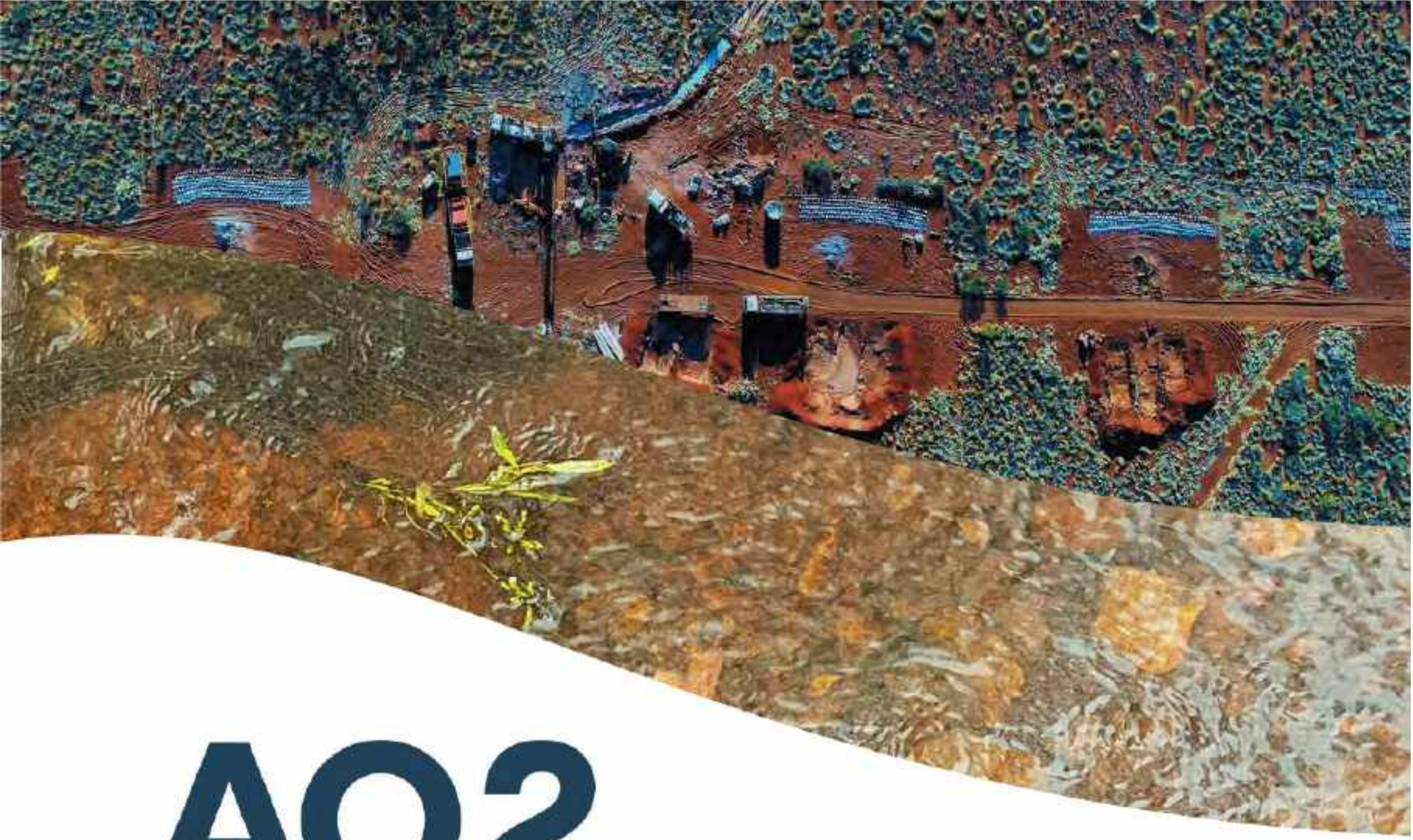
17.3 Appendix 3. AQ2 (2025a). Youanmi DFS Water Studies



YOUANMI DFS
WATER ASSESSMENTS

Prepared for:

Rox Resources

December 2025

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Table of Abbreviations

Abbreviation	Definition
2D	Two-dimensional
3D	Three-dimensional
AEP	Annual Exceedance Probability
AMD	Acid Mine Drainage
ANZECC	Australian and New Zealand Environment and Conservation Council
ARR	Australian Rainfall and Runoff
ARI	Annual Recurrence Interval
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
BOM	Bureau of Meteorology
CAD	Computer Aided Design
CL	Continuing Loss
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DBCA	Department of Biodiversity, Conservation and Attractions
DEM	Digital Elevation Model
DFS	Definitive Feasibility Study
DN	Diameter Nominal
DMIRS	Department of Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation
EC	Electrical Conductivity
EOH	End of Hole
ESA	Environmentally Sensitive Area
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority
ERD	Environmental Review Document
FFA	Flood Frequency Analysis
GDE	Groundwater Dependent Ecosystem
GDV	Groundwater Dependent Vegetation
GIS	Geographic Information System
GL/a	Giga Litres per Annum
GWL	Groundwater Licence
GWOS	Groundwater Operating Strategy
HDPE	High Density Polyethylene
HEC-RAS	Hydrologic Engineering Centre's River Analysis System
HSU	Hydrostratigraphic Unit
IECA	International Erosion Control Association
IFD	Intensity-Frequency-Duration
IL	Initial Loss
JV	Joint Venture
kL/d	Kilolitres per day
km	Kilometre
km^2	Square kilometres
LiDAR	Light Detection and Ranging
LoM	Life of Mine
LOR	Laboratory Limit of Reporting
L/s	Litres per Second
m	Metre
m/d	Metres per day
m/s	Metres per second
m^2	Metres squared
m^2/d	Metres squared per day
m^3	Cubic metres
m^3/s	Cubic metres per second
MAR	Managed Aquifer Recharge
Max	Maximum
magl	Metres above Ground Level

Abbreviation	Definition
mAHD	Metres Above Australian Height Datum
mbd	Metres Below Datum
mbgl	Metres Below Ground Level
mbTOC	Metres Below Top of Casing
MCP	Mine Closure Plan
MDEC	Mulga Downs Exploration Camp
meq/L	Milliequivalents per litre
mg/L	Milligrams per litre
ML/d	Mega litres per Day
mm	Millimetre
MP	Mine Plan
mRL	Metres Relative Level
µS/cm	MicroSiemens per cm
Mtpa	Million Tonnes per Annum
NASA	National Aeronautics and Space Administration
ND	Nominal Diameter
PAF	Potentially Acid Forming
PEC	Priority Ecological Community
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PMPF	Probable Maximum Precipitation Flood
PFS	Pre-Feasibility Study
PN	Pressure Nominal
PL	Proportional Loss
PSD	Particle Size Distribution
RFFE	Regional Flood Frequency Estimation
RFFP	Regional Flood Frequency Procedure
ROM	Run of Mine
QGIS	Quantum Geographic Information System
SCL	Stochastic Climate Library
SILO	Scientific Information for Landowners
SWL	Static Water Level
SWML	Surface Water Monitoring Location
SWMP	Surface Water Management Plan
SRTM	Shuttle Radar Topography Mission
TARP	Trigger Action Response Plan
TDS	Total Dissolved Solids
TDH	Total Dynamic Head
TEC	Threatened Ecological Community
TPH	Total Petroleum Hydrocarbons
TSF	Tailings Storage Facility
V	Volt
VWP	Vibrating Wire Piezometer
WRD	Waste Rock Dump

1. INTRODUCTION

1.1 Project Overview

Rox Resources is planning to restart mining at the Youanmi Project (the Project), located about 115 km southeast of Mount Magnet in the East Murchison Mineral Field of Western Australia. Gold mining has taken place at Youanmi for more than 100 years since 1908, with periods of no activity from 1942 to 1987 and from 1997 to the present day. The last period of operation from 1987 to 1993 and 1995 to 1997 resulted in the excavation of a number of open cut mine pits comprising Main Pit, United North, Kathleen, Rebel/Kurrajong, Laterite and Bunker. Underground workings were developed extending beneath Main Pit with the Main Lode and Pollard workings. Following the cessation of mining and active dewatering in 1997, the workings were abandoned and the underground mines and pits were allowed to fill with groundwater.

Rox Resources proposes to restart mining at Youanmi by significantly extending the existing underground workings to form three separate underground mining areas, comprising Main Lode, Pollard and United North. This work requires groundwater and surface water work to be carried out at Youanmi to support mining to restart. The Project needs to consider water supply studies, hydrological flood studies, dewatering investigations, site water balance and associated environmental impact studies.

This report details the outcomes of AQ2's assessments on the different water-related aspects of the Project. The report provides an overview of the water-related assessments conducted and the proposed water management strategies to be implemented on site to reduce the environmental impact of the project on the hydrological environment.

1.2 Key Issues

The key issues of the project related to water management are as follows:

- Groundwater inflow into the Main Pit and existing underground mine since previous mining activities ceased needs to be removed prior to mining recommencing. During mining, there will be a requirement for ongoing dewatering.
- Dewatering required to empty the mine workings and then to facilitate ongoing mining needs to be managed (by storage, reuse or disposal).
- The mining operations require a reliable water supply which needs to meet the specifications for different uses.
- A drainage line lies to the west of the pit development and the proposed processing facilities and the risk of flooding to the mine operations needs to be quantified.
- A new Tailings Storage Facility is proposed to support the restarting of mining. The potential impact of the TSF on the environment (including groundwater and surface water flows) is required to be considered.

1.3 Study Methodology

To address the key issues described above, the following study components have been completed:

- Surface water hydrology studies covering:
    - Definition of key catchment areas.
    - Estimation of peak flow rates through key drainage lines for different recurrence interval events.
    - Hydraulic flood modelling of the key drainage lines.
    - Comparison of flood model extents to proposed mine development footprint.
    - Identification of surface water mitigation measures.

- Dewatering studies covering:
    - Review of historical site dewatering reports.
    - Groundwater chemistry assessment.
    - Production of a conceptual groundwater model.
    - Prediction of groundwater inflow rates into the existing pits and planned underground mines.
    - Assessment of groundwater drawdown due to dewatering operations.
- Integrated site water balance development:
    - Defining different water quality streams required by the mine to meet different demands.
    - Quantifying mine water demands and water circuit losses (for the different water quality streams).
    - Comparing the mine water demands to the available water sources (for different streams).
    - Quantifying mine water shortfalls and surpluses for the different water quality streams.
    - Use the above information to define design flow rates for the design of water supply and water discharge systems.
- Water supply options study covering:
    - Review of relevant existing hydrogeological, hydrological reports.
    - Identify potential water sources.
    - Scoping drilling programs to define the yield from different borefield options.
- Hydrogeological TSF assessment covering:
    - Hydrogeological assessment of the TSF construction.
    - Assessment of the potential impacts of seepage from the TSF on local groundwater.
    - Scoping monitoring bore requirements.

2. BACKGROUND

2.1 Location

Youanmi Mine is located approximately 100 km east of the Great Northern Highway, within the East Murchison Mineral Field of Western Australia. It lies about 480 km northeast of Perth, 115 km southeast of Mount Magnet, 80 km southwest of Sandstone and 100 km northeast of Paynes Find. Its location is shown in Figure 2.1. It is located within the central portion of the Youanmi Greenstone Belt, within the Southern Cross Province of the Archaean Eon Yilgarn Craton.

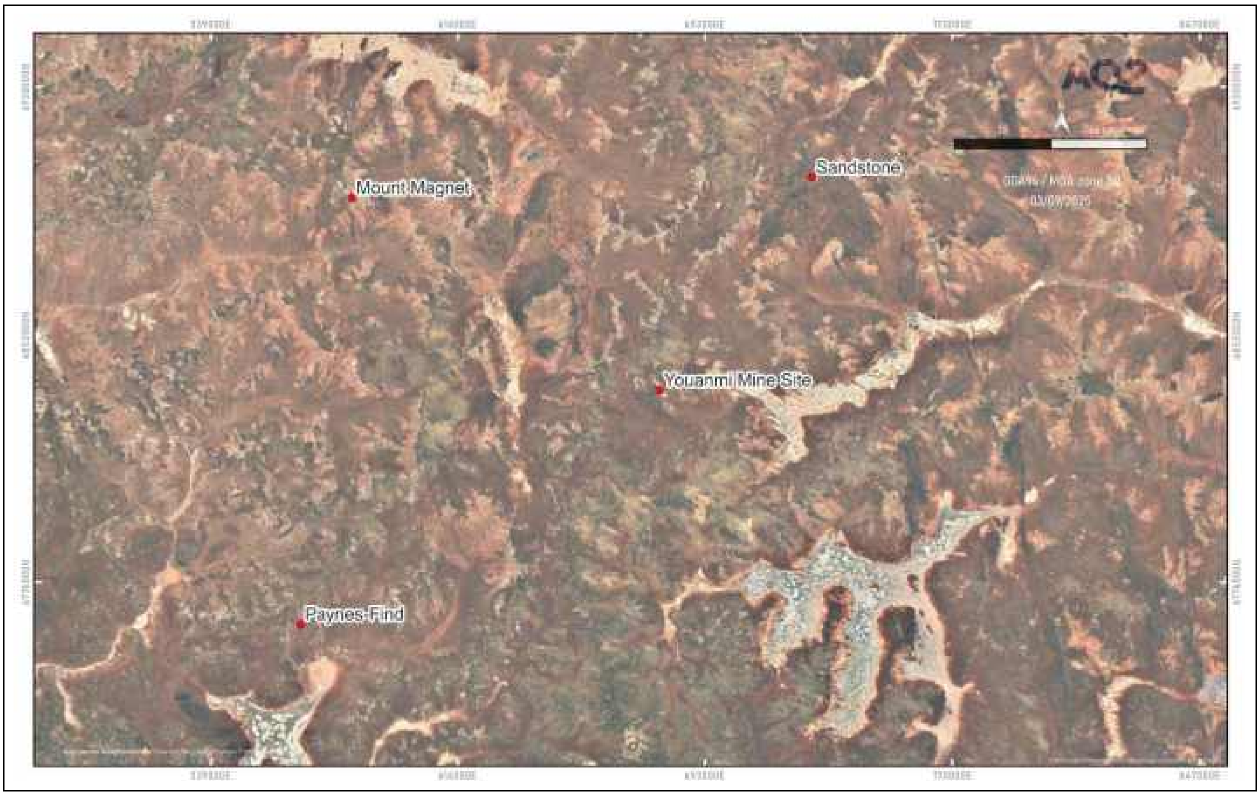


Figure 2.1 Youanmi Location

2.2 Project History

Gold was first discovered at Youanmi in the mid-1890s by prospector Tom Payne. After a slow start, prospectors moved into the area in 1907 and the Youanmi Gold Mine was set up in 1908. The Youanmi townsite was gazetted in August 1910 and underground gold mining was successfully carried out until 1921, with a second period of production from 1937 to 1942. During these two periods of operation, it is reported that 276,000 ounces of gold was produced. In 1942 the Youanmi Gold Mine closed and the town was abandoned.

Gold mining activities recommenced at Youanmi from 1987 to 1993 by Eastmet Ltd and several open pits were developed and mined. This period of open pit operations produced approximately 262,700 ounces of gold. From 1995 to 1997 the operations passed to Gold Mines of Australia Ltd, who further developed underground mining that had been started under Eastmet control. This period of underground operations yielded approximately 128,200 ounces of gold. The Youanmi mine was closed in November 1997 due to a combination of a low gold price and a failure to meet production targets. The shutdown left a number of open cut mine pits comprising Main Pit, United North, Kathleen, Rebel/Kurrajong, Laterite and Bunker, with underground workings extending beneath Main Pit, with the Main Lode and Pollard workings. Following the cessation of mining and active dewatering in 1997, the workings were abandoned and the underground mines and pits were allowed to fill with groundwater. The surface layout of the workings are shown in Figure 2.2, (taken from an Animal Plant Mineral report dated June 2014).

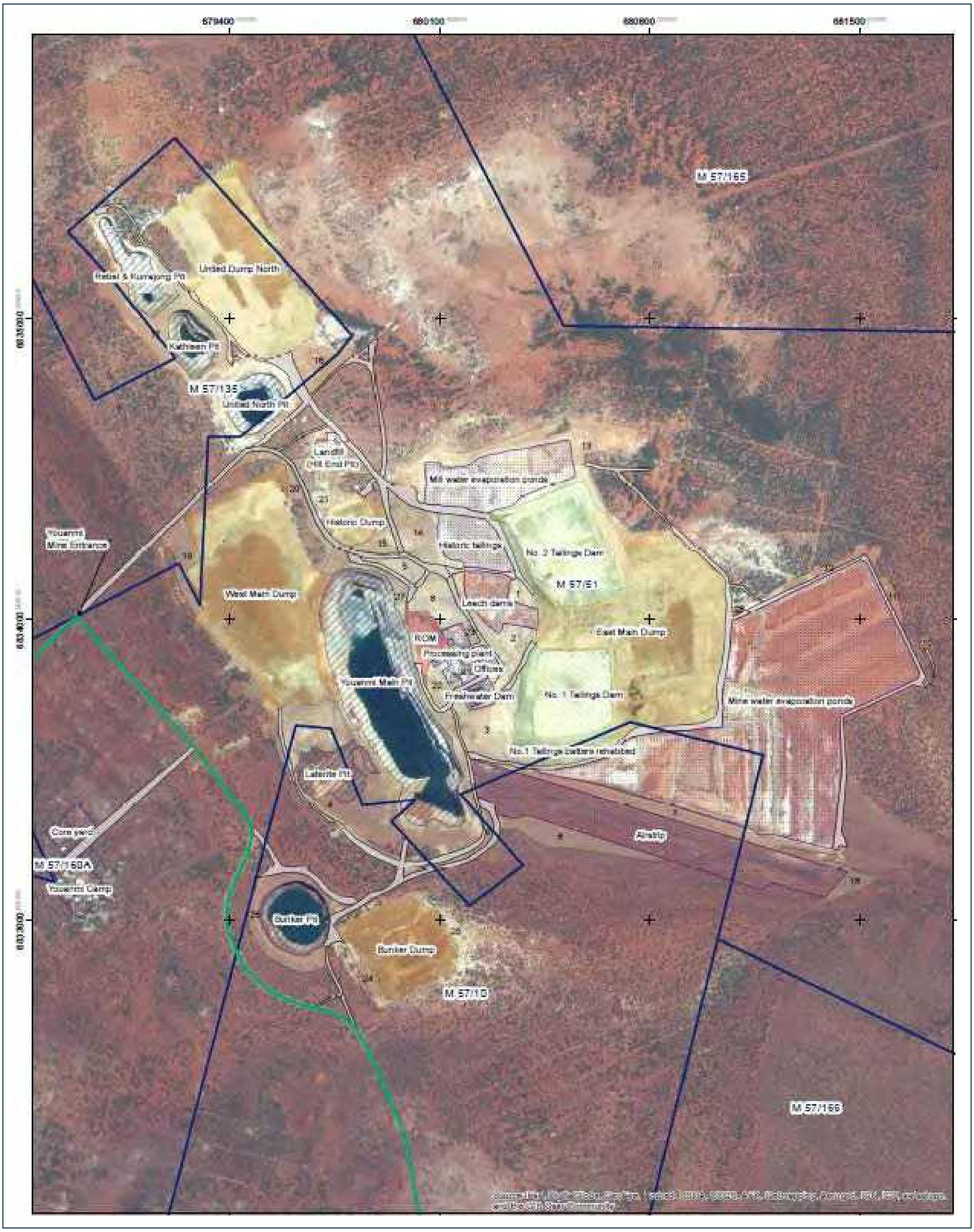


Figure 2.2 Youanmi Existing Mine Layout (APM, 2014)

2.3 Climate

2.3.1 General

The Youanmi site is in a region with a Köppen climate classification of hot (summer drought) grassland with hot dry summers and cold winters (BOM 2025a). The closest weather station to the site is Sandstone (012072); details of the station are shown in Table 2.1.

The average annual daily maximum temperature at Sandstone is 27.3°C, with average monthly daily maximum temperature in summer of 35.8°C and in winter of 5.1°C. Individual daily maximum temperatures can exceed 40°C during the summer and minimum temperatures close to 0°C can occur during winter.

Average monthly rainfall is low across all months of the year with the highest monthly average rainfall depths occurring in January to March. The average rainfall in these months is likely to be driven by the occurrence of rare, large rainfall events which result in the monthly rainfall totals for January to March being highly variable. Average monthly evaporation rates exceed the average monthly rainfall throughout every month of the year, with runoff events are generated by short-duration intense rainfall events.

Table 2.1 Sandstone Weather Station Details

Site Name	BOM Site Number	Rainfall Data Period	Distance From Site (km)
Sandstone	012072	1904 -2025	80

Table 2.2 Sandstone Monthly Climate Statistics (source BOM 2025b)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max Temp (°C)	35.8	35.5	32.4	27.7	22.1	18.2	17.5	19.6	24.1	27.6	32.4	35.3	27.3
Mean Min Temp (°C)	21.3	20.9	18.4	14.1	9.3	6.3	5.1	8.8	8.8	11.8	16.6	19.8	13.2
Mean Rainfall (mm)	30.8	33.3	29.3	19.3	26.0	26.2	22.4	18.0	7.7	8.5	11.3	16.7	249.7
Mean Pan Evaporation (mm) *	411	331	292	186	120	81	83	109	170	257	320	389	2750

* Pan evaporation taken from BOM maps of average pan evaporation for the Youanmi site location

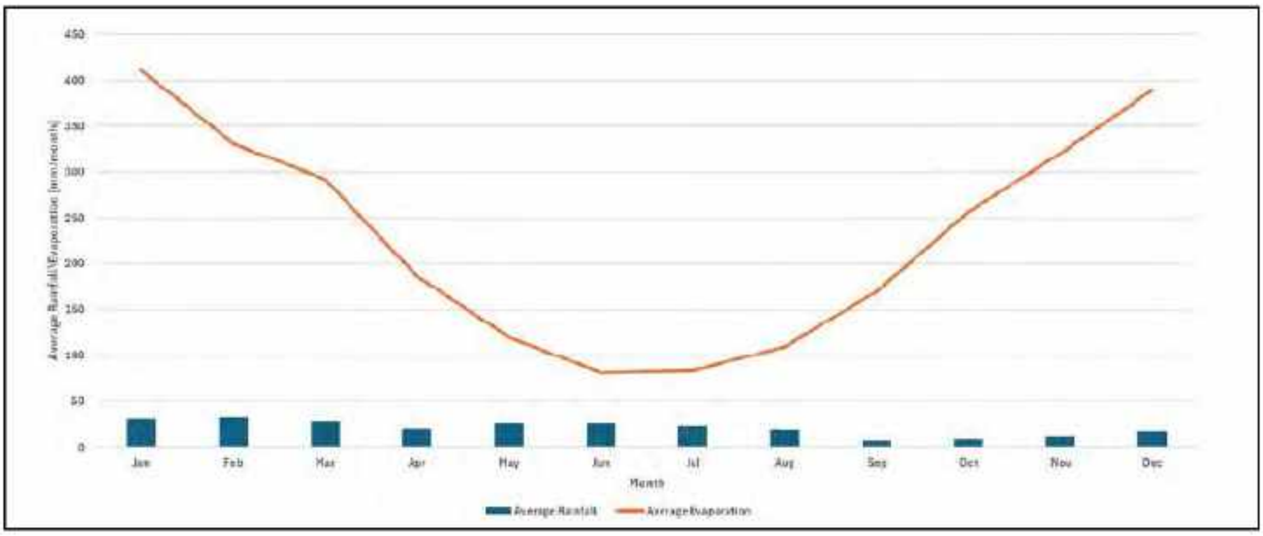


Figure 2.3 Sandstone Monthly Average Rainfall vs Evaporation

2.3.2 Rainfall

Daily rain records are available from the Sandstone Weather Station (station 012072) between 1904 to 2025, noting the station is still open. The data shows that the frequency and magnitude of rainfall events is highly variable. Large rainfall events are typically a result of rain-bearing depressions from ex-tropical cyclones passing through the area in summer.

The daily rainfall record is shown in Figure 2.4 and over the recorded rainfall period there have been about 7 daily rainfall events which were in the order of 100 mm or higher (average recurrence interval of ~20 years). The highest daily rainfall total recorded at Sandstone was 144 mm on 24 February 1975 and associated with the passing of Cyclone Trixie through the region. Note that this rainfall total was actually recorded over a 2 day period (with no recording on 23 February). The event resulted in a total of 281 mm over four days. Another significant rainfall event occurred on 13 January 1939 (127 mm) following a cyclone which struck the Pilbara.

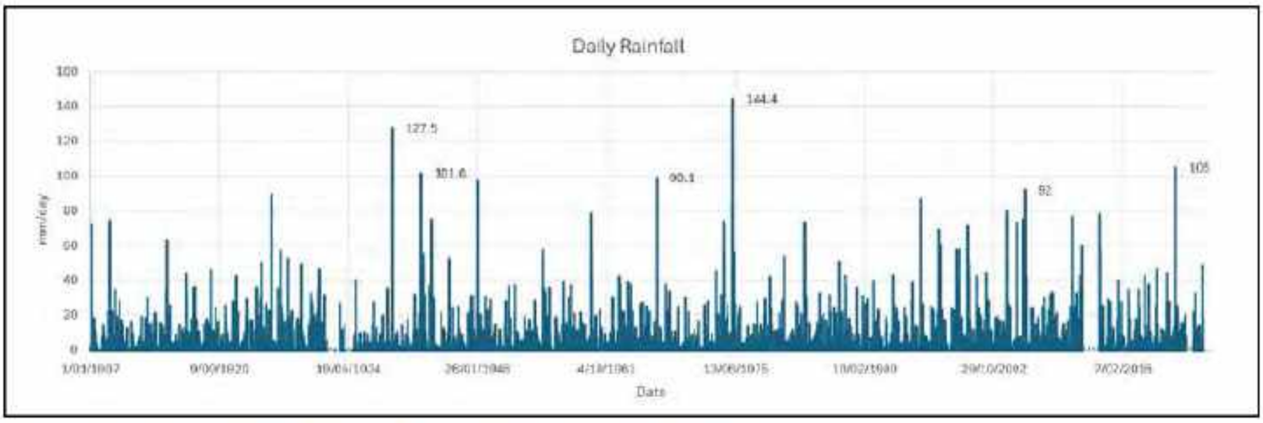


Figure 2.4 Daily Rainfall from the Sandstone Station (012072)

Rainfall IFD data was sourced from BOM for the Project location. The IFD data is shown in Table 2.3.

Table 2.3 IFD Rainfall Depth

Duration	63.20%	50%	20%	10%	5%	2%	1%
1 min	1.11	1.34	2.14	2.76	3.43	4.4	5.24
2 min	1.86	2.25	3.62	4.68	5.78	7.47	8.92
3 min	2.55	3.09	4.96	6.4	7.92	10.2	12.2
4 min	3.16	3.83	6.14	7.91	9.79	12.6	15
5 min	3.7	4.48	7.17	9.24	11.4	14.7	17.5
10 min	5.67	6.86	11	14.1	17.5	22.5	26.8
15 min	6.97	8.43	13.5	17.4	21.6	27.7	32.9
20 min	7.93	9.59	15.3	19.8	24.6	31.6	37.5
25 min	8.7	10.5	16.8	21.7	26.9	34.6	41.2
30 min	9.33	11.3	18.1	23.3	28.9	37.2	44.3
45 min	10.8	13.1	20.9	26.9	33.4	43.1	51.3
1 hour	11.9	14.4	23	29.7	36.8	47.5	56.6
1.5 hour	13.6	16.4	26.2	33.8	41.9	54	64.5
2 hour	14.9	18	28.7	36.9	45.8	59.1	70.5
3 hour	17	20.4	32.6	41.9	52	67.1	80
4.5 hour	19.4	23.3	37.1	47.7	59.2	76.3	91

Duration	63.20%	50%	20%	10%	5%	2%	1%
6 hour	21.3	25.6	40.6	52.3	65	83.8	99.8
9 hour	24.3	29.2	46.3	59.7	74.4	95.7	114
12 hour	26.7	32	50.7	65.5	81.8	105	125
18 hour	30.2	36.2	57.4	74.3	93.2	120	143
24 hour	32.7	39.2	62.3	80.9	102	131	156
30 hour	34.6	41.4	66	86	108	140	167
36 hour	36.1	43.2	69	90.1	114	147	175
48 hour	38.2	45.7	73.4	96.2	122	158	188
72 hour	40.7	48.7	78.5	103	132	171	205
96 hour	42	50.3	81.2	107	137	178	214
120 hour	42.9	51.3	82.6	109	139	182	218
144 hour	43.4	52	83.4	109	141	183	220
168 hour	43.9	52.5	83.9	109	141	184	221

2.4 Topography

The mine site is situated on a ridge with an elevation of approximately 470 mRL. On both sides of the ridge, the terrain transitions into relatively flat areas that form the surrounding catchments. Within the mine site, several waste dumps are located near the Kathleen pits and the main pit areas, with crest elevations reaching around 490 mRL. The overall topographic gradient of the area generally slopes from the northwest towards the east-southeast, influencing the natural surface water flow paths across the site.

Figure 2.5 Youanmi Mine Site Topography

2.5 Hydrology

2.5.1 Regional Hydrology

The Youanmi mine site is located within the broader Reaside-Ponton catchment (DWER 2025), which forms part of an extensive regional drainage system. Within that drainage system, the Lake Noondie catchment is extensive. The mine site is located towards the top of the Lake Noondie catchment with drainage from the site reporting to a tributary of one of the main Lake Noondie drainage lines. The drainage path from the mine site to Lake Noondie is approximately 28 km.

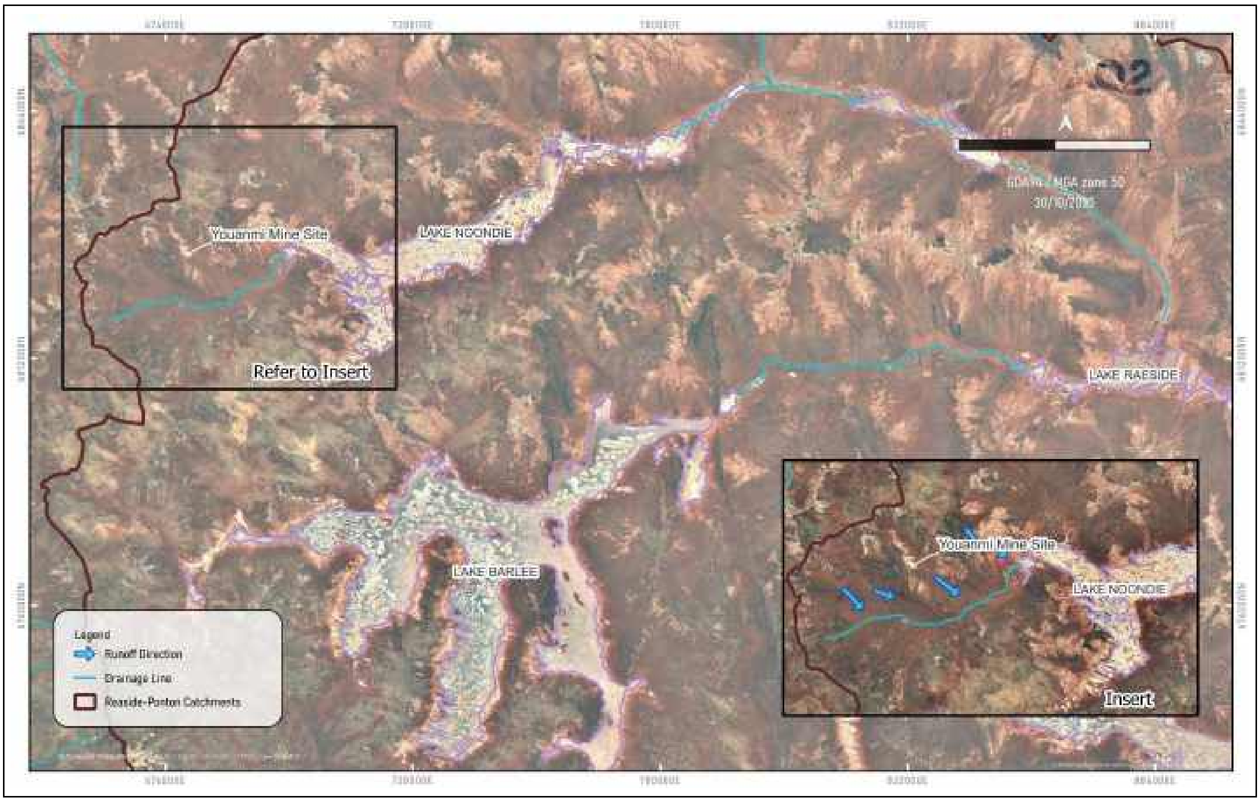


Figure 2.6 Regional Hydrology

2.5.2 Local Hydrology

The existing pit areas (other than Bunker Pit) are located along a localised ridge line with runoff from the ridge line flowing to the east or west. The ridge line acts as a catchment divide to two localised surface water catchments, which convey water through the Project area, which are referred to as Catchment A and B for this report. Catchment A and B converge immediately downstream of the mining area with any drainage flow continuing from the convergence point to Lake Noondie (refer Figure 2.7).

Catchment A, located to the west of the ridge commands a catchment area of 37 km^2 to the point where it converges with Catchment B. Catchment A contains a defined creek line (named Western Creek for this report) with a sandy/gravelly base and hosts the historic water supply bores for the Youanmi townsite.

Catchment B commands catchment area of 70 km^2 and is located on the eastern side of the ridge. Although in the upper parts of the catchment defined creek channels are apparent, the main drainage path within this catchment adjacent to the Project (Eastern Creek) is poorly defined, with flow likely to be characterised by a broad area of concentrated shallow sheetflow.

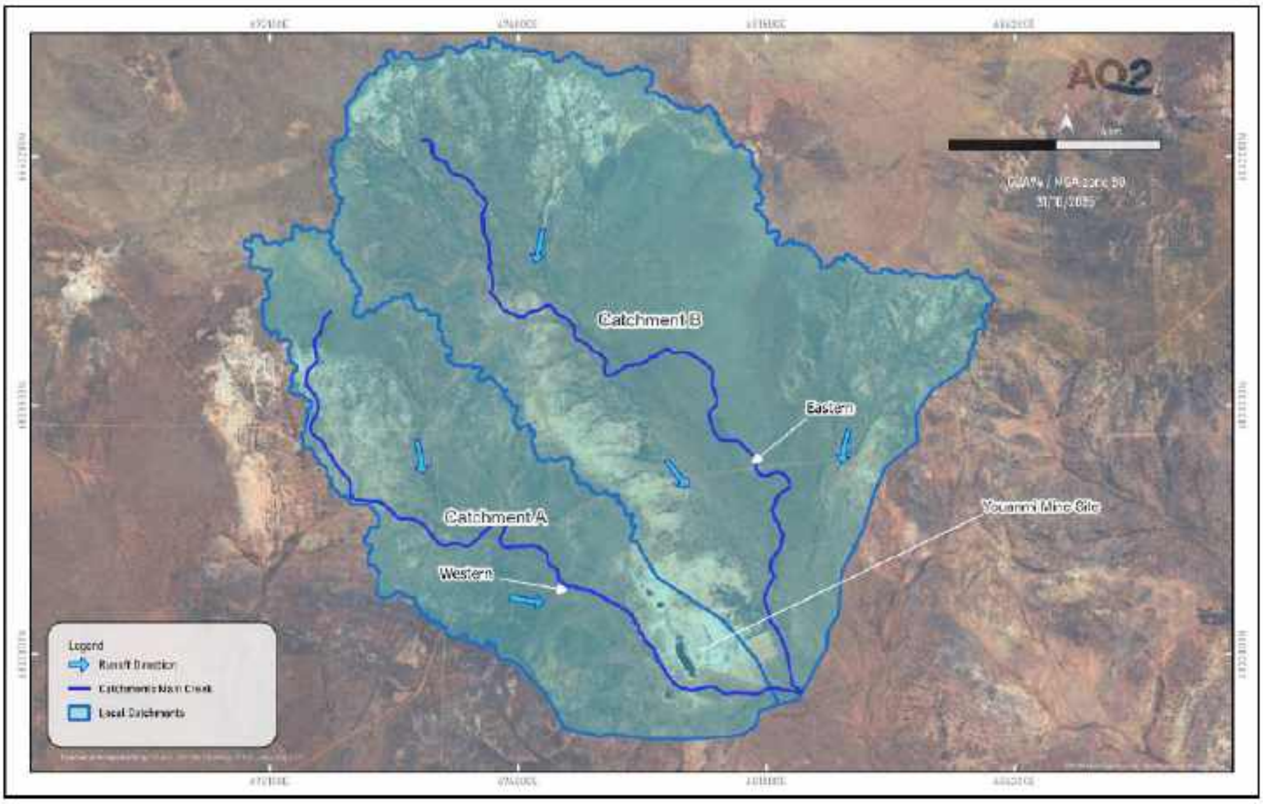


Figure 2.7 Local Hydrology

2.6 Geology

2.6.1 Regional Geology

Youanmi is located within the central portion of the Youanmi Greenstone Belt, which is part of the Archaean Eon, Yilgarn Craton of Western Australia. The Youanmi Greenstone Belt is about 80 km long and 25 km wide and is made up of a series of metamorphosed sedimentary and volcanic strata that have been intruded by granitoids. It has been subjected to multiple periods of deformation, which produced major regional scale shear zones. The Youanmi Greenstone Belt consists of komatiitic and tholeiitic basalts, banded iron formation, felsic volcanics, minor sedimentary units and chert horizons. Dolerite dykes, porphyry dykes and sills are common within it.

One of the major structural features of the Youanmi Greenstone Belt is the Youanmi Shear Zone, which trends north northeast to south southwest and is a faulted area in which gold mineralisation has been localised. The greenstone sequence is flanked by granitic intrusions, such as the Youanmi and Pollelle batholiths. The upper part of the greenstone sequence is weathered and laterite is present. Alluvial deposits of up to 20 m thickness overlie the weathered greenstones beneath some of the drainage channels.

2.6.2 Local Geology

The outcrop and bedrock geology in the Youanmi deposit area are shown in Figure 2.6 and Figure 2.9.

The geology of the local area at Youanmi is dominated by the Youanmi fault, which generally separates schistose and gneissic granitic rocks to the north and east from greenstones to the west and south. The position of the Youanmi Fault is shown in Figure 2.8 (Rockwater, October 2021), together with the Archean granites and greenstones contact. The greenstones generally comprise mafic volcanic and volcaniclastic strata with minor banded iron formation (BIF) and chert horizons. The geology of the mine area is made up of a north to northwest trending greenstone succession consisting of strongly magnetic tholeiitic basalt, sheared basalt, BIF and mafic schist. To the east, this is bounded by an adamellite batholith, called the Youanmi Granite. Dykes and sills are common in the area. There are several approximately east to west trending faults that crosscut the mining area, comprising:

- Kurrjong North Fault, that passes the northern tip of Kurrjong Pit.
- Kathleen Fault, that bisects the Kathleen Pit.
- Hillend Fault, that runs between Hillend Pit and Main Pit.
- Main Pit Fault, that runs through the northern half of Main Pit.

The fault locations are shown in Figure 2.8.

The gold mineralisation at Youanmi is hosted in the Mine Lode Shear Zone, a 1 to 25 m wide shear zone that has been traced along strike for over 2.3 km and down dip for 1,100 m, and a series of footwall and hanging wall shear zones. The mineralisation is generally within 100 m of the shear zone and mainly takes the form of sulphide replacement styles, where extensive replacement of magnetite in the host sequence has occurred. The Sulphide replaced shear zones are structurally controlled and favour a position at or around the greenstone-granite contact. The greenstone-granite contact has variable dips of between -50° to -70°W and strikes at 330°. Granite hosted gold mineralisation occurs at several sites, most notably Grace and the Plant Zone Prospects. Gold mineralisation is hosted in strong sericite altered granite, shear veins and quartz breccia-style veins. A cross-section of the Youanmi deposit (through the Main Pit), showing the granite and mafic contact and locations of the mineralised lodes is illustrated in Figure 2.9.

The upper part of the greenstones is weathered and lateritised, and there is up to 20 m of alluvium beneath the drainage lines.

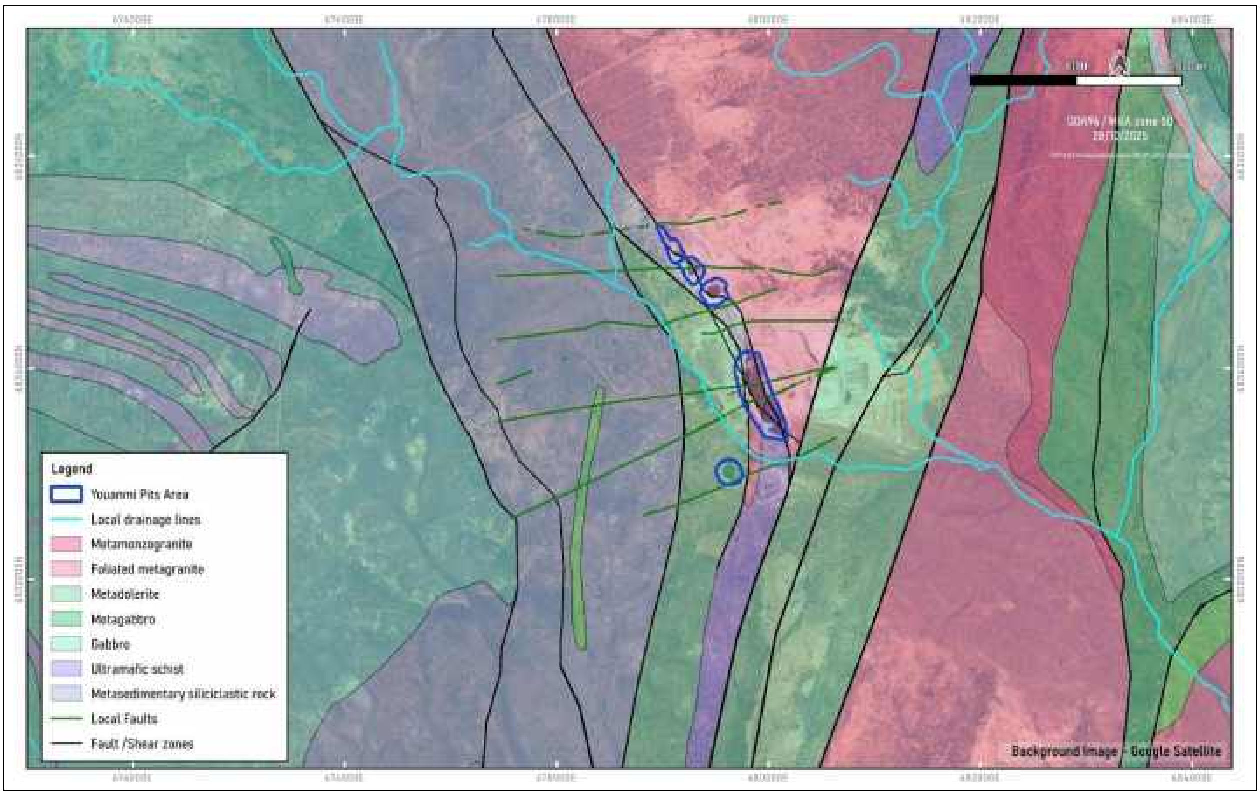


Figure 2.8 Youanmi Project, Local Bedrock Geology

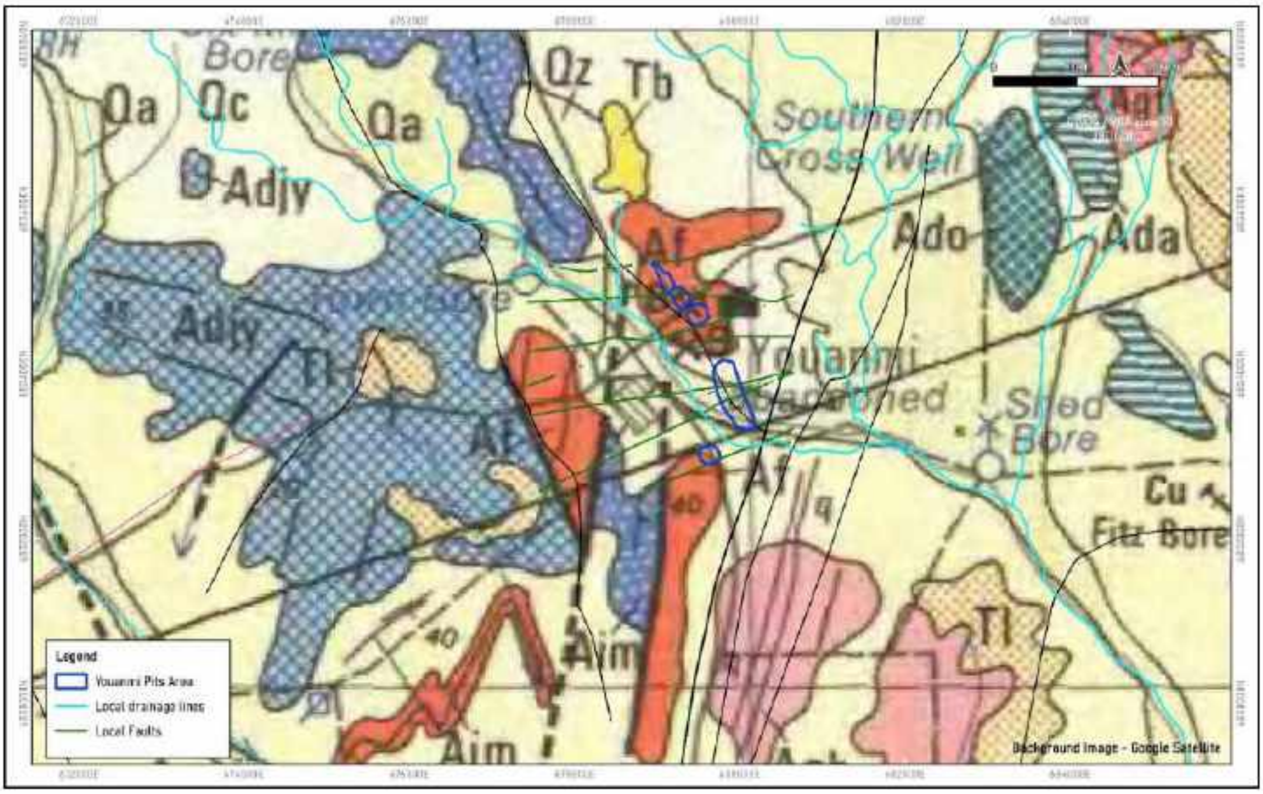


Figure 2.9 Youanmi Project, Local Outcrop Geology

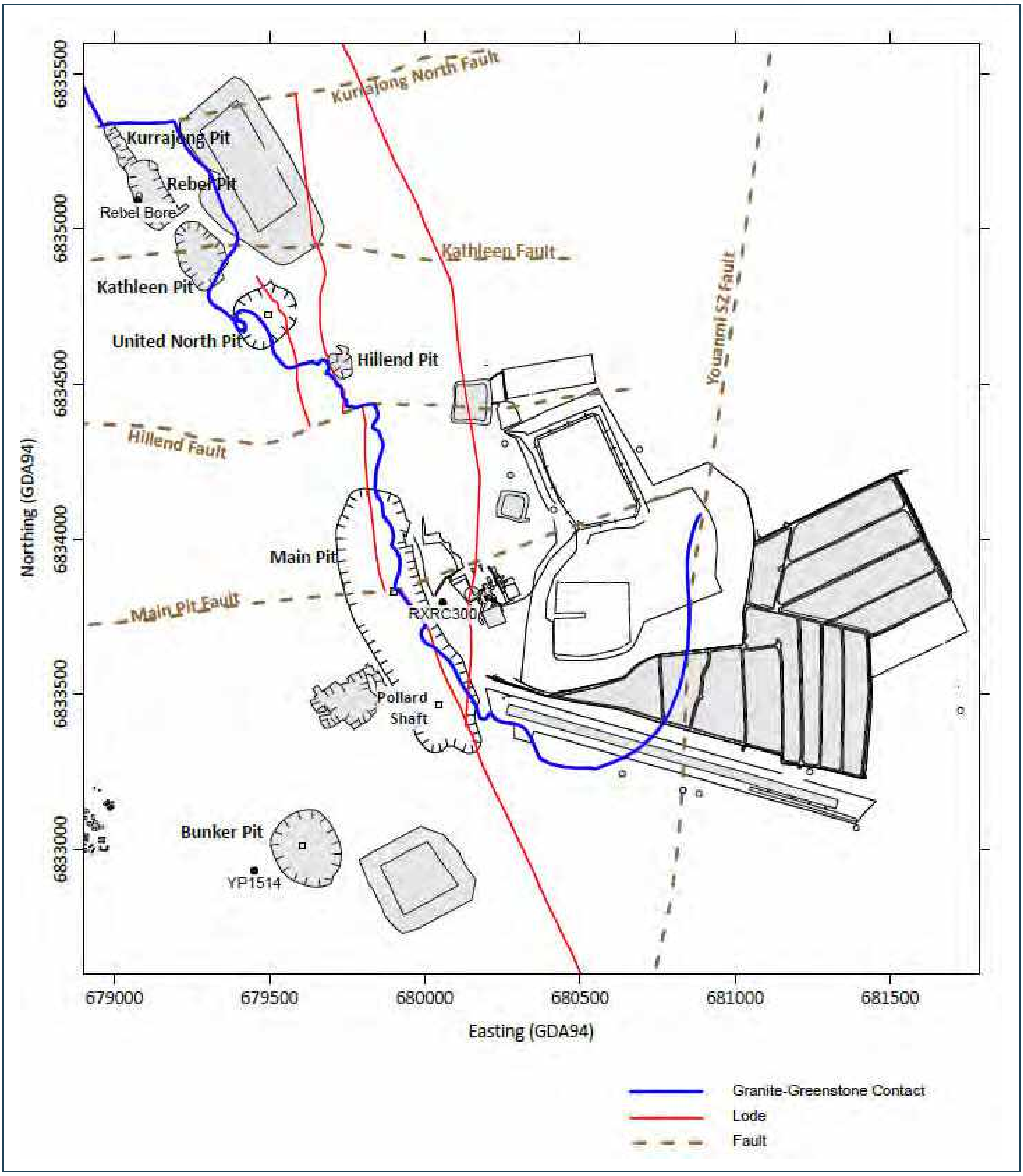


Figure 2.10 Youanmi Faulting and Site Layout (Rockwater, 2021)

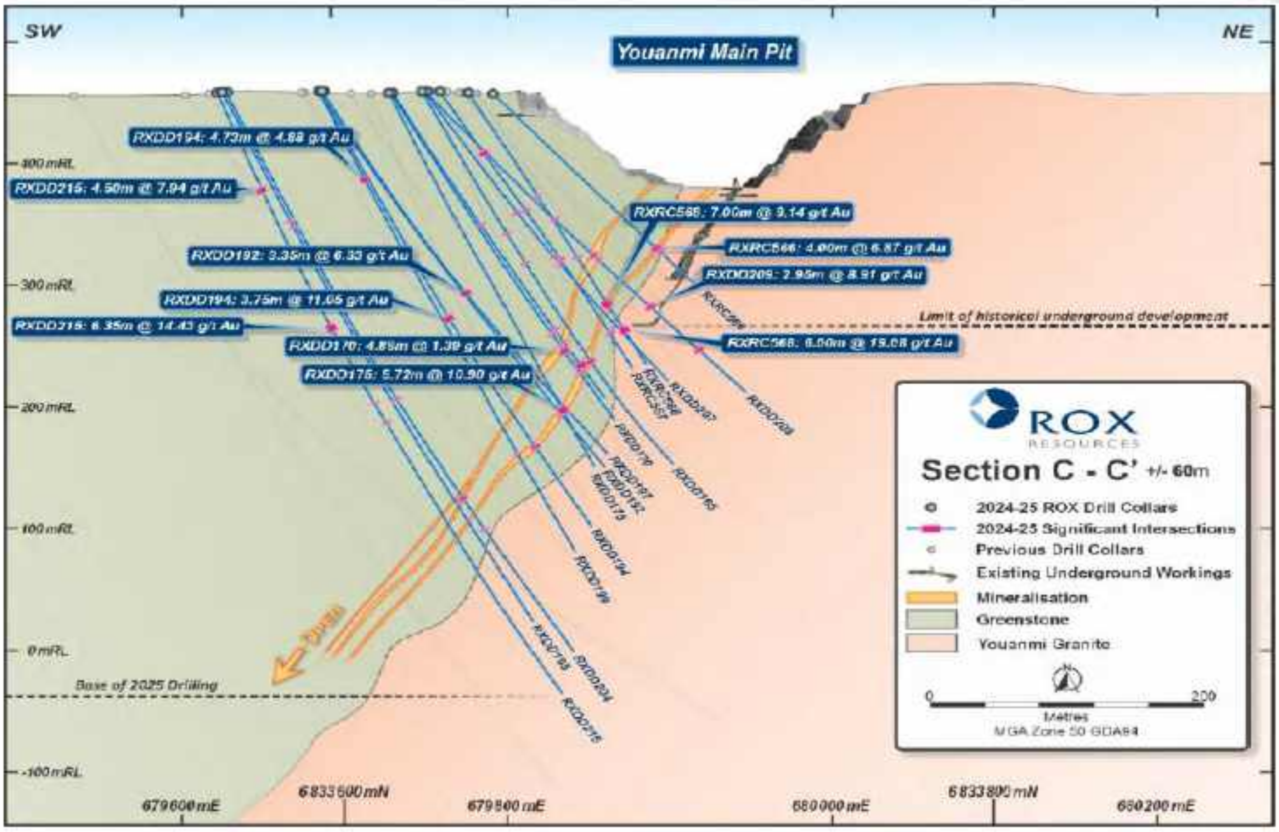


Figure 2.11 Simplified Cross-Section Through Youanmi Deposit Main Pit (Rox, 2025)

2.7 Hydrogeology

2.7.1 Regional Hydrogeology

The regional area around Youanmi is underlain by weathered and fractured Archaeon Eon bedrock that hosts the bulk of the available groundwater in the area. The Archaeon bedrock has been subject to multiple phases of deformation and metamorphism and consequently has little to no primary porosity. It is characterised by secondary permeability resulting from chemical weathering of fracture systems. Fractured rock aquifers are developed in greenstone rocks such as mafic and ultramafic volcanic rocks, with minor groundwater supplies present in fractured granitoid rocks. Weathering profiles containing vugs can be developed in ultramafic and carbonatite rocks and these can host small scale groundwater supplies. Open fractures containing groundwater are often within the top 50 m below ground level with open fracture density decreasing with depth down to around 100 m and largely being closed below that depth. Areas of faulting and fracturing, such as shear zones, provide deeper zones of fracturing and more extensive groundwater resources. Fractured aquifers can be of high transmissivity, but are typically of low storage and groundwater yields from them can rapidly decline with continuous abstraction.

The Archaeon bedrock is covered by alluvium and in places by palaeochannel deposits. The alluvium can be clayey in nature with consequent low permeability, but where it is sandier can be a small scale thin aquifer. The Youanmi area contains one of the westernmost arms of the Raeside Palaeochannel. This is a regional palaeochannel system that extends from north of Sandstone, to the southeast to its confluence with the Rebecca and Roe Palaeochannels. Laid down in the Tertiary and infilling former river valleys, the palaeochannels are typically filled with a basal fluvial sand aquifer overlain by a clay layer. Where the basal sand is present, it can represent a significant aquifer system. However, the upper reaches, such as at Youanmi, are often shallow and can be largely clay filled.

Groundwater movement is slow, and water table gradients are low with discharge points often being at the salt lakes. Groundwater recharge is low and most recharge is likely to occur during heavy rainfall events and will be augmented by infiltration from surface runoff and local flooding. Groundwater quality is variable, but generally poor. The least saline water with a salinity of less than approximately 4,600 µS/cm (3,000 mg/L TDS (total dissolved solids)) occurs furthest from the salt lakes in shallow aquifers in colluvium and alluvium or near surface water watersheds, particularly in granite terrain. Groundwater in aquifers over greenstones commonly has salinity values of well over 7,700 µS/cm (5,000 mg/L). Groundwater in fractured aquifers at depth is usually hypersaline.

2.7.2 Local Hydrogeology

The Youanmi mine is located between two minor creek surface water sub-catchments, both of which flow to the southeast and converge at a confluence about 3 km east-southeast of the mining area. The mining area forms a minor surface water divide between the two catchments, with surface water runoff draining both east and west from it. The subdued valley areas of the catchments are underlain by alluvium and colluvium which can be up to 20 m thick. Below this is weathered Archaean bedrock, weathered into saprolite above fresh bedrock. Where they are saturated, the alluvial deposits form a minor aquifer capable of small groundwater yields. The overlying ephemeral creeks recharge the alluvium during high flow and flooding events and the frequence of this means that groundwater in the alluvium aquifer can have much lower salinities than is found in the underlying Archaean bedrock.

As shown in Figure 2.3, the Youanmi mine is situated close to the contact zone between granitic rocks to the north and east and the greenstone mafic and felsic volcanic rocks and intermittent banded iron formation to the south and west. The aquifer system in the area is complicated, with the multiple east west striking faults (Kurrajong North, Kathleen, Hillend and Main Pit Faults) forming low permeability and semipermeable barriers to compartmentalise the bedrock aquifer system. This results in different groundwater levels and salinities in each fault controlled block. Where fracturing extends to depth, deep bedrock aquifer systems are present, but are structurally controlled and are anisotropic. Groundwater recharge to the bedrock aquifers occurs where they outcrop at surface and through leakage from the overlying alluvial cover.

The highest levels of aquifer permeability are likely to be in the mineralised shear zones, the BIF, the chert and to a lesser extent, in transition zone strata. Permeability in the fractured zones is likely to decrease with depth as fractures become increasingly closed. However, a drive at the 1050 level (50 mAHD) intersected large groundwater flows when it cut the Main Pit Fault in BIF. This high permeability zone extends down to at least the 940 mRL (-60 mAHD) level.

Pre-mining groundwater levels were probably around 20 m below ground level and shallower under the drainage lines. However, there are no historic groundwater level records in the area prior to mine development. The original water table would have declined downwards to the south at a low gradient and natural groundwater flow would have been towards the south and southeast. Rockwater (2022) report that data from the Department of Water and Environmental Regulation (DWER) Water Information Reporting (WIR) database shows a groundwater gradient towards the south of 0.0052 in the area north of Town Well (bore 94TWRC1, 1.5 km due west of Kathleen Pit), and 0.0016 in the area to the south. Ultimately the groundwater flow will feed the Lake Noondie palaeodrainage, south of Youanmi and a tributary of the Raeside palaeochannel. Refer to Section 3.2.5 for the most recent water level monitoring data.

Groundwater salinities are highly variable and change both laterally and vertically. Groundwater salinity increases with depth and this was seen in the historic Youanmi underground workings. In 1996 salinity levels in the Hillend workings were about 13,460 µS/cm (8,750 mg/L TDS), but increase to around 287,460 µS/cm (186,850 mg/L TDS) in the Youanmi Deeps. The salinity of the dewatering water produced from United North and Bunker Pits increased as groundwater levels were lowered. Groundwater salinity values for different workings were reported by Rockwater (2021) and are shown in Table 2.3.

Table 2.4 Youanmi Workings Groundwater Salinity Values

Location	Date	Level/RL	EC (µS/cm)	Salinity (mg/L TDS)
Main Pit	December 2020		43,080	28,000
Rebel Pit Bore	November 2011		1,690	1,100
United North Pit	June 1996		9,250	6,010
Hillend Underground	June 1996		13,460	8,750
Youanmi Deeps	March 1996	Level 6	3,030	1,970
Youanmi Deeps	April 1996	Level 8	287,460	186,850
Youanmi Deeps	April 1996	1050 RL	192,300	125,000
Pollard Shaft	June 1996		7,380	4,800
Bunker Pit	May 1996		6,820	4,430
Kathleen Pit	December 1996		2,115	1,375

Note: Data taken from Rockwater, (2021).
Key: RL – Reduced Level, EC – Electrical Conductivity, TDS – Total Dissolved Solids

Groundwater salinity in shallow pastoral wells within 10 km of Youanmi was reported by Rockwater (2022) to range from 1,260 to 14,310 µS/cm (820 to 9,300 mg/L TDS) (from DWER WIR database). Refer to Section 3.2.6 for the most recent water quality monitoring data for the pit lakes and monitoring bores.

A more comprehensive description of the local hydrogeology and the conceptual hydrogeological and inflow models for the Project area are presented in Sections 3 and 5.

2.8 Existing Water Use

2.8.1 Groundwater Dependent Ecosystems

2.8.1.1 Wetlands and Vegetation

Groundwater Dependent Ecosystems (GDE) include biological assemblages of species such as wetlands or vegetation that use groundwater either opportunistically or as their primary water source.

The Bureau of Meteorology (BOM) has developed the Groundwater Dependent Ecosystems Atlas (GDE Atlas) as a national dataset of Australian GDEs to inform groundwater planning and management (BoM, 2023). The GDE Atlas contains information about three key types of ecosystems:

- Aquatic ecosystems that rely on the surface expression of groundwater; this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs.
- Terrestrial ecosystems that rely on the subsurface presence of groundwater; this includes all vegetation ecosystems.
- Subterranean ecosystems; this includes cave and aquifer ecosystems.

The BOM GDE Atlas shows no aquatic GDEs (i.e., no wetlands of environmental significance) present in the vicinity (10 km radius) of the Youanmi project area. The nearest wetland is an ephemeral salt lake (Lake Noondie) located 23 km east of the mine site within the Murchison bioregion. The Youanmi mine site area is mapped with terrestrial GDEs of low and medium potential (Figure 2.12)which are as follows:

- Low potential terrestrial GDE described as plains with quartz mantles supporting mulga shrublands locally with wanderrie grasses.
- Medium potential terrestrial GDE described as gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga.

Notwithstanding, the moderate and low potential GDE areas are also mapped as being respectively highly likely and likely to be inflow dependent ecosystems (IDE), reliant on water sources in addition to rainfall, such as water stored in the unsaturated zone, surface water or groundwater (BOM, 2024, Figure 2.13).

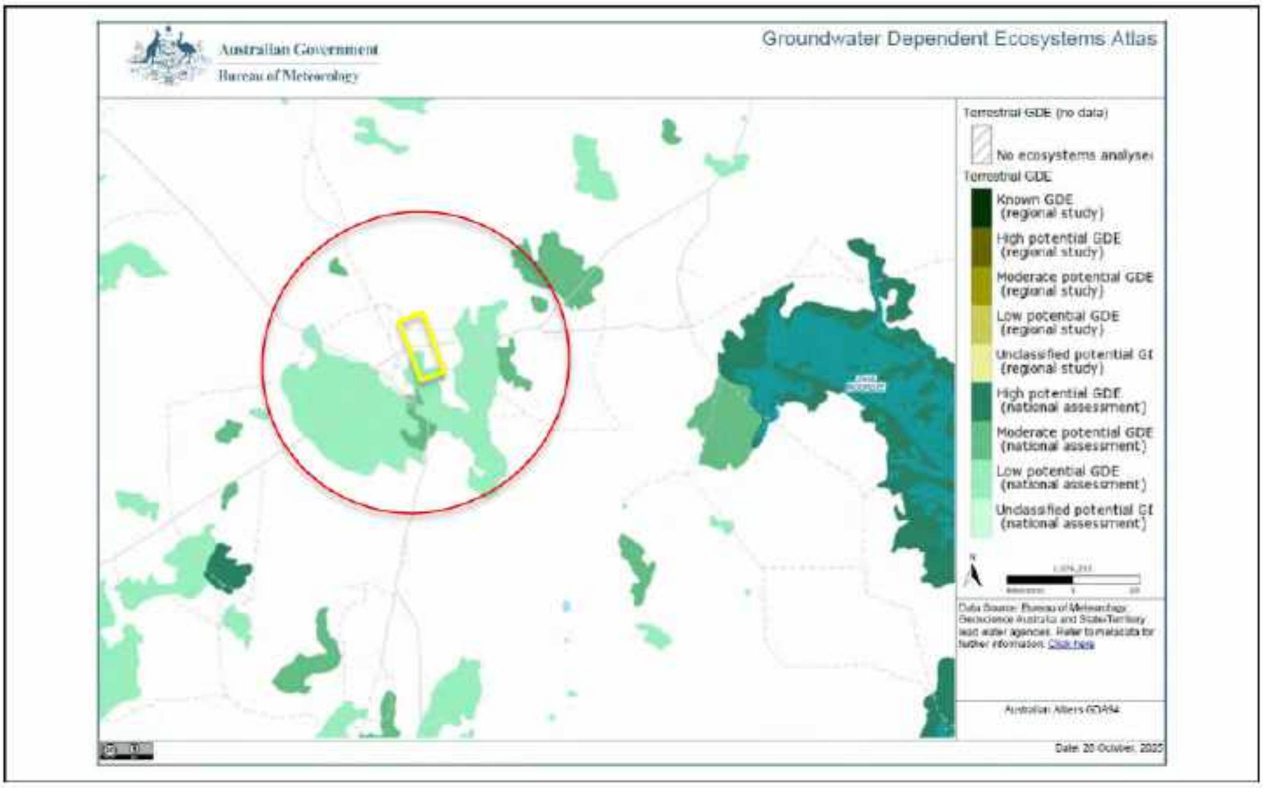


Figure 2.12 Desktop Search Results of Terrestrial GDEs Within 10 km Radius of Youanmi Project (BOM GDE Atlas Map)

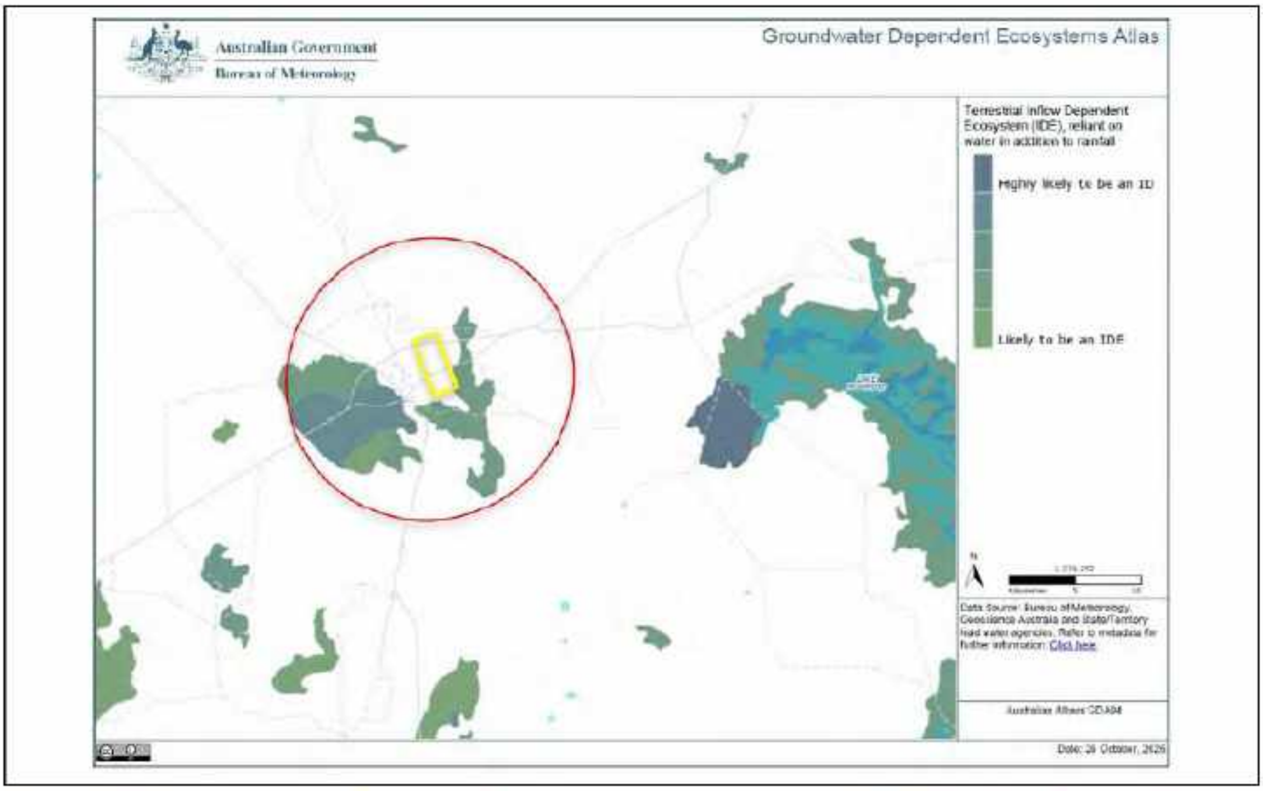


Figure 2.13 Desktop Search Results of Terrestrial Inflow Dependent (IDE) Within 10 km Radius of the Youanmi Project (BOM GDE Atlas Map)

A flora and vegetation survey of the Youanmi Project area and a potential pipeline easement to Lake Noondie was completed by Native Vegetation Solutions in November 2022 (Native Vegetation Solutions, 2022). The results of this assessment concluded the following:

- There are no wetlands of international importance (Ramsar Wetlands) or national importance (Australian Nature Conservation Agency Wetlands) within the survey area.
- No Environmentally Sensitive Areas were identified within the survey area.
- No critical habitat listed under the WA (Biodiversity Conservation Act 2016) BC Act was recorded within the survey area.
- No threatened ecological community (TEC) or Priority Ecological Communities (PECs) was located in the survey area.
- No Threatened Flora were recorded in the survey area.
- One Priority Flora species was recorded in the survey area, *Calytrix hislopii* (P3). Six locations with a total population size of 139 plants were recorded.
- No unique or restricted vegetation communities were identified, and all vegetation types/communities are common, widespread and well represented in the Eastern Murchison subregion.
- Any proposed disturbance/clearing of vegetation will result in a loss of species. However, given the size of the area and the extent of the Beard (1990) vegetation association elsewhere, the impact on the vegetation and its component flora will not affect the conservation values of either, or create fragmentation or patches of remnant vegetation.
- The general vegetation group descriptions within the survey area is described as a Mulga shrubland with emergent Eucalyptus spp, and also a Mulga creek line. No unique or restricted vegetation communities were identified, and all vegetation types/communities are common, widespread and well represented in the Eastern Murchison subregion.
- The field assessment established that the condition of the vegetation in the proposed disturbance area ranged from “Completely Degraded” to “Very Good” with most of the area falling into the “Good” Category. Areas which were affected by historic exploration were deemed in “Degraded” or “Good” condition. No areas of vegetation were assessed to be in “Pristine” condition.
- Six weed species was recorded within the survey area, *Nicotiana glauca* (Tree Tobacco) *Citrullus amarus* (Pie Melon), *Lysimachia arvensis* (Pimpernel), *Rumex vesicarius* (Ruby Dock), *Salvia verbenaca* (Wild Sage) and *Sonchus oleraceus* (Common Sowthistle). None of these species are considered Declared Pests (DPIRD, 2022).

The vegetation present in the vicinity (10 km radius) of the Youanmi area is likely to source water from soil moisture in the unsaturated zone above the water table and is likely to rely on sporadic rainfall and overland water flow events, with no association with the groundwater (i.e., phreatophytic vegetation). The groundwater table at the Project is more than 20 mbgl, well below most plants’ rooting depths in this area.

The closest priority ecological community (PEC, as listed by DBCA) is located 23 km to the east nearby Lake Noondie and is shown in Figure 2.14.

Figure 2.14 Nearest Priority Ecological Communities (PECs, as listed by DBCA)

2.8.1.2 Stygofauna

The issue of stygofauna and troglofauna has become increasingly prevalent for mining operations throughout WA. Stygofauna are known to exist in the area, are mostly prolific in "fresh" calcrete aquifers, but have been found in other types of aquifers with salinity levels in excess of 60,000 mg/L TDS. It is also known (EPA, 2013) that stygofauna are unlikely to occur in deep sands and clays (especially over solid rock) and do not exist in groundwater environments where salinity exceeds marine concentrations (sea water). As outlined in Section 2.8.1.1, there are no groundwater-dependent ecosystems at or near the Youanmi mine site that could be impacted by mining operations. The nearest wetland is an ephemeral salt lake (Lake Noondie) located 23 km east of the mine site within the Murchison bioregion (Bennelongia, 2021 & 2022). This investigation undertaken by Bennelongia identified widespread species of aquatic fauna commonly found in salt lakes in Western Australia and are currently not protected. There are also areas of calcrete near the Lake Noondie that might be a habitat for stygofauna and troglofauna.

2.8.1.3 Groundwater-Surface Water Connection

Due to the depth to water table (i.e., more than 20 mbgl) at the Project area, it is unlikely that the groundwater system and surface water system (i.e., ephemeral surface water features) are in direct hydraulic connection (the water table is below the base of the local creek beds). The ephemeral creeks recharge the underlying alluvium during high flow and flooding events and the frequence of this means that groundwater in the alluvium aquifer can have much lower salinities than is found in the underlying Archaean bedrock.

2.8.2 Other Groundwater Users

Existing groundwater use has been assessed via the DWER Water Register Database of licensed registered users. The groundwater abstractions at the Youanmi Mine is covered under DWER groundwater licence (GWL) 208485 that allows Rox Resources to abstract 1,807,000 kL/year of groundwater from the fractured aquifer system. According to this database there are currently no other groundwater users within a 10 km radius of the Project area. However, there are licensed groundwater users that abstract water from the fractured rock aquifer system further out from the Project area. Licensed drawpoints of the existing groundwater users and their GWL numbers are shown in Figure 4.2. The nearest fractured rock aquifer user is located approximately 25 km to the south (Penny Operations Pty Ltd; GWL205133, allocation of 500,000 kL/year).

In addition to the DWER Water Register Database, the DWER Water Information Reporting (WIR) database provides information regarding water bores drilled (including licensed and unlicensed bores). This shows that there are several pastoral bores in the vicinity of the Project area, with the closest pastoral bore being at Southern Cross, which is approximately 4 km northeast of the mine. The status of any of other unlicensed bores is unknown, whether these bores are still in operation or abandoned.

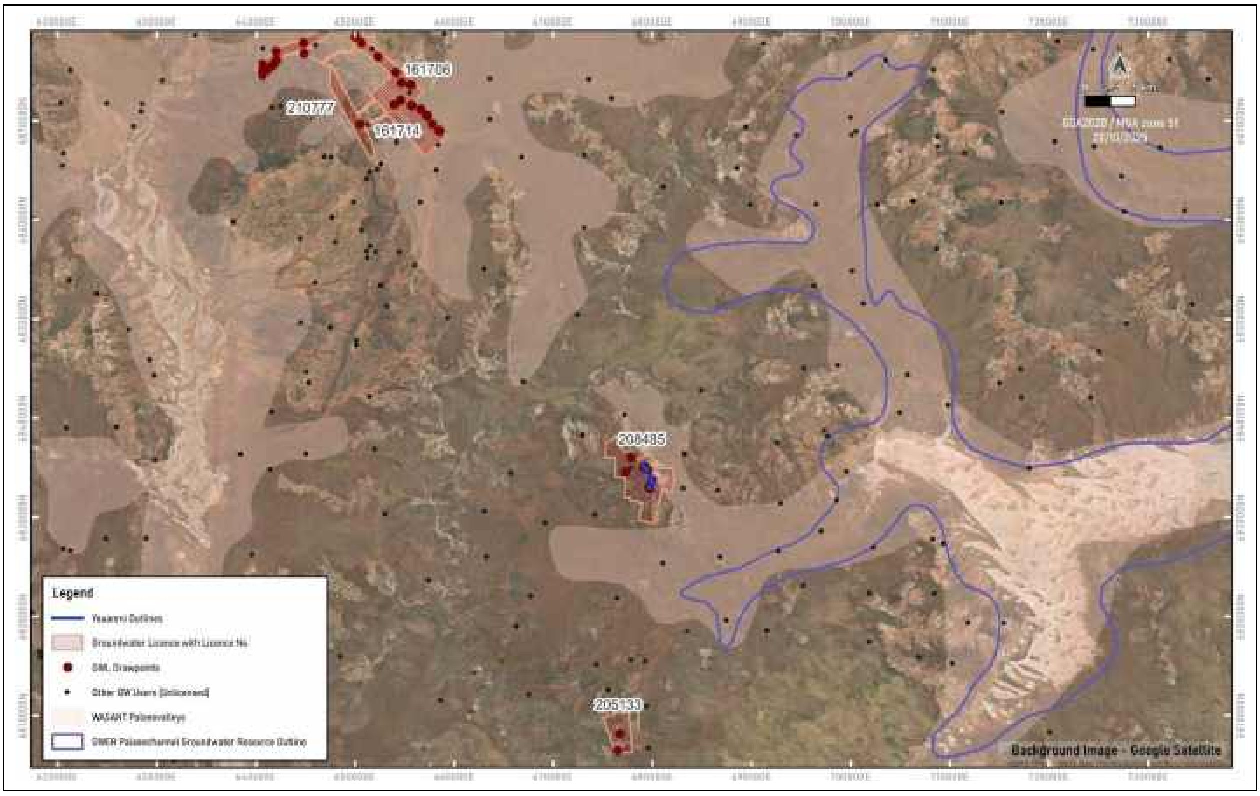


Figure 2.15 Nearest Other Groundwater Users

2.8.3 Surface Water Users

Runoff from the local catchments is expected to be relatively fresh within the ephemeral drainage lines with salinity of runoff collected within.

There does not appear to be any formal agricultural dams constructed within Catchment A or B, or further downstream on the converged drainage path. However, it is possible that local pastoralists opportunistically use runoff generated within the catchment.

Historically, runoff from Western Creek has been diverted into Bunker Pit and used to recharge the aquifer which the current site potable water bore draws from.

Surface water runoff also supplies water for use by flora and fauna communities within the catchment. Direct rainfall is likely to be an important source of water replenishment within the vadose zone as runoff events are anticipated to be infrequent.

3. DATA COLLECTION

3.1 Hydrology

The hydrology assessment detailed within this report has been based on the following sources:

- Client provided 1 m LiDAR terrain data in November 2024.
- Meteorological data sources from BOM.
- Guidance and recommendations contained in Australian Rainfall and Runoff.
- Project development footprints for the proposed Project; namely the processing facility area and the TSF.
- Observations from a site reconnaissance visit including dimensions of drainage channels and culverts, catchment roughness and yield expectations etc.

A previous hydrological assessment was completed by Rockwater but this report was not relied upon for the current assessment. The current assessment follows ARR guidance for surface water assessments and aligns with AQ2's understanding of regulator's expectations for flood modelling to support mining applications.

3.2 Hydrogeology

3.2.1 Past Reports

The hydrogeology of the Youanmi Project area has previously been documented by Rockwater based on a number of hydrogeological investigations that have been carried out at Youanmi. The reports produced for these include:

- Rockwater, January 2021. Memo on Youanmi Groundwater Regime, Historical Mine Dewatering and Conceptual Plans for Future Groundwater Management.
- Rockwater, October 2021. Assessment of Dewatering Flows, from Pits and Underground Workings. Report.
- Rockwater, June 2022. Hydrogeological Assessment, Planned Grace Pit. Memo.
- Rockwater, July 2022. Estimates of Dewatering Inflows, to Planned Pits.
- Rockwater, November 2022. H2 Hydrogeological Assessment. Report.
- Rox Resources, January 2021. Youanmi Groundwater Regime, Historical Mine Dewatering and Conceptual Plans for Future Groundwater Management.

The current understanding of the site hydrogeological conditions has been based on the review of all available literature in the region and site specific geological and hydrogeological data, including historical dewatering and groundwater level and quality monitoring data for the site, together with the assessment of the hydrogeological data collected during the May 2025 site visit undertaken by AQ2 (refer to Section 3.2.6 of this report).

3.2.2 Existing Production and Monitoring Bores

Two production and several monitoring bores have been drilled across the Youanmi area to gain better understanding of the local geology and hydrogeology, to provide a water supply source and to assess the impact of groundwater abstraction (dewatering and water supply) on the local aquifer system. Locations of the production and monitoring bores are shown in Figure 3.1. Details of the production and monitoring bores are listed in Table 3.1.

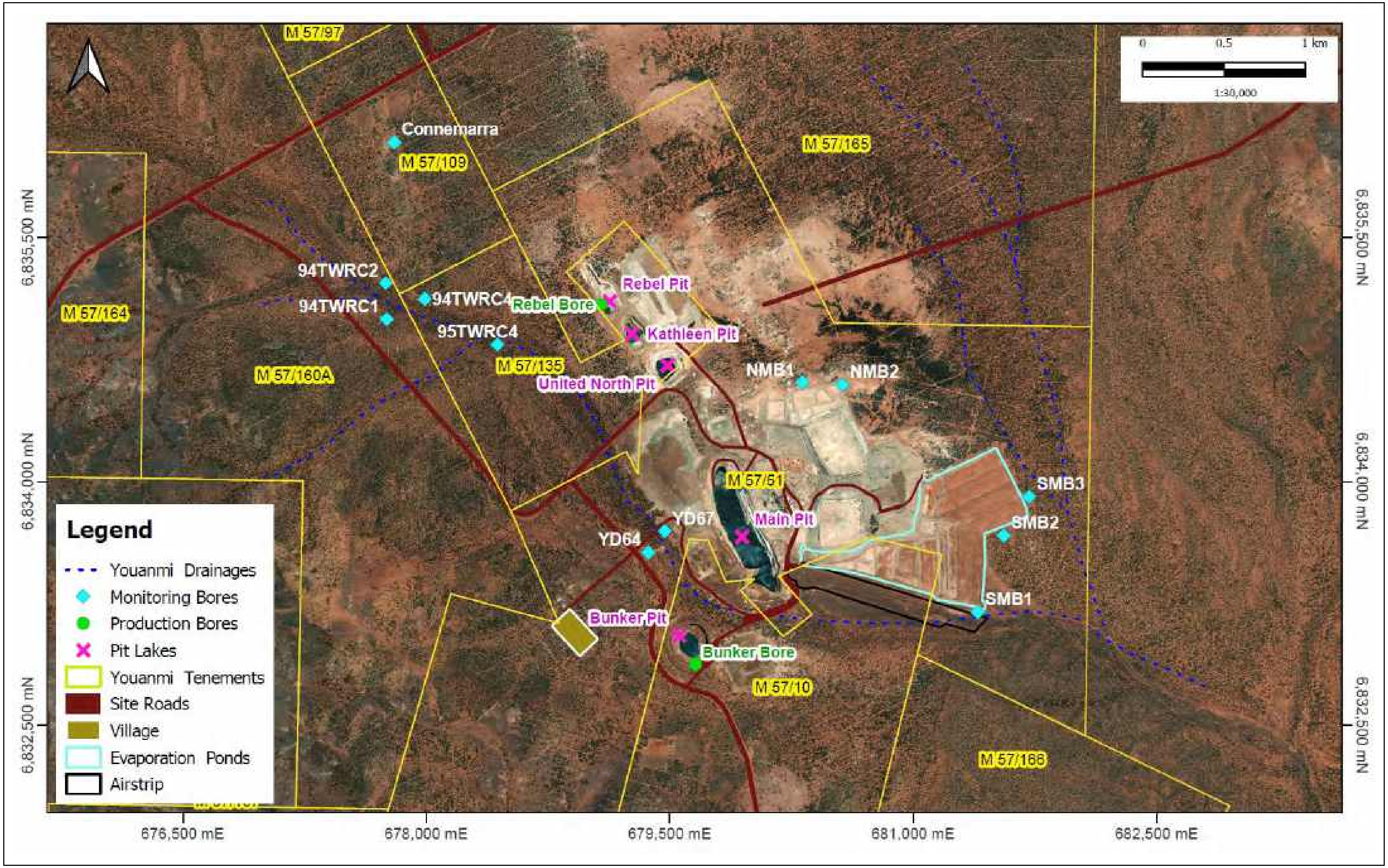


Figure 3.1 Youanmi Project, Existing Production and Monitoring Bores and Pit Lakes Locations (Source: Rockwater, 2022)

Table 3.1 Existing Production and Monitoring Bores and Pit Lakes

Bore Name	Eastings mE	Northings mN	Ground RL (mAHD)	Casing Depth (mbgl)	Casing Type	Casing ID (mm)	TOC	SWL (mbtc)	SWL (mbgl)	SWL (mAHD)	SWL date	Salinity (mg/L TDS)
Monitoring Bores												
SMB1	681391	6833199	452.55	39	PVC	104	1.13	24.00	22.87	429.68	29/05/25	24,700
SMB2	681559	6833667	452.81	37	PVC	80	0.92	23.96	23.04	429.77	29/05/25	1,960
SMB3	681715	6833908	453.49	38	PVC	80	0.85	23.54	22.69	430.80	29/05/25	2,040
NMB1	680318	6834610	461.01	41	PVC	80	0.80	30.94	30.14	430.87	29/05/25	6,070
NMB2	680566	6834596	459.16	42	PVC	80	0.89	28.39	27.50	431.66	29/05/25	6,190
94TWRC1 (Town well)	677758	6835001	466.35	33	PVC	130	0.48	26.38	25.97	440.38	29/05/25	816
94TWRC2	677752	6835222	466.50	74	PVC	160	0.32	26.22	25.90	440.60	29/05/25	783
94TWRC4	677992	6835125	466.00	71	Steel	210	0.44	26.41	25.97	440.03	29/05/25	846
95TWRC4	678442	6834845	463.50	29	PVC	55	0.19	27.46	27.27	436.23	29/05/25	941
Main Pit YD64[2]	679369	6833562	459.48	46	PVC	71	0.13	27.37	27.24	432.24	29/05/25	1,050
Main Pit YD67[2]	679471	6833695	459.00		PVC	147	0.49	31.68	31.19	427.81	29/05/25	
Production Bores												
Bunker bore	679723	6832942	460.00		PVC	200	0.30	34.28	33.98	426.02	16/04/25	780
Rebel bore	679077	6835090	453.18	79	PVC	150	0.10	21.44	21.34	431.84	29/05/25	1,270
Pit Lakes												
Main Pit	679948	6833659	458.00							417.34	16/04/25	39,790
Bunker Pit	679309	6832780	448.00							436.09	16/04/25	668
Kathleen Pit	679268	6834910	470.00							430.59	16/04/25	3,010
Rebel Pit	679134	6835109	470.00							431.68	16/04/25	3,250
United North Pit	679489	6834714	470.00							428.91	16/04/25	7,470

TOC-top of casing; SWL-standing water level; mbgl-m below ground level; ND-not determined; mbtc-m below top of collar; TDS - total dissolved solids

[1] Depths calculated from EC profiling

[2] Angled bores assumed 60°

3.2.3 Current Pit Lake Pumping

Dewatering of some of the existing pits and the current underground mine is required before the new underground mining can commence at Main Lode, United North and Pollard. Portals to the underground mine are planned to be developed or reused from Main Pit for Pollard and Main Lode and separately from both the United North Pit and Kathleen Pit for the United North underground. In addition, both the United North and Main Lode will be connected underground. This means that Main Pit, United North Pit and Kathleen Pit need to be fully dewatered to access their respective underground portals.

A dewatering assessment was previously done by Rockwater for Rox Resources in October 2021, although was for a different mine plan, that included cutting back Main Pit to mine the Grace deposit. Using analytical methods, the report estimated groundwater inflows into the different pits and the underground workings as well as groundwater stored within the pits and mine workings. Refer to Section 5.1.2 for the details on the estimated pit dewatering rates.

Dewatering discharges from the Main and United North Pits are planned to be initially pump water to the fully licensed evaporation ponds, as well as the two northern pits (Rebel and Kathleen Pits) while approvals for the long-term discharge solution are sought. A hydrogeological assessment of the planned discharge of dewatering excess to the 2 northern pits was undertaken by AQ2 in November 2024 (AQ2, 2024) to support an application to amend the existing Prescribed Premise Licence (L8275/2008/2) and concluded that the planned discharge will have no long-term impact on the local hydrogeological environment (refer to Appendix C for more details on this assessment). The amendment of the existing Prescribed Premise Licence (L8275/2008/2) was approved by DWER.

Currently, dewatering of the Youanmi Main and United North Pit Lakes has progressed, with dewatering at United North now being completed. At Main Pit pumping has continued at the planned rate of +100 L/s, discharging to the evaporation ponds and Kathleen Pit. Once these are at their full capacity, water will be discharged to Rebel pit.

3.2.4 Current Water Supply Abstraction

Groundwater abstraction for camp water supply and drilling purposes takes place from Bunker Bore, on the southern side of Bunker Pit (Figure 3.1). The bore is in hydraulic continuity with Bunker Pit, which is fed by a diversion of the adjacent creek. Current groundwater use at Youanmi is minimal. Groundwater abstraction from Bunker Bore averages about 6,600 kL/a (0.2 L/s), ranging historically from 4,366 kL (0.1 L/s) in 2017 to 14,360 kL (0.5 L/s) in 2021.

Groundwater was historically abstracted from Rebel Bore, located on the western side of Rebel Pit (Figure 3.1). This was for potable supply and abstraction rates during the period April 1993 to June 1996 varied from 85 to 425 kL/d (i.e., 1.0 to 4.9 L/s).

3.2.5 Groundwater Water Levels

The recent groundwater monitoring records from the production and monitoring bores and the pit lakes, are shown in Figure 3.2 and Figure 3.3, indicate the following:

- Pre-mining groundwater levels in the mine area were around 20 mbgl.
- Groundwater levels in monitoring bores range from 427 mAHD in monitoring bore YD64 near Main Pit to 440.4 mAHD in the 94TWRC1 (Town Well). Monitoring-bore water levels have ranged between 21.5 and 32 m bgl. There is a general steady trend in groundwater levels evident since January 2021, with minor seasonal fluctuations.
- The existing water table levels in the open pits range from 417 mAHD in Main Pit, to 432 mAHD in the Rebel Pit; these are lower than groundwater levels in surrounding rocks due to evaporation losses

from the pits. Water levels in Rebel, Kathleen, United North and the Main Pits fluctuate in response to rainfall and evaporation.

- The groundwater levels in Bunker Bore and the Bunker Pit mirror each other, where both are in recession from December 2022. The Bunker Bore is pumped at less than 1 L/s as a water supply bore on site, and the influence of pumping is evident on the Bunker Pit water levels.
- Current groundwater levels have been influenced by the presence of mined out pits, which are all groundwater sinks. That is, the pit lakes that have developed are all below the general water table, (as a result of evaporative losses from the pit lake surfaces and also by pumping from some pits), and the pits act as groundwater sinks. The pit lake in the Main Pit prior to pumping beginning was around 50 m below ground surface and the pit lakes in the northern pits were around 40 m below surface. As a result, there was groundwater flow to all pits and this flow has influenced the general groundwater flow patterns and local groundwater levels. In addition, minor drawdown of groundwater is currently developed small water supply pumping from the Bunker Bore The inferred current groundwater levels and flow directions are shown in Figure 3.3.
- The regional water table slopes gently to the south, (with a very flat hydraulic gradient: <0.005), with shallow groundwater discharging to the Lake Noondie palaeodrainage, south of Youanmi.

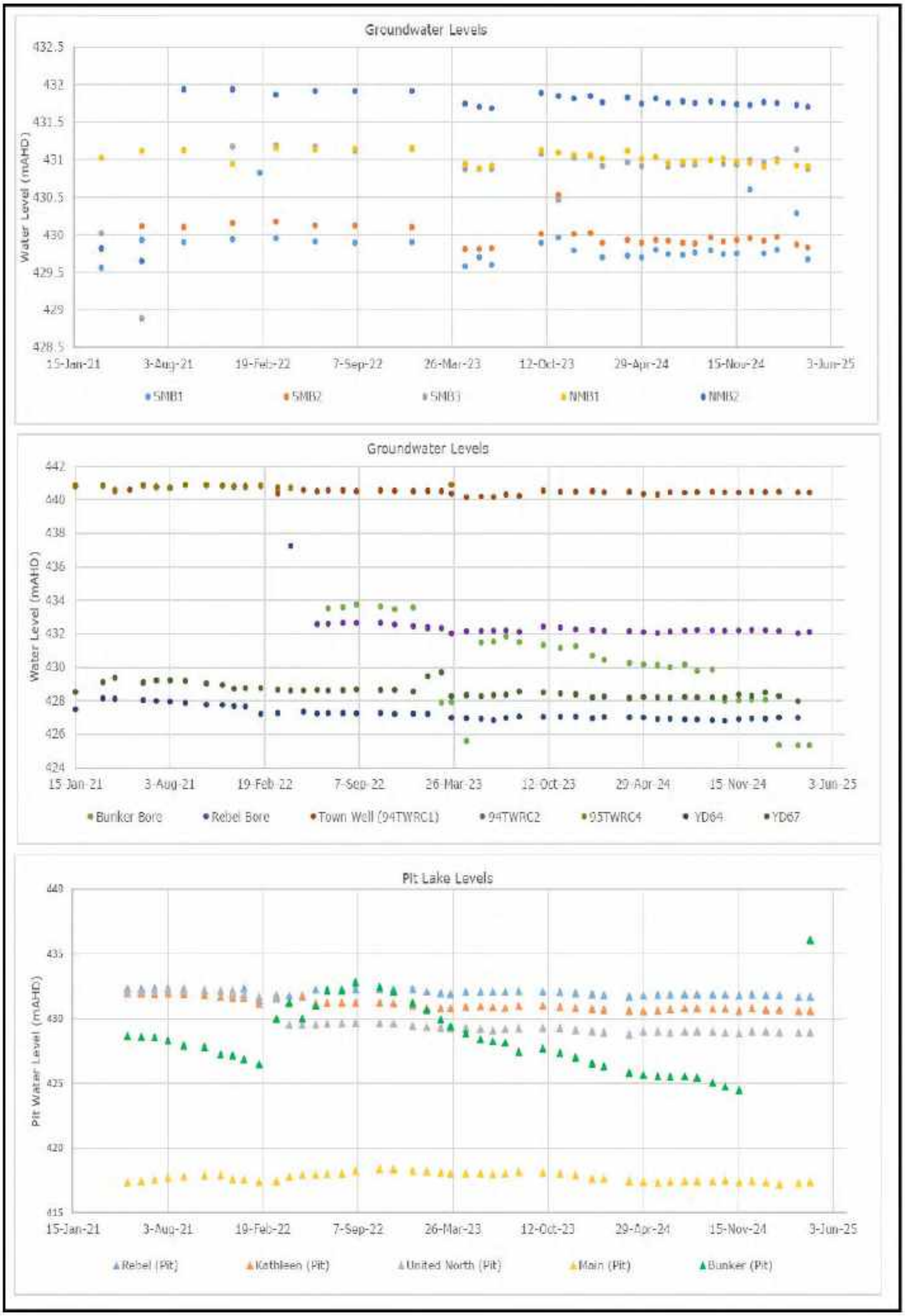


Figure 3.2 Monitoring Bore and Pit Lake Water Levels

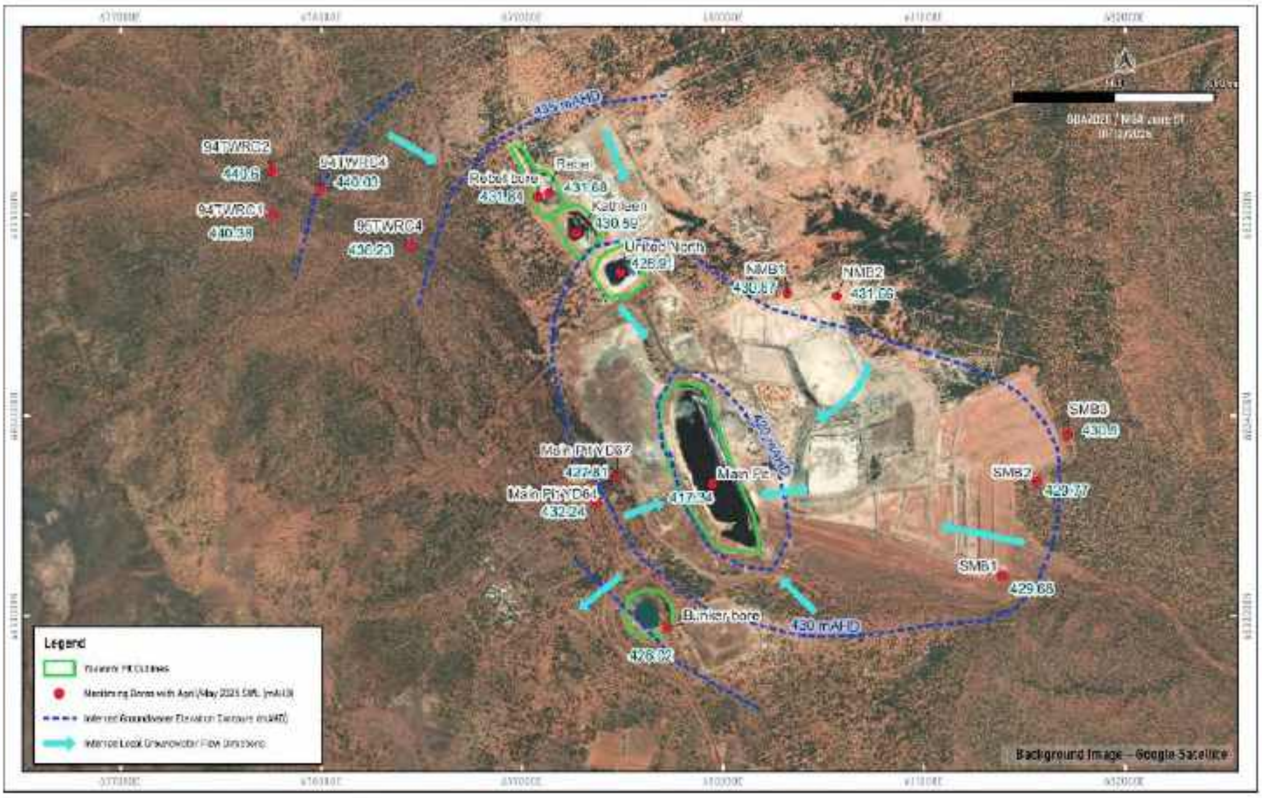


Figure 3.3 Monitoring Bore and Pit Lake Water Levels

3.2.6 Groundwater Quality

The recent water quality monitoring records from the production and monitoring bores and the pit lakes, are shown in Figure 3.4 and Figure 3.5, indicate the following:

- Currently, the salinities recorded in the pit lakes are:
  - Main Pit – between 27,000 and 46,000 mg/L TDS (saline to hypersaline).
  - Rebel, Kathleen and United North Pits – 3,000 to 7,500 mg/L TDS (brackish).
  - Bunker Pit – between 400 and 5,200 mg/L TDS, averaging 2,300 mg/L TDS (fresh to brackish).
- The recent water analysis in these pits indicates an increased salinity in the pit lake water since 1995 (Table 2.4). However, this is likely attributed to the high evaporation rates that increase the salt concentrations within the pits.
- Currently, the salinities recorded in the monitoring bores are:
  - Town bores long the creek line (94TWRC2 94TWRC4) – between 370 and 1,400 mg/L TDS (fresh).
  - NMB1 and NMB2 east of the mining area – 5,000 to 8,000 mg/L TDS (brackish).
  - Evaporation pond bores – SMB2 and SMB3 from 2,000 to 4,000 mg/L TDS (brackish) and SMB3 from 18,000 to 41,500 mg/L TDS (saline).
  - Bunker Bore and Rebel Bore– average 820 and 1,200 mg/L TDS, respectively (fresh).
- Groundwater is generally slightly alkaline, ranging from neutral to alkaline (pH range of 6.95 to 8.2).
- Groundwater is a sodium chloride type, and most of the metals and minor constituents were below levels of detection. There were some low concentrations of arsenic, barium, boron, nitrate, and two BTEX constituents.

Figure 3.4 Pit Lake Water Quality (pH, EC, TDS)

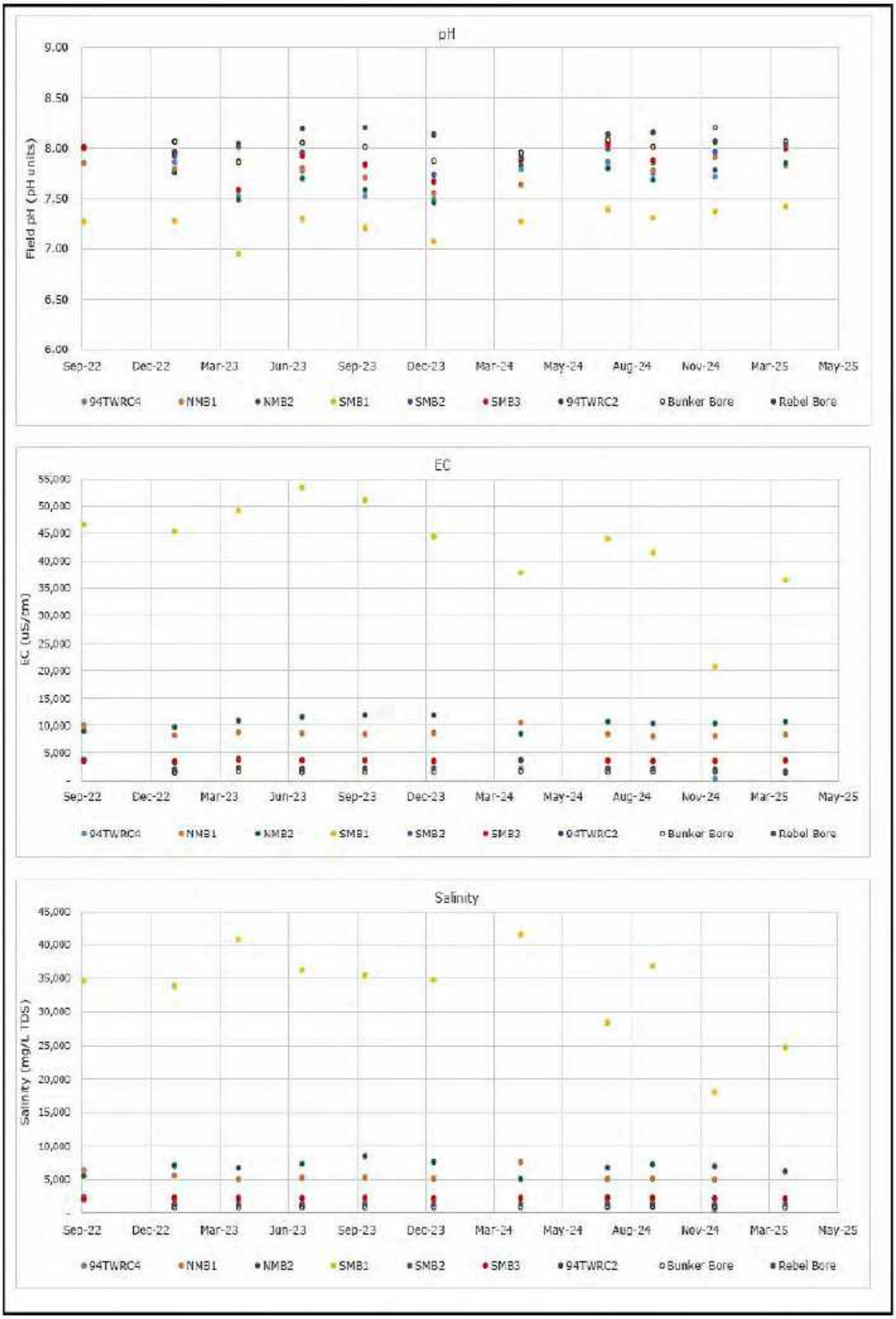


Figure 3.5 Monitoring Bores Water Quality (pH, EC, TDS)

3.2.6.1 Salinity Profiles

AQ2 visited the Youanmi site from 27th to 29th May 2025 and during this time, salinity profiles were run on most of the existing groundwater monitoring bores. This was done by running a datalogger down each bore, which recorded both depth and electrical conductivity (EC) of the groundwater in µS/cm. The results are shown in Figure 3.6 for those monitoring bores with lower salinity values, except YD67. The results show that most bores have a thin layer of fresher water at the groundwater table, which is normal as fresher water is less dense than more saline water and will float above it. The least saline water was seen in bore 94TWRC2 with a maximum salinity of approximately 1,500 µS/cm and a clear salinity gradient with depth. In contrast, bore 94TWRC4, which is approximately 780 m to the southeast, generally has a uniform salinity value throughout its depth of approximately 1,580 µS/cm. Bores 94TWRC1 (Town Bore) and Rebel Bore had similar salinities averaging about 2,100 µS/cm, but increasing to 2,200 µS/cm in Rebel Bore at its base. Bore YD64 had a greater salinity with a fairly uniform approximately 2,300 µS/cm.

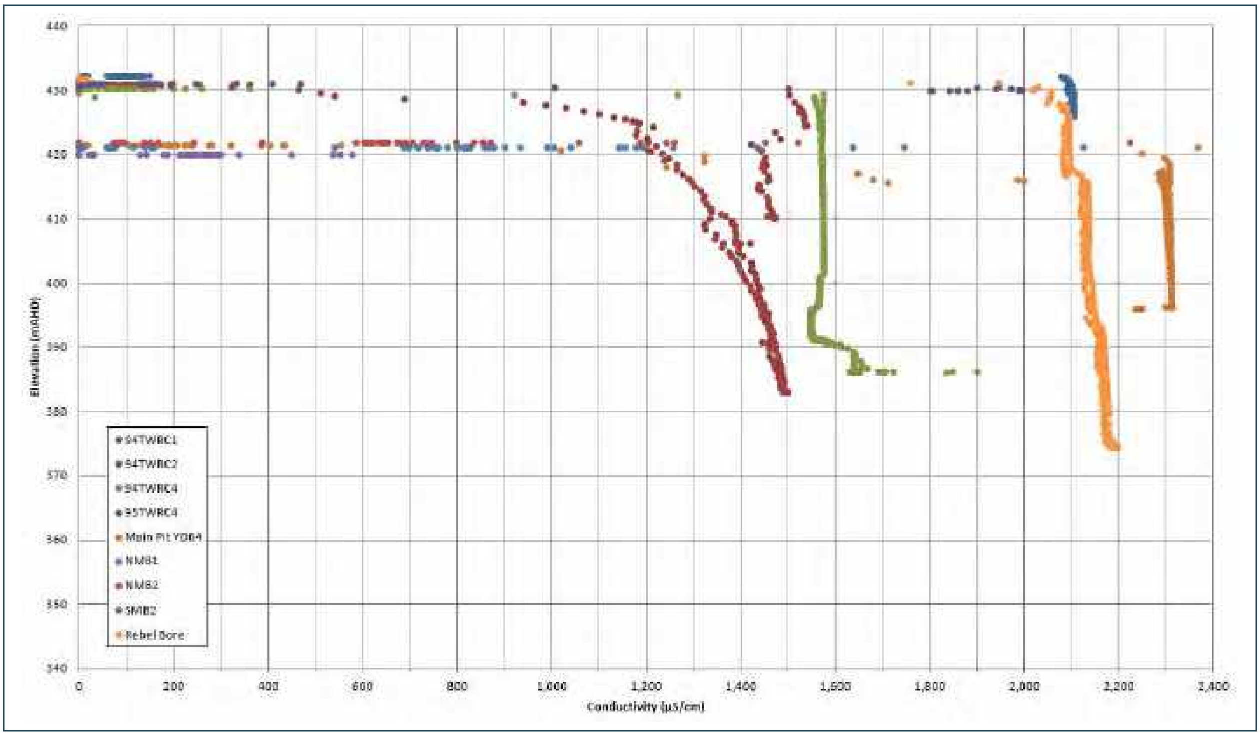


Figure 3.6 Lower Salinity Bore Electrical Conductivity Profiles

Figure 3.7 shows bores that have higher salinity values, together with a profile through the water in Main Pit. The Main Pit has the highest salinity, being hypersaline with an average electrical conductivity of 54,000 to 55,000 µS/cm throughout its depth. Bore SMB1, on the southeastern corner of the evaporation ponds has the next highest salinity with an electrical conductivity value of between 32,000 to 35,000 µS/cm. This elevated value probably relates to historical over topping of the ponds during cyclonic related rainfall. The other two bores around the evaporation ponds have electrical conductivities at their base of about 6,400 µS/cm for bore SMB2 and 3,800 µS/cm for SMB3. Bores NMB1 and NMB2 to the north have electrical conductivity values of approximately 8,500 µS/cm and 10,800 µS/cm respectively.

In conclusion, the freshest groundwater is found in the area of the Town Bore. This is probably as it is on a drainage line with groundwater recharge happening during high rainfall and flooding events.

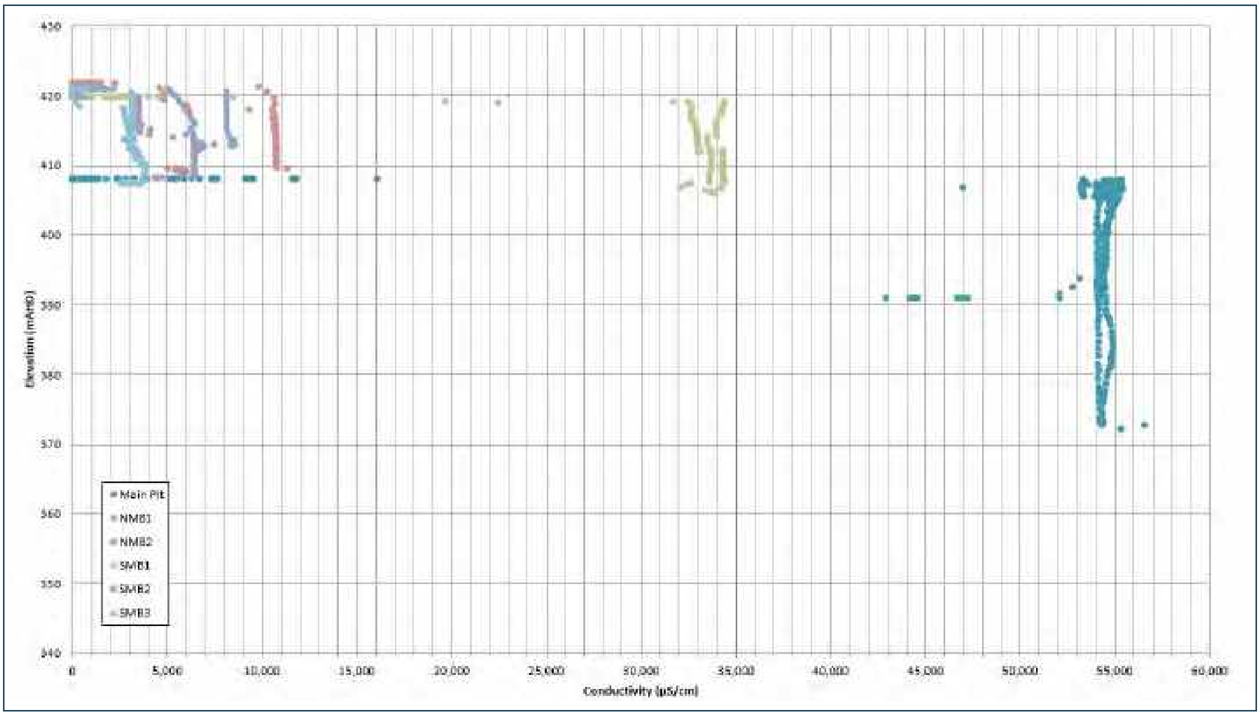


Figure 3.7 Higher Salinity Bores and Main Pit Electrical Conductivity Profiles

3.2.7 Site Conceptual Hydrogeological Model

The conceptual hydrogeological model for the immediate Youanmi area comprises the following key elements:

- Four local aquifers (or aquitards) associated with the following (in increasing order of permeability):
    - Surficial sediments (valley-fill deposits)– associated with recent cover material (transported sediments i.e., sand, silt and clay).
    - Fault/Fractured/shear zones – a fractured rock aquifer system associated with the northwest trending mineralised shear zones that host the Youanmi orebodies.
    - Saprock - associated with slightly weathered material in the transition zone from decomposed/highly weathered (clay rich saprolite) to fresh bedrock.
    - Saprolite – associated with shallow weathered horizons (clay rich).
    - Fresh basement rock - associated with fresh and weakly fractured basement rocks at depth.
- The groundwater storage within the enhanced local permeability associated with structural and mineralised zones is likely to be limited and longer-term inflows will be controlled by the bulk permeability of the general shallow and deep aquifer material.
- The aquifer system in the area is complicated, with the multiple east west striking faults (Kurrajong North, Kathleen, Hillend and Main Pit Faults) forming low permeability and semi permeable barriers to compartmentalise the bedrock aquifer system. This results in different groundwater levels and salinities in each fault controlled block. Where fracturing extends to depth, deep bedrock aquifer systems are present, but are structurally controlled and are anisotropic.
- While individual aquifer units might be considered to be semi-confined (e.g., the deeper basement rock aquifers will be partially confined by the low permeability saprolites), overall the aquifers can be considered as two discrete aquifers (shallow and deep) with variable permeability.

- Pre-mining groundwater levels in the mine area were around 20 mbgl. The regional water table slopes gently to the south, (with a very flat hydraulic gradient: <0.005), with shallow groundwater discharging to the Lake Noondie palaeodrainage, south of Youanmi.
- Current groundwater flows have been (and will continue to be) influenced by mining, dewatering and water supply abstraction. Current groundwater levels have been influenced by the presence of mined out pits, which are all groundwater sinks. Main Pit is currently a largest groundwater sink as a result of active pit lake water abstraction (i.e., advanced pit and old underground workings dewatering prior to the commencement of the planned underground mining). In addition, minor drawdown is currently developed south of the Bunker Pit, as a result of small water supply pumping from the Bunker Bore.
- The local shallow aquifers are recharged by localised infiltration of rainfall runoff. The local deeper, fractured rock aquifers are recharged by a combination of vertical leakage from the shallow aquifers and regional groundwater throughflow.

3.3 Integrated Site Water Balance

The development of the Integrated Site Water Balance was reliant on the following data sources:

- TSF design and TSF water balance parameters outlined in the TailCon TSF DFS.
- Process water demand data provided in correspondence with MACA.
- Mining and Potable water demands consistent with what was assumed in the Youanmi PFS.
- Meteorological data from BOM and SILO.

3.4 Hydrogeological TSF Assessment

A new TSF is proposed in the eastern part of the Youanmi site. The design and construction of this was assessed hydrogeologically to determine its impacts on the local groundwater regime and to identify requirements for monitoring bores to operate throughout its operation and was based on the following data sources:

- TSF design and TSF water balance parameters outlined in the TailCon TSF DFS.
- Current site groundwater level and flow directions and water quality (Section 3.2).

4. SURFACE WATER MANAGEMENT

4.1 Introduction

The Project includes two separate mine development areas: the proposed processing (and ancillary supporting infrastructure) area and the TSF. The Processing Plant is located within Catchment A and there is the potential that it could be impacted by flooding from Western Creek. The TSF is located in Catchment B and potentially could be impacted by flooding of Eastern Creek. Further, the risk of creek inflows to the open cut pits post-closure has been considered, identifying surface water closure risks which may need to be managed.

During the previous mine operation, surface water runoff from Western Creek is diverted into Bunker Pit to recharge the aquifer which the site potable water bore abstracts from. A drain was installed to connect Western Creek and Bunker Pit and culverts under a haul road crossing Western Creek were blocked to divert runoff to Bunker Pit. The following surface water assessment is based on the Bunker Pit diversion drain being closed and all existing haul road culverts along the Western Creek being open.

A surface water assessment has been completed to identify management measures which may be required to reduce the impact of flooding on the operation of the Youanmi mine site. Additionally, consideration of any surface water management measures required to reduce the environmental impact of the project have also been considered (and are discussed in more detail in Section 10).

To assist with the assessment, hydrological (flow rates) and hydraulic surface water models have been prepared for the project.

4.2 Modelling Approach

A 2D hydraulic flood model was developed in HEC-RAS to assess surface water risks to the mine site and to identify the requirements for the site surface water management strategy. The flood model simulated rainfall-runoff processes to understand the potential distribution of flood waters across the site.

Design runoff hydrographs (runoff rate with time) were prepared for Catchment A and B using a hydrological model (RORB) for different exceedance probability events. These hydrographs were applied as inflow boundaries in HEC-RAS.

4.3 Pre-Development Flood Assessment

A 2D pre-development 1% AEP flood model was developed to simulate site hydrology and hydraulics and to identify flood-prone areas. Results from this model informed Rox Resources' assessment of suitable locations for the proposed mine site infrastructure

4.3.1 Design Flow Rates

RORB hydrology models were created for Catchment A and Catchment B to simulate flow hydrographs for Western Creek and Eastern Creek respectively. The layout of each of the RORB models is shown in Figure 4.1 and Figure 4.2. The models were used to develop flow hydrographs for both the 1% AEP and PMF events.

The RORB model setups are summarised as follows:

- RORB model was run for the 1% AEP and PMF events.

- The IFD rainfall depths sourced from BOM were increased to account for climate change as per ARR guidelines. The rainfall depths were increased by 22% consistent with predictions from SPP2-4.5 climate change projections to 2070.
- A runoff coefficient (ROC) value was used to simulate rainfall losses within the RORB simulations. For the 1% AEP event a ROC value of 32% was used. This ROC value includes an allowance for a 10% increase in rainfall losses consistent with predictions from SPP2-4.5 climate change projections to 2070.
- The model's key parameters, Kc and m, are inputs that represent the catchment's hydrological response. Published regional relationships for determining Kc have been established for Australia, as outlined in ARR (Ball et al., 2019), including specific recommendations for the arid and northwest regions of Western Australia. The following relationship has been adopted for this study:

$$K_c = 1.06L^{0.87} \qquad S_e^{-0.46}$$

- The Kc values for each catchment was calculated separately for Catchment A (6.84) and Catchment B (5.69).
- The exponent "m" is the RORB parameter that describes the non-linearity of a catchment's storage routing. A value of 0.8 was adopted for the exponent "m" for ungauged catchments (Laurenson et al. 2010) without any streamflow calibration data available.
- 1% AEP ensemble rainfall simulations were completed for each of the catchments to generate a range of catchment discharge rates. The selected design discharge rates was selected using the following procedure:
    - For each ensemble rainfall simulation, a series of ARR 2016-defined temporal pattern rainfall hyetographs was used for storm durations ranging from 10 minutes to 168 hours.
    - The ensemble hyetographs consist of 10 different synthetic temporal rainfall patterns for each storm duration.
    - RORB produces a flood hydrograph and maximum discharge rate for each of the ensemble hyetographs.
    - The critical storm duration for the catchment was selected as the storm duration producing the highest peak discharge
    - For that critical storm duration, the hydrograph closest to the mean value of the peak flows was adopted as the design flood hydrograph.

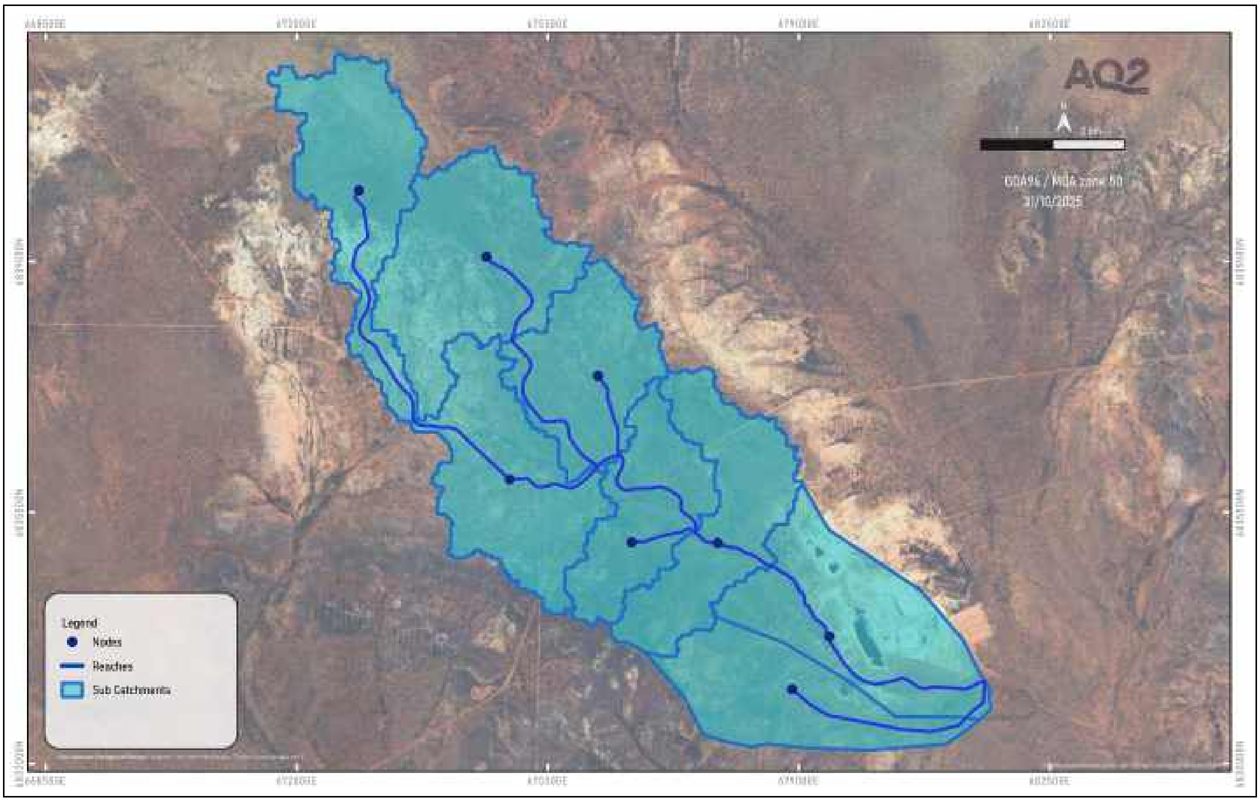


Figure 4.1 Catchment A (Western Creek) RORB Model Set Up

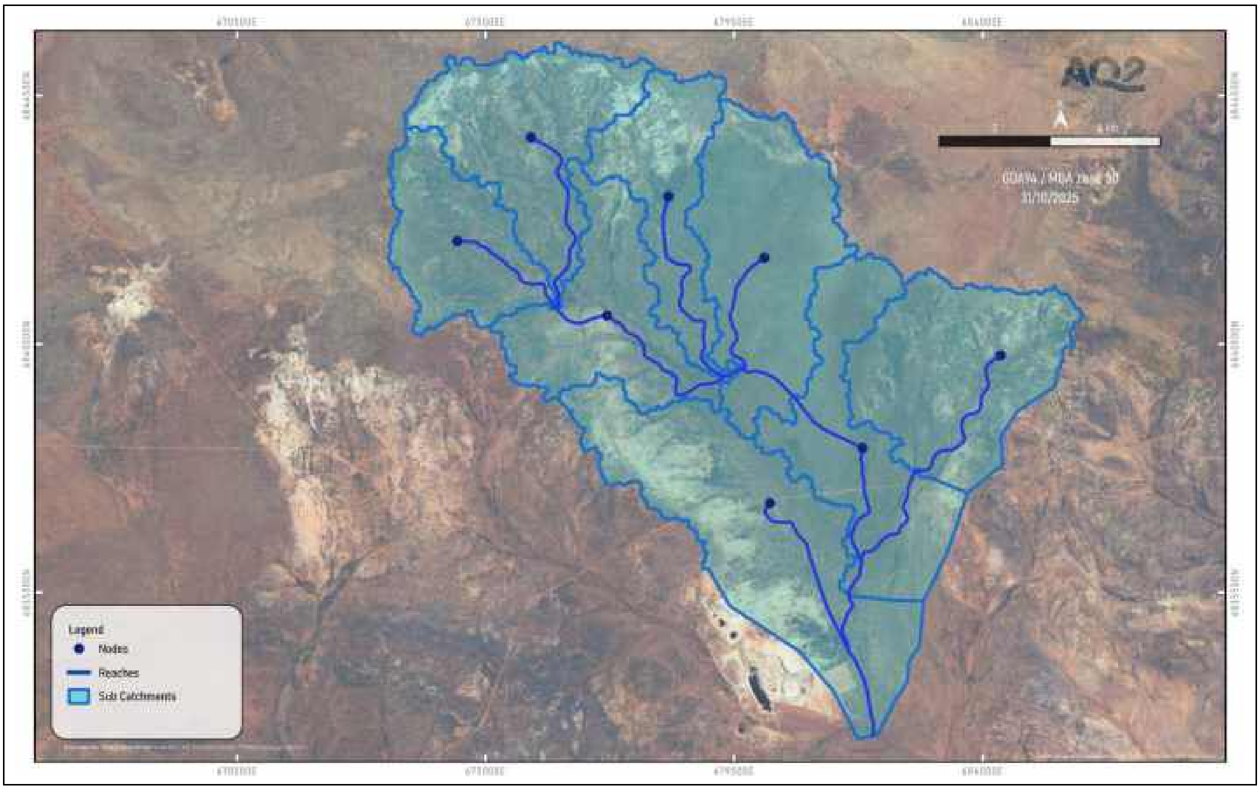


Figure 4.2 Catchment B (Eastern Creek) RORB Model Set Up

The resulting peak flows from the RORB model are shown in Table 4.1. The critical duration for both Catchment A and B was the 6-hour event. The results were compared against estimates from ARR's RFFE to validate the RORB model. A comparison between the peak flow rates from the RORB models and the RFFE estimates (refer Figure 4.3) indicates that the RORB peak flows are within the range of likely flow rates generated from RFFE and close to the likely design flow rate.

Table 4.1 Project Catchment Peak Flow Rates

Catchment ID	Area (km^2)	RORB 1% AEP Peak Flow (m^3/s)
Catchment A	37	51
Catchment B	70	113

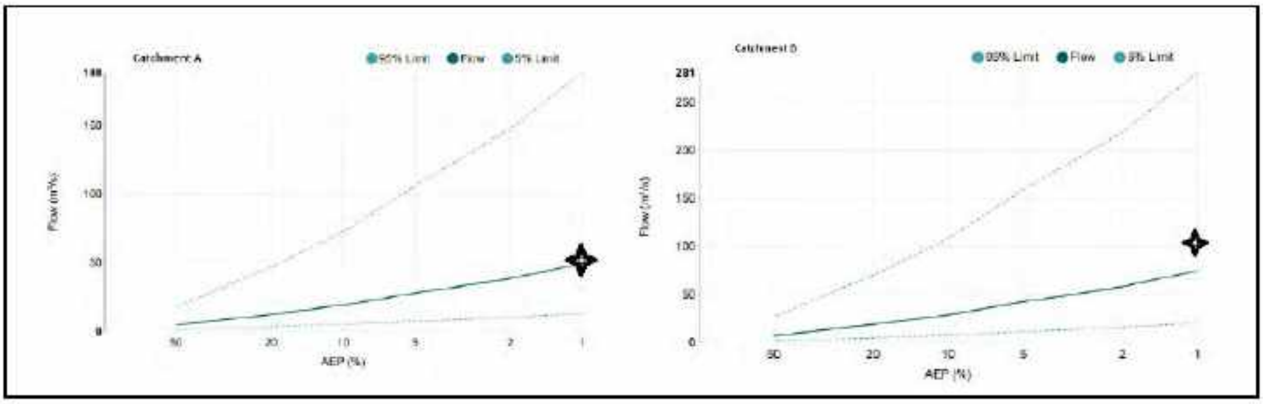


Figure 4.3 Comparison of 1% AEP RORB Peak Flow Estimates and RFFE Flow Range

The short-duration PMP rainfall depth was estimated using the Generalised Short Duration Method. The method was used for the total contributing catchment area for Catchments A and B of 110 km^2. The estimated PMP rainfall depths are shown in Table 4.2.

Table 4.2 PMP Rainfall Depth Estimation (110km^2 Catchment)

3-hour	4-hour	5-hour
440	510	540

To estimate the design flow rates for the catchments in a PMF event, the 5-hour PMP rainfall depth was used, together with the relevant PMP rainfall hyetographs, to create a storm event which was used in the RORB model to generate a design flow hydrograph for each catchment. The resulting PMF peak flow rate estimates from Catchment A and B are summarised in Table 4.3.

Table 4.3 PMF Peak Runoff Rates

Catchment A	Catchment B
1070 m^3/s	2100 m^3/s

4.3.2 Flood Modelling Setup

The pre-development flood characteristics of the Project area and the upstream catchments were mapped by creating a 2D flood model using HEC-RAS, version 6.7 beta 4 software. The flood model was run for the 1% AEP. The resulting pre-development flood map was used to identify where surface water management measures may need to be considered.

The general model build details for the pre-development model are as follows (and summarised in Figure 4.5):

- A computational mesh spacing of 50 m x 50 m was applied to the 2D flow area.
- Breaklines were added along the perimeter of the evaporation ponds, the haul roads, and around the Bunker Waste Rock Dump, with grid sizes between 1m and 10 m along the breaklines. Figure 4.5 shows the model layout.
- Different manning 'n' values were applied across the extent of the model. A Manning 'n' value of 0.045 was applied to the defined flow channel of the Western Creek and 0.1 for the rest of the model extent (to simulate roughness in sheet/flood plan flow).
- An adaptive timestep was assigned using a maximum Courant Number of 1.0.
- Inflow hydrographs were then applied for each inflow catchment (Catchment A and Catchment B).
- The model simulation time of 48 hours was applied to allow all peak flows to recede before the end of the simulation.
- Outflow model boundary conditions were set on the eastern side and south-east corner of the model domain, using normal depth energy gradients.
- A rain-on-grid calculation routine was run over the model domain to simulate the local runoff across the mine site. A 1-hour nested frequency storm using the 1% AEP rainfall depths (adjusted for climate change) was used to simulate the rainfall event.
- The model simulates the flow of runoff through culverts at the locations shown in Figure 4.5. The following culvert dimensions measured during the site visit were incorporated into the model:
    - Culvert 1 – 1 x 450 mm.
    - Culvert 2 - 2 x 900 mm.
    - Culvert 3 – 1 x 900 mm.

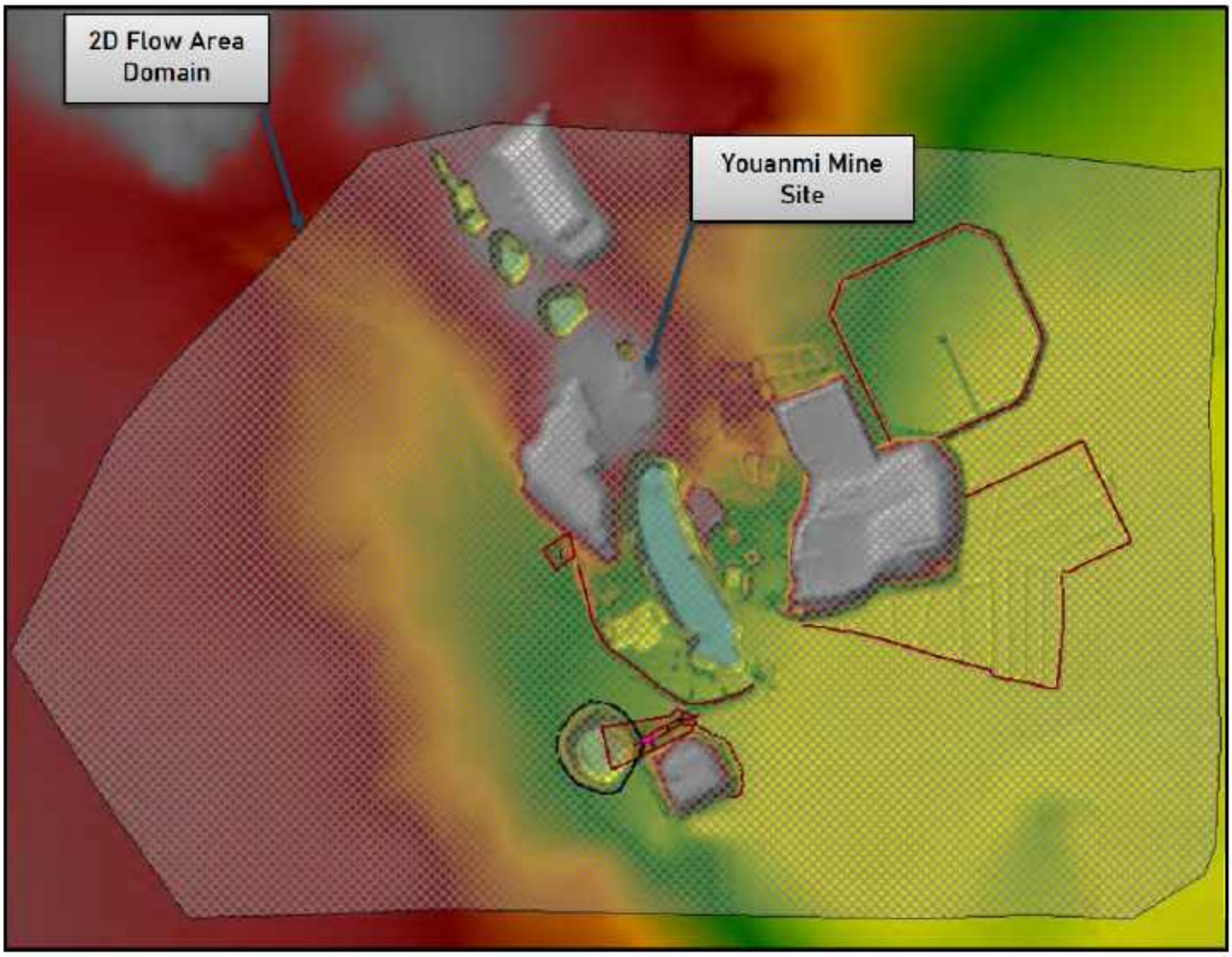


Figure 4.4 Model Terrain Data

Figure 4.5 2D Model Set Up

4.3.3 Flood Model Results

A map of the predicted 1% AEP pre-development maximum flood depths and velocities from the flood model are shown in Appendix A. Key observations from the flood map are as follows:

- The TSF is located on a local drainage line, plus extends into the Eastern Creek floodplain.
- Western Creek is a more defined flow channel than Eastern Creek but still has a broad floodplain extending away from the low flow channel. The flood plain is constrained where the creek passes between Bunker Pit/Bunker Waste dump and the other existing mining areas.
- The extents of the available terrain data for the flood model mean that the extent of flooding within Eastern Creek is constrained by the model boundary.
- Flooding from the Western and Eastern Creek join at the south east corner of the model prior to leaving the model through a boundary condition.
- Limited flood risk to the existing mine development footprint area.

4.4 Surface Water Risks

Potential surface water risks to the proposed mine infrastructure were identified using the pre-development 1% AEP flood model predictions. Potential surface water risks were identified at the Processing Area, and the TSF.

4.4.1 Processing Area

The proposed Processing Area (including process plant and supporting infrastructure) are adjacent to the main low flow channel of Western Creek (refer Figure 4.6). The 1% AEP pre-development model predictions indicate that the flood extents from the Western Creek extend within the footprint of the Processing Area. Flood depths of up to 0.4 m are predicted within the footprint of the Processing Area. This is like to have a low impact as the buildings/offices in this area would be built up in any case to accommodate building footings and to accommodate for the downward slope of the area.

Figure 4.6 Processing Area - Pre-Development 1% AEP Flood Depth Map

4.4.2 TSF

The proposed TSF is a paddock-style impoundment located within the project area (TailCon 2025). The 1% AEP pre-development flood depth map (Figure 4.7) and flood velocity map (Figure 4.8) show the following:

- The 1% AEP Eastern Creek floodplain is predicted to extend into the southeast corner of the proposed TSF footprint.
- Runoff from a local drainage line crosses the TSF footprint. The runoff is generated locally from the ridge line and historic waste dump.
- Flow velocities typically less than 0.5 m/s predicted within the Eastern Creek catchment, and generally less than 0.25 m/s around the toe of the TSF. Velocities predicted to be between 0.25 m/s and 0.5 m/s occur in the southeast corner of the TSF.

Potential surface water risks associated with the TSF are therefore:

- Increased flood levels in Eastern Creek caused by the encroachment of the TSF into the Eastern Creek floodplain.
- Ponding of runoff from the local drainage line on the northern side of the TSF.
- Erosion of the toe of the TSF during flood events, however this is expected to be a low risk due to perimeter drainage being included in the TSF design.

Figure 4.7 Pre-Developed Flood Depth TSF

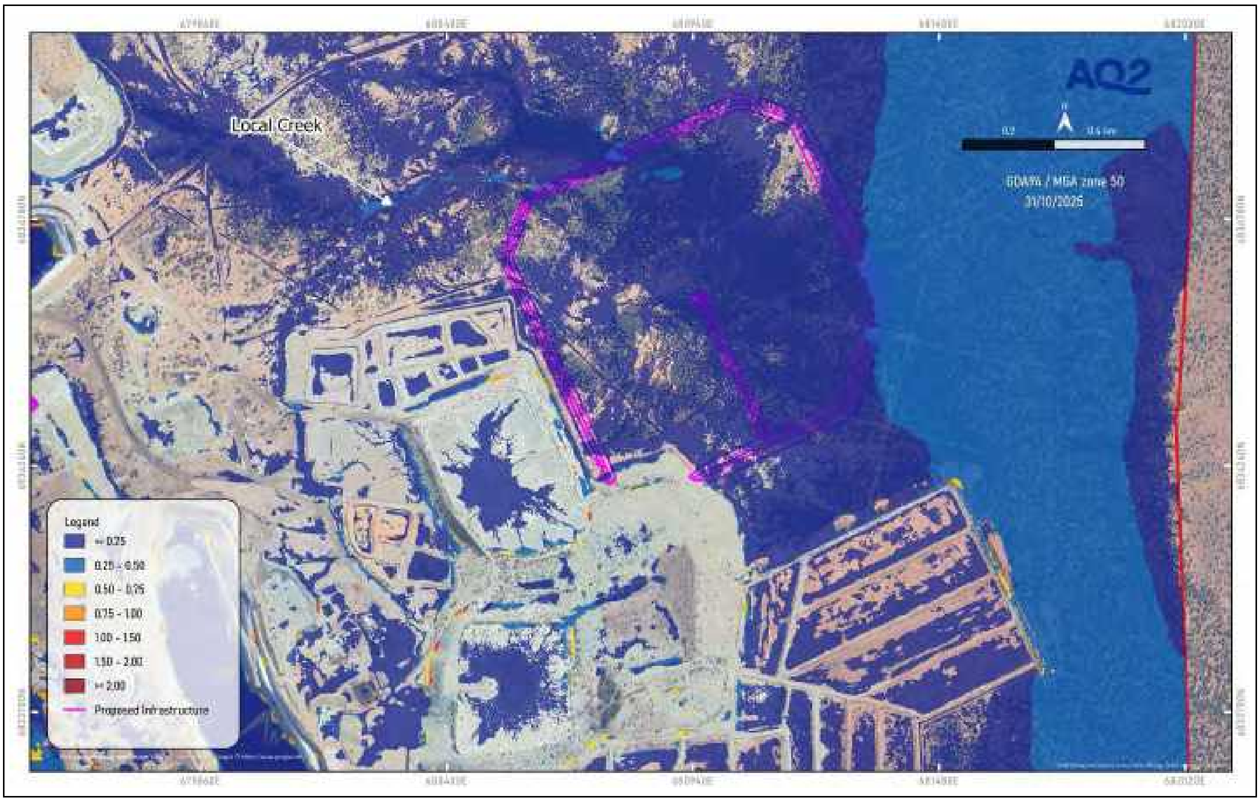


Figure 4.8 Pre-Developed Flood Velocity TSF

4.5 Management Measures

Based on the potential surface water risks identified above, management measures for the project have been identified. A Post-Development 2D flood model has been created with a terrain modified to reflect:

- Construction of the TSF within the Eastern Creek floodplain.
- Identified flood management measures to reduce the surface water risks identified above. The management measures modelled (and discussed further below) include:
    - Flood protection of the Processing Area.
    - Flood maps covering the extent of the 2D model for the Post-Development scenario are shown in Appendix B for the 1% AEP event, with zoomed-in results for specific areas of interest shown in the following sections.

4.5.1 Processing Area

As discussed in Section 4.4, the Processing Area extends into the Western Creek flood plain. To reduce the risk of flooding on the Processing Area, it is proposed to either shift the Processing Area further to the east (upslope) to be out of the flood plain or to ensure the Processing Area is constructed on an earth pad elevated above the predicted flood plain flood depth.

The Pre-Development model was run with the terrain modified to simulate an earth pad under the Processing Area footprint which extends into the Western Creek. Flood levels and flow velocities around the toe of the earth pad were predicted in the 2D flood model to provide design criteria for the pad.

Figure 4.9 shows the post development flood map at the Processing Area, with a long-section of the existing ground surface elevation, predicted 1% AEP flood surface elevation and recommended earth pad elevation shown in Figure 4.10. The recommended earth pad elevation includes a 300 mm freeboard allowance above the predicted 1% AEP flood levels and ranges from 463 mRL in the north (about 0.8 m above the terrain) to 463.2 mRL in the south (0.3 to 0.4 above the terrain).

The predicted flood velocities in the 1% AEP flood event in the vicinity of the Processing Area are shown in Figure 4.11. Flood velocities in the 1% AEP event are predicted to be typically less than 0.5 m/s and the building area pad will be constructed to withstand scouring at these velocities (or appropriate erosion protection measures installed).

Figure 4.9 Processing Area: 1% AEP Post-Development Flood Depth Map

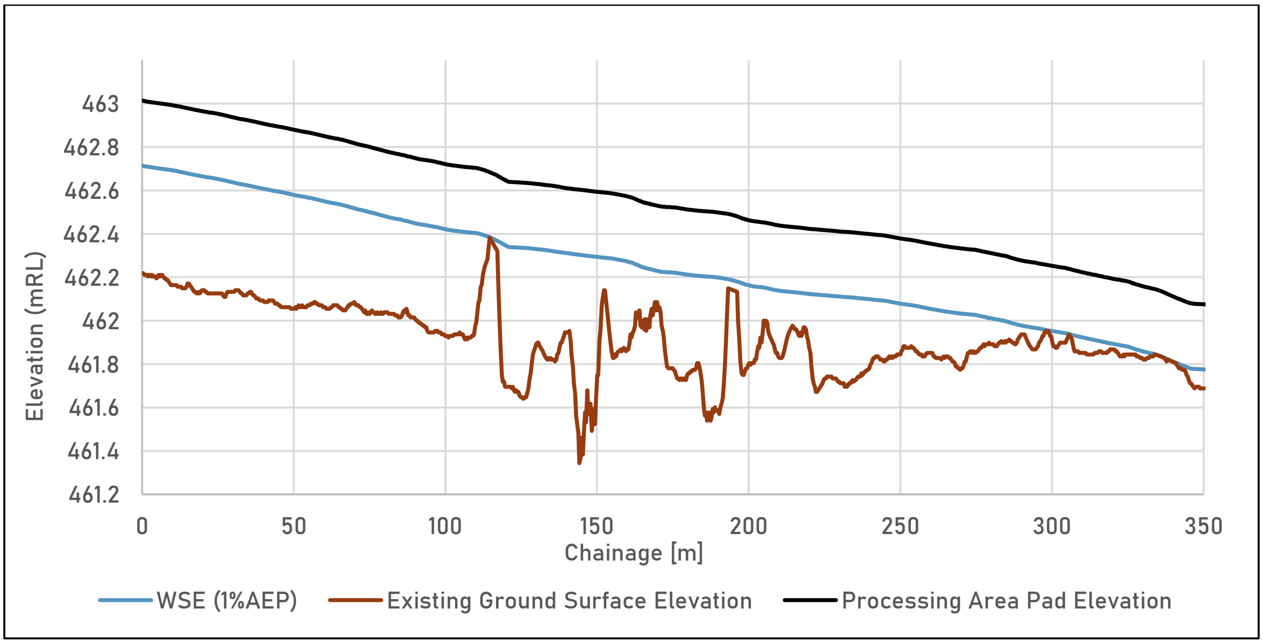


Figure 4.10 Processing Area: Long-Section of Earth Pad Elevations

Figure 4.11 Processing Area: 1% AEP Post-Development Flood Velocity Map

4.5.2 TSF Surface Water Management Measures

The predicted Post-Development flood regime focusing on the area immediately surrounding the TSF is mapped in Figure 4.12 (1% AEP) and Figure 4.13 (PMF event). The results show that the flow from the local creek are deflected around the northern side of the TSF footprint to join the Eastern Creek flood plain. Although not shown in the maximum flood depth maps, the 2D flood model results also show that the drainage path around the TSF footprint has a continual fall naturally, such that significant ponding is unlikely to occur. A nominal diversion drain around the northern and eastern boundary of the TSF would assist in ensuring positive drainage occurs.

Maximum flood water depths along the eastern perimeter of the TSF are predicted to be up to 0.75 m in the 1% AEP event and exceed 1 m in the PMF. The design of the TSF should also consider flow velocities around the toe of the TSF during flood events. The flow velocities around the TSF are plotted in Figure 4.14 (1% AEP) and Figure 4.15 (PMF). During a 1% AEP event, flow velocities around the TSF are generally low (<0.5 m/s) but they increase to up to 1.5 m/s in the PMF.

Figure 4.12 TSF Area: 1% AEP Post-Development Flood Depth Map

Figure 4.13 TSF Area: PMF Post-Development Flood Depth Map

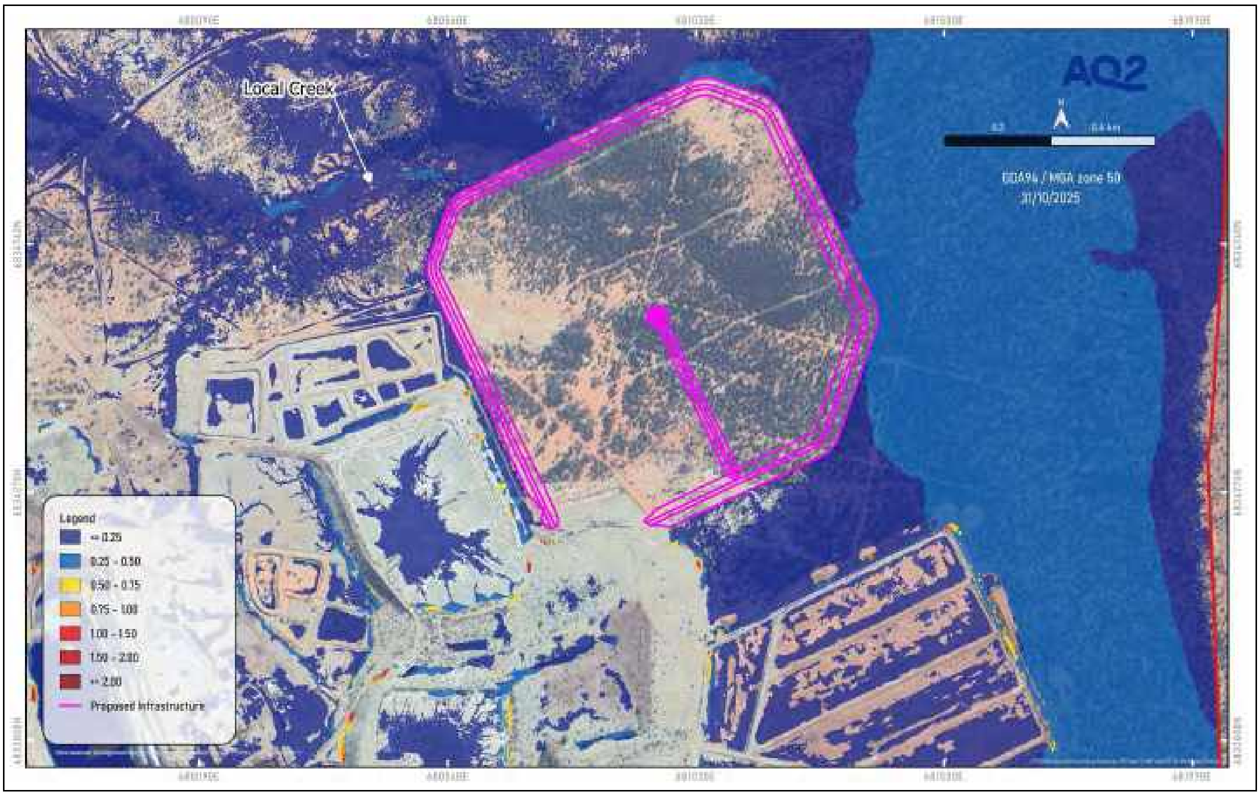


Figure 4.14 TSF Area: 1% AEP Post-Development Flood Velocity Map

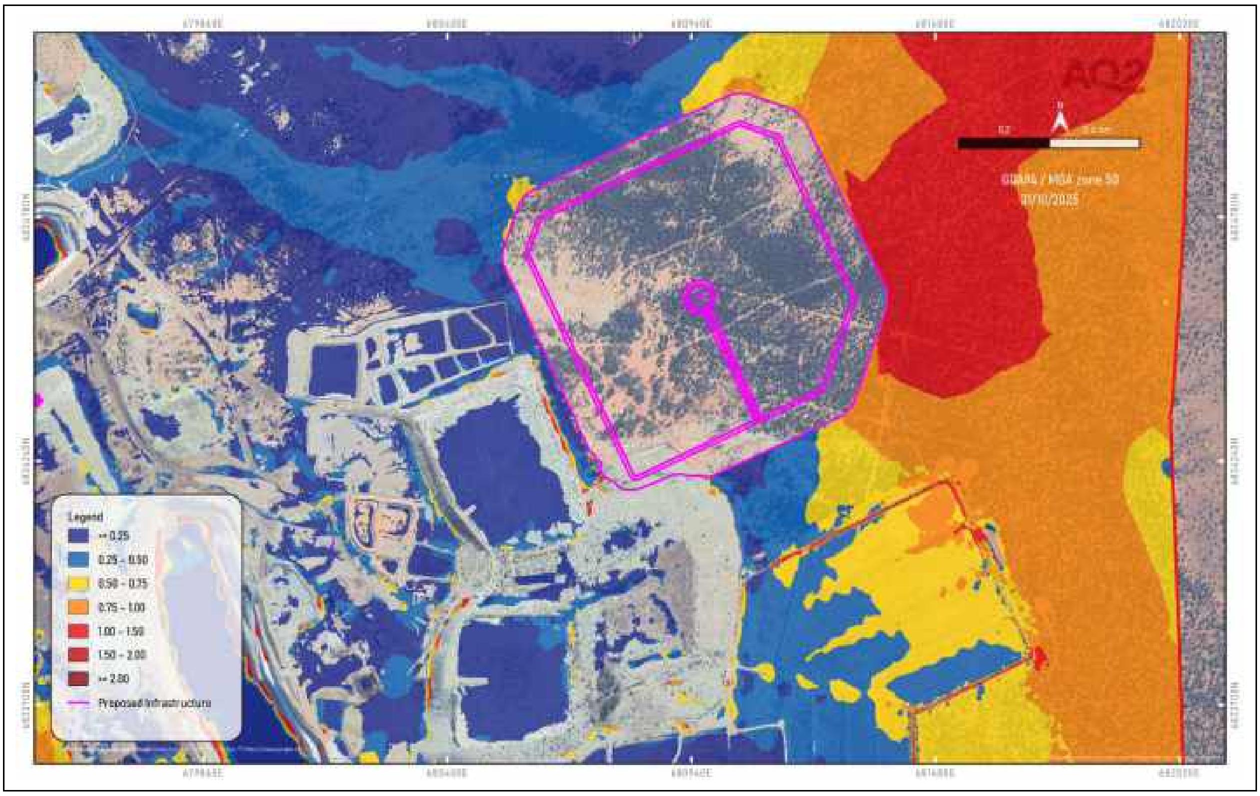


Figure 4.15 TSF Area: PMF Post-Development Flood Velocity Map

5. DEWATERING ASSESSMENT

5.1 Dewatering History

5.1.1 Mining

Small-scale underground mining occurred from 1908 to 1921 and again from 1937 to 1942. Multiple open-pit operations and some underground mining took place from 1987 to 1997. Key features of the more recent mining history which are relevant to dewatering history are:

- Open pit mining commenced (at the Main Pit) in January 1987.
- The pit intersected the local water table at around 20 m depth (~450 mRL) and was mined to a depth of 90 m (to ~380 mRL).
- Underground mining of the Main Lode commenced with decline development from the Main Pit in January 1993 and with production (stoping) commencing in June 1994.
- The Pollard Shaft (first developed during earlier mining) was redeveloped and underground mining of the southern part of the Main Lode (Pollard) commenced in January 1995.
- The Main Lode workings were mined down to around 620 m depth (to ~ -150 mRL).
- Underground mining of the Hill End Lode commenced in October 1995.
- Mining at Youanmi ceased in late 1997.

5.1.2 Dewatering

There is no dewatering data available prior to November 1994. Table 5.1 lists monthly total mine inflows based on flow meter readings (Rox, 2024).

Table 5.1 Underground Mine Inflows* (kL/d)

Month	Hillend	Youanmi Deeps (net)	Pollard	Remarks
Nov-94		1054		
Dec-94		1159		
Jan-95		1305	386	
Feb-95		982	601	
Mar-95		1956	645	
Apr-95		2287	1146	Hillend development started
May-95		3157	1185	
Jun-95		2682	399	
Jul-95		2925	679	
Aug-95		3942	900	Main fault intersected
Sep-95		3370	1115	
Oct-95	428	3934	823	
Nov-95	501	4263	551	
Dec-95	383	4241	478	
Jan-96	491	3866	273	
Feb-96	327	4193	513	
Mar-96	403	4070	506	
Apr-96	399	3950	466	

Month	Hillend	Youanmi Deeps (net)	Pollard	Remarks
May-96	401	3950	447	
Jun-96	469	3950	466	
Jul-Dec-96	534	2426	344	

* Average inflows based on monthly flow meter readings

Based on the data listed in Table 5.1 and reported spot observations of inflows at various times by mine workers (Rox, 2024), the dewatering history can be described as:

- Up to 1,100 kL/d (≤13 L/s) inflows to the Main Pit prior to underground mine development.
- Around 1,100 kL/d (~13 L/s) average monthly inflows to the Main Lode underground workings in late 1994. It is noted that it is considered that this mostly reflects the pumping of pit inflows when had flowed down into the immediately underlaying shallow underground mine workings.
- Increase in average monthly total inflows to around 1,700 kL/d (~20 L/s) when the Pollard workings are commenced in January 1995 further increasing to around 3,300 kL/d (~38 L/s) by April 1995.
- Significant increase in average monthly total mine inflows to around 4,300 kL/d (~50 L/s) when the Main Fault was intersected in the Main Lode workings. Spot observations indicate that initial burst inflows in the Main Lode workings were as high as 8,600 kL/d (~100 L/s), gradually declining to around 3,000 kL/d (~35 L/s) in November and then to around 1,600 kL/d (~18 L/s) in May 1996 after "sealing" of the Main Fault by grouting.
- Increase in average monthly total mine inflows to around 5,200 kL/d (~60 L/s) in October 1995 following development of the Hillend workings below water table, declining to around 4,900 kL/d (~57 L/s in June 1996 and to around 3,300 kL/d (~38 L/s) in December 1996, just prior to the cessation of mining.
- The average total mine inflow over the life of the underground mine workings was around 4,000 kL/d (~46 L/s).

Following the cessation of mining (and dewatering) in 1997, groundwater levels rebounded, flooding the underground mine workings and the partial re-filling of the Main Pit to the current pit lake level of 418 mRL (around 52 m below ground surface and around 32 m below the pre-mining water table). It is noted that water balance studies undertaken as part of earlier investigations (Rockwater, 2021) suggested that groundwater inflows to the pit (balancing evaporation losses and pit lake storage changes) were around:

- 690 kL/d (~8 L/s) at a pit lake level of 412 mRL.
- 480 kL/d (~6 L/s) at the current pit lake level of 418 mRL).

Based on the above, Rockwater also predicted that short-term pit inflows once the pit lake had been pumped dry again would be around 1,500 kL/d (~17 L/s), which is marginally higher than the total recorded inflows at the commencement of underground mining (which have been interpreted to reflect pit inflows following 7 years mining).

5.2 Current Mine Plan

The Youanmi underground mine plan consists of 3 distinct mining areas, being the Main Lode, Pollard, and United North. The locations of these areas relative to the historical workings and open pits are shown in Figure 5.1. There is no open pit mining planned at this stage.

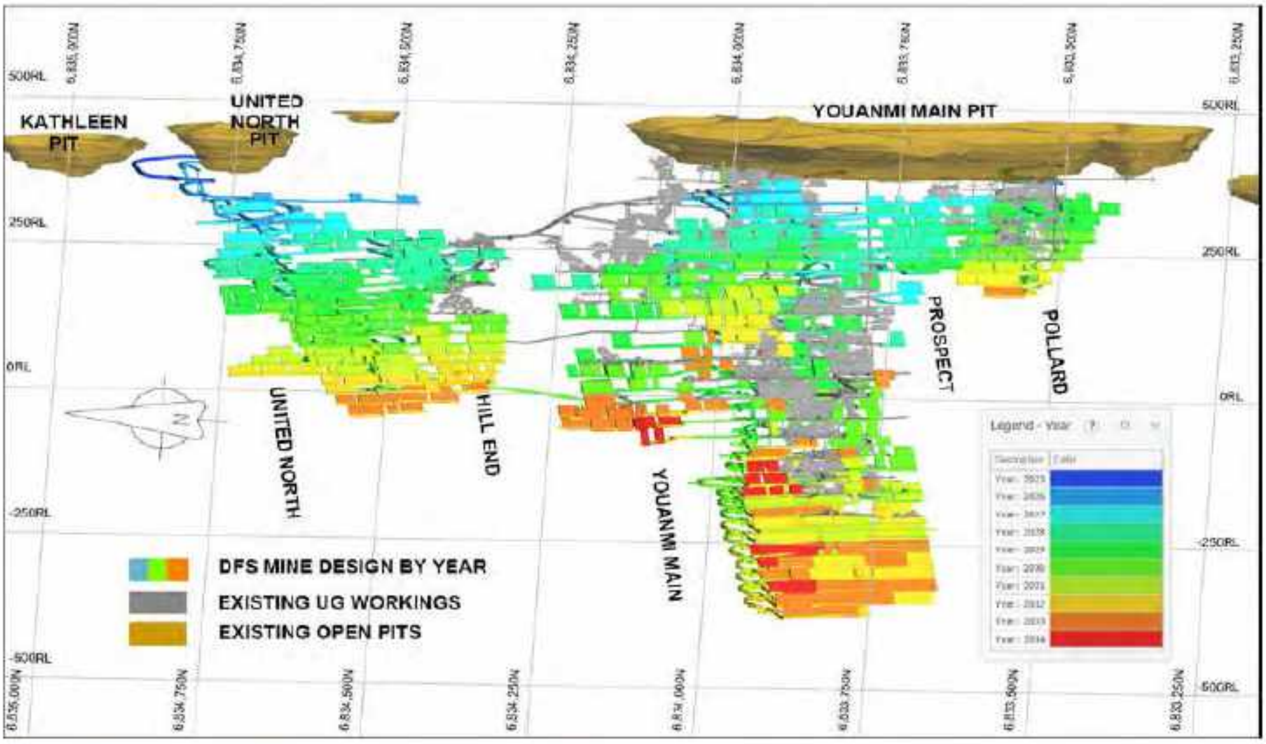


Figure 5.1 Youanmi Underground Mine Layout by Year

5.3 Conceptual Pit and Underground Inflow Models

The local hydrogeology is well understood, with essentially an aquifer system comprising an upper/shallow zone of comparatively higher permeability weathered/transitional material and a deeper zone of comparatively lower permeability (tighter) fresh basement rocks. Within both zones there will also be enhanced local permeability associated with structural and mineralised zones. However, the groundwater storage within these higher permeability zones will be limited and longer-term inflows will be controlled by the bulk permeability of the general shallow and deep aquifer material.

There are two possible broad conceptual models for how the pit and the various underground mines interact hydraulically that have been considered in this study:

- Model A: the pit and all underground mines (existing and future) are in hydraulic connection (i.e., all in the same aquifer).
- Model B: the pit and the Main and Pollard underground mines are in hydraulic connection but the Main, Pollard and United North underground mines are not in hydraulic connection with each other.

Both conceptual models have been considered in groundwater inflow modelling (refer Section 5.4).

5.4 Predicted Mine Inflows (Pit and Underground)

5.4.1 Modelling Approach

An analytical modelling approach was adopted to simulate groundwater inflows to the LOM underground development and to the pit during initial pit lake pumping. The approach predicts groundwater inflow to the pit and underground workings from surrounding aquifers over set time periods.

Like all models, this approach makes a number of simplifying assumptions (principally that the aquifer system is homogeneous and isotropic) and model predictions cannot be considered to be precise. However, this approach does allow for the estimation of pit inflows based on limited data and model predictions have historically proven to closely match observed inflows. At other nearby mines in the Goldfields, this modelling approach has also provided predicted dewatering rates comparable with those derived from more complex (and more time consuming) numerical modelling.

Notwithstanding the above, there are inherent constraints to any modelling (due to limited aquifer distribution data) and it is generally considered that predicted dewatering requirements should be considered (at best) to be plus or minus 25%.

The model used is a two-dimensional analytical model based on the Theim and Dupuit-Forchheimer equations for flow to a large diameter well. Key steps in the model approach are as follows:

- Average aquifer parameters are applied to each equivalent well (representing stages of the pit).
- Two discrete aquifers are simulated (shallow and deep), each with its own adopted bulk aquifer permeability.
- The pit and underground mines (or various sections of the mines) are represented by a series of large diameter "equivalent wells" of similar area and depth at various time steps, representing various stages of pit development.
- The model calculates the pumping rate required to maintain pumping water levels in each equivalent well at or below the base of each equivalent well (mine base) at the end of each time step. For each time-step, the groundwater level is lowered to the base of the mine active during that time-step and the inflows calculated at the end of the time step.
- The results provide a good approximation of the inflows to each mine.

The first step in the modelling process was to set up models for the existing mine workings and derive bulk aquifer permeability for the shallow and deep aquifers, by model calibration against recorded historical dewatering.

It is also recognised that there remains a number of uncertainties as to precisely where the inflows reported in Section 5.1.2 originated and what the driving hydraulic heads for inflows have been. As such, a range of possible inflow sources and driving heads have been considered for both models (Options A1 to A4 and B1 to B4). As detailed in Section 5.4.1 below, the groundwater inflow model used in this study simulates flow to an "equivalent well" which encapsulates the mine workings. The base of the adopted equivalent well is set at the base of the aquifer which is contributing inflows and the adopted pumping water level (PWL) in the equivalent well is the level to which the mine has been (or will be dewatered).

5.4.2 Model Set Up

Individual models were set up to simulate various parts of the overall mine during calibration and prediction. The models simulated both Conceptual Models A and B (refer Section 5.3) and, during calibration, considered various potential inflow pathways. This provided a range of calibration (and prediction) results that reflect the heterogeneity of the aquifer systems present and take into account the consequent uncertainties in any predictions.

The calibration models considered (and the assumptions associated with each) are as follows:

Model A - Hydraulically Connected Mines:

- Model A1:
  - Recorded pumping in November 1994 was all pit inflows.
  - Calibration model simulated inflows to base of pit.
  - Base of equivalent well and pumping water level set at base of pit (380 mRL).

- Model A2:
    - Recorded UG pumping in November 1994 was all direct inflow to Main Lode underground.
    - Base of equivalent well and pumping water level at base of mining (300 mRL).
- Model A3:
    - Recorded pumping in January 1995 was all direct inflow to the Main and Pollard underground.
    - Base of equivalent well and pumping water level was at base of mining (300 mRL).
- Model A4:
    - Recorded pumping in June 1996 was direct inflow to all three undergrounds.
    - Base of equivalent well and pumping water level as at base of mining (-110 mRL).

The model set up for the above options is shown (long and cross section) on Figure 5.2.

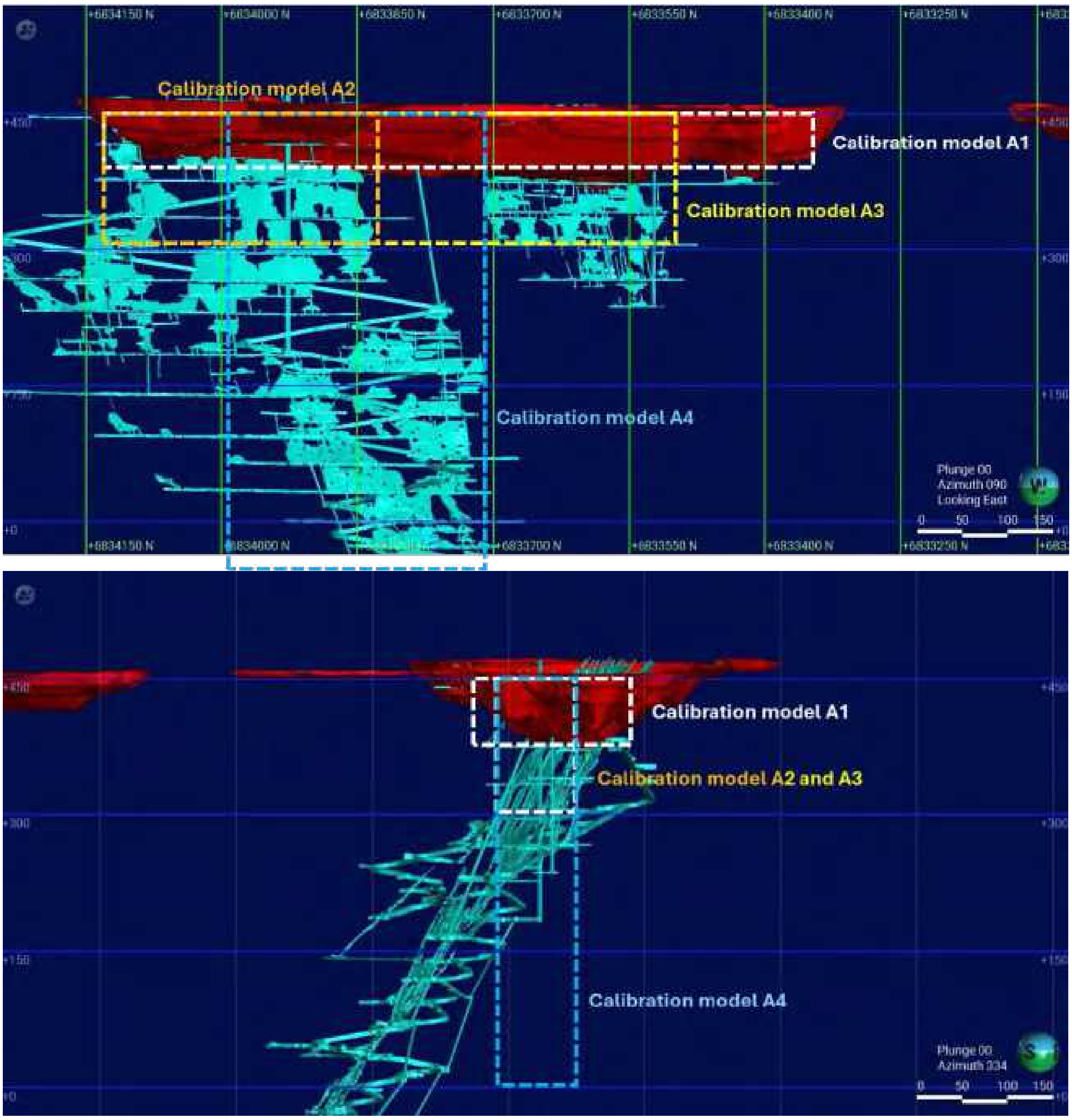


Figure 5.2 Sections through Calibration Models – Model A

The calibration inputs for the Model A options are shown in Table 5.2.

Table 5.2 Calibration Model Inputs – Models A1 to A4

Model	Base of Aquifer (mRL)	Base of Equ Well (mRL)	Length Mine (m)	Width Mine (m)	Plan Area of Mine (m2)	Equiv Well Radius (m)	Inflow at end of Period (m3/d)	Time since start of DW (yrs)
A1	250	380	780	180	140,400	210	1,100	6.9
A2	250	300	300	80	24,000	90	1,100	6.9
A3	250	300	600	80	48,000	120	1,700	7.2
A4	-100	-100	300	80	24,000	90	5,000	8.5

SWL ~ 450mRL

Base of aquifer:

- Models A1 to A3: 50m below base of mining
- Model A4: at base of mining

Start of DW ~ Jan 1987
End Model #1 ~ Nov 1994
End model #2 ~ Nov 1994
End of model #3 ~ Jan 1995
End model #4 ~ Jun 1996

Model B – Hydraulically Isolated Underground Mines

- Model B1 (essentially the same as Model A1):
  - Recorded pumping in November 1994 was all pit inflows.
  - Calibration model simulated inflows to base of pit.
  - Base of equivalent well and pumping water level set at base of pit (380 mRL).
- Models B2, B3 and B4:
  - Calibrated to recorded pumping and mine depths in June 1996.
  - Aquifer base at base of final mining in each mine area.
  - Like the Model A options, the cross-sectional width of the mining envelopes is 80 m.

The model set up for the above options is shown (long and cross section) on Figure 5.3.

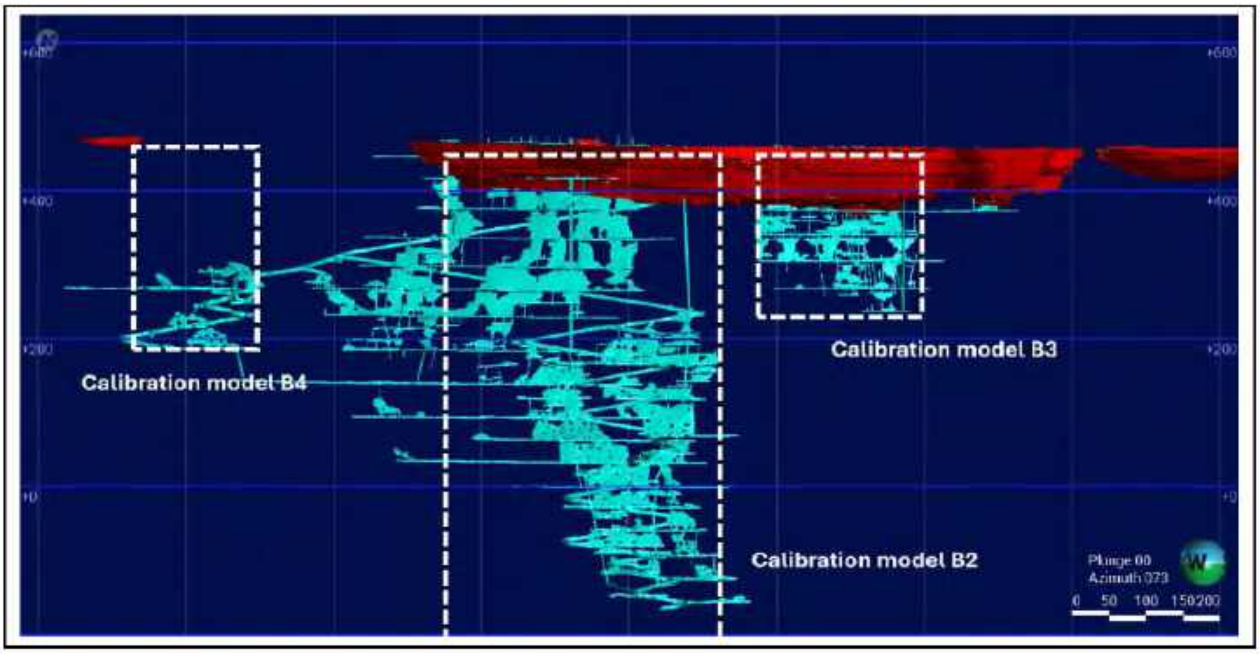


Figure 5.3 Sections through Calibration Models – Model B

The calibration inputs for the Model B options are shown in Table 5.3.

Table 5.3 Calibration Model Inputs – Models B2 to B4

Model	Base of Aquifer (mRL)	Base of Equ Well (mRL)	Length Mine (m)	Width Mine (m)	Plan Area of Mine (m^2)	Equiv Well Radius (m)	Inflow at end of Period (m^3/d)	Time since start of DW (yrs)
B2 (Main)	-400	-110	300	80	24,000	90	4,000	8.5
B3 (Pollard)	180	240	200	80	16,000	70	500	1.5
B4 (Hillend)	0	180	150	80	12,000	60	5,000	0.75

SWL ~ 450mRL
Base of aquifer:

- At base of UG mine in each area

Start of DW:
Main ~ Jan 1987
Pollard ~Jan1995
Hillend ~ Oct 95
End Model ~ Jun 1996

5.4.3 Model Calibration

Calibration results are listed below. In all cases, the adopted aquifer storativity (Specific Yield) was 0.5%, a typical value for basement rock aquifers and one commonly adopted for dewatering modelling in the Goldfields region.

Model A – Hydraulically Connected Mines

- Models A1, A2 and A3 (with aquifer base set at 250 mRL):
    - Model A1 – calibrated permeability of 0.04 m/d.
    - Model A2 - calibrated permeability of 0.035 m/d.
    - Model A3 - calibrated permeability of 0.045 m/d.

The average calibrated permeability over the upper 200 m of aquifer is 0.04 m/d. This is considered to reflect the bulk permeability of the shallow aquifer.

- Model A4a (with aquifer base set at -100 mRL):
    - Model A4a – calibrated permeability of 0.02 m/d.

This considered to reflect the bulk permeability of the deep aquifer assuming the aquifer base is at the current base of mining. If the base of aquifer is set at the base of future LOM mining (-400 mRL) the calibrated bulk permeability becomes 0.01 m/d. This option (termed Model 4b) is considered in model predictions.

Model B – Hydraulically Isolated Underground Mines

- Model B1 – same as Model A1.
- Models B2, B3 and B4:
    - Model B2 (Main) – calibrated permeability of 0.007 m/d (most reliable calibration – more data) available).
    - Model B3 (Pollard) - calibrated permeability of 0.005 m/d.
    - Model B4 (Hillend) - calibrated permeability of 0.001 m/d.

Model B2 is considered to be the most reliable as a result of it having the most calibration data. Model B4 is considered to be the least reliable as a result of it having the least calibration data. The following were adopted as the bulk permeabilities for the various mines:

- Main underground - 0.007 m/d.
- Pollard and Hillend underground - 0.005 m/d.

5.4.4 Model Predictions – Underground Inflows

The calibrated models were used to predict inflows to the underground mine workings for the two conceptual inflow models (Models A and B) at a number of time steps during the life of mine. Figure 5.1 shows the life of mine development plan. The time steps selected (based on significant mine development phases) were FY2026, FY2028, FY2032 and FY2034.

Key assumptions used in prediction modelling are:

Model A – Hydraulically Connected Mines

- Dewatering of the Main underground mine will dewater the other underground mines.
- Prediction Model A1:
  - Essentially an extension of Calibration Model A4a.
  - The aquifer base is at -110 mRL and there will be no inflows below this depth.
  - The bulk permeability is 0.002 m/d.
  - No inflows to UG below -110 mRL (i.e., tight aquifer below).
  - Inflows to -110 mRL and above continue over the life of mine.
- Prediction Model A2:
  - Essentially an extension of Calibration Model A4b.
  - The bulk permeability is 0.001 m/d.
  - Inflows will be over full depth of mining (to -400 mRL).

Figure 5.4 shows the model set up for these models.

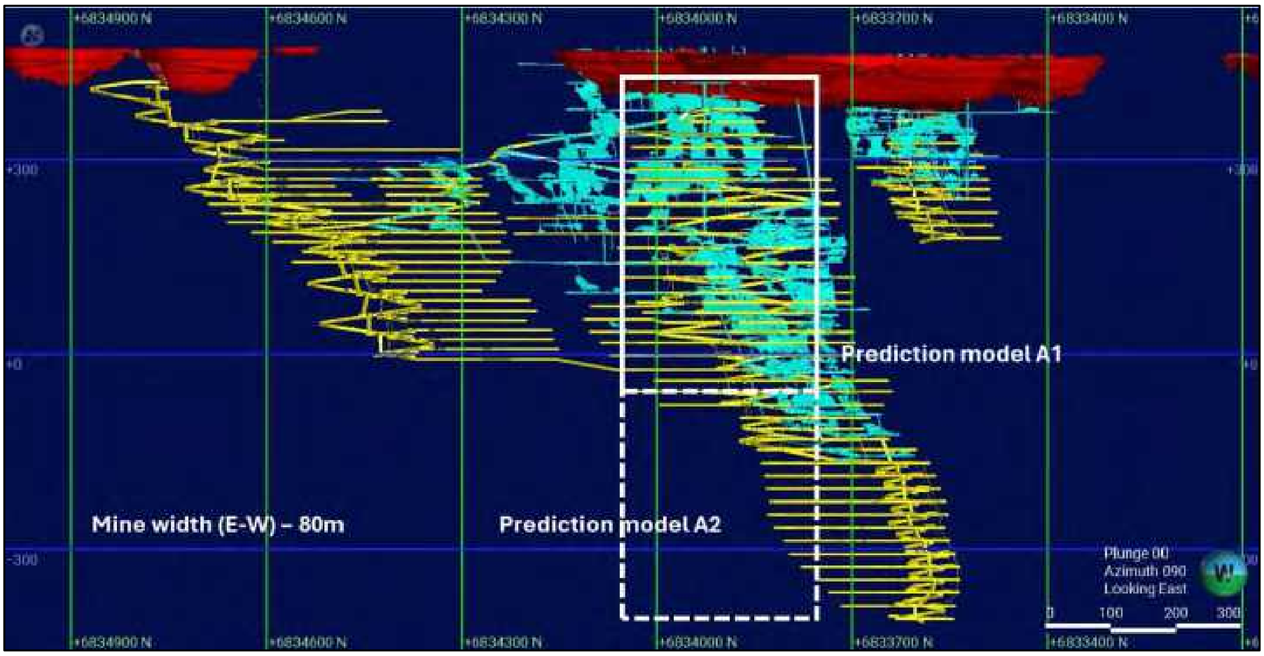


Figure 5.4 Model Setup for Prediction Models A1 and A2

Model B – Hydraulically Isolated Underground Mines

- Prediction Models B2, B3 and B4 are essentially extensions of calibration Models B2, B3 and B4.
- Inflows will be to the underground mines over the full depth of mining.
- Predictions considered two starting water table scenarios:
  - Water table at 450 mRL as per pre-mining conditions.
  - Water table at 418 mRL as per the current pit lake and local water table around pit.

Figure 5.5 shows the model setup for these models.

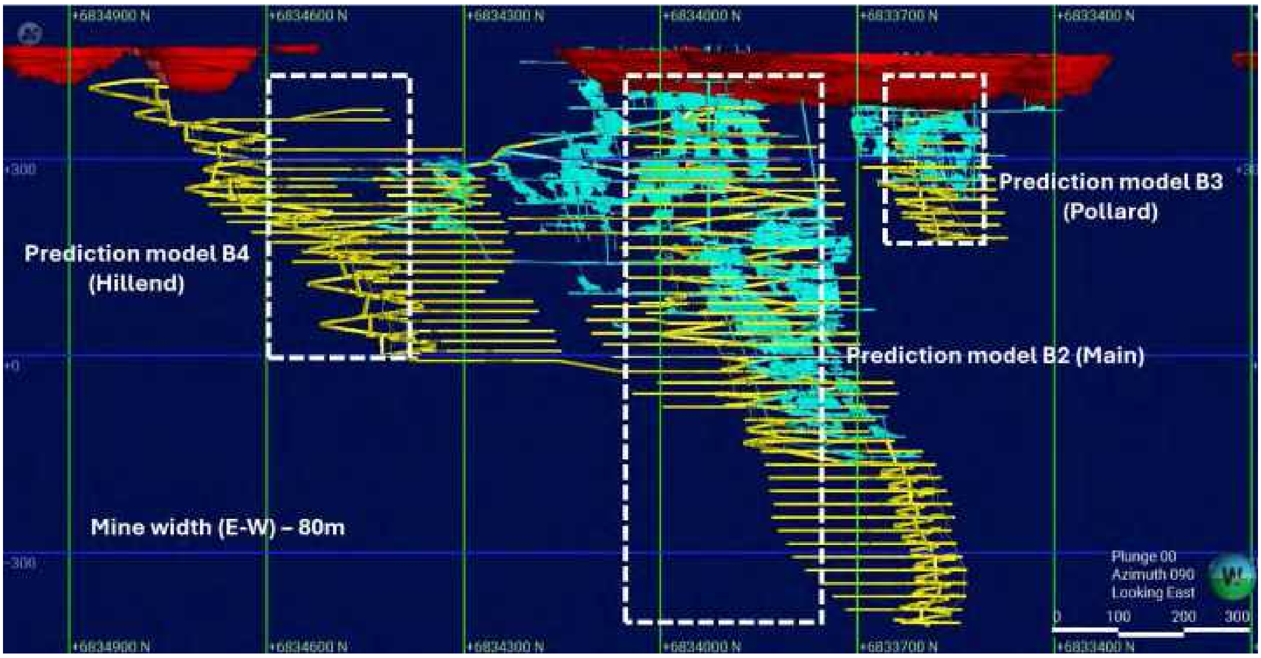


Figure 5.5 Model Setup for Prediction Models B2, B3 and B4

5.4.5 Model Predictions – Pit Inflows

As outlined in Section 5.1.2, the Main Pit has filled with water (from groundwater inflows and rainfall runoff) to around 418 mRL (around 32 m below the pre-mining water table) and still recovering. Based on historical water balance studies (Rockwater, 2021), it has been estimated that there is currently around 480 kL/d (~6 L/s) groundwater inflow to the pit, largely balanced by evaporation losses from the pit lake surface.

During pumping of the pit lake ahead of mining, groundwater inflows will increase and contribute to total pumping requirements. A pit inflow model was developed based on Calibration Model A1 to predict groundwater inflows as the pit lake is dewatered.

5.5 Predicted Total Mine Inflows

The following presents the results of model predictions of groundwater inflows to the underground mines during mining and groundwater inflows to the pit during initial pit lake dewatering. These predictions do not include the pumping required to remove existing stored water in the pit and underground mines. These volumes are accounted for in the overall mine dewatering strategy.

5.5.1 Underground Inflows

Table 5.4 shows the ranges of predicted groundwater inflows to the underground mines.

Table 5.4 Predicted Underground Inflows (L/s at end of FY)

Model	FY26	FY28	FY32	FY34
A4a	26 to 34	60 to 66	54 to 60	52 to 54
A4b	22 to 29	65 to 70	67 to 72	65 to 70
B2 - Main	17 to 21	48 to 52	49 to 53	48 to 51
B3 - Pollard	-	-	3 to 4	3 to 4
B4 - Hillend	6 to 8	8 to 10	11 to 13	11 to 13
B - Total	23 to 27	56 to 62	63 to 70	62 to 68

In summary, it is predicted that:

- Total underground inflows will be around 20 to 30 L/s at the end of FY2026.
- Total inflows will increase to around 60 to 70 L/s by the end of FY2028.
- Total inflows will then remain relatively steady (at up to 70 L/s) over the rest of the life of mine.

It should be noted that the predicted inflows are averages and do not account for "burst inflows" when major structures intersected by development headings or stoping. History shows that short-term inflows of 100+L/s could occur.

5.5.2 Pit Inflows

The model predicts that net groundwater inflows (i.e., net of evaporation losses) will gradually increase to around 1,600 kL/d (~18 L/s) when the pit lake is at the base of the pit. These pit inflows will continue until such time as dewatering of the Main underground intercepts all inflows. The contribution of shallow (i.e., pit depth) inflow is accommodated in underground inflow predictions.

5.6 Recommended Dewatering Management Approach

It is assumed that Rox has already developed the overall optimum mine inflow management (dewatering) strategy driven by the initial dewatering of stored water in the Main and United North Pits. Once the existing Main and United North Pits are dry, the most practical and cost-effective water management (dewatering) strategy will be to manage all net pit inflows including any rainfall runoff inflows with pit floor sump pumping at each pit with a transfer station for underground dewatering. Underground dewatering should be achieved through a series of sumps at increasing depths as the mine progresses. This can easily be managed by standard "off-the-shelf" mine dewatering pumping equipment. Sump pumping capacity (far in excess of the pumping capacity to manage groundwater inflows) will be required to manage runoff to the open pits and the box-cut following high rainfall events.

5.7 Mine Inflow Risks and Risk Management

5.7.1 Mine Inflow Risks

The main potential risks relate to underground mining include:

- Burst inflows if/when development headings (or stopes) intersect permeable fracture zones that have not been dewatered/depressurised by ongoing dewatering.
- Inrush of water from pit following storms.
- Failure of underground pumping systems.

5.7.2 Risk Management Strategies

There are relatively simple and straightforward risk management strategies that can be adopted to manage the identified risks. These include:

- Burst inflows:
  - Cover drilling ahead of development headings into “unknown” ground conditions.
  - Drilling will identify water hazards.
  - Drill-holes can be used to dewater/depressurise the permeable structure ahead of development.
- Storm water inrush:
  - Maintain a pit sump collection and pumping system.
  - System should be sized to accommodate peak storm event (typically 10yr ARI 72hr storm).
  - System can also be used as transfer pumping station for underground dewatering pumping.
- Underground pumping system failure:
  - Install backup/contingency pumping capacity.

6. SITE WATER BALANCE

A site water balance model has been developed for the Youanmi Mine Operations. The water balance model was developed in GoldSim with the purpose of achieving the following over the mine life:

- Quantifying water demands for different streams of water required at the mine.
- Comparing the water demands to the available supply of water from different mandatory water generating activities (such as dewatering).
- Quantifying the amount of make-up water required from discretionary supply sources for each of the water streams.
- Quantify the amount of surplus water (across the different streams) which may be generated by the Project.
- Account for fluctuations in the water circuit due to climatic variability.

6.1 Water Quality Streams

The water circuit has different water quality streams accounted for, based on requirements outlined by MACA (pers comms. June 2025).

- Stream 1 – Potable Water
  - The requirements for this stream are for the water to be no suspended solids and low salinity.
  - Potable Water would be used for domestic water use plus supply to safety showers.
  - Potable Water could be used as make-up water to supply shortfalls in Raw Water and Process Water demands.
- Stream 2 – Raw Water
  - The requirements for this stream are for the water to contain no suspended solids and preference for lower salinity water. Total TDS must be less than 50,000 ppm.
  - The water quality within Pollard Shaft, Hillend and Bunker Pit has the potential to be suitable to meet the water quality requirements for Raw Water (provided low TDS can be achieved).
  - Raw Water is used to supply gland water demands and the RO Plant (which would in turn supply water to the elution and kiln water demands).
- Stream 3 – Process Water
  - There are no assumed water quality limits on this water stream. However, better quality water would result in lower operating costs.
  - TSF return water and Main Pit underground dewatering would be classed as Process Water.

6.2 Water Demands

The following water demands and losses are accounted for in the model:

- Potable Water:
  - Camp/Domestic – 0.7 L/s (based on a nominal ~300 L per person per day and 200 people camp).
  - Safety showers – 0.3 L/s (based on data provided by MACA).
- Raw Water:
  - Plant use (including glands) – 6 L/s.
  - RO Plant demand – 6 L/s (outflow of 300 m^3/d with a notional 60% recovery).
  - Mining water demand – 9 L/s.

- Process Water:
  - Plant – 30 L/s (approximate, to be determined by the water balance model to account for TSF losses).

6.3 Mandatory Water Inputs

The mandatory water inputs (i.e., external water that must be used within the mine water circuit) to the mine water circuit accounted for in the water balance model are as follows:

- Potable Water – none.
- Raw Water:
  - Dewatering of Pollard Shaft and Hillend Shaft, as per Section 5.
  - FY26 – 6 to 8 L/s.
  - FY28 – 8 to 10 L/s.
  - FY32 – 14 to 17 L/s.
  - FY34 – 14 to 17 L/s.
- Process Water:
  - Dewatering of Main Pit and underground, as per Section 5.
  - FY26 – 17 to 26L/s.
  - FY28 – 48 to 60L/s.
  - FY32 – 39 to 55 L/s.
  - FY34 – 48 to 53 L/s.
  - RO Plant reject water – 2.3 L/s.
  - Rainfall on the TSF footprint.

6.4 Discretionary Water Inputs

The mine site may choose to supply water from the following potential discretionary sources (as discussed further in Section 7):

- Potable Water – groundwater production bores (if any).
- Raw Water – groundwater production bores and Bunker Pit.
- Process Water – groundwater, stored water in Rebel and Kathleen Pits.

6.5 Discharge Options

Surplus water may be discharged to the site evaporation ponds and other approved discharge locations/facilities. For the purpose of this feasibility report, the requirement to discharge water which cannot be managed by the evaporation ponds has been quantified. Potentially some spare capacity for additional discharge of water at Rebel and Kathleen Pits may be available, but, for the purposes of this water balance model, it is assumed that these pits are filled due to emptying of the Main Pit in advance of this water balance commencing.

6.6 Water Balance Overview

Based on a review of the values presented above, the following observations are made:

- A potable water demand of about 1 L/s needs to be sourced. It is assumed that this will be found from an external water supply borefield, which will need to be developed.
- The required Raw Water demand may be able to be sourced by pumping from Pollard and United North, if higher pumping rates (causing advanced dewatering) can occur during the early stages of the mine

development. Minor demand shortfalls may exist which would require water supply from other sources such as external water supply borefields or Bunker Pit. [Other supplies may also be needed if the water quality in Pollard/Hillend ends up being unsuitable for Raw Water use].

- An excess of Process Water is likely to be generated from the site, particularly from 2030 onwards.

A GoldSim water balance has been developed to quantify the water supply shortfalls and surpluses throughout the mine life. The assumed water circuit which has been modelled is shown in Figure 6.1.

The water balance is calculated on a daily timestep over the 8-year life of the mine. The model is run for 100 different model realisations, with each realisation using a different rainfall sequence and mine dewatering requirement (between the ranges discussed in Section 5).

The water balance model starts when the mine process plant/tailings circuit starts operating and assumes that this will occur at the start of FY26 (i.e., 1/7/2026) and will continue to the end of mining (30/4/2034).

Key components of the water balance model are discussed below.

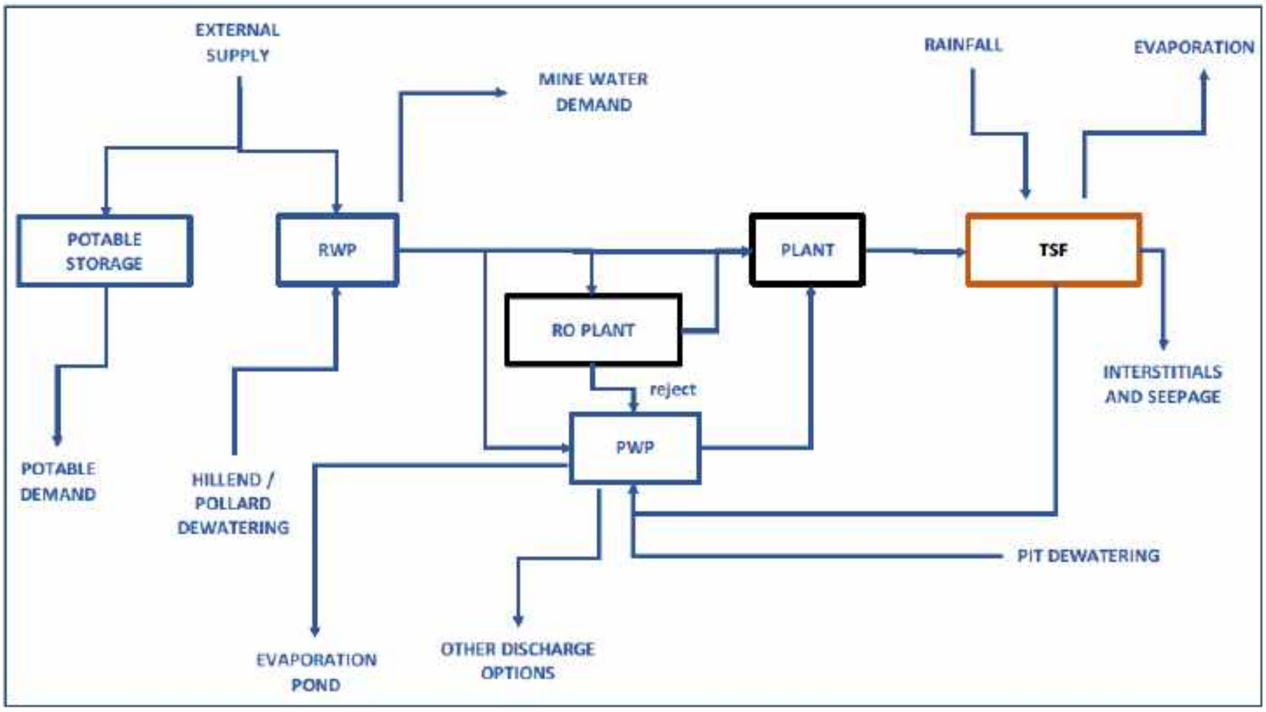


Figure 6.1 Adopted Water Circuit for Water Balance

6.6.1 Rainfall

Rainfall data is used within the model to account for rainfall falling over the footprint of the TSF.

A synthetic rainfall time series data was developed using the Stochastic Climate Library (SCL) daily rainfall generator. The SCL software uses historic rainfall data as an input and produces a synthetic rainfall data set for the user-required duration, which is a statistical fit to observed rainfall. For this assessment the daily rainfall records from the BOM Sandstone weather station (measured between 1904 and 2024) were used to generate a 1000-year-long rainfall sequence, with the water balance model sampling a different 10-year sequence of rainfall data in each model realisation. Note that although Sandstone has records from 1904 to 2024, many years had significant gaps in the records, such that 83 years of the rainfall record were used in the SCL software program to generate the statistics for the synthetic rainfall record.

6.6.2 Evaporation

Evaporation losses were applied to the model in the following processes:

- Evaporation loss of water from the TSF footprint.
- Evaporative loss from the Bunker Pit.
- Evaporative losses from the evaporation ponds.

Evaporative losses from the TSF have been based on the Morton's Shallow Lake Evaporation estimates and losses from the catchment areas have been based on Morton's Potential Evapotranspiration (PET) estimates.

Monthly average Morton's Shallow Lake Evaporation data on data published for evaporative losses from shallow agricultural dams (Department of Agriculture 2003), which provides monthly average evaporation loss rates from shallow water bodies for a number of regional centres. The data applied to the water balance model was the average between the monthly evaporation rates provided for Sandstone and Paynes Find. The evaporation rates used within the model for each month are shown in Table 6.1.

Table 6.1 Average Daily Evaporation Rates Modelled (mm/d)

Month	Evaporation Rate
January	11.4
February	10.7
March	8.5
April	5.8
May	3.7
June	2.5
July	2.5
August	3.3
September	4.5
October	6.9
November	8.6
December	10.4

6.6.3 Process Circuit

The process plant is assumed to process 1Mt/annum of solids (TailCon 2025) with a slurry density of 45%. This equates to the process plant discharging ~39 L/s continuously to the TSF throughout the life of the Project. Within the water balance model, 39 L/s of inflow to the plant (to support the 39 L/s discharge to the TSF) is sourced from:

- Gland water inflow (and other plant Raw Water use) – 6 L/s.
- RO plant supply to elution circuit, carbon transfers, carbon kiln and others – 3.5 L/s (300 m^3/hr).
- Make-up process water supplied from the Process Water Pond, including the TSF return water.

6.6.4 TSF Circuit

The tailings water circuit is based on data provided by TailCon (TailCon 2025) and is summarised as follows:

- Water within the tailings slurry is discharged to the TSF at a rate of ~39 L/s.

- Evaporative losses from the TSF are assumed based on:
  - Monthly evaporative loss rates discussed above.
  - A constant pond surface area of 8.5 ha and tailings running beach of 3.6 ha to which the evaporation loss is applied.
- Rainfall inflow to the TSF, based on:
  - Daily rainfall sequences discussed above.
  - Assumed catchment area for the rainfall of 42 ha.
  - Volumetric runoff coefficient of 75%.
- Seepage losses based on a loss rate of 128 m^3/d (which is the equivalent of 0.3 mm/d of loss over the footprint of the TSF).
- Interstitial storage of water within the tailings of ~10.5 L/s.
- In-situ tailings dry density of 1.45.

6.6.5 Other Water Demands

Other than the make-up water required to maintain the process and TSF circuit, the other losses from the water circuit which have been accounted for include:

- Mine water demand – assumed demand of 9 L/s to be sourced from raw water.
- Camp and mine potable water demand – 1 L/s to be sourced from potable water sources.

6.6.6 Dewatering

The water balance model adopts the range of dewatering rates discussed in Section 5. The dewatering is split into "Raw Water" dewatering (Hillend and Pollard shafts) and "Process Water" dewatering (all other dewatering) based on the water quality from each of these areas (from past water quality sampling data). As such, the following dewatering ranges are used in the water balance model:

Table 6.2 Pit Dewatering Rates Adopted in Water Balance Model (L/s)

Water Quality Stream	FY28	FY30	FY34	FY36
Raw Water - Minimum	6	8	14	14
Raw Water - Maximum	8	10	17	17
Process Water - Minimum	17	48	39	48
Process Water Maximum	26	60	55	53

The water balance model assumes that the Main Pit has been emptied by the time the model commences, so the availability of dewatering from the Main Pit has not been accounted for in the model.

Both the maximum and minimum dewatering rates are stated in the model, together with a "scaling factor" function which chooses the dewatering rate to use for the model run within the range for that period of time. The scaling factor is:

- Selected at the start of each of the 100 model realisations but held steady for the full model realisation duration.
- Different in each model realisation.

- A random number selected by the water balance from a uniform distribution function defined as a number between 0 and 1.
    - If the uniform distribution returns a scaling factor value of 0, the minimum dewatering rate is applied at each time step of the model.
    - If the uniform distribution returns a scaling factor value of 1, the maximum dewatering rate is applied at each time step of the model.
    - A scaling factor value of 0.5 would use the value halfway between the minimum and maximum rate at each time step (and so forth).

It is assumed that if dewatering requirements are one end of the range for a specific dewatering location and time, then they will continue to be at that range across the dewatering area and across time. Hence a constant dewatering scaling factor is used for each model realisation.

Across the 100 model realisations, it is expected that the range of dewatering rates is tested with different rainfall sequences. Although there are likely to be model realisation that have concurrent high dewatering and high rainfall sequences (and low dewatering and low rainfall), specific model runs have not been run which specifically simulate these conditions.

6.6.7 Water Storages

The water balance model includes simulations of water storage volumes in the following assumed water storages:

- TSF decant pond (discussed above).
- Potable Water Tank/Pond.
- Raw Water Pond.
- Process Water Pond.
- Evaporation Pond (discussed further below).

The water balance does not consider stored water within Kathleen and Rebel pits.

Nominal volumes for the Potable Water, Raw Water and Process Water storages have been adopted in the model, mainly to ensure that simulated fluxes in/out of the storages don't cause model instability with the daily calculation time step. Within the model, water can be supplied from the Potable Water Tank to the Raw Water Pond and from the Raw Water Pond to the Process Water Pond. When there is surplus water in the circuit, water is sent from the Process Water Pond to the evaporation ponds and then (if the evaporation ponds are at capacity) to one of the other approved discharge locations.

The water levels within the ponds are used as triggers to transfer water within the model. For example:

- An external water supply is assumed to supply the Potable Tank if the water levels in the Potable Tank fall below a setpoint.
- Water in the Potable Tank is used to supply the Raw Water Pond if water levels in the Raw Water Pond fall below a setpoint (which in turn triggers the external supply to supply the Potable Tank).
- Water is sent from the TSF decant pond to the Process Water Pond when water in the decant pond is above a set volume.
- Water is sent from the Raw Water Pond to the Process Water Pond when water levels in the Raw Water Pond become too high.

The fluxes in and out of the storages are summarised in Table 6.3.

Table 6.3 Storage Fluxes

Storage	Inflow	Outflow
Potable Tank	External Supply	Camp Supply
		Plant Potable Demand
		To Raw Water Pond
Raw Water Pond	Raw Water Dewatering	RO Plant Supply
	Supply from Potable Tank	Mining Water Demand
		Gland and Plant Demand
		Surplus to Process Water Pond
Process Water Pond	TSF decant return	Process Plant
	Saline dewatering	Surplus to Evaporation Ponds
	Surplus from Raw Water Pond	Surplus to Lake
	RO Reject	
TSF	Process Plant Slurry	Decant return to Process Water Pond
	Rainfall	Evaporation Loss
		Seepage Loss
		Water Retention
Evaporation Pond (see below)	Surplus from Process Water Pond	Evaporation Loss
	Rainfall	Seepage Loss

6.6.8 Evaporation Ponds

The operation of the existing mine evaporation ponds are simulated in the water balance model. The simulation of the evaporation ponds is based on the following:

- Measurement of the total footprint area of the ponds from GIS aerial images and assumed 20% area is ineffective due to bunds, embankment slopes etc. This resulted in an assumed water storage surface area of 480,000 m^2.
- Evaporation rates discussed above, reduced by a further 20% to account for potential reduced evaporation rates caused by increased water salinity (expected from the underground dewatering).
- A maximum depth of water in the ponds of 1 m (to provide an estimated storage volume within the ponds of 480,000 m^3). There is assumed to be a freeboard storage elevation above the 1 m depth for management of large rainfall events on the ponds.
- A nominal leakage rate from the base of the evaporation ponds of 1 mm/d.
- Water is pumped from the Process Water Pond to the evaporation ponds whenever the storage volume in the evaporation ponds is less than 480,000 m^2.
- Water is lost from the ponds via evaporation and seepage leakage. Note that the seepage and evaporation losses are both functions of the pond footprints, which do not change as the storage volume in the ponds change.

6.6.9 Alternate Discharge Locations

Pumping from the Process Water Ponds to a further discharge location(s) is triggered in the model if the water volumes in the Process Water Pond become high and the evaporation ponds are full. A nominal discharge rate from the Process Water Pond to the discharge location of nominally 25% higher than the total dewatering pumping rate has been adopted in the model

6.6.10 External Water Supply

The required external water supply to ensure water shortfalls in the water balance model do not occur is tracked in the model. In the model (for simplicity), the external water supply to the model is triggered by low water levels in the Potable Water Tank (with the Potable Water Tank able to supply the Raw Water Tank if it is short of water). In reality, there may be different water supplies supplying the Potable Water Tank and Raw Water Pond depending on the water quality available from external water supply options.

There may be the potential to supply additional water to the system from the following supply sources:

- New water supply borefield(s).
- Pumping from old shafts.
- Pumping from existing and previous water supply bores.
- Return water from Rebel, Kathleen or United North pits (where the Main Pit is being emptied into).
- Pumping from the Bunker Pit.
- Advanced dewatering of Pollard and Hillend shaft areas.

6.7 Water Balance Results

The model has been run for 100 model realisations with each model realisation using a different rainfall sequence and dewatering rate (within the range of dewatering estimates). Results are therefore presented as a probability distribution, with an explanation of the probability results which are plotted provided below:

- Min/Max - minimum and maximum results at the specific timestep across the 100 model realisations, noting that different model realisations could cause the Min/Max at different timesteps.
- 99%-ile: the value with only 1% of model realisations having a higher value.
- 50%-ile: the median value, where 50% of the model realisations have a higher value and 50% have a lower value.

The water balance predictions indicate the following:

- A surplus of “process” water is predicted to occur during the life of the model due to the predicted dewatering requirements. The surplus water initially fills the evaporation ponds and then some surplus is required to be managed in another manner (such as discharge to a lake).
- A deficit of potable and raw water is predicted within the model, noting:
  - There are no potable water supplies in the model, such that the potable water demand (~1 L/s) is always a deficit needing to be covered by the external water supply system.
  - The raw water demand (~21 L/s) is not met by dewatering from Hillend and Pollard throughout the life of the mine, although the make-up requirements are reduced after the first three years of mining.
  - A plot of the predicted external make-up water required to support the mine is shown in Figure 6.2.
- The median external water demand averages to be:
  - 1.27 GL required over the three years between 1/7/2028 to 1/7/2030 (average 0.42 GL/yr, 13 L/s).
  - A further 1.39 GL is required over the remaining 4 years (average 0.20GL/yr, 6.3L/s).
- The maximum external water demand requirement averages to be:
  - 1.36 GL required over the three years between 1/7/2028 to 1/7/2030 (average 0.45 GL/yr, 14 L/s).
  - A further 1.76 GL is required over the remaining 4 years (average 0.25 GL/yr, 8 L/s).

- Meaningful discharge to additional discharge points is predicted to be required from mid-2029 (in the median case). However, the timing of when discharge would be required is dependent on the adopted dewatering rate within the model and how full the evaporation ponds are once emptying of the Main Pit and initial underground areas is completed (and mining/processing can commence).
- Between mid-2029 and the end of the model (8 years), the median additional discharge is predicted to be 325 ML/year (in the order of 10 L/s). The maximum model result predicts that 664 ML/year (21 L/s) would need to be discharged.

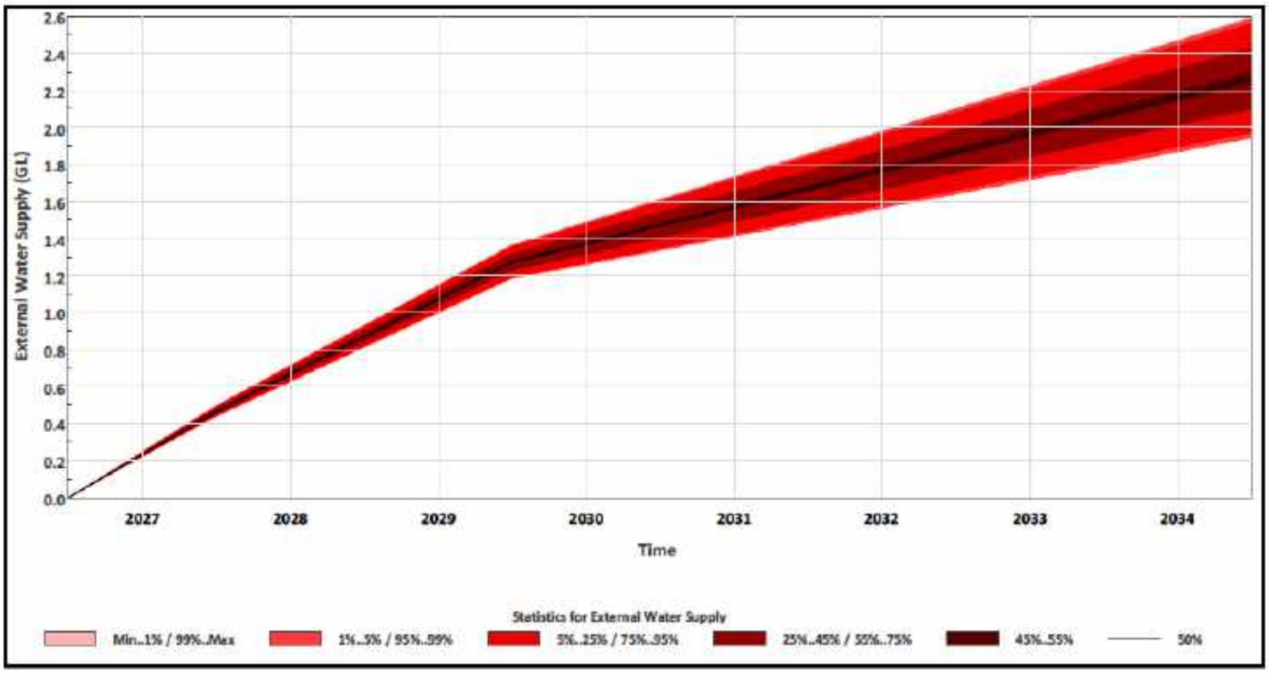


Figure 6.2 External Water Supply Volumes - Probability Plot

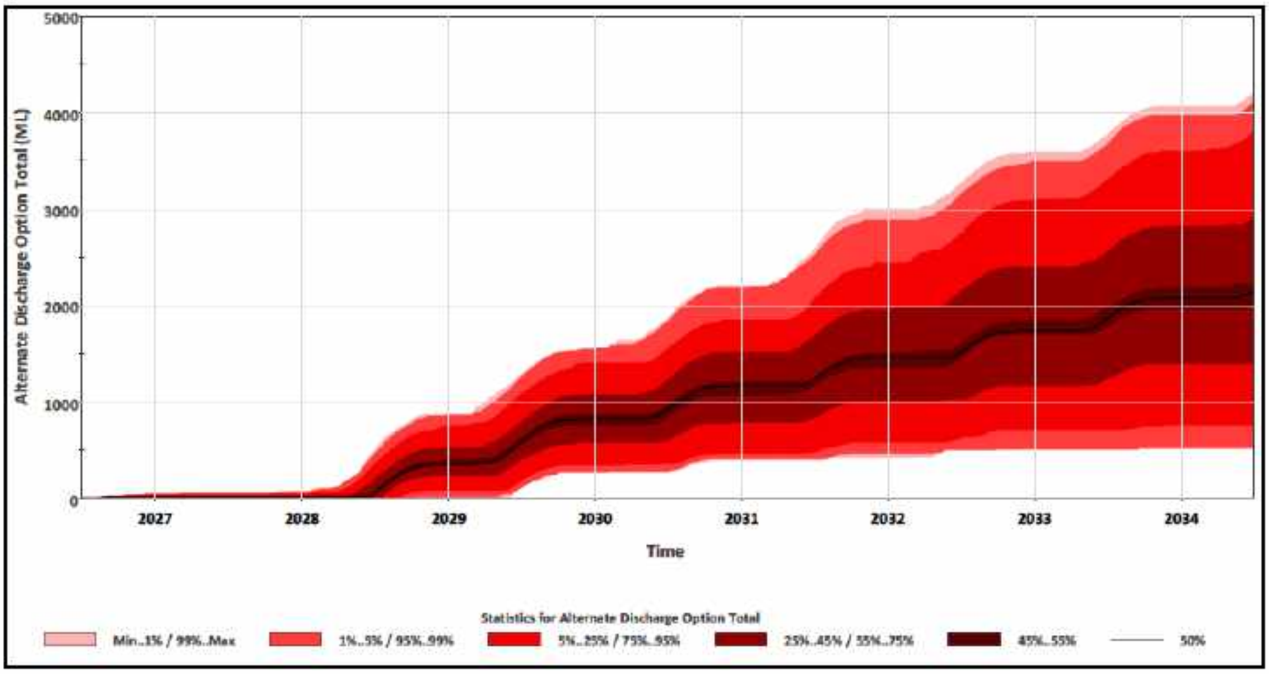


Figure 6.3 Required Discharge Volumes to Alternate Location: Probability Plot

Based on the above model results, the key findings from the water balance model are as follows:

- The project needs to source external water to meet a deficit of 1 L/s potable demand and up to 13 L/s raw water demand.
- The project needs to have suitable capacity to manage the predicted rate of surplus water which may be generated due to dewatering activities. Water balance modelling predicts that the average annual discharge rate to additional discharge mechanisms is estimated to be in the order of 20 L/s in the maximum model scenario. However, in practice, there are likely to be short-term requirements to pump at a higher rate than this and the discharge system should be designed to accommodate a flow rate in the order of 60 L/s (to match the maximum saline dewatering stream predictions).

7. BOREFIELD WATER SUPPLY OPTIONS

7.1 System Requirements Overview

An integrated site water balance was developed for the project to identify potential surplus water and / or make-up water requirements for the different water quality bands across the project site (i.e., potable, raw and process water), over the duration of the mining operation. As outlined in Section 6, a deficit of potable and raw water has been estimated and is as follows:

- A potable water demand of approximately 1 L/s.
- The raw water demand of up to 13 L/s (this is in addition to dewatering from Hillend and Pollard).
- Total of approximately 14 L/s of low salinity water.

There are two known low salinity water sources at Youanmi site:

- Rebel Bore – this bore was previously the main potable water supply for the 1990s mine (supplying on average ~2.1 L/s but up to 5 L/s, with EC of 2,150 µS/cm and TDS of 1,400 mg/L). Rebel Bore can no longer be used as a low salinity source due to the dewatering transfer of hypersaline water from Main Pit to Rebel Pit and Kathleen Pit, to allow the resumption of mining in the underground beneath Main Pit (refer to Sections 3.2.3 and 10.1.2).
- Bunker Bore – this bore is in direct connection with Bunker Pit (bore levels rise and fall with the pit) and capable of producing up to 1 L/s (current EC of 1,400 µS/cm and TDS of 900 mg/L due to surface water diversion into Bunker Pit, but historical higher EC of 6,800 µS/cm and TDS of 4,400 mg/L).

In addition, low salinity demands may be sourced from Kathleen Pit, where there would be approximately 400,000 kL of water available at approximately 40,000 mg/L TDS suitable for the process plant raw water. It should be noted that Rox will monitor the salinity of dewatering discharges from the Main and United North Pits into Kathleen Pit, with more saline groundwater being discharged into the Evaporation Ponds.

To reduce the project risks related to low salinity water supply, an alternative external (off-site) water supply will be needed to be developed (refer to Section 7.2 below).

7.2 Alternative Low Salinity Water Supply Options

7.2.1 Objectives

The main purpose of this assessment is to identify a risk-based ranking of sensible options (targets) for external water supply development to satisfy the Youanmi project low salinity (potable and raw) water demand (outlined in Section 7.1).

The study is driven by water quality rather than water quantity. Groundwater quality in the area is variable and generally poor to hypersaline. Therefore, where fresher water is identified, use of it should be carefully controlled to preserve it as a usable source. Overuse of a fresher groundwater supply in this area can result in salinisation of that source.

7.2.2 Data Sources

A review of the previous studies and work in the Youanmi region (within 25 km radius) has been undertaken to define the characteristics of all potential groundwater supply options. The following data sources were reviewed:

- Published geological and topographic maps for the local area.
- Records held on the DWER Water Information Reporting (WIR) Database.

- DWER Water Register Database (for current GWL users).
- A review of historical groundwater resource studies and investigations by Rockwater (1986 & 1996).
- 2012 GSWA Palaeovalleys Map.
- Google Earth satellite imagery.
- The catchments / sub catchments for the study area to assist in identifying areas where recent recharge may take place.

7.2.3 Water Supply Potential

Overall, the study area can be deemed to have low prospects of providing a groundwater supply of a lower salinity (potable).

Based on the review of the available data, the most prospective aquifers for low salinity groundwater within and outside the mining area are:

- Quaternary-age transported sediments:
  - Deposited along modern drainage (alluvium and colluvium). These deposits when saturated (i.e. below the water table) can form a localised aquifer consisting of unconsolidated and usually poorly sorted silt, sand and gravel. Permeability is highly variable and depends on the sand-clay contents, generally low yielding. Receives direct and diffuse recharge (rainfall).
  - Deposited at the foot of topographic mound when bedrock is exposed (build-up of coarse gravelly colluvium and scree, weathered material e.g. granite). May receive direct rainfall recharge and recharge run-off from the outcrop.
- Weathered bedrock below the valley-fill sediments formed from the creek erosion. If erosion of the creek channel has been influenced by the geological structure (such as a shear zone or regional faults), then there may be a zone of enhanced weathering at top of the fresh bedrock this zone, if it exists and is below the water table, may also contribute to aquifer potential associated with the creek (especially over granitic rock).
- Palaeochannels - Lower salinity occurs around the headwaters of paleochannels (areas of higher topography) or in tributary channels to the trunk channel. This is owing to direct recharge where unconsolidated aquifers outcrop at surface.

Groundwater is the main source of water for pastoral and domestic use, due to the low rainfall in the Youanmi region. Figure 7.1 shows the inferred water low salinity (<3,000 mg/L TDS) contours (reported by GSWA, 1983) together with the outcrop geology and the outline of the Raeside Palaeochannel.

The least saline water, generally containing less than 3,000 mg/L TDS occurs furthest from the salt lakes in shallow aquifers in colluvium and alluvium on or near the watersheds, particularly over granitic terrain. Water from aquifers near or over greenstones contains up to 5,000 mg/L TDS, and in localised areas 9,000 mg/L TDS.

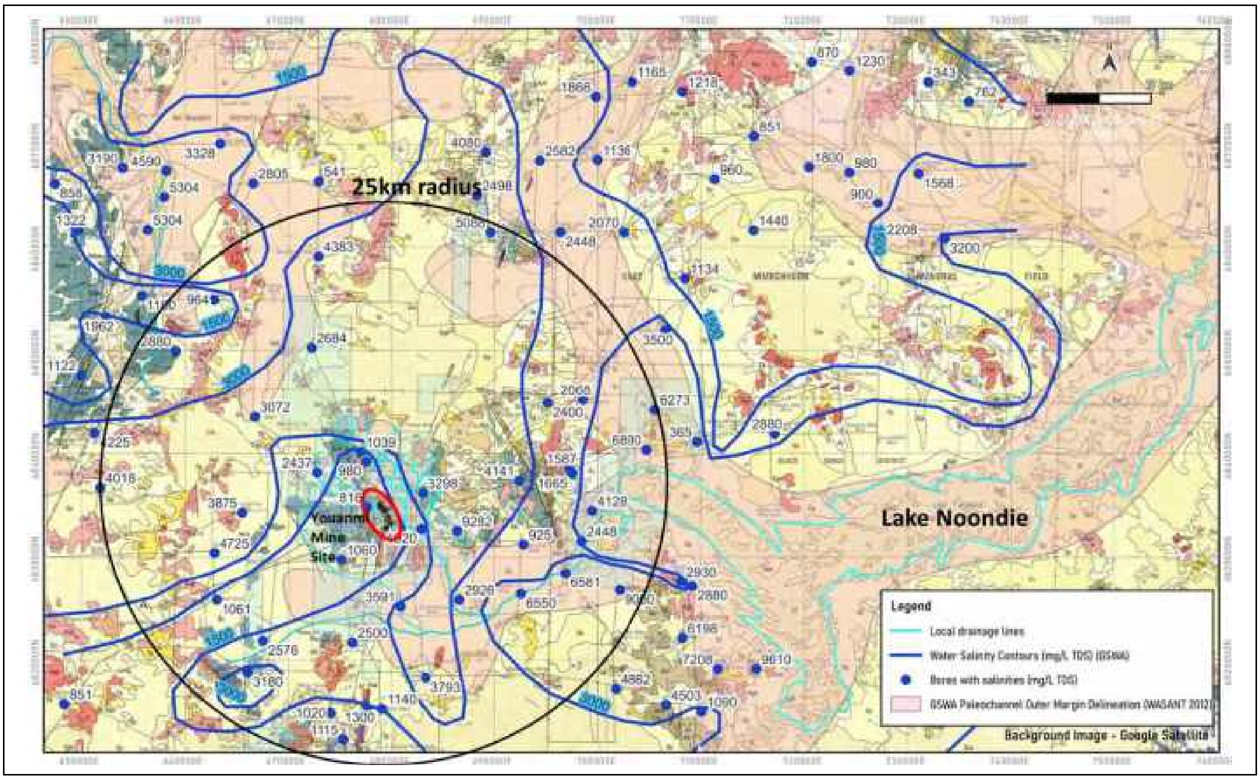


Figure 7.1 Overview of Regional Water Salinity (Source GSWA, 1983)

7.2.4 Potential Water Supply Targets

The suitable groundwater sources (targets) were based on the following selection criteria (key factors):

- Targeted aquifer.
- Proximity to Youanmi Project.
- Level of Confidence (Reliability).
- Water quality – salinity maximum requirement of 3,000 mg/L TDS.
- Potential tenue issues (i.e., on/off existing Rox tenure).
- Potential GWL issues.
- Potential environmental issues and / or issues relating to other land users (e.g., heritage sites).
- Timelines for water supply development (including investigations, third party approvals, design and construction of infrastructure).

Six potential water sources within 25 km radius of the Youanmi project area were identified that may contribute meeting the long-term Project's low salinity water demand of up to 12 L/s. The overview of water supply targets is shown in Figure 7.2 , Figure 7.3 and summarised in Table 7.1. Each of potential water targets (options) are shown in Figure 7.4 and Figure 7.5.

These water sources may be investigated further for their suitability (both water quality and quantity). Water source options may potentially involve:

- Development of groundwater resources with salinity less than 1,200 mg/L TDS (i.e., potable water).
- Development of groundwater resources with salinity exceeding 1,200 mg/L TDS (but still being brackish, with salinity up to ~3,000 mg/L TDS) with reverse osmosis (RO) treatment on site.
- There will likely be a need for combining several water supply options to meet required low salinity water demand.

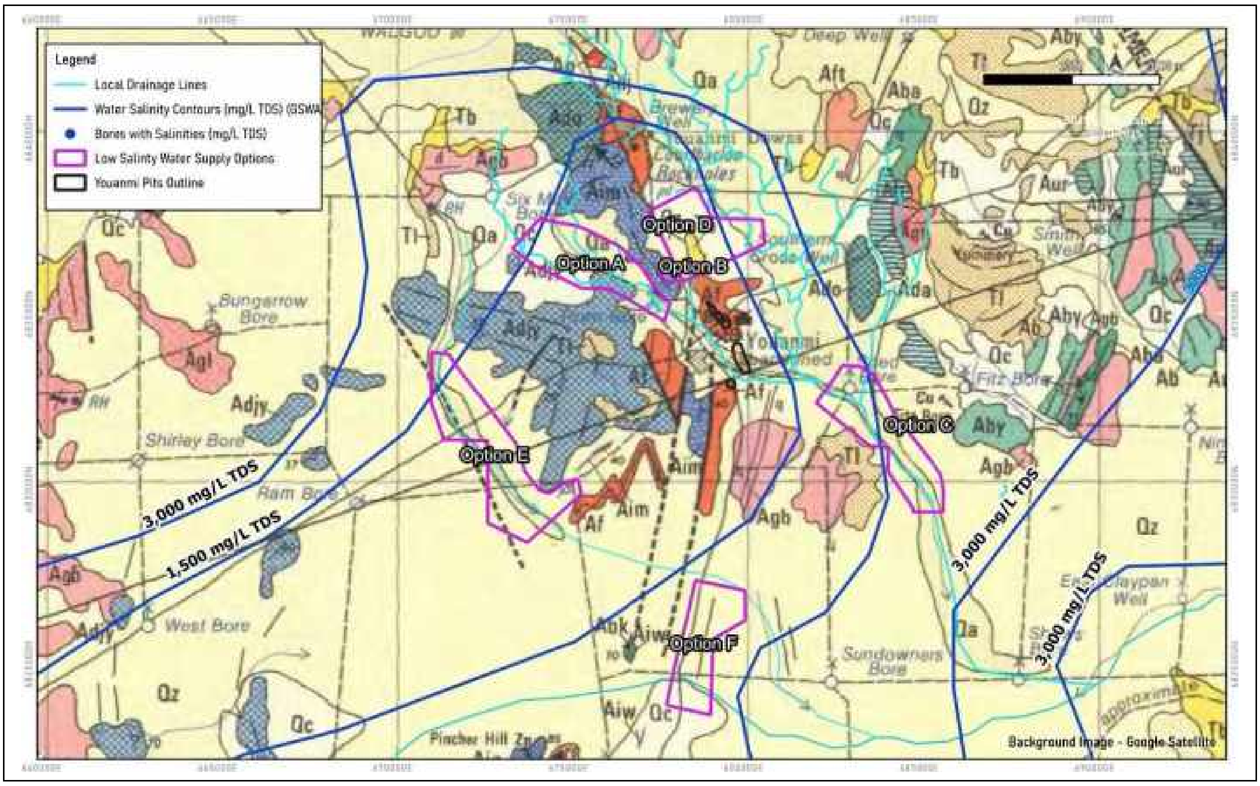


Figure 7.2 Potential Low Salinity Water Supply Options

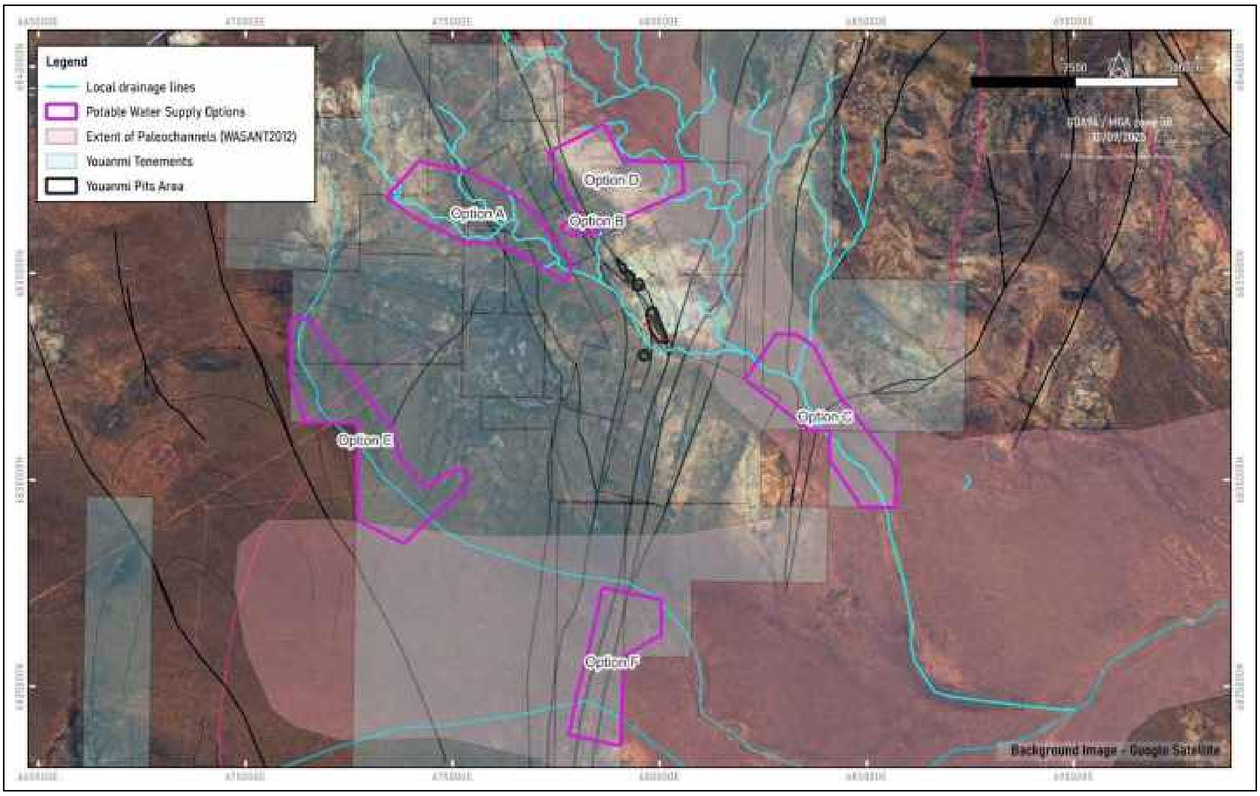


Figure 7.3 Potential Low Salinity Water Supply Options and Youanmi Tenements and Palaeochannel

Table 7.1 Summary of Youanmi Project Groundwater Supply Options

Water Supply Target Location	Potential Aquifer(s)	Straight Line Distance from Main Pit (km)	Tenure Issues (on/off existing project tenure)	Potential Long Term Bore Yield (L/s)	Potential Length of Water Source (km)	Level of Confidence	Salinity (mg/L TDS)	Limitations / Risks	Remarks
Option A (Town Bores)	Valley-fill (alluvium, colluvium & scree) & weathered bedrock below the creek	2.4-7 km north-west	No On existing Rox tenure	0.5-1.5 L/s	5 km	Medium ("proven" by town bores 94TWRC1 &2)	600-1,500 mg/L TDS	• Lack of hydrogeological and structural data • Sustainable yield • The extent and connection of these aquifers within the creek line are uncertain • Potential for a discontinuity of saturated valley-fill aquifer	This aquifer system is potentially recharged by the surface water stream flow of the creek
Option B (Connemarra Shaft)	Connemarra Shaft	3 km north-west	No On existing Rox tenure	0.5- L/s	0 km	Medium	900 mg/L TDS	• Lack of hydrogeological and structural data • Sustainable yield	Unknown pumping rate. Shaft blocked by grating
Option C (South east Creek Line)	Valley-fill (alluvium, colluvium) & weathered bedrock below the creek & palaeochannel (?)	2.7-6.7 km south-east	No On existing Rox tenure	0.5 L/s	4.5 km	Low-Medium	~1,500-2,500		
Option D (North of Rebel Bore)	Fault/shear zone, Valley-fill (alluvium, colluvium & scree) & weathered bedrock below the creek & palaeochannel (?)	2.7-4.7 km north	No On existing Rox tenure	0.5 L/s	2 kM	Low	~1,000-2,000	• Lack of hydrogeological and structural data • Sustainable yield • The extent and connection of these aquifers within the creek line are uncertain • Potential for a discontinuity of saturated valley-fill aquifer	This aquifer system is potentially recharged by the surface water stream flow of the creek
Option E (Rockwater holes)	Valley-fill (alluvium, colluvium) & weathered bedrock	6.5-10 km south	No On existing Rox tenure	0.25-0.5 L/s	3.7 km	Medium ("proven" by Rockwater expl holes)	2,000-2,500 mg/L TDS		
Option F (South West Creek Line)	Valley-fill (alluvium, colluvium) & weathered bedrock below the creek	7-9 km south-west	No On existing Rox tenure	~0.5 L/s	5.5 km	Low	~1,000-1,500		

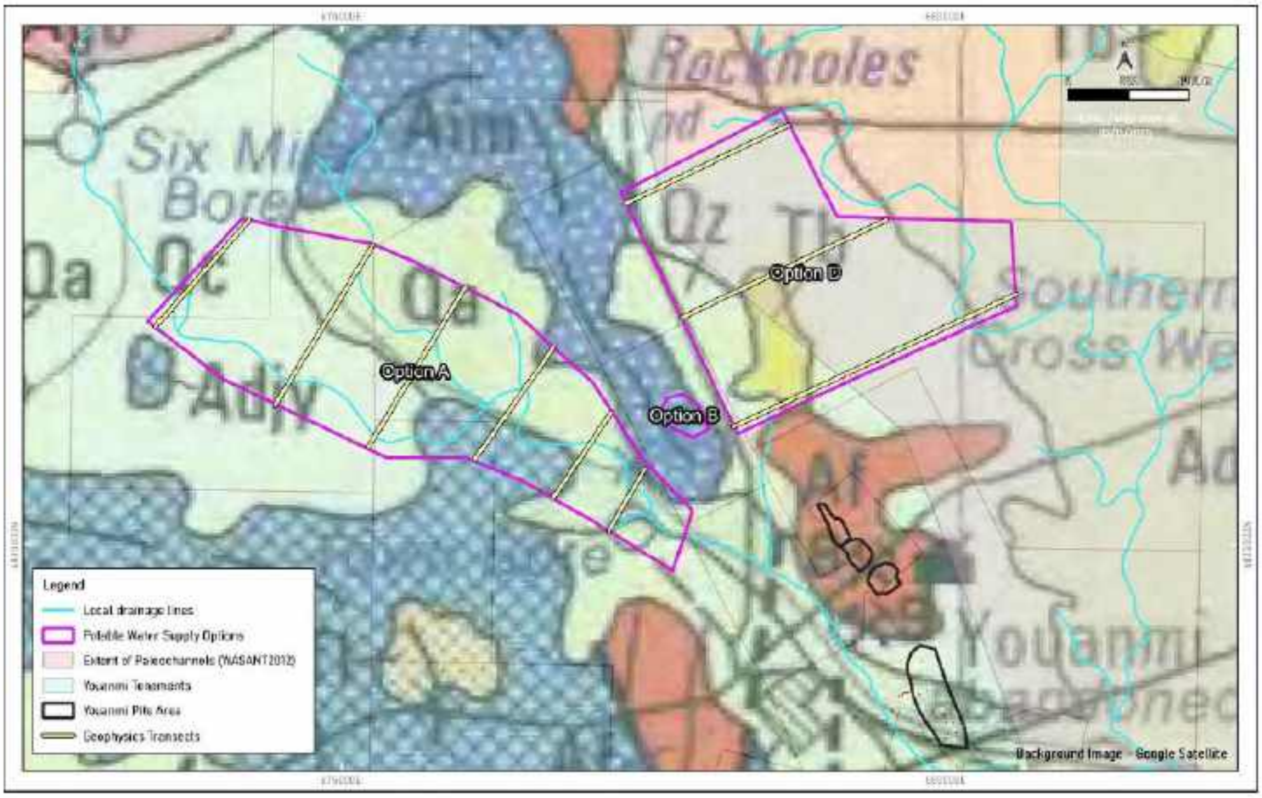


Figure 7.4 Options A (Town Bores), Option B (Connemara Shaft) and Option D (North of Rebel Bore)

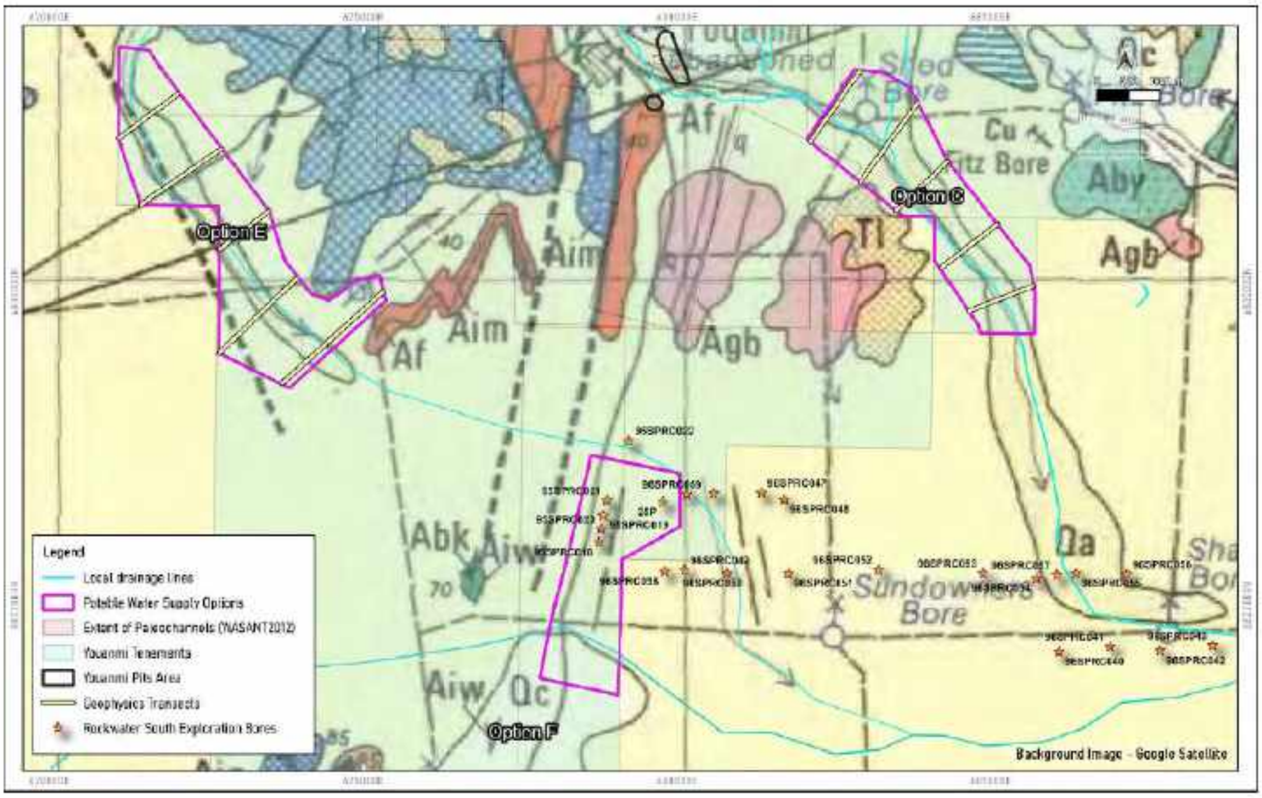


Figure 7.5 Option C (South East Creek Line), Option E (South, Rockwater Investigation) and Option F (South West Creek Line)

It should be noted that these targets are conceptual at this stage as no hydrogeological investigations in these areas have been completed to date. As such, the long-term yield / sustainability of the selected water supply options is uncertain and the targets are provisional only (subject to further, more detailed investigation). Also, the degree of confidence varies between these water supply options, depending on the level of previous study, however the confidence is mostly low due to the lack of adequate data.

There may be a need for combining several water supply options in order to meet the project's long-term low salinity water demand requirements (subject to the "proven" capacity of each option). Of the water source options selected (as per Table 7.1), two potential water supply schemes have been developed and are as follows:

- Preferred water supply scheme:
    - Option A (Town Bores) –5+ bores at 1,000 m spacing could produce up to 6 L/s.
    - Option B (Connemarra Shaft) – could supply 1-2 L/s.
    - Option C (South East Creek Line) - up to 10 bores at 500 m spacing could supply up to 6 L/s.
    - Comparatively close to mine site.
    - Potentially up-scaling.
- Alternative water supply scheme:
    - Option A (Town Bores) –5 bores at 1,000 m spacing could produce up to 6 L/s.
    - Option D (North of Rebel Bore) - could supply 1-2 L/s.
    - Option (South East Creek Line) - up to 10 bores at 500 m spacing could supply 6 L/s.
- Then Option F and lastly Option E.

It should be noted that at this stage Option B is excluded from the water supply scheme due to the current status of the Connemarra Shaft (i.e., blocked). However, if the access to this shaft is restored, this option could provide additional supply of 1-2 L/s.

For the purpose of providing this Water Assessment study, a selected water supply system that comprises two water supply borefields, Borefield A (Option A) and Borefield B (Option C) have been chosen to be the most prospective low salinity supply options capable of supplying a total of up to 12 L/s (i.e., 6 L/s per borefield).

7.2.5 Data Gaps and Sources of Uncertainty Related to Potential Water Supply

Based on our review of the data available to date and the conceptual hydrogeological model outlined above, key data gaps and uncertainties related to future low salinity water supply are:

- Quantification of hydraulic parameters (hydraulic conductivity) for the hydrogeological units in the potential water supply areas.
- Extents and hydraulic connection of the potential water supply aquifers.
- Confirmation of sustainable yield of the potential water supply aquifers.
- Understanding of any hydraulic connection between the surface water (creek lines) and groundwater.
- Understanding hydrochemistry in the potential water supply areas; including water quality differentiation between hydrostratigraphic units, both spatial and temporal variations in groundwater quality.

7.2.6 Further Work to Address the Water Supply Data Gaps

Further work is recommended to be undertaken to address the project key data gaps and uncertainties (as outlined in Section 7.2.5) related to selected future water supply target(s) and are as follows:

- Hydrogeological Field Investigations: to characterise and quantify the groundwater environment in the potential water supply areas in more detail.
- Detailed Water Supply Options Study: based on the outcomes from the hydrogeological field investigations and aquifer assessment.
- Hydrogeological Impact Assessment: to address potential groundwater related impacts due to water supply abstraction.

The outcomes of the proposed studies will support the project's groundwater abstraction licences and environmental approval documentation.

Hydrogeological field investigations and detailed aquifer assessment will be required to better understand the water supply potentials (i.e., hydrogeological characteristics and confirm water supply feasibility) in the selected targets. The hydrogeological field investigations will be staged, depending on which water supply options are targeted as priority (i.e., recommended Options A and C). Hydrogeological field Investigations for each borefield development will cover the following:

- Geophysical survey along selected water supply options to add confidence to generate drilling targets (ground-based passive seismic lines at strategic locations).
- Scout groundwater exploration drilling and testing (to determine hydraulic and quality characteristics of the hydrostratigraphic units in potential water supply areas). At this investigation phase a total of 28 exploration holes are planned to be drilled.
- Installation of a total of 6 monitoring bores and 4 test production bores in proposed water supply areas (i.e., Borefield A and B) to determine baseline conditions (water levels and water quality).
- Test pumping of production bores to assess aquifer parameters and determine the long-term pumping rates (i.e., sustainable yield).
- Water quality analyses (based on water samples collected during test pumping).
- Note - the hydrogeological field programmes are progressive and each subsequent stage is contingent on the "failure" of the preceding stage, or the preferred options to be targeted first (Staged Approach).
- Appropriate groundwater modelling to assess:
  - Optimum distribution of pumping.
  - Potential impacts of pumping on other licensed users (borefields) or unlicensed users.
- Programme is recommended to be staged to defer cost (and optimise design):
  - Stage 1 (Investigation Phase) – Exploration holes, install monitoring bores and install and test production bores; modelling and design optimisation.
  - Stage 2 (Final Development Phase)– Complete required borefield(s).

8. ALTERNATE DISCHARGE REQUIREMENTS

To manage the predicted surplus in dewatering generated by mine dewatering activities, a further surplus water discharge system is likely to be required. The water balance assessment indicates that the average required discharge rate to additional discharge management systems is predicted to require a capacity of up to 20 L/s on average, with some additional capacity required to handle discharge rates during short-term pumping campaigns.

9. TSF HYDROGEOLOGICAL ASSESSMENT

9.1 Proposed TSF Site

9.1.1 Proposed TSF Site Location and Topography

A new Tailings Storage Facility (TSF3) is proposed in the eastern part of the Youanmi site as shown in Figure 9.1. There are two existing TSFs at Youanmi (TSF1 and TSF2), with no or limited remaining capacity. The proposed TSF has an anticipated life of 10 years (TailCon, 2025a). An assessment of potential impacts of the proposed TSF3 on local groundwater regime has been undertaken based on the proposed DFS design documented by TailCon (2025a) and the results are presented herein.

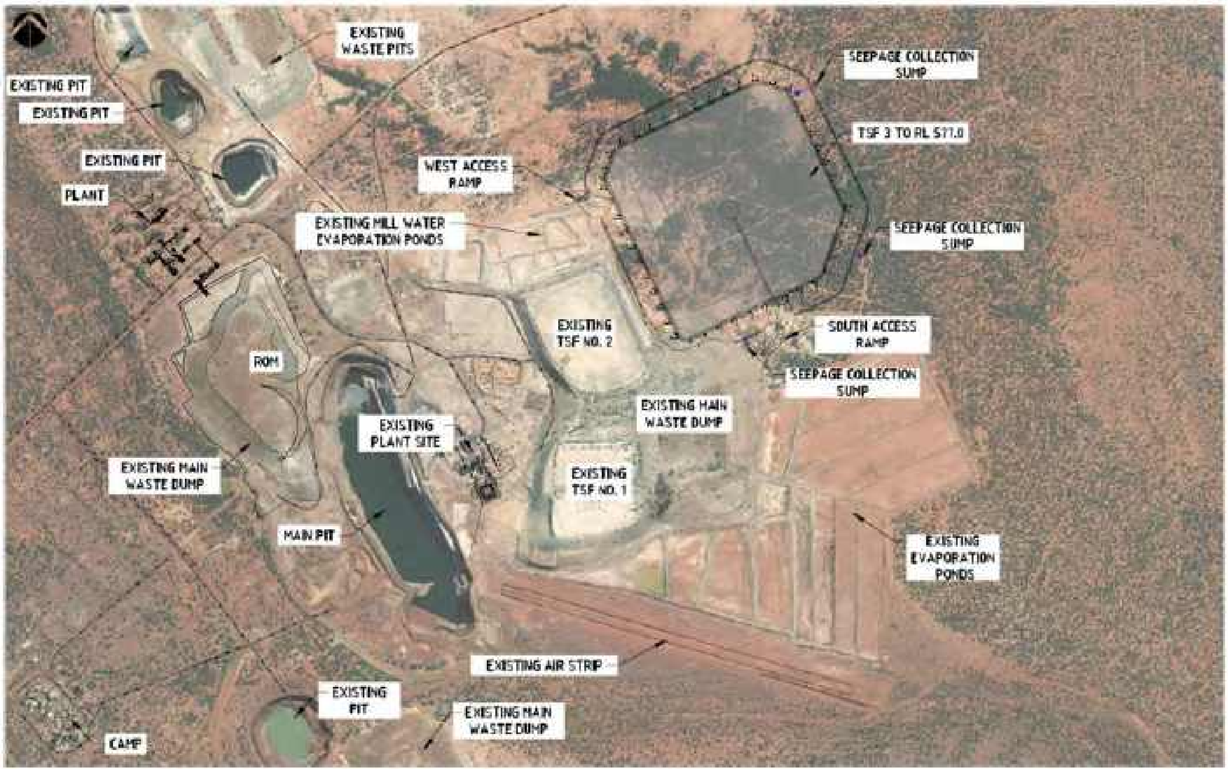


Figure 9.1 Proposed DFS TSF Site Layout

Since the project's inception in 1987, mining infrastructure has been developed, altering the landscape. Topography at the proposed TSF3 site vary from elevations of 417 mAHD to 491 mAHD, with the ground generally sloping to the southeast. The grades are steeper around the existing pits, TSFs and waste dumps, but remain relatively flat elsewhere.

9.1.2 Local Geology

A geotechnical site investigation consisting of bores and test pits across the proposed TSF3 footprint was completed in May 2025 (TailCon, 2025b). The geotechnical results indicate the following subsurface profile:

- Topsoil - 0.1 to 0.3 m –top layer comprising brown, slightly moist, sandy and gravelly silt/clay with roots. The topsoil is typically firm to stiff and of low plasticity.
- Colluvium / Ferricrete (Wiluna Hardpan) - 0.3 to (0.8 to 11.9) m –consisting of sandy, gravelly, and occasionally cobbly silt/clay. Material is commonly red brown to orange, brown in colour, with variable degrees of cementation. Consistency is stiff to very stiff, with strength ranging from hard to very hard. This unit generally extends to refusal depths between 0.6 m and 1.2 m in most test pits.

- Weathered Bedrock – more than 0.8 to 12 m. The nature of the underlying rock varies laterally across the site:
    - In the western portion (adjacent to TSF2), the bedrock is typically highly weathered granite, occasionally encountered as early as 0.8 m depth.
    - Moving eastward, a Ferricrete hardpan transitions into silcrete before reaching residual basalt, as observed in BH03 (Ferricrete to 2.65 m, Silcrete to 11.9 m, then Basalt from 12 m to EOH).
    - Notably, BH02 reportedly encountered a thick sequence of decomposed bedrock extending to 30 m, with SPT N-values indicating the material is stiff to very stiff to hard.

9.1.3 Groundwater Levels and Flow Directions

There are two monitoring bores NMB1 and NMB2 located in the vicinity of the proposed TSF3 (i.e., north and north east corner of the existing TSF2 as shown on Figure 9.2). Depth to water in the TSF2/TSF3 area are ranges from 28 to 31 mbgl. This equates to a groundwater elevation of around 430.9 and 431.7 mAHD (refer to Figure 3.2). Current groundwater levels have been influenced by the presence of mined out pits, which are all groundwater sinks. As a result, there was groundwater flow to all pits and this flow has influenced the general groundwater flow patterns and local groundwater levels (Figure 3.3). The data shows that the groundwater flow direction in the vicinity of the proposed TSF is to the south west towards the Main Pit.

Figure 9.2 Existing Bores Nearby Proposed TSF

9.1.4 Groundwater Quality

Currently, the salinities recorded in the NMB1 and NMB2 bores are ranging from 5,000 to 8,000 mg/L TDS, indicating groundwater being brackish. Groundwater is generally slightly alkaline and of sodium chloride type, with low calcium and bicarbonate concentrations (indicating limited rainfall recharge).

9.1.5 Foundation Permeability

There has been geotechnical test work undertaken within the proposed TSF footprint to estimate the permeabilities of the in-situ soils, with the results presented in the factual report (TailCon, 2025b). TailCon adopted the following permeabilities of the foundation material based on the results from geotechnical investigation and experience on similar projects:

- Colluvium / Ferricrete (Wiluna Hardpan) – 1x10^{-2} to 1x10^{-3} m/d (i.e. 1x1 10^{-7} to 1x1 10^{-8} m/s).
- Weathered Bedrock (granite & basalt)- 1x10^{-3} m/d (i.e. 1x1 10^{-8} m/s).

9.1.6 Key TSF Design Features

The proposed TSF3 design is documented in TailCon (2025a) and key features of the TSF design are as follows:

- The proposed TSF3 is a paddock-style impoundment located within the Youanmi project area. The facility is designed to treat 1 Mtpa of ore over a 10-year LoM, using a flowsheet comprising crushing, grinding, sulphide flotation, ultra-fine grinding, thickening, Carbon-In-Leach (CIL) processing, and prior to tailings deposition. Geochemical investigations confirm that all tailings and waste rock are Non-Acid Forming (NAF).
- The proposed TSF3 includes a starter dam followed by five upstream raises, providing a total tailings storage capacity of 10.7 million tons.
- Assumed tailings permeability of 1 x 10^{-1} to 1 x 10^{-2} m/d (1 x 10^{-6} to 1 x 10^{-7} m/s).
- The proposed TSF design is assuming no TSF basin being lined. Only proposed TSF2 embankment structure comprises two distinct material zones:
    - Zone A -compacted clay with permeability of 1x10^{-3} m/d (i.e., 1x1 10^{-8} m/s).
    - Zone B -compacted mine waste with permeability of 1x10^{-1} m/d (i.e., 1x1 10^{-6} m/s).
- To prevent external water from entering the facility, this minor floodwater flow path will be re-directed around the north-eastern side of the TSF. The diversion works will be completed during the initial construction and topsoil stripping phase, prior to any tailings deposition. This will ensure the facility remains isolated from catchment runoff and external floodwater.
- The TSF will operate with a minimal decant pond, and internal water will be managed via a central rock ring decant system, directing water to a return water dam. The design also includes a seepage collection drain to manage phreatic surface development and support effective tailings consolidation.
- Additionally, a cutoff trench with seepage interception drain is also included to minimise lateral seepage outside the facility footprint. The slope of the existing waste rock dump located in the southwest corner will also be lined with low permeability fill as the facility is raised.
- These TSF design features have been incorporated to minimise seepage losses. A detailed quantitative seepage analysis has been undertaken by TailCon (2025a) and the seepage modelling indicated the following:
    - The seepage collection drain is effective in significantly reducing lateral seepage through the embankments and beyond the facility footprint.
    - The combination of low-permeability Zone A material and the cut-off trench provides additional control, further limiting seepage through and beneath the embankments.
    - The modelled seepage through the embankments is minimal, at approximately 0.0004 m^3/d.
    - The modelled seepage through the base of the final TSF is at maximum 0.15 m^3/d over 1m section, which equates to around 90 m^3/d.

9.2 TSF Seepage Assessment

9.2.1 Seepage Mechanisms

There will be some minor seepage through the TSF foundation, which will eventually make its way down to the water table in the main aquifer.

Seepage losses from the TSF are dependent on the nature and behaviour of the tailings once deposited (i.e., settled density, moisture content and permeability), and the nature of the TSF foundations (pre and post construction), underdrainage systems and walls. As outlined in Section 9.1.6, predicted maximum seepage losses during the TSF deposition have been estimated to be approximately 0.0004 kL/d. It is noted that, in practice, seepage losses will be minimal at the start of operation and will gradually increase as the height of the TSF (and the pressure head in tailings liquor/decant) is raised.

The fate (flow paths) of seepage once it has exited the TSF will depend upon the nature of the subsurface and local aquifers and regional groundwater flow gradients. The main seepage mechanisms and pathways away from the base of the TSF are as follows:

- Infiltration through unsaturated zone – seepage will initially move vertically under the influence of gravity until it reaches the water table (in the main aquifer - transported cover/saprolite). There may be some minor shedding of seepage along the top of saprolite (base of cover material) and any such flow will follow the topography of this surface. However, specific shallow seepage interception and recovery design features incorporated into the design of the TSF should minimise this. Some minor seepages may make its way vertically to the water table.
- Flow within the main aquifer – once seepage reaches the water table in the main aquifer, the water table will rise forming a “mound”. Seepage will mix with groundwater and then flow down hydraulic gradient. Initially, flow will be radial (or semi-radial) away from the mound at rates determined by the hydraulic gradient and aquifer permeability. However, at some distance from the TSF the regional hydraulic gradients will be the dominant influence, and flows will be to the south to south east towards the local surface water drainage systems and towards the Main Pit.

The water table mound will continue to rise until such time as either tailings deposition ceases or the hydraulic gradients are sufficient to drive enough water away from the mound to balance all seepage.

It is noted that the water table mound (as measured by rising water levels in bores) can expand far more quickly than physical seepage (i.e., seepage that has originated in the TSF). The rising water levels reflect a moving “hydraulic pressure wave” induced by leakage to the water table beneath the TSF. Seepage particle rates are controlled by a range of aquifer hydraulic properties and move relatively slowly. The “front” of elevated solutes is also controlled by geochemical attenuation properties and results in the front moving even more slowly. The presence (and first arrival) of seepage can only be confirmed by water quality changes, but will significantly lag behind rises in water levels.

9.2.2 Potential Seepage Risk on Groundwater

The potential environmental consequences of seepage on groundwater are largely related to:

- The water table rising to ground level (i.e., surface expression of groundwater) as a result of “hydraulic push” from the water table mound that will develop beneath the TSF and consequent impacts on local vegetation. The quality of the surface expression of groundwater may or may not be affected by seepage depending on location.
- The development of surface water flow (from the immediate area of the TSF) of any surface expression water that is not evaporated or retained as soil moisture
- The movement of “contaminated” mine water beyond the margins of the TSF and potential impacts on GDEs and other groundwater users.

The potential for water table mounding and seepage away from the TSF is assessed in the following sections. The potential impacts are addressed in Section 10.5.

9.2.3 Potential Receptors

Potential receptors have been identified based on the expected seepage processes and pathways and are as follows:

- Topographic low points on-lease, including minor creeks.
- Topographic low points off-lease, including minor creeks.
- Main Pit mine void.

9.2.4 Predicted Water Table Mound

A seepage model was developed to predict likely maximum water table mounding for the TSF. The model is an analytical model based on the Hantush (1967) equation for calculating a groundwater mound under a rectangular recharge area. The model, which is now available as an "on-line calculator" (GroundwaterSoftware.com) predicts the maximum rise in the water table (i.e. the mound) recharge area for given values for:

- Aquifer thickness (m).
- Aquifer permeability (m/d).
- Specific yield of the aquifer (dimensionless).
- Time (days).
- Base area of the rectangular recharge area (m).
- Recharge or percolation rate (m^3/d).

Key parameters adopted were as follows:

- Aquifer thickness – 10 m (the initial height of the water table above the base of the aquifer based on the average depth to the base of weathered bedrock of 40 m and the average inferred depth to groundwater of 30 m).
- Aquifer permeability - 0.01 m/d (adopted upper range).
- Specific yield - 0.015.
- Base area of TSF – 360,000 m^2.
- Recharge rate – 0.00025 m/d (based on the assumed average permeability of the TSF basin, which equates to around 90 m^3/d total seepage over the base are of the TSF).
- Time - 10 years.

The predicted water table mound around the TSF is shown (as a model output) in Figure 9.3. This shows a water table rise of 5 m extending around 190 m from the inside toe of the TSF at the end of the 10 year active life of the TSF. Based on inferred water levels in the TSF footprint (30 m below ground), this means that the water table at the margins of the TSF area will be mounded to about 25 m below surface. The water table mound rapidly decreases in magnitude with distance from the TSF and the predicted water table rise is less than 1 m at 320 m distance from the inside toe of the TSF.

Figure 9.3 Predicted Groundwater Flow Paths After 10 Years

It is noted that, seepage losses will in practice, be minimal at the start of operation and will gradually increase as the height of the TSF is raised. As such:

- The water table mound will also gradually build up over time; and
- The maximum (LOM) water table mound should be less than predicted, as the average seepage rate will be less than the constant 90 kL/d modelled.

9.2.5 Seepage Flow Directions

As outlined in Section 9.2.1, seepage flows will initially be semi-radially away from the TSF under the influence of the water table mound, but will eventually come under the influence of regional hydraulic gradients and flow to the south south-east towards the Main Pit.

It should be noted that the Main Pit is a long-term groundwater sink during (due to dewatering) and after mining (post-closure).

Figure 9.4 shows the interpreted seepage flow pathways from the TSF. Please note that, based on available topographic data, the minimal predicted water table mound rise and the fact that the Main Pit will be a long-term groundwater sink during and after mining, all seepage flow is predicted to flow to the southeast and eventually into the Main Pit (i.e., seepage flows will be "captured" by the Main Pit).

It is not expected that there will be any seepage flow away from the Project site. That is, any seepage that reaches the surface water drainage or the diversion channel will be captured by groundwater flows to the Main Pit.

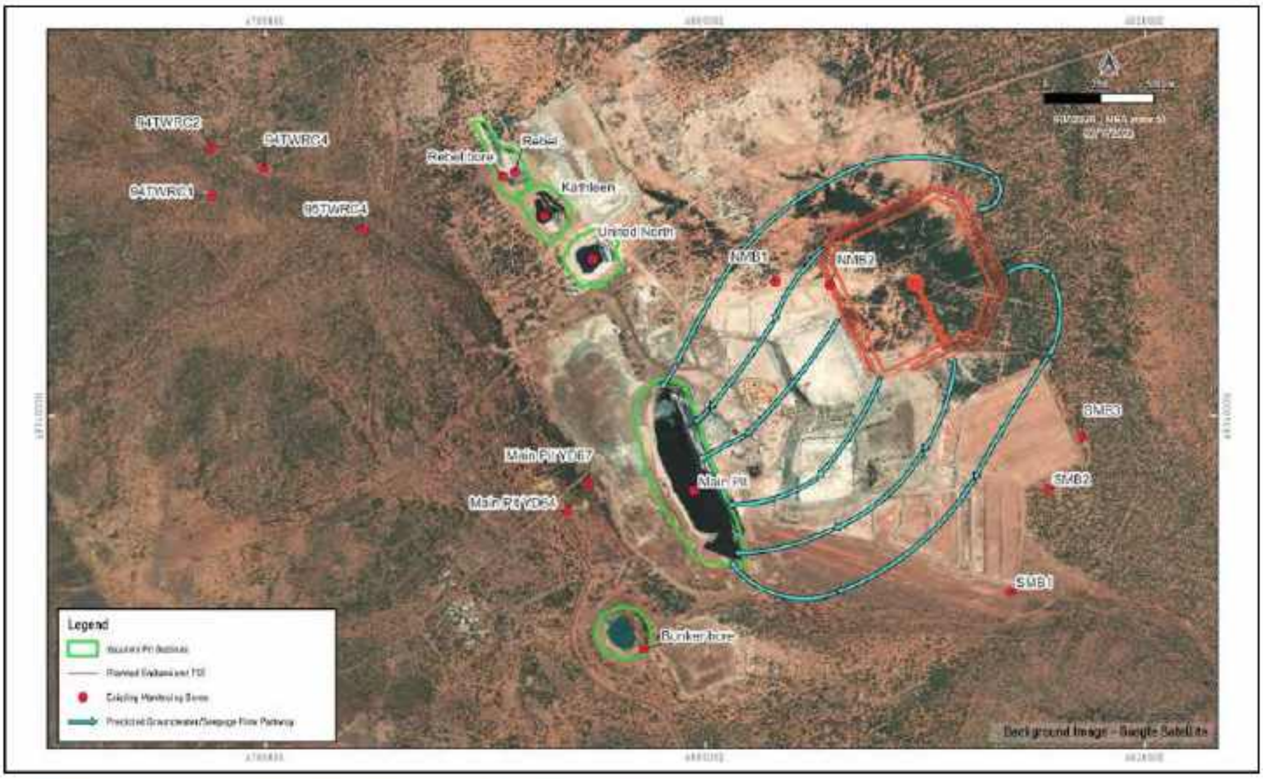


Figure 9.4 Predicted Groundwater Flow Paths After 10 Years

9.2.6 Seepage Velocities and Travel Times

Seepage velocity is the migration velocity of a conservative (i.e., non-reactive) solute carried by groundwater through the local aquifers and can be estimated using the following Darcy equation:

$v = Ki/n$

Where: v is the pore velocity (seepage velocity) (m/d)
K is the permeability (m/d)
i is the hydraulic gradient (m/m)
n is the effective porosity (similar to specific yield for velocity calculations)

For the purposes of these predictions, an average permeability of 0.01 m/d and an effective porosity of 0.015 have been adopted (refer Section 9.2.4). Hydraulic gradients were measured on Figure 8 (predicted water table mound), the following average seepage velocities were derived:

- From the toe of the TSF to the 5 m water table mound contour – around 6 m/year.
- From the 5 m to the 1 m contour – around 4 m/year.
- Beyond the 1 m contour - <3 m/year.

Please note, however, that these seepage velocity estimates only refer to the velocities and travel times of water particles. The concentrations of solutes within the seepage from TSF will be reduced as a result of blending with unaffected groundwater and geochemical attenuation reactions within the aquifer matrix. As such, the "front" of elevated solutes will advance much more slowly that the actual seepage water particles.

For example, WAD CN (one of the principal contaminants of concern associated with any gold mine TSF) has a strong affinity with metal ions within the weathered profile and will typically bond strongly with these, thus reducing WAD CN concentrations within the seepage flow path. Such attenuation processes are also time dependent and the very slow seepage travel times makes this (and other) geochemical attenuation processes very effective in the reduction of concentrations of contaminants.

10. POTENTIAL ENVIRONMENTAL IMPACTS

10.1 Water Discharge to Northern Pits

As outlined in Section 3.2.3, dewatering discharges from the Main and United North Pits are planned to be initially pump water the two northern pits (Rebel and Kathleen Pits). A hydrogeological assessment of the planned discharged of dewatering excess to the 2 northern pits was undertaken by AQ2 in November 2024 (AQ2, 2024). The full assessment is contained in Appendix C and the potential environmental impacts due to water discharge to Northern Pits are provided below.

Two hydrogeological consequences of the discharge of saline water from Main Pit to the northern pits (Rebel and Kathleen Pits) have been identified:

- Mounding of the water table close to the pits.
- Migration of saline water into brackish local shallow aquifers.

The potential impacts of the above and the risks of these impacts are assessed below.

10.1.1 Water Table Mounding

10.1.1.1 Hydrogeological Processes

The hydrogeological processes that will occur as the pits are filled are as follows:

- During initial discharge to the pits, the discharged water will fill the void space with little to no seepage from the pits (as there will still be hydraulic gradients towards the pits), although some evaporative loss will occur. The local water table around the pit will then gradually rise to match the pit lake level.
- Once the pit lake levels reach and then rise above the pre-mining water table levels, the pits will become recharge pits and there will be net seepage from the pit. This will induce the water table around the pit to rise and form a “mound” shape around each pit. The mounds around each pit will eventually merge to form an elongated mound around both pits.

10.1.1.2 Potential Impact

It has long been recognised that local Goldfields vegetation largely relies on fresh soil moisture above brackish and saline water tables and that water tables less than 6 m deep can negatively impact vegetation. In recent years DWER have adopted the following trigger levels for managing the impacts of seepage, (from pits and tailings storage facilities (TSFs)), to local aquifers:

- Water table reaches 6 m depth below surface – trigger for investigation.
- Water table 4 m depth below surface – trigger for immediate remedial action.

10.1.1.3 Predicted Water Table Mounding Around Northern Pits

The Western Australian Department of Mines, Petroleum and Exploration (DMPE), which is the successor Department to DEMIRS, typically adopt the constraint, (when assessing Mining Proposals), that there should be a minimum of 5 m freeboard between the crest level of a pit and the maximum pit lake level. A simple analytical model, (based on the Theis equations for drawdown/drawup around a well), was used to predict the distribution of the resulting mound around the pits assuming that the pit lakes were maintained at 5 m below pit crest level for 12 months. Table 10.1 lists predicted groundwater levels with different distances from the pit crest.

Table 10.1 Predicted Groundwater Level Mounding Elevations at Different Distances from the Pit Crest

Distance from Edge of Pits (m)	1	10	50	100	400
Depth to water table (m below ground)	9	13	16	17	20

Table 10.1 results indicate that, when the pit lakes are 5 m below ground level, the mounded water table is 9 m (or more) below ground level beyond a metre distance from the pits.

By way of comparison, the model was also run to predict the maximum possible pit lake level that would result in water table mounding to no more than 6 m below ground level. The model predicts that for a pit lake level of 2 m below crest, the mounded water table would be 7 m (or more) beyond a metre distance from the pits.

10.1.1.4 Risk of Impact

Based on the above, the environmental risk of impact of water table mounding around the pits is considered to be negligible.

10.1.2 Migration of Saline Water into Brackish Aquifers

10.1.2.1 Hydrogeological Processes

As outlined previously, once the pit lakes reach and then rise above the pre-mining water table levels, the pits will become recharge pits and there will be net seepage from the pit. As well as the development of a water table mound around the pits, there will also be some physical movement of saline water from the pits into the surrounding local aquifers. The hydrogeological processes that will occur during and after the northern pits become recharge pits will be as follows:

- Saline water will migrate outwards from the pits driven by the hydraulic gradients away from the pits, as long as the pit lake level is above the pre-mining water table level. It is noted that the rates of seepage migration, (which is a physical flux process), will be much less than the rates of propagation of the water table mound, (which is a hydraulic response).
- Following the cessation of discharge to the northern pits, the pit lake levels will decline as a result of seepage losses and evaporative losses. Eventually, the pit lakes will decline below the pre-mining water table and the pits will again become groundwater sinks, (as they are at present). It is also planned to pump the northern pits down once the evaporation ponds have capacity, or when the long term discharge becomes available.
- Once the pits again become groundwater sinks, any seepage that has migrated into the local aquifers, (and remains within the capture zones of the pits), will flow back to the pits.
- Independently of the impact of pit lake levels on groundwater levels and flows, dewatering of the Main Pit and Underground will generate a very large "cone of depression" in the water table and a consequent groundwater capture zone. Any former residual seepage from the pits, (that is not recaptured by the pits), that falls within the capture zone of the Main Pit and Underground, will flow towards the active mining area.

10.1.2.2 Potential Impacts

The potential impact of seepage migration of saline water from the northern pits is an increase in the salinity of local shallow aquifers around the pits from brackish (<10,000 mg/L TDS) to saline (>50,000 mg/L TDS) levels.

10.1.2.3 Predicted Seepage Migration and Capture

A simple Darcy flow model was used to predict the migration of the seepage front of saline water away from the northern pits, assuming that the pit lakes will be at a maximum level of 5 m below pit crest for 12 months. The Darcy model adopted the bulk permeability of 0.16 m/d derived for the shallow aquifers and an effective porosity of 0.5%, (which is equivalent to the Specific Yield of such aquifers and very conservative), and hydraulic gradients derived from the predicted water table mounds. The model predicts that the seepage front would migrate about 70 m from the pit margins after 12 months. Figure 10.1 shows the predicted extent of the seepage plume around the northern pits.

The Theis model used to predict water table mounding was also used to predict the extent of the capture zone around the Main Pit and Underground. The model adopted the derived permeability for the Main Pit and Underground and was used to predict the drawdown around the pit once the Main Pit had been pumped dry and maintained dry for 12 months, (this would roughly correspond to the end of the period when the northern pits are "full"). It is noted that the model assumed that the Underground mine workings, which extend around 600 m to the northwest of the Main Pit, would be dewatered to the same level. The model predicts the following:

Table 10.2 Predicted Groundwater Level Drawdown at Different Distances from the Pit Crest

Distance from edge of Pit/Underground (m)	50	100	500	1000	2000
Drawdown around Pit/Underground (m)	35	28	11	5	<1

Figure 10.2 shows the interpreted capture zone around the Main Pit and Underground 12 months after the pit has been pumped dry. The capture zone has conservatively been interpreted based on the 5 m drawdown contour. It is also noted that the 5 m contour (capture zone) assumes the adopted bulk permeability applies to the principal direction of permeability, (i.e., along strike of the main shear zones – northwest), but that the actual permeability in the cross strike direction (southwest-northeast) is around half the bulk permeability. As such, the plotted capture zone is elliptical in shape.

Figure 10.2 clearly shows that the northern pits lie within the capture zone of the Main Pit and Underground and as such, any saline seepage from the northern pits that is not subsequently recaptured by the northern pits when they again become ground water sinks, will be intercepted by the Main Pit and Underground.

10.1.2.4 Risk of Impact

Based on the above, the risk of impact on brackish shallow aquifers around the northern pits is negligible. It is also noted that there are no groundwater users, other than Rox Resources, that would be impacted by the short-term increase in salinity immediately around the northern pits or any impact on salinity along groundwater flow paths if any residual seepage is captured by the Main Pit and Underground.

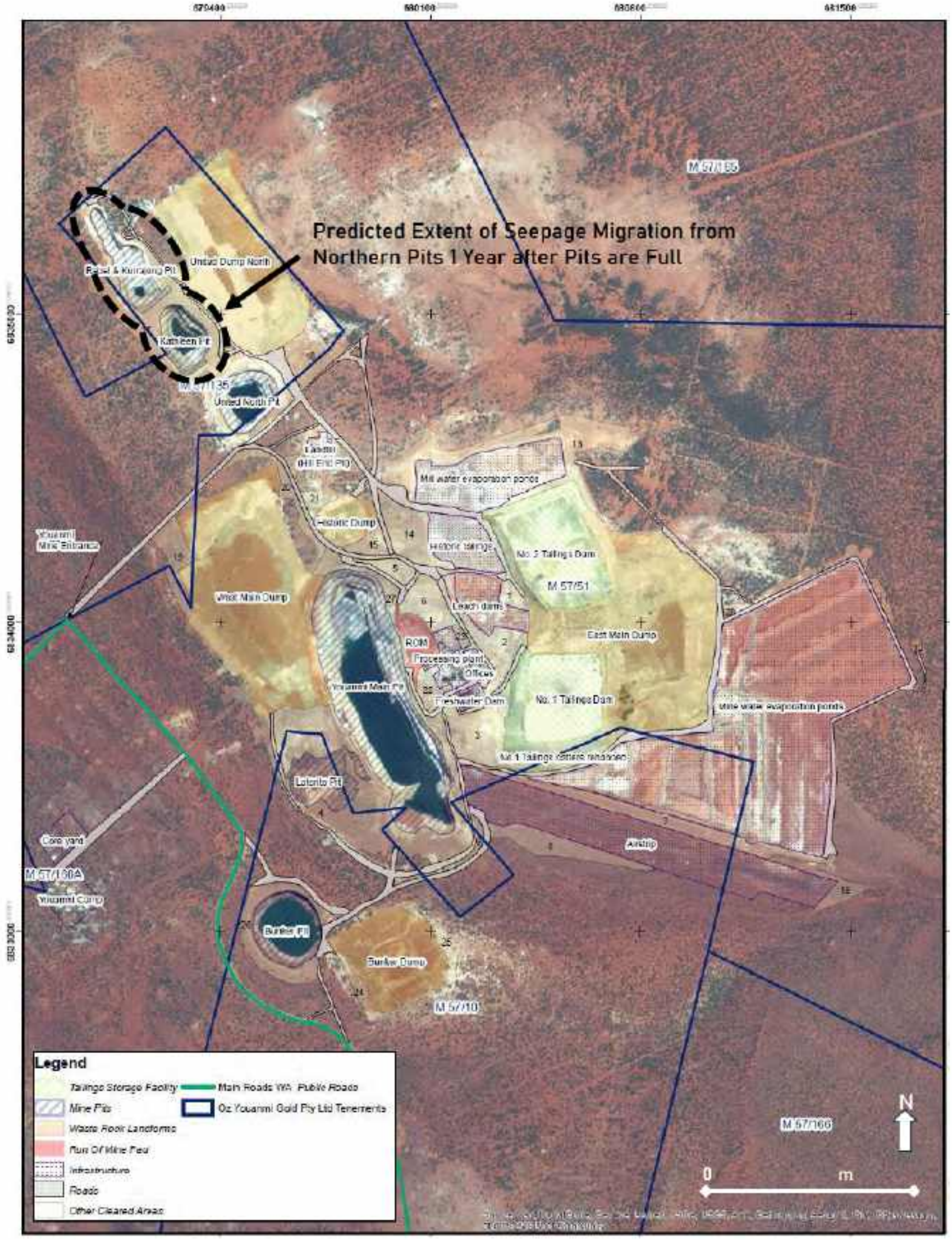


Figure 10.1 Predicted Extent of Seepage Migration from Northern Pits

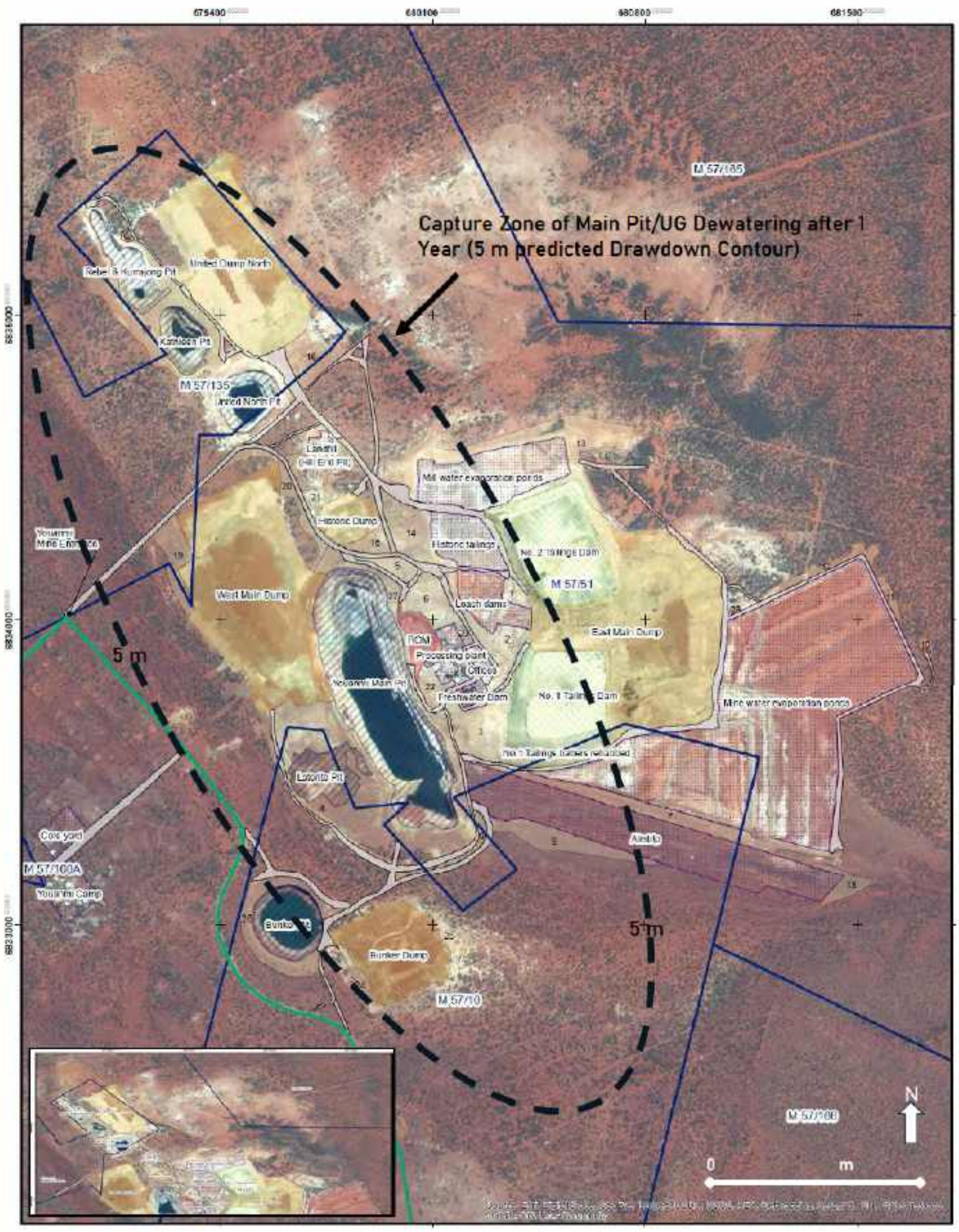


Figure 10.2 Predicted Capture Zone around Main Pit and Underground Mine

10.1.3 Conclusions

The following conclusions are made regarding the water transfer from Main Pit to Rebel and Kathleen Pits:

- Discharge to the northern pits should not result in a rise in the local water table to within 6 m of the ground surface except immediately adjacent to the pits (within a metre). The predicted depth to water table 10 m away from the pit margins is more than 12 m. As such, the discharge should not result in any impact on local vegetation due to inundation of tree roots.
- Discharge to the pits will result in some migration of saline water into local shallow brackish aquifers/aquitards. Seepage is predicted to migrate less than 100 m from the pits. However, this will have no significant impact on the local aquifers/aquitards or any local groundwater users as:
    - There are no local users of the groundwater in the small fringing area around the pits that will be affected, other than the Youanmi mine.
    - Following cessation of discharge to the pits, pit lake water levels will decline over time and the pits will become groundwater sinks. The saline water which had migrated into the local shallow aquifers will largely flow back to the pits.
    - A groundwater capture zone will develop around Main Pit and the existing underground mine workings. This capture zone will extend beyond the northern pits and the saline water seepage migration zone around the pits. As such, any seepage not intercepted by the northern pits, (once they again become groundwater sinks), will be intercepted by the cone of depression in the regional groundwater system around the mine workings.

In summary, the water discharge to the northern pits will have no long-term impact on the local hydrogeological environment.

10.2 Dewatering Pumping

10.2.1 Predicted Extent of Drawdowns

The maximum extent of the drawdown (radius of influence) from dewatering of the Youanmi pits and underground has been calculated using the analytical model derived from the Cooper-Jacob equation below:

$$r_o=\sqrt{\frac{2.25*k*ho*t}{Sy}}$$

where: ro = radius of maximum extent of cone of drawdown (m)
k=hydraulic conductivity (m/d)
ho=height of SWL above base of aquifer (m)
t=time since pumping or inflow started (days)
Sy=specific yield (unitless).

This analytical model adopted parameters based on conceptual model referred in Section 5. The predicted maximum extent of drawdowns (i.e., the distance where there is no lowering of water table or potentiometric surface) in response to active dewatering depends upon the depth of mining, the permeability of the aquifer material and the duration of mining. The model predicts the maximum distance that drawdown extends in response to active dewatering at Youanmi is:

- Up to 8 km for Model A (Hydraulically Connected Mines).
- Up to 1.5 km for Pollard, ~3 km for Hillend and ~4 km for Main Pits - Model B (Hydraulically Isolated Underground Mines).

It should be borne in mind that this distance is based on the prevailing aquifer conditions extending over that full distance; in reality, in a basement rock aquifer environment, aquifers are unlikely to be that extensive and some types of barriers would be expected (i.e., dyke intrusions, or changes in geology), thus reducing the extent of drawdown. The 8 km distance should therefore be seen as a theoretical maximum.

In addition, the Theis model was used to predict the extent of the capture zone around the Main Pit and Underground. The model adopted the derived permeability for the Main Pit and Underground and was used to predict the drawdown around the pit once the Main Pit had been pumped dry and maintained dry for 10 years, (i.e., beyond LOM) It is noted that the model assumed that the Underground mine workings, which extend around 600 m to the northwest of the Main Pit, would be dewatered to the same level. The model predicts the following:

Table 10.3 Predicted Groundwater Level Drawdown at Different Distances from the Pit Crest

Distance from edge of Pit/Underground (m)	50	500	1,000	4,400	7,000
Drawdown around Pit/Underground (m)	100	50	35	5	<1

Figure 10.3 shows the interpreted capture zone around the Main Pit and Underground 10 years after the pit has been pumped dry. The capture zone has conservatively been interpreted based on the 5 m drawdown contour. It is also noted that the 5 m contour (capture zone) assumes the adopted bulk permeability applies to the principal direction of permeability, (i.e. along strike of the main shear zones – northwest), but that the actual permeability in the cross strike direction (southwest-northeast) is around half the bulk permeability. As such, the plotted capture zone is elliptical in shape.

10.2.2 Potential Impacts

Potential impacts caused by dewatering abstraction from the Youanmi underground mining on hydrogeological processes are discussed below.

10.2.2.1 Aquifers

The predicted dewatering abstraction from the deep bedrock aquifers is highly unlikely to have any adverse impacts on the water supply potential of the overall aquifer system outside of the immediate mining area. Groundwater level drawdowns will be mainly controlled by permeable lodes, fractures and rocks such as BIF, and at least one of the faults – Main Pit Fault – is highly permeable. Other cross-cutting faults are interpreted to be hydraulic barriers, and there will be restricted drawdowns across-strike.

10.2.2.2 Existing Other Groundwater Users

Based on the data available through the DWER databases (Section 4.3), the nearest other weathered/fractured bedrock aquifer groundwater user is located approximately 25 km to the south from the Project (Figure 2.15), therefore no groundwater users are likely to be impacted by the proposed Project dewatering.

10.2.2.3 Groundwater Dependent Ecosystems

There are no known GDEs within the predicted maximum radius of the cone of depression (i.e., drawdowns up to 8 km), thus the proposed groundwater abstraction from the project area is highly unlikely to have any adverse impacts on any GDEs. The groundwater around the Main Pit and underground is saline and does not support any groundwater dependent ecosystems. There are no known subterranean fauna in the area and local vegetation is likely to rely on sporadic rainfall and overland water flow events (i.e., supported by fresh soil moisture in the vadose zone above the local water table). The groundwater table at the Project is more than 20 mbgl, well below most plants' rooting depths in this area.

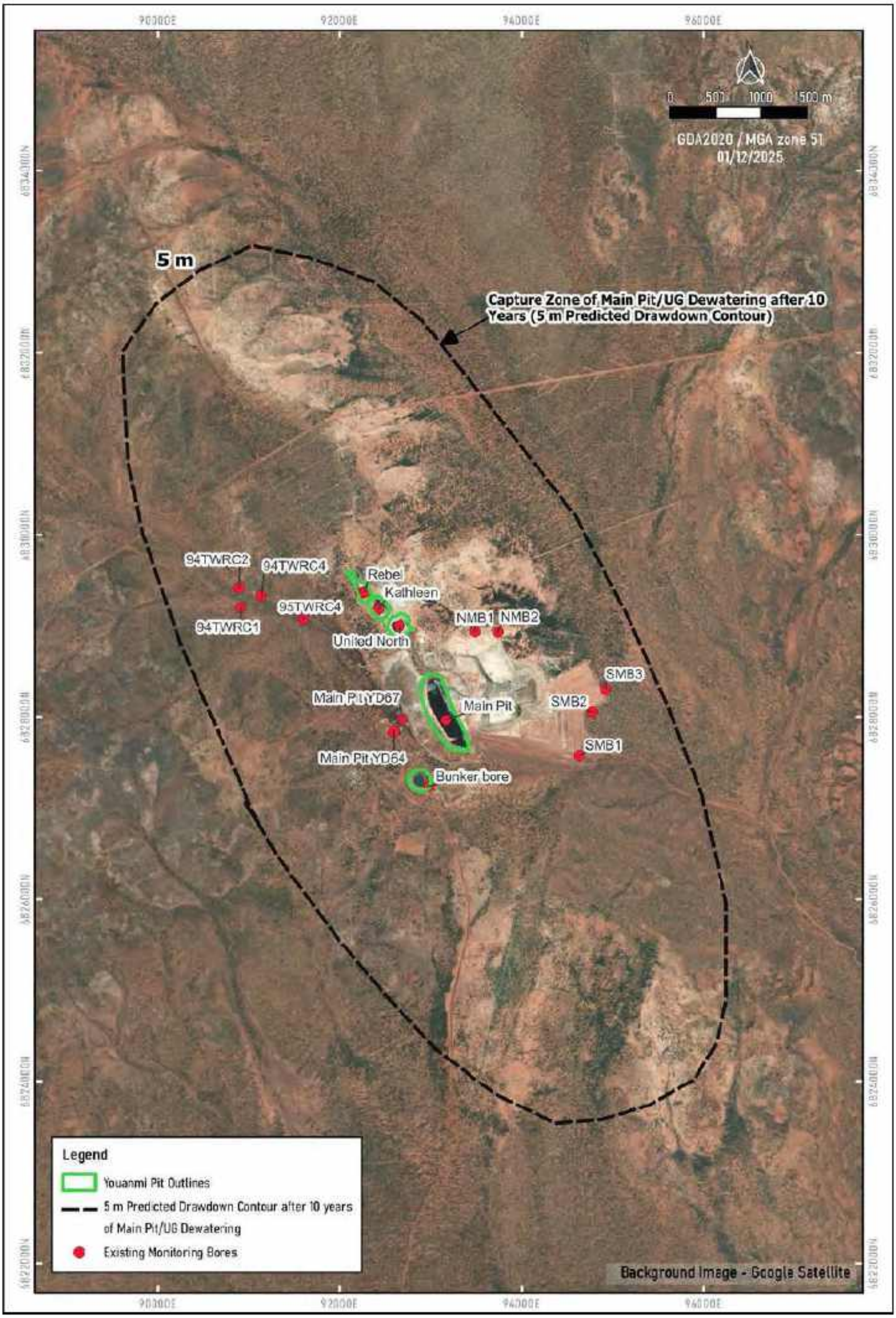


Figure 10.3 Predicted Capture Zone around Main Pit and Underground Mine after 10 Years of Dewatering

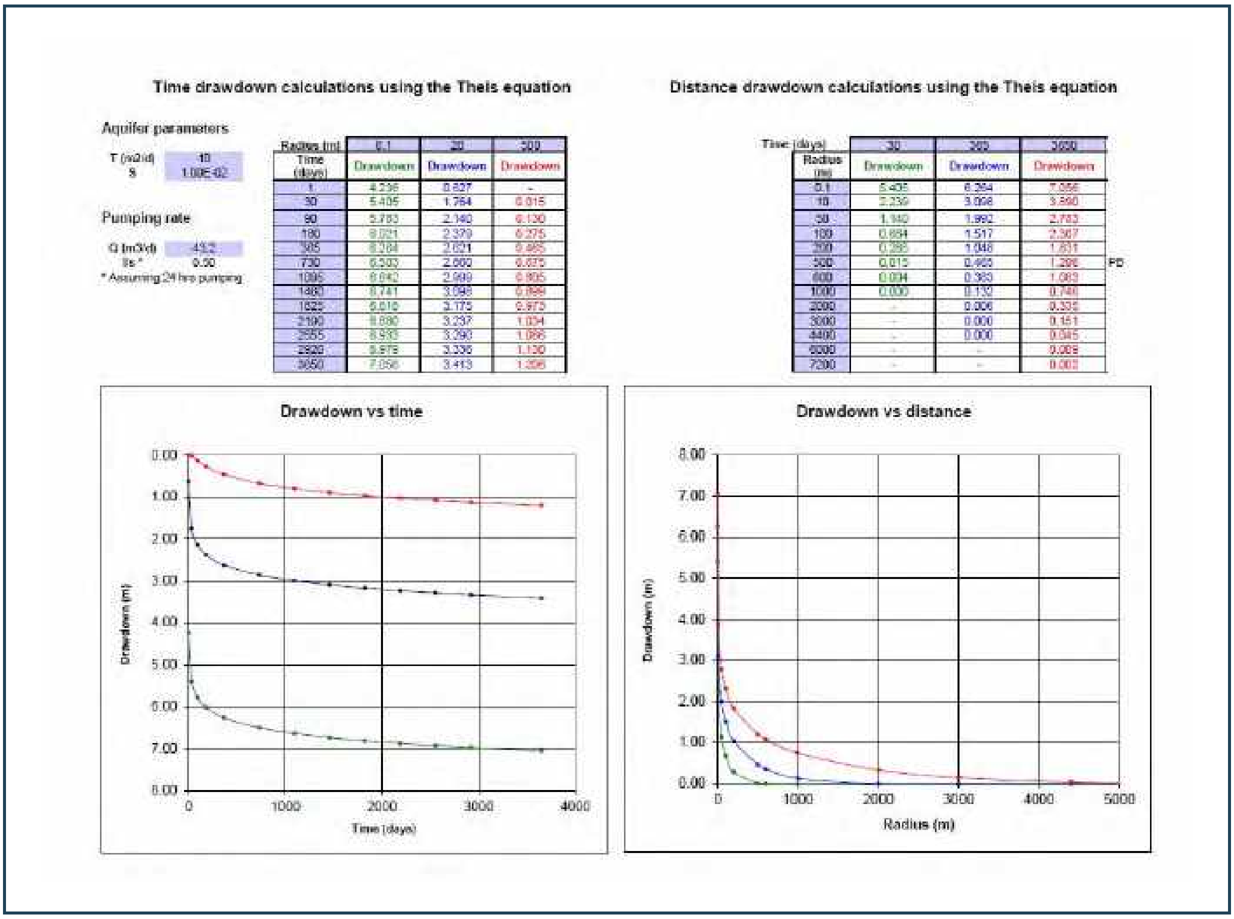
10.3 Water Supply Pumping

10.3.1 Predicted Extent of Drawdowns

A simple analytical model based on Theis equation was used to predict the 1m drawdown along the targeted aquifers (i.e., a combination of valley-fill (alluvium, colluvium) and weathered bedrock below the creek) as a result of water supply pumping of a total of 6 L/s from 10 bores (at the average bore pumping rate of 0.5 L/s) per water supply borefield for 10 years. The analytical model adopted the following parameters:

- An average transmissivity value of 10 m^2/d was used based on the average hydraulic conductivity of 1 m/d (typical for slightly silty/clayey sand) and aquifer thickness of 10 m).
- A specific yield of 10% was used.

Figure 10.4 shows the distance-drawdowns and time-drawdowns that are likely to be produces in the shallow water supply bore, that is continuously pumped at a rate of 0.5 L/s for 10 years.



Time drawdown calculations using the Theis equation

Aquifer parameters

T (m2/d) 10
S 1.00E-02

Pumping rate

Q (m3/d) 43.2
l/s * 0.50
* Assuming 24 hrs pumping

Radius (m)	0.1	20	500
Time (days)	Drawdown	Drawdown	Drawdown
1	4.236	0.827	-
30	5.405	1.764	0.015
90	5.783	2.140	0.130
180	6.021	2.379	0.275
365	6.264	2.621	0.465
730	6.503	2.860	0.675
1095	6.642	2.999	0.805
1460	6.741	3.098	0.899
1825	6.818	3.175	0.973
2190	6.880	3.237	1.034
2555	6.933	3.290	1.086
2920	6.979	3.336	1.130
3650	7.056	3.413	1.206

Distance drawdown calculations using the Theis equation

Time (days)	30	365	3650	
Radius (m)	Drawdown	Drawdown	Drawdown	
0.1	5.405	6.264	7.056	
10	2.239	3.098	3.890	
50	1.140	1.992	2.783	
100	0.684	1.517	2.307	
200	0.285	1.048	1.831	
500	0.015	0.465	1.206	PD
600	0.004	0.383	1.083	
1000	0.000	0.132	0.746	
2000	-	0.006	0.335	
3000	-	0.000	0.151	
4400	-	0.000	0.045	
6000	-	-	0.009	
7200	-	-	0.002	

Figure 10.4 Predicted Long-Term Drawdowns in the Shallow Aquifer After Pumping at Average 0.5 L/s from One Water Supply Boe for 10 Years

After 10 years of continuous pumping at 0.5 L/s, the drawdown immediately adjacent to the bore is predicted to be approximately 7 m (inside the bore the drawdown will be somewhat higher owing to the effects of well loss and partial penetration). The majority of the drawdown will be surrounded nearby the pumped bore with broader small drawdown extent. The model predicted drawdown contour of 1 m only extending up to 600 m. It should be noted that predicted drawdowns do not include allowance for interference from other bores, drying climate and any rainfall recharge.

Cumulative drawdown impacts at the proposed low salinity water supply borefields due to combined abstraction from the shallow aquifers have been assessed based on a simple interference drawdown assessment (addition) and the 1 m cumulative drawdown contour is shown in Figure 10.5.

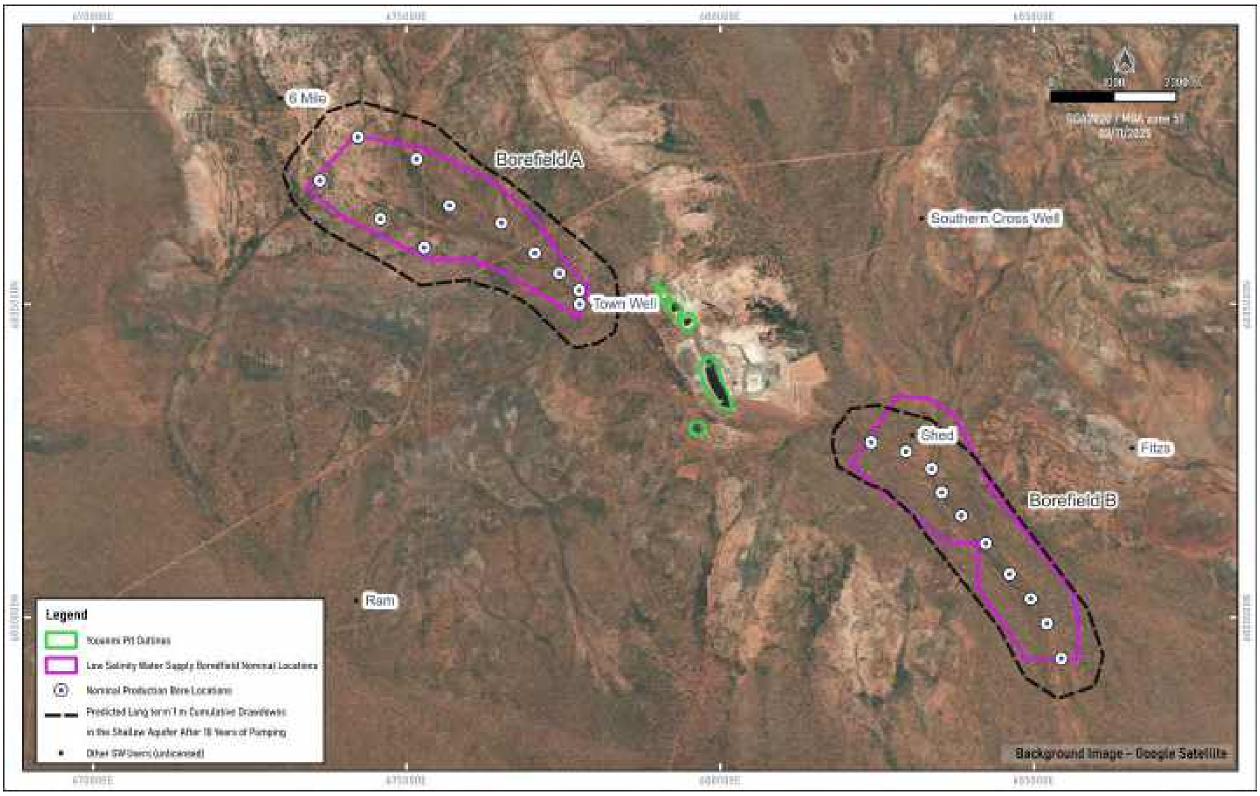


Figure 10.5 Predicted Long-Term 1 m Cumulative Drawdown in the Shallow Aquifer

10.3.2 Potential Impacts

10.3.2.1 Aquifers

The predicted water supply abstraction from the shallow aquifers is unlikely to have any adverse impacts on the water supply potential of the overall aquifer system. The planned abstraction is likely to cause minor impact on the local groundwater beyond the immediate area of the pumping operations (i.e., water supply pumping).

10.3.2.2 Existing Other Groundwater Users

Based on the data available through the DWER databases (Section 4.3), there are no water supply bores within the 1 m cumulative drawdown extent predicted in response to pumping (up to 600 m from the production bore). As a result, no licensed groundwater users would be impacted by the proposed abstraction.

Additionally, none of the unlicensed other groundwater users (i.e., stock bores) in the vicinity of the proposed water supply borefields are within the 1 m cumulative drawdown extent predicted in response to pumping (Figure 10.5).

Regular monitoring of groundwater levels and the clear communication with the nearby groundwater users during the mining operation, will provide information on the actual induced drawdowns and impacts on the other user. If any of other user's bores are affected by Youanmi operations, then Rox will implement mitigation measures to account for any impacts to neighbouring user.

10.3.2.3 GDEs

There are no known GDEs within the predicted cone of depression, thus the proposed water supply abstraction is highly unlikely to have any adverse impacts on any GDEs. Additionally, local vegetation identified within the Project area obtain water from the soil moisture in the unsaturated zone above the water table, and are likely to rely on sporadic rainfall and overland water flow events, with no association to the groundwater (i.e., phreatophytic vegetation). The groundwater table at the Project is more than 20 mbgl, well below most plants' rooting depths in this area

10.4 TSF Seepage

The potential environmental consequences of seepage from any TSF in the Goldfields region groundwater (and surface water) resources are:

- Rising water tables as a result of water table mounding and consequent impacts on local vegetation and/or Groundwater Dependent Ecosystems (GDEs).
- Rising water tables as a result of water table mounding sufficient to induce groundwater baseflow to local lakes and playas.
- The movement of "contaminated" mine water beyond the margins of the TSF and potential impacts on GDEs and other groundwater users.

However, it is concluded that the risk of such consequences is extremely low for the proposed TSF at Youanmi as detailed below.

10.4.1 Potential Impacts

10.4.1.1 Water Table Mounding on Vegetation

Depending on the magnitude of water level rise, water table mounding can potentially have significant impact on local vegetation and surface soils with the inundation and/or salinisation of vegetation root systems and the development of boggy and salt scalded areas at the surface. The above can have significant impact even if there is no change in water quality.

The predicted water table mound outside of the area cleared for TSF construction and drainage works is less than 5 m, which means the water table will likely be well below the ground surface (i.e. 25 mbgl). This is also below trigger levels commonly adopted in DWER licensing conditions (i.e., the 6 mbgl investigation trigger and the 4 mbgl action trigger).

10.4.1.2 Contaminated Seepage on GDEs

There are no known groundwater dependent ecosystems (GDEs) within the predicted water table mounding area, thus it is highly unlikely that the proposed TSF will have adverse impacts on any GDEs.

10.4.1.3 Contaminated Seepage on Other Users

As outlined in Section 4.5, all seepage will eventually make its way to the Main Pit (which is and will be a long-term groundwater sink – during and after mining). The seepage will not migrate off the current Rox tenements and therefore will not impact any other groundwater users.

10.4.2 TSF Impact Management Strategies

As outlined in Section 10.5.1.3, there are not expected to be any measurable impacts on groundwater outside the immediate vicinity of the TSF. However, there will always remain a risk (even if a very low risk) that unexpected/unknown site conditions might result in the water table mound rising higher than predicted or the seepage advancing more quickly than predicted.

Management strategies are presented below which cover:

- Groundwater Monitoring – to measure actual impacts.
- Mitigation – in case unacceptable impacts appear to be likely based on monitoring results.

TailCon (2025a) developed a monitoring strategy with the following:

- A network of strategically placed Vibrating Wire Piezometers (VWPs) integrated into the design to monitor the development of the phreatic surface.
- Two standpipe piezometers have been constructed (TSF-BH-01 and TSF-BH-03) to allow for monitoring of seepage and or groundwater beyond the facility embankments.
- These instruments will provide data for performance monitoring and inform the Trigger Action Response Plan (TARP).

10.5 Surface Water

Generally, mining operations can impact or modify the environmental values and hydrological behaviour of the surrounding areas as follows:

- Increasing or reducing water availability within the environment.
- Interfering with floodplain capacity and changing flood patterns and flood levels.
- Causing erosion of disturbed areas (runoff from construction areas, stockpiles, ROM pads and mine voids may increase sedimentation downstream).
- Causing erosion of undisturbed areas, where flood velocities have increased due to water management around the mine.
- Degradation of water quality through discharge of contaminants (chemicals, hydrocarbons).

Specifically, for Youanmi, the key surface water related environmental risks associated with the proposed project development include:

- Modification of existing hydrological regimes, by increasing or decreasing water availability and flood levels within the environment.
- Increased risk of erosion and subsequent sedimentation in downstream areas.
- Degradation of water quality through the discharge of chemicals.

A risk assessment of the potential surface water related environmental impacts are presented in Appendix D, which is discussed further in the sections below.

10.5.1 Modification of the Hydrological Regime

Generally, construction of mine pits, waste dumps, haul roads and other associated infrastructure for proposed mines potentially could affect existing surface water drainage features, including creek lines, pools and flood plains. Modification of the existing catchments and drainage channels can reduce the volume and distribution of runoff to some areas, creating water shadows and increasing flows and periods of ponding in others. This disturbance has the potential to adversely impact vegetation due to water starvation, drowning and/or sedimentation. Haul roads have the potential to impede flow and create water shadows on the downstream side of the road. The development of mine pits adjacent to or within major drainage channels poses significant flood risk to the mine pits and potential for water starvation downstream.

The area of the proposed project development layout which has the potential to cause significant changes to the hydrological regime is the TSF encroachment into the Eastern Creek floodplain.

Results from the surface water flood modelling indicate that the impact of the TSF encroachment on the flood levels in the Eastern Creek floodplain is an increase in flood levels of up to 0.1 m in the 1% AEP event. The increased flood levels are only predicted in the local area immediately to the east of the TSF.

10.5.2 Sediment Generation

Mining operations will inherently cause ground disturbance related to mining and construction of ancillary landforms, such as ROM pads and crushers, topsoil stockpiles and waste landforms. The impacts of this ground disturbance can be significant, depending on several factors, including the location of the deposit, mine planning, materials of construction and the terrain of the area, among others. The development of these landforms can increase sediment loads transported in runoff and could result in sedimentation of vegetated and other sensitive ecological areas.

Specifically for the proposed Youanmi Project, the main potential source of increased sediment loads in runoff is from stockpiles of mined material within the Processing Area. No new waste rock landforms are proposed as part of the project development and the proposed mining activities are all proposed within underground mine developments.

Runoff within the Processing Area should be passed through local sedimentation basins to reduce the sediment load of runoff generated from across this area.

10.5.3 Water Quality

Mine developments have the potential for adverse impacts to surface and groundwater quality due to:

- Spillage of hydrocarbons and chemicals stored, handled or transported on site.
- Runoff from the mine pit, stockpiles, ROM pad and waste dump areas containing metals or other elements.
- Spillage from the transfer of hypersaline groundwater associated with mine dewatering.

Any contaminated discharges have the potential to impact vegetation, pools and other sensitive ecological areas and fauna, which may consume the water if allowed to enter nearby waterways.

Standard environmental procedures for storage, transport and handling of industrial chemicals will be used in the operations. If spills were to occur, the spills would most likely occur in the Processing Area, with runoff reporting to Western Creek.

The Project will likely require pumping hypersaline groundwater associated with pit dewatering activities. To manage the risk of pipeline leaks/bursts of hypersaline groundwater impacting the environment, the following controls are proposed:

- Burial of the pipeline to reduce the risk of leaks resulting in surface flow of saline water.
- A leak detection system with flow meters at either end of the discharge pipeline.
- Containment scour pits at pipeline scour valve locations.
- Pipeline pressure control systems to turn off the system to reduce the risk of high-pressure pipeline bursts.

10.5.4 Risk Assessment (Environmental)

The following section assesses the inherent risk of the Project to hydrological and environmental receptors from the potential surface water risks discussed above. A residual risk rating is provided considering the mitigation measures which are proposed.

The hydrological risk assessment (Appendix D) has been completed using the DMPE (2025) risk matrix template.

The DMPE (formerly DEMIRS) guideline document "Guideline for preparing Mining Development and Closure Proposals" (DEMIRS 2025) states that environmental assessments address the objectives of the DEMIRS environmental objectives. The evaluation of Inherent Risks (i.e., prior to the application of mitigation or management measures) associated with the Project have therefore been considered in relation to the different key environmental objectives (DEMIRS 2024). An excerpt of Table 1 from the publication is shown below, with the 'Inland Waters' factor being the most relevant for this assessment.

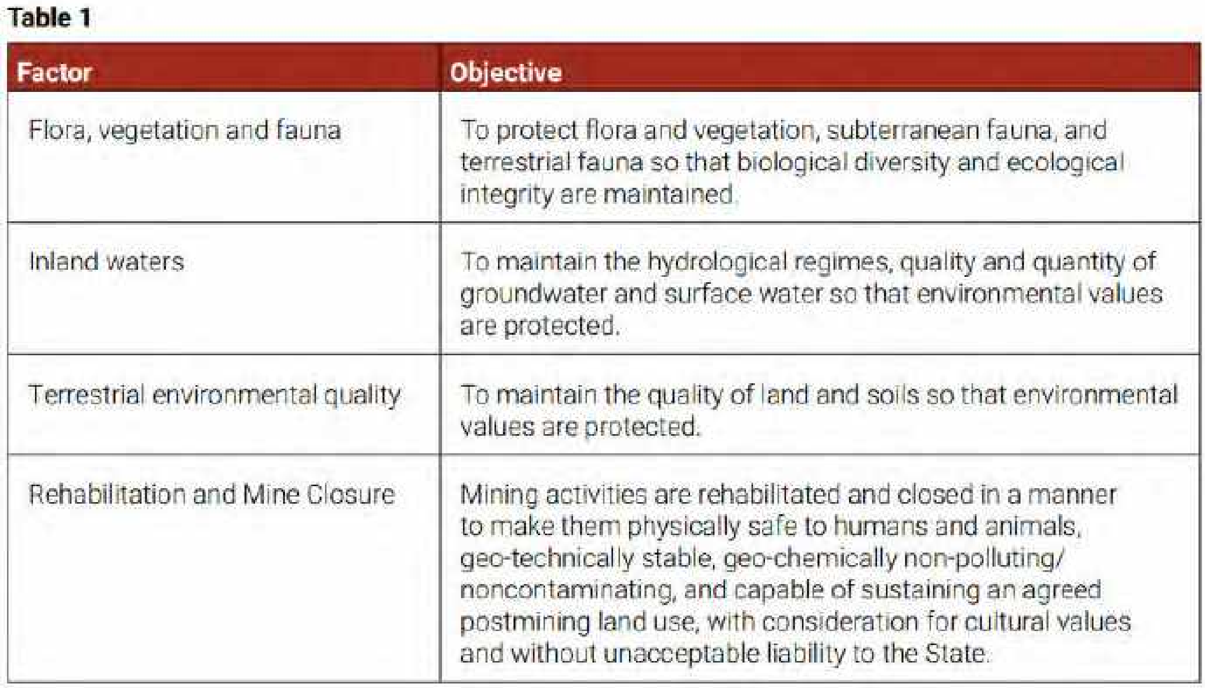


Table 1

Factor	Objective
Flora, vegetation and fauna	To protect flora and vegetation, subterranean fauna, and terrestrial fauna so that biological diversity and ecological integrity are maintained.
Inland waters	To maintain the hydrological regimes, quality and quantity of groundwater and surface water so that environmental values are protected.
Terrestrial environmental quality	To maintain the quality of land and soils so that environmental values are protected.
Rehabilitation and Mine Closure	Mining activities are rehabilitated and closed in a manner to make them physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/ noncontaminating, and capable of sustaining an agreed postmining land use, with consideration for cultural values and without unacceptable liability to the State.

Source DMPE 2025

A Risk Matrix (Appendix D) was developed for the potential surface water related environmental impacts of the project. The following risks were assessed to pose a "High" risk to the environment without any further controls being put in place:

- Risk 2 – Erosion of the toe of the TSF by the Eastern Creek may result in failure of the TSF wall and release of sediment and tailings to the environment. The likelihood of this occurring is low during the operating life of the TSF (10-years) but, post-closure, there is a risk that the PMF may result in flow with sufficiently high velocity to scour the toe if adequate erosion protection is not constructed. With adequate erosion protection installed, the Residual Risk reduces to "Medium".
- Risk 6 – Flood modelling of the PMF event in Western Creek indicates the potential for inflow of creek flows to Bunker Pit which may result in creek capture post-closure. If Rox Resources are responsible for the closure of Bunker Pit, a flood protection bund may be required around Bunker Pit at closure to reduce the risk to downstream receptors (refer further Section 10.5.5).

10.5.5 Post-Closure Surface Water Impacts

It is not clear what closure responsibilities Rox Resources have for historically mined pits in the Project area. In particular, Bunker Pit, which sits adjacent to Western Creek. Flood modelling of the PMF event was completed with hydraulic modelling indicated indicating that creek flow from Western Creek may reach elevations high enough to enter Bunker Pit in a PMF event, typically in the north/east side of the pit.

If Rox Resources are responsible for the closure of Bunker Pit, there may be a requirement to construct a flood protection bund around the eastern side of the pit at closure to prevent the risk of creek capture occurring. If creek capture were to occur it would reduce the volume of runoff from Western Creek reporting to the downstream environment and has the potential to cause outflows from Bunker Pit of water with poor quality.

11. RECOMMENDED MONITORING

11.1 Surface Water

A surface water monitoring program has been designed to allow impacts to surface water quality because of the mining activities to be identified. Surface water quality samples should be collected prior to commencement of the project development to collect some baseline water quality data.

The monitoring network involves installing a number of Surface Water Monitoring Stations (SWMS) from where water quality samples can be retrieved for laboratory analysis. Proposed monitoring locations are concentrated within the Western and Eastern Creeks. The philosophy behind the placement of proposed surface water sampling locations is to collect samples:

- Upstream of the point where Project development activities may be impacting runoff water quality (to provide control points).
- In close proximity to Project development activity areas.
- Downstream of the Project.

The proposed monitoring network is shown in Figure 11.1. A total of 6 SWMS are proposed, with final locations selected based on a site inspection for suitable installation locations within the low flow channel of the drainage lines. The monitoring network may need to be extended with time if the disturbance areas associated with the Project extend past the current development footprint areas.

Given the arid conditions, surface water flow only occur after significant rainfall events, and monitoring would need to be predominantly event-based. The irregularity of rainfall and runoff events mean that collection of water quality samples should be collected twice per year (where at least two runoff events occur in a year). The flashy nature of runoff responses to rainfall in the area also means that it can be difficult to retrieve water samples while the drainage lines are flowing. The proposed SWMS include a passive surface water collection bottle (Nalgene) to allow surface water samples to be collected post-runoff event. These samples should be collected as soon possible following a surface water flow event.

Water quality samples should be analysed for the following parameters:

- General water quality suite (including EC, pH, DO etc.).
- Total and dissolved metals.
- Nutrients.
- Total suspended solids.
- Hydrocarbons.

Post-closure, the monitoring program should continue during the completion period or longer until it can be demonstrated that water quality is stable and comparable to pre-mining conditions. Water quality results should be regularly reported, ensuring compliance with relevant environmental regulations.

Results should be compared against both site-specific water quality criteria and water quality guideline values, with triggers in place to initiate investigation of contamination if significant deviations are observed.

Water quality samples should also be collected from:

- The evaporation ponds.
- Water storage ponds.
- Any alternate discharge locations/systems.

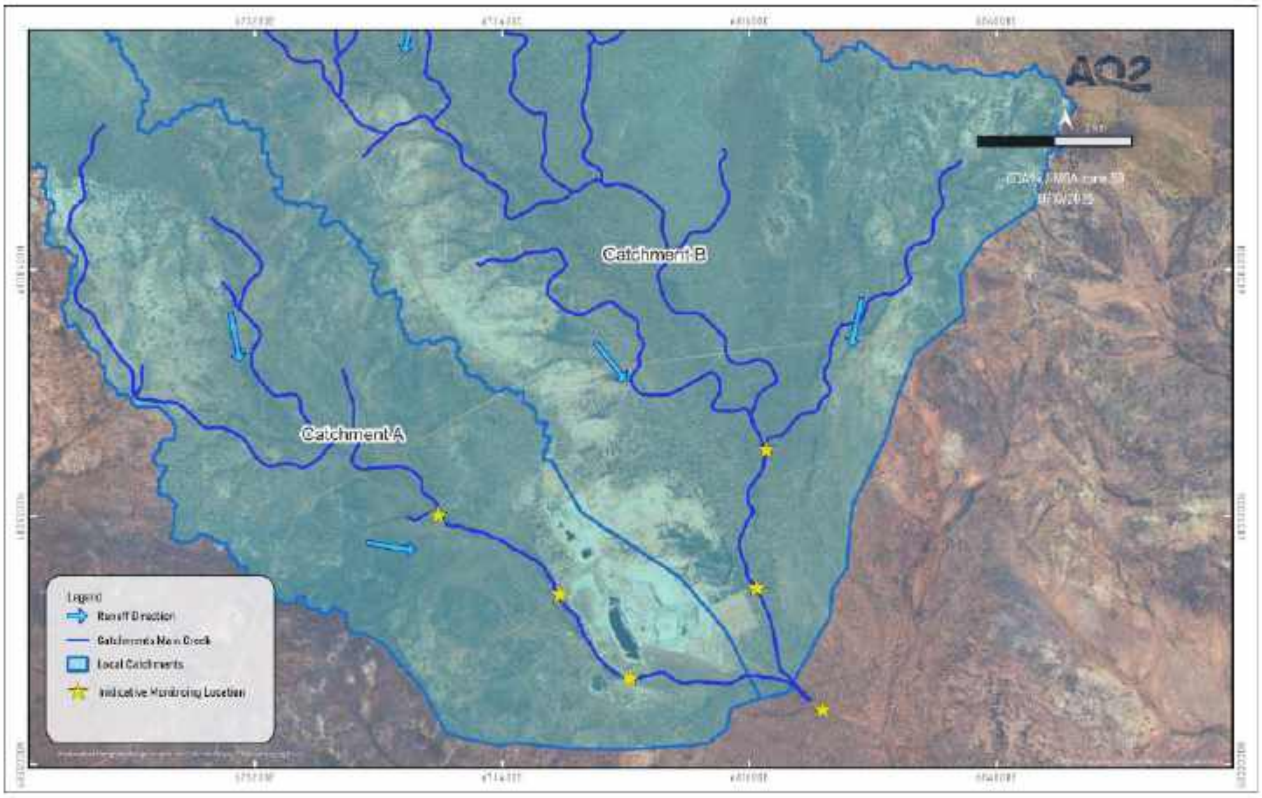


Figure 11.1 Indicative Surface Water Monitoring Locations

11.2 Groundwater

11.2.1 Mine Site

A detailed groundwater management framework at the Youanmi under GWL208485 is outlined in the current Groundwater Operating Strategy (GWOS; Rox Resources, 2022b). The GWOS includes a groundwater monitoring programme that is designed to assess aquifer performance, the potential impacts of groundwater abstraction proposed upon commencement of operations and specify operational requirements. GWOS data are to be compiled in regular monitoring reports (i.e. Annual Groundwater Monitoring Summary or Triennial Aquifer Review) and the monitoring programme will be amended as necessary.

The following monitoring schedule is currently in pace as part of the GWOS (Table 11.1).

Table 11.1 GWL208485 Current Groundwater Monitoring Programme

	Abstraction Volume (Flow Meter Readings)	Standing Water Levels	Laboratory Analysis (Water Quality, Major Component Analysis*)	Field pH, EC & TDS
Pontoons, In-Pit Sumps & Underground Pumping Stations	Weekly	Quarterly (Calculated) Annually (Surveyed)	Annually	Quarterly
Production Bores	Weekly	Monthly	Annually	Quarterly
Monitoring Bores	N/A	Monthly	N/A	Quarterly

N/A – Not Analysed/ Not Applicable
*Laboratory Parameters: EC, TDS and pH, Total alkalinity, Ca, Na, Mg, K, SO4, Cl, NO3, HCO3, CO3, SiO2, Al, Fe, P.

In addition, a total of ten groundwater monitoring bores is proposed to be included in the Youanmi mine site groundwater monitoring network and programme to assist in monitoring of potential impacts (i.e., dewatering, water supply pumping, seepage from TSF and evaporation ponds, water discharges). The proposed groundwater monitoring network is shown in Figure 11.2. It should be noted that these are provisional locations and they will be revised during the drilling programme together with the drilling depths. It is recommended that 10 new monitoring bores are drilled and constructed with PVC casing, slotted at selected depths and with their annulus gravel packed.

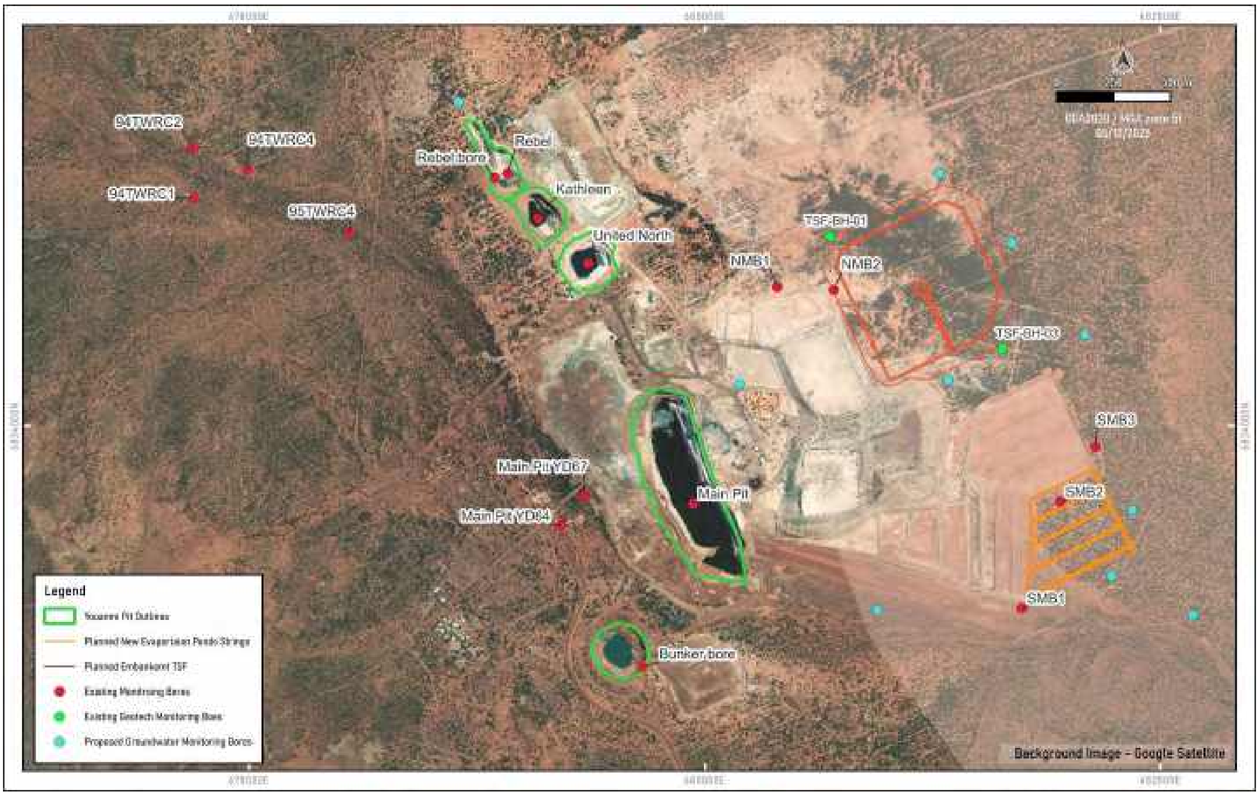


Figure 11.2 Proposed Groundwater Monitoring Network

11.2.2 Water Supply Borefields

The groundwater system will need to be carefully managed at the proposed low salinity water supply borefields in order to avoid or minimise impacts to hydrological processes (i.e., groundwater), due to water supply abstraction. A detailed proposed management framework for the low salinity water supply borefields will be outlined in a separate GWOS, which will be prepared and submitted to DWER to support a 5C licence application to abstract groundwater from the shallow alluvium aquifer system (i.e., together with this H2 Level Assessment report). The GWOS will include a groundwater monitoring programme that is designed to assess aquifer performance, the potential impacts of proposed groundwater abstraction and specify operational requirements. GWOS data will be compiled in regular monitoring reports and the monitoring programme will be amended as necessary.

The following monitoring schedule is proposed at the Water Supply Borefields (Table 11.2).

Table 11.2 Proposed Groundwater Monitoring Programme

	Abstraction Volume (Flow Meter Readings)	Standing Water Levels	Laboratory Analysis (Water Quality, Major Component Analysis*)	Field pH, EC & TDS
Active Production Bores	Weekly	Monthly	Annually	Quarterly
Monitoring Bores	N/A	Monthly	N/A	Quarterly

N/A – Not Analysed/ Not Applicable
*Laboratory Parameters: EC, TDS and pH, Total alkalinity, Ca, Na, Mg, K, SO_4, Cl, NO_3, HCO_3, CO_3, SiO_2, Al, Fe, P.

Monitoring data are and will be regularly reviewed by a hydrogeologist throughout the mining period to analyse trends and to guide operational water supply management. In the event that the extraction does have detrimental effects on the surrounding aquifers, environment or other users contrary to predictions, mitigation measures will be implemented (which could include adjustment of pumping rates to reduce impacts).

12. SUMMARY AND CONCLUSIONS

12.1 Water Discharge to Northern Pits

Hydrogeological assessment of the planned discharge of dewatering excess to the 2 northern pits at the Youanmi (prior to the planned underground development) was undertaken by AQ2 in late 2024. The key outcomes of this assessment are:

- Discharge to the 2 northern pits of Rebel and Kathleen will not result in a rise in the local water table to within 6 m of the ground surface, except immediately adjacent to the pits (within a metre of the pit walls). The predicted depth to water table 10 m away from the pit margins is more than 12 m. As such, the planned discharge should not result in any impact on local vegetation due to inundation of tree roots.
- Discharge to the pits will result in some migration of saline water into local shallow brackish aquifers/aquitards. Seepage is predicted to migrate less than 100 m from the pits. However, this will have no significant impact on the local aquifers/aquitards or any local groundwater users as:
    - There are no local users of the groundwater in the small fringing area around the pits that will be affected other than the Youanmi mine.
    - Following cessation of discharge to the pits, pit lake water levels will decline over time and the pits will become groundwater sinks (as they are now). The saline water which had migrated into the local shallow aquifers will largely flow back to the pits.
    - A groundwater capture zone will develop around the planned Main Pit and UG mine workings. This capture zone will extend beyond the northern pits and the saline water seepage migration zone around the pits. As such, any seepage not intercepted by the northern pits (once they again become groundwater sinks) will be intercepted by the cone of depression in the regional groundwater system around the mine workings.
- It is recommended that the water level in Rebel and Kathleen Pits does not go higher than 6 m from the pit crest. This gives a maximum water level elevation of:
    - Kathleen: 462 mAHD.
    - Rebel: 460 mAHD.
- In summary, the planned discharge to the northern pits will have no long-term impact on the local hydrogeological environment.

12.2 Pit and Underground Dewatering

The assessment of the likely groundwater inflows to the Youanmi underground mines during mining and groundwater inflows to the pit during initial pit lake dewatering was completed and the key outcomes of dewatering assessment are as follows:

- In summary, it is predicted that:
    - Total underground inflows will be around 20 to 30 L/s at the end of FY2026.
    - Total inflows will increase to around 60 to 70 L/s by the end of FY2028.
    - Total inflows will then remain relatively steady (at up to 70 L/s) over the rest of the life of mine.
- The predicted inflows are averages and do not account for "burst inflows" when major structures intersected by development headings or stoping. History shows that short-term inflows of 100+L/s could occur.
- These predictions do not include the pumping required to remove existing stored water in the pit and underground mines. These volumes are accounted for in the overall mine dewatering strategy.
- The model predicts that net groundwater inflows (i.e. net of evaporation losses) will gradually increase to around 18 L/s when the pit lake is at the base of the pit. These pit inflows will continue until such

time as dewatering of the Main underground intercepts all inflows. The contribution of shallow (i.e. pit depth) inflows is accommodated in underground inflow predictions.

- The most practical and cost-effective water management (dewatering) strategy will be to manage all net pit inflows including any rainfall runoff inflows with pit floor sump pumping at each pit with a transfer station for underground dewatering. Underground dewatering should be achieved through a series of sumps at increasing depths as the mine progresses. This can easily be managed by standard "off-the-shelf" mine dewatering pumping equipment. Sump pumping capacity (far in excess of the pumping capacity to manage groundwater inflows) will be required to manage runoff to the open pits and the box-cut following high rainfall events.
- The extent of the cone of depression in the groundwater level due to dewatering depends on the depth of mining and the duration of pumping. The predicted dewatering abstraction from the deep bedrock aquifers is highly unlikely to have any adverse impacts on the water supply potential of the overall aquifer system outside of the immediate mining area. Groundwater level drawdowns will be mainly controlled by permeable lodes, fractures and rocks such as BIF, and at least one of the faults – Main Pit Fault – is highly permeable. Other cross-cutting faults are interpreted to be hydraulic barriers, and there will be restricted drawdowns across-strike.
- The predicted drawdown extent is unlikely to impact on any other groundwater users (the closest other GWL user is approximately 25 km away from the Youanmi mine). There are also no known groundwater dependent ecosystems within the radius of the influence of dewatering pumping.

12.3 Water Balance

The water balance assessment completed indicates the following key points:

- Three water streams were identified, based on water quality limitations:
  - Potable Water.
  - Raw Water.
  - Process Water.
- There is a potable water supply deficit throughout the duration of the project which is in the order of 1 L/s.
- Raw water can be sourced from the Hillend and Pollard dewatering streams, which can not meet the full raw water demand during the project. The average requirement for makeup raw water demand (including potable water demand) is predicted to be up to 14 L/s between mid-2028 and mid-2030 and up to 8 L/s from mid-2030.
- Dewatering from the main underground area is hypersaline and can be used for process water. The predicted dewatering rates exceed the process water demands, particularly towards the later part of the mine life (when dewatering rates are predicted to be the greatest).
- Surplus water is discharged to the evaporation ponds and, when they are at capacity, to other approved discharge points or ponds, which are predicted to be required from mid-2029, with an average of 21 L/s of discharge predicted to be required from then on.

12.4 Water Supply

A total of approximately 14 L/s of low salinity water is estimated to be required to fulfill a deficit of potable and raw water demands (i.e., 1 L/s and 13 L/s, respectively). There are two known low salinity water sources at the Youanmi mine site at Rebel Bore and Bunker Bore. Rebel Bore was previously the main potable water supply for the 1990s mine (supplying on average ~2.1 L/s but up to 5 L/s, with salinity of 1,400 mg/L TDS). However, this bore can no longer be used as a low salinity source due to the dewatering transfer of hypersaline water from Main Pit to Rebel Pit and Kathleen Pit, to allow the resumption of mining in the underground beneath Main Pit. A second water supply bore is Bunker Bore, which is in direct connection with Bunker Pit (bore levels rise and fall with the pit) and capable of producing up to 1 L/s (current TDS of 900 mg/L, but historical higher TDS of 4,400 mg/L). In addition, low salinity demands may be sourced from Kathleen Pit, where there would be approximately 400,000 kL of water available at approximately 40,000 mg/L TDS suitable for the process plant raw water.

To reduce the project risks related to low salinity water supply, an alternative external (off-site) water supply will be needed to be developed. A high-level desktop assessment of alternative low salinity water supply options for the Youanmi Project have been completed and the key outcomes are as follows:

- Overall, the study area can be deemed to have low prospects of providing a groundwater supply of a lower salinity (potable). Groundwater quality in the area is variable and generally poor to hypersaline.
- The most prospective aquifers for low salinity groundwater within and outside the mining area are:
    - Quaternary-age transported sediments deposited along modern drainage (alluvium and colluvium) and deposited at the foot of topographic mound when bedrock is exposed (build-up of coarse gravelly colluvium and scree, weathered material e.g., granite).
    - Weathered bedrock below the valley-fill sediments formed from the creek erosion.
    - Palaeochannels, with lower salinity occurs around the headwaters of paleochannels (areas of higher topography) or in tributary channels to the trunk channel.
- At the study area, the least saline water, generally containing less than 3,000 mg/L TDS occurs furthest from the salt lakes in shallow aquifers in colluvium and alluvium on or near the watersheds, particularly over granitic terrain. Water from aquifers near or over greenstones contains up to 5,000 mg/L TDS, and in localised areas 9,000 mg/L TDS.
- The study was driven by water quality rather than water quantity. Therefore, where fresher water is identified, use of it should be carefully controlled to preserve it as a usable source. Overuse of a fresher groundwater supply in this area can result in salinisation of that source.
- Six potential water sources (Options A to F) within 25 km radius of the Youanmi project area were identified that may contribute meeting the long-term Project's low salinity water demand of up to 12 L/s.
- All potential water supply options have risks and limitations. Further work is recommended to be undertaken to address the project key data gaps and uncertainties related to selected future water supply target(s). First steps are recommended to assist in decision making process, including hydrogeological field investigations and detailed aquifer assessment to better understand the water supply potentials (i.e. hydrogeological characteristics and confirm water supply feasibility) in the selected targets.
- Based on our current knowledge, the selected water supply system that comprises two water supply borefields, Borefield A (Option A) and Borefield B (Option C) have been chosen to be the most prospective low salinity supply options capable of supplying a total of up to 12 L/s (i.e., 6 L/s per borefield).
- The predicted water supply abstraction from the shallow aquifers is unlikely to have any adverse impacts on the water supply potential of the overall aquifer system. The planned abstraction is likely to cause minor impact on the local groundwater beyond the immediate area of the pumping operations (i.e., water supply pumping).
- The predicted drawdown extent is unlikely to impact on any other groundwater users (licensed or unlicensed). There are also no known groundwater dependent ecosystems within the radius of the influence of water supply pumping.
- A conceptual design for the water supply borefields A and B has been completed. The borefields were assumed to consist of a total of 20 water supply bores operating at 0.7 L/s per bore, up to a maximum of 12 L/s total pumping rate from the borefields (6 L/s from Borefield A and 6 L/s from Borefield B).

12.5 TSF Seepage to Groundwater

The key outcomes of the TSF seepage assessment are as follows:

- The design and proposed construction methodology of the proposed TSF3 are such that there will be minimal seepage losses to the local environment.
- Any seepage will infiltrate vertically to the local water table which has developed in low permeability transported cover sediments (colluvium / ferricrete) and underlying weathered basement rock. The predicted hydraulic impacts of such seepage are as follows:
  - A negligible water table mound will develop beneath the TSF. The predicted maximum rise in the water table from the toe of the TSF is around 5 m.
  - Based on current groundwater levels (i.e., between 30 mbgl), the resulting water table will remain below the surface.
- Seepage will move away from the TSF at rates determined by the hydraulic gradient and aquifer permeability. Seepage flow will initially be semi-radially away from TSF, but will become dominated by existing regional hydraulic gradients a short distance away from the TSF.
- Seepage flows will then largely be in an southeasterly direction towards the Main Pit. The ultimate fate of any seepage will be flow towards and into the Main Pit (i.e., seepage flows will be "captured" by the pit).
- The predicted water table rise and rates of seepage migration are not expected to result in any impacts on GDEs or the beneficial use of local groundwater. Nevertheless, an impact management strategy is proposed to identify any unexpected impacts and to mitigate these if/when they arise. These include groundwater monitoring to confirm the hydraulic response of the aquifer system to seepage and to monitor the migration of seepage through the aquifer system.

12.6 Surface Water Management

Surface water flood modelling of the proposed project layout has been completed to identify the requirements for surface water management measures. The assessments completed identified the following:

- Potential inundation of the Processing Area by flooding from Western Creek. The western side of the Processing Area could be constructed upon a raised earth pad to be out of the predicted Western Creek flood levels, or the Processing Area could be moved to the east (further uphill) out of the flood prone area. Any raised pad installation may require erosion protection along its outer face where it extends into the flood plain.
- The TSF extends within the Eastern Creek floodplain. Minor drainage works could be consider around the northern perimeter of the TSF to assist drainage of local runoff along the north side of the TSF. Erosion protection along the toe of the TSF should consider that flow velocities up to 1.5 m/s may occur through Eastern Creek during a PMF event.
- It is not clear what environmental/closure liabilities Rox Resources has inherited from past mining operations at the site, in particular, the closure of Bunker Pit. There is a risk that inflow of runoff from Western Creek into Bunker Pit over time could lead to the formation of a preferred surface water flow connection between Western Creek and the pit which would result in creek capture. A closure flood protection bund around this pit at closure may need to be considered if Rox Resources are responsible for the closure of Bunker Pit.

The main surface water management infrastructure requirement identified was to construct a raised pad at the Processing Area to keep the plant out of the 1% AEP flood plain.

12.7 Groundwater Management

A detailed groundwater management framework at the Youanmi under the existing groundwater licence (GWL208485) for the weathered/fractured aquifer system is outlined in the current Groundwater Operating Strategy (GWOS). A groundwater monitoring programme is being undertaken as per current GWOS to assess the aquifer performance, potential aquifer impacts and operational requirements. In addition, six groundwater monitoring bores are proposed to be included in the Youanmi mine site groundwater monitoring network and programme to assist in monitoring of potential future impacts (i.e., dewatering, water supply pumping, seepage from TSF and evaporation ponds, water discharges).

A standalone GWOS covering the future water supply abstraction from the proposed low salinity borefields will be prepared once the water supply sources have been confirmed feasible (following the hydrogeological investigations). The GWOS will include a groundwater monitoring programme that is designed to assess aquifer performance, the potential impacts of proposed groundwater abstraction and specify operational requirements. GWOS data will be compiled in regular monitoring reports and the monitoring programme will be amended as necessary.

Monitoring data are and will be regularly reviewed throughout the mining period to analyse trends and to guide operational water supply management. In the event that the groundwater abstraction (dewatering and water supply) does have detrimental effects on the surrounding aquifers, environment or other users contrary to predictions, mitigation measures will be implemented.

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APPENDIX A
PRE-DEVELOPMENT FLOOD MAPS

GDA94 / MGA zone 50
05/12/2025

Notes

- Flood depths for 1% AEP are a result from the external catchment and the rain on grid precitiation
- Ponding in pits and evaporation ponds
- Terrain data sourced form Youanmi LIDAR.dxf file
- Proposed TSF and process plant shown in pink

AQ2

Appendix A1
1% Pre-Developed Event
Maximum Flood Depth

N

0.37 0.74 km

GDA94 / MGA zone 50
04/12/2025

Notes

- Flood depths for 1% AEP are a result from the external catchment and the rain on grid precitiation
- Ponding in pits and evaporation ponds
- Terrain data sourced form Youanmi LIDAR.dxf file
- Proposed TSF and process plant shown in pink

AQ2

Appendix A1
1% Pre-Developed Event
Maximum Flood Depth

APPENDIX B
POST - DEVELOPMENT FLOOD MAPS

GDA94 / MGA zone 50
04/12/2025

Notes

- Flood depths for 1% AEP are from the external catchement and rain on grid precipitation
- Ponding in pits and evaporation ponds
- Terrain data sourced from Youanmi LIDAR.dxf file
- Proposed TSF and process plant shown in pink

AQ2

Appendix B1
1% Developed Event
Maximum Flood Depth

0.37 0.74 km

GDA94 / MGA zone 50
03/11/2025

Notes

- Terrain data sourced from Youanmi.dxf file
- Proposed TSF and process plant shown in pink

AQ2

Appendix B2
1% Developed Event
Maximum Flood Velocity

N

0.37 0.74 km

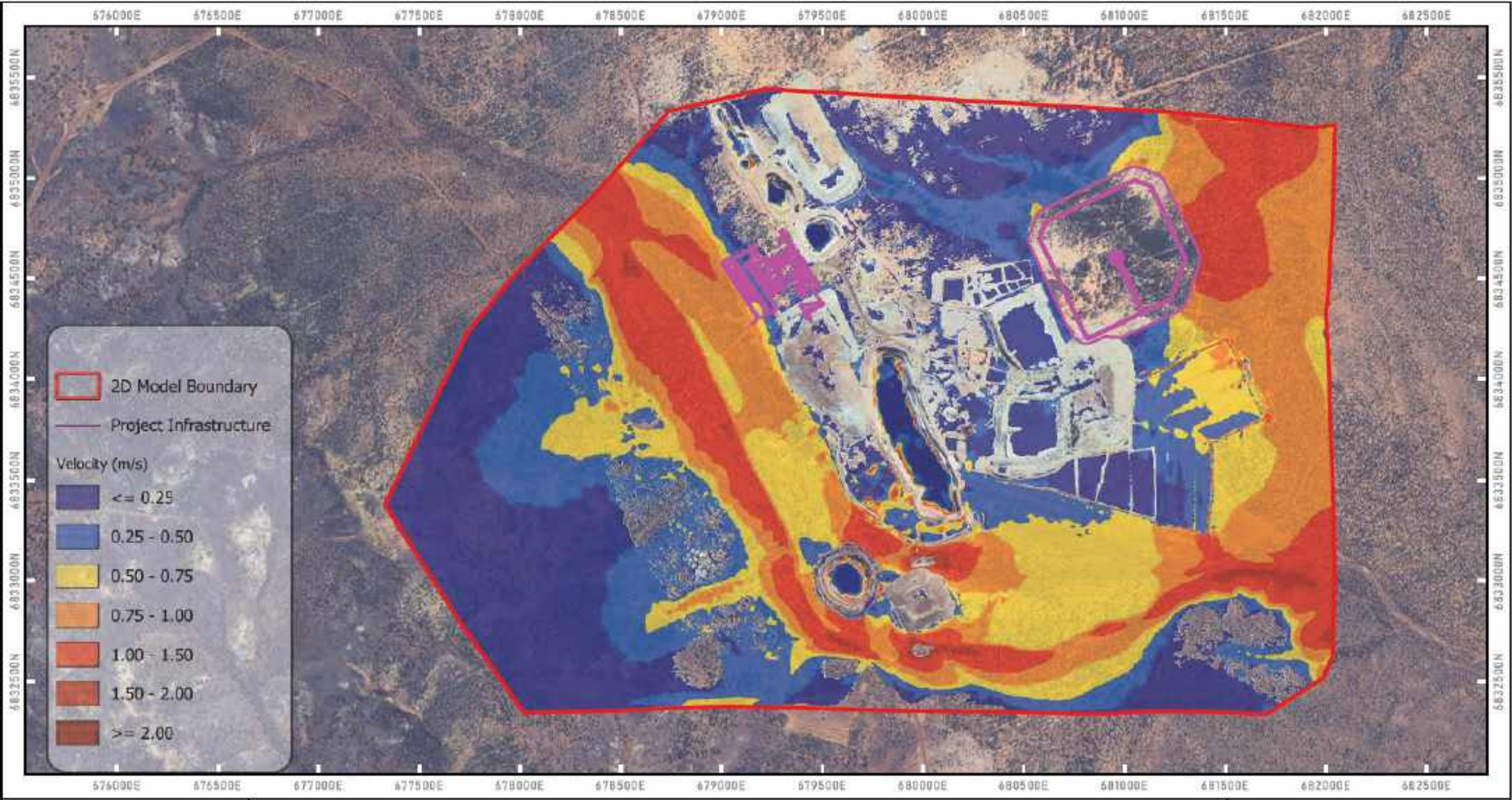
GDA94 / MGA zone 50
05/12/2025

Notes

- PMF flood depths are a result from the external catchment and rain on grid precipitation
- Ponding in pits and evaporation ponds
- Terrain data sourced from Youanmi LIDAR.dxf file
- Proposed TSF shown in pink

AQ2

Appendix B3
PMF Event
Maximum Flood Depth



N

0.37 0.74 km

GDA94 / MGA zone 50
05/12/2025

Notes

- Terrain data sourced from Youanmi LIDAR.dxf file
- Proposed TSF shown in pink

AQ2

Appendix B4
PMF Event
Maximum Flood Velocity

APPENDIX C
NORTHERN PIT DISCHARGE ASSESSMENT

AQ2 Pty Ltd
ABN 38 164 858 075

Ground Floor
1 Howard Street
Perth WA 6000
Tel +61 8 9322 9733

www.aq2.com.au

Memo

To	[redacted]	Company	Rox Resources
From	[redacted]	Job No.	581B
Date	29th November 2024	Doc No.	006b
Subject	Youanmi Gold Project - Northern Pits Hydrogeological Assessment		

Dan,

We have now completed our hydrogeological assessment of the planned discharge of dewatering excess to the 2 northern pits at the Youanmi Gold Project, and we present the following report.

The key outcomes of this assessment are:

- Discharge to the 2 northern pits of Rebel and Kathleen will not result in a rise in the local water table to within 6 m of the ground surface, except immediately adjacent to the pits (within a metre of the pit walls). The predicted depth to water table 10 m away from the pit margins is more than 12 m. As such, the planned discharge should not result in any impact on local vegetation due to inundation of tree roots.
- Discharge to the pits will result in some migration of saline water into local shallow brackish aquifers/aquitards. Seepage is predicted to migrate less than 100 m from the pits. However, this will have no significant impact on the local aquifers/aquitards or any local groundwater users as:
    - There are no local users of the groundwater in the small fringing area around the pits that will be affected other than the Youanmi mine.
    - Following cessation of discharge to the pits, pit lake water levels will decline over time and the pits will become groundwater sinks (as they are now). The saline water which had migrated into the local shallow aquifers will largely flow back to the pits.
    - A groundwater capture zone will develop around the planned Main Pit and UG mine workings. This capture zone will extend beyond the northern pits and the saline water seepage migration zone around the pits. As such, any seepage not intercepted by the northern pits (once they again become groundwater sinks) will be intercepted by the cone of depression in the regional groundwater system around the mine workings.
- It is recommended that the water level in Rebel and Kathleen Pits does not go higher than 6 m from the pit crest. This gives a maximum water level elevation of:
    - Kathleen: 462 mAHD.
    - Rebel: 460 mAHD.
- In summary, the planned discharge to the northern pits will have no long-term impact on the local hydrogeological environment.

1. BACKGROUND

Rox Resources is planning to re-commence mining at the Youanmi Gold Project with the development of new access declines to the old underground (UG) mine workings in late 2025 and production mining in mid-2026. To facilitate mining, the existing Main Pit and UG mine workings will need to be pumped dry. Rox Resources is planning to initially pump water from the Main Pit to the fully licensed evaporation ponds, as well as the two northern pits (Rebel and Kathleen Pits) while approvals for the long-term discharge solution are sought.

The objective of this study is to assess the potential impacts of the short-term discharge to the 2 northern pits on the local and regional hydrogeological environment. This is in order to support an application to amend the existing Prescribed Premise Licence (L8275/2008/2) to increase the annual dewatering discharge from 1,480,000 kL/a to 2,345,000 kL/a, with the addition of the 2 Northern Pits as discharge points. It is also to facilitate an increase in the annual pumping entitlement (for dewatering) on GWL 208485(1) to 2,345,000 kL/a.

It is noted that:

- The planned dewatering of the Main Pit and UG is covered by existing GWL208485(1) which has an annual pumping entitlement of 1,807,000 kL/a. An increase in the allocated annual pumping volume is subject to an upcoming application.

2. HYDROGEOLOGICAL BACKGROUND

A detailed description of the local and regional hydrogeology is provided in the H2 Level Hydrogeological Assessment submitted to DWER to support the application for GWL208485(1) (Rockwater, 2022[1]). Recent monitoring data collected by Rox Resources provides additional information. A summary of the key hydrogeological features relevant to the current assessment is as follows:

2.1 Local Aquifers

The main local aquifer in the immediate mine area is a fractured rock aquifer system associated with the northwest trending mineralised shear zones that host the Youanmi orebodies. Aquifers are also associated with the weathered profiles overlying the fresh basement rocks, mostly in the transition zone between fresh and highly weathered material. There are also localised low permeability aquifers associated with shallow weathered horizons. Regionally, the above-described aquifers are intersected by younger alluvial aquifers associated with paleodrainage systems which drain towards nearby salt lakes (Lake Noondie and Lake Barlee, located to the east of Youanmi).

The local shallow aquifers are recharged by localised infiltration of rainfall runoff. The local deeper, fractured rock aquifers are recharged by a combination of vertical leakage from the shallow aquifers and regional groundwater throughflow.

2.2 Aquifer Parameters

As part of this current assessment, simple analytical modelling was undertaken to estimate local bulk aquifer permeability. Pit inflow models (based on the Theim and Dupuit-Forcheimer equations for flow to large diameter wells) were set up for each pit and bulk aquifer permeability derived by calibration against recorded pit dewatering. The following bulk permeabilities were derived:

- Rebel and Kathleen Pits: range – 0.1 to 0.2 m/d (average of 0.16 m/d).

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[1] Rockwater, 2022*: Youanmi Gold Mine - H2 Level Hydrogeological Assessment.* Report to Rox Resources, November 2022

- Main Pit and UG – 0.12 m/d.

It is considered that the average value derived for the northern pits represents the bulk permeability of the shallow aquifers present, while the value derived for the Main Pit and UG represents the bulk permeability of the deeper fractured rock aquifers.

2.3 Groundwater Levels and Flow

Pre-mining groundwater levels in the mine area were around 20 mbgl. The regional water table slopes gently to the south, (with a very flat hydraulic gradient: <0.005), with shallow groundwater discharging to the Lake Noondie palaeodrainage, south of Youanmi.

Current groundwater levels have been influenced by the presence of mined out pits, which are all groundwater sinks. That is, the pit lakes that have developed are all below the general water table, (as a result of evaporative losses from the pit lake surfaces and also by pumping from some pits), and the pits act as groundwater sinks. The pit lake in the Main Pit is currently around 50 m below surface and the pit lakes in the northern pits are currently around 40 m below surface. As a result, there is groundwater flow to all pits and this flow has influenced the general groundwater flow patterns and local groundwater levels.

2.4 Groundwater Quality

Groundwater salinities measured in shallow pastoral wells within 10 km of Youanmi range from around 1,000 to 9,000 mg/L total dissolved solids (TDS), while salinities measured in mine site bores ranged from around 6,000 to 8,000 mg/L TDS. Salinity increases with depth and salinities of around 120,000 mg/L TDS were measured in deep (~670 m depth) Main UG workings.

Currently, the salinities recorded in the pit lakes are:

- Main Pit – 64,000 mg/L TDS.
- Rebel and Kathleen Pits – 3,000 to 3,200 mg/L TDS.

2.5 Other Groundwater Users

There are no groundwater users other than Rox Resources in the mine area. Two bores, (adjacent to the Rebel and Bunker Pits), have been used to pump low salinity water to the plant in the past, but these are not used for potable water, (which has and will be carted to site).

There are also no groundwater dependent ecosystems near the mine site that could be impacted by mining and/or the planned discharge. The nearest wetland is an ephemeral salt lake (Lake Noondie) located 23 km east of the mine site. This lake will host various species of aquatic fauna and calcretes near the lake may also host stygofauna and troglofauna.

3. PIT WATER STORAGE VOLUMES AND POTENTIAL PUMPING RATES

Table 3.1 lists the pit water storage volumes for different elevations. Kathleen Pit has the largest potential water storage volume of 477,642 m^3 to 6 m below the pit crest. Rebel Pit has a maximum storage volume of 304,865 m^3 to the same 6 m below the pit crest criteria. Both pits have current water level elevations (November 2024) in the 431 to 432 mAHD range.

The current available water storage volume at Rebel Pit is 300,850 m^3 and at Kathleen Pit is 438,214 m^3. At a pumping rate of 100 L/s (8,640 m^3/d) from Main Pit and assuming no seepage or evaporative loss from the receiving pit, it would take 35 days to fill Rebel Pit when pumped to on its own and 51 days to fill Kathleen Pit under the same scenario.

Table 3.1 Pit Water Storage Volumes at Different Elevations

Pit	Rebel		Kathleen	
Pit Feature	**Elevation (mAHD)**	**Water Storage Volume (m^3)**	**Elevation (mAHD)**	**Water Storage Volume (m^3)**
Pit Crest	466	445,623	468	619,330
Maximum Fill Level	460	304,865	462	477,642
Current Water Level	432	4,015	431	39,428
Pit Floor	420	0	413	0

4. POTENTIAL IMPACTS OF DISCHARGE TO THE NORTHERN PITS

Two hydrogeological consequences of the discharge of saline water from Main Pit to the northern pits have been identified:

- Mounding of the water table close to the pits.
- Migration of saline water into brackish local shallow aquifers.

The potential impacts of the above and the risks of these impacts are assessed below.

4.1 Water Table Mounding

4.1.1 Hydrogeological Processes

The pit lakes in the northern pits are currently around 40 m below surface and 20 m below the pre-mining water table. The hydrogeological processes that will occur as the pits are filled are as follows:

- During initial discharge to the pits, the discharged water will fill the void space with little to no seepage from the pits (as there will still be hydraulic gradients towards the pits), although some evaporative loss will occur. The local water table around the pit will then gradually rise to match the pit lake level.
- Once the pit lake levels reach and then rise above the pre-mining water table levels, the pits will become recharge pits and there will be net seepage from the pit. This will induce the water table around the pit to rise and form a "mound" shape around each pit. The mounds around each pit will eventually merge to form an elongated mound around both pits.

4.1.2 Potential Impact

It has long been recognised that local Goldfields vegetation largely relies on fresh soil moisture above brackish and saline water tables and that water tables less than 6 m deep can negatively impact vegetation. In recent years DWER have adopted the following trigger levels for managing the impacts of seepage, (from pits and tailings storage facilities (TSFs)), to local aquifers:

- Water table reaches 6 m depth below surface – trigger for investigation.
- Water table 4 m depth below surface – trigger for immediate remedial action.

4.1.3 Predicted Water Table Mounding around Northern Pits

The Western Australian Department of Energy, Mines, Industry Regulation and Safety (DMIRS) typically adopt the constraint, (when assessing Mining Proposals), that there should be a minimum of 5 m freeboard between the crest level of a pit and the maximum pit lake level. A simple analytical model, (based on the Theis equations for drawdown/drawup around a well), was used to predict the distribution of the resulting mound around the pits assuming that the pit lakes were maintained at 5 m below pit crest level for 12 months. The model predicts the following:

Distance from Edge of Pits (m)	1	10	50	100	400
Depth to water table (m below ground)	9	13	16	17	20

The above results indicate that, when the pit lakes are 5 m below ground level, the mounded water table is 9 m (or more) below ground level beyond a metre distance from the pits.

By way of comparison, the model was also run to predict the maximum possible pit lake level that would result in water table mounding to no more than 6 m below ground level. The model predicts that for a pit lake level of 2 m below crest, the mounded water table would be 7 m (or more) beyond a metre distance from the pits.

4.1.4 Risk of Impact

Based on the above, the environmental risk of impact of water table mounding around the pits is negligible.

4.2 Migration of Saline Water into Brackish Aquifers

4.2.1 Hydrogeological Processes

As outlined in Section 4.1.1, once the pit lakes reach and then rise above the pre-mining water table levels, the pits will become recharge pits and there will be net seepage from the pit. As well as the development of a water table mound around the pits, there will also be some physical movement of saline water from the pits into the surrounding local aquifers. The hydrogeological processes that will occur during and after the northern pits become recharge pits will be as follows:

- Saline water will migrate outwards from the pits driven by the hydraulic gradients away from the pits, as long as the pit lake level is above the pre-mining water table level. It is noted that the rates of seepage migration, (which is a physical flux process), will be much less than the rates of propagation of the water table mound, (which is a hydraulic response).
- Following the cessation of discharge to the northern pits, the pit lake levels will decline as a result of seepage losses and evaporative losses. Eventually, (likely to be less than 12 months), the pit lakes will decline below the pre-mining water table and the pits will again become groundwater sinks, (as they are at present). It is also planned to pump the northern pits dry once the evaporation ponds have capacity, or when the long term discharge becomes available.
- Once the pits again become groundwater sinks, any seepage that has migrated into the local aquifers, (and remains within the capture zones of the pits), will flow back to the pits.
- Independently of the impact of pit lake levels on groundwater levels and flows, dewatering of the Main Pit and UG will generate a very large "cone of depression" in the water table and a consequent groundwater capture zone. Any former residual seepage from the pits, (that is not recaptured by the pits), that falls within the capture zone of the Main Pit and UG, will flow towards the active mining area.

4.2.2 Potential Impacts

The potential impact of seepage migration of saline water from the northern pits is an increase in the salinity of local shallow aquifers around the pits from brackish (<10,000 mg/L TDS) to saline (>50,000 mg/L TDS) levels.

4.2.3 Predicted Seepage Migration and Capture

A simple Darcy flow model was used to predict the migration of the seepage front of saline water away from the northern pits, assuming that the pit lakes will be at a maximum level of 5 m below pit crest for 12 months. The Darcy model adopted the bulk permeability of 0.16 m/d derived for the shallow aquifers, (refer Section 2.2), and effective porosity of 0.5%, (which is equivalent to the Specific Yield of such aquifers and very conservative), and hydraulic gradients derived from the predicted water table mounds. The model predicts that:

- The seepage front would migrate about 70 m from the pit margins after 12 months. Figure 4.1 shows the predicted extent of the seepage plume around the northern pits.

The Theis model used to predict water table mounding was also used to predict the extent of the capture zone around the Main Pit and UG. The model adopted the derived permeability for the Main Pit and UG (refer Section 2.2) and was used to predict the drawdown around the pit once the Main Pit had been pumped dry and maintained dry for 12 months, (this would roughly correspond to the end of the period when the northern pits are "full"). It is noted that the model assumed that the UG mine workings, which extend around 600 m to the northwest of the Main Pit, would be dewatered to the same level. The model predicts the following:

Distance from edge of Pit/UG (m)	50	100	500	1000	2000
Drawdown around Pit/UG (m)	35	28	11	5	<1

Figure 4.2 shows the interpreted capture zone around the Main Pit and UG 12 months after the pit has been pumped dry. The capture zone has conservatively been interpreted based on the 5 m drawdown contour. It is also noted that the 5 m contour (capture zone) assumes the adopted bulk permeability applies to the principal direction of permeability, (i.e. along strike of the main shear zones – northwest), but that the actual permeability in the cross strike direction (southwest-northeast) is around half the bulk permeability. As such, the plotted capture zone is elliptical in shape.

Figure 4.2 clearly shows that the northern pits lie within the capture zone of the Main Pit and UG and as such, any saline seepage from the northern pits that is not subsequently recaptured by the northern pits when they again become ground water sinks, will be intercepted by the Main Pit and UG.

4.2.4 Risk of Impact

Based on the above, the risk of impact on brackish shallow aquifers around the northern pits is negligible. It is also noted that there are no groundwater users, other than Rox Resources, that would be impacted by the short-term increase in salinity immediately around the northern pits or any impact on salinity along groundwater flow paths if any residual seepage is captured by the Main Pit and UG.

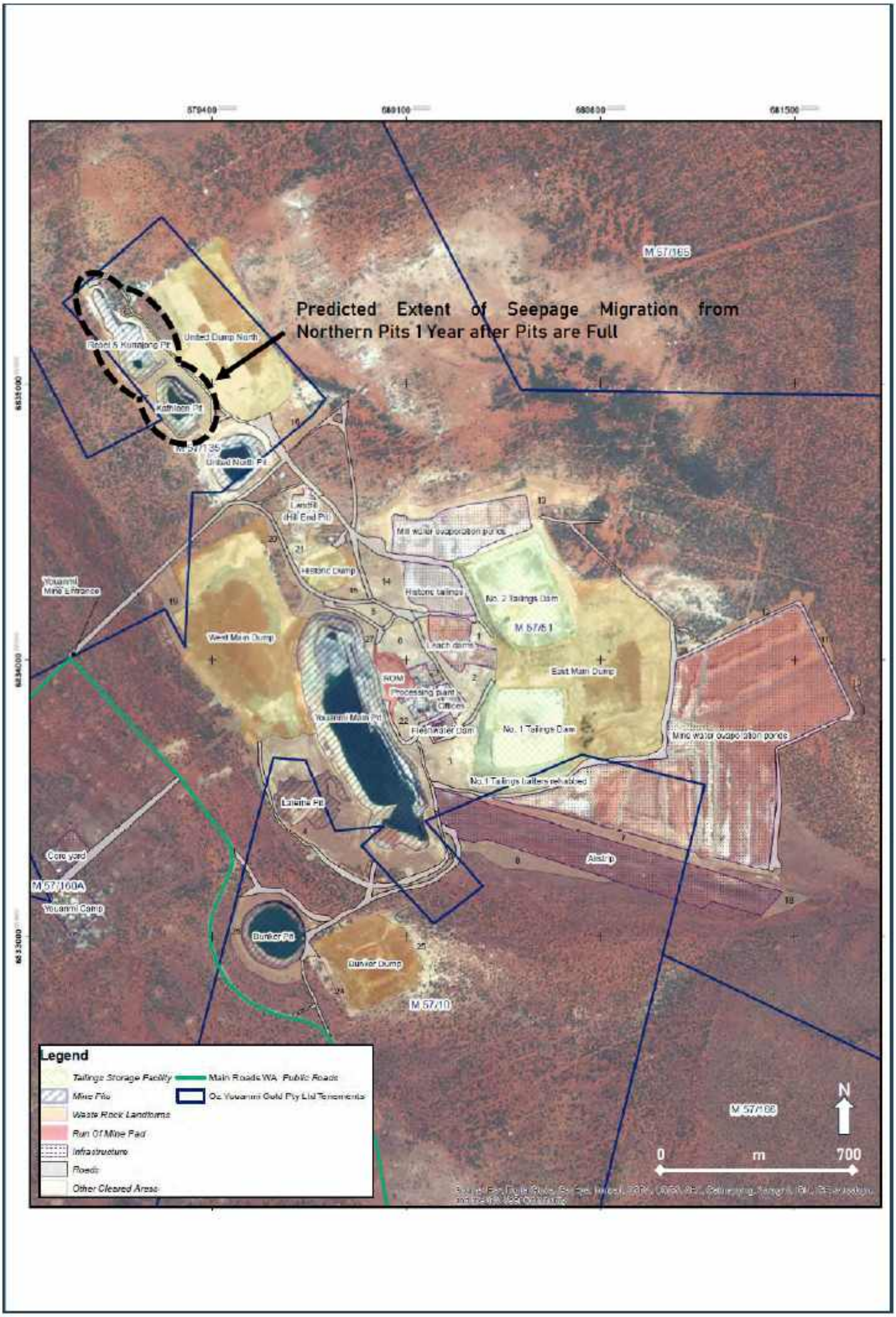

Figure 4.1 Predicted Extent of Seepage Migration from Northern Pits

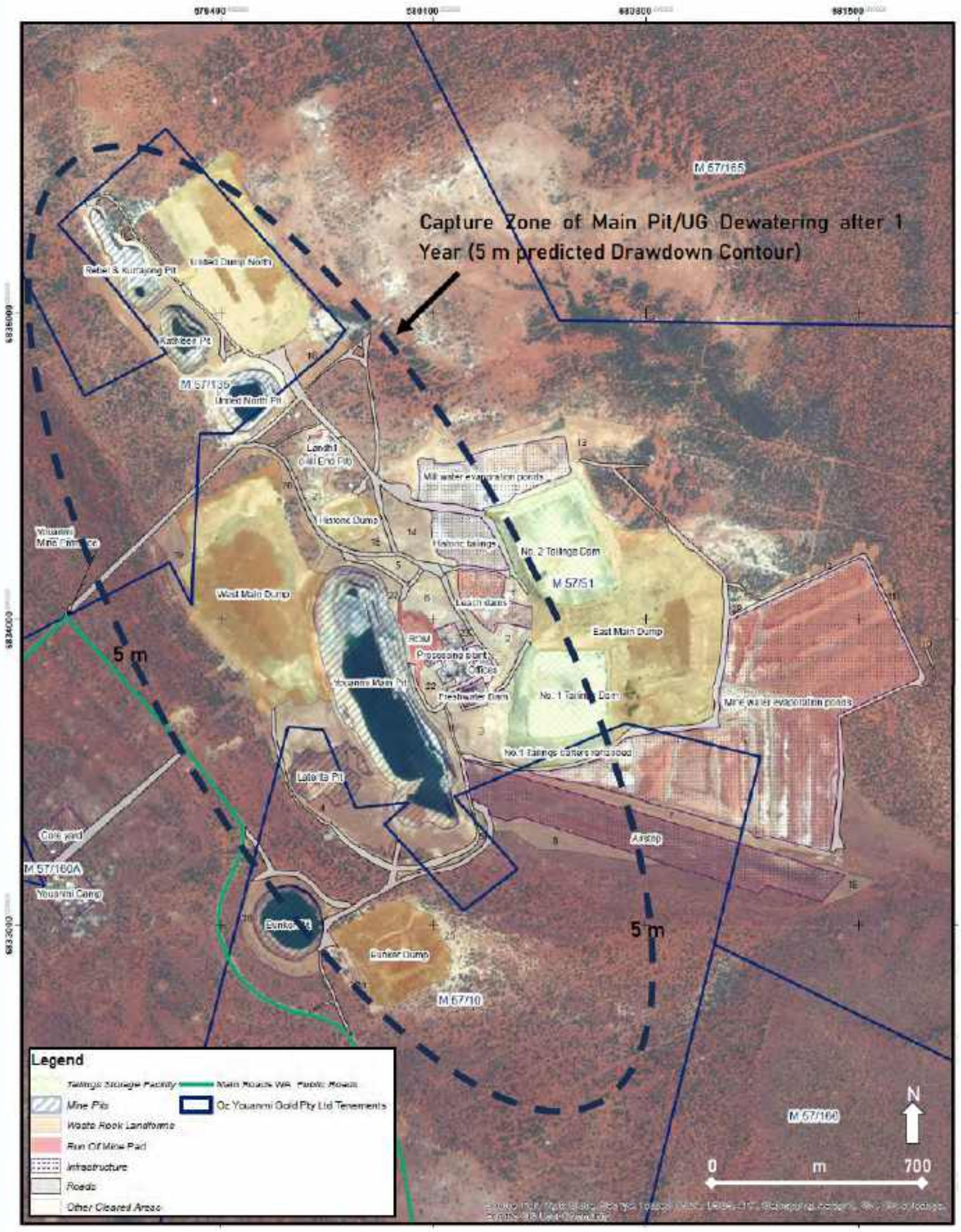

Figure 4.2 Predicted Capture Zone around Main Pit and UG Mine

5. CONCLUSIONS

- Discharge to the northern pits will not result in a rise in the local water table to within 6 m of the ground surface except immediately adjacent to the pits (within a metre). The predicted depth to water table 10 m away from the pit margins is more than 12 m. As such, the planned discharge should not result in any impact on local vegetation due to inundation of tree roots.
- Discharge to the pits will result in some migration of saline water into local shallow brackish aquifers/aquitards. Seepage is predicted to migrate less than 100 m from the pits. However, this will have no significant impact on the local aquifers/aquitards or any local groundwater users as:
  - There are no local users of the groundwater in the small fringing area around the pits that will be affected, other than the Youanmi mine.
  - Following cessation of discharge to the pits, pit lake water levels will decline over time and the pits will become groundwater sinks (as they are now). The saline water which had migrated into the local shallow aquifers will largely flow back to the pits.
  - A groundwater capture zone will develop around the planned Main Pit and UG mine workings. This capture zone will extend beyond the northern pits and the saline water seepage migration zone around the pits. As such, any seepage not intercepted by the northern pits, (once they again become groundwater sinks), will be intercepted by the cone of depression in the regional groundwater system around the mine workings.
- In summary, the planned discharge to the northern pits will have no long-term impact on the local hydrogeological environment.

We trust that the above report is sufficient for your current requirements. If you required any further information or assistance with other aspects of water management at Youanmi, please do not hesitate to contact us.

Regards,

[redacted]

APPENDIX D
ENVIRONMENTAL RISK MATRIX

Risk ID Number	Key Environmental Factor	Environmental Indicator(s)[1]	Domain
1	Inland waters	Surface water quantity	Processing Area
2	Inland waters	Surface water quality	TSF
3	Inland waters	Surface water quantity	TSF
4	Inland waters	Surface water quality	Processing Area
5	Inland waters	Surface water quality	Dewatering Pipelines
6	Inland waters	Surface water quantity	Bunker Pit Closure

7	Inland waters	Surface water quality	Bunker Pit Closure

Risk Pathway	Phase(s) of mine life	Consequence
The Processing Area encroaches on the flood extent of the Western Ceek. Flood management may involve construction of a pad extending into the Western Creek floodplain, reducing the floodplain width and increasing flood depths. Flood modelling shows that the impact of the Processing Area encroachment on flood levels in the 1% AEP event is negligible.	☐ Construction ☑ Operation ☐ Care & maintenance ☐ Closure ☐ Decommissioning	Insignificant
Failure of the TSF wall due to scouring of the embankment toe or long-term ponding against the TSF leads to transport of tailings material into the downstream environment. Flood modelling indicates that the 1% AEP flood velocities around the TSF toe do not exceed 0.4 m/s and ponding agianst the embankment does not occur. During a PMF event, flood velocities around the TSF can reach up to 1.5 m/s.	☐ Construction ☑ Operation ☐ Care & maintenance ☑ Closure ☐ Decommissioning	Major
The TSF encroaches on the flood extent of Eastern Ceek. Encroachment into the Eastern Creek floodplain reduces the floodplain width and may increase flood depths. Flood modelling shows that the impact of the Processing Area encroachment on flood levels in the 1% AEP event is less than 0.1 m.	☐ Construction ☑ Operation ☐ Care & maintenance ☑ Closure ☐ Decommissioning	Insignificant
Spillage of hydrocarbons and chemicals, risking the pollution of the downstream environment, leading to environmental damage.	☐ Construction ☑ Operation ☑ Care & maintenance ☐ Closure ☐ Decommissioning	Moderate
Spillage of saline groundwater being pumped during dewatering activities results in vegetation health impacts.	☐ Construction ☑ Operation ☐ Care & maintenance ☐ Closure ☐ Decommissioning	Minor
Potential for creek capture of Western Creek within Bunker Pit post-closure.	☐ Construction ☐ Operation ☐ Care & maintenance ☑ Closure ☐ Decommissioning	Severe

Potential for creek capture of Western Creek within Bunker Pit post-closure, resulting in outflow of water Bunker Pit which may have poor water quality	☐ Construction ☐ Operation ☐ Care & maintenance ☑ Closure ☐ **Decommissioning**	Moderate

Inherent Risk		Risk Treatment	Residual Risk	
Likelihood	Risk rating		Consequence	Likelihood
Rare	Low	None	Insignificant	Rare
Unlikely	High	Suitable scour protection around the toe of the TSF considering the predicted flow velocities.	Major	Rare
Rare	Low	None	Insignificant	Rare
Possible	Medium	Operators to use standard storage, handling and transport procedures for chemicals while working on site.	Minor	Unlikely
Possible	Medium	Leak detection, buried pipelines, pipeline pressure controls.	Minor	Rare
Rare	High	Closure flood protection bund preventing Western Creek inflow to Bunker Pit.	Insignificant	Rare

Rare	Medium	Closure flood protection bund preventing Western Creek inflow to Bunker Pit.	Insignificant	Rare

Risk rating	Environmental or closure outcomes
Low	No impact on flood levels or the hydrological regime
Medium	Stable TSF landform psot-closure
Low	No impact on flood levels or the hydrological regime
Low	No impact on surface water quality
Low	No vegetation health impacts
Low	No permanent changes to flows in Westrn Creek to the downstream environment.

Low	No impacts on downstream water quality

Comments
Processing Area to be removed at closure.