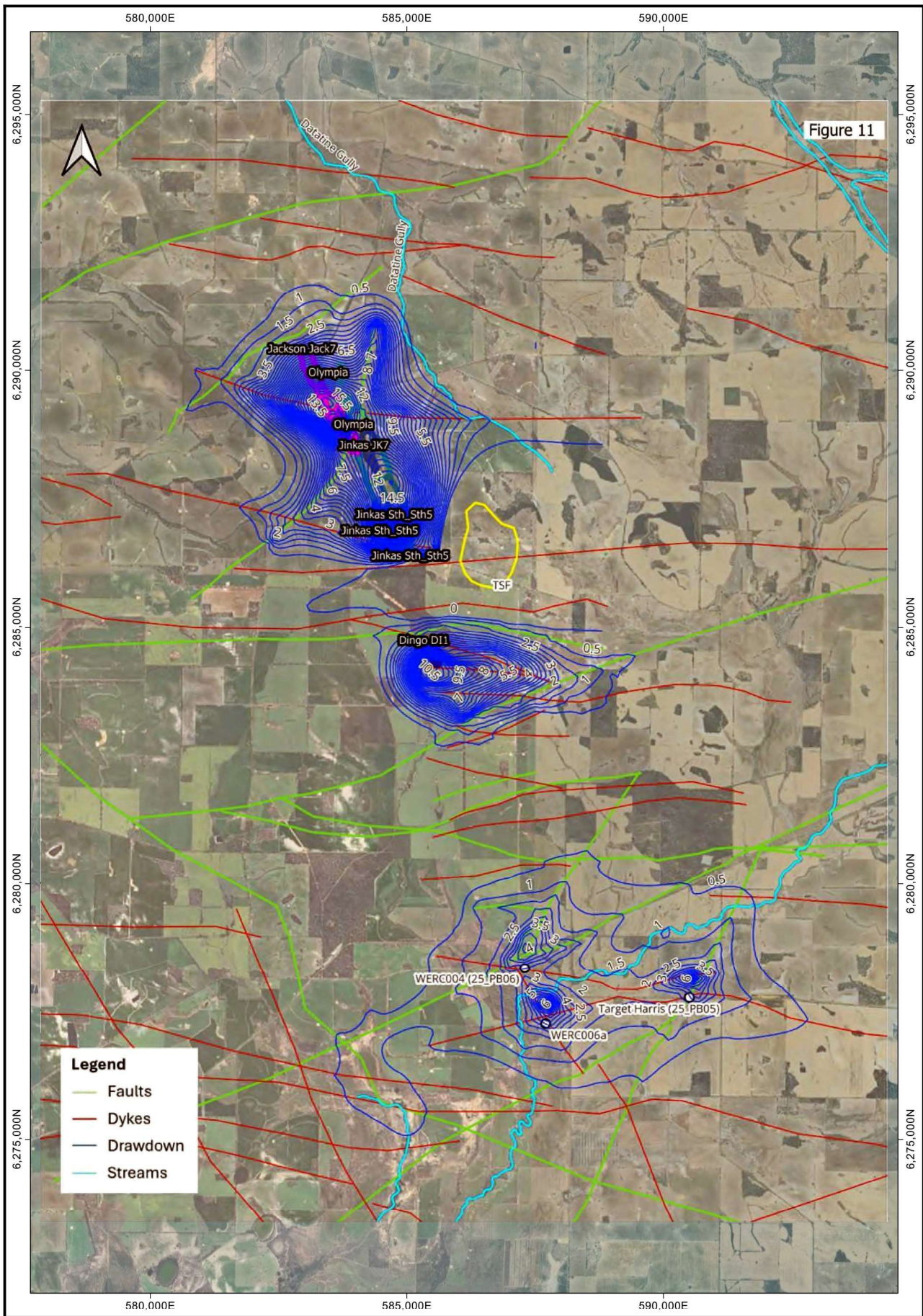
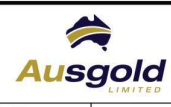


Figure 11

**Legend**

- Faults
- Dykes
- Drawdown
- Streams

0 1 2km  
 Scale: 1:100,000  
 GDA 1994 MGA Zone 50



**Groundwater Drawdowns at  
end of Year 10**

**5.4**

Imagery: © OpenStreetMap (and) contributors, CC-BY-SA; Source: Rockwater

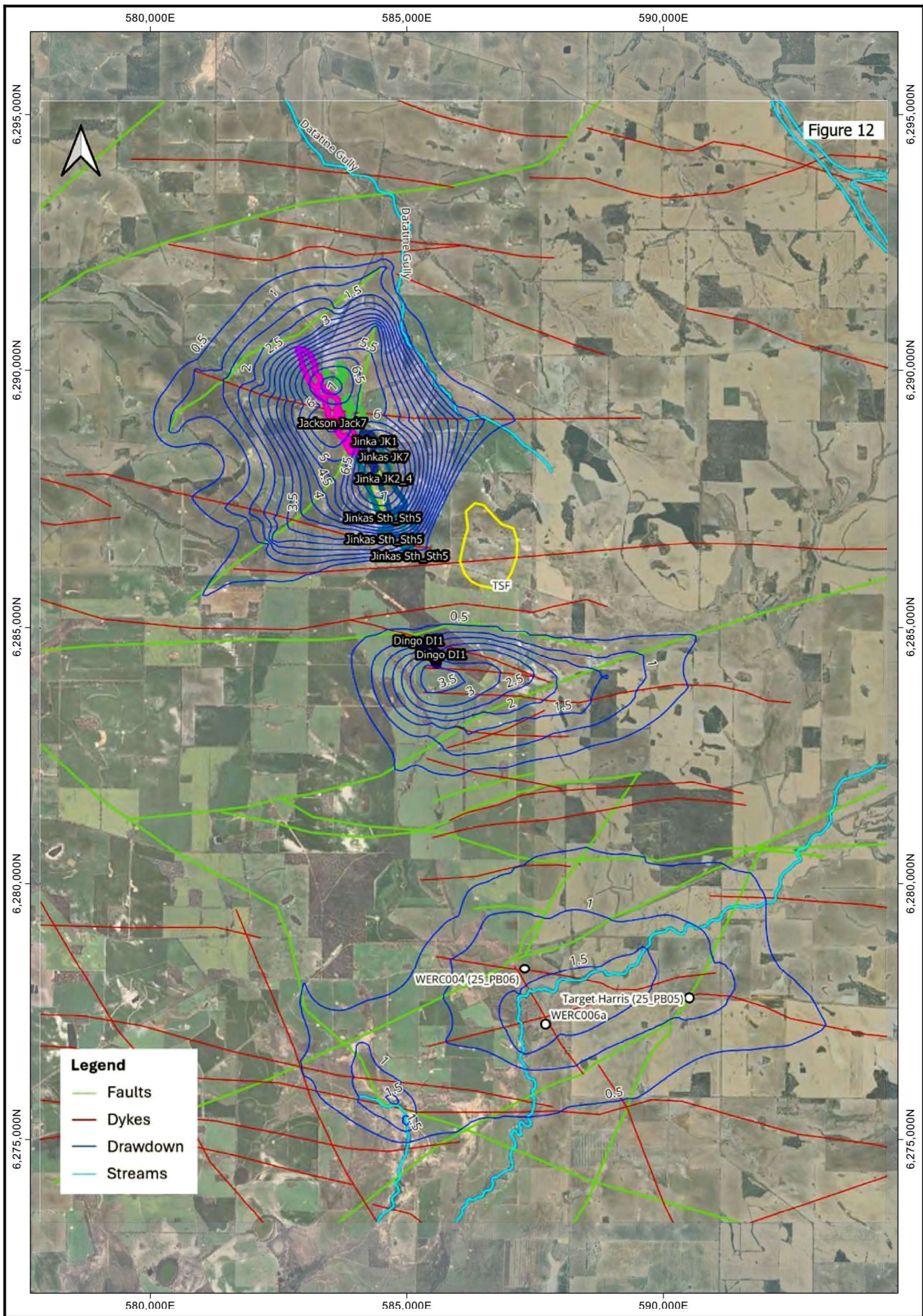
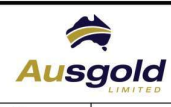


Figure 12

**Legend**

- Faults
- Dykes
- Drawdown
- Streams

0 1 2km  
 Scale: 1:100,000  
 GDA 1994 MGA Zone 50



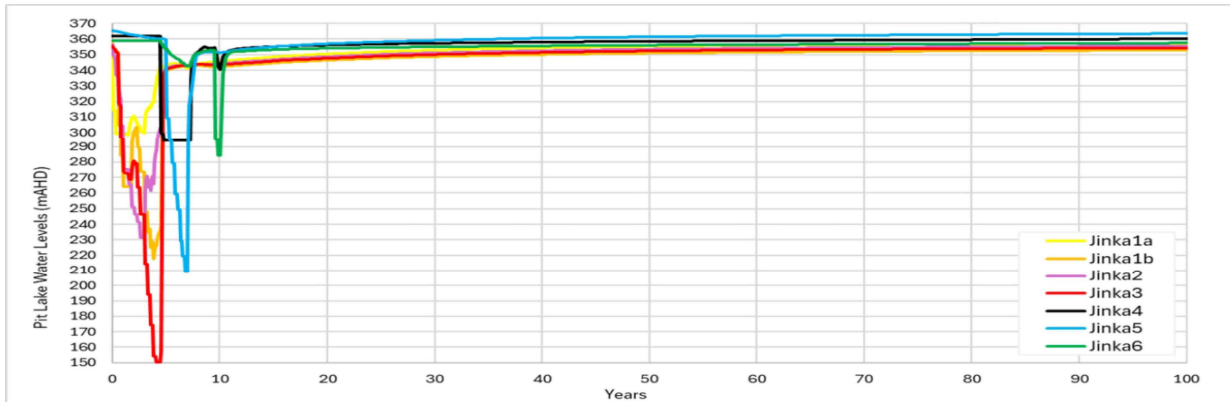
**Groundwater Drawdowns at  
end of Year 20**

**5.5**

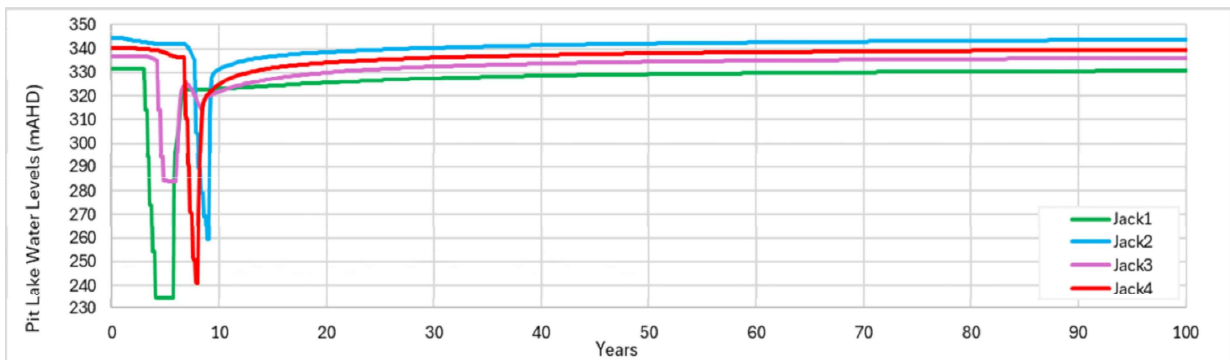
Imagery: © OpenStreetMap (and) contributors, CC-BY-SA; Source: Rockwater

Figure 5-6: Simulated Groundwater Drawdowns and Recoveries

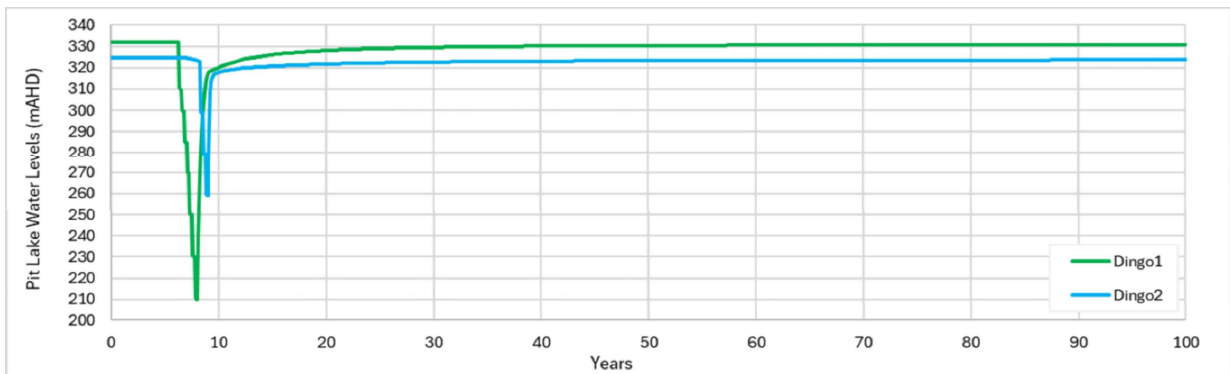
Jinkas Pit 100-year simulated drawdown and recovery



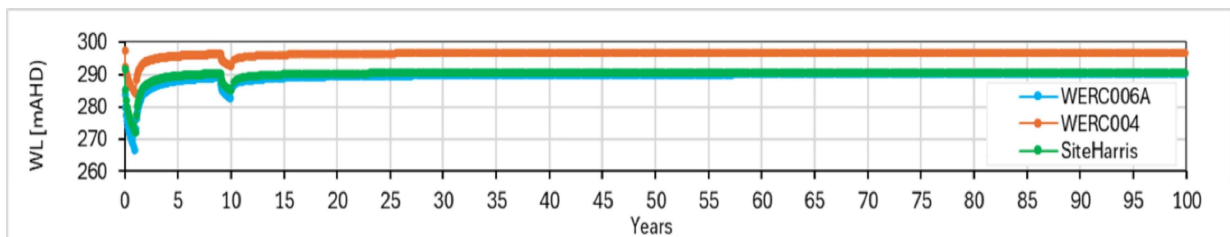
Jackson Pit 100-year simulated drawdown and recovery



Dingo Pit 100-year simulated drawdown and recovery



Southern borefield 100-year simulated drawdown and recovery



## 5.6 Identified Groundwater Risks

### 5.6.1 GDEs within Drawdown Extent

The distribution of aquatic and terrestrial GDEs proximal to the Project and drawdown zones are shown in Figure 5-7, Figure 5-8 and Figure 5-9. Modelled drawdown extents of pit dewatering indicate that adverse effects on GDEs are of low to moderate risk when considering the following factors:

- It is anticipated that there is little connection between the bedrock aquifer and shallow surficial aquifer systems, where GDEs will be drawing any groundwater from, due to the presence of aquitards. Therefore, drawdown response within the bedrock aquifer should not transmit significantly through to the surficial aquifers.
- The GDEs identified reside in upper-catchment settings, reducing the susceptibility to widespread drawdown impact. The higher rates of natural recharge in upper catchments can also help mitigate the potential effects of groundwater fluctuations.
- The local watercourses are largely ephemeral, meaning they are naturally resilient to intermittent water availability.
- Groundwater drawdown due to dewatering could also have a positive influence on ecosystems or farm land already impacted by clearing and associated dryland salinity.

Following its assessment and modelling of drawdown effects, the potential local and regional drawdown effects of the Project were refined and modelled drawdown zones could be overlaid relative to BoM GDE Atlas mapped aquatic and terrestrial GDE polygons. Specifically, modelled drawdown outputs were compared against mapped areas of potential high, moderate, and low GDE likelihood using BoM's national GDE Atlas (Bureau of Meteorology, 2023). A notional drawdown threshold was applied, defined as areas where groundwater levels in 'Layer 1' (Tertiary clay and alluvium) are within 10 m of ground surface and are predicted to experience greater than 1.0 m drawdown after ten years of mine operation. The calculations did not consider the current land use/vegetation in these areas (i.e., GDE may not be currently present due to historic land clearing practices and/or salinisation effects).

The total overall area of modelled drawdown threshold (>1m where groundwater is shallower than 10m below surface) within the mine area covers approximately 3.6 km<sup>2</sup>, while the southern borefield would encompass approximately 10.6 km<sup>2</sup>, giving a combined area of 14.2 km<sup>2</sup> (Table 5-4). These zones represent areas of potential effect, where any shallow rooted vegetation or aquatic ecosystems that rely on near surface fresh quality groundwater could be most at risk of stress.

**Table 5-4: Calculated area after 10 year's groundwater extraction**

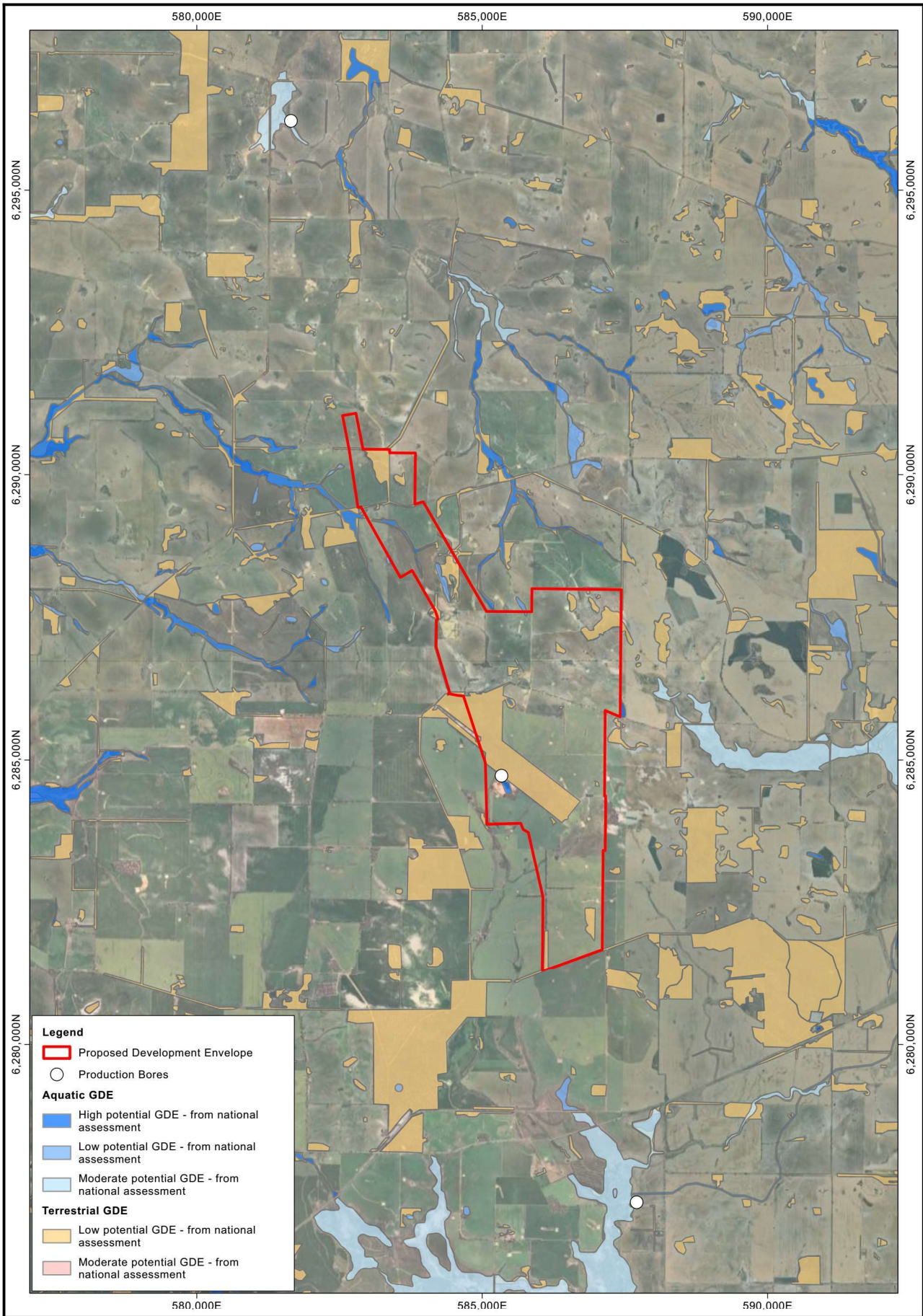
Area	Total area 1.0 m drawdown	Total Forecast drawdown threshold zones
	km <sup>2</sup>	km <sup>2</sup>
Mine area	22.6	3.6
Southern Borefield	10.6	10.6
<b>Total</b>	<b>33.2</b>	<b>14.2</b>

Rockwater (2025a) examined potentially affected aquatic GDEs that occur near the proposed southern borefield (refer Figure 5-8 and Figure 5-9). They determined that in terms of terrestrial GDEs, there are only 0.388 km<sup>2</sup> of low-potential GDEs occurring in the vicinity of the southern borefield, and 0.586 km<sup>2</sup> at the mine area. As the project area is largely agricultural in use, much of the native vegetation has been cleared; therefore, the mapped potential GDEs may not represent currently functioning ecosystems. It would therefore be fair to conclude that:

- Little to no areas of exposure to any mapped potential GDE from drawdown of greater than 1m in the deep aquifer at or around the mine pits; and
- Some exposure to any mapped potential GDE from drawdown of greater than 1m in the deep aquifer at or around the southern bore (WERC006A).

Of the mapped potential GDEs within the drawdown threshold zone, the largest areas are of low or moderate potential. Where the mapped area was high potential Aquatic GDE, field observations in HBWA (2025a) reported that such areas or highly modified or completely degraded.

Rockwater's (2025a) mapped intersections therefore provide a useful screening tool for conservatively identifying and prioritising the need for and focus of additional ground truthing to refine the GDE distribution around the drawdown cones. Project design and implementation will therefore adopt a precautionary approach to managing potential ecological impact as far as practicable and commensurate with identified risks to these systems.



Imagery: © OpenStreetMap (and) contributors, CC-BY-SA; GDE: DoW

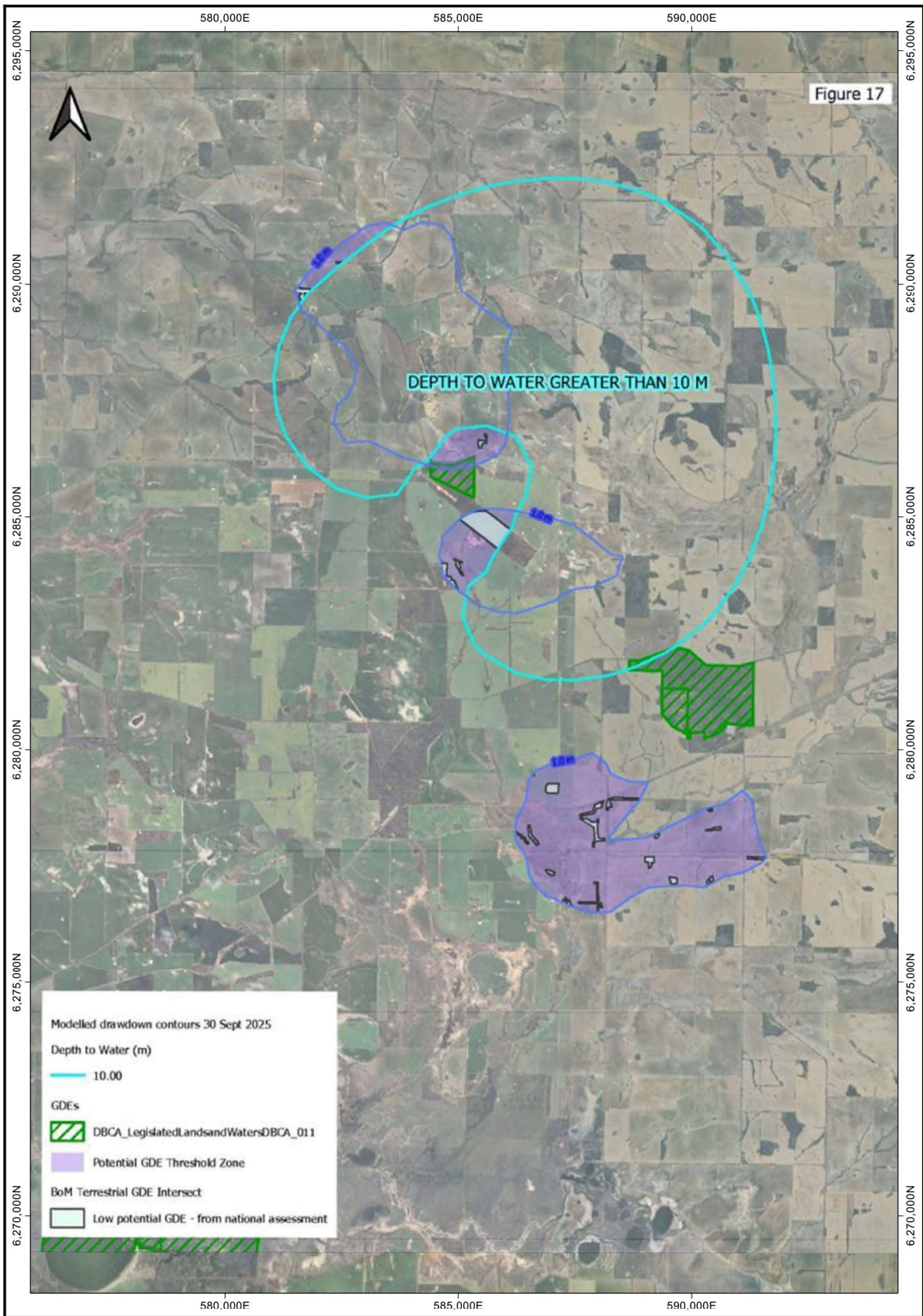
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**Potential GDEs relative to test production bores (potential supply sites)**

Figure:  
**5.7**



Imagery: © OpenStreetMap (and) contributors, CC-BY-SA; Source: Rockwater

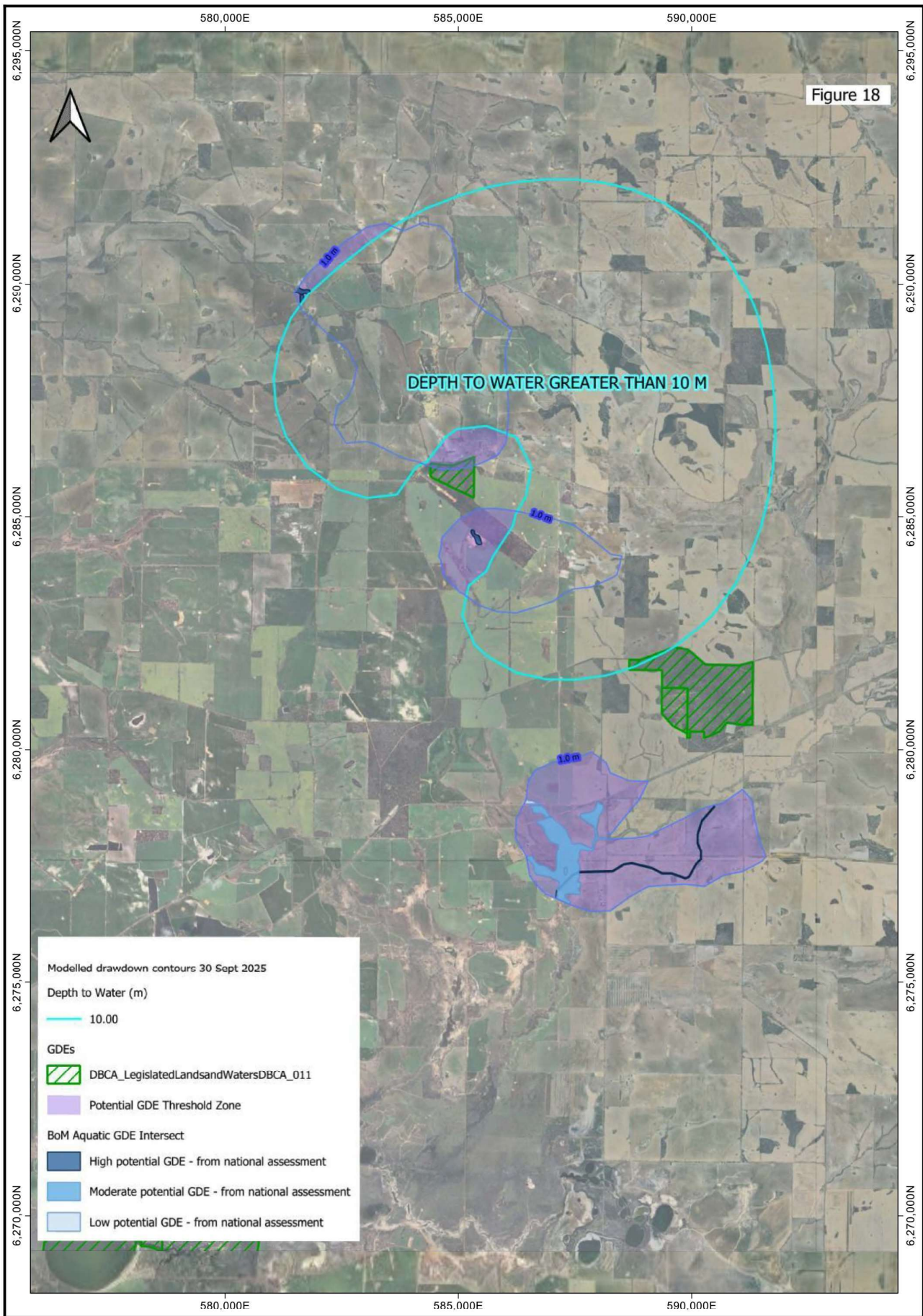


Figure 18

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 GDA 1994 MGA Zone 50

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**Potential Aquatic GDEs within 10m depth to water where >1.0m drawdown (purple area)**

Figure:  
**5.9**

Imagery: © OpenStreetMap (and) contributors, CC-BY-SA; Source: Rockwater

As detailed previously, Ausgold commissioned HBWA to undertake a desktop risk assessment (2025b) (refer Appendix 1) of potential GDEs near the proposed groundwater production zones which used national GDE mapping, groundwater drawdown zones, and satellite-derived vegetation and climate data. NDVI and AI were analysed to assess vegetation responses during drought periods. Vegetation that remained relatively healthy during drought was considered more likely to access groundwater, while vegetation with low or seasonal NDVI was excluded as groundwater dependent.

Modelling outputs by Rockwater (2025a) were used to determine the extent of groundwater drawdown of greater than 1.0 m after 10 years extraction from these bores. In addition, depth to groundwater that is greater than 10 m was estimated by Rockwater, based on groundwater elevation data from January. These outputs were applied to inform the risk assessment criteria for impacts to GDE.

The risk assessment evaluating potential impacts to GDEs from proposed groundwater abstraction is summarised in Table 5-5 below (HBWA, 2025a).

Table 5-5: GDE Risk Assessment

Potential impact	Initial Assessment Ratings			Mitigations	Revised Assessment		
	Severity	Likelihood	Risk		Severity	Likelihood	Risk
Climate change is expected to reduce natural groundwater recharge by rainfall, leading to lower water availability and long-term declines in GDE resilience and stream baseflows.	Moderate	Possible	M	<p>KGP groundwater drawdown limited to lifetime of the mine (10 years). Only Low Potential Terrestrial GDE were identified within the area where predicted drawdown is &gt;1.0 m after 10 years extraction, and where depth to groundwater &lt;10 m.</p> <p>High Potential Aquatic GDE were also identified, but only 1 was determined to be likely to be a true GDE. This was located on the boundary of the area where predicted drawdown is &gt;1.0 m after 10 years extraction, and where depth to groundwater &lt;10 m.</p> <p>A clay-rich soil layer potentially prevents roots from accessing deeper aquifers tapped by mining (DeSilva et al. 2000). Instead, vegetation may rely on shallow soil moisture from rainfall, making it unlikely to be impacted by groundwater abstraction unless drawdown is extreme or sustained (Zencich et al., 2002; O’Grady et al., 2006). This hypothesis is supported by an assessment of aridity (drought periods) and vegetation vigour (NDVI).</p>	Moderate	Unlikely	M
Groundwater extraction near surface water lowers water tables, reducing discharge to gaining streams or increasing losses from losing streams, ultimately decreasing surface water availability to riparian GDE.	Moderate	Likely	M	<p>A clay-rich soil layer potentially prevents roots from accessing deeper aquifers tapped by mining (DeSilva et al. 2000). Instead, vegetation may rely on shallow soil moisture from rainfall, making it unlikely to be impacted by groundwater abstraction, unless drawdown is extreme or sustained. (Zencich et al., 2002; O’Grady et al., 2006). This hypothesis is supported by an assessment of aridity (drought periods) and vegetation vigour (NDVI).</p>	Minor	Unlikely	L
Poor bore construction or decommissioning can cause aquifer leakage or blowouts, leading to pressure loss, contamination, or flooding.	Major	Unlikely	M	<p>Bore construction to meet rigorous engineering standards. Non-artesian bores.</p>	Major	Rarely	L
Excessive drawdown in confined aquifers can cause depressurisation and compaction, leading to permanent loss of storage and transmissivity.	Major	Unlikely	M	<p>A clay-rich soil layer potentially prevents roots from accessing deeper aquifers tapped by mining (DeSilva et al. 2000). Instead, vegetation may rely on shallow soil moisture from rainfall, making it unlikely to be impacted by groundwater abstraction, unless drawdown is extreme or sustained (Zencich et al., 2002; O’Grady et al., 2006). This hypothesis is supported by an assessment of aridity (drought periods) and vegetation vigour (NDVI).</p>	Moderate	Unlikely	M

In conclusion, HBWA (2025a) determined that a total of 21 terrestrial and 10 aquatic GDEs were identified and assessed. Of these, all terrestrial GDEs were classified as Low Potential. Four (4) Aquatic GDEs were classified as High Potential, four (4) Moderate Potential and one (1) Low Potential. Of the four High Potential Aquatic GDEs, only one was assessed to be an obligate GDE. HBWA's study found moderate to low risk from groundwater abstraction and supported a precautionary approach to managing potential ecological impacts.

### 5.6.2 Water Supply Availability

If groundwater abstraction rates are lower than anticipated, water supply will be required from more regional bores (within the tenements) along structures known to provide higher yields. This will have potential to decrease groundwater levels within these structures. However, pumping test analysis and subsequent numerical groundwater modelling has predicted that recharge to these regional structures is high and that abstraction rates required to meet current mine raw water demand (3.0 GL/yr) will have spatially-limited impact to groundwater levels.

### 5.6.3 Uncontrolled Release of Groundwater to Environment

The Wheatbelt region faces salinity challenges due to deforestation, which has led to rising saline groundwater levels, impacting both crop yields and native vegetation health.

There is a risk of negative impact to aquatic GDEs if saline groundwater is released to the environment. The current 5C licence conditions mandate containment or disposal of all abstracted groundwater on site, and this approach has been adopted for the site wide water management strategy for the proposed KGP mine.

The management of potential project emissions that have the potential to impact on groundwater quality will be assessed and regulated under Part V of the *Environmental Protection Act 1986* (EP Act) by DWER during the Works Approval and licensing process.

## 5.7 Risk Assessment Matrix

A risk assessment has been developed to summarise the potential impacts above within the anticipated 1 m drawdown extent associated with pit dewatering and depressurisation. Risks are given a rating based on the severity of the impact (Negligible, Minor, Moderate, Significant and Severe), and the likelihood of this impact occurring (Very likely, Likely, Possible, Unlikely, Very Unlikely) once any risk mitigation strategies are included.

**Table 5-6: Risk Assessment Matrix**

Risk	Risk description and potential impact	Risk mitigation currently in place or part of project plan	Severity	Likelihood after risk mitigation	Final rating
Negatively impacting GDEs by lowering groundwater levels through dewatering activities	Partial/full removal of the groundwater source for GDEs through lowering of groundwater levels, leading to partial or full degradation and removal of GDE from area.	The conceptual model has negligible connectivity between the two aquifers. Further hydraulic testing can increase confidence in this assertion.	Moderate	Unlikely	Low
Impacting surface water ponds/soaks/drainage channels	Hydraulic connection between shallow aquifer and deeper fracture/fault aquifers.	Shallow aquifer is clay rich with low permeability. Most country rock is also low permeability. Hydraulic connection between surface feature and fracture/fault is possible but likely to have low seepage rates.	Minor	Unlikely	Low
Reducing yields of local borehole users through dewatering	Reduction of operational pumping yields from local borehole users within the modelled maximum drawdown radius during dewatering activities.	Based on the WIR borehole dataset, there are no operational bores abstracting groundwater within the modelled maximum drawdown radius, so no impact is anticipated.	Negligible	Very Unlikely	Low
Increased salinity of surface water and shallow groundwater	Introduction of higher salinity groundwater to lower salinity surface water/shallow groundwater, causing a subsequent increase in salinity through mixing, potentially impacting GDEs and any abstractions downstream.	Containing all abstracted groundwater from dewatering operations on site (as per requirements for 5C licence).	Moderate	Very unlikely	Low
Reduction of groundwater levels along major structures through additional groundwater abstractions to meet mine water supply requirements	If additional groundwater abstraction is required in addition to dewatering activities through regional bores, the subsequent lowering of groundwater levels may have a negative impact on any proximal GDEs and/or borehole users.	Regional structures are observed to have high yields and recharge rates with pressure heads close to or above ground level. Drawdown extent is likely to be minor and temporary in nature.	Moderate	Unlikely	Low

## 5.8 Hydrogeological Assessments – Conclusions and Recommendations

The region has a complex network of geologic faults and dykes cross-cutting the country rock. Groundwater flows transmit along these features as flow conduits, but compartmentalisation likely exists between individual features because of dykes and other features.

Within the Project area, the groundwater investigation programs completed between 2022 and 2025 have identified available groundwater with potential to meet the indicated raw water demand of (3.6 GL/year) for operational requirements. A numerical groundwater model constructed by Rockwater (2025a) was used to estimate pit inflows under a series of predictive scenarios recorded the following outcomes:

- The faults and dykes network that cross-cut the Project area are the most prospective for sustainable water supply, providing 82% of all modelled inflows from mine pit dewatering.
- Total annual pit inflow volumes across mine life, for the majority of predictive scenarios, are much less than the annual raw water demand at the processing plant. The largest inflow of borefield make-up water is in Year 1. Surface water management controls are required during operations to hold and recycle the annual water demand. Make-up inbound bore field water will be very unlikely to be needed in later years of mining.
- The surrounding country rock has low permeability forming a drawdown extent that loosely follows the orientation of the fault and dyke network. Maximum drawdown by end of mine life is modelled to be 200 m.

There is a low risk to all identified potential groundwater receptors (including groundwater users and GDEs) due to pit dewatering activities.

### 5.8.1 Conclusions – Groundwater Assessment

Drawing from previous hydrogeological assessments and in consideration of more refined geological data for the Project area, Rockwater (2025a) developed a simple two-layer numerical groundwater model to provide estimates of dewatering requirements for the KPG. Model outputs indicate an average dewatering rate of approximately 373,000 kL/year (equivalent to ~12 L/s) over the projected ten-year mine life. Peak dewatering demand is anticipated to reach approximately 20 L/s during Years 4 and 5, coinciding with the deepest stages of pit development in the Jinkas deposit. Short-term flows higher than this may be experienced.

Groundwater samples have been collected from thirteen bores and analysed at an accredited laboratory. Groundwater quality varies between marginal and saline across the Project area. Salinity increases towards lower elevations. EC values range from 48,000  $\mu\text{S}/\text{cm}$  in the lower elevation northern drainage valleys of the Project area to the lowest values of 894  $\mu\text{S}/\text{cm}$  at higher elevations within the pit footprint. The data also show groundwater types are all one groundwater type (sodium-chloride dominant).

The drawdown model is currently underpinned by a limited dataset of hydraulic test parameters, within the immediate vicinity of the mine. The SRK (2025) report includes hydraulic test data comprising five slug tests and three short-duration pumping tests, which form the basis for aquifer parameterisation. To improve confidence in model outputs and to better characterise the hydraulic properties of the mine area, it is recommended that test production bores be installed in the central sections near the proposed Jinkas 3/Jinkas 4, and/or Jackson 1 pits. This work is planned and subject to a new 26D expected in Q4 2025.

The total water demand for the Project is projected to be in the order of 3.6 GL/year, indicating that supplementary water sources will be required in addition to dewatering returns in operating after year 2. It is therefore recommended that additional extended-duration, higher-capacity pumping tests be undertaken on existing test production bores WERC06A and other test bores in the southern field, and these too are scheduled in early 2026. Future tests will assist in determining the sustainable yields of the bores and delineating aquifer boundaries. To facilitate testing without interruption from time-based discharge limitations, the use of old mine pits as discharge locations could be considered.

Upon completion of the above investigations and data acquisition, a more robust numerical groundwater model will be developed in accordance with the Australian modelling guidelines (Barnett et. al., 2012). This updated model will be better informed by growing site-specific hydrogeological data and will provide improved confidence in predictions of dewatering to support environmental approvals and regulatory submissions.

## 6. Site-Wide Water Balance (WSP, 2025a)

As previously discussed, WSP was engaged by Ausgold to develop a site-wide Water Balance for the Project. This study aims to develop a site-wide water balance model to provide a general understanding on the site water management requirements and to support the regulatory approval process.

The focus of the site-wide water balance is on tracking the contact water and estimate the annual water surplus that will require management through either a mechanical evaporator system or managed aquifer recharge (MAR). Non-contact water will be diverted and managed according to the site SWMP which was developed in parallel scope. This approach will prevent any mixing of contact and non-contact water.

The report provided as Appendix 4 summarises the methodology adopted, outlines the conceptualisation of the model, and presents the findings of the water balance modelling.

### 6.1 Model Overview

#### 6.1.1 Objectives and Considerations

The WB model was developed using the GoldSim software. The model operates on a daily time step to predict the water storage volumes for key structures. The predictive simulations incorporate a probabilistic (stochastic) climate generator to account for uncertainties related to future climatic conditions and variability in selected model inputs and parameters. This approach enables the prediction of the likely long-term interactive performance of the site's infrastructure under alternative climatic sequences.

The objective of the site-wide water balance was to establish a base model to inform the strategic planning for the operational phase focusing on:

- Understanding fluxes: Analysing the inflows and outflows of the main infrastructure under stochastic climate time series.
- Quantifying the yearly water surplus that will require management through either a mechanical evaporator system or MAR, adhering to the 'zero release' assumption.

A simplified mass-balance analysis was conducted exclusively for the pits to evaluate the impact of TDS from groundwater inflow on potential evapo-concentration within the pit. TDS concentrations from other inflows were not considered. This approach represents a high-level assessment and does not account for geochemical processes such as precipitation, dissolution, adsorption, or other chemical reactions.

#### 6.1.2 Software

The water balance was developed in GoldSim (Version 15.0) (GoldSim Technology Group, 2021). GoldSim is used globally to simulate dynamic systems, to understand the factors which control the systems and to predict the future behaviour. Any system that can be quantitatively described using equations and/or rules can be modelled using GoldSim.

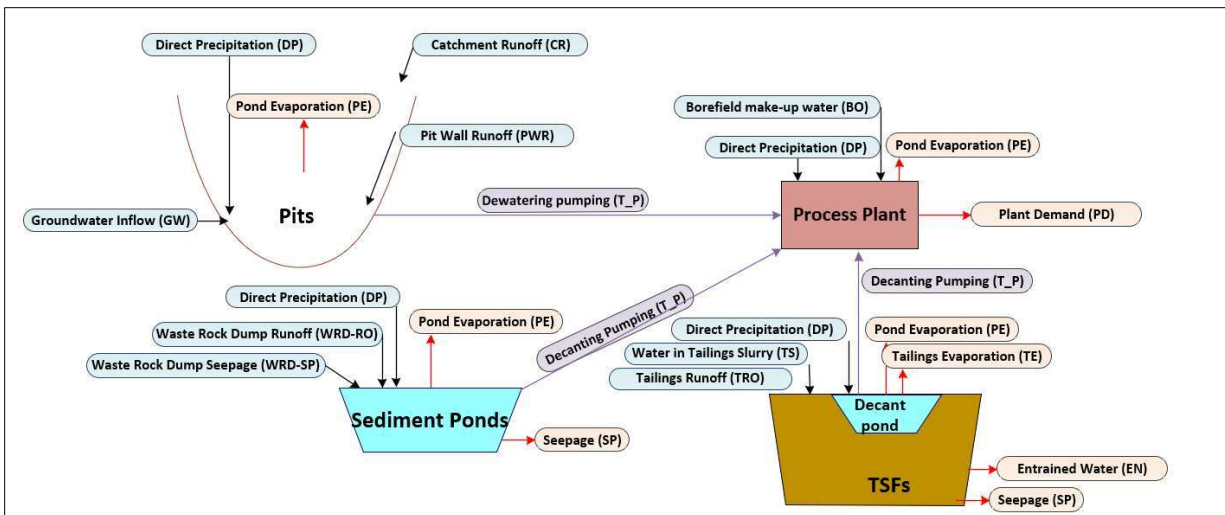
GoldSim models are composed of containers and functional elements such as inputs, expressions, stocks, events, delays, cell pathways and results. Each functional element forms part of the model structure which is developed specifically for a particular modelled system. The calculations within and relationship between functional elements are built by the modeller. Input data are stored within the model and can come in the form of a scalar value, a vector or a matrix.

Model simulations are run at a daily time-step over an identified simulation period with one or multiple model realisations. A realisation is defined as a single model run under one set of stochastic inputs (e.g., climate dataset). The purpose of using multiple realisations in this case is to test the system under multiple alternative rainfall/evaporation time series or other input patterns.

### 6.1.3 Conceptualisation

A simplified version of the process flow diagram for the water balance was referenced for model development, showing the general interactions between the main storages.

Figure 6-1: Simplified Process Flow Diagram for KGP



In general, the contact water flow during operations is as follows:

- Pits:** There are four main pits on site (Jackson, Jinkas, Dingo, and Olympia), with each pit developed in stages. Pits in general receive water from direct precipitation, catchment runoff, pit wall runoff and groundwater inflow, the latter as a result of the pit being mined below the regional groundwater level (except Olympia). Water ponding within a pit is mainly lost through dewatering pumping to the process plant.
- Sediment Ponds and Storm Water pond:** 16 Sediment ponds are expected to collect runoff and seepage from the Waste Rock Dumps (WRDs) across the mine area, and 1 Storm Water pond is expected to collect runoff from the ROM pad. Operational rules governing pumping from the sediment ponds to the process plant are applied. The sediment ponds are expected to be clay lined, and therefore only minimal seepage is expected.
- Tailings Storage Facility (TSF):** The TSF comprises two cells (Northern cell and Southern cell). The TSF cells receive water from Direct precipitation, Water released from the tailings slurry, and runoff from the tailings surface. The main outflow from the TSF cells is decanting pumping directed to the process plant. A minimal seepage is expected to be captured via an underdrainage system. The models consider this seepage as a loss in the water balance.
- Process Plant:** The process plant receives water from the pits, sediment ponds, and TSF cells. It has an annual water demand of approximately 3700 ML and if the inflow is insufficient, borefields are used to supplement the water supply.

Model inflows and outflows and water transfers for each storage were identified for each storage type.

## 6.1.4 Model Input Data

### 6.1.4.1 Climate

Based on climate conditions at the site, the water balance simulates the system based on daily rainfall and evaporation data. The Project is located within a temperate climate zone with a hot dry summer and cold winter, typically featuring low but highly variable annual rainfall in which there is a significant surplus of evaporation over rainfall. Baseline climate conditions were derived from the Queensland Department of Environment and Science's SILO Data Drill (SILO) gridded data for the period 1986-2005. Monthly climate change factors were derived from publicly available data from Climate Change in Australia (CCiA) for rainfall and evaporation based on future period 2020 to 2040 (centred in 2030) and are applicable to the adopted baseline data period from 1986-2005.

Model input data comprised climate conditions at the site particularly daily rainfall and evaporation data. Three climate change scenarios were considered:

- Wetter scenario
- Drier Scenario
- Max consensus scenario.

To assess climate variability, the model utilised daily stochastically generated rainfall and evaporation data.

In summary, for a defined modelled period, climate conditions adopted may be summarised as follows:

- **Rainfall:** The average annual rainfall is 379 mm, with summer rainfall, i.e., November to April, averaging 109 mm and winter rainfall, i.e., May to October, averaging 269 mm. Further rainfall statistics based on SILO data.
- **Pan Evaporation:** The average annual Pan evaporation is 1553 mm, with summer evaporation, i.e., November to April, averaging 1019 mm and winter evaporation, i.e., May to October, averaging 434 mm.

### 6.1.4.2 Climate change

A climate change assessment was carried out to provide an understanding of the projected future climate conditions (i.e., rainfall and evaporation) at the project site based on a range of global Greenhouse Gas emission scenarios. The assessment was carried out for the near future (2020-2040) centred in 2030 (herein referred to as 2030) to estimate the possible climatic conditions for the operational period, considering a Life of Mine ending in 2035. The projected monthly changes for rainfall and evapotranspiration were incorporated into the water balance model as an additional scenario to assess the potential impacts of climate change on the water balance model.

### 6.1.4.3 Pit Inflows and Dewatering Model Assumptions

Inflows, outflows, and water transfers for each storage as modelled in the Site Wide Water Balance (WSP, 2025b) are summarised in Table 6-1 and Table 6-2 for each storage type.

Table 6-1: TSF Inflows and Outflows

Flow ID	Flow	Description	Rationale for calculation												
<b>Inflows</b>															
DP	Direct precipitation	Direct precipitation over the ponding area	Water volumes generated by direct precipitation over the decant pond assuming a runoff coefficient of 1 (i.e., no losses). Area was considered variable depending on the pond volume at each time step.												
TR	Tailings runoff	Run off from the tailings area	<p>Runoff from the tailings was calculated based on the saturation level (beach condition) and runoff coefficient for each area. The values presented in the table below are adopted from the TSF design report (WSP, 2025c).</p> <p>Area contributions and runoff coefficients for different areas of the tailings</p> <table border="1"> <thead> <tr> <th>Saturation level</th> <th>% Area</th> <th>Runoff coefficient</th> </tr> </thead> <tbody> <tr> <td>Wet beach</td> <td>30%</td> <td>90%</td> </tr> <tr> <td>Drying beach</td> <td>10%</td> <td>80%</td> </tr> <tr> <td>Dry beach</td> <td>40%</td> <td>60%</td> </tr> </tbody> </table>	Saturation level	% Area	Runoff coefficient	Wet beach	30%	90%	Drying beach	10%	80%	Dry beach	40%	60%
Saturation level	% Area	Runoff coefficient													
Wet beach	30%	90%													
Drying beach	10%	80%													
Dry beach	40%	60%													
TS	Water in tailings slurry	Water within the tailings	<p>Tailings pumped into the TSF includes slurry water of which some is released from the tailings and eventually flows to the TSF pond. The water in slurry released from the tailings depends on the tailings characteristics, and in particular the tailings solids content, defined as follows:</p> $(eq1) \text{ Water in tailings slurry} = \frac{\text{Production Rate}}{\delta_w} \times \frac{1 - \text{Tailings Solids Content}}{\text{Tailings Solids Content}}$ <p><math>\delta_w</math> = Density of water (1 t/m<sup>3</sup>)</p>												
<b>Outflows</b>															
PE	Pond evaporation	Evaporation over the ponding area	Evaporation was estimated by applying pan evaporation rates scaled by a pan evaporation factor (EF=0.7) to the ponding surface area.												
TE	Tailings evaporation	Tailings evaporation	<p>To estimate the evaporation from the different beach areas within the TSF (as mentioned in the table above), the parameters presented in the table below were considered.</p> <p>Factors to derive evaporation from different beach areas</p> <table border="1"> <thead> <tr> <th>Saturation levels</th> <th>% Area</th> <th>Evaporation factor</th> </tr> </thead> <tbody> <tr> <td>Wet Beach Factor</td> <td>30%</td> <td>60%</td> </tr> <tr> <td>Drying beach</td> <td>10%</td> <td>30%</td> </tr> <tr> <td>Dry beach</td> <td>40%</td> <td>10%</td> </tr> </tbody> </table>	Saturation levels	% Area	Evaporation factor	Wet Beach Factor	30%	60%	Drying beach	10%	30%	Dry beach	40%	10%
Saturation levels	% Area	Evaporation factor													
Wet Beach Factor	30%	60%													
Drying beach	10%	30%													
Dry beach	40%	10%													
T_P	Decanting pumping	Decanting pumping	TSF decant pond is designed to have a decant pond no larger than 20% of the tailings area, therefore excess water in the TSF pond was pumped out to the process plant, even if the process plant has no capacity to store any water in excess of process requirements.												
EN	Entrained water	Entrained water	<p>As tailings is pumped to the TSF some water is entrained as interstitial water. The proportion depends on the tailings characteristics, and in particular the initial settled dry density (<math>\delta_{di}</math>), specific gravity (SG) of tailings material and tailings solids content, defined as follows:</p> $(eq2) \text{ Entrained water} = \frac{\text{Production Rate} \times w}{\delta_w}$ $(eq6) w = \frac{(SG \times \delta_w) - \delta_{di}}{SG \times \delta_{di}}$ <p>where:</p> <ul style="list-style-type: none"> <li>w = Moisture content of tailings (% w/w)</li> <li>SG = Specific gravity of tailings material (dimensionless)</li> <li><math>\delta_w</math> = Density of water (1 t/m<sup>3</sup>)</li> <li><math>\delta_{di}</math> = Initial settled dry density of pumped tailings (t/m<sup>3</sup>).</li> </ul>												

Flow ID	Flow	Description	Rationale for calculation
SP	Seepage	Seepage	Seepage water from tailings is assumed to occur at a rate 0.044 L/s for the Southern Cell and 0.045 L/s for the Northern Cell based on the TSF Design report (WSP, 2025c. Although seepage is expected to be minimal and negligible in terms of its impact on the overall water balance, it is tracked as an outflow. This is to ensure that in case the seepage is not captured by the underdrainage system, the total volumes can be tracked for environmental checks. Seepage is considered a loss in the system.
OV	Overtopping	Overflow from the TSF	Overflow from the TSF.

**Table 6-2: Pit Inflows and Outflows**

Flow ID	Flow	Description	Rationale for calculation																				
<b>Inflows</b>																							
DP	Direct precipitation	Direct precipitation over the ponding area	Water volumes generated by direct precipitation over the decant pond in a Pit assume a runoff coefficient of 1 (i.e., no losses). A constant pond area of 2240 m <sup>2</sup> was adopted considering the dewatering will aim to maintain the pond (sump) in a pit at a minimal water depth of 0.5 m.																				
CR	Catchment runoff	Catchment runoff	This inflow was estimated by the rainfall-runoff relationship established by McCullough, Marchand and Unsel (2013) and varies depending on the magnitude of the daily rainfall and the preceding day's rainfall to account for antecedent moisture conditions as summarised in the table below. <b>Runoff coefficients for pit walls</b>																				
			<table border="1"> <thead> <tr> <th>Current day rainfall</th> <th>Previous day rainfall</th> <th>Runoff coefficient for catchment area (CR)</th> <th>Runoff coefficient for pit wall (PWR).</th> </tr> </thead> <tbody> <tr> <td>&lt; 5 mm/d</td> <td>N/A</td> <td>0</td> <td>0</td> </tr> <tr> <td>&lt; 40 mm/d</td> <td>&lt; 20 mm/d</td> <td>0.15</td> <td>0.30</td> </tr> <tr> <td>&lt; 40 mm/d</td> <td>&gt; 20 mm/d</td> <td>0.40</td> <td>0.65</td> </tr> <tr> <td>≥ 40 mm/d</td> <td>N/A</td> <td>0.40</td> <td>0.65</td> </tr> </tbody> </table>	Current day rainfall	Previous day rainfall	Runoff coefficient for catchment area (CR)	Runoff coefficient for pit wall (PWR).	< 5 mm/d	N/A	0	0	< 40 mm/d	< 20 mm/d	0.15	0.30	< 40 mm/d	> 20 mm/d	0.40	0.65	≥ 40 mm/d	N/A	0.40	0.65
Current day rainfall	Previous day rainfall	Runoff coefficient for catchment area (CR)	Runoff coefficient for pit wall (PWR).																				
< 5 mm/d	N/A	0	0																				
< 40 mm/d	< 20 mm/d	0.15	0.30																				
< 40 mm/d	> 20 mm/d	0.40	0.65																				
≥ 40 mm/d	N/A	0.40	0.65																				
PWR	Pit wall runoff	Pit wall runoff	This inflow was estimated by the rainfall-runoff relationship established by McCullough, Marchand and Unsel (2013). Refer table above.																				
GW	Groundwater inflow	Groundwater inflow	Continuous groundwater (GW) inflow occurs due to the head difference between the regional GW level and the pit lake level. Ausgold has provided GW inflow data for each pit as a yearly inflow. It is assumed the GW inflow has a TDS concentration of (12,600 ppm=mg/L) (Pers comm, 2025b).																				
<b>Outflows</b>																							
PE	Pond evaporation	Evaporation over the ponding area	Evaporation was estimated by applying two factors to the pan evaporation rates as follows: <ul style="list-style-type: none"> <li>Pan evaporation factor (EF): To convert pan evaporation to pond evaporation a factor of 0.7 adopted.</li> <li>Salinity factor (SF): Leanny and Christen (Leaney, 2020) estimated the decrease in the evaporation rate due to the increase in salinity as per equation 1, where S corresponds to salinity in g/L: <math display="block">eq1. SF = 1.025 - 0.0246 e^{0.00879 * S}</math> </li> </ul>																				
T_P	Dewatering pumping	Dewatering pumping	Excess water in the pit voids will be pumped out and directed to the process plant. The pump rate will be defined based on the requirement to maintain a constant water level of 0.5 m in the pond.																				
OV	Overtopping	Overflow from the pits	Overflow from the pit if pond surface elevation exceeds perimeter ground elevation																				

Table 6-3: Sediment Pond Inflows and Outflows

Flow ID	Flow	Description	Rationale for calculation
<b>Inflows</b>			
DP	Direct precipitation	Direct precipitation over the ponding area	Water volumes generated by direct precipitation over the sediment ponds assume a runoff coefficient of 1 (i.e., no losses). The water surface area of the pond was considered for the calculation.
WRD_RO	Run off	Run off	A 10% runoff coefficient is applied to the WRDs and 90% to the ROM pad for daily rainfall.
WRD_SP	Seepage from the WRD	Seepage from the WRD	A 35% coefficient for daily rainfall is assumed to represent seepage from the WRDs.
<b>Outflows</b>			
PE	Pond Evaporation	Evaporation over the ponding area	Evaporation was estimated by applying pan evaporation rates scaled by a pan evaporation factor (EF=0.7) to the surface area of the pond.
T_P	Dewatering pumping	Dewatering pumping	A pump capacity of 200 m <sup>3</sup> /hour was adopted with pumping assumed to be activated when the water level in the pond is within 1 meter of the crest (using the crest as a reference due to variable pond depths) and deactivated when the water level reduces below 0.5 m.
SP	Seepage	Seepage	Calculated considering a clay lined pond with a seepage rate of 10 mm/d over the ponded area.
OV	Overtopping	Overflow from the sediment ponds	Overflow from the sediment ponds.

## 6.2 Water Balance Model Results

In general, the water balance model assumed that contact water is derived from three main sources:

- **Pits:** Dewatering of surplus groundwater inflow in the pits (~440 ML/year).
- **Sediment Ponds:** Runoff and seepage from the WRDs (~540 ML/year).
- **Tailings Storage Facility (TSF):** Return water from the TSF (~2,970 ML/year), which constitutes about ~70% of the total water the TSF receives resulting from slurry water release, incident rainfall and surface runoff.

Based on the average results under baseline climate, the Plant demand is approximately 3.7 GL/yr, resulting in an annual surplus of water required to be processed via a mechanical loss system (i.e., mechanical evaporator or MAR) of approximately 250 ML/yr.

Conversely, assuming there will be no onsite storage (e.g., an evaporation pond) currently incorporated in the site design, there is no capacity to retain the 250ML/yr water surplus during the wet period. The model has therefore indicated determined that there will be a water deficit during the dry period and borefield make up is therefore required at approximately 300 ML/yr.

### 6.3 Site Water Balance Recommendations

#### Seasonal Water Management:

- Due to insufficient storage to retain surplus water during the wet period, the system experiences a 250ML/yr surplus required to be processed via a mechanical loss system (i.e., mechanical evaporator or MAR) of approximately 250 ML/yr.
- Consequently, in the dry period borefield makeup water is required, amounting to an average of approximately 300 ML/year.

#### Climate change:

- A high-level climate change assessment was undertaken to provide likely variability in climate conditions and the impact on the range in WB model results. A more detailed assessment is recommended in further design stages to ensure resilience of the project under potential future climate change.
- The selected ranged of climate change for the near future centred in 2030 is estimated to have minimal impact on the water balance results for most of the facilities with the exception of the Sediment Ponds and Olympia Pit.

## 7. Surface Water Management Plan (WSP, 2025b)

On the basis of findings from the Site-Wide Water Balance described in Section 6, Ausgold commissioned WSP to develop a SWMP which included proposed designs of surface water management structures for the Project. The full SWMP report is provided as Appendix 5.

Proposed surface water management considerations include measures to protect proposed infrastructure for example, from erosion and scouring of WRDs, establish of diversion drains of suitable capacity to particularly during flood events, and establishment of sedimentation ponds that are optimised for sizing and location to achieve a zero discharge philosophy as far as practicable.

### 7.1 SWMP Basis of Design

The key basis of design for the SWMP is as follows:

- Design life: the SWMP assumes a 10-year operational period considering mining operations commencing in year 2028. SWMP for closure and post-closure periods are not part of this assessment.
- Surface water control structures protecting critical mine infrastructure: Structures (including non-contact diversion channels) are sized to withstand the 1 in 100 AEP event which is typically selected for open drains/bunds to protect critical infrastructure on other mine sites. The selected AEP storm event is estimated to withstand an event with a probability of exceedance of 10% over the 10-year life of the current proposed operation. This means that the likelihood to experience at least one event exceeding the design event over a given Project life of 'n = 10' years is 10%. This is based on recommendations in Austroads (1994), and risk management approaches used widely in other mining operations in WA that are independent (or external) to tailings storage facilities noting the latter has more prescriptive requirements for extreme flood events.
- Surface water control structures for local catchments are sized to the 1 in 20 AEP 24-hour event for storage, or critical duration for conveyance. The design intent of the structures is not to protect critical mine infrastructure, rather provide management of more frequent storm events. Freeboard for all structures has been adopted as 0.3 m.
- Design peak flows: Design peak flows used to design the surface water control structures is based on the hydrological and hydraulic (TUFLOW) model.
- Climate change considerations: Climate change considerations have been applied to the baseline IFD according to the 10-year operational period and follows the procedure developed by ARR (Ball, et al. 2019).
- Sediment retention ponds for the WRDs: Minimum required volume, pond dimensions (i.e., length by width ratio 1:3) and sediment storage volume has been calculated using RUSLE equation (K.G. Renard, 1997).
- Stormwater pond: Minimum required volume to store the 1 in 20 AEP, 24-hour storm event runoff volume but to also provide settling capacity for sediment laden runoff from the adjacent ROM pad. Perimeter drains capturing runoff from the catchment is also recommended to be sized to the 1 in 20 AEP design peak flow.
- Pond emergency spillways: Sized to convey the peak flow resulting from the 1 in 50 AEP storm event with a minimum freeboard of 0.3 m.
- Perimeter drains reporting to ponds: Perimeters drains capturing runoff from the pond catchment areas are recommended to be sized to the 1 in 20 AEP design peak flow.

## 7.2 Hydrologic and Hydraulic Modelling

Flood estimation (including flood levels, depths, and velocities) was completed using the TUFLOW hydraulic modelling software version 2025.0.2. TUFLOW is a two-dimensional hydraulic modelling software whereby a rainfall depth is applied to every active cell within a digitised polygon based on an input rainfall hyetograph which provides simulated flood depths, flows, and velocities. The input rainfall hyetograph was developed in accordance with ARR (Ball, et al. 2019), in which web-based design rainfall information specific to the Project location has been retrieved.

A direct rainfall approach enables reliable representation of the physiographic characteristics of the mine site, and its upstream catchment. This is due to several factors including greater consideration of the storage effects of depressions, better representation of sheet flow conditions associated with surrounding topography, and the ability to vary coefficients of roughness with increasing flow depths.

## 7.3 Model Results

The hydrologic and hydraulic modelling was completed adopting the three scenarios provided in Table 7-1.

**Table 7-1: Surface Water TUFLOW Modelling Scenarios**

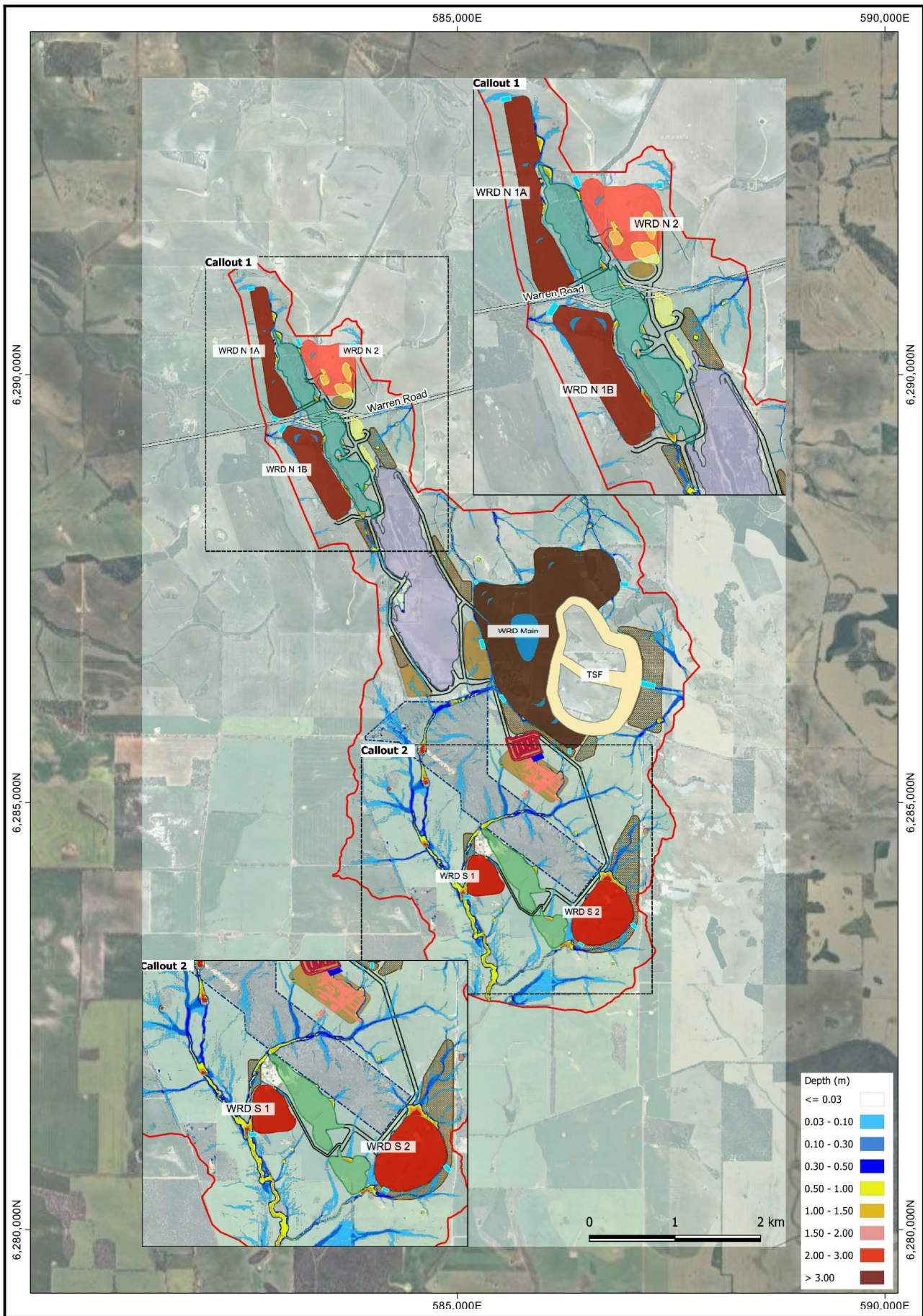
Scenario number	Description
1 Baseline	Pre-development condition to understand the local flooding without considering any mine and surface water control structure.
2 Ultimate site development – without mitigation	Post-development condition considering the proposed mine layout and without surface water control structures.
3 Ultimate site development – with mitigation	Post-development condition considering both the proposed mine layout and surface water control structures.

Flood mapping and results including the mine structures and the proposed surface water control structures are shown in following figures.

Figure 7-1 presents the flood depths across the site under post-development conditions for the 1 in 100 AEP flood event. Ponding areas were identified around site structures, with flow depths reaching up to 3 m in some locations, highlighting the need for surface water control structures.

Surface water controls were proposed based on the results of hydrologic modelling for the post-development scenario without mitigation measures and were incorporated into the hydraulic model. The open channel diversions were located at key ponding locations around the site infrastructures to manage surface runoff. Figure 7-2 presents the post-development condition with mitigation measures for the 1 in 100 AEP flood event. Flow depths within the channels are generally below 1.5 m.

Surface water management features to be adopted, their location, functionality and footprints are subject to ongoing feasibility assessments with proposed infrastructure yet to be finalised. Once proposed infrastructure is determined, these will be presented in applicable approvals documentation for assessment by DWER under Part V of the EP Act and by the Department of Mines, Petroleum and Exploration (DMPE) under the *Mining Act 1978*.



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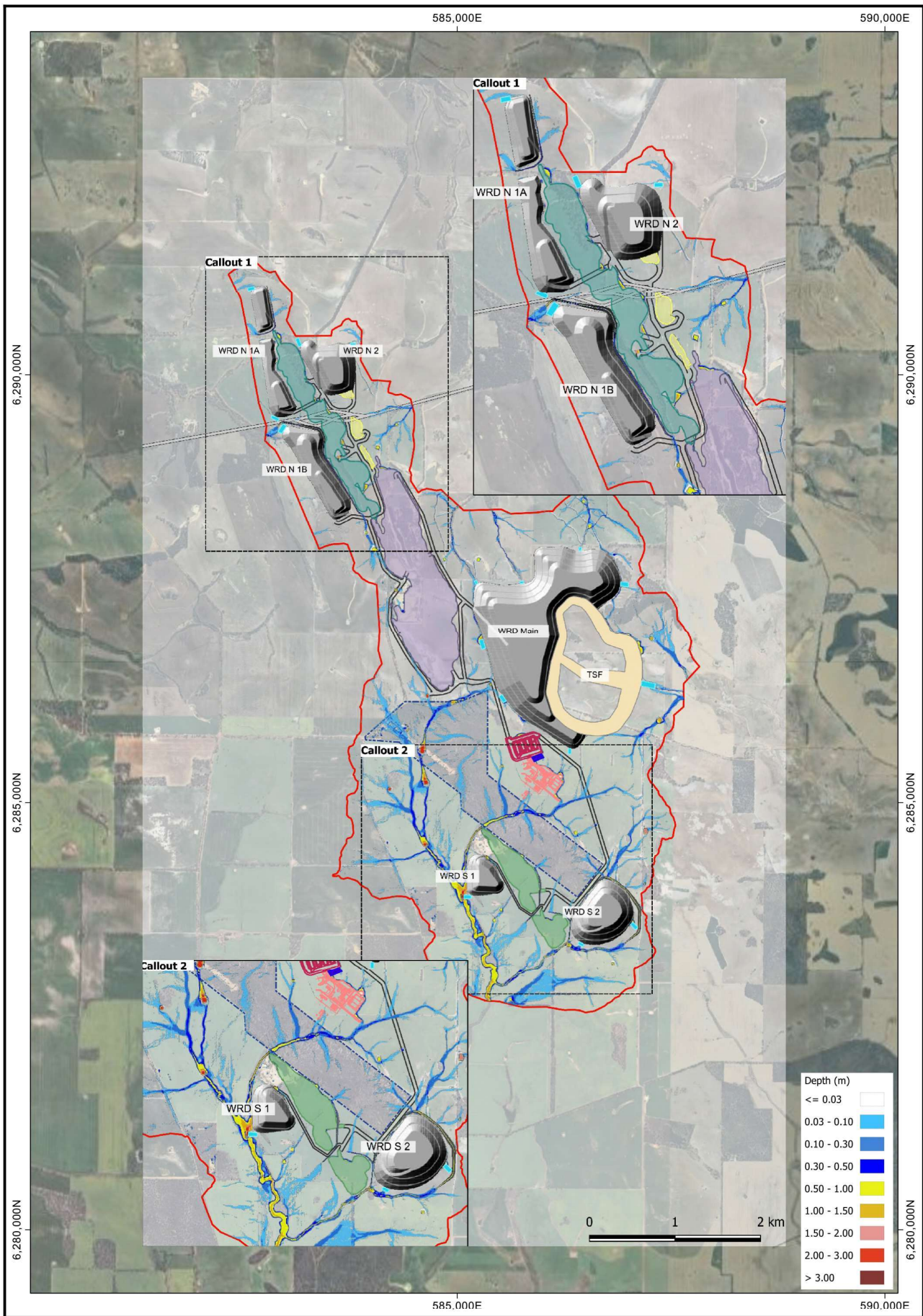
0 0.8 1.5km  
 Scale: 1:60,000  
 GDA 1994 MGA Zone 50

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 LIMITED

Author: T. Collie  
 Date: October 2025  
 Rev: A A4  
 Drawn: CAD Resources ~ www.cadresources.com.au

## Maximum Flooding Depth without Mitigations

Figure:  
**7.1**



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0 0.8 1.5km  
 Scale: 1:60,000  
 GDA 1994 MGA Zone 50

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## Maximum Flooding Depth with Mitigations

Figure:  
**7.2**

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# Appendices

Appendix 1: Groundwater Dependent Ecosystems (HBWA, 2025a)

# GROUNDWATER DEPENDENT ECOSYSTEMS

BRAZIL | BRISBANE | PERTH | SINGAPORE

KATANNING GOLD PROJECT



**Ausgold**  
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P24130  
12/06/2025  
VERSION 1.0

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# EXECUTIVE SUMMARY

Ausgold Ltd is progressing the Katanning Gold Project in southwest Western Australia. As part of feasibility investigations, Hydrobiology undertook a desktop risk assessment of potential groundwater dependent ecosystems (GDE) near proposed groundwater production bores.

The study used national GDE mapping, groundwater drawdown zones, and satellite-derived vegetation and climate data. NDVI and Aridity Index (AI) were analysed to assess vegetation responses during drought periods. Vegetation that remained relatively healthy during drought was considered more likely to access groundwater, while vegetation with low or seasonal NDVI was excluded as groundwater dependent.

Sixty-seven GDE features were identified, mostly low to moderate potential terrestrial GDEs. Only two high-potential aquatic GDEs were within 500 m of proposed bores. NDVI declined significantly between 2020–2021 and 2022–2024, consistent with increased aridity. Our study found moderate to low risk from groundwater abstraction and supports a precautionary approach to managing potential ecological impacts.

## contents

<b>1. INTRODUCTION</b>	<b>8</b>
<b>1.1 Background</b>	<b>8</b>
<b>1.2 Study Objective</b>	<b>8</b>
<b>1.3 Limitations</b>	<b>8</b>
<b>1.4 Groundwater Dependent Ecosystems</b>	<b>9</b>
1.4.1 Aquatic GDE	9
1.4.2 Terrestrial GDE and Phreatophytes	9
<b>2. METHODS</b>	<b>10</b>
<b>2.1 Study Area</b>	<b>10</b>
<b>2.2 Study Design and Data Sources</b>	<b>10</b>
2.2.1 GDE Atlas	14
2.2.2 Vegetation Condition	16
2.2.3 Aridity Index	18
2.2.4 Normalised Difference Vegetation Index	21
2.2.5 Groundwater Drawdown Zones	22
<b>2.3 Risk Assessment</b>	<b>24</b>
2.3.1 Impact Pathways	25
<b>3. RESULTS</b>	<b>26</b>
<b>3.1 GDE intersecting with Drawdown Zones</b>	<b>26</b>
<b>3.2 Terrestrial GDE</b>	<b>32</b>
<b>3.3 Aquatic GDE</b>	<b>33</b>
3.3.1 High Potential Aquatic GDE	34
<b>3.4 GDE Risk Assessment</b>	<b>35</b>
<b>4. CONCLUSIONS</b>	<b>37</b>
<b>5. REFERENCES</b>	<b>38</b>
<b>APPENDIX A. ARIDITY INDEX</b>	
<b>APPENDIX B. GDE ATLAS</b>	

## tables

Table 2-1 Summary of data sources used in this assessment .....	12
Table 2-2 Categories applied from the GDE Atlas (BoM 2024).....	14
Table 2-3 Vegetation condition as described by Keighery (1994) .....	16
Table 2-4 Aridity Index (UNEP, 1997) .....	18
Table 2-5 Sentinel-2 specification.....	21
Table 2-6 Groundwater bores (GDA 2020 MGA Zone 50).....	22
Table 2-7 Consequence criteria (DEW, 2020).....	24
Table 2-8 Likelihood criteria (DEW, 2020).....	24
Table 2-9 Matrix of severity and likelihood of impacts used to assess risk of mining activities impact. The combination of severity and probability give the user a risk rank of Low, Moderate and High.....	25
Table 2-10 Proposed impact pathways .....	25
Table 3-1 Aquatic GDE intersecting with drawdown zones for WER007 .....	29
Table 3-2 Aquatic GDE intersecting with drawdown zones for WER015 .....	29
Table 3-3 Aquatic GDE intersecting with drawdown zones for WER006A .....	29
Table 3-4 Terrestrial GDE intersecting with drawdown zones for WER007 .....	30
Table 3-5 Terrestrial GDE intersecting with drawdown zones for WER015.....	30
Table 3-6 Terrestrial GDE intersecting with drawdown zones for WER006A .....	30
Table 3-7 Area of potential GDEs within each drawdown zone by GDE type	31
Table 3-8 High Potential Aquatic GDE.....	34
Table 3-9 GDE Risk Assessment .....	36
Table 5-1 Monthly Potential Evapotranspiration (PET), Rainfall (mm) and Aridity Index .....	42
Table 5-2 BoM GDE Atlas – Aquatic GDE .....	52
Table 5-3 BoM GDE Atlas – Terrestrial GDE .....	55

## figures

Figure 1-1 Hydrogeological schematic column (SRK, 2024).....	9
Figure 2-1 Overview of AUC KGP project.....	11

Figure 2-2 Aquatic and terrestrial groundwater dependent ecosystems .....	15
Figure 2-3 Vegetation Condition, orange polygon indicates extent of available data .....	17
Figure 2-4 Monthly rainfall observations at Katanning (BoM 010916; Lat: -33.69, Lon: 117.61; 2020-2025). Dashed line indicates the average (2020 – 2025) .....	19
Figure 2-5 Monthly Evapotranspiration (SILO Grid Point; Lat: -33.55, Lon: 117.90; 2020-2025). Dashed line indicates the average (2020 – 2025).....	19
Figure 2-6 Monthly Aridity Index 2020 - 2025.....	20
Figure 2-7 Number of months in each year that met the threshold for drought conditions (Aridity Index <0.2).....	20
Figure 2-8 Groundwater bore drawdown zones used in this assessment.....	23
Figure 3-1 Potential GDE per groundwater bore and drawdown zone	27
Figure 3-2 Precautionary Approach – Feature 1065119 occurs in both 300 and 500 m drawdown zones but will be assessed in the 300 m zone only. ....	28
Figure 3-3 Median NDVI per month (2020-2025) for all Potentially Terrestrial GDE polygons (n = 51). Aridity Index overlaid for reference. ....	32
Figure 3-4 boxplots showing distribution of data for the Aridity Index (left) and Potentially Terrestrial GDE NDVI (right) .....	32
Figure 3-5 Median NDVI per month (2020-2025) for all Potentially Aquatic GDE polygons (n = 16). Aridity Index overlaid for reference. ...	33
Figure 3-6 Boxplots showing distribution of data for the Aridity Index (left) and Potentially Aquatic GDE NDVI (right).....	33
Figure 3-7 WERC007 High Potential GDE within 500m of the bore location – NDVI timeseries previous 5 years. ....	35
Figure 3-8 WERC015 High Potential GDE within 500m of the bore location – NDVI timeseries previous 5 years. ....	35
Figure 3-9 WERC006A High Potential GDE within 500m of the bore location – NDVI timeseries previous 5 years. ....	35

# 1. INTRODUCTION

## 1.1 BACKGROUND

Ausgold (AUC) are developing the Katanning Gold Project (KGP) in Western Australia. The KGP is located 275 km south-east of Perth and approximately 40 km north-east of the town of Katanning in southwest Western Australia. The tenements are located within the Blackwood River drainage basin and the Hardy Estuary-Coblinine River Catchment, covering approximately 3,500 km<sup>2</sup> of the Katanning Greenstone Belt in the south-west corner of the Yilgarn Craton.

KGP encompasses the historical Jinkas Hill and Dingo open pits, which were mined between 1995 and 1997 before being placed into care and maintenance. AUC acquired a significant tenure position in the region in 2009 with the objective of redeveloping the project. In 2017, the geological model was reinterpreted to support ongoing drilling aimed at expanding the defined mineral resource, forming a key input into the project's preliminary feasibility study.

AUC are currently undertaking resource delineation, metallurgical testing, and feasibility studies to support the development of a large-scale open pit mining operation. To support this phase of works, Hydrobiology was commissioned by AUC to undertake a desktop assessment of potential groundwater dependent ecosystems (GDE) adjacent to the project location.

## 1.2 STUDY OBJECTIVE

The objective of this study is to undertake a desktop risk assessment of potential groundwater dependent ecosystems at the KGP study area.

## 1.3 LIMITATIONS

This is a desktop study based on remote sensing observations and field surveys completed for flora and vegetation assessments. Our conclusions are constrained to the quality and representativeness of the information supplied.

## 1.4 GROUNDWATER DEPENDENT ECOSYSTEMS

Groundwater Dependent Ecosystems (GDE) are ecosystems that rely on groundwater to survive, either all the time or just during dry periods (Eamus & Froend, 2006). In the Goldfields region of Western Australia, these include wetlands, salt lakes, samphire shrublands, and some types of woodland. The GDE Atlas (BoM, 2022) is the main tool used to identify and map potential GDEs across Australia, although some of the information is based on older surveys. It classifies GDEs as aquatic (e.g., wetlands and springs), terrestrial (vegetation), or subterranean (e.g., cave ecosystems). Only aquatic and terrestrial GDEs are considered relevant to this study area.

### 1.4.1 AQUATIC GDE

Aquatic GDE in this region are mostly found around naturally salty areas like lakes and drainage lines. These are often dominated by samphires (*Tecticornia* species), which are salt-tolerant plants. While they can survive in high salinity, changes in water availability—especially reduced rainfall or lowered groundwater levels—can affect their health, growth, and ability to reproduce (Rabhi et al., 2012; English & Colmer, 2013). Freshwater inputs after rain are important, especially during long dry periods. If mining lowers the water table, this could reduce both groundwater availability and surface water expression, putting extra stress on these systems (Monie et al., 2025; Moir-Barnetson, 2014).

### 1.4.2 TERRESTRIAL GDE AND PHREATOPHYTES

Terrestrial GDE in the Goldfields include Eucalyptus woodlands, some of which may include phreatophytic species—plants that use deep roots to tap into the water table. These species don't always rely on groundwater, but they may use it when surface moisture is low. In the study area, these woodlands are mostly classified as 'low potential' GDEs in the Atlas, meaning they are not likely to be strongly reliant on groundwater. This is likely due to a clay-rich layer in the soil that stops roots from reaching the deeper aquifers where mining draws water (SRK, 2024; Figure 1-1). Instead, most of the vegetation is likely to be using moisture stored in the upper soil after rainfall (Zencich et al., 2002). Because of this, deeper groundwater abstraction is unlikely to affect these woodlands unless the drawdown is very large or prolonged.

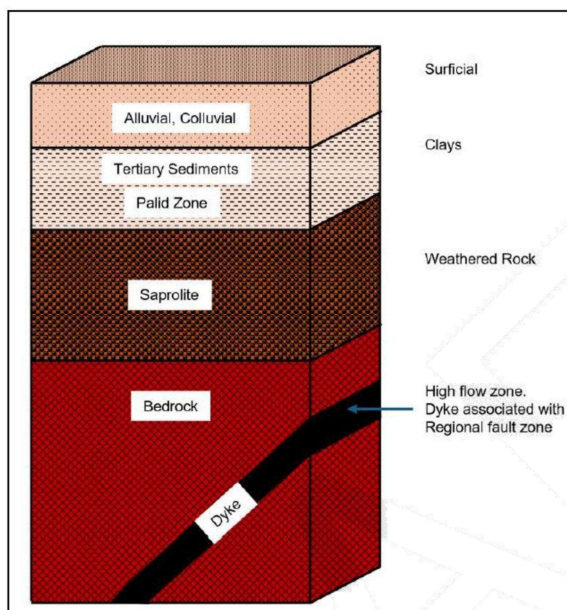


Figure 1-1 Hydrogeological schematic column (SRK, 2024)

# 2. METHODS

## 2.1 STUDY AREA

The study area is approximately 40 kilometres northeast of the town of Katanning, within the Blackwood River drainage basin and the Hardy Estuary-Cobline River Catchment. The KGP Mining Leases (M-70/211, M-70/488, M 70/210) and Exploration Lease (E 70/2928) are typical of the Wheatbelt, featuring gently rolling landscapes with a mix of sandy plains, low hills, and broad valleys. (Figure 2-1). These valleys often contain salt lakes and seasonal wetlands, though surface water is generally limited and flows are mostly short-lived after rainfall. The land has been heavily cleared for farming, with broadacre cropping and livestock grazing being the main land uses. Remnant patches of native vegetation, including eucalypt woodlands and shrublands, remain mostly along roadsides and rocky outcrops. Dryland salinity and salinisation of both surface and groundwaters of the region has occurred over the last century. This has created salinity tolerant GDEs and altered aquatic and phreatophyte habitats across the region (e.g., Clarke et al, 2002).

## 2.2 STUDY DESIGN AND DATA SOURCES

This study uses satellite imagery and climate data to assess whether vegetation mapped in the GDE Atlas is likely to rely on groundwater. The main datasets used are the Normalized Difference Vegetation Index (NDVI), which provides a proxy for vegetation health, and the Aridity Index (AI), which compares rainfall to potential evaporation. Data sources are summarised in Table 2-1.

We identified a suitable drought period by analysing changes in the Aridity Index and rainfall data. NDVI values during this period was then checked for seasonal variation. Vegetation that stays green (has a relatively elevated NDVI value) during the drought may be using groundwater, while vegetation that dries out (has a lower NDVI value) is more likely to depend on rainfall. This helps separate groundwater-dependent plants from those that respond only to surface water. Vegetation was determined to be unlikely to be groundwater-dependent if it showed low or highly seasonal NDVI, (i.e. likely to track seasonal rainfall). The approach will also consider whether the species present are typically phreatophytes. This process helped refine GDE mapping where field data are limited.

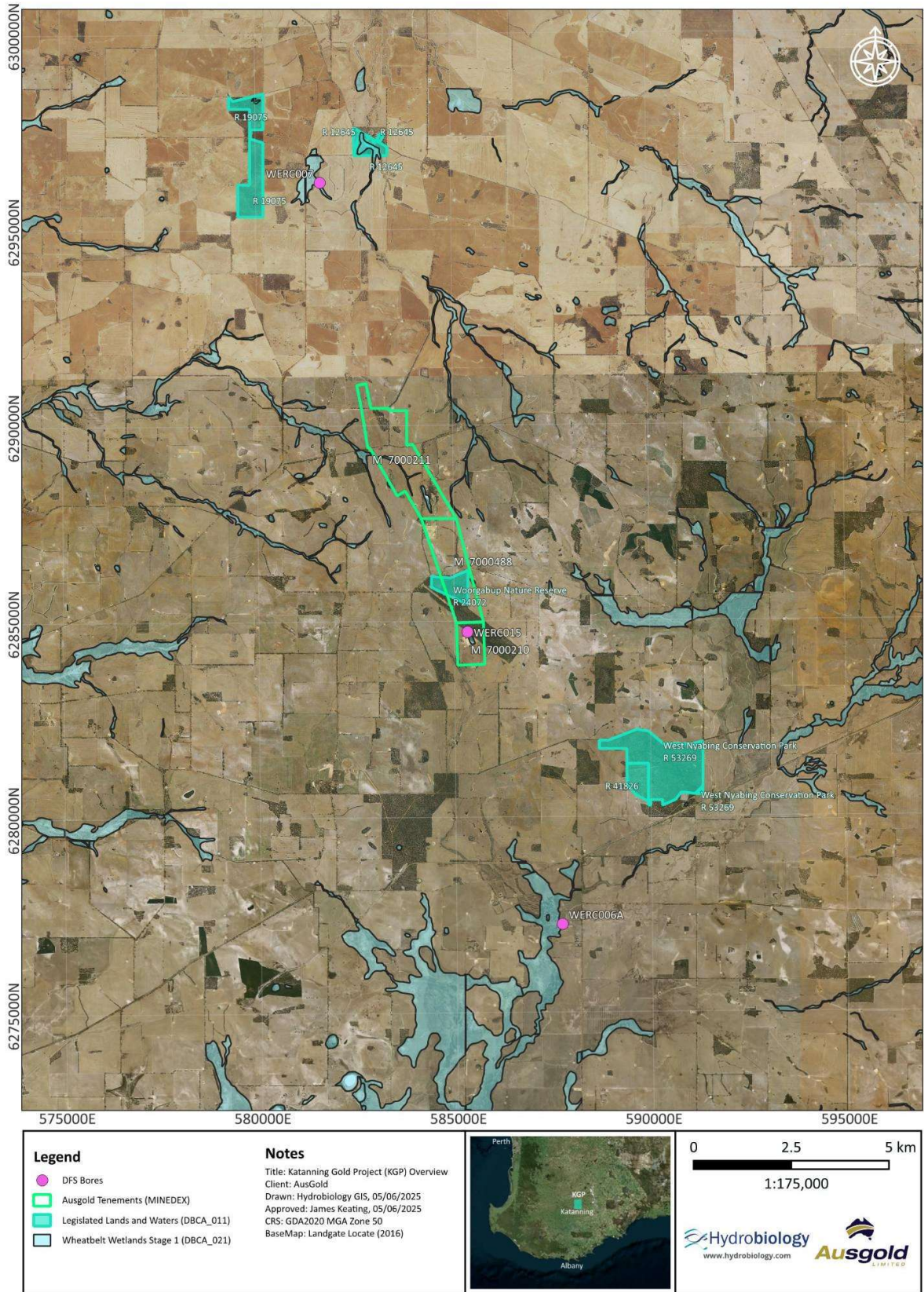


Figure 2-1 Overview of AUC KGP project

Table 2-1 Summary of data sources used in this assessment

Data	Source	Summary	Spatial Resolution	Temporal Resolution
<b>Groundwater Dependent Ecosystems (GDE) Atlas</b>	Australian Bureau of Meteorology (BoM)	The BoM Groundwater Dependent Ecosystems (GDE) Atlas is a national mapping tool that identifies ecosystems reliant on groundwater, including wetlands, vegetation, and subterranean habitats.	The national assessment layers are mapped at a 1 km <sup>2</sup> grid resolution across Australia. The regional study layers have variable resolutions, typically ranging from 1:25,000 to 1:100,000, depending on the original study and available data quality.	The national assessment layer is based primarily on modelling and spatial inference using datasets available up to 2011–2012 with updates in subsequent versions (latest release ~2023). Regional datasets may reflect fieldwork, studies, or mapping efforts carried out at various times, with some datasets dating from the early 2000s and others more recent depending on jurisdictional input.
<b>Keighery vegetation condition scale for the Southwest and Interzone Botanical Province</b>	Botanica Consulting, 2024 Mattiske Consulting, 2019; 2020; 2021 Hydrobiology, 2025	Vegetation units within a study area adjacent to the AUC tenements were assigned a vegetation condition score from field botany surveys. Additional scores were assigned to un-surveyed areas using an integrated remote sensing predictive model (refer to Hydrobiology, 2025 for further details).	Vegetation unit polygons accuracy is < 10 m	161 vegetation units across 2,599 ha were surveyed by Botanica Consulting in September 2023 and Mattiske Consulting in October 2018, February 2019 and November 2019.
<b>Monthly Rainfall</b>	Bureau of Meteorology, Australian Government	Monthly rainfall data	Point data measured at Katanning RS (BoM 010916). Lat: -33.69, Lon: 117.61	Monthly totals, 2020 - 2025

Data	Source	Summary	Spatial Resolution	Temporal Resolution
<p><b>Potential Evapotranspiration</b>  <b>FAO56 Penman-Monteith for short crops</b></p>	<p>QLD Government Long Paddock.            SILO - Australian climate data from 1889 to yesterday</p>	<p>The FAO-56 Penman-Monteith equation estimates reference evapotranspiration (ET<sub>0</sub>) from a short, well-watered grass crop under standard conditions. It combines energy balance (net radiation) and aerodynamic factors (temperature, humidity, and wind speed) to model water loss. This method is widely used for calculating PET in agriculture, water balance studies, and aridity assessments.</p>	<p>Point data calculated from SILO Grid Point; Lat: -33.55, Lon: 117.90.</p>	<p>Monthly, 2020 - 2025</p>
<p><b>Aridity Index (AI)</b></p>	<p>Derived from BoM monthly rainfall and SILO PET data</p>	<p>AI is calculated as the ratio of monthly precipitation to potential evapotranspiration (AI = P/PET), following UNEP (1997) methodology.</p>	<p>Point-based estimate using matched rainfall (BoM 010916) and PET (SILO Grid Point)</p>	<p>Monthly, 2020 - 2025</p>
<p><b>Normalised Difference Vegetation Index (NDVI)</b></p>	<p>European Space Agency Sentinel-2 satellite program</p>	<p>Normalized Difference Vegetation Index (NDVI) is a proxy for vegetative health through a measurement of the photosynthetic functions of plants</p>	<p>10 x 10 m ground sampling resolution</p>	<p>Monthly averages, 2020 - 2025</p>

## 2.2.1 GDE ATLAS

The Groundwater Dependent Ecosystems (GDE) Atlas, developed by the Bureau of Meteorology (BoM), provides a national-scale inventory of ecosystems across Australia that are potentially reliant on groundwater (BoM, 2024). It categorises GDEs into three broad types; aquatic, terrestrial, and subterranean - and assigns each a likelihood classification (e.g., known, high, moderate, low potential) based on their potential dependency on groundwater (BoM, 2024; Table 2-2). The original assessments were undertaken between 2009 and 2012, with limited updates from regional studies incorporated since.

While the GDE Atlas serves as a valuable desktop screening tool, it has several limitations. Firstly, the spatial resolution of the underlying datasets is relatively coarse, which restricts the Atlas's ability to identify smaller-scale or cryptic GDEs, especially in data-poor or ecologically complex regions such as the arid and semi-arid zones of Western Australia. Secondly, the modelled nature of the data means that classifications are based on indirect indicators rather than empirical measurements of groundwater use by vegetation or ecosystems. Consequently, the Atlas may produce both false positives (e.g., areas mapped as high potential GDEs that are not functioning ecosystems) and false negatives (e.g., unrecognised but functioning GDEs).

Given these constraints, the GDE Atlas should not be used as a definitive source of GDE presence or condition. Instead, it is best applied as a preliminary tool to guide further investigation. Site-specific studies are required to confirm the presence, dependency, and vulnerability of GDEs, particularly where mining-related groundwater abstraction is proposed. This is especially important in the context of regulatory approvals, where evidence-based risk assessment is necessary to inform sustainable groundwater use and ecosystem protection.

Table 2-2 Categories applied from the GDE Atlas (BoM 2024)

Layer Type	GDE Potential Category	Description
<b>Regional Study</b>	Known GDE	Confirmed groundwater dependence based on local studies or field data.
	High potential GDE	Strong evidence of groundwater reliance, though not directly confirmed.
	Moderate potential GDE	Moderate likelihood of groundwater dependence based on spatial indicators.
	Low potential GDE	Some indicators suggest groundwater use, but less likely.
	Unclassified potential GDE	Possible GDEs identified but not yet classified due to insufficient information.
<b>National Assessment</b>	High potential GDE	Modelled likelihood of groundwater dependence based on national-scale datasets.
	Moderate potential GDE	Moderate modelled probability of groundwater use.
	Low potential GDE	Low modelled likelihood of dependence on groundwater.
	Unclassified potential GDE	Areas where modelled results were inconclusive or data were insufficient.

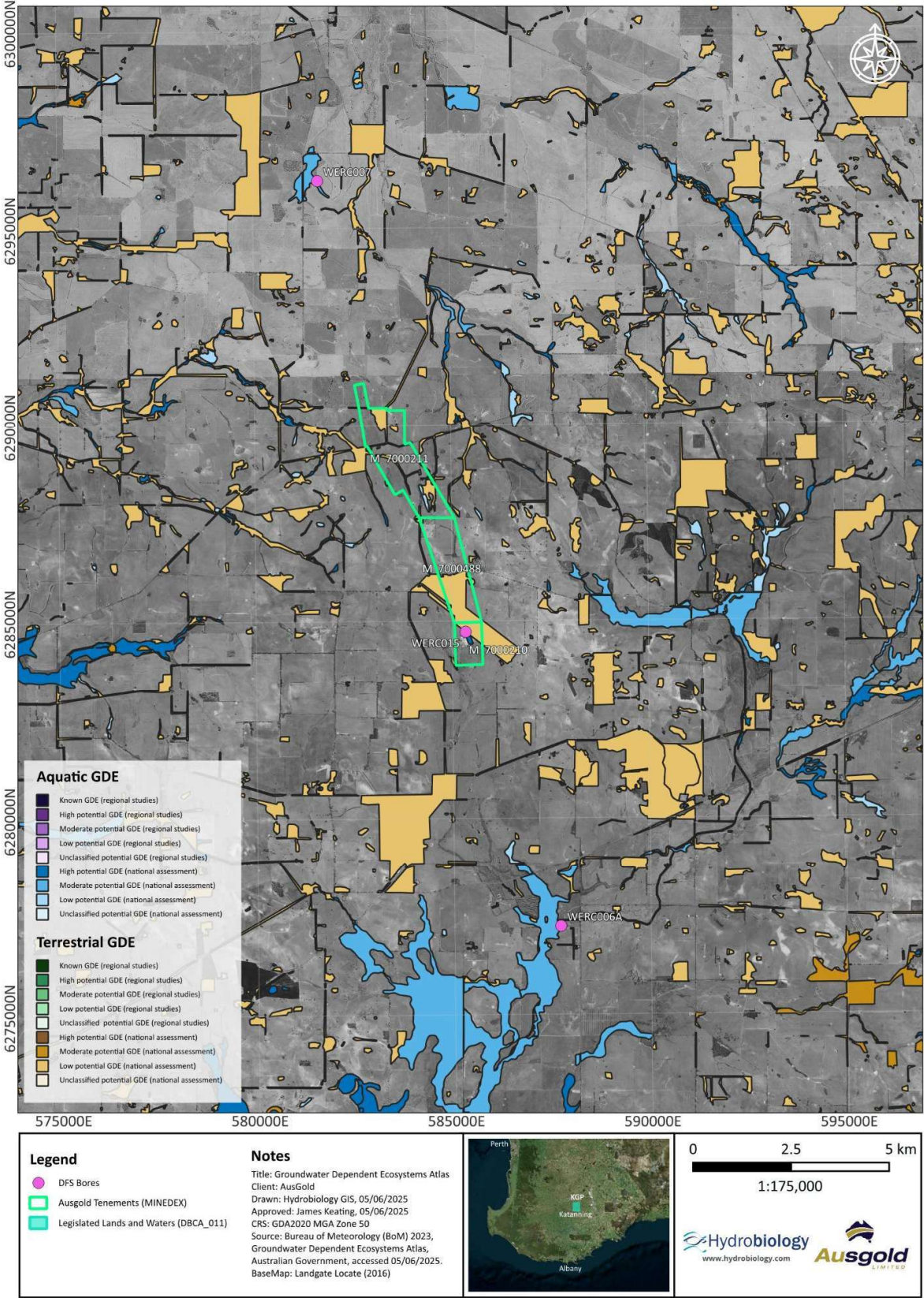


Figure 2-2 Aquatic and terrestrial groundwater dependent ecosystems

## 2.2.2 VEGETATION CONDITION

Vegetation condition at the Katanning Gold Project was assessed using the Keighery (1994; Table 2-3) vegetation condition scale, consistent with EPA Technical Guidance (2016). The method used is presented in Hydrobiology (2015) and summarised below.

Field surveys by Botanica Consulting (2023) and Mattiske Consulting (2018–2019) provided baseline condition scores for accessible areas. These assessments evaluated vegetation structure, disturbance, and species composition to assign scores ranging from Pristine to Completely Degraded.

Vegetation condition was estimated for unsurveyed areas using a combination of LiDAR-derived Canopy Height Models (CHM) and Sentinel-2 NDVI data. A Generalised Linear Model (GLM) was developed using field-surveyed units to relate NDVI and canopy height to Keighery scores. The model showed that NDVI was a significant predictor of vegetation condition, particularly distinguishing Good from Completely Degraded areas, while canopy height was not statistically significant.

Vegetation condition assessments were limited to the central extent of the KGP only and are used in this study for reference only.

Table 2-3 Vegetation condition as described by Keighery (1994)

Vegetation Condition	Description: South-West and Interzone Botanical Provinces
<b>Completely Degraded</b>	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.
<b>Degraded</b>	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
<b>Good</b>	Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
<b>Very Good</b>	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
<b>Excellent</b>	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
<b>Pristine</b>	Pristine or nearly so, no obvious signs of disturbance.

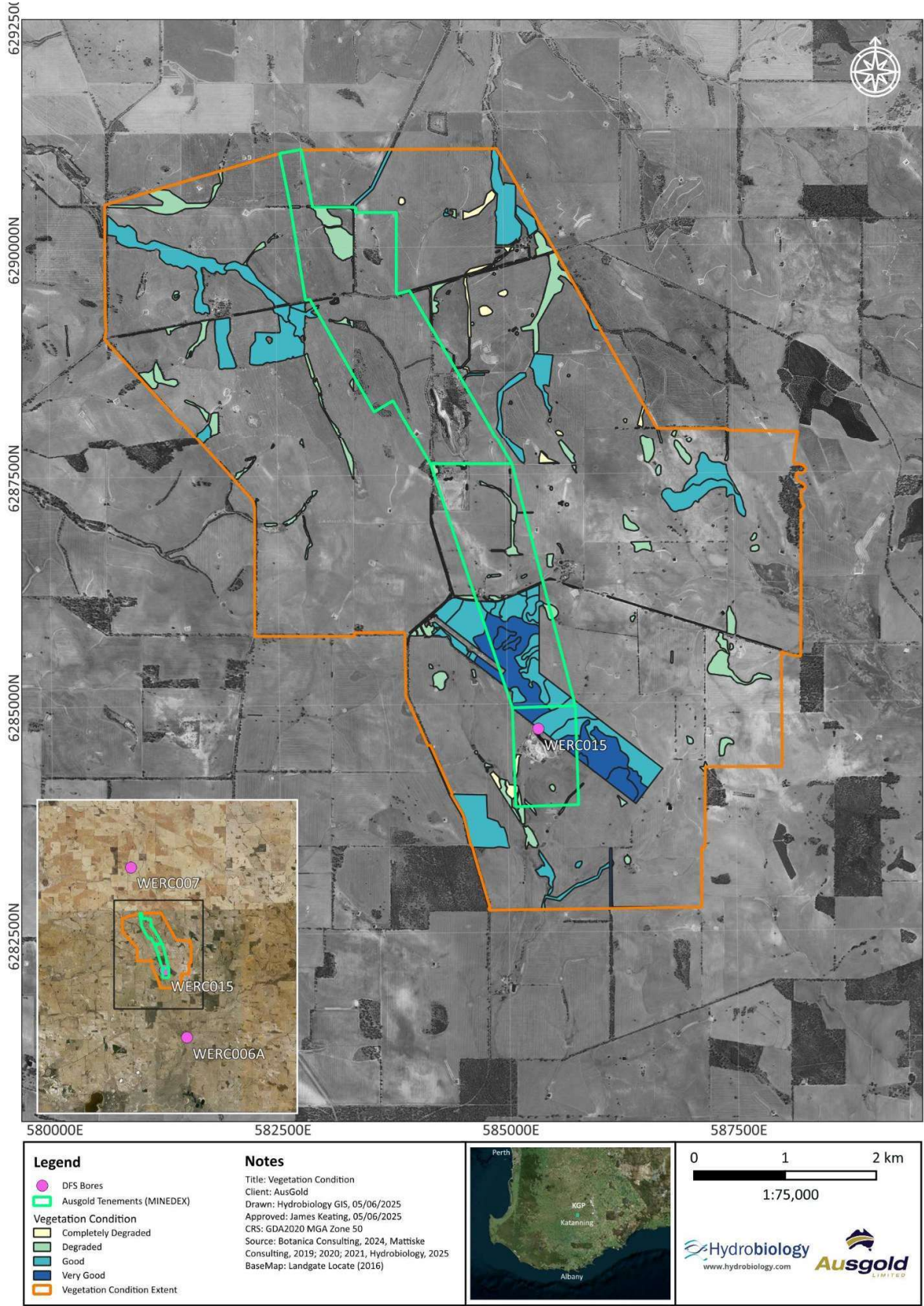


Figure 2-3 Vegetation Condition, orange polygon indicates extent of available data

### 2.2.3 ARIDITY INDEX

Monthly Aridity Index (AI) values were calculated for the period 2020–2025 using the ratio of total monthly precipitation to potential evapotranspiration (PET), as defined by the United Nations Environment Programme (UNEP, 1997; Table 2-4). The AI provides a standardised indicator of climatic water availability and is widely used to assess drought severity and classify climatic conditions relevant to ecological and hydrological assessments;

$$\text{Aridity Index (AI)} = \frac{\text{Precipitation (P)}}{\text{Potential Evapotranspiration (PET)}}$$

Monthly rainfall observations were sourced from the Bureau of Meteorology's Katanning weather station (Station ID: 010916; Lat: -33.69, Lon: 117.61; Figure 2-4). PET estimates were obtained from the SILO Data Drill at a nearby grid point (Lat: -33.55, Lon: 117.90), based on the FAO56 Penman–Monteith method (Allen et al., 1998; Figure 2-5). This approach incorporates local temperature, solar radiation, vapour pressure, and wind data to model evapotranspiration from a reference crop under standardised conditions. This analysis identified 2024 as a potentially drought impact year (indicated in Figure 2-4 and Figure 2-5).

Aridity classifications followed UNEP (1997; Table 2-4), where AI values below 0.20 indicate arid conditions. Based on this criterion, the period from January to April 2024 exhibited persistently low rainfall and elevated PET, resulting in AI values consistently below the arid threshold. These conditions support the designation of early 2024 as a candidate drought phase, with implications for landscape-scale water balance and the vulnerability of groundwater-dependent ecosystems (GDEs). The monthly Aridity Index is presented in Table 2-4.

Table 2-4 Aridity Index (UNEP, 1997)

Aridity Index (AI = P / PET)	Climate Class
< 0.05	Hyper-arid
0.05 – 0.20	Arid
0.20 – 0.50	Semi-arid
0.50 – 0.65	Dry sub-humid
> 0.65	Humid

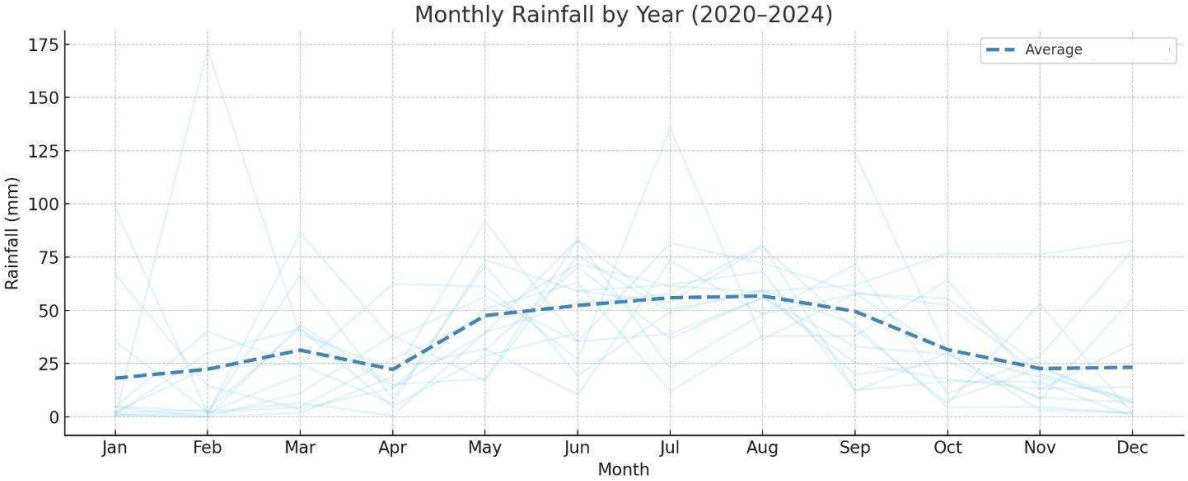


Figure 2-4 Monthly rainfall observations at Katanning (BoM 010916; Lat: -33.69, Lon: 117.61; 2020-2025). Dashed line indicates the average (2020 – 2025)

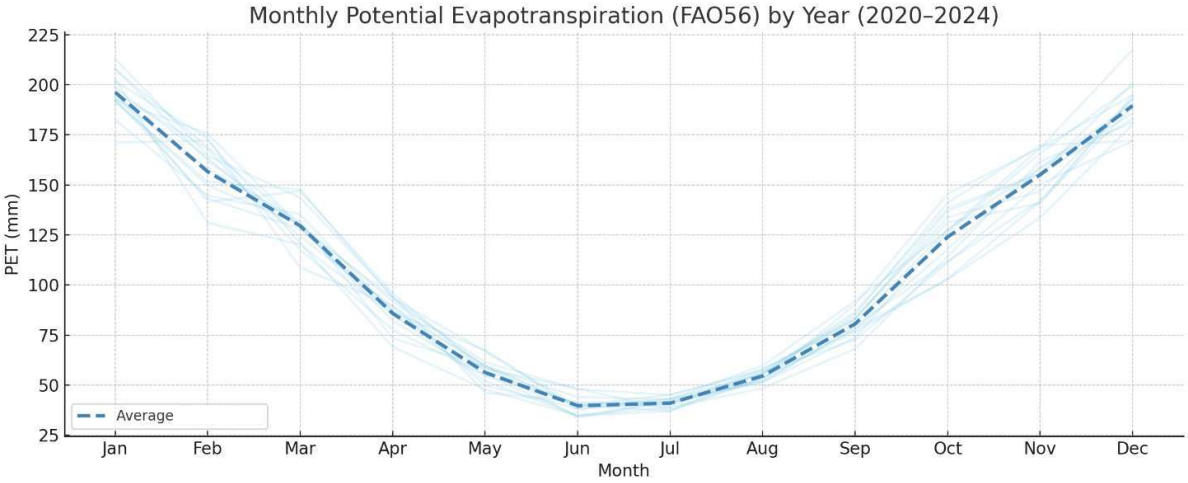


Figure 2-5 Monthly Evapotranspiration (SILO Grid Point; Lat: -33.55, Lon: 117.90; 2020-2025). Dashed line indicates the average (2020 – 2025).

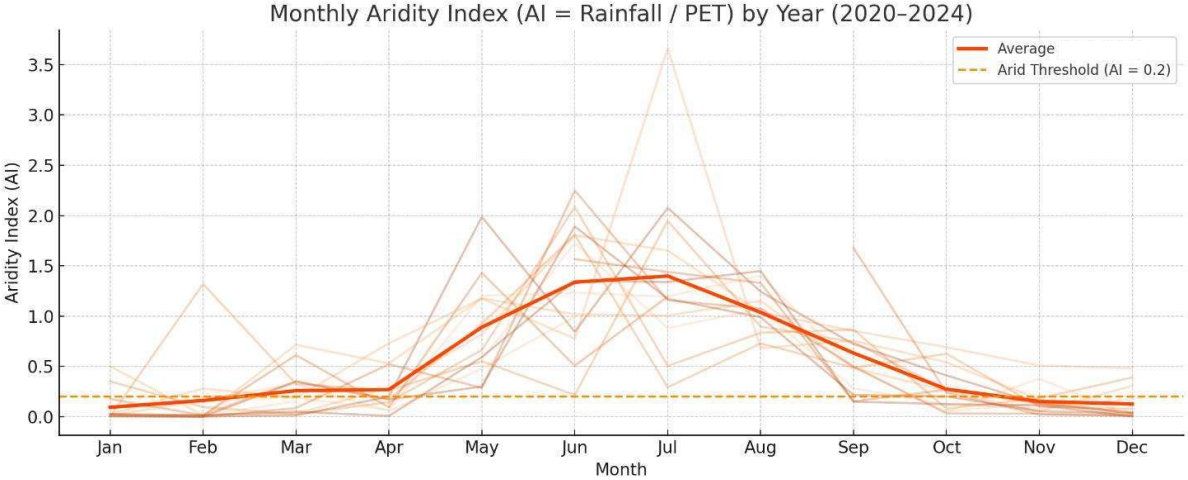


Figure 2-6 Monthly Aridity Index 2020 - 2025

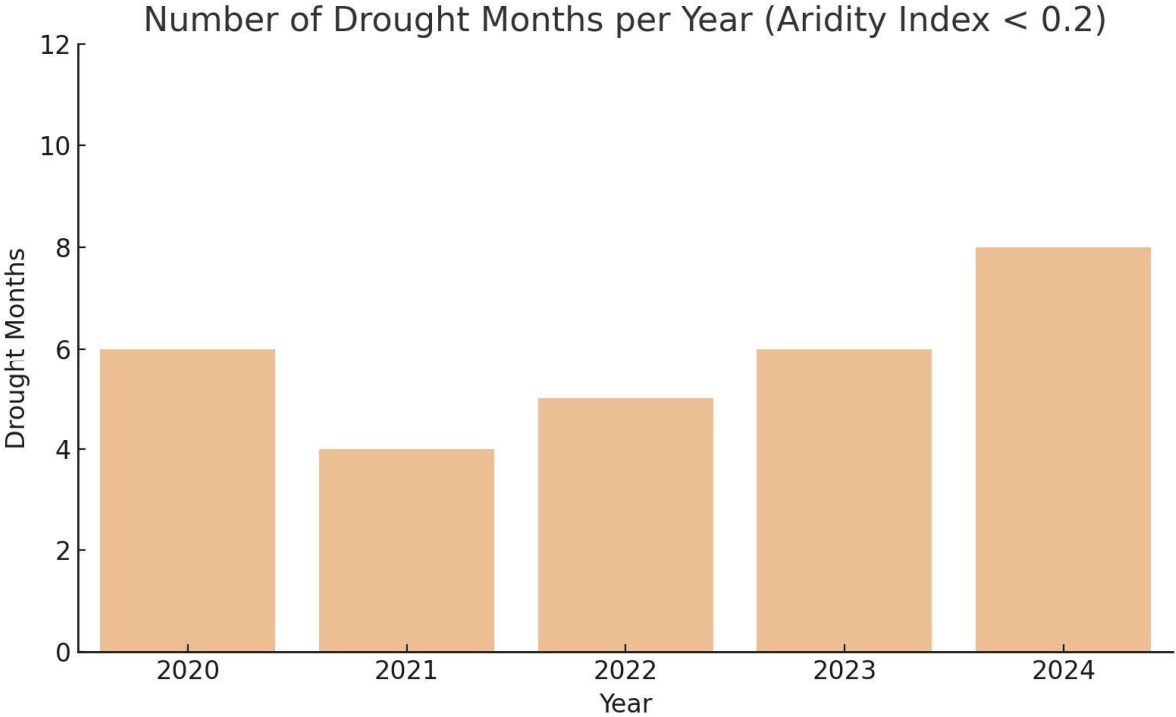


Figure 2-7 Number of months in each year that met the threshold for drought conditions (Aridity Index <0.2)

## 2.2.4 NORMALISED DIFFERENCE VEGETATION INDEX

Multispectral satellite imagery was acquired to provide an index for vegetation health. The European Space Agency Sentinel-2 satellite program was preferred due to the temporal and spatial availability of imagery and the relatively high ground sampling resolution, which was appropriate to the size of the vegetation units (Table 2-5).

Table 2-5 Sentinel-2 specification

Satellite	Processing and Quality Control	Red wavelength (µm)	NIR wavelength (µm)	Resolution (m)
<b>Sentinel-2</b>	Level 2A data are high quality data where the effects of the atmosphere on the light being reflected off of the surface of the Earth and reaching the sensor are excluded.	0.65 – 0.69	0.85 – 0.88	10 x 10

Normalized Difference Vegetation Index (NDVI) is an accepted proxy for quantifying vegetative health through a measurement of the photosynthetic functions of plants (Santin-Janin et al., 2009). The NDVI is calculated by measuring the difference between near-infrared (NIR) light (which vegetation strongly reflects) and red light (which vegetation absorbs) following the equation (as described in Barron et al., 2014) shown below;

$$NDVI = \frac{NIR - Red}{NIR + Red}$$

The resolution of the resulting NDVI layer matched that of the original satellite imagery (*i.e.*, each pixel measures 10 m x 10 m on the ground). The NDVI ranges from -1 to +1, where higher values represent healthier, denser vegetation. Lower values indicate low reflectance. This may be caused by poor vegetation quality or areas that have been cleared.

Google Earth Engine (GEE) was used to extract monthly median NDVI values for polygons mapped as potential Groundwater Dependent Ecosystems (GDEs). The analysis relied on the Sentinel-2 Surface Reflectance (L2A) image collection, filtered for the period January 2020 to December 2025 and limited to scenes with less than 20% cloud cover. NDVI was calculated using the normalized difference between the near-infrared (B8) and red (B4) bands. Monthly median composites were generated for each calendar month, and zonal statistics were applied to extract the median NDVI for each polygon. This time series supports the assessment of vegetation persistence and potential groundwater reliance.

### 2.2.4.1 NDVI LIMITATIONS

NDVI is not a direct measurement of vegetation health, however strong relationships between in-situ measurements on the ground with satellite derived indices are common in the literature (Higginbottom and Symeonakis, 2014). That said, the application of NDVI to sparsely vegetated areas (typical NDVI values of < 0.1) can be compromised by the soils reflectance signature that can influence or obscure true NDVI values (Higginbottom and Symeonakis, 2014). Those low NDVI levels in the context of this study are indicative of agriculturally degraded land.

## 2.2.5 GROUNDWATER DRAWDOWN ZONES

The following groundwater bores have been identified for this study (Table 2-6). Arbitrary spatial buffers (drawdown zones) radiating away from the bores at 300, 500, 1,000 and 2,500 metre gradients have been assigned (Figure 2-8).

Table 2-6 Groundwater bores (GDA 2020 MGA Zone 50)

Bore	Northing mN	Easting mE
<b>WERC007</b>	6296212	581648
<b>WERC015</b>	6284726	585337
<b>WERC006A</b>	6277244	587705

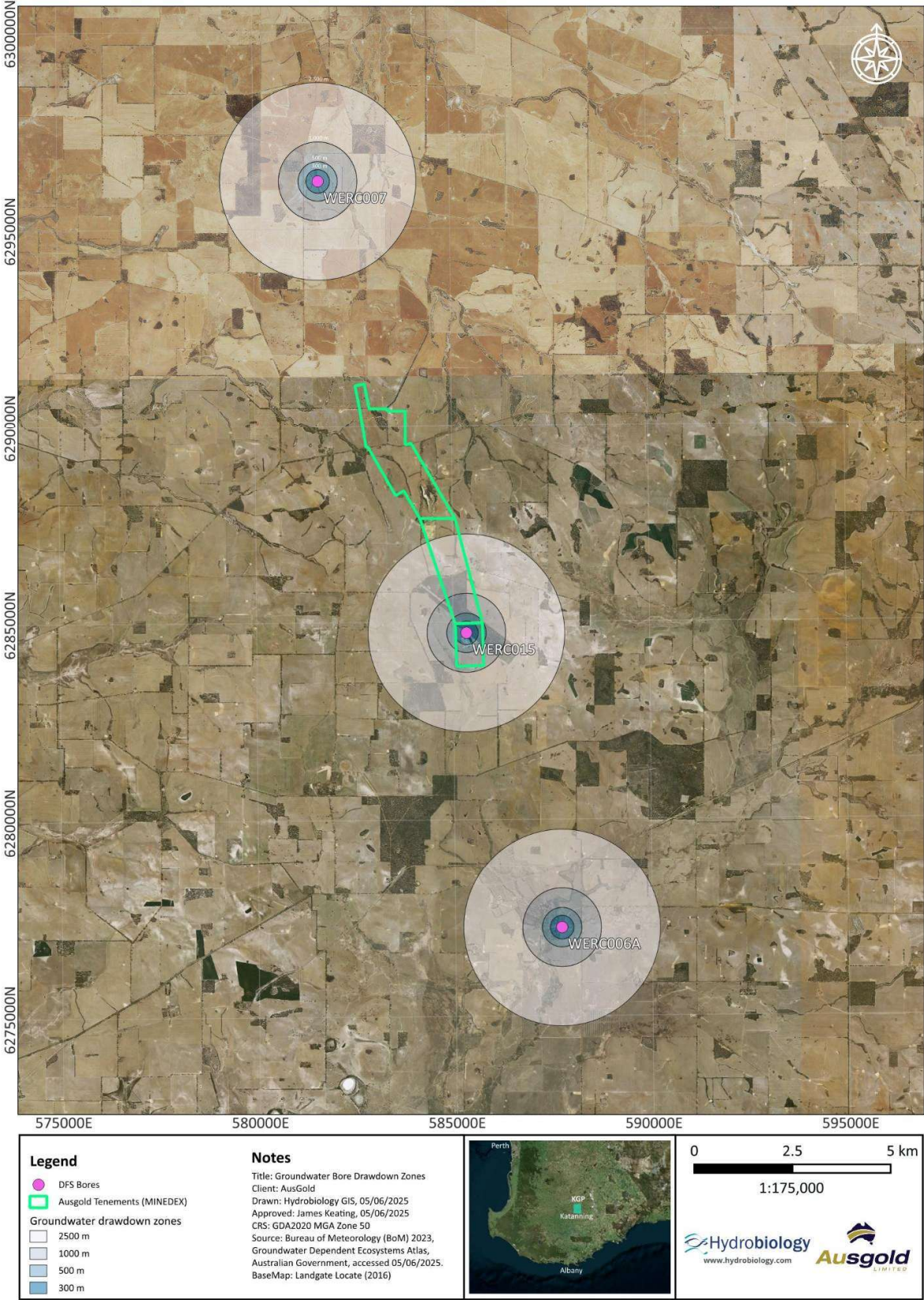


Figure 2-8 Groundwater bore drawdown zones used in this assessment

## 2.3 RISK ASSESSMENT

A risk assessment was undertaken to evaluate potential impacts to groundwater-dependent ecosystems (GDEs) from proposed groundwater extraction. The assessment followed a structured approach consistent with ISO 31000, combining estimates of consequence (severity of ecological impact; Table 2-7) with likelihood (probability of occurrence over a defined time period; Table 2-8) to determine overall risk (Table 2-9).

Table 2-7 Consequence criteria (DEW, 2020).

Level	Criteria
<b>Catastrophic</b>	Irreversible damage causing permanent widespread decline in ecosystem health and/or habitat quality. Irreversible loss of species or ecological communities having state, national or international importance
<b>Major</b>	Severe impact to ecosystem health and habitat quality over a large area. Substantial impact or decline of species and/or ecological communities having state, national or international importance. Recovery is protracted, uncertain and requires extensive policy and management intervention and resources
<b>Moderate</b>	Severe temporary impacts to ecosystem health and habitat quality over a limited area. Observed impacts to species and/or ecological communities having state, national or international importance. Recovery is feasible with dedicated management intervention and resources.
<b>Minor</b>	Temporary impacts to ecosystem health and habitat quality affecting local area.
<b>Insignificant</b>	Nil or negligible damage or impacts to ecosystem health, habitat quality or species and/or ecological communities

Table 2-8 Likelihood criteria (DEW, 2020)

Category	Description	Likelihood
<b>Rarely</b>	Only occurs in exceptional circumstances	0-5%
<b>Unlikely</b>	Unusual but not exceptional	5-25%
<b>Possible</b>	Less than even chance but not unusual	25-50%
<b>Likely</b>	Greater than even chance but not certain	50-90%
<b>Almost certain</b>	Expected in all circumstances	90-100%

Table 2-9 Matrix of severity and likelihood of impacts used to assess risk of mining activities impact. The combination of severity and probability give the user a risk rank of Low, Moderate and High.

		Likelihood				
		Rarely	Unlikely	Possible	Likely	Almost certain
Severity	Catastrophic	M	H	H	H	H
	Major	L	M	M	H	H
	Moderate	L	M	M	M	H
	Minor	L	L	M	M	M
	Insignificant	L	L	L	M	M

### 2.3.1 IMPACT PATHWAYS

The following impact pathways and outcomes are proposed for the risk assessment (Table 2-10).

Table 2-10 Proposed impact pathways

Impact Driver	Impact Pathway	Potential Outcome
<b>Groundwater extraction</b>	Water table decline leads to reduced discharge to ecosystems	Loss of wetland or vegetation health; decline in GDE function
<b>Climate change</b>	Reduced recharge leads to lower groundwater availability	Long-term decline in GDE resilience; reduced baseflows
<b>Groundwater extraction near surface water</b>	Lowered groundwater levels result in reduced discharge to gaining streams or increased leakage from losing streams	Decrease in surface water availability; impact to water entitlements and riparian GDEs
<b>Poor bore construction or decommissioning</b>	Inter-aquifer leakage or confined aquifer blowout	Groundwater pressure loss, contamination risk, or nuisance flooding
<b>Excessive groundwater drawdown in confined aquifers</b>	Depressurisation results in aquifer compaction	Permanent reduction in aquifer storage and transmissivity

# 3. RESULTS

## 3.1 GDE INTERSECTING WITH DRAWDOWN ZONES

An assessment of mapped aquatic and terrestrial groundwater-dependent ecosystems (GDEs) was conducted for bores WERC007, WERC015, and WERC006A, using national datasets (Figure 3-1). GDEs were evaluated against four groundwater drawdown zones (300 m, 500 m, 1,000 m, and 2,500 m), with each feature assigned only to its intersecting zone closest to the proposed bore, using its unique identifier (e.g. Figure 3-2). This method of interpretation emphasises GDE presence in the most potentially groundwater-sensitive areas closest to the bores. Using a spatially resolved approach supports improved risk assessments for ecological vulnerability under groundwater drawdown.

A total of 16 aquatic and 51 terrestrial GDE instances were identified across the three bore locations. No GDEs from regional studies were present in the area, highlighting the limited ecological data coverage for the region. Accordingly, the GDE classification in this report is derived solely from the national level assessment (BoM 2024). WERC006A (the southern bore) recorded the highest total number of adjacent GDEs (26 features), largely driven by terrestrial GDEs of low and moderate potential. WERC007 (northern bore) followed with 25 GDEs, including a higher proportion of aquatic ecosystems (n = 5). WERC015 (central bore) had the lowest representation, with 16 GDEs in total. These values reflect the filtered, zone-prioritised distribution of ecosystems and highlight local variability in GDE types and extent.

A summary of Aquatic and Terrestrial GDE counts per groundwater bore, following the precautionary approach, are presented from Table 3-1 to Table 3-6.

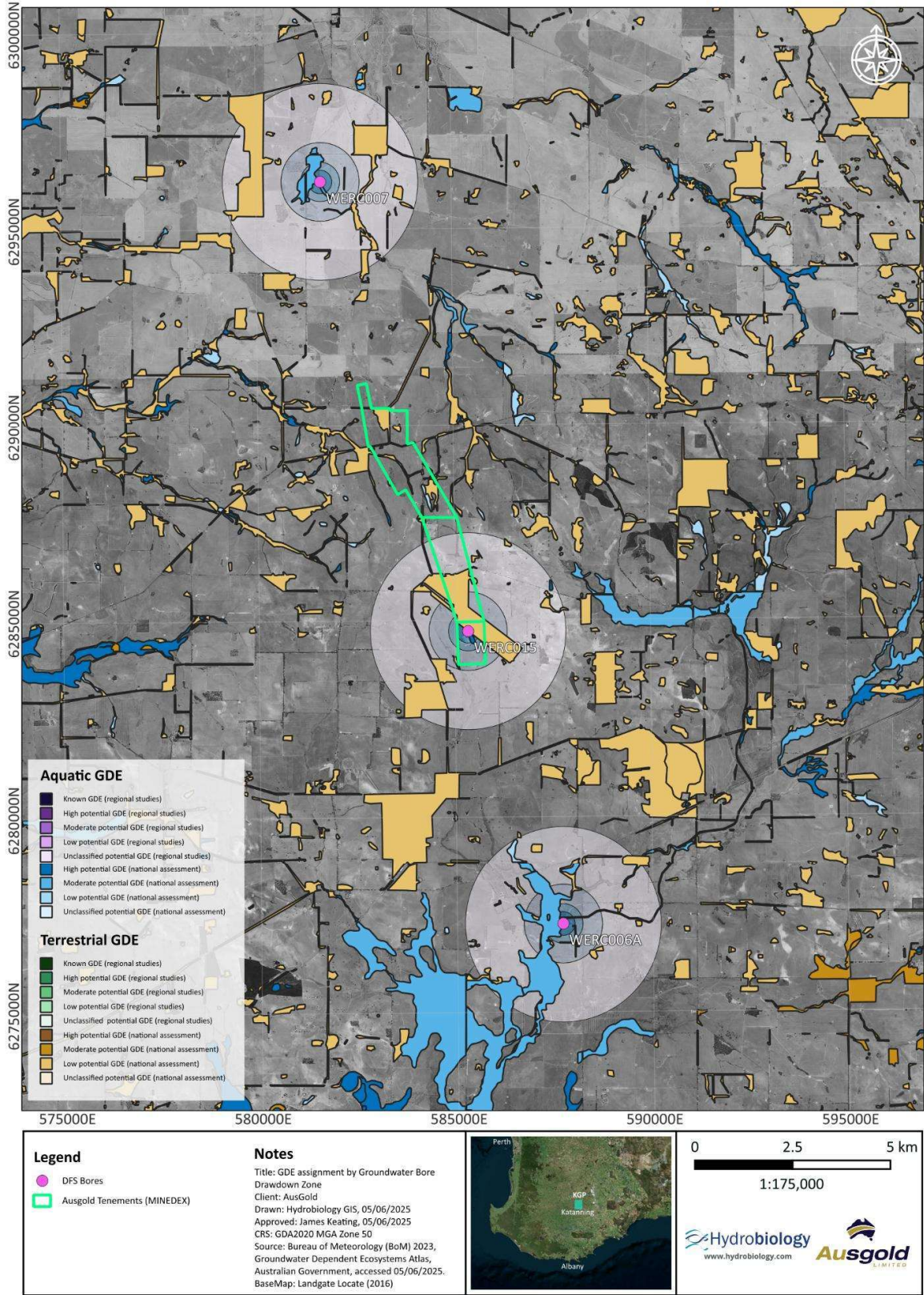


Figure 3-1 Potential GDE per groundwater bore and drawdown zone

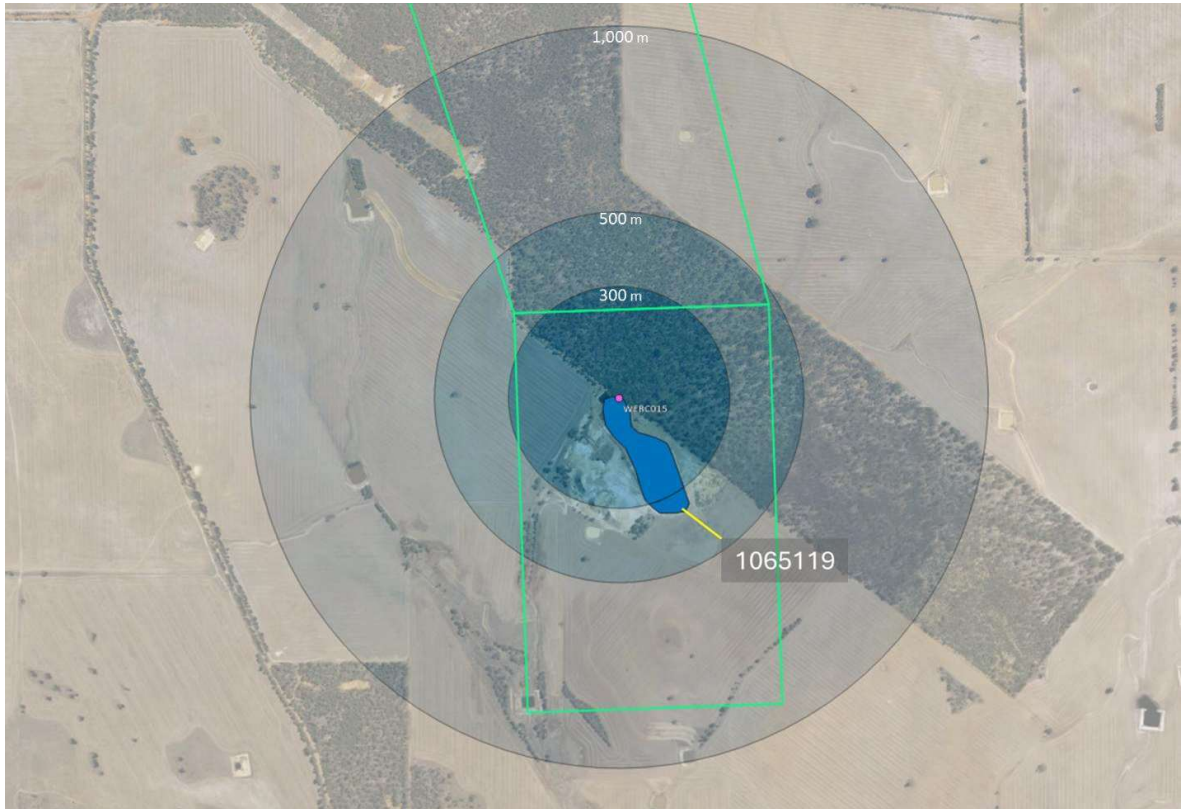


Figure 3-2 Precautionary Approach – Feature 1065119 occurs in both 300 and 500 m drawdown zones but will be assessed in the 300 m zone only.

Table 3-1 Aquatic GDE intersecting with drawdown zones for WER007

WERC007	AQUATIC GDE	Drawdown Zone			
Category	Source	300 m	500 m	1,000 m	2,500 m
High potential GDE	BoM 2024	0	0	1	1
Moderate potential GDE	BoM 2024	1	1	1	0
Low potential GDE	BoM 2024	0	0	0	0

Table 3-2 Aquatic GDE intersecting with drawdown zones for WER015

WERC015	AQUATIC GDE	Drawdown Zone			
Category	Source	300 m	500 m	1,000 m	2,500 m
High potential GDE	BoM 2024	1	0	0	2
Moderate potential GDE	BoM 2024	0	0	0	0
Low potential GDE	BoM 2024	0	0	0	0

Table 3-3 Aquatic GDE intersecting with drawdown zones for WER006A

WERC006A	AQUATIC GDE	Drawdown Zone			
Category	Source	300 m	500 m	1,000 m	2,500 m
High potential GDE	BoM 2024	1	0	1	0
Moderate potential GDE	BoM 2024	1	1	0	3
Low potential GDE	BoM 2024	0	0	0	1

Table 3-4 Terrestrial GDE intersecting with drawdown zones for WER007

WERC007	TERRESTRIAL GDE	Drawdown Zone			
Category	Source	300 m	500 m	1,000 m	2,500 m
High potential GDE	BoM 2024	0	0	0	0
Moderate potential GDE	BoM 2024	0	0	0	0
Low potential GDE	BoM 2024	0	0	2	18

Table 3-5 Terrestrial GDE intersecting with drawdown zones for WER015

WERC015	TERRESTRIAL GDE	Drawdown Zone			
Category	Source	300 m	500 m	1,000 m	2,500 m
High potential GDE	BoM 2024	0	0	0	0
Moderate potential GDE	BoM 2024	0	0	0	0
Low potential GDE	BoM 2024	1	0	1	11

Table 3-6 Terrestrial GDE intersecting with drawdown zones for WER006A

WERC006A	TERRESTRIAL GDE	Drawdown Zone			
Category	Source	300 m	500 m	1,000 m	2,500 m
High potential GDE	BoM 2024	0	0	0	0
Moderate potential GDE	BoM 2024	0	0	0	0
Low potential GDE	BoM 2024	1	0	4	13

Table 3-7 provides the spatial area in hectares of each potential GDE type within each drawdown zone for each of the three bores assessed. There is a combined area of 1015 Ha of potential GDEs within 2.5 km of all three bores. Of this, only 5% or 54.6 Ha is High Potential GDE, illustrating that most of the area is only marginally suitable for supporting GDEs. A further 29.6% (300.5 Ha) is moderately likely to be GDE and the remaining 65% or 660.6 Ha is low potential GDE.

Table 3-7 Area of potential GDEs within each drawdown zone by GDE type

Bore	Zone	Low Potential Terrestrial (Ha)	Moderate Potential Terrestrial (Ha)	High Potential Terrestrial (Ha)	Low Potential Aquatic (Ha)	Moderate Potential Aquatic (Ha)	High Potential Aquatic (Ha)	Total GDE (Ha)
<b>WERC006A</b>	<b>Total</b>	<b>58.6</b>	<b>0.0</b>	<b>0.0</b>	<b>8.6</b>	<b>256.7</b>	<b>21.2</b>	<b>345.1</b>
	300 m	0.1	0.0	0.0	0.0	9.1	14.9	24.1
	500 m	1.4	0.0	0.0	0.0	18.4	1.6	21.5
	1000 m	6.4	0.0	0.0	0.0	54.9	1.2	62.6
	2500 m	50.6	0.0	0.0	8.6	174.3	3.4	236.9
<b>WERC007</b>	<b>Total</b>	<b>285.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>43.8</b>	<b>28.0</b>	<b>356.8</b>
	300 m	0.0	0.0	0.0	0.0	8.6	0.0	8.6
	500 m	0.0	0.0	0.0	0.0	16.2	0.0	16.2
	1000 m	2.8	0.0	0.0	0.0	19.0	0.1	21.9
	2500 m	282.2	0.0	0.0	0.0	0.0	27.9	310.1
<b>WERC015</b>	<b>Total</b>	<b>308.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>5.4</b>	<b>313.9</b>
	300 m	14.0	0.0	0.0	0.0	0.0	2.7	16.6
	500 m	23.8	0.0	0.0	0.0	0.0	0.4	24.2
	1000 m	56.8	0.0	0.0	0.0	0.0	0.0	56.8
	2500 m	214.0	0.0	0.0	0.0	0.0	2.3	216.3
	<b>Grand Total</b>	<b>652.1</b>	<b>0.0</b>	<b>0.0</b>	<b>8.6</b>	<b>300.5</b>	<b>54.6</b>	<b>1015.7</b>

## 3.2 TERRESTRIAL GDE

Median NDVI values per month, per GDE were extracted and plotted (Figure 3-3). A substantial decrease in NDVI was observed when comparing the 2020-2021 period with the 2022-2024 period. This aligned with the Aridity Index for the same period of time (Figure 3-4). A Mann-Whitney U test was used to assess differences in median NDVI between the wetter period (2020-2021) and the drier period (2022-2024). The analysis revealed a statistically significant reduction in NDVI during 2022-2024 ( $U = 1,849,398$ ,  $p < 0.001$ ), indicating a marked decline in vegetation vigour with increased aridity and water stress.

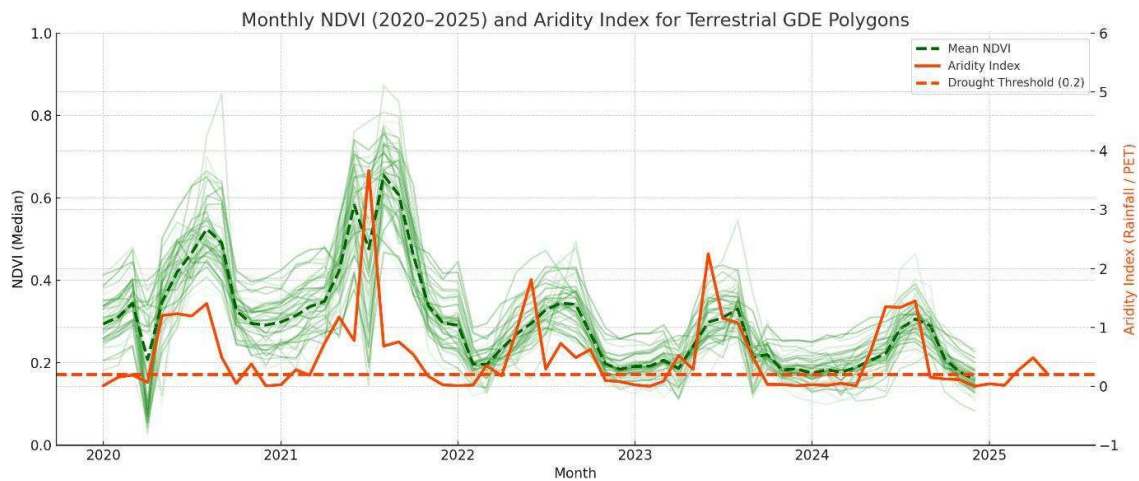


Figure 3-3 Median NDVI per month (2020-2025) for all Potentially Terrestrial GDE polygons ( $n = 51$ ). Aridity Index overlaid for reference.

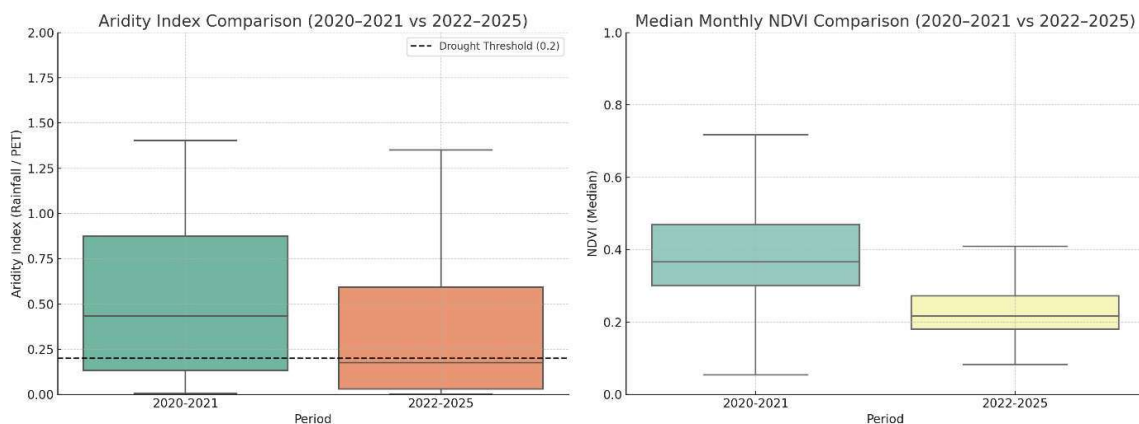


Figure 3-4 boxplots showing distribution of data for the Aridity Index (left) and Potentially Terrestrial GDE NDVI (right)

### 3.3 AQUATIC GDE

Aquatic GDE presented a similar relationship to aridity as for the Terrestrial GDE, when comparing the 2020-2021 period with 2022-2024 (Figure 3-5 and Figure 3-6). A Mann-Whitney U test was used to assess differences in median NDVI for aquatic GDEs between the wetter period (2020-2021) and the drier period (2022-2024). The analysis revealed a statistically significant reduction in NDVI during 2022-2024 ( $U = 146,864$ ,  $p < 0.001$ ), indicating a marked decline in vegetation vigour consistent with increased aridity during that period.

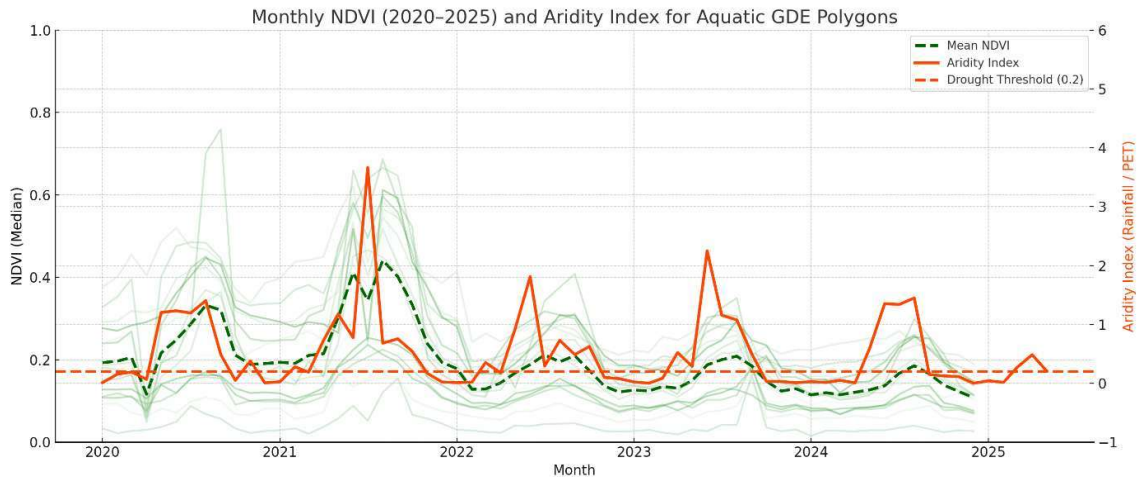


Figure 3-5 Median NDVI per month (2020-2025) for all Potentially Aquatic GDE polygons ( $n = 16$ ). Aridity Index overlaid for reference.

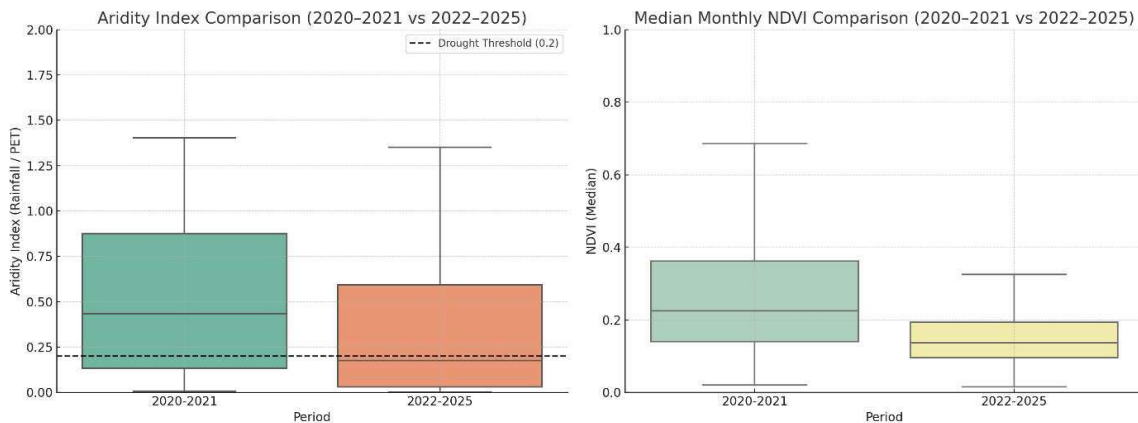


Figure 3-6 Boxplots showing distribution of data for the Aridity Index (left) and Potentially Aquatic GDE NDVI (right)

### 3.3.1 HIGH POTENTIAL AQUATIC GDE

Seven High Potential Aquatic GDE were indicated by the BoM GDE Atlas; two at WERC007, three at WERC015 and two at WERC006A. Of these, only 2 were identified within 500 m of the bore locations. These are investigated in further detail below (Table 3-8).

Table 3-8 High Potential Aquatic GDE

ObjectID	Details	Image
<b>WERC007</b> 1063141 1037915	Both features form a creek line through heavily developed paddocks. To the North is a sparse patch of vegetation which has been used for agriculture (dams visible within the boundary).	
<b>WERC015</b> 789796 824383 1065119	1065119 has been incorrectly attributed to the historical pit lake.  The other two features are small outcrops of vegetation within paddocks. Both have been classified by botanists as Degraded (Botanica, 2024)	
<b>WERC006A</b> 750957 924598	Both features appear to follow a creek line according to the BoM GDE Atlas. Aerial imagery indicates substantial modification and agricultural / industrial land use. The creek line does not match modern aerial imagery suggesting an error due to the low resolution of the National Assessment.	

Figure 3-7 to Figure 3-9 provides the NDVI variability over the previous 5 years within the 500m zone from the respective bores for the High Potential GDE (Aquatic) category. This data shows that the central bore (WERC015) is less responsive to seasonal conditions, though this is likely due to the pit lake rather than GDE presence. The subdued signal at the northern bore indicates a low vegetation cover rather than lack of seasonal response. The southern bore shows the highest seasonal response, indicating that vegetation is accessing seasonal surface layer soil moisture rather than deep groundwater.

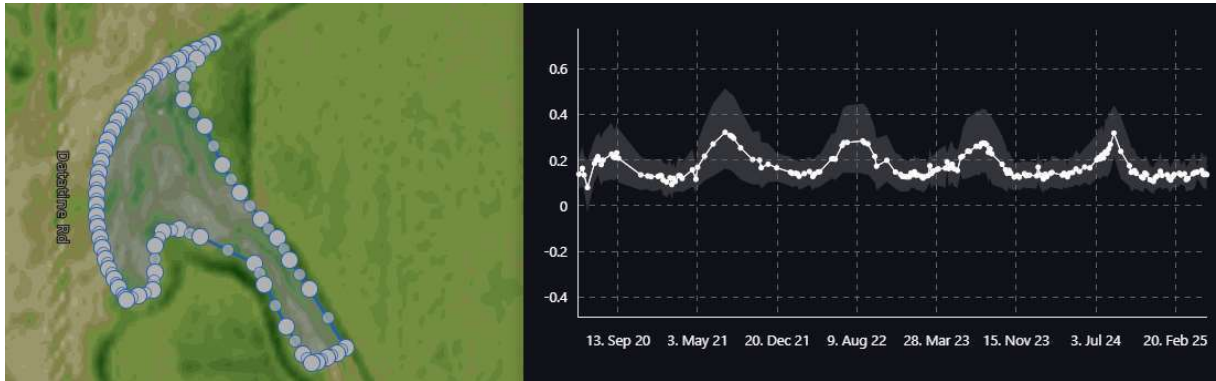


Figure 3-7 WERC007 High Potential GDE within 500m of the bore location – NDVI timeseries previous 5 years.

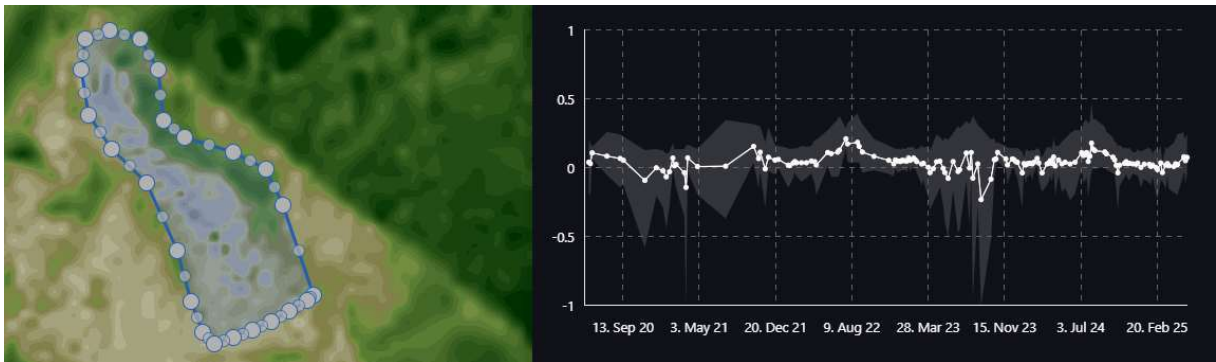


Figure 3-8 WERC015 High Potential GDE within 500m of the bore location – NDVI timeseries previous 5 years.

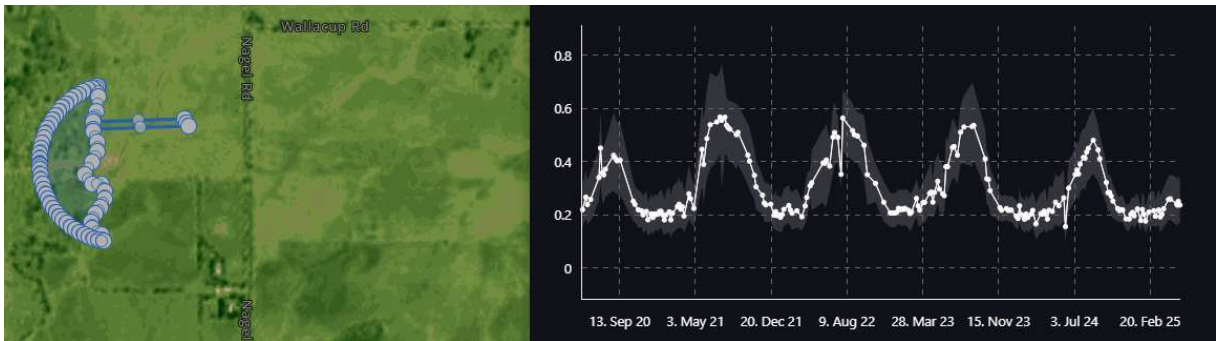


Figure 3-9 WERC006A High Potential GDE within 500m of the bore location – NDVI timeseries previous 5 years.

### 3.4 GDE RISK ASSESSMENT

A risk assessment, based on the findings of our analysis is presented in Table 3-9.

Table 3-9 GDE Risk Assessment

Potential impact	Initial Assessment Ratings			Revised Assessment			
	Severity	Likelihood	Risk	Mitigations	Severity	Likelihood	Risk
<b>Climate change is expected to reduce groundwater recharge, leading to lower water availability and long-term declines in GDE resilience and stream baseflows.</b>	Moderate	Possible	<b>M</b>	KGP groundwater drawdown limited to lifetime of the mine (10 years) A clay-rich soil layer potentially prevents roots from accessing deeper aquifers tapped by mining (DeSilva et al. 2000). Instead, vegetation may rely on shallow soil moisture from rainfall, making it unlikely to be impacted by groundwater abstraction unless drawdown is extreme or sustained (Zencich et al., 2002; O'Grady et al., 2006).	Moderate	Unlikely	<b>M</b>
<b>Groundwater extraction near surface water can lower water tables, reducing discharge to gaining streams or increasing losses from losing streams, ultimately decreasing surface water availability to riparian GDE</b>	Moderate	Likely	<b>M</b>	A clay-rich soil layer potentially prevents roots from accessing deeper aquifers tapped by mining (DeSilva et al. 2000). Instead, vegetation may rely on shallow soil moisture from rainfall, making it unlikely to be impacted by groundwater abstraction unless drawdown is extreme or sustained (Zencich et al., 2002; O'Grady et al., 2006).	Minor	Unlikely	<b>L</b>
<b>Poor bore construction or decommissioning can cause aquifer leakage or blowouts, leading to pressure loss, contamination, or flooding.</b>	Major	Unlikely	<b>M</b>	Bore construction to meet rigorous engineering standards. Non-artesian bores.	Major	Rarely	<b>L</b>
<b>Excessive drawdown in confined aquifers can cause depressurisation and compaction, leading to permanent loss of storage and transmissivity.</b>	Major	Unlikely	<b>M</b>	A clay-rich soil layer potentially prevents roots from accessing deeper aquifers tapped by mining (DeSilva et al. 2000). Instead, vegetation may rely on shallow soil moisture from rainfall, making it unlikely to be impacted by groundwater abstraction unless drawdown is extreme or sustained (Zencich et al., 2002; O'Grady et al., 2006).	Moderate	Unlikely	<b>M</b>

# 4. CONCLUSIONS

This desktop assessment integrated national-scale GDE mapping, groundwater drawdown zone proximity, and time-series NDVI analysis to identify and evaluate potential groundwater-dependent ecosystems near key bore locations. A total of 67 GDE features were mapped, with WERC006A recording the highest number, primarily composed of low to moderate potential terrestrial GDE. GDE were not identified from Regional Studies. While seven high-potential aquatic GDE were flagged in the region, only two were located within 500 m of the proposed bores. No high-potential terrestrial GDE were identified.

There is a combined area of 1015 Ha of potential GDEs within 2.5 km of all three bores. Of this, 5% is High Potential GDE, 30% Moderate Potential GDE and the remaining 65% is Low Potential GDE.

Vegetation health indices showed a statistically significant decline between 2020–2021 when compared with 2022–2024, corresponding with increased aridity, indicating potential ecological stress. Both terrestrial and aquatic GDEs exhibited similar NDVI-aridity relationships, reinforcing the sensitivity of these systems to reduced water availability. This may indicate that these vegetation units are not true GDEs, but instead display a more phreatophytic life cycle. Overall, we assigned a moderate-low risk from hypothesised impact pathways related to capital groundwater abstraction for the operation of KGP.

Analysis of seasonal NDVI signals within 500m of each bore indicated that the High Potential GDE areas are likely to be accessing seasonal surface zone moisture rather than less variable deep groundwater zones.

Our findings support a precautionary approach to managing potential groundwater impacts and highlight the value of integrated spatial and temporal assessments in ecological risk evaluations.

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# APPENDIX A. ARIDITY INDEX

Table 5-1 Monthly Potential Evapotranspiration (PET), Rainfall (mm) and Aridity Index

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2010	1	207.7	1.2	0.01
2010	2	168.7	30	0.18
2010	3	129.4	41.2	0.32
2010	4	87.3	4.8	0.05
2010	5	59.8	28.6	0.48
2010	6	39.7	39.4	0.99
2010	7	41	N/A	N/A
2010	8	55.6	N/A	N/A
2010	9	85.4	N/A	N/A
2010	10	141.1	7.6	0.05
2010	11	169.7	23	0.14
2010	12	172	7	0.04
2011	1	196.1	98	0.50
2011	2	141.5	1.8	0.01
2011	3	146.9	4.6	0.03
2011	4	95.9	27.2	0.28
2011	5	57.2	46.8	0.82
2011	6	39.8	71.8	1.80
2011	7	37.2	61.4	1.65
2011	8	56.7	58.8	1.04
2011	9	72.7	62	0.85
2011	10	111.2	76.8	0.69

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2011	11	150.4	76.4	0.51
2011	12	171.8	82.8	0.48
2012	1	191.5	67	0.35
2012	2	151.5	14.4	0.10
2012	3	147.6	3.6	0.02
2012	4	93.6	13.4	0.14
2012	5	59.4	39.4	0.66
2012	6	39.9	83.2	2.09
2012	7	45.2	22.8	0.50
2012	8	57.8	48.2	0.83
2012	9	82.8	71.6	0.86
2012	10	136.9	10.8	0.08
2012	11	155.4	28.4	0.18
2012	12	200.9	78.2	0.39
2013	1	201.6	35.4	0.18
2013	2	173.3	2.2	0.01
2013	3	108.6	66.4	0.61
2013	4	89.7	8.4	0.09
2013	5	49.8	71.2	1.43
2013	6	38.3	19.4	0.51
2013	7	41.2	49.2	1.19
2013	8	51.5	N/A	N/A
2013	9	73.7	123.6	1.68

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2013	10	126.5	30.2	0.24
2013	11	165.7	3.2	0.02
2013	12	199.5	2	0.01
2014	1	212.9	0.4	0.00
2014	2	164.5	0	0.00
2014	3	143.6	1.8	0.01
2014	4	94.5	18.8	0.20
2014	5	46.2	91.8	1.99
2014	6	41.7	35.2	0.84
2014	7	39.3	81.6	2.08
2014	8	58.1	72.2	1.24
2014	9	80.9	58.4	0.72
2014	10	127.9	52.4	0.41
2014	11	158.5	20.2	0.13
2014	12	190.3	6.6	0.03
2015	1	207.9	1	0.00
2015	2	162.1	1.8	0.01
2015	3	129	19.6	0.15
2015	4	82.1	N/A	N/A
2015	5	54.8	31.2	0.57
2015	6	40.8	70.4	1.73
2015	7	41.8	36.8	0.88
2015	8	52.5	56.2	1.07

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2015	9	90.3	25.4	0.28
2015	10	145.5	17.6	0.12
2015	11	168.3	13	0.08
2015	12	194.8	34.2	0.18
2016	1	171.1	N/A	N/A
2016	2	172.1	1.2	0.01
2016	3	120.9	86.4	0.71
2016	4	69.1	36.6	0.53
2016	5	47.9	56.4	1.18
2016	6	34.8	35.4	1.02
2016	7	38.8	39	1.01
2016	8	48.5	55.8	1.15
2016	9	68.1	33	0.48
2016	10	114.2	29.4	0.26
2016	11	161.7	8.2	0.05
2016	12	181	55.4	0.31
2017	1	202.5	0.2	0.00
2017	2	131	172.8	1.32
2017	3	120.2	39	0.32
2017	4	84.9	22.2	0.26
2017	5	58.1	32	0.55
2017	6	48.3	10.4	0.22
2017	7	37.7	73.4	1.95

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2017	8	53.8	48.2	0.90
2017	9	77.9	57.8	0.74
2017	10	117.9	30.8	0.26
2017	11	158.3	N/A	N/A
2017	12	185.5	N/A	N/A
2018	1	182.4	N/A	N/A
2018	2	144.6	N/A	N/A
2018	3	135.2	N/A	N/A
2018	4	86.4	N/A	N/A
2018	5	67.4	N/A	N/A
2018	6	37.8	59.2	1.57
2018	7	43.1	62	1.44
2018	8	51.3	68.2	1.33
2018	9	79.5	12	0.15
2018	10	111.8	30	0.27
2018	11	142.2	18.6	0.13
2018	12	193.2	8.2	0.04
2019	1	198.4	1	0.01
2019	2	163.5	0	0.00
2019	3	124.2	43.2	0.35
2019	4	89.2	15.2	0.17
2019	5	59.5	17.8	0.30
2019	6	44	83.2	1.89

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2019	7	43	50.4	1.17
2019	8	59.7	59	0.99
2019	9	91.9	19.8	0.22
2019	10	127.3	25.6	0.20
2019	11	168.4	9	0.05
2019	12	217.3	6.8	0.03
2020	1	191.8	2	0.01
2020	2	149.7	23.2	0.15
2020	3	130.2	24.8	0.19
2020	4	91.8	6	0.07
2020	5	61.4	73.8	1.20
2020	6	47.9	59	1.23
2020	7	45.1	53.8	1.19
2020	8	57	80	1.40
2020	9	83.9	41	0.49
2020	10	131.2	6.2	0.05
2020	11	140.7	53.2	0.38
2020	12	194.6	1.2	0.01
2021	1	192.8	4.8	0.02
2021	2	143.2	40	0.28
2021	3	128.1	24	0.19
2021	4	85.5	62.4	0.73
2021	5	52.1	61.2	1.17

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2021	6	34.6	26.8	0.77
2021	7	37	135.6	3.66
2021	8	53.5	36.4	0.68
2021	9	76.6	57.8	0.75
2021	10	103	55.6	0.54
2021	11	141.6	23.8	0.17
2021	12	188.9	4.2	0.02
2022	1	196.2	2	0.01
2022	2	167.8	3.2	0.02
2022	3	117.7	41.4	0.35
2022	4	77.6	13.6	0.18
2022	5	55	50.8	0.92
2022	6	34.8	63	1.81
2022	7	41.1	12	0.29
2022	8	52.2	38	0.73
2022	9	78.1	38	0.49
2022	10	102.8	64.2	0.62
2022	11	133.6	13.2	0.10
2022	12	180.2	14	0.08
2023	1	193.5	4.4	0.02
2023	2	158	0	0.00
2023	3	131.7	11.2	0.09
2023	4	73.3	38.2	0.52

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2023	5	59.4	17	0.29
2023	6	33.7	75.8	2.25
2023	7	42.4	49	1.16
2023	8	55.6	59.8	1.08
2023	9	86.7	43.2	0.50
2023	10	138.3	4.4	0.03
2023	11	155.9	4.6	0.03
2023	12	182.8	1.6	0.01
2024	1	192.4	5	0.03
2024	2	175.5	2.4	0.01
2024	3	129.2	6.4	0.05
2024	4	93.4	0.6	0.01
2024	5	66.8	39.6	0.59
2024	6	39.5	53.4	1.35
2024	7	43.2	57.8	1.34
2024	8	55.8	80.8	1.45
2024	9	83.2	12.4	0.15
2024	10	133.8	16.6	0.12
2024	11	146.7	16.4	0.11
2024	12	192.7	0	0.00
2025	1	205.5	8.4	0.04
2025	2	156.7	2.4	0.02
2025	3	148.1	39.8	0.27

year	Month	PET (mm)	Rainfall (mm)	Aridity Index
2025	4	81.8	39.6	0.48
2025	5	63.4	13.2	0.21
2025	6	9.6	N/A	N/A

# APPENDIX B. GDE ATLAS

Table 5-2 BoM GDE Atlas – Aquatic GDE

Bore	Zone	OBJECTID	Name	Ecosystem	Ecohydrological zone	Geomorphological classification	Landscape	Rainfall	GDE Potential
<b>WERC007</b>	1000 m	760522	BLACKWOOD_AB0031B_B3_B2_A2B	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
<b>WERC007</b>	1000 m	1013666	BLACKWOOD_AB0031B_B3_B2_A1	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
<b>WERC007</b>	1000 m	1037915	BLACKWOOD_AB0031B_B3_B4	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
<b>WERC007</b>	1000 m	1078123	BLACKWOOD_AB0031B_B3_B2_A2A	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
<b>WERC006A</b>	1000 m	750957		River	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
<b>WERC006A</b>	1000 m	924598		River	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
<b>WERC006A</b>	1000 m	1063857	BLACKWOOD_AB0031_A9A_B2	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
<b>WERC007</b>	2500 m	1037915	BLACKWOOD_AB0031B_B3_B4	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
<b>WERC007</b>	2500 m	1063141	BLACKWOOD_AB0031B_B3_B3	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
<b>WERC015</b>	2500 m	789796		Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Plateau	Wet winter and low summer rainfall	High potential GDE - from national assessment

Bore	Zone	OBJECTID	Name	Ecosystem	Ecological zone	Geomorphological classification	Landscape	Rainfall	GDE Potential
WERC015	2500 m	824383		Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
WERC06A	2500 m	750957		River	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
WERC06A	2500 m	799928	BLACKWOOD_AB0031_A9A_B2_A1B	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
WERC06A	2500 m	924598		River	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
WERC06A	2500 m	1000462	BLACKWOOD_AB0031_A9A_B3	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
WERC06A	2500 m	1003717	BLACKWOOD_AB0031_A9A_B1	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
WERC06A	2500 m	1038381	BLACKWOOD_AB0031_A9A_B2_A1A	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
WERC06A	2500 m	1063857	BLACKWOOD_AB0031_A9A_B2	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
WERC07	300 m	1078123	BLACKWOOD_AB0031B_B3_B2_A2A	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
WERC015	300 m	1065119		Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	High potential GDE - from national assessment
WERC06A	300 m	924598		River	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment

Bore	Zone	OBJECTID	Name	Ecosystem	Ecological zone	Geomorphological classification	Landscape	Rainfall	GDE Potential
<b>WERC0 06A</b>	300 m	1063857	BLACKWOOD_AB0031_ A9A_B2	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
<b>WERC0 07</b>	500 m	760522	BLACKWOOD_AB0031B _B3_B2_A2B	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
<b>WERC0 07</b>	500 m	1078123	BLACKWOOD_AB0031B _B3_B2_A2A	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
<b>WERC0 15</b>	500 m	1065119		Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	High potential GDE - from national assessment
<b>WERC0 06A</b>	500 m	924598		River	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	High potential GDE - from national assessment
<b>WERC0 06A</b>	500 m	1044627		Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment
<b>WERC0 06A</b>	500 m	1063857	BLACKWOOD_AB0031_ A9A_B2	Wetland	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Moderate potential GDE - from national assessment

Table 5-3 BoM GDE Atlas – Terrestrial GDE

BoRE	Zone	OBJECT ID	Ecosystem	Ecological zone	Geomorphological classification	Landscap e	Rainfall	GDE Potential
<b>WERC007</b>	1000 m	2006459	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	1000 m	2078234	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC015</b>	1000 m	2104069	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC015</b>	1000 m	3112836	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC06A</b>	1000 m	2110910	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC06A</b>	1000 m	2605006	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC06A</b>	1000 m	2605389	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC06A</b>	1000 m	2605601	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC06A</b>	1000 m	2632392	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2006459	Vegetati on	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment

Bore	Zone	OBJECT ID	Ecosystem	Ecohydrological zone	Geomorphological classification	Landscape	Rainfall	GDE Potential
<b>WERC007</b>	2500 m	2006683	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2031928	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2034135	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2056682	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2085520	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2600891	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2600927	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2601369	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2601485	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2601578	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC007</b>	2500 m	2601696	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment

Bore	Zone	OBJECT ID	Ecosystem	Ecohydrological zone	Geomorphological classification	Landscape	Rainfall	GDE Potential
<b>WERC07</b>	2500 m	2601805	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC07</b>	2500 m	2614794	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC07</b>	2500 m	3072193	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC07</b>	2500 m	3090647	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC07</b>	2500 m	3110790	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC07</b>	2500 m	3618317	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC07</b>	2500 m	3628360	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC05</b>	2500 m	2081225	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC05</b>	2500 m	2104069	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC05</b>	2500 m	26033169	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC05</b>	2500 m	2603371	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment

Bore	Zone	OBJECT ID	Ecosystem	Ecohydrological zone	Geomorphological classification	Landsc	Rainfall	GDE Potential
<b>WERC01 5</b>	2500 m	2603422	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC01 5</b>	2500 m	2604021	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC01 5</b>	2500 m	3086014	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC01 5</b>	2500 m	3088451	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC01 5</b>	2500 m	3111017	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC01 5</b>	2500 m	3112170	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC01 5</b>	2500 m	3112836	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC01 5</b>	2500 m	3122125	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC01 5</b>	2500 m	3624906	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2098828	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2103146	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment

Bore	Zone	OBJECT ID	Ecosystem	Ecohydrological zone	Geomorphological classification	Landscape	Rainfall	GDE Potential
<b>WERC00 6A</b>	2500 m	2604676	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2604868	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2604996	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2605006	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2605151	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2605184	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2605188	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2605585	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2605601	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	2622437	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC00 6A</b>	2500 m	3063321	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment

Bore	Zone	OBJECT ID	Ecosystem	Ecohydrological zone	Geomorphological classification	Landscape	Rainfall	GDE Potential
<b>WERC006A</b>	2500 m	3068570	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC006A</b>	2500 m	3611392	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC015</b>	300 m	3112836	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC006A</b>	300 m	2632392	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC015</b>	500 m	3112836	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Slope	Wet winter and low summer rainfall	Low potential GDE - from national assessment
<b>WERC006A</b>	500 m	2632392	Vegetation	Avon Wheatbelt P2	Gently undulating surface of sandplains and ferruginous divides; stripped granitic slopes; and broad valley floors with salt lake chains.	Low Lying	Wet winter and low summer rainfall	Low potential GDE - from national assessment



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Appendix 2: Groundwater Modelling Summary, Katanning Gold Project.  
(Rockwater, 2025a)

# Memo

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PROJECT: **DEWATERING MODEL SUMMARY, KATANNING GOLD PROJECT**

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FROM: Miranda Taylor TO: Troy Collie

DATE: April 2025 COMPANY: Ausgold

JOB No.: 72-262 REFERENCE: 25-02

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## 1 INTRODUCTION

Ausgold Limited (Ausgold) commissioned SRK Consulting to undertake hydrogeological field investigations, aquifer testing, and associated assessments, including the development of a numerical groundwater flow model for the Katanning Gold Project (KGP). To ensure the robustness of the hydrogeological assessment and model outcomes, Rockwater was subsequently engaged to conduct an independent technical review of SRK's hydrogeological report and numerical groundwater model.

Preliminary findings from Rockwater's review suggest that the dewatering volumes predicted by the SRK model are likely to have been overestimated. A key contributing factor appears to be the structural configuration and parameterisation of faults within the model domain. These structural elements have a significant influence on groundwater flow dynamics and, consequently, the estimated dewatering requirements.

In response to these findings, and following consultation with Ausgold, Rockwater was further engaged to evaluate the influence of the existing model's structural framework on predicted dewatering volumes. While this initial scope of work commenced as a sensitivity assessment of SRK's model structure, it subsequently evolved into the development of a simple but robust numerical groundwater model aimed at producing more realistic dewatering predictions.

This memorandum outlines the modelling approach, key assumptions, results of the revised simulations, and recommendations for future hydrogeological assessments.

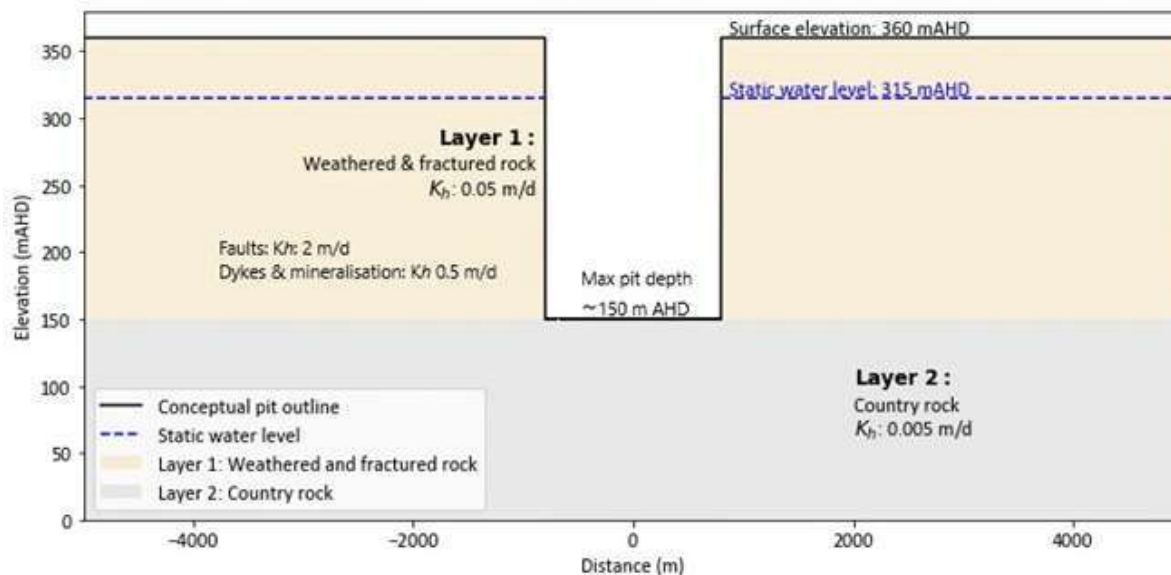
## 2 MODEL SET-UP

A groundwater model was set up with the following settings and assumptions:

**Type and domain:** The model is a two-layer, confined groundwater model which was set up in Processing Modflow 11, covering an area 30 km E-W by 40 km N-S, centred over the mine area.

**Cell size:** Model cell size was set at 100 m by 100 m.

**Layer description:** Layer 1 includes weathered/somewhat fractured country rock as well as faults and dykes as per KGP mapping. Layer 2 is the non-fractured/weathered county rock which was set from 150 m AHD to the base of the model at 0 m AHD. Below 150 m AHD faults are assumed to have low permeability. A conceptual model diagram is provided as Chart 1.



**Chart 1: Conceptual Model Diagram**

**Boundaries:** Constant heads were set at the topographic high points to the east, and at the river system to the west. No-flow boundaries were set to the north and south and these were at a sufficient distance to not impact the results.

**Recharge:** Recharge was set at 5% of the annual average rainfall recorded at Badgerup (BoM Station 15008) of 390 mm except over topographic highs in the mine areas where 20% was assigned.

**Calibration:** The model was calibrated in steady-state with the test pumping and slug test parameters from SRK’s 2025 report used as an initial guide. These were adapted (within reasonable limits) to achieve calibration to groundwater levels in the vicinity of the mine area. Noting that groundwater levels are variable in the vicinity of the mine, with the groundwater level between BSMB02 in the south, BSMB03 in the mid-mine area and BSMB06 in the north all being about 315 m AHD. This was matched in the calibrated model to a SRMS of 4%. In other holes the groundwater level is higher (up to 359 m AHD in BSRC1422) which may be associated with perched groundwater in the weathered zone which can’t be replicated in a simple two-layer model.

**Parameters:** Model parameters are set out in Table 1.

**Table 1: Model Parameters**

Unit	Model Layer	Horizontal Hydraulic Conductivity m/d	Specific Storage
Weathered/Slightly Fractured Country Rock	1	0.05	5.0E-05
Faults		2	1.0E-04
Dykes/Mineralised Zone		0.5	5.0E-04
Fresh Country Rock	2	0.005	1.0E-05

### 3 MODEL RESULTS

The calibrated model was run in transient mode over a duration of ten years, with quarterly time steps. Drain cells set at the base of the active mining level (as per Ausgold’s mining schedule dated 12 March 2025) to simulate dewatering. Predictive uncertainty analysis was undertaken where it was found that the hydraulic conductivity (K) had the largest control on predicted dewatering rates. The results for the base case (calibrated parameters) and those for hydraulic conductivity multiplied by 2 and 0.5 are presented in Chart 2 and summarised for each pit area in Table 2.

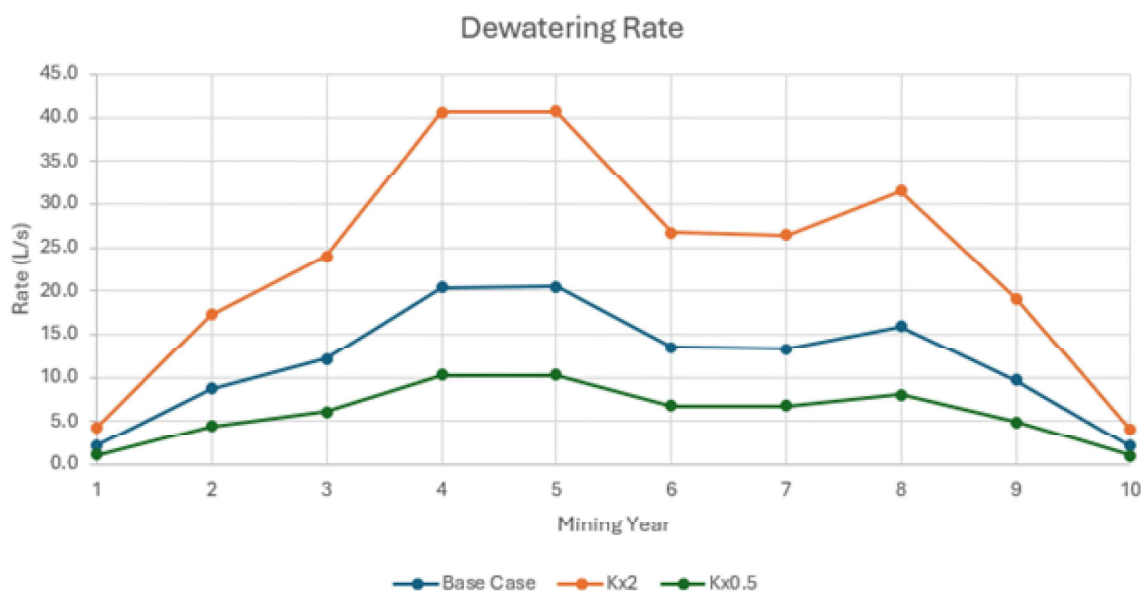
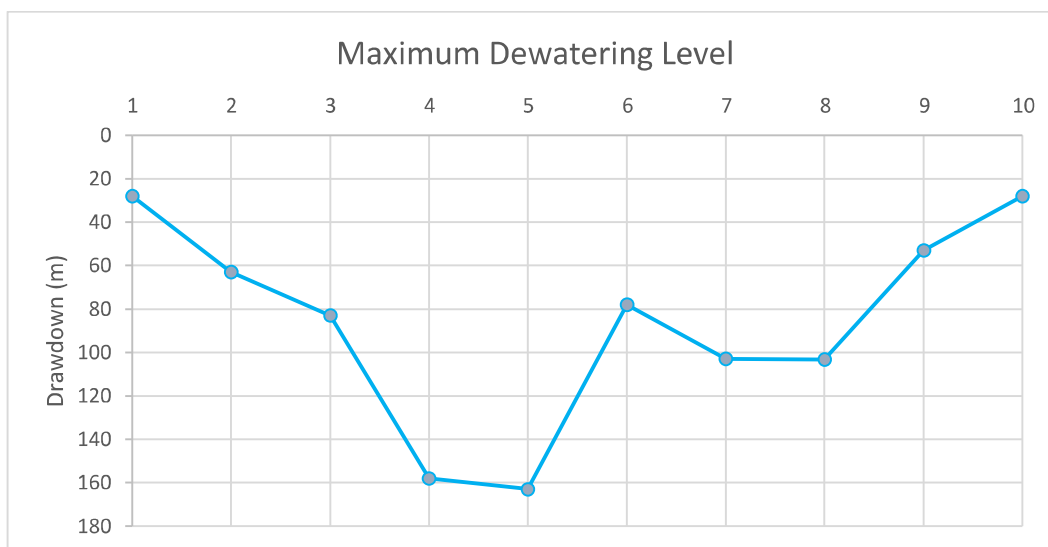


Chart 2: Model Predicted Dewatering Rates

Table 2: Predicted Dewatering Rates for each Pit Area

Mining Year	Year	Jackson kL/d	Jinkas kL/d	Dingo kL/d	Olympia kL/d
1	2026	0	188	0	0
2	2027	0	750	0	0
3	2028	0	1,043	0	0
4	2029	0	1,761	0	0
5	2030	666	1,105	0	0
6	2031	990	177	0	0
7	2032	0	1,149	0	0
8	2033	542	0	827	0
9	2034	585	0	248	0
10	2035	0	175	0	0

The dewatering rates are directly related to the modelled depth of mining, and so the largest dewatering flows are predicted to occur during the 4<sup>th</sup> and 5<sup>th</sup> years of mining when the Jinkas pits reach their deepest level (Chart 3). It should be noted however, that the flow rates presented are calculated annual average values and short-term flows higher than this may be experienced. Also based on the dewatering schedule set in the model the Olympia pits are not predicted to require dewatering. Minor flows maybe encountered if perched groundwater occurs in the weathered zone or if the dewatering schedule is changed (i.e. if the nearby Jinkas pits are not as heavily dewatered prior to mining at Olympia).



**Chart 3: Maximum Drawdown with Time**

## 4 CONCLUSIONS AND RECOMMENDATION

A simple two-layer numerical groundwater model was developed to provide estimates of dewatering requirements for the KGP. Model outputs indicate an average dewatering rate of approximately 373,000 kL/year (equivalent to ~12 L/s) over the projected ten-year mine life. Peak dewatering demand is anticipated to reach approximately 20 L/s during Years 4 and 5, coinciding with the deepest stages of pit development in the Jinkas deposit. Short-term flows higher than this may be experienced.

The model is underpinned by a limited dataset of hydraulic parameters, particularly within the immediate vicinity of the mine. The SRK (2025) report includes hydraulic test data comprising five slug tests and three short-duration pumping tests, which form the basis for aquifer parameterisation. To improve confidence in model outputs and to better characterise the hydraulic properties of the mine area, it is recommended that test production bores be installed in the central sections of the proposed Jinkas 3, Jinkas 4, and Jackson 1 pits.

The total water demand for the KGP is projected to be in the order of 3 GL/year, indicating that supplementary water sources will probably be required in addition to dewatering returns. It is therefore recommended that extended-duration, higher-capacity pumping tests be undertaken on existing production bores WERC06A, WERC07, and WERC15 (these were previously only tested at 5, 7 and 3 L/s, respectively, with minimal drawdown especially for the former two). These tests will assist in determining the sustainable yields of the bores and delineating aquifer boundaries. To facilitate testing without interruption from time-based discharge limitations, the use of old mine pits as discharge locations should be considered.

Upon completion of the above investigations and data acquisition, a more robust numerical groundwater model should be developed in accordance with the Australian modelling guidelines (Barnett et. al., 2012). This updated model will be better informed by site-specific hydrogeological data and will provide improved confidence in predictions of dewatering impacts to support environmental approvals and regulatory submissions.

**DATED: 22 April 2025**

**Rockwater Pty Ltd**



**M J Taylor  
Principal**

## **REFERENCES**

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SRK Consulting, 2025. H3 Hydrogeological Assessment Katanning Gold Project, Katanning. Unpubl. Report for Ausgold, January, 2025.

**Disclaimer:** *The aquifer is heterogeneous and varies in thickness and hydraulic conductivity throughout the mining area. The results in this report are based on a numerical model, which is an estimation only of the known aquifer conditions derived from a relatively few number of bore sites and short duration pumping and falling-head tests.*

**KATANNING GOLD PROJECT**

**GROUNDWATER  
MODELLING  
SUMMARY**

**REPORT FOR  
AUSGOLD**

**OCTOBER 2025**



**Rockwater**  
HYDROGEOLOGICAL AND ENVIRONMENTAL CONSULTANTS



Report No. 710.0/25/01

## TABLE OF CONTENTS

1	INTRODUCTION	1
2	HYDROGEOLOGICAL SETTING	2
	2.1 PHYSIOGRAPHY AND CLIMATE	2
	2.2 GEOLOGY	2
	2.3 HYDROGEOLOGY	2
3	MODEL BASIS OF DESIGN	3
	3.1 MODEL SETUP	3
	3.2 BASE CASE ASSUMPTIONS	4
4	MODELLING RESULTS	5
	4.1 PREDICTED PIT INFLOWS	5
	4.2 MODELLED DRAWDOWN AND RECOVERY	6
5	POTENTIAL IMPACTS ON GROUNDWATER DEPENDENT ECOSYSTEMS	6
6	RECOMMENDATIONS	7
	REFERENCES	9
	FIGURES	1
	APPENDICES	16

### Tables

Table 1 – Base case model parameters	4
Table 2 – Predicted pit inflow volumes (ML/a)	5
Table 3 – Updated water balance table (modified from Table 4.28 from WSP, 2025)	5
Table 4 – Drawdown and recovery statistics for each pit and supply borefield	6
Table 5 – Calculated area of potential impacts after 10 years extraction	7
Table 6 – Calculated area of potential impacts to likely GDE presence after 10 years extraction	7

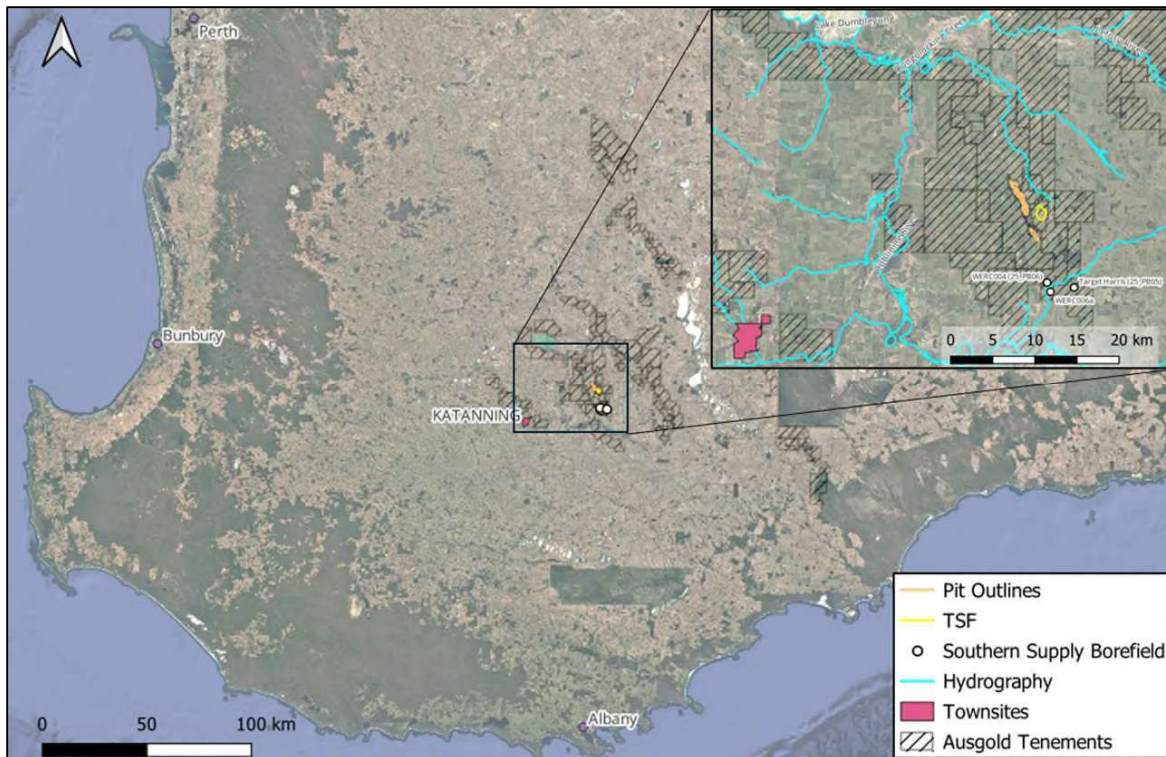
### Figures

Figure 1 – Locality Plan – Katanning Gold Project	1
Figure 2 – Groundwater drawdowns at end of year 1	2
Figure 3 – Groundwater drawdowns at end of year 2	3
Figure 4 – Groundwater drawdowns at end of year 3	4
Figure 5 – Groundwater drawdowns at end of year 4	5
Figure 6 – Groundwater drawdowns at end of year 5	6
Figure 7 – Groundwater drawdowns at end of year 6	7
Figure 8 – Groundwater drawdowns at end of year 7	8
Figure 9 – Groundwater drawdowns at end of year 8	9
Figure 10 – Groundwater drawdowns at end of year 9	10
Figure 11 – Groundwater drawdowns at end of year 10	11
Figure 12 – Groundwater drawdowns at end of year 20	12
Figure 13 – Jinkas Pit 100-year simulated drawdown and recovery	13
Figure 14 – Jackson Pit 100-year simulated drawdown and recovery	13
Figure 15 – Dingo Pit 100-year simulated drawdown and recovery	13
Figure 16 – Southern borefield 100-year simulated drawdown and recovery	13
Figure 17 – Terrestrial GDE's within 10 m depth to water where > 0.5 m drawdown predicted	14
Figure 18 – Aquatic GDE's within 10 m depth to water where > 0.5 m drawdown predicted	15

REVISION	AUTHOR	REVIEW	AUTHORISED	ISSUED
Rev 0	CN	MT	MT	17 Oct 2025

## 1 INTRODUCTION

Ausgold Limited (Ausgold) is developing the Katanning Gold Project (KGP) in the southern wheatbelt region of Western Australia (Figure 1). Gold mineralisation occurs within the Archaean Katanning Greenstone Belt, hosted within sheared metasediments and granitoids. The project area is underlain by a variably weathered saprolitic profile which together with the fractured bedrock constitutes the aquifer system that locally contains saline groundwater.



**Figure 1 – Locality Plan – Katanning Gold Project**

Between 2021 and 2024, SRK consulting completed groundwater investigations which included drilling, bore construction, test-pumping, and modelling in support of a hydrogeological conceptualisation, a groundwater model and a H3 Hydrogeological Assessment. Subsequent peer reviews and revised groundwater modelling by Rockwater and EMM consulting concluded that SRK’s predicted dewatering rates were likely over-estimated by one to two orders of magnitude, mainly due to use of an unrealistic specific yield value used to represent the fractured bedrock.

Ausgold subsequently engaged Rockwater to undertake new predictive groundwater modelling to reflect the broader water management strategy, incorporating dewatering, water supply borefield operation and use of a wet tailings storage facility (TSF), and to prepare an updated technical report to support a referral to the Environmental Protection Authority (EPA).

This report documents Rockwater’s updated groundwater modelling, which was undertaken to:

- Quantify the extent of drawdown from base-case pit dewatering and water supply extraction
- Evaluate the resultant groundwater mounding from the proposed base case TSF design
- Simulate post mining recovery timeframes, and
- Integrate findings into a single concise groundwater modelling summary (this document).

## 2 HYDROGEOLOGICAL SETTING

### 2.1 PHYSIOGRAPHY AND CLIMATE

The KGP project landscape is typical of the Wheatbelt, featuring gently rolling agricultural landscapes hosting a mix of low hills and broad valleys, with elevations ranging between 219 and 433 m Australian height Datum (AHD). The regional climate is Mediterranean with average annual rainfall ~390 mm/yr and potential evaporation exceeding 2,000 mm/yr, resulting in limited groundwater recharge. Regionally, the project area sits within the Blackwood River Catchment, with surface water draining toward the north via the Datatine Gully into Dumbleyung Lake to the north, as well as toward the south via the Cobline River before also discharging into Dumbleyung Lake.

Historic land clearing has resulted in dryland salinity issues in the area, particularly in low-lying areas where the groundwater table is close to the ground surface.

### 2.2 GEOLOGY

The project area is underlain by the Yilgarn Craton, comprising predominantly Archaean gneiss and granite. The bedrock is intersected by numerous south-west to north-east-trending faults and east-west-trending Proterozoic dykes composed of dolerite, gabbro, and quartz, which locally influence groundwater movement.

The upper bedrock is extensively weathered to form a saprolitic zone, marking the transition to the overlying regolith profile of variable thickness. This regolith includes both residual and transported materials, such as colluvial and alluvial sediments, derived from in-situ weathering of local lithologies.

### 2.3 HYDROGEOLOGY

Groundwater within the KGP area occurs in a multi-layered system that reflects the underlying geological profile. Three principal aquifer units are recognised:

- Superficial aquifers; comprising colluvial and alluvial deposits within the regolith. These host shallow groundwater that is variably connected to surface drainage and are generally unconfined to semi-confined.
- Weathered rock aquifers; corresponding to the saprolitic and lateritic zones developed at the top of the bedrock. Groundwater is stored within fine-grained pore spaces and minor secondary fractures, typically forming low-permeability, semi-confined systems.
- Fractured rock aquifers; comprising fractured gneiss and greenstone units that provide the main transmissive pathways for groundwater flow and potential dewatering inflows. Hydraulic conductivity is controlled primarily by the density and orientation of faults, joints, and dykes.

Groundwater levels across the project area range from about 19 m below ground level (bgl) to up to 2 m above ground level (agl), with elevations between 265 m and 360 m AHD. Levels are highest near Jinkas Pit on a topographic high and lowest near the surface-water tributaries draining toward Lake Dumbleyung. The regional groundwater flow is radial and outward from the higher topography of the project area toward these lower-lying discharge zones.

### 3 MODEL BASIS OF DESIGN

Given the inherent heterogeneity of the KGP hydrogeological system, the numerical groundwater model was designed as a fit-for-purpose, simplified three-layer representation of the conceptual hydrogeology. The model was developed to efficiently quantify base-case drawdown associated with combined pit dewatering, wet TSF operation, and water-supply extraction, while remaining consistent with available hydrogeological data and the conceptual understanding of aquifer behaviour.

#### 3.1 MODEL SETUP

The numerical groundwater model was set up as follows:

**Software:** FloPy (Python interface to MODFLOW 6)

**Grid and cell size:** The model grids spans a 30 km by 40 km area centred on project. This is discretised into 400 rows and 300 columns equivalent to a homogenous cell size of 100 m x 100 m.

**Topography:** The top of the model was derived from the local Digital Elevation Model (DEM).

**Layers:**

- Layer 1 – Superficial alluvium and clay (up to 30 m thick)
- Layer 2 – Weathered and fractured rock (90–205 m thick, including faults & dykes)
- Layer 3 – Fresh bedrock (150 m thick)

**Boundaries:**

- Surface drainage lines are represented along the western boundary with river bed conductance set at 1.42 m/d;
- Recharge zones are applied, with higher rates on topographic highs.
- No-flow boundaries are assigned to the north, south, and east model limits.

**Recharge:** This was calibrated within realistic ranges for the Wheatbelt climate, and consistent with the low infiltration expected under semi-arid conditions and high evaporation losses. The base case was assigned  $2.0 \times 10^{-6}$  and  $5.0 \times 10^{-5}$ .

**Timesteps:** The model was temporally discretised into 41 stress periods, each of three months duration spanning the period of mine operations (i.e. 10 years), followed by a 100-year post-closure period.

**Calibration:** Steady-state calibration was undertaken using PEST, with Kh/Kv values of superficial and fractured units, recharge, and river-bed conductance adjusted. Fault and dyke Kh values were fixed at 1.5 m/d and 0.5 m/day respectively. Weighting favoured measured groundwater level data derived from the project area. The calibration achieved an SRMS error of ~8.38 %, meeting AGMG (2012) criteria for predictive simulations. The calibrated parameters adopted for the dewatering simulations are summarised in Table 1.

**Table 1 – Base case model parameters**

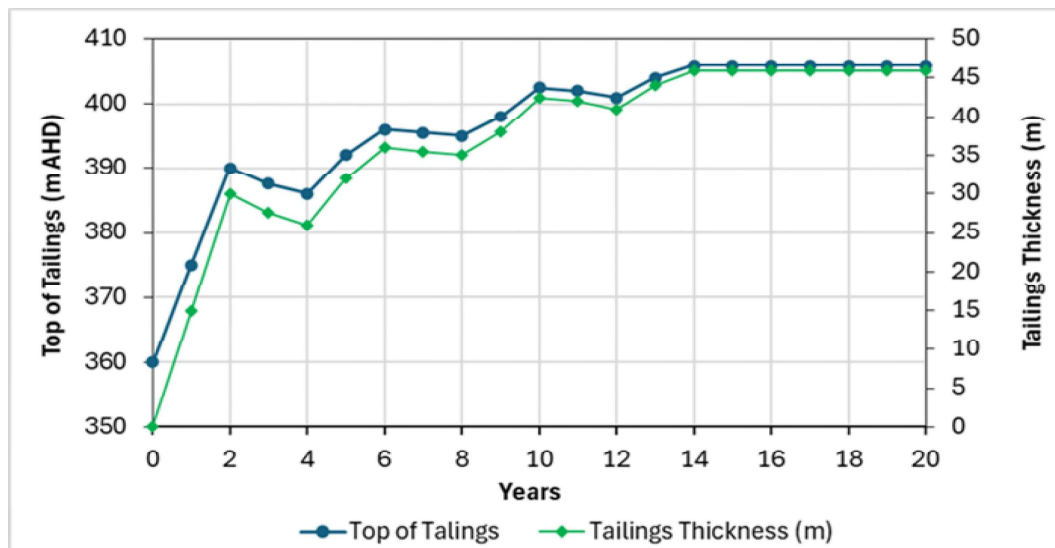
Layer and Description		Kh, Kv (m/day)	Specific Storage (SS)	Specific Yield (Sy)
1	Tertiary clay and alluvium	0.007	$5.0 \times 10^{-4}$	0.02
2	Weathered bedrock	0.009	$5.0 \times 10^{-5}$	0.02
	Faults	1.50	$1.0 \times 10^{-4}$	0.02
	Dykes	0.50	$5.0 \times 10^{-4}$	0.02
3	Fresh bedrock	0.0001	$1.0 \times 10^{-5}$	0.02

### 3.2 BASE CASE ASSUMPTIONS

The KGP plans to develop four open cut pits, each of which are planned to be mined below the groundwater table. Mining is currently planned to take place over a ten-year period. Pit advancement details are in Appendix 1.

Simulation of the TSF seepage and associated mounding was undertaken based on the following base case assumptions:

- The base of the TSF was assumed to be horizontal at 360 m AHD (both cells) and above the simulated pre-mining groundwater table.
- The deposition and thickness of the tailings was assumed identical in both cells and followed the predicted consolidated tailings thicknesses at the thickest section (WSP 2025, Figure 8.4). Thickness of tailings material during operation and post-closure used for the seepage modelling is shown in Chart 1.
- Modflow’s reservoir package was used to simulate the seepage, assuming that the entire thickness of the TSF was constantly saturated. The base and internal benches of the TSF are fully lined with a LLPDE geomembrane of low hydraulic conductivity ( $8.64 \times 10^{-6}$  m/d).



**Chart 1– Wet Tailings depositional thickness over time**

## 4 MODELLING RESULTS

### 4.1 PREDICTED PIT INFLOWS

Pit inflow volumes at each bench elevation for each year have been simulated using the calibrated model and are presented in Table 2. Despite being mined below baseline water levels, the Olympia pits are not predicted to require dewatering due to being passively dewatered through the advancement of nearby Jinkas and Jackson pits, however, there may be minor inflows if perched groundwater is encountered in the weathered zone or if the dewatering schedule is changed (i.e. if the nearby Jinkas and Jackson dewatering is reduced due a mine plan change).

**Table 2 – Predicted pit inflow volumes (ML/a)**

Year	Dingo	Jackson	Jinkas	Olympia	Total
Y1	0.0	0.0	323.7	0.0	323.7
Y2	0.0	0.0	255.5	0.0	255.5
Y3	0.0	0.0	199.6	0.0	199.6
Y4	0.0	159.3	151.3	0.0	310.6
Y5	0.0	272.5	137.0	0.0	409.4
Y6	0.0	195.6	370.8	0.0	566.4
Y7	472.3	0.0	314.4	0.0	786.7
Y8	789.8	61.8	30.2	0.0	881.9
Y9	133.0	250.4	0.0	0.0	383.4
Y10	0.0	0.0	158.2	0.0	158.2

A detailed water balance model for the site was provided by the client (WSP, 2015), which has been revised in **Error! Not a valid bookmark self-reference.** based on updated pit inflow modelling, updated pit void storage volumes, from which recalculated supply borefield makeup volumes and unmanaged surplus water volumes were made. The revised water balance shows that additional makeup water will only be required in Years 1 and 10. Unmanaged surplus from Years 2 to 9 is assumed to be managed in a way that will not impact groundwater levels (i.e. through direct recharge or infiltration back into the aquifer via creeks, bores or pit voids).

**Table 3 – Updated water balance table (modified from Table 4.28 from WSP, 2025)**

Year	Input (ML/a)						Output (ML/a)			Balance (ML/a)		
	Rainfall	Transfer from Pit lakes	Transfer from TSF	Pit inflow	Sed. Pond	Supply Borefield Makeup	Pan Evap	Plant Demand	Unmanaged Surplus	Total In	Total Out	IN - OUT
Y1	1.4	150.0	0.0	323.7	304.4	2487.80	3.9	3263.4	0.0	3267.3	3267.3	0.0
Y2	1.3	0.0	3100.6	255.5	299.6	0.00	3.9	3652.2	0.9	3657.0	3657.0	0.0
Y3	1.4	0.0	3137.3	199.6	480.5	0.00	3.9	3779.1	35.8	3818.8	3818.8	0.0
Y4	1.4	0.0	3196.8	310.6	459.1	0.00	3.9	3823.7	140.3	3967.9	3967.9	0.0
Y5	1.4	0.0	3087.7	409.4	457.3	0.00	3.9	3811.3	140.6	3955.8	3955.8	0.0
Y6	1.4	0.0	3047.5	566.4	473.5	0.00	3.9	3704.9	380.0	4088.8	4088.8	0.0
Y7	1.4	0.0	3055.0	786.7	536.7	0.00	3.9	3766.1	609.8	4379.8	4379.8	0.0
Y8	1.3	0.0	3004.9	881.9	523.3	0.00	3.9	3679.2	728.3	4411.4	4411.4	0.0
Y9	1.3	0.0	3015.2	383.4	533.3	0.00	3.9	3839.8	89.5	3933.2	3933.2	0.0
Y10	1.4	0.0	2323.5	158.2	552.7	654.60	3.9	3686.5	0.0	3690.4	3690.4	0.0

The preferred makeup water supply strategy will be to focus extraction on three bores within the “southern borefield” (Fig. 1). It is assumed in the base case that these bores would be operated at equal extraction rates of 29 L/s in Year 1, and 7.6 L/s in Year 10.

## 4.2 MODELLED DRAWDOWN AND RECOVERY

Based on the assumptions and methods outlined in Section 3, composite drawdowns were simulated over a 110-year period (including 10-years of mine operations and 100-years of closure) to quantify the impact that the proposed dewatering, water supply and TSF activities would have on the groundwater levels. The results are summarised in Table 4, from which the following findings can be drawn:

- Drawdown is mainly centred on the proposed dewatering pits commensurate with mine bench progression and dewatering requirements, and to a lesser extent the southern borefield.
- Drawdown propagates preferentially along the faults and dykes where hydraulic conductivity is higher (i.e. faults, and to a lesser degree, dykes). Drawdown contours for Years 1 to 10 and Year 20 (10 years post mining) are presented in Figure 2 through to Figure 12.
- After 100 years post-operations, pit lakes recover to on average of 99.2% of baseline water levels, noting that full recovery will never be reached in the pit lakes due to evaporative losses. Drawdown and recovery hydrographs for each draw point are in Figure 13 through to Figure 16.
- Seepage from the wet TSF is negligible, with no observable mounding because of its planned design.

**Table 4 – Drawdown and recovery statistics for each pit and supply borefield**

Pit stage / Bore	Initial simulated WL (m AHD)	Minimum simulated WL (m AHD)	Maximum simulated drawdown (m)	Minimum simulated WL year	95% recovered WL	95% recovery year
Jinka 3	355.51	150.10	205.41	Year 4	345.24	~ Year 13
Jackson 1	331.54	234.16	97.38	Year 5	326.67	~ Year 24
Dingo 1	332.12	210.01	122.11	Year 8	326.02	~ Year 15
Southern Borefield (average)	293.38	274.28	19.10	Year 1	292.42	~ Year 30

## 5 POTENTIAL IMPACTS ON GROUNDWATER DEPENDENT ECOSYSTEMS

To assess potential risks to groundwater dependent ecosystems (GDEs), modelled drawdown outputs were compared against mapped areas of high, moderate, and low GDE likelihood using the Bureau of Meteorology’s (BoM) national GDE Atlas (BoM, 2023). A notional impact threshold was applied, defined as areas where groundwater levels are within 10 m of ground surface and are predicted to experience greater than 0.5 m drawdown after ten years of mine operation. The calculations do not consider the current land use/vegetation at these sites (i.e. no GDE may be currently present due to historic land clearing practices).

Within the mine area, the total zone of modelled notional impact covered approximately 4.94 km<sup>2</sup>, while the southern borefield encompassed approximately 25.92 km<sup>2</sup>, giving a combined potential impact area of 30.86 km<sup>2</sup> (Table 5). These zones represent areas where any shallow rooted vegetation or aquatic ecosystems that rely on near surface groundwater could be most at risk of stress.

**Table 5 – Calculated area of potential impacts after 10 years extraction**

Area	Total area >0.5 m DD	Total Potential GDE Impact Area <sup>1</sup>
	Km <sup>2</sup>	Km <sup>2</sup>
Mine area	27.038	4.938
Southern Borefield	25.924	25.924
Total	52.962	30.862

<sup>1</sup> >0.5 drawdown with modelled water level <10 m bgl

An overlay of the modelled impact area with the BoM GDE polygons indicates that the majority of potentially affected aquatic GDEs occur near the proposed southern borefield (Figure 17, Figure 18). Within this area, approximately 2.98 km<sup>2</sup> coincide with moderate likelihood aquatic GDEs, and 0.257 km<sup>2</sup> with high likelihood aquatic GDE's, in contrast with the mine area having 0.167 km<sup>2</sup> in high likelihood GDE's. In terms of terrestrial GDE's, there are only 1.05 km<sup>2</sup> of potentially low-likelihood GDEs occurring in the vicinity of the southern borefield, and 0.79 km<sup>2</sup> at the mine area. Calculated impact areas and GDE likelihood categories, as defined by the BoM, are presented in Table 6.

**Table 6 – Calculated area of potential impacts to likely GDE presence after 10 years extraction**

Area	Aquatic GDE (km <sup>2</sup> )			Terrestrial GDE (km <sup>2</sup> )		
	Low	Moderate	High	Low	Moderate	High
Mine area	0.029	0	0.167	0.79	0	0
Southern Borefield	0.09	2.98	0.254	1.05	0	0
Total	0.119	2.98	0.421	1.84	0	0

As the project area is largely agricultural, much of the native vegetation has been cleared; therefore, the mapped GDE potential may not represent currently functioning ecosystems. Nevertheless, these mapped intersections provide a useful screening tool for identifying areas where groundwater–ecosystem interactions could persist and therefore areas where future flora, fauna, or vegetation surveys should be prioritised.

## 6 RECOMMENDATIONS

Rockwater recommends the following actions are undertaken to ensure the Katanning Gold Project improves upon and maintains its groundwater model to ensure it remains fit for purpose should any additional scenarios need to be run:

- Define a clear unmanaged-surplus-water strategy (e.g. MAR or pit-void storage) and assess its potential impacts to groundwater through targeted modelling.
- Undertake a full sensitivity and uncertainty analyses to quantify potential variations to the base case modelling results

- Complete additional drilling and step-drawdown testing to refine parameters in under-represented zones within the model domain.
- Maintain ongoing model accuracy checks (observed versus calculated) and re-calibrate where necessary.
- Conduct additional test-pumping following the drilling of new production bores to ensure the conceptual model remains valid and is honoured through the numerical model.
- Consider prioritising GDE surveys in areas where drawdown greater than 0.5 m is predicted where with groundwater is <10 m bgl.
- Consider optimising the extraction from water supply bores to focus drawdown in areas of least concern, if required.

**Dated: 16 October 2025**

**Rockwater Pty Ltd**



**Craig Noble**  
**Senior Hydrogeologist**

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## FIGURES



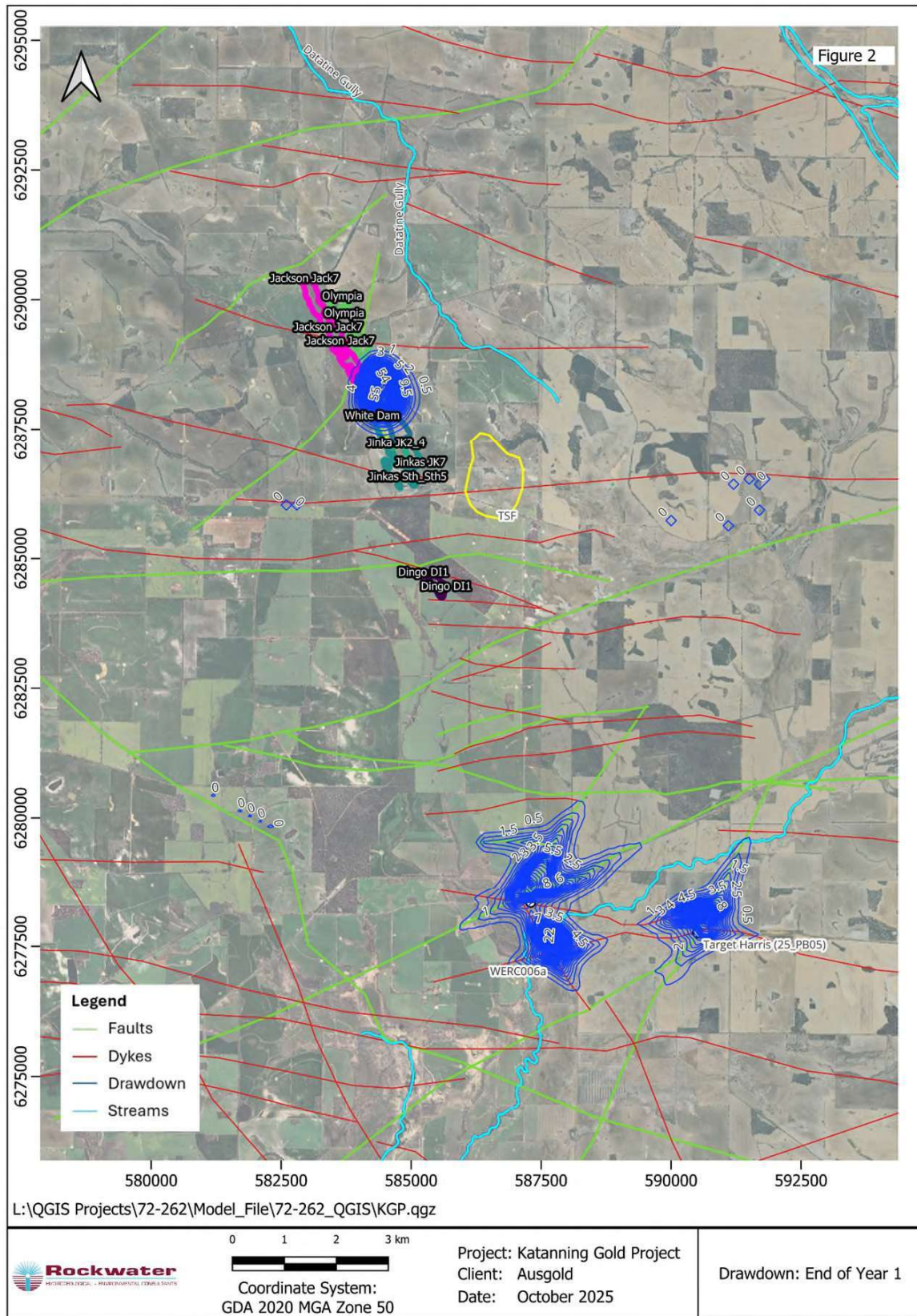


Figure 2 – Groundwater drawdowns at end of year 1

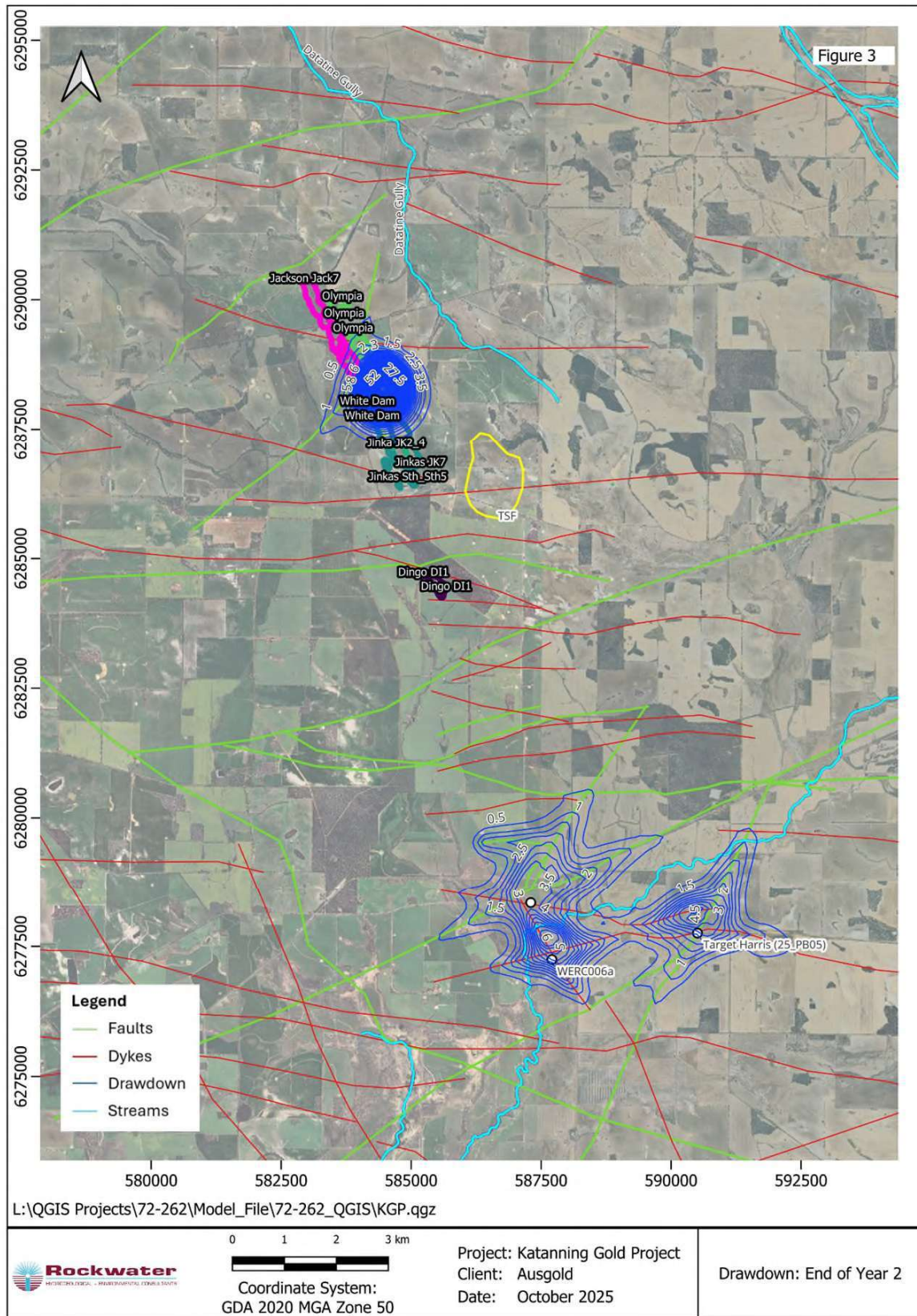


Figure 3 – Groundwater drawdowns at end of year 2

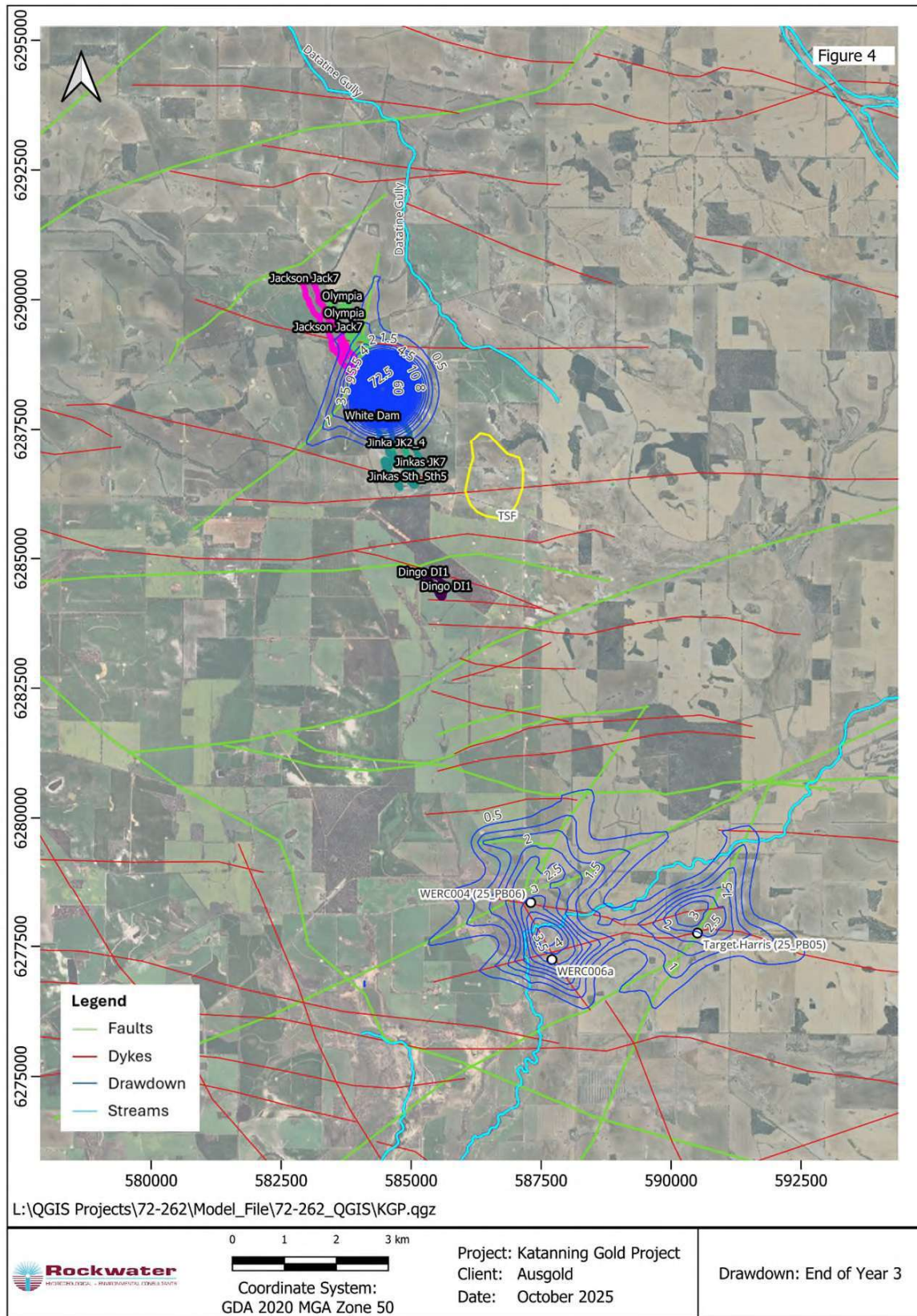


Figure 4 – Groundwater drawdowns at end of year 3

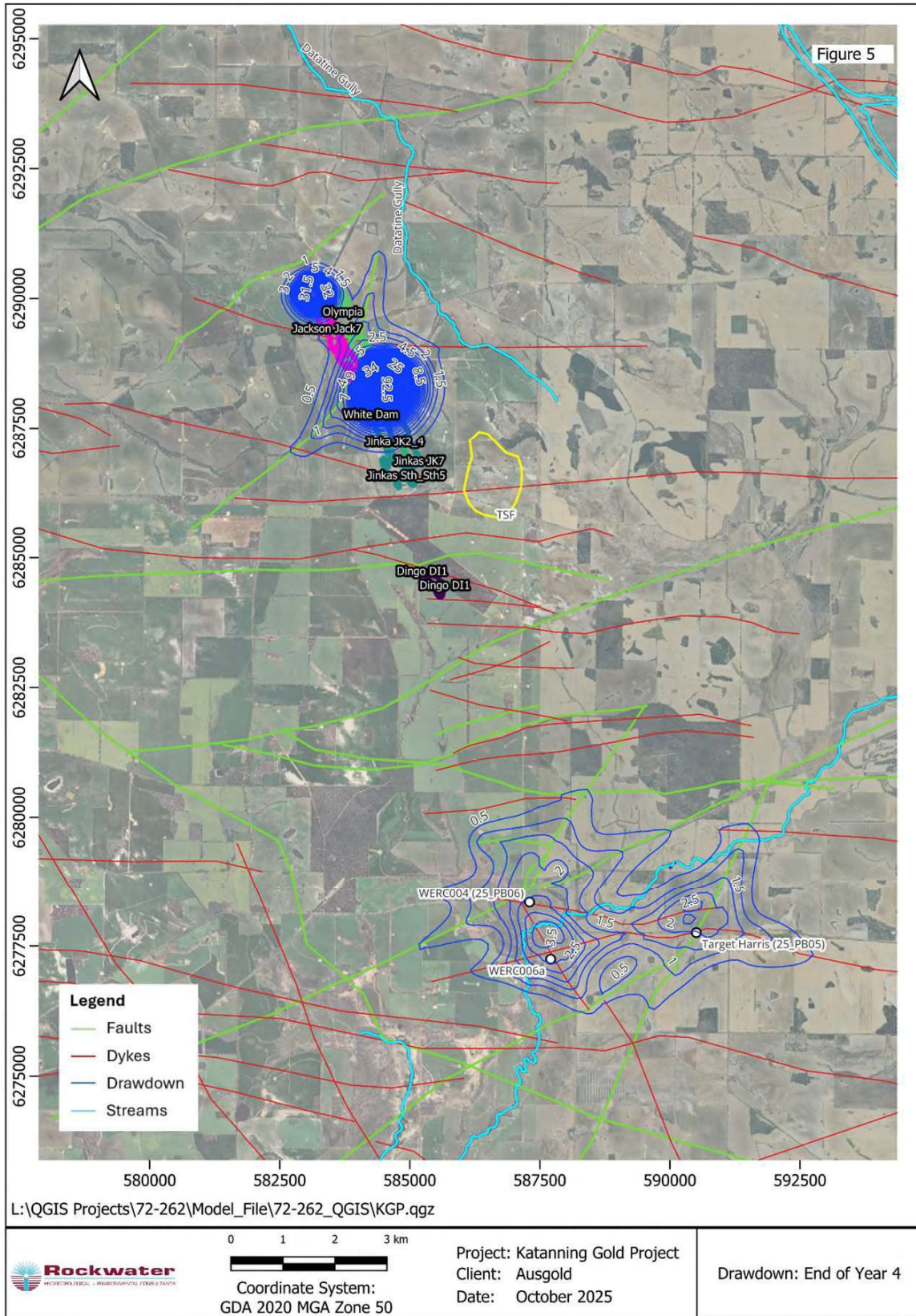


Figure 5 – Groundwater drawdowns at end of year 4

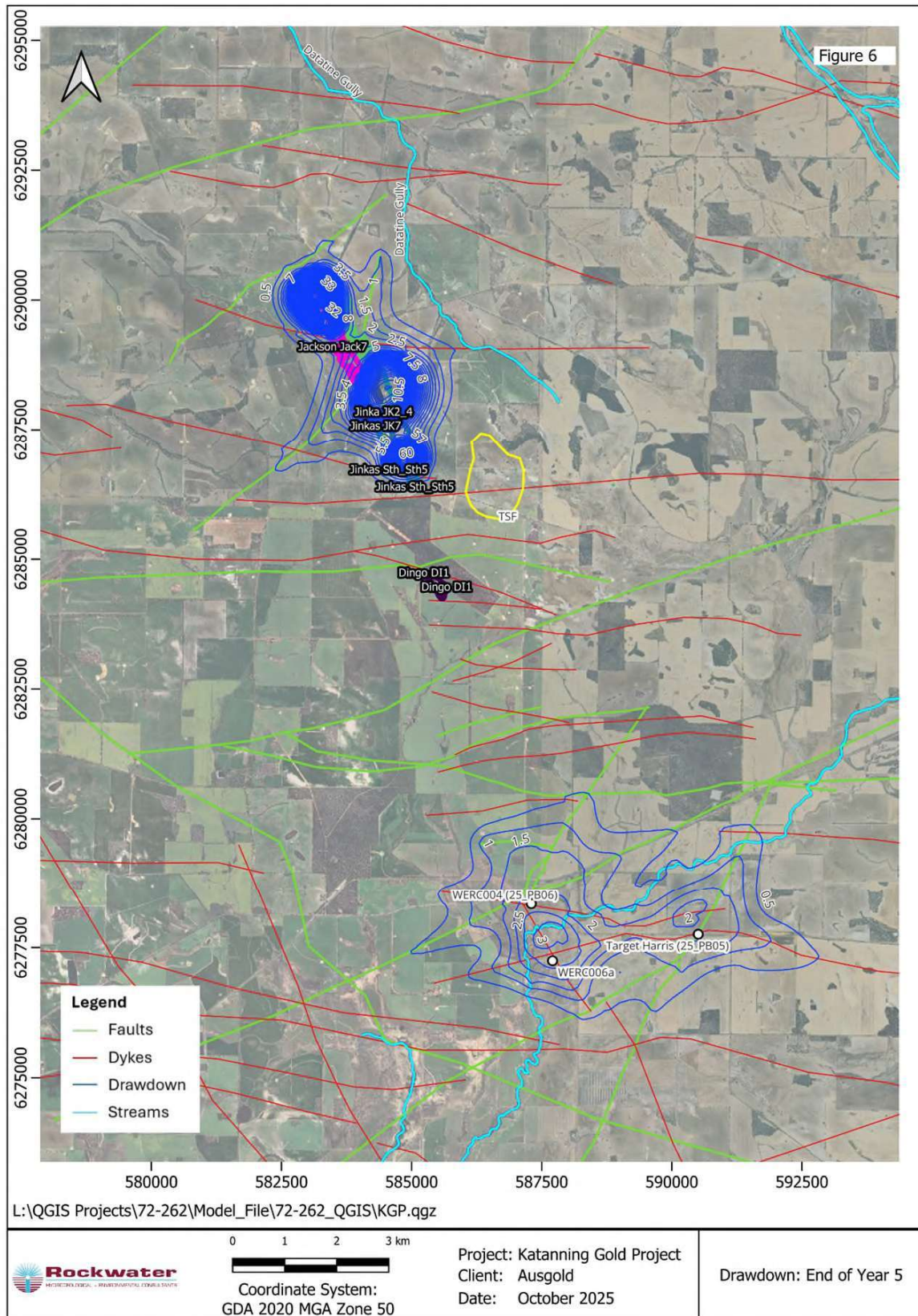


Figure 6 – Groundwater drawdowns at end of year 5



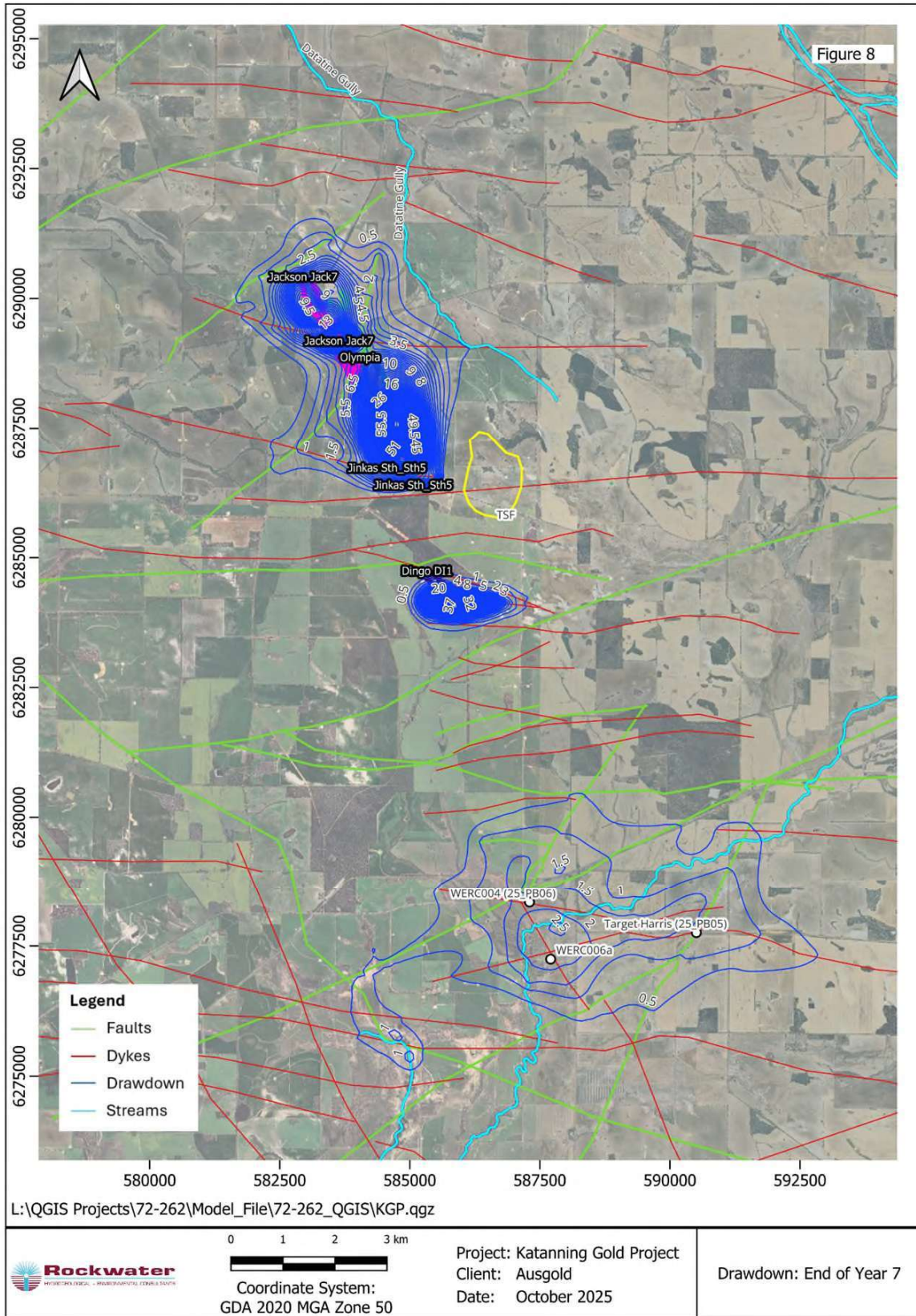


Figure 8 – Groundwater drawdowns at end of year 7

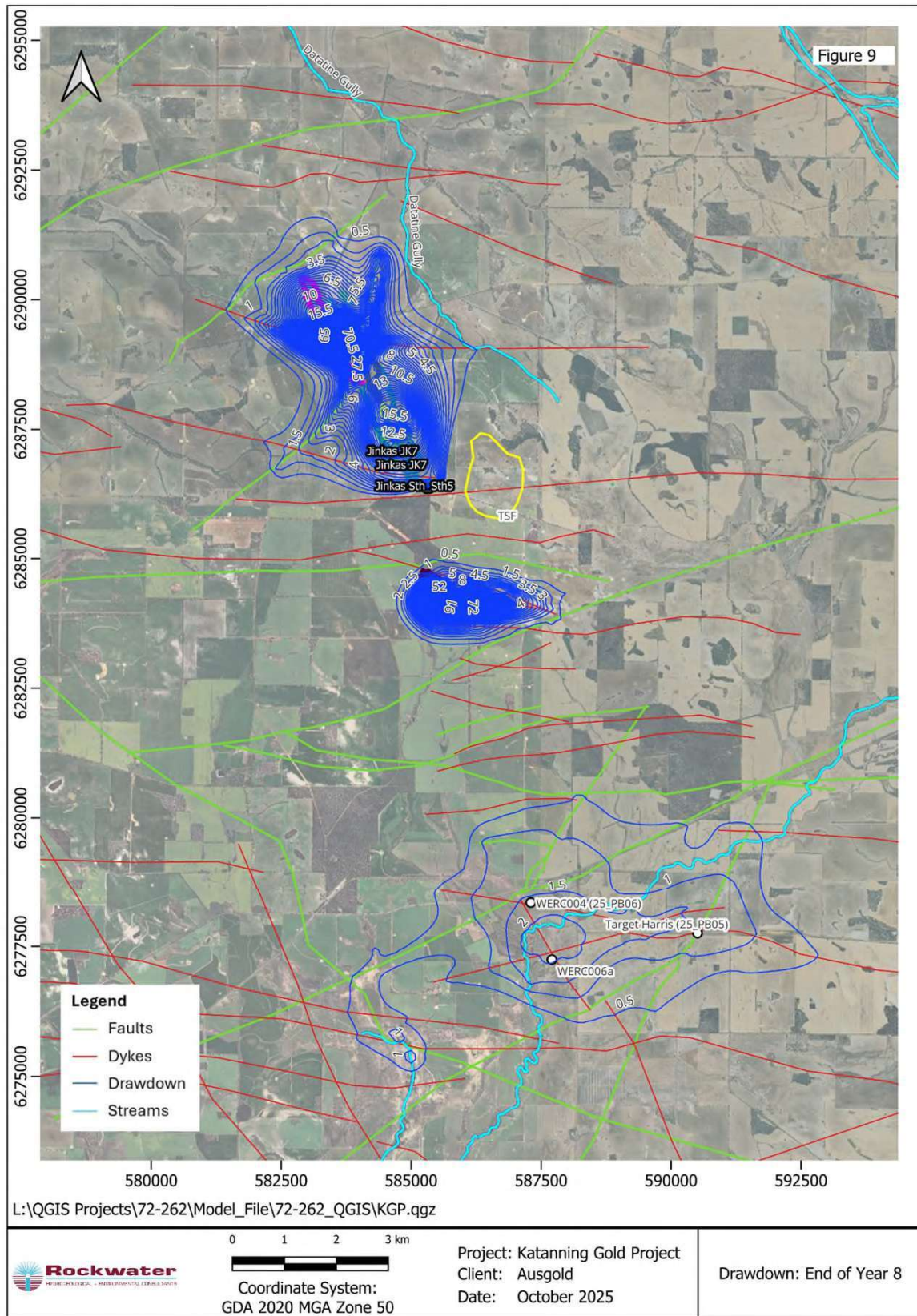


Figure 9 – Groundwater drawdowns at end of year 8

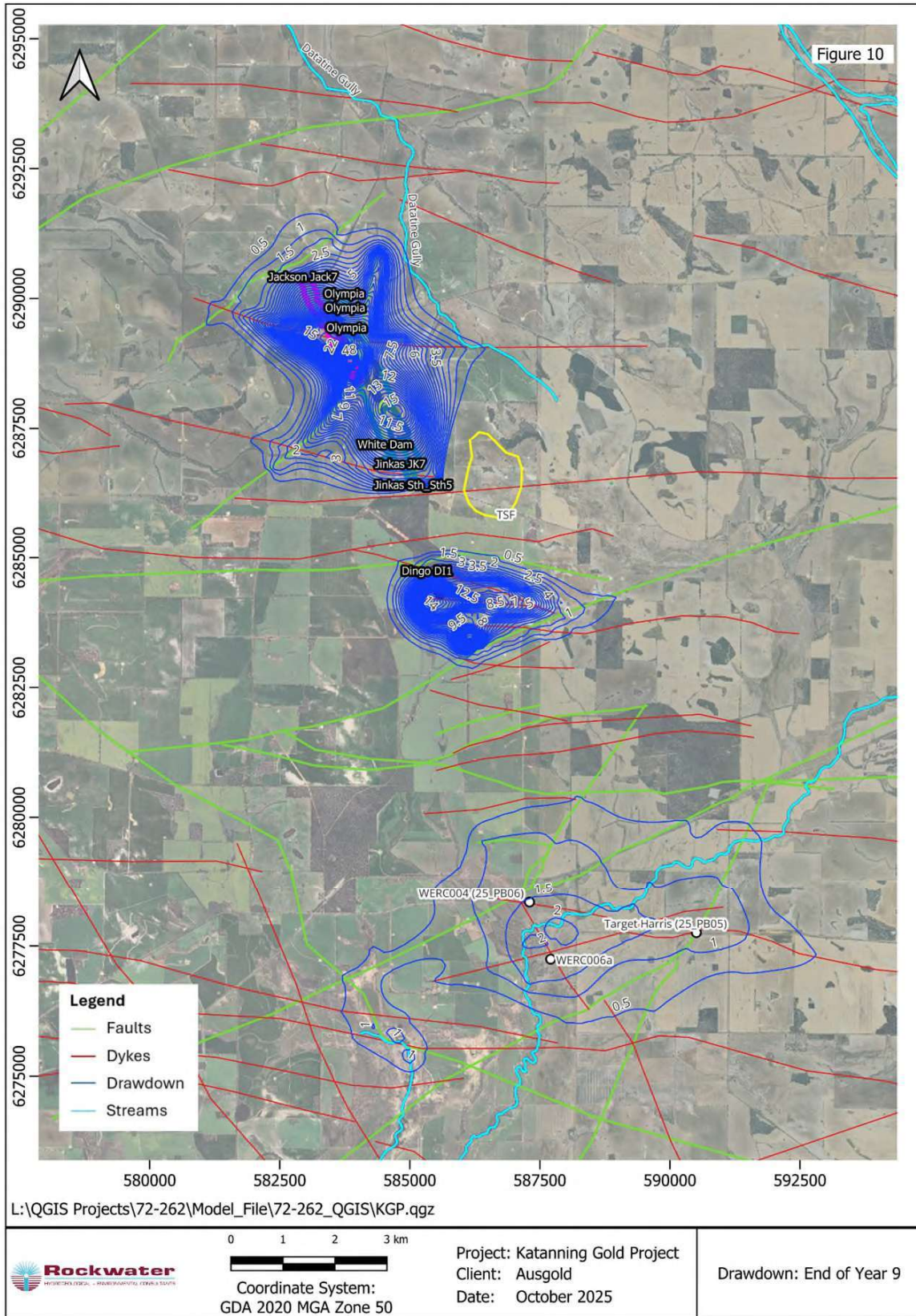


Figure 10 – Groundwater drawdowns at end of year 9

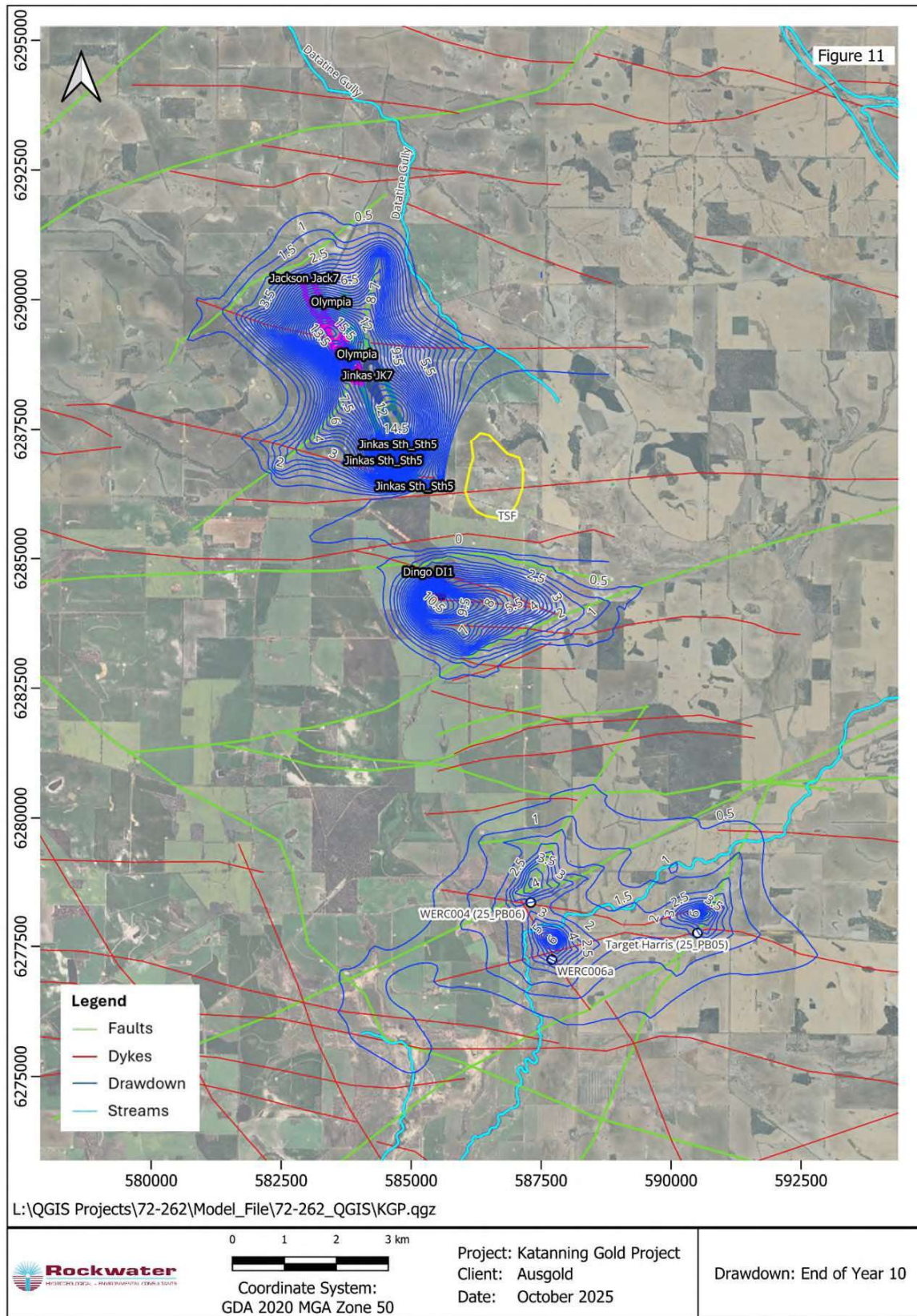


Figure 11 – Groundwater drawdowns at end of year 10

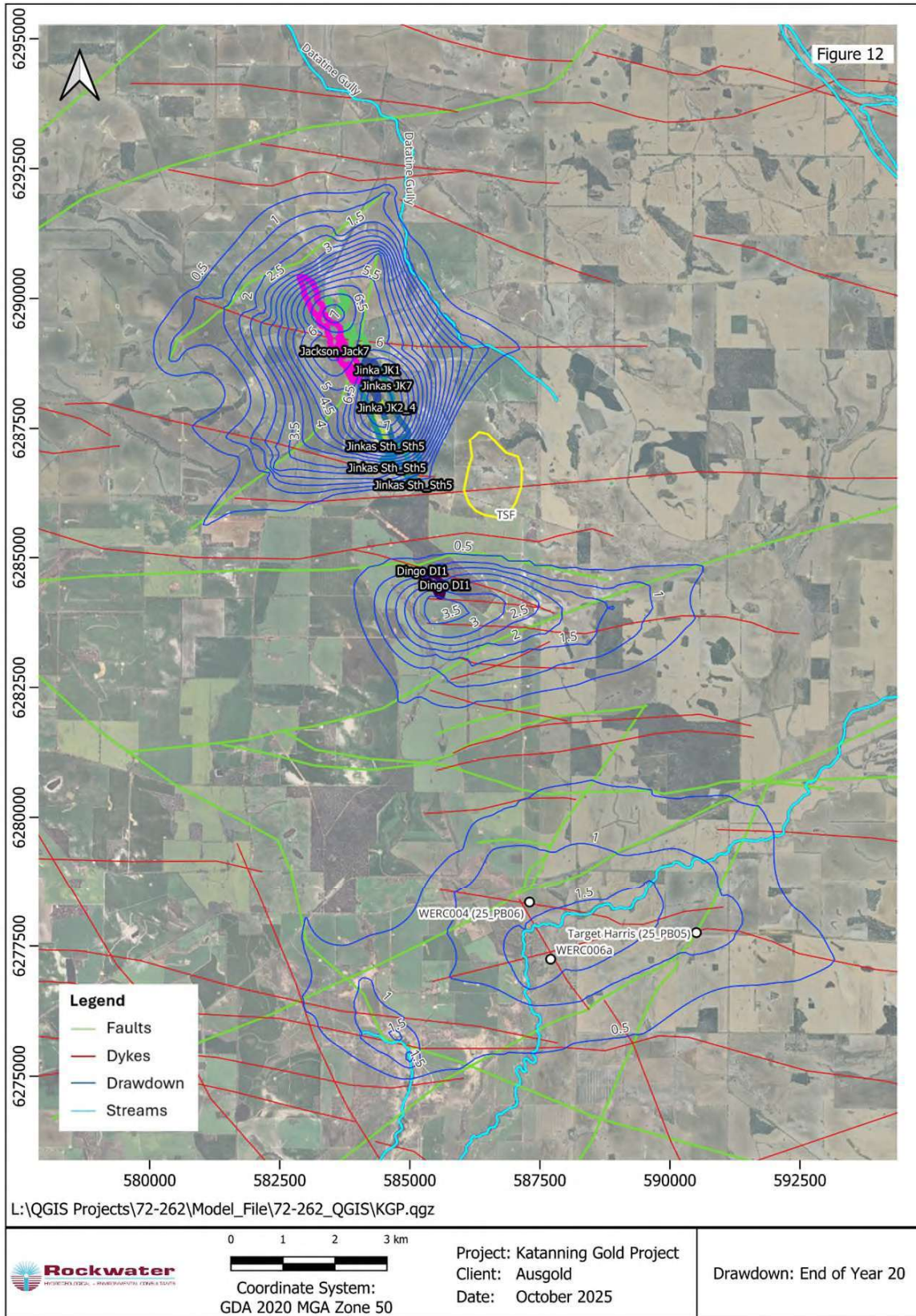


Figure 12 – Groundwater drawdowns at end of year 20

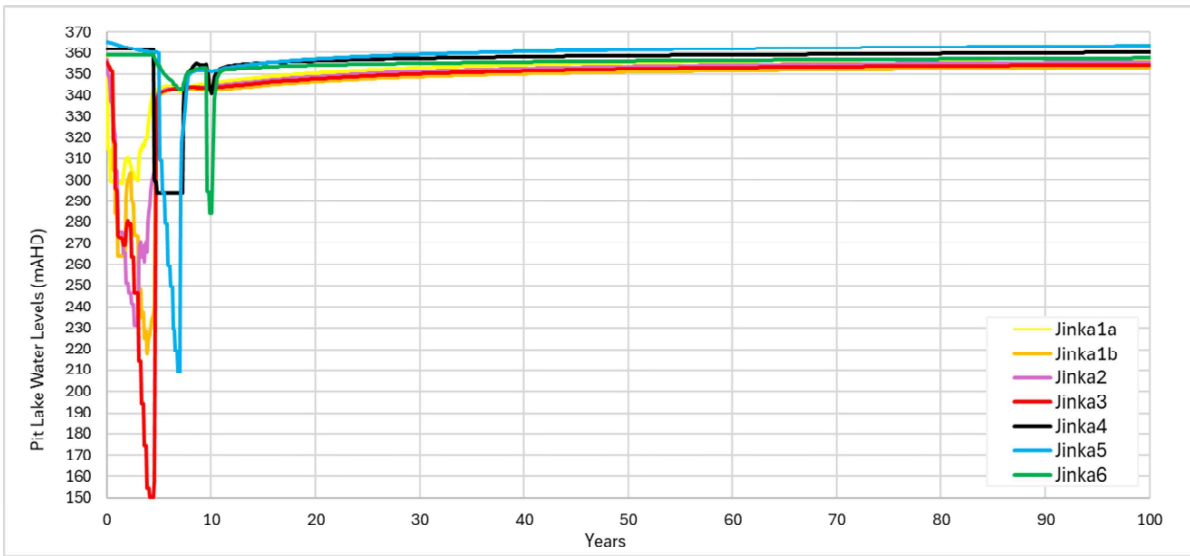


Figure 13 – Jinkas Pit 100-year simulated drawdown and recovery

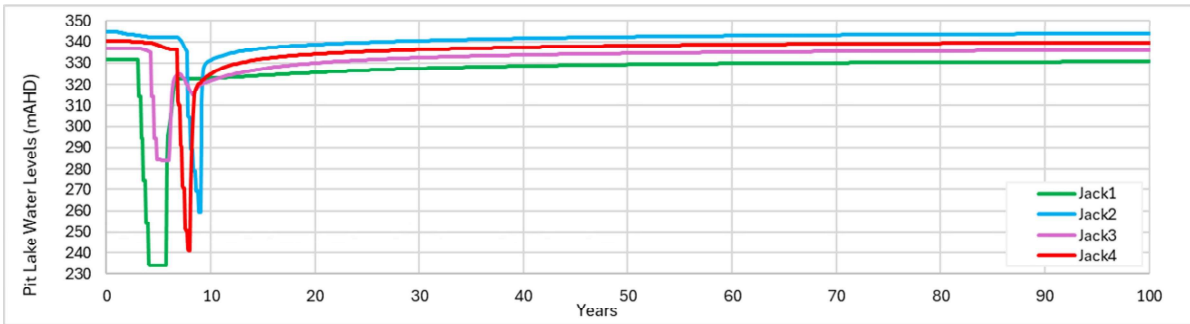


Figure 14 – Jackson Pit 100-year simulated drawdown and recovery

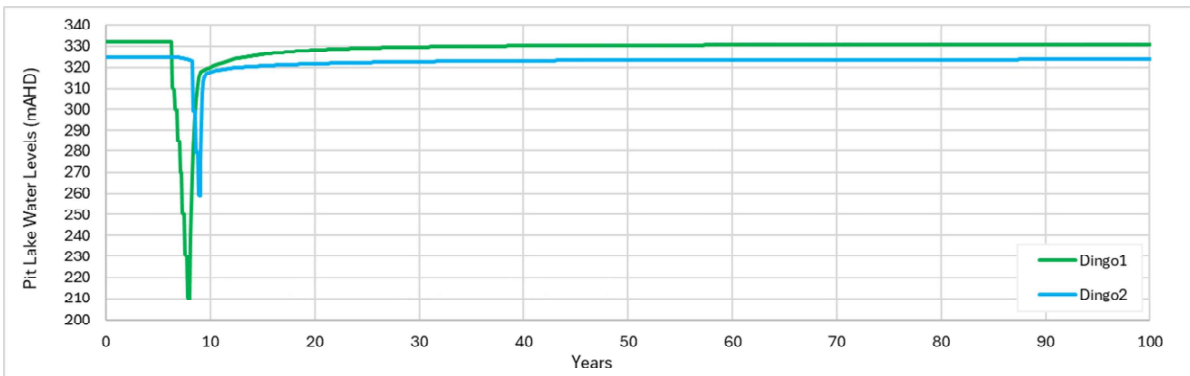


Figure 15 – Dingo Pit 100-year simulated drawdown and recovery

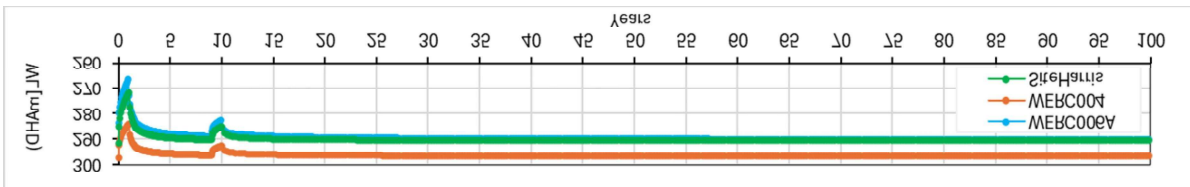
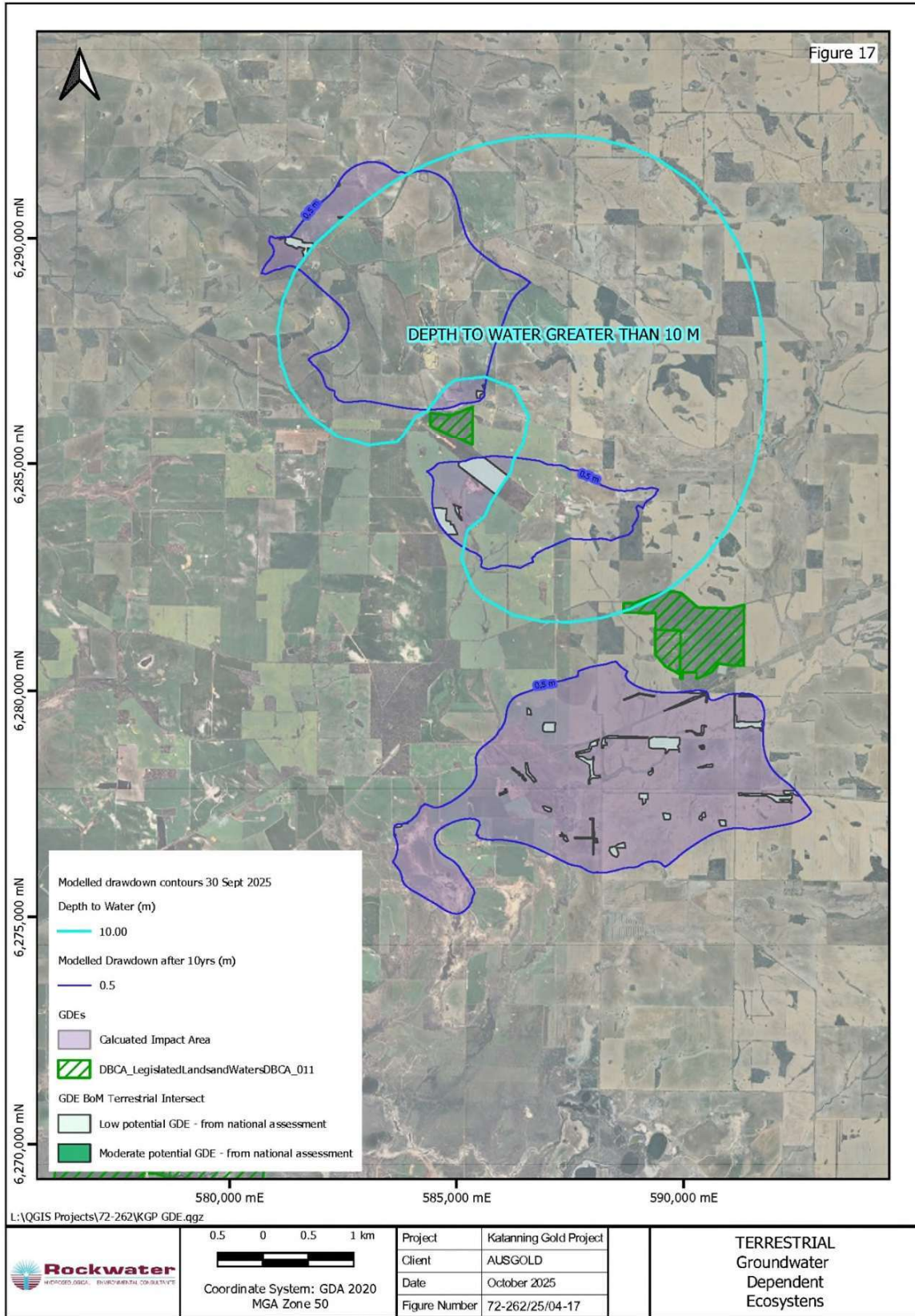


Figure 16 – Southern borefield 100-year simulated drawdown and recovery



**Figure 17 – Terrestrial GDE's within 10 m depth to water where > 0.5 m drawdown predicted**

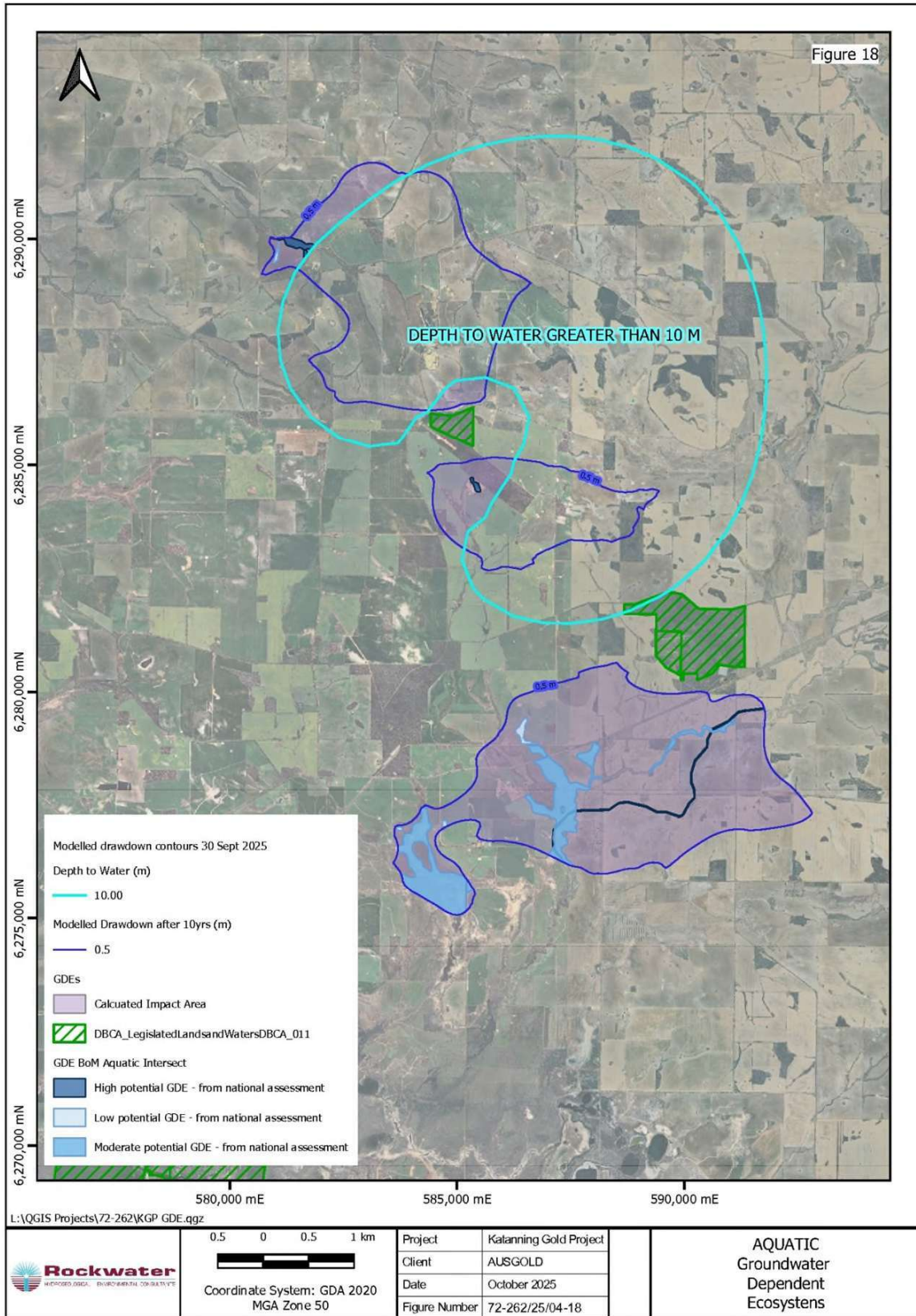


Figure 18 – Aquatic GDE's within 10 m depth to water where > 0.5 m drawdown predicted

## APPENDICES



Appendix 1 - Mine plan bench elevations for each pit (below pre-mining water table elevations in blue)

Model Yr	Qtr	Timestep	Dingo		Jackson			Jinkas						Olympia						
			ding1	ding2	jack1	jack2	jack3	jack4	jink1a	jink1b	Jink2	Jink3	Jink4	Jink5	Jink6	olym1	olym2	olym3	olym4	olym5
0	0	1 (steady state)																		
	1	2																		
	2	3																		
	3	4																		
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10	40	41																		

Appendix 3: Assessment of Groundwater Salinity (Hydrobiology, 2025)

# MEMORANDUM



**TO:** Ausgold: Troy Collie – Manager, Environment & Approvals

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**AUTHORS:** Bronwyn Woodward, Keisha Desmond

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**REVIEWER:** Phil Whittle

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**SENDER:** Bronwyn Woodward

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**VERSION/DATE:** Version 0.1 (Draft) 11/07/2025

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## KATANNING GOLD PROJECT - ASSESSMENT OF GROUNDWATER SALINITY

This report presents the results of an assessment undertaken to characterise salinity gradients within the hydrogeological profile within and surrounding the proposed mine pits for the Katanning Gold Project (KGP). The assessment focused on describing the distribution of groundwater salinity with depth, elevation and aquifer type. Baseline salinity conditions in nearby surface water systems, potential receptors for any future discharge, were also evaluated. The findings are intended to support discussions with regulatory authorities regarding the potential discharge of lower salinity groundwater generated through dewatering activities.

### Hydrogeological and Surface Water Context

According to the H3 Hydrogeological Assessment for the project (SRK 2025), the site is underlain by a sequence of geological units that influence groundwater occurrence and behaviour. These units correspond to the layers used in the groundwater model developed for the site and provide a framework for a simple aquifer classification relevant to our analysis. The units, listed in order of increasing depth, include:

- Alluvial and colluvial sediments near the surface (~0–13 m), representing an unconfined aquifer
- Interbedded clay and sand deposits (~13–30 m), which may behave as partially confined or unconfined aquifers depending on local conditions
- Bedrock and high-permeability fractured bedrock (dykes and faults) at approximately 50 m depth, considered confined aquifers
- Deeper bedrock and fractured zones near 100 m depth, also confined
- Basement bedrock devoid of faults or dykes at ~110 m depth, representing a confined aquifer with low permeability

Saline groundwater occurs in fractured rock aquifers in the project area due to dissolution of salts from marine-derived sediments or mineralised bedrock, a natural source of primary salinity (George et al. 2006; DWER 2019). The Wheatbelt region has also experienced significant land clearing for agriculture, leading to rising water tables and secondary salinisation, especially in shallow, unconfined aquifers in low-lying areas where saline discharge and waterlogging occur (DPIRD 2002; South Coast NRM 2020; UWA 2024).



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Surface water drainage is highly modified by agriculture, with artificial contour drains and earthen dams altering natural flows (SRK 2025). Salinity affects many wetlands and streams regionally, driven largely by secondary salinisation. However, the area also contains natural salt lakes formed by regional processes of salt accumulation in low-lying discharge zones. The project area drains primarily into Dumbleyung Lake, a natural salt lake typical of the Wheatbelt's semi-arid landscape, where evaporation and limited outflow concentrate salts. Coyrecup Lake, a near-permanent saline lake on the floodplain of the upper Coblinine River, receives minor drainage from the site. Dumbleyung Lake discharges into the Blackwood River, which flows to its estuary at Augusta (SRK 2025).

## Methodology

Groundwater and surface water salinity data, including electrical conductivity (EC) and total dissolved solids (TDS), were compiled from datasets and reports provided by Ausgold for the Katanning Gold Project (KGP), and from the Department of Water and Environmental Regulation's (DWER) Water Information Reporting (WIR) database. Only data within an approximately 10-kilometre buffer around the mining tenement were included, as shown on Figure 1. Where TDS measurements were not available, EC values were converted to TDS. Where both field and laboratory measurements were available, field readings were prioritised.

For groundwater records the bore depth, elevation, and aquifer type were attributed where possible. Bore depth was derived from field notes or bore logs. Elevation was derived from Digital Elevation Models (DEMs) available through Geoscience Australia (2008, 2020).

For the purposes of our analysis, bores were grouped into the following categories based on depth and geology:

- **Perched** — Shallow bores intersecting isolated groundwater above clay-rich layers
- **Superficial** — Bores screened within the near-surface alluvial and colluvial sediments, representing unconfined aquifers
- **Fractured rock** — Bores intercepting groundwater within deeper fractured or basement bedrock, under confined conditions
- **Unknown** — Bores with insufficient geological logging or bore construction data, mostly drilled using reverse circulation methods, preventing confident aquifer classification.

After applying the spatial buffer and excluding records lacking sufficient attribute information, a total of 554 groundwater samples and 39 surface water samples were retained for analysis.

Groundwater and surface water salinities were compared to livestock water quality guidelines. Ecosystem protection trigger values from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000) were not applied as salinity in the Katanning region, driven by both natural processes and secondary salinisation, commonly exceeds even the upper end of default values for slightly disturbed systems, as demonstrated by the data presented in this study.

Instead, livestock water quality guidelines from ANZECC & ARMCANZ (2000) were considered a more appropriate benchmark, given the already saline nature of local surface water bodies and their relevance as potential receptors in an agricultural landscape. A conservative threshold of 2000 mg/L TDS was used to highlight potential areas of elevated salinity, while 10,000 mg/L TDS represents a higher level of salinity commonly associated with reduced livestock water quality. These values provide context for understanding salinity variation and potential implications, without constituting a formal risk assessment.

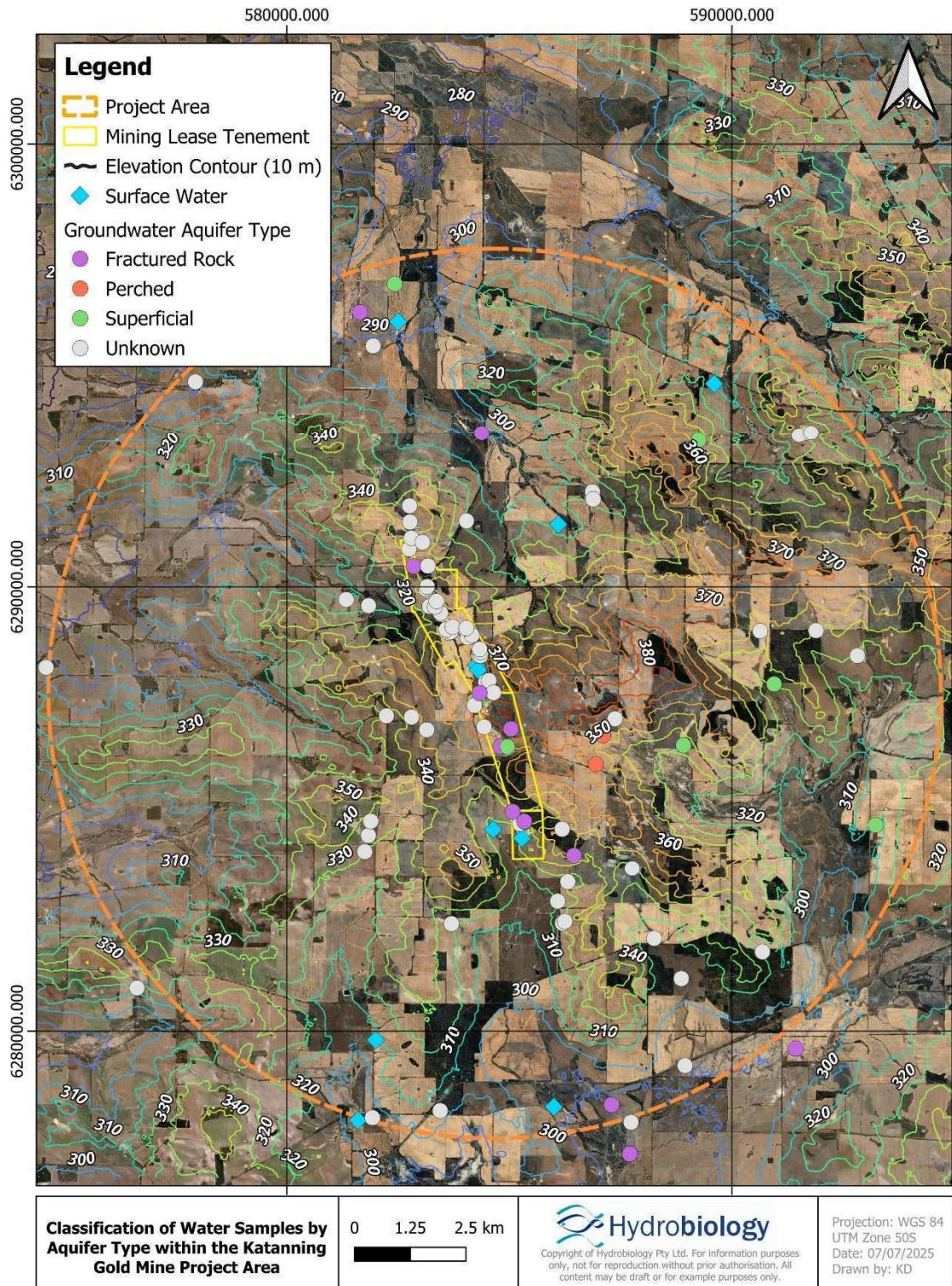


Figure 1 Location of groundwater and surface water sampling sites within and around the Katanning Gold Project area.

## Results

Figure 3 and Figure 3 illustrate the relationship between groundwater salinity (TDS) and depth, elevation and aquifer type. The scatter plots show TwDS plotted against elevation and bore depth, with data points colour-coded by aquifer category.

Groundwater in the perched aquifer is fresh, while salinity in the superficial and fractured rock aquifers varies widely from fresh to saline. Regarding depth trends, groundwater salinity in the superficial aquifer generally increases with bore depth, while in the fractured rock aquifer, it tends to decrease with depth (Figure 3).

The most pronounced pattern is that groundwater salinity in both the superficial and fractured rock aquifers decrease with increasing elevation (Figure 3), reflecting fresher conditions at higher ground and higher salinity in lower drainage valleys irrespective of depth below natural surface. This is consistent with observations made by SRK Consulting (2025).

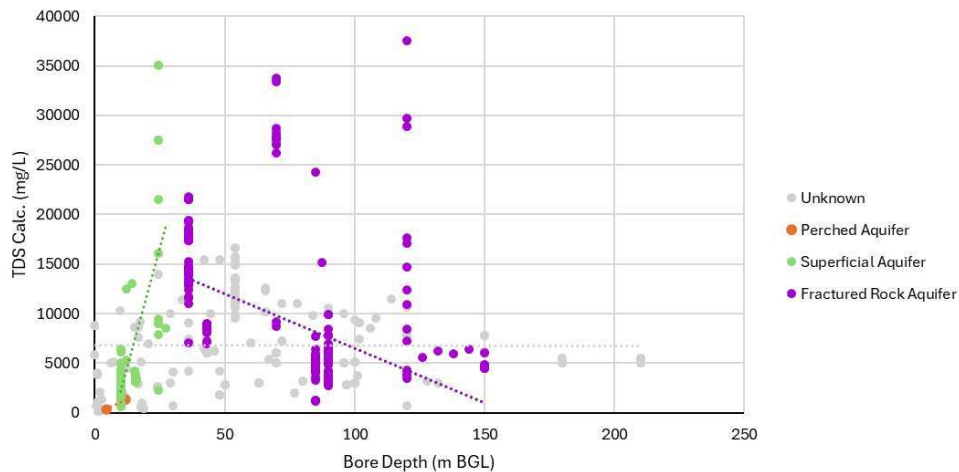


Figure 2 Groundwater Salinity vs. Depth across various aquifer types

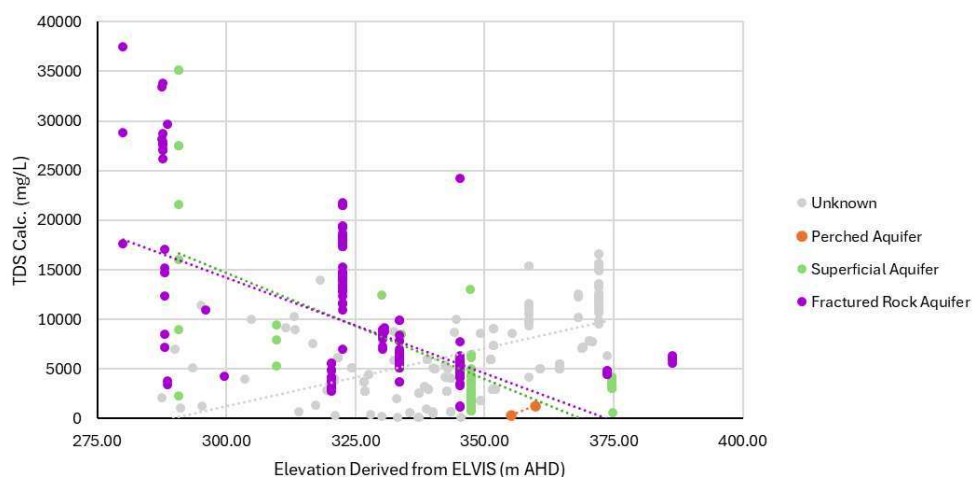


Figure 3 Groundwater Salinity vs. Elevation across various aquifer types

As shown on Figure 4, groundwater salinity in bores located at elevations greater than 300 m AHD is generally lower than surface water, with both the medians and 80<sup>th</sup> percentiles below those of surface water and below the upper livestock guideline of 10,000 mg/L TDS (Table 1). This indicates that groundwater is fresher than surface water at these elevations, and likely that near surface salts are yielded into runoff and shallow seeps after rainfall.

Table 1 Surface water and groundwater salinity in TDS (mg/L) at varying elevation ranges in the Katanning Gold Project Area. Exceedances of the ANZECC & ARM CANZ (2000) livestock water quality guideline (10,000 mg/L) are bolded\*

Elevation Range	TDS (mg/L)			
	Median	80 <sup>th</sup> percentile	Minimum	Maximum
Surface	<b>11,400</b>	<b>15,629</b>	838	25,208
>275 to <300 m	<b>17,378</b>	<b>28,512</b>	1,117	37,500
>300 to <325 m	5,715	8,120	305	14,000
>325 to <350 m	5,995	<b>9,955</b>	105	21,800
>350 m	5,140	<b>10,802</b>	618	24,255

The median salinity for both surface water and groundwater from bores located at elevations below 300 m AHD exceeds the upper livestock guideline (Table 1). While part of the central range of groundwater salinity overlaps with that of surface water, a substantial portion extends above it, and the groundwater has a higher median salinity.

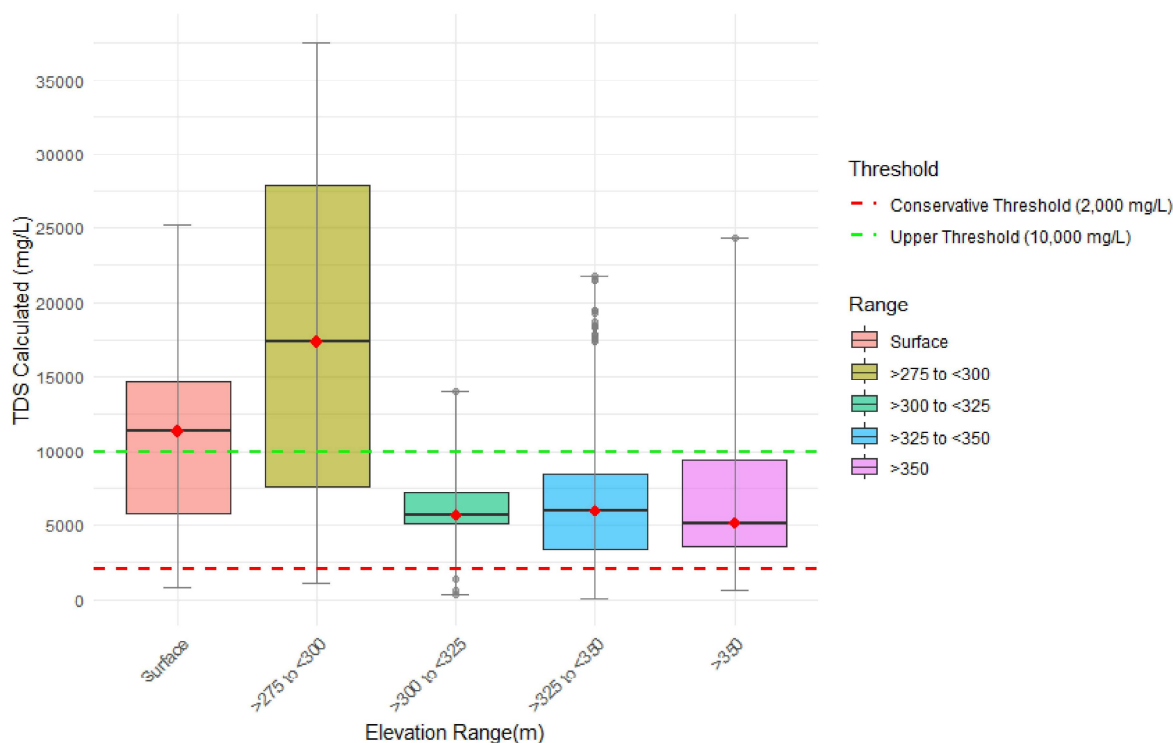


Figure 4 Medians and 20th to 80th percentile ranges for surface water and groundwater salinity at varying elevation ranges, compared against livestock drinking water guidelines.

## Conclusions and recommendations

This assessment provides a preliminary understanding of salinity variation within the hydrogeological profile at the Katanning Gold Project.

This preliminary analysis indicates that:

- At bore locations above 300 m elevation, groundwater from the superficial and fractured rock aquifers is generally fresher than surface water and below livestock guidelines - discharge is unlikely to pose a salinity risk to the receiving environment. In fact, it could slightly dilute existing surface water salinity in some areas.
- At bore locations below 300 m elevation, groundwater from the superficial and fractured rock aquifers is generally more saline than surface water and exceeds livestock guidelines - discharge may increase salinity levels in surface waters and could be unsuitable for livestock use downstream unless managed or treated.

Given the preliminary nature of this assessment, the following recommendations are made:

- Continue to collect and refine groundwater and surface water salinity data, including bore construction details, lithology, and updated field measurements, to improve confidence in spatial and vertical salinity trends.

- Examine by detailed statistical and spatial analyses as the dataset expands, to validate observed relationships between salinity, elevation, depth, and aquifer type.
- Consider developing a 3D visualisation of groundwater salinity, if further data collection provides sufficient spatial coverage. While not essential at this stage, a 3D model could serve as a useful communication tool for regulatory engagement or operating 'health checks'.
- Use updated results to inform site-specific risk assessments for groundwater discharge, particularly where more saline groundwater from lower elevations may pose a risk to receiving surface water environments.

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