Prepared for
Rumble Resources Ltd
ABN: 74 1482 142 60

AECOM

Western Queen Groundwater Assessment

Western Queen Dewatering

12-Jun-2025
Western Queen Dewatering

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Client: Rumble Resources Ltd

ABN: 74 1482 142 60

Prepared by

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Executive Summary

The proposed Western Queen Development, a co-operation arrangement between Rumble Resources Ltd (Rumble) , Bain Global Resources and MEGA Resources (MEGA), is currently assessing the feasibility of the proposed re-development of Western Queen South (WQS) and pits within and adjacent to Western Queen North (WQN). This proposed project includes the development of up to four open pits (WQS, Princess, Duke, and Cranes deposits).

Historical mining at the Western Queen Mine was conducted in two pits:

- Western Queen North (WQN) pit was initially undertaken by Western Mining from 1998 until 2002. Mining included open pit and underground workings.
- Western Queen South (WQS) pit was initially undertaken by Harmony Gold Pty Ltd (Harmony) between June and November 2007. During this time, the pit was developed to a depth of approximately 41m below ground level (mbgl). Pit wall instability and water ingress resulted in early closure of WQS which was subsequently placed on care and maintenance. Mining re-commenced between 2011 and 2013 by Ramelius Resources Ltd (Ramelius).

A shallow depth to groundwater of between 25m and 30mbgl will necessitate dewatering to allow for below groundwater mining. This report presents a summary of hydrogeological findings and site investigation results to support project feasibility input and environmental approvals.

Similar to historical dewatering requirements, to enable re-mining of the WQS deposit, several groundwater related activities will be required including:

- pit lake dewatering
- advanced open pit dewatering
- management of excess abstracted mine water.

Conceptual Groundwater Model

Based on the knowledgebase review, the conceptual hydrogeology of the project includes:

- The local ground elevation around 390 m Australian Height Datum (m AHD).
- The pre-mining water level was reported at about 355m reduced level (RL) (35mbgl) to the north of WQN and about 367m RL (23mbgl) in WQS.
- Regional groundwater flow generally follows topography and flows to regional low-lying areas in the west associated with present day drainages and ultimately discharges towards the north-western Sandford River.
- The average annual rainfall is about 217 mm, with annual evaporation up to 2,600 mm.
- Stratigraphic units in order of increasing depth:
    - Alluvial and aeolian superficial sediments (Aquifer where saturated) - Local ferricrete formations may be preferential pathways that transmit rainfall recharge to low lying areas.
    - Saprolite clay (Aquitard) - Extremely weathered saprolitic clay that is normally of low to very low hydraulic conductivity and forms an aquitard when below the water table.
    - Saprock (Aquifer where saturated) - moderately weathered bedrock, varying between being an aquitard to aquifer of low to moderate hydraulic conductivity. Locally, the saprock interval may be transmissive along contact zones and/or fault or shear zones.
    - Fresh bedrock (Aquitard) - generally massive and non-fractured and is regarded as a regional aquitard that is expected to yield little groundwater.

- The alluvial sediments occur to a depth of about 5mbgl (385m AHD) on the northern side of WQS and about 27mbgl (363m AHD) on the southern side. Surface water infiltration into these shallow deposits is probably an important mechanism for local groundwater recharge.
- The fracturing intensity and saprock thicknesses were found to be greater at contact zones between rock types and the mineralised zones.
- The high transmissivity value determined for WQN of 84 m^2/day was not considered appropriate for WQS. An aquifer transmissivity of 30 m^2/day and hydraulic conductivity of 0.5 m/day were estimated by Morgan (2000).
- Based on in situ water quality sampling, pit lake salinity is approximately 18,400mg/L – Total Dissolved Solids (TDS) for WQS and 18,800mg/L TDS for WQN.
- Historical dewatering abstraction of up to 54 L/sec or 4,650 kL/day were reported from WQN (Morgan, 1999) and 30 L/sec or 2,500 kL/day during mining of WQS (Morgan, 2000).
- Historical groundwater is reportedly fresh to slightly brackish, sodium chloride type with TDS concentrations at WQN ranging up between 2,000 mg/L and 10,660 mg/L (average 4,500 mg/L TDS) and between 1,200 mg/L and 3,700mg/L (average 2,100mg/L TDS) at WQS. Groundwater is generally neutral to slightly alkaline pH (pH 7.9 to 8.1).

Pit Lake Water Transfer

WQN currently holds approximately 3.2 Gigalitres (GL) of water and an additional water storage capacity of about 2.4 GL to a point 1.5m below the pit crest. With the proposed Princess and Duke pit developments, this may increase total WQN capacity up to 3.8 GL.

The WQS pit currently holds approximately 672,000 kL or 0.7 Gigalitres (GL) of water (based on a pit lake elevation estimate of 362m AHD). To allow future deepening of the WQS open pit, the water stored within the existing pit will be transferred to WQN.

The water quality characteristics in both pits have been measured and are very similar. However, at lower pit lake elevations, suspended sediments will likely increase, though no environmental impact is foreseen with this water transfer strategy.

To minimise pit wall stability issues and allow groundwater to drain and pore pressures to be lowered, it is proposed the pit lake be emptied over a period at least 90 days. Over the 90-day period an expected additional 0.2GL of dewatered water from groundwater inflows is estimated, based on the assumed 2,200 kL/day inflows, and an additional estimated 500 kL/day form interconnection between WQN and WQS. This equates to a total of up to 1.0GL (about 130 L/sec), that may require abstraction to allow access to the WQS pit floor.

The maximum WQN pit lake elevation has been defined by potential mounding-related impacts on local vegetation and the groundwater resource, along with having enough remaining capacity to limit over-topping from high rainfall events. A high-level assessment of the propagation of predicted mounding from WQN reported groundwater levels are predicted to remain below about 20m bgl in the northern areas at distances of about 200m.

Pit Water Transfer over a proposed 90-day period up to 130 L/sec or 11,000 kL/day

Groundwater Dewatering

Simplified analytical groundwater models have been completed to determine indicative dewatering rates and maximum drawdown extents for WQS. Dewatering for WQN will require the pit lake to be partially lowered, and the proposed Cranes development is above the water table. Findings from the predictive WQS groundwater modelling are summarised in Table ES1.

Table ES1 Summary of Predicted Dewatering Estimates

Deposit	Estimated Dewatering Duration[1]	Predicted Steady-State Abstraction Range		Predicted Total Project Abstraction Volume	Predicted Drawdown Distance - 1 m contour	Comments
		(kL/day)	L/sec	(GL)	(m)	
WQS	608 days	2,400 to 5,800	27 to 67	1.4 to 2.7	1,700 to 2,000	Drawdown will propagate to the adjacent WQN and proposed discharge location
Note [1] – MEGA, 2025						

Based on the modelling, an indicative reasonable case (lower-case) maximum abstraction is predicted to be up to about 1.0 GL/annum.

WQS Dewatering over the proposed 608-day period up to 1.0 GL/annum (Total 1.5 GL)

Dewatering Strategy

The recommended dewatering strategy should seek to dewater ahead of mining to avoid difficult mining conditions, i.e. boggy pit floor, lower pore pressures in the pit walls through targeted horizontal drains, and control pit wall seepage and horizontal drain inflows through a closed collect system to minimise uncontrolled drainage to the pit floor and flows across benches.

Dewatering options considered include:

- Option 1: Dewatering Bores – to abstract groundwater from deeper flow paths in-pit or ex-pit, depending on their depth, interconnectedness, and permeability. Their effectiveness can be limited in deep fractured rock settings due to the low hydraulic conductivity and often compartmentalised nature of these aquifers. In-pit bores are often sacrificial and only effective for short periods. Opportunities to dewater in advance of mining from bores exist as per details in Section 6.1.1.
- Option 2: Shallow Sumps – to intercept gravity drainage from seeps and drain holes on the pit floor.
- Option 3: Preferentially Sloped Pit Floor – to allow for gravity drainage across a sloped pit floor to strategically placed sumps, potentially on deep permeable structures to intercept groundwater inflows.
- Option 4: Horizontal Drain Holes – using a system of closely spaced interconnected drain holes to gravity drain and depressurise rock contacts and fault zones behind pit walls to improve geotechnical stability.

Mine Water Management Strategy

Several alternative excess water management options have been identified and, in order of priority, include:

- Mine water use – road watering, dust suppression, etc.
- Environmental discharge to local creekline – reserved for fresh to brackish groundwater (<2,100 mg/L TDS).
- Additional storage within WQN – reserved for water salinity above 15,000 mg/L TDS.
- Use of mechanical evaporators on WQN to allow more storage capacity (if required).
- Dedicated evaporation pond (if required).
- Future discharge to the Sandford River.

Having multiple water discharge options allows the project to manage water quality constraints (salinity) outside the option to discharge local groundwater to the environment via a local creekline.

Following disposal of higher salinity (18,000 mg/L TDS) WQS pit lake stored water (totalling about 1.0GL) to WQN, it is estimated WQN will have a remaining void capacity of about 1.5GL (without Duke and Princess extensions). With a predicted range of WQS groundwater inflows of between 2,300 to 4,500 kL/day, a total dewatering volume is predicted to be between about 1.4 and 2.7 GL over the anticipated 608 days of mining.

Previously up to about 800 kL/day (10 L/sec) was used during mining for dust suppression on site (Morgan, 1999). Using these estimates for water usage, the total mine excess may be up to about 1.5 GL over the duration of mining. Although not likely a uniform volume per day, this equates to an excess of up to about 2,400 kL/day or 28 L/sec.

Figure ES1 presents a schematic diagram of the proposed water transfer strategy.

Mine Water Usage estimate of 800 kL/day (0.3 GL/annum)

Mine Water Management – Environmental Discharge

Groundwater salinity in the WQS area has previously been reported to average about 2,100 mg/L TDS (maximum 3,700 mg/L TDS) and is of higher quality (lower salinity) than that measured in other areas within the Western Queen areas. With this in mind, excess groundwater is proposed to be discharged to the environment over a duration of up to about 1.7 years.

A recent vegetation and fauna survey (Botanica, 2025) at the Western Queen project area did not identify any significant vegetation assemblages and there is a low risk of potential terrestrial groundwater dependent ecosystems (GDE) in the adjacent floodplain areas. The closest station well, Wanrey Well, is about 7 km northwest and down-gradient of the proposed outfall location.

Surface water modelling was undertaken to assess sensitivity of the predicted wetting front extent with discharge rates. The model was based on a 1:20 year rainfall event and relevant findings from this assessment include:

- Under the lower discharge rate of 1,500 kL/day (total 1.0 GL), a wetted front extent of 1.75km is predicted and generally remains within the low flow channel.
- Under an estimated average discharge rate of 2,400 kL/day (total 1.5 GL), a wetted front extent of 2.0km is predicted.
- Under the extreme discharge rate of 5,800 kL/day (total 3.5 GL), should unforeseen higher dewatering rate occur, a wetted front extent of up to about 3.9km is predicted.

The wet weather assessment found that mine water releases do not affect baseline (non-mine-related) flooding conditions. This is because the mine's contribution—0.03 m^3/s (2,400 kL/day)—is negligible compared to the natural baseline flow of 1.75 m^3/s at the release point. Therefore, mine discharges during wet weather are not expected to adversely impact the receiving environment.

Proposed Environmental Discharge of excess mine water with a salinity average of 2,100 mg/L TDS over the proposed 608-day period up to 2,400 kL/day (1.5 GL)

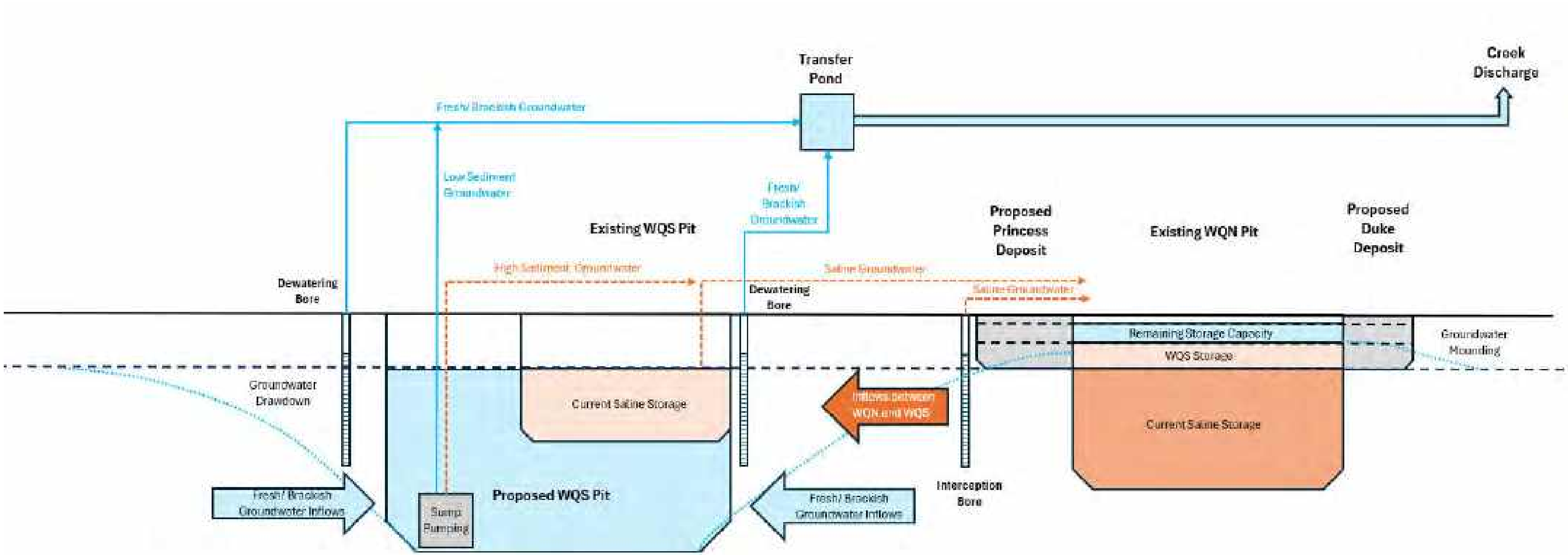

Figure ES1 Conceptual Water Management Strategy Schematic

Post Closure - Residual Drawdown

Results of the post closure water balance identified that the residual post-closure drawdown footprint associated with WQS will create a hydraulic sink (Table ES2).

Table ES2 Summary of Residual WQS Pit Lake Drawdown

Description	WQS Pit
Max Pit Lake Fill Level (m AHD)	343
Years to Reach Steady State	55
Estimated Residual Pit Freeboard - Overtopping (low pit crest to maximum fill level)(m)	55
Residual Difference from Baseline (m)	18
Final Pit Surface Area (m^2)	224,688
Residual Evaporation Loss (kL/annum)	8,429
Post-Closure Groundwater Flow	Groundwater Sink
External Factors	None
Potential for poor water quality to develop due to evapo-concentration	Potential
Potential to contaminate groundwater if quality is poor and level is too high	None
Potential for unstable materials to release; Solutes through oxidation, weathering, and erosion	Unknown
Potential for geotechnical pit wall instability	Potential on NE face, where historical failures have occurred.
Potential for human and birdlife interaction	Unknown
Post-Closure Volume of Freeboard – Overtopping (m^3)	5,393,724
Pit Lake Over-Topping during extreme climatic events	Unlikely
Potential for post-closure environmental impacts	Unlikely

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was engaged by Rumble Resources Ltd (Rumble) to undertake a mine dewatering assessment of the Western Queen Mine, located approximately 90km northwest of Mount Magnet in Western Australia (Figure 2).

Historical mining at the Western Queen was conducted in two pits:

- Western Queen North (WQN) pit was initially undertaken by Western Mining from 1998 until 2002. Mining included open pit and underground workings.
- Western Queen South (WQS) pit was initially undertaken by Harmony Gold Pty Ltd (Harmony) between June and November 2007. During this time, the pit was developed to a depth of approximately 41m below ground level (mbgl). Pit wall instability and water ingress resulted in early closure of WQS which was subsequently placed on care and maintenance. Mining re-commenced between 2011 and 2013 by Ramelius Resources Ltd (Ramelius).

In late-2019, Rumble purchased the historical Western Queen Mine. The site layout is presented on Figure 3.

Rumble recently completed several exploration drilling campaigns to develop an updated resource model. To allow Rumble, along with co-operation agreement partners, Bain and MEGA Resources (MEGA), to commence mining operations within Western Queen South Mine (WQS) and in the vicinity of the Western Queen North Mine (WQN), a number of technical studies are required to support mining approvals.

1.1 Study Objectives

The project objective was to provide supporting documents for environmental approvals, works approvals, and groundwater related licencing requirements. To meet this objective, the scope of work included:

1. Groundwater Assessment – desktop hydrogeological assessment, including site collection of groundwater levels and water quality samples and to assess local catchment conditions. Analytical groundwater models were used to predict dewatering rates and volumes and pit lake post-closure residual changes.
2. Assess opportunities for managing Excess Mine Water through transfer between open pits, creek discharge and potential mechanical evaporator implementation.

This report presents a summary of hydrogeological findings and data gaps following site work for feasibility input and environmental approvals. This report has been prepared in accordance with the requirements of:

1. *Operational policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence* (Department of Water (DoW), 2007).
2. *Mining Proposal Guidance – How to prepare in accordance with Part 1 of the Statutory Guidelines for Mining Proposals* (Department of Water and Environmental Regulation (DWER), 2020; Section 8.5.2).

This report summarises the groundwater characteristics of Western Queen mining area, including estimated dewatering rates and volumes, high level site water balance, opportunities to manage excess mine water through exiting open pit water transfer and creek discharge, and post-closure pit lake residual groundwater related impacts.

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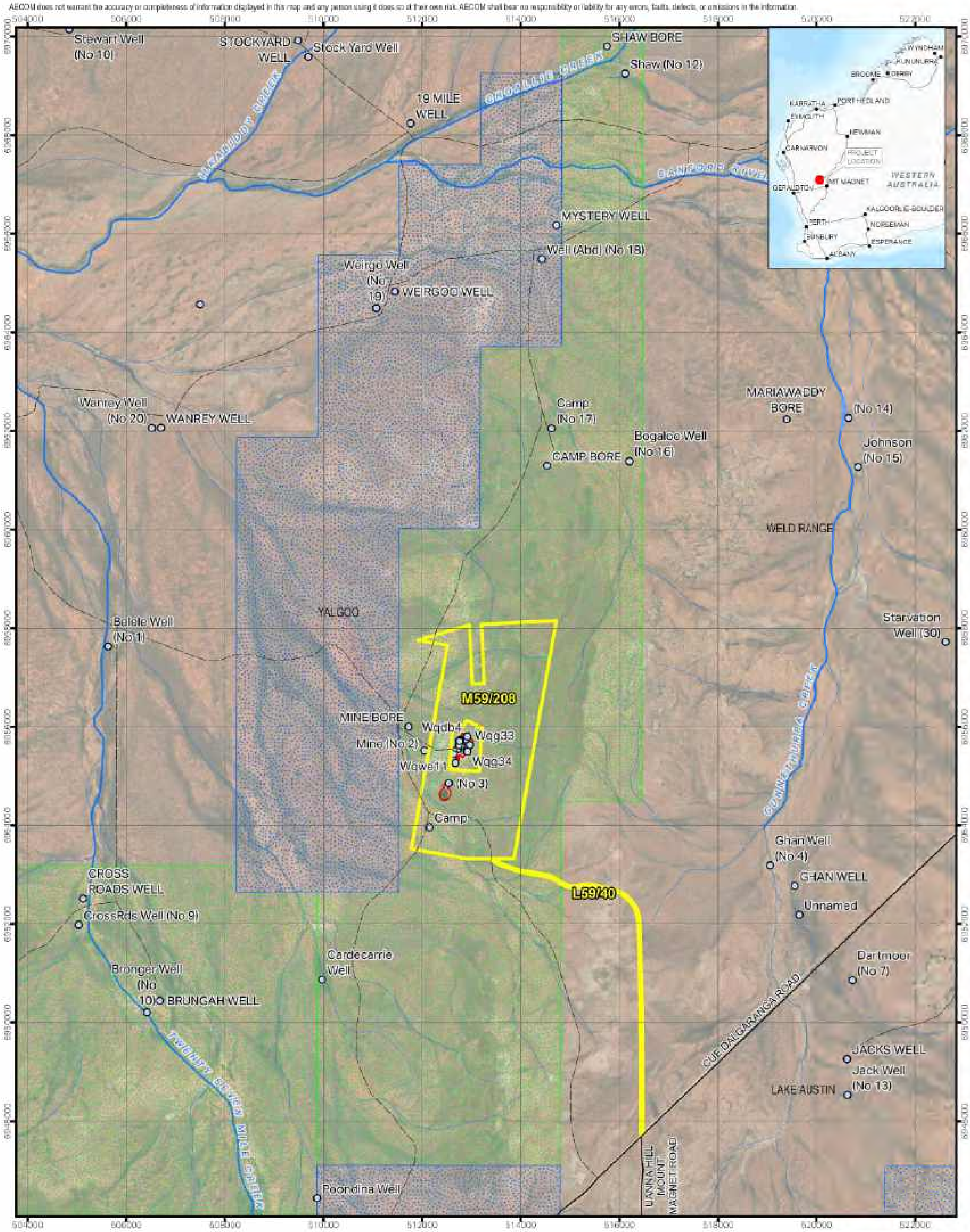

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GDA 1994 MGA ZONE 50

LEGEND

- Existing Pit Outlines
- Western Queen Tenements
- Rumble Resources Tenements
  - Live
  - Pending
- Lakes
- Major Watercourses
- Minor Road
- Track
- Regional Station Bores / Wells

Locality Plan

WESTERN QUEEN

WESTERN QUEEN DEWATERING ASSESSMENT

Figure **2**

A4 size

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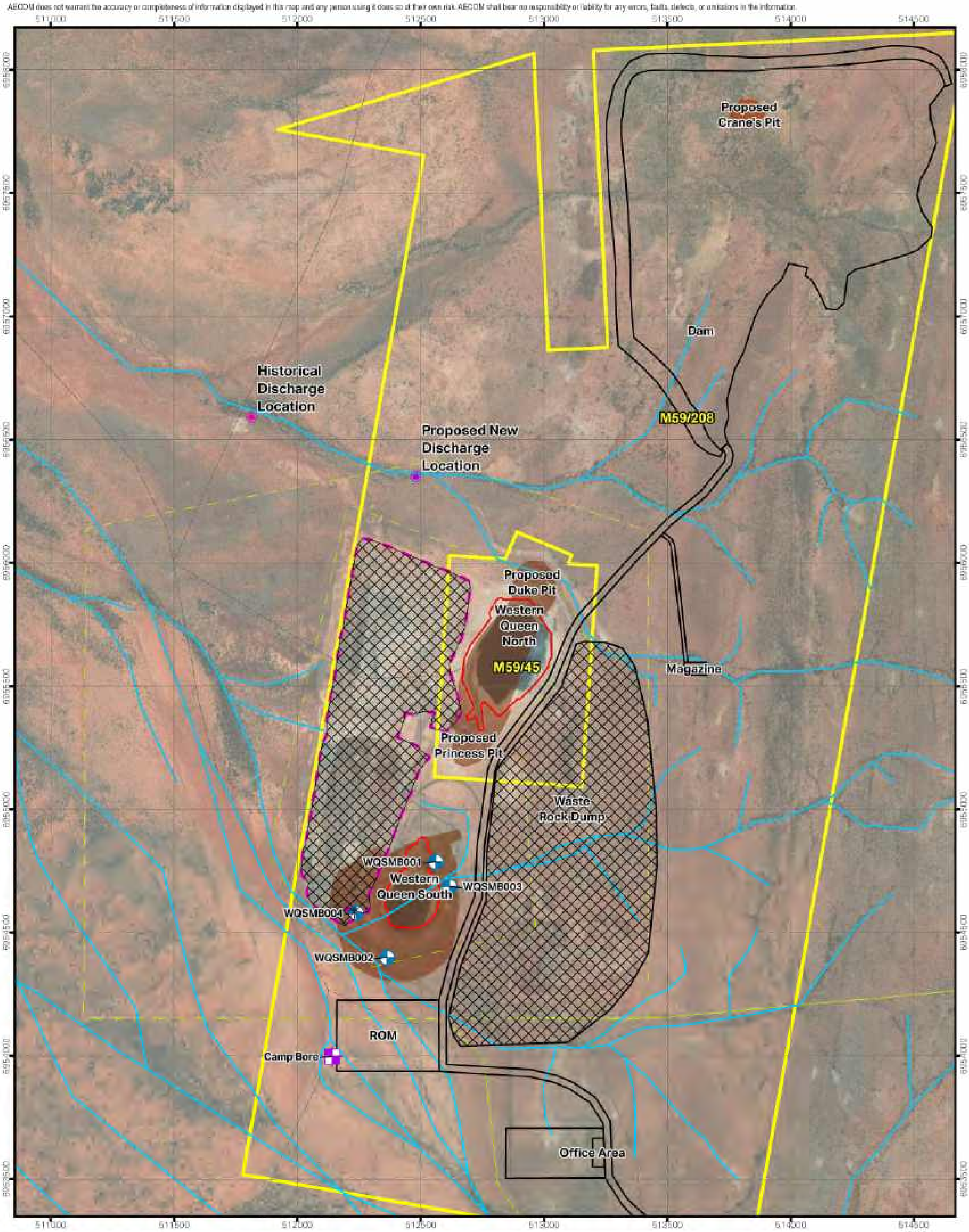

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0 100 200 300 400
metres
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LEGEND
- Western Queen Tenements
- Existing Pit Outline
- Proposed Pit
- Proposed Site Layout
- Existing Waste Dump
- Waste Roack Dump
- Drainage Lines
- Existing Monitoring Bore
- Existing Production Bore
- Historical Discharge Location
- Proposed New Discharge Location

Site Layout

WESTERN QUEEN

WESTERN QUEEN DEWATERING ASSESSMENT

Figure 3

A4 size

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1.2 Proposed Mine Development

Rumble, along with co-operation agreement partner, Bain Global Resources and MEGA Resources (MEGA), propose to commence mining operations within Western Queen South Mine (WQSM) and Western Queen North Mine (WQNM). As part of the operation WQNM will be further developed into two additional adjacent open pits, Duke Mine (DM) and Princess Mine (PM). Figure 4 presents an indicative cross section of the proposed Western Queen development.

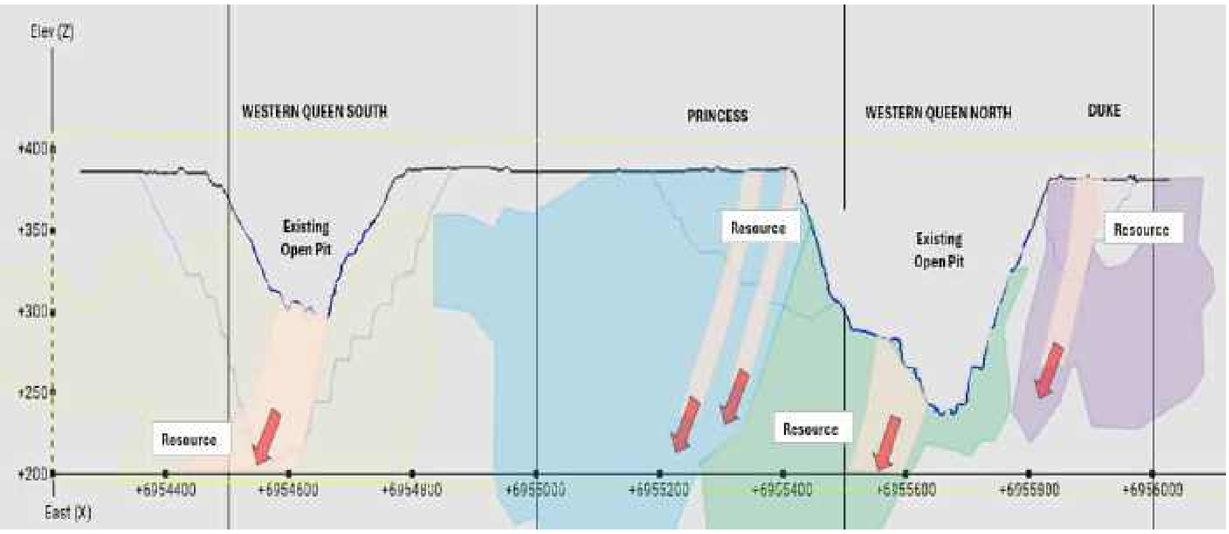

Figure 4 Western Queen Gold Deposit Longitudinal Section (modified Rumble, 2024)

The proposed project includes:

- Partially filled existing open pits with a pit lake elevation of about 362 metres Australian Height Datum (m Australian Height Datum (m AHD)).
- Maximum pit floor elevations of 200m AHD for WQS.
- Mining duration up to 1.6 years (577 days). Dewatering duration allowance of 608 days.

1.3 Previous Studies

Several water related studies have been completed and provided information on the local hydrogeological characteristics and historical challenges related to mine dewatering. In date order, documents reviewed include:

- Morgan, 1999, Western Queen Pit Dewatering Investigation, for Dalgaranga Gold Mines Joint Venture, 14th May 1999.
- Morgan, 2000, Hydrogeological Report Western Queen South Project, for Dalgaranga Gold Mines Joint Venture, 18th January 2000.
- MWES, 2012a. Western Queen South: Groundwater and Surface Water Assessment for Mining & Environmental Applications, for Mt Magnet Gold Pty Ltd, 10th May 2012.
- MWES, 2012b. Western Queen South: Monitoring Bore Drilling Results and Hydrogeological Review, for Mt Magnet Gold Pty Ltd, 17th April 2012.
- Peter O'Bryan and Associates, 2012. Western Queen South Open Pit – preliminary Geotechnical Assessment, for Mt Magnet Gold Pty Ltd, 23rd November 2012.
- Ramelius Resources Ltd, 2014. Western Queen South – Pit Closure Report, June 2014.
- AECOM Pty Ltd, 2021. Western Queen South – Dewatering Review, June 2021.

In addition to the above reports, several datasets were provided and used in the assessment. Datasets provided include:

- WQS monitoring bore data (130807 pit_monitoring_bores.xlsx).
- Leapfrog Works file (Western Queen Water Volumes 20200824.lfview).
- 2013 Ramelius geotechnical photographs.
- WQ PITS - WESTERN QUEEN PITS_02 PIT DESIGN_QUEEN241028_DTM.dxf
- WQ PITS - WESTERN QUEEN PITS_02 PIT DESIGN_FULL DTM FOR DP_DUKEANDPRINCESS_DTM.dxf

1.4 Historical Mining

The region has a long history of mining and exploration, evident by the numerous historical shafts, and costeans scattered across the site's tenements. Mining occurred between 1998 and 2002 with mining of the WQN open pit and underground.

In mid-2007, Harmony Gold Australia commenced open pit mining on the WQS deposit that extended from about 390m AHD to 350m AHD and approximately 260m long by 220m wide. However, development of the open pit was terminated 7m below the water table due to the floor becoming boggy and unsafe for mining activities. Geotechnical wall instability eventually resulted in the early closure of the WQS pit, with the eastern wall deemed too unstable for mining to continue. The wall instability was reported (Peter O'Bryan and Associates, 2012) to be related to a pegmatite dyke dipping 65^{o} west into the eastern pit wall and strong shearing against the surrounding mafic rock.

To re-establish safe mining conditions, a cut-back of the WQS open pit was completed, with the access ramp entering on the western side in more competent rock. Mining extended to 290m reduced level (RL) (60mbgl) but again terminated in late-2007 due to further pit wall instability, combined with the cessation of the Mt Magnet mill where the ore was processed.

Ramelius restarted the Mt Magnet processing facility in 2011 to target a mining local gold reserves through to 2014 (Ramelius Resources, 2014). Two wall failures were noted during the operational phase of WQS (Ramelius, 2014):

- On 31 August 2013 a portion of the oxide zone of the northeastern wall failed.
- On 4 August 2013 a large section of the western wall failed between the ramp and the pit floor (325m RL).

Following the cessation of mining and dewatering, groundwater levels recovered, and pit lakes formed in both the WQS and WQN voids.

Table 3 summarises current pit volumes in context with proposal. Based on the estimated pit lake elevations in both pits of 362 m AHD, there is up to approximately 2.5 Gigalitres (GL) of remaining capacity in WQN (to 1.5m below the low pit crest) for future excess water storage.

1.5 WQS Historical Pit Wall Instability

The Western Queen Dewatering Report (AECOM, 2021) outlines the history of wall instability within the WQS pit, and the links to past dewatering and depressurisation activities. A summary of this historical instability is presented below:

- Geotechnical issues and pit wall instability resulted in the early closure of WQS pit in late 2007, with the north-eastern wall deemed too unstable to continue with mining activity. A geotechnical assessment by AMC Consultants (AMC, 2007) concluded that high pore water pressures had destabilised clay material on either side of a pegmatite dyke.
- Following a period of care and maintenance, a further geotechnical assessment of the WQS pit was completed in 2012 (Peter O'Bryan and Associates, 2012) indicated that during the care and maintained period, groundwater had formed a pit lake with a level of about 366m RL. The geotechnical assessment concluded that the stability of the upper wall at WQS would be governed

Table 3 Summary of Estimated Pit Volumes and Potential Water Storage Capacities

Void	Water Stored	Total Pit Volume	Total Pit Lake Volume	1.5m Below Pit Crest		2m Below Pit Crest		3m Below Pit Crest	
				Total Pit Volume to	Remaining Water Storage Capacity	Total Pit Volume to	Remaining Water Storage Capacity	Total Pit Volume to	Remaining Water Storage Capacity
	(kL)	(m^3)							
WQN	3,177,000	5,754,000	3,177,000	5,586,000	2,409,000	5,531,000	2,353,000	5,422,000	2,244,000
WQN - with Princess and Duke	*3,177,000*	*8,350,000*	*3,177,000*	*8,069,000*	*4,892,000*	*7,977,000*	*4,799,000*	*7,794,000*	*4,616,000*
WQS	672,000	2,122,000	671,000	2,015,000	1,344,000	1,981,000	1,309,000	1,913,000	1,241,000
WQS Planned	-	*8,817,000*	*0*	*8,565,000*	*8,565,000*	*8,482,000*	*8,482,000*	*8,319,000*	*8,319,000*

by weak rock strength associated with deep weathering as well as the possible influence of geological structures and groundwater pressures.

- Mining resumed in July 2013 and in August 2013 Ramelius Resources (2014) reported a portion of the oxide zone of the northwestern wall failed along a slip plane in ultramafic saprolite, characterised by wet, talc textured clay.
- In December 2013, another pit wall failure occurred between the ramp at 355m AHD and the pit floor (325m AHD) on the opposite western pit wall. Ramelius described the failure as being caused by toppling of clayey materials along steep, smooth, westerly dipping geological structures and contact zones. These zones spanned the saprolite and transitional saprock zone. This occurrence resulted in suspended mining activities whilst remediation works were underway.
- Hydrostatic pressure from groundwater was also considered (Peter O'Bryan and Associates, 2012) to be a factor, despite the presence of horizontal drainholes intercepting high groundwater yields behind the pit wall. The pit design was then modified to include an extra-large berm at the 325m AHD to strengthen the wall and prevent further failure. This design change had a knock-on effect of limiting the maximum pit depth from 290 to 300m AHD.
- Although the majority of groundwater inflow was reported by Ramelius Resources (2014) as being from the transitional/fresh rock interface, small amounts of seepage in the pit wall above the pit floor suggested there was poor connectivity between aquifer zones and vertical drainage behind the pit wall. In our opinion, this has likely been a significant contributor to the historical pit wall failures.
- A present-day east to west surface water drainage features now diverted around the WQS pit, may contribute to local recharge during higher rainfall events. It is apparent that this surface drainage line is aligned with some of the pit wall failure areas. It is unknown if the drainage line is formed along a sub-surface geological fault or shear. However, such features often underlie such topographically low areas. As a result of the flood bund, this may result in surface water sheetflow typically accumulating in this area allowing longer retention times for infiltration to the groundwater table through the upper alluvial sediments, upgradient of the open pit.

1.6 Historical Dewatering

A review of historical dewatering of the Western Queen area was completed by AECOM (2021) and included a compilation of several groundwater studies (Morgan, 1999; Morgan, 2000; and MWES, 2012a and 2021b). In context with the proposed mine development, key findings included:

WQN

- Morgan (1999) identified the WQN pre-mining groundwater table of about 35mbgl (355m RL)
- The main aquifer at WQN is linked to bedrock with varying degrees of oxidation (weathering) and fracturing.

- Alluvial sediments overlie the weathered bedrock. They consist of a layered succession and were reported to be of low permeability.
- Native groundwater was reported as slightly brackish in quality (1,000mg/L TDS – Total Dissolved Solids). This lower salinity indicates local groundwater recharge may be occurring through the upper alluvial sentiments.
- A final WQN pit depth of 145m (245m AHD) required 110m of dewatering to maintain dry in-pit conditions.
- Groundwater levels at WQN were monitored in 11 monitoring bores and recorded an average drawdown of 18m over a 7-month period.
- Rates of drawdown were reported to be highly sensitive to the pumping rates.
- Bore WQDB2, installed in the WQN pit, was capable of maintaining groundwater levels approximately 8 m below the final pit floor depth.
- Morgan concluded that the dewatering bore was sufficient to successfully deplete aquifer storage at WQN and to retard water inflow from the surrounding aquifer.

WQS

- During reverse-circulation mineral exploration drilling, water intersects were reported in all holes with 25 of the 57 holes reported as intersecting significant aquifer zones, based on continuous airlift flows during drilling (Morgan, 2000).
- No specific initial groundwater test drilling was completed for WQS, with the groundwater assessment based on analogies with groundwater findings from WQN.
- The local hydro-stratigraphy was identified (from top-down) as:
  - transported alluvial sediments (**aquifer where saturated**) – interlayers pisolitic colluvium and ferruginous clay and some strongly silicified horizons (silcrete)
  - saprolite (**aquitard where saturated**) – a soft moist clay unit devoid of primary structure up to 40m thick
  - saprock (**aquifer where saturated**) – at the transition between the saprolite and fresh rock, but was reported to be generally a thin interval
  - fresh bedrock (**aquitard**) – including competent amphibolite with small zones of ultramafic.
- Structurally, there is a sheared zone of amphibolite along part of the Western Queen Shear zone.
- Pre-mining groundwater levels at WQS ranged between 19 and 23 meters below ground level (mbgl) with a flat gradient from northeast to southwest.
- Dewatering from 25 to 80mbgl was achieved over a period of 8-months.

Estimates of groundwater inflows were based on hydraulic properties derived from WQN and concluded pumping rates between 1,000 and 2,550 kilolitres/ day (kL/day) over the 250-day period would be required to maintain dry mining conditions to a depth of 80mbgl (MWES (2012a).

In addition to the initial groundwater characterisation, MWES (2012a) installed four monitoring bores around the WQS open pit cutback and concluded that ex-pit dewatering via bores would likely have limited success due to the low hydraulic conductivity of alluvial clay and weathered rock between the surface and about 90m depth.

MWES concluded that all identified aquifers were from fractures within the saprock interval between the saprolite and fresh bedrock. However, the fractured rock aquifer was considered to have a low hydraulic conductivity and yield low to moderate flow rates (up to 250kL/day) based on airlift yields during drilling. To provide a buffer, flows of up to 1,300kL/day were planned for by Ramelius.

However, during mining, it was reported by Ramelius (2014) that groundwater inflows were significantly greater than expected, with rates up to 2,800kL/day. This was in line with the initial upper end of the range of estimated inflow rates predicted by Morgan (2000). Figure 5 presents historical abstraction rates in context with mining rate (pit floor elevation).

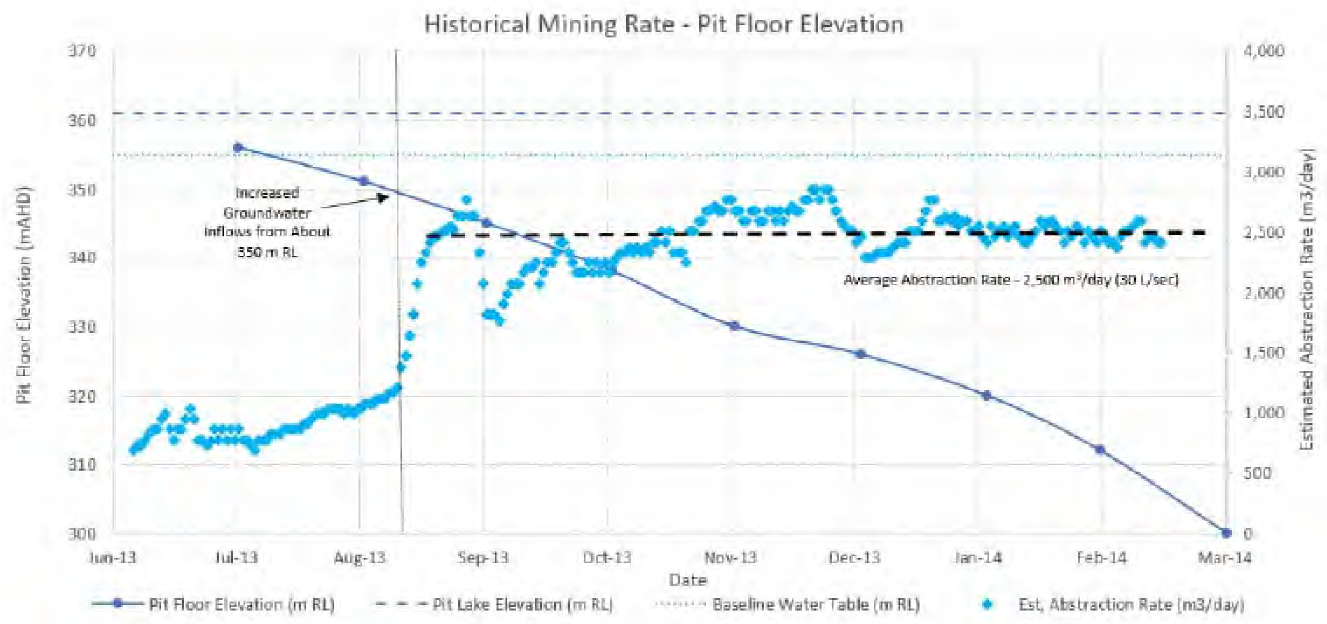

Figure 5 WQS - Historical Abstraction Rate in Context to Pit Floor Elevation

Based on the information available, it is apparent that that a constant recharge source at elevation between 340m AHD and 350 m AHD resulted in a consistent average groundwater inflow rate of about 2,500 kL/day as the pit floor was progressed. It is therefore likely this rate may form the expected minimum for future mining at WQS.

It has been reported (Ramelius (2014) that maintaining dewatered conditions against such high (unexpected) groundwater inflows ultimately resulted in part, in the cessation of mining. Several groundwater related issues reported during cut-back mining include:

- Water flows into the pit started between 864 and 1,300kL/day, and in late-2013 were relatively steady at between 2,100 to 2,600kL/day. This coincided with the exposure of less oxidised (clayey) and more competent bedrock in the northern end of the pit.
- Groundwater levels generally reached a steady-state by late-2013, likely a result of the steady rates of abstraction.
- Higher groundwater inflows were encountered when the pit floor reached fractured saprock beneath the saprolite.
- No reduction in groundwater inflows was reported as mining continued into the fresh bedrock.
- Dewatering was managed by in pit sumps as mining progressed. Interruption to pumping during blasting resulted in partial flooding of the pit floor.
- Excess abstracted groundwater above mine requirements was diverted to WQN for storage.
- Sub-horizontal drain holes were installed in the cutback walls (elevation 355m AHD) to promote drainage within the eastern side. These were reported (Ramelius, 2014) to be successful in draining the pit walls and lowering pore pressures in oxide and transitional zones. However, groundwater inflows from these holes were uncontrolled and drained into the pit floor sump.
- Groundwater levels in ex-pit monitoring bores fell in response to blasting from elevation 350m RL and the installation of horizontal drainholes.

- High and continuous inflow rates at an elevation of about 345m RL were encountered from locally transmissive zones in one area on the north-eastern wall.
- The local structural corridor (shear zone) between WQN and WQS open pits, located approximately 700m apart, may promote some groundwater connectivity.
- Groundwater levels were monitored in five ex-pit monitoring bores (WQSMB01, WQSMB02, WQSMB03, WQSMB04 and Bore 41045) (Figure 2). Bore details are provided in Table 4. All the bores showed a steady decrease in the groundwater level around the pit during the first five months of mining (Figure 6).

Table 4 WQS - Monitoring Bore Details

Bore ID	Easting	Northing	Ground RL	Stick-up	Completion Date	Casing Diameter	Total Depth	Cased Depth
	(MGA)	(MGA)	(m AHD)	(m)		(mm)	(mbgl)	(mbgl)
WQSMB001	512,560	6,954,795	394.04	0.2	14-Mar-12	80	78	77.5
WQSMB002	512,363	6,954,398	389.80	0.2	13-Mar-12	80	90	89.5
WQSMB003	512,617	6,954,686	391.55	0.2	13-Mar-12	80	72	71.5
WQSMB004	512,239	6,954,579	389.29	0.2	14-Mar-12	80	90	89.5

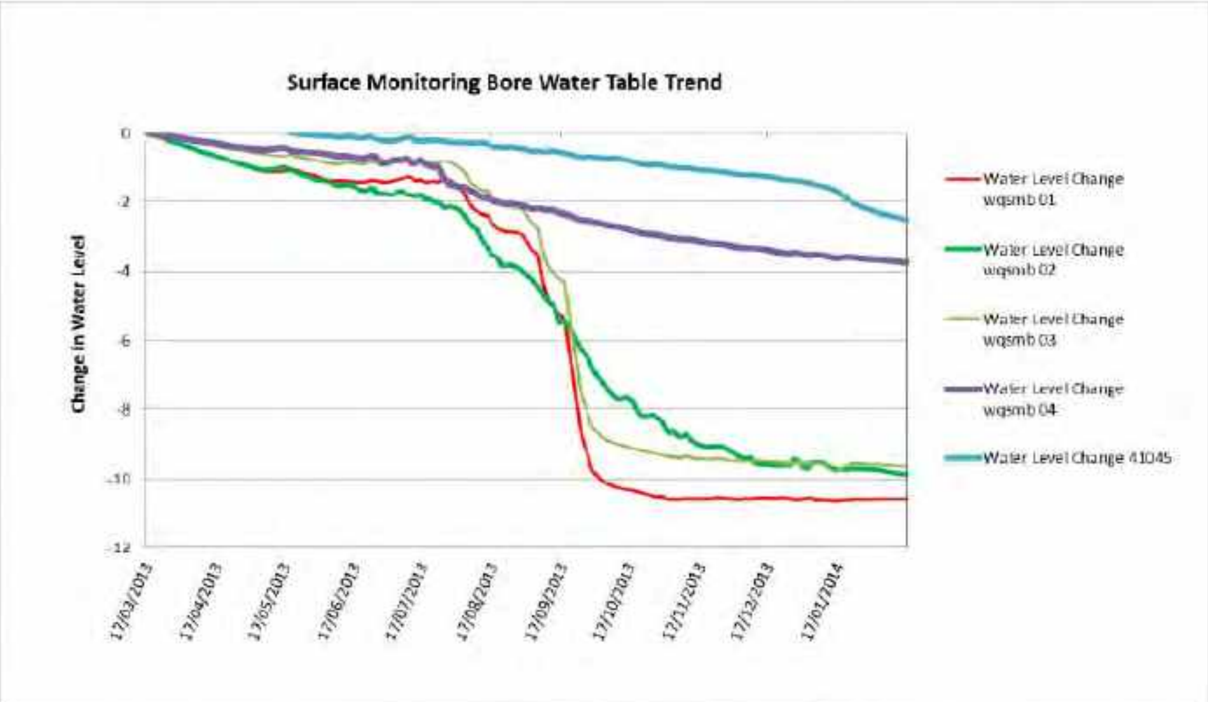

Figure 6 WQS Hydrograph - Historical Groundwater Levels (Source: Ramelius, 2014)

- It was apparent that some groundwater levels (WQSMB04 and Bore 41045) remained at elevated levels behind the pit walls (Figure 6) and were reported to have likely contributed to pit wall instability.

In conclusion, groundwater flow is controlled by regional geological structural features that are fractured and permeable, and local higher transmissive zones linked to moderate degrees of weathering, higher fracture frequency, and connectivity between local and regional geological structures.

2.0 Site Characteristics

2.1 Climate

The region has a semi-arid climate characterised by low rainfall and a large temperature range. The winter months of May to August typically have the highest and most reliable average rainfall, but intense rainfall can occur periodically in the summer months (Johnson et. al., 1999).

2.1.1 Rainfall

Local climate data is available from the Bureau of Meteorology (BoM) station at nearby Yoweragabbie (Station No. 7095 – BoM, 2025). The average annual rainfall over the past 10 years is 217.5mm (Table 5). The data set indicate the highest rainfalls occur in February and March, while the monthly average is commonly exceeded in January and March. Above-average rainfall years e.g. 2014 to 2018 incorporate more winter months that exceed the averages.

Table 5 Rainfall Data: Station No. 7095 (BoM, 2025)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	mm												
2014	25	72.6	7	10.8	88.6	3.7	1.3	1.4	16.8	4.2	9	10.3	250.7
2015	29.3	21	149.6	12.6	2.1	12.8	24.4	22.1	0.2	0	21.3	3.4	298.8
2016	29.4	12.3	46.1	11.6	21.1	40.5	38.9	17.7	6.4	5.8	5	15.8	250.6
2017	24.8	117.7	2.9	5.2	1.2	8.3	10.4	27.9	30.6	0	7.5	5.2	241.7
2018	43.4	19.3	15.6	3.1	0	32.4	26.4	16.7	1.8	37.6	44.1	0	240.4
2019	0	0.9	12.2	34.7	0	48.6	10.9	8.3	0	0	0	12	127.6
2020	25.8	44.8	21	0	2.2	12.5	12.5	16.5	0	0	4.2	3.8	143.3
2021	0	61.9	29	5.8	92	14.5	35.5	0	0	16.2	9	0	263.9
2022	0	6	45	18.5	7.5	21.5	9	49	49.5	0	0	0	206
2023	40	0	54	9	3	25	0	17	3	0	1	0	152
Avg.*	**21.77**	**35.65**	**38.24**	**11.13**	**21.77**	**21.98**	**16.93**	**17.66**	**10.83**	**6.38**	**10.11**	**5.05**	**217.5**
Note: Blue = above monthly average													

2.1.2 Evaporation

The long-term average monthly evaporation for the Western Queen mine is shown in Table 6. The annual pan evaporation for 2020 was recorded as 2,688mm at Mt Magnet (BoM, 2021).

Table 6 Long-Term Average Monthly Evaporation (BoM, 2025)

	Monthly Evaporation (mm) (BoM, 2021)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	353	293	8.05	250	180	134	100	103	122	200	275	304	2,688

2.2 Regional Vegetation

The vegetation of the region has been mapped and described by several previous studies (Beard, 1974 and 1994; Pringle et al., 1994; Mattiske, 2020). The project lies in the Austin Botanical District of the Eremaean Botanical Province and the East Murchison (MUR1) subregion of the Murchison Region of the Interim Biogeographic Regionalisation for Australia (IBRA) (DAWE 2020). Grazing has strongly influenced the structure and composition of much of the vegetation throughout the area. Vegetation associations of the areas surrounding the project area are generally defined as Mulga Woodland. These woodlands include Acacia and Casuarina species, both of which have a laterally spreading, relatively shallow root system. Mulga represents the most deeply rooted species in these ecosystems. Regional flora studies indicate mulga root depths have been recorded between 0.1 and 1.0 m. It is therefore likely that local vegetation is not and has never been dependent on groundwater.

A recent reconnaissance flora/ vegetation survey and basic fauna survey was undertaken by Botanica Consulting Pty Ltd (Botanica) at the Western Queen Project area. The survey was completed in January 2025. Key vegetation related observations include:

- Analysis of the Priority Ecological Communities within the Midwest region (DBCA, 2021) did not identify any significant vegetation assemblages as potentially occurring within the survey area.
- No Environmentally Sensitive Areas (ESAs) were identified within the survey area.
- There are no wetlands of international importance (Ramsar Wetlands) or national importance (Australian Nature Conservation Agency Wetlands) within the survey area.
- There are no proposed or gazetted conservation reserves within the survey area.
- No Threatened, Priority or otherwise significant flora species were recorded within the survey area.
- No Threatened, Priority or otherwise significant ecological communities were identified within the survey area.

Furthermore, a low risk of potential terrestrial groundwater dependent ecosystems (GDE) was reported in the adjacent floodplain areas.

2.3 Regional Hydrology

There are no natural permanent surface water bodies in the Western Queen Mine area. Ephemeral drainage channels flow only after heavy rainfall. Recharge occurs after large rainfall events when the surface water is present in low-lying areas for extended periods of time.

Several small surface water catchments drain from southeast to northwest across the Western Queen mine area. A main drainage runs west of the mining areas. A small natural drainage channel, with a catchment area of about 150ha, historically ran from east to west, through the WQS open pit area. As part of the mine development surface water flows are now diverted around the pit (MWES, 2012a). It is unknown if this drainage line is linked to sub-surface geological features (faults and/or shear zone) that may have been a contributing factor with pit wall instability.

Figure 2 presents local infrastructure in context to the current drainage lines.

2.4 Geology

2.4.1 Regional Geology

The Western Queen mine area lies within the Archaean Warda Warra Greenstone Belt, a north trending enclave within the Murchison Province of the Yilgarn Craton. The Warda Warra greenstone is surrounded by granitic rocks and consist of a mafic hanging wall contracting an ultramafic footwall. The contact dips steeply to the west and strikes north-northeast (Water Management Consultants, 1996). The belt is about 35km in length, and at the southern end near the Western Queen deposit it is 2km wide. To the north, it is up to 7km wide. The north-striking and west-dipping layered sequence has been metamorphosed to amphibolite grade and is enveloped by recrystallised granitoids (Ramelius Resources, 2014).

2.4.2 Local Geology

The local geology and geological structures that impact groundwater occurrence and flow in the Western Queen area is presented on Figure 7. In 2014, Ramelius Resources described the local stratigraphy as a steeply west-dipping greenstone sequence comprised of inter-bedded schistose amphibolites of mafic to ultramafic composition with thin iron formation horizons, spinifex textured komatiitic basalt, dolerite sills, talc chlorite schist and other assorted ultramafics. Later dolerite dykes and pegmatoid felsic intrusives cut the amphibolites.

The mafic lithologies are overlain by an overburden comprising of transported pisolitic colluvium and ferruginous clays, capped with a laterite formation of Tertiary age. The depth of the transported cover material is reported to be approximately 3m on the northern side of WQS, increasing significantly up to about 41m on the southern side (MWES, 2012).

The mineralised system that hosts the WQS deposit is a continuation of the deposit in the WQN mine to the north. Located within sheared mafic amphibolite host material, the layering in this zone dips steeply to the west, with the hanging wall being a continuation of the mafic amphibolite and the footwall a more ultramafic composition amphibolite. The amphibolite sequence is intruded by pegmatite and dolerite dykes.

Both the east and west sides of the mineralised zone are intruded by pegmatite dykes, stringers of which cut the mineralised zone. A prominent pegmatite dyke dipping at 65^{o} west, intrudes the western pit wall at WQS. Because the contact zones are fractured, they are a preferential groundwater flow path.

Oxidation of the bedrock at WQS varies considerably and extends to greater depths on the southern side of the deposit. This increased depth of weathering corresponds with increase depth of transported overburden because a shallow palaeovalley formed where these weathered materials were exposed.

The depth of the base of complete oxidation (BOCO) is interpreted to be located at about 41m depth on the northern side of the deposit and about 70m on the southern side. This influences the depth and distribution of fractured bedrock aquifers.

Across the proposed WQS mining area the *transitional* weathering (saprock) zone is limited to a sharp gradation between BOCO and the top of fresh rock (TOFR). TOFR is interpreted to lie at ~ 50m depth in the north and ~ 81m in the south of the deposit (Peter O'Bryan and Associates, 2012).

2.1 Hydrogeology Overview

The most prevalent aquifer at the Western Queen Mine site is associated with weathered and fractured Archaean bedrock. Previous reviews have established that fracturing results in high permeabilities in a variety of rock types above 50 to 60 meters depth, with fracturing being less common to 100 meters and difficult to find below 100m depth (Water Management Consultants, 1996). Fracturing was also noted to occur in or near pegmatite units at a number of locations.

The saprock aquifer is typically characterised by secondary porosity and permeability, often in association with geological structures. The storativity and hydraulic conductivity of this aquifer is largely related to the degree of weathering (clay content) and fracture intensity. Based on photographic evidence within the Western Queen Dewatering report (AECOM, 2021) the saprock aquifer is, outside of deep geological structures, only a thin layer at the transition between oxidised (clayey) weathered and fresh bedrock.

The saprock aquifer is overlain by a thick layer of saprolitic clay and superficial alluvial and laterite deposits. The saprolite zone varies in depth between 40m in the northern end of the deposit to 90m to the south. This deepening of the oxidation boundary roughly coincides with the deepening of the overlying transported alluvial sediments.

The Western Queen Shear is the dominant feature controlling the occurrence of deep permeable fractured aquifers. The WQS deposit is in a sheared amphibolite forming part of the Western Queen Shear. The fresh rock is comprised of competent (non-fractured) amphibolite in a steeply west dipping configuration.

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DATE MODIFIED 20 MAY 2020 APPROVED BY G.BROPHY

N
1:15,000

0 50 100 150 200
metres
GDA 1994 MGA ZONE 50

LEGEND

- Western Queen Tenements
- Existing Pit Outline
- Proposed Pit
- Haul Road
- Drainage Lines
- Fences
- Regional Structures (500k)
- Inferred fault
- Shear

Geology

- BIF
- Dyke
- GOO
- GPO
- MAO
- MBO
- Mafic
- Pegmatite
- Pegmatite
- TSH
- UDO
- USE
- USH
- USO
- Ultramafic

Geology and Structures

WESTERN QUEEN

WESTERN QUEEN DEWATERING ASSESSMENT

Figure
7

Layout: 60716551_02_006 Last exported 8/02/2024 11:23 AM

A4 size

Recharge to the aquifers hosted by the superficial alluvial and laterite deposits occurs via rainfall infiltration, typically after short duration sheet flooding events that flow along local surface drainages. This recharge would likely be migrating down to the saprolite clay then flow laterally towards the pit where it discharges as seepage high in the pit wall. The rate of recharge is typically linked to how long surface water remains in low-lying areas. The former creek line that crossed the WQS footprint has been bunded to divert surface water around the pit. Ponding and enhanced recharge behind this bund may be exacerbating high water levels behind the north-eastern wall of the WQS pit.

A long-term pumping test was carried out in the old main shaft of WQN in 1995. This test was undertaken over a period of 27 days at a pumping rate between 1,598 kL/day and 1,117 kL/day. Aquifer parameters were calculated from this test, with adopted values of Transmissivity of 75 m^2/day and a Storage Coefficient of 0.013 (Hydrosearch, 1996). In addition, Morgan (2000) reported these initial predictions from WQN were not considered valid for WQS because these high values were derived from unique highly transmissive fractured rocks deep in the section that were not detected during exploration at WQS. Therefore, with transmissivity of 30 m^2/day and a saturated thickness estimate of 60m, a hydraulic conductivity of 0.5 m/day is derived. A specific yield (Sy) of 0.02 (dimensionless) was used for estimating groundwater in storage for WQS.

The pre-mining water table was relatively flat, generally ranging between 19 and 23mbgl, forming a saturated zone of approximately 60m thick. Morgan (2000) estimated dewatering requirements to be up to about 2,500kL/day based on the estimated specific yield and transmissivity values. Although, these high yields were not intersected in more recent groundwater monitoring bores, this initial estimate was close to the final measured abstraction prior to cessation of mining.

Generally, groundwater within the main transmission zone which occurs between 40 and 80 m depth reported electrical conductivity (EC) in the range 3,000 µS/cm to 4,000 µS/cm (Water Management Consultants, 1996). An increase in conductivity with depth was also identified and where permeable fractures occur below 80- m depth, the groundwater quality deteriorated up to 15,000 µS/cm or 9,800 mg/L Total Dissolved Solids (TDS).

Historical groundwater salinity at WQS was reported by Morgan (2000) as being of better-quality ranging between 1,800 – 1,900µS/cm, equivalent to about 1,000 to 1,050mg/L TDS and neutral pH of about 7.6. Ground was collected from three exploration holes (Table 7) and samples sent for laboratory analysis. Native groundwater quality (baseline) for WQS is presented in Table 8.

Table 7 Groundwater Chemistry of Western Queen South (Morgan, 2000)

Hole No.	Easting	Northing	GL (m AHD)	Depth (m)
QNC 38900-4	20,739	38,899	390.12	121
QNC 38875-1	20,759	38,878	389.94	90
QNC 38950-3	20,709	38,949	390.31	160

Table 8 Groundwater Chemistry of Western Queen South (Morgan, 2000)

Component	Units	Detection Limit	M001	M002	M003
			QNC 38900-4	QNC 38875-1	QNC 38950-3
			WQS (Morgan, 2000)		
Electrical Conductivity (EC)	mS/cm	1	1,900	1,800	1,800
Total Dissolved Solids (TDS)	mg/L	1	1,050	1,050	1,000
Sodium	mg/L	1	340	345	335
Potassium	mg/L	1	9	9	9
Calcium	mg/L	1	22	20	20
Magnesium	mg/L	1	20	20	19
Harness ($CaCO_3$)	mg/L	1	135	130	130
Iron	mg/L	0.01	<0.01	<0.01	<0.01
Silicon	mg/L	1	40	33	34
Cadmium	mg/L	1	<1	<1	<1
Lead	mg/L	1	<1	<1	<1

Component	Units	Detection Limit	M001	M002	M003
			QNC 38900-4	QNC 38875-1	QNC 38950-3
			WQS (Morgan, 2000)		
Copper	mg/L	0.01	<0.01	<0.01	<0.01
Manganese	mg/L	0.01	<0.01	0.06	<0.01
Zinc	mg/L	0.01	0.02	0.13	0.02
Selenium	mg/L	1	<1	<1	<1
Arsenic	mg/L	1	<1	<1	<1
Chromium	mg/L	0.01	<0.01	<0.01	<0.01
Mercury	mg/L	0.1	<0.1	<0.1	<0.1
pH	-	1	7.55	7.3	7.45
Carbonate	mg/L	1	<1	<1	<1
Bicarbonate	mg/L	1	134	131	122
Hydroxide	mg/L	1	<1	122	<1
Ion Balance	mg/L	1	0.3	3.7	3.3
Chloride	mg/L	1	450	415	415
Sulphate	mg/L	1	98	92	91
Fluoride	mg/L	0.1	0.9	1	1
Nitrate (as NO_3)	mg/L	0.01	51	51	44
Nitrite (asNO_2)	mg/L	0.01	<0.01	<0.01	<0.01

MWES Consulting sampled groundwater from four groundwater monitoring bores at WQS in 2012. In context with measured groundwater inflows, local groundwater quality is summarised in Table 9. Results highlight lower salinity concentrations in WQS compared to WQN.

Table 9 Historical Western Queen Groundwater Quality Analysis

Bore ID	Maximum Flow Rate During Drilling	EC @ 25° C	TDS	pH
	L/sec	µS/cm	mg/L	
WQS (MWES, 2012)				
WQSMB01	0.76	4,700	3,700	7.9
WQSMB02	0.44	2,100	1,300	8.1
WQSMB03	2.90	3,900	2,400	8.1
WQSMB04	0.31	1,900	1,200	8.2
		Minimum	*1,200*	-
		Maximum	*3,700*	-
		Average	*2,150*	-
WQN (Morgan, 2000)				
WQG31-SW	30.1	3,500	2,275	-
WQG32-NW	2.0	4,000	2,600	-
WQG33-NE	4.6	16,400	10,660	-
WQG34-SE	2.5	3,800	2,470	-
		Minimum	*2,275*	-
		Maximum	*10,660*	-
		Average	*4,500*	-

Morgan (2000) reported heavy metals have historically been reported mostly below detection limits set by the laboratory indicating that heavy metals are not of environmental concern. Nitrate was reported high (44 to 51 mg/L), however is typical of natural groundwaters in the arid to semi-arid regions of Western Australia.

3.0 Hydrogeological Site Work 2025

3.1 Overview

To complement the historical hydrogeological information available and collect more recent groundwater related data, a 5-day site reconnaissance was undertaken. Site works were conducted by AECOM between 17 and 21 February 2025, with support from Rumble and Mega personnel.

The objective was to visually assess current pit lakes, open pit extent in context of existing pits and historical dewatering challenges, and mine water discharge options, such as the proposed evaporation pond area and local creeklines for potential direct discharge. Pit lake sampling locations are presented in Table 10 and on Figure 8. The following tasks were completed during this site visit:

- Use of a small boat on both WQS and WQN pit lakes to allow pit lake water quality information to be collected.
- Water quality profiling at two locations within each pit (WQN and WQS) using a multi-parameter YSI ProDDS water quality meter capable of 100m depth, to allow measurements of pH, Oxidation Reduction Potential (ORP), Dissolved Oxygen (DO), Electrical Conductivity (EC), Salinity, Temperature, Total Dissolved Solids (TDS) and Turbidity for the entire vertical column (116m max Western Queen North; 60m max Western Queen South).
- To complement the profiling, water samples were collected from nominal depths of 30m and 60m. Samples were dispatched to ALS Environmental, a NATA certified laboratory, for analysis of major ions and metals.
- Ad hoc groundwater levels from existing monitoring bores and opportunistic open exploration holes were measured using an electric dipmeter and where possible, groundwater samples were bailed and dispatched for laboratory analysis.

Table 10 2025 Pit Lake Sampling Locations

Western Queen Pit	Easting (MGA)	Northing (MGA)	Pit Lake Elevation (m AHD)	Floor Elevation (m AHD)	Water Depth (m)
South 1	512,465	6,954,650	362	301	61
South 2	512,442	6,954,594	362	318	44
North 1	512,807	6,955,568	361	276	85
North 2	512,881	6,955,655	361	268	93

Details of field results are provided below.

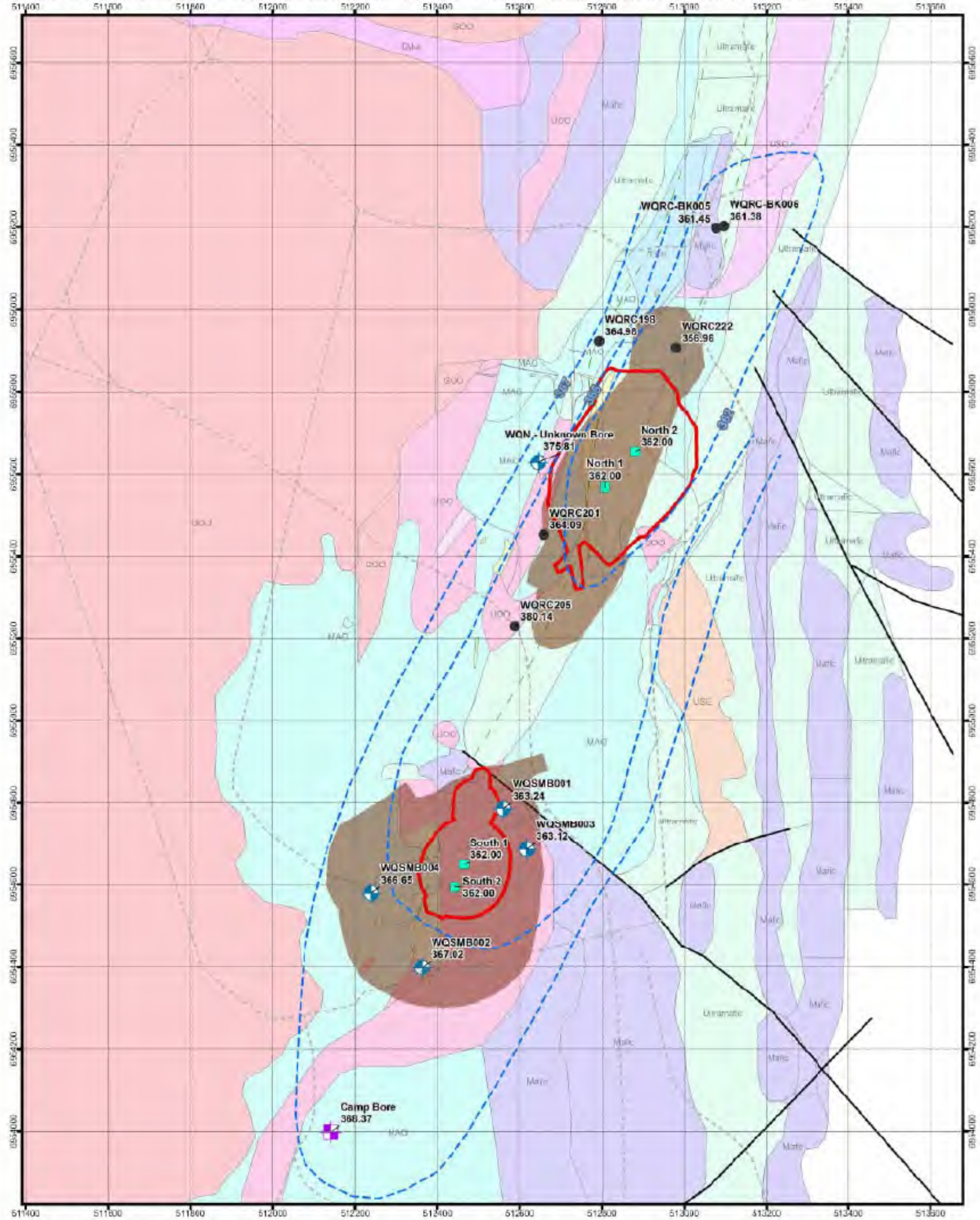
3.2 WQN and WQS Pit Lakes

3.2.1 Water Quality Profiling

Field water quality measurements were derived using an Aqua TROLL 600 Multiparameter Sonde. Measured parameters included pH, conductivity, salinity (TDS), turbidity, dissolved oxygen, redox potential, resistivity, density, temperature and pressure. Upon review of the results the instrument was found to be faulty, due to abnormally low and high in parts of the profiles. However, the data does provide the following:

- The water column is stratified.
- The water column reports a neutral pH (a general pH between 7 and 8).
- A thermal barrier appears to exist in both pit lakes at around 20m depth.
- Water quality spatial patterns appear to be the result of rainfall runoff down pit ramp areas.

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



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DATE MODIFIED 27 MAY 2025 APPROVED BY G BROPHY

1:12,000

0 50 100 150 200 metres

GDA 1994 MGA ZONE 50

LEGEND

- Existing Pit Outlines
- Proposed Pit
- Track, Unsealed
- Exploration hole
- Monitoring Bore
- Production Bore
- Pit Lake
- Groundwater Level Contours (mAHD)
- Inferred fault
- Shear

Geology

- Dyke
- GOO
- GPO
- MAO
- MDO
- Mafic
- Pegmatite
- Pegmatite
- TSH
- UOO
- USE
- USH
- USO
- Ultramafic

Western Queen Groundwater Contours (Feb, 2025)

WESTERN QUEEN

WESTERN QUEEN DEWATERING ASSESSMENT

Figure 8

A4 size

- Dissolved oxygen concentrations in both ends of WQS and the southern end of WQN report increasing concentrations to 20 to 30m depths. This may indicate a rainfall recharge event occurred given this aligns with elevated turbidity in the water column.

Pit lake water quality profile results for WQS are presented on Table 11 and for WQN on Figure 8.

3.2.2 Laboratory Sampling

During the 2025 site work, pit lake water sampled were collected from the water column and dispatched for laboratory analysis. Laboratory results are summarised in Table 11. Laboratory certificates are provided in Appendix A.

Key pit lake water quality observations:

- Generally, a uniform salinity throughout the water column for both open pits and ranges between 18,400mg/L TDS at the surface (<10m depth) and 31,100 mg/L TDS at a depth of 75m.
- pH values reporting neutral (pH 7.6) to slightly alkaline (pH 8.3) water
- Sodium Chloride water type
- Elevated metals concentrations (iron, Manganese, Chromium) below 75m in WQN.
- Slight reduction in Nitrate, Nitrite below 75m depth in WQN.

In context to the above pit lake water quality, laboratory groundwater quality for the WQS area (Table 9) reported an average salinity of about 2,150 mg/L TDS, neutral pH (pH 7.5) and an elevated bicarbonate compared with the pit lake water.

In conclusion, pit lake water quality in both open pits has likely undergone evapo-concentration over the estimated 10-year period as pit lake levels recovered. The water quality is however observed to have similar chemical composition and therefore mixing between the two pits would pose little additional risk.

To help inform other excess water management options, pit lake laboratory results were screened against water standards for likely at-risk water resource users, including freshwater fish within the local creeks and Sanford River and local livestock. The two categories include:

- Criteria 1 - ANZG (2018) Freshwater Unknown Light organic solvent preservative (LOSP) Toxicant default guideline value (DGV)
- Criteria 2 - ANZECC 2000 Livestock DW Low Risk Trigger Values

The results indicated exceedances mostly within WQN for metals and sulphate (Table 12). A single exceedance in WQS was noted due to cobalt.

Table 11 Summary of Pit Lake Laboratory Sample Results (February 2025)

Component	Units	WESTERN QUEEN NORTH					WESTERN QUEEN SOUTH			
		WQN1	WQN2	WQN3	WQN4	WQN5	WQS1	WQS2	WQS3	WQS4
		Sample Depth (m)								
		20	92	75	20	10	30	50	6	18
Electrical Conductivity (EC)	mS/cm	25,900	24,900	43,700	24,700	25,000	24,600	25,000	25,700	25,100
Total Dissolved Solids (TDS)	mg/L	19,200	18,500	31,100	18,200	18,700	18,400	18,900	18,800	18,800
Sodium	mg/L	4,090	3,850	8,240	3,850	3,870	3,650	3,750	3,770	3,790
Potassium	mg/L	94	116	287	116	117	101	103	103	104
Calcium	mg/L	583	580	582	577	589	619	629	640	644
Magnesium	mg/L	580	571	789	565	576	602	613	622	626
Harness ($CaCO_3$)	mg/L	90	93	152	91	89	82	99	62	81
Iron	mg/L	<0.05	<0.05	3.41	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0015
Lead	mg/L	<0.002	<0.002	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	0.006
Copper	mg/L	<0.002	<0.002	0.112	<0.002	<0.002	0.005	0.004	<0.002	0.006
Manganese	mg/L	0.023	0.008	0.668	0.006	0.003	0.002	0.058	0.004	0.008
Zinc	mg/L	0.06	0.023	0.071	0.011	<0.010	<0.010	<0.010	0.016	0.011
Selenium	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	mg/L	<0.002	<0.002	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.008
Chromium	mg/L	0.002	0.003	0.901	0.008	0.003	<0.002	<0.002	<0.002	0.006
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
pH	-	8.14	8.31	8.18	8.34	8.23	7.86	7.78	7.63	8.22
Carbonate	mg/L	<1	<1	<1	2	<1	<1	<1	<1	<1
Bicarbonate	mg/L	90	92	152	88	89	82	99	62	81
Hydroxide	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ion Balance	mg/L	2.12	0.09	2.95	0.3	1.5	3.81	0.26	0.7	1.24
Chloride	mg/L	8,720	7,990	14,000	8,010	8,310	8,580	8,140	8,310	8,440
Sulphate	mg/L	984	940	1,700	934	935	830	830	846	855
Fluoride	mg/L	1.6	1.6	1.5	1.6	1.6	1	1	1	1
Nitrate (as NO_3)	mg/L	8.19	8.35	6.54	8.27	8.29	1.28	0.98	1.17	1.17
Nitrite (asNO_2)	mg/L	0.24	0.25	0.19	0.22	0.28	0.02	0.01	0.05	0.05

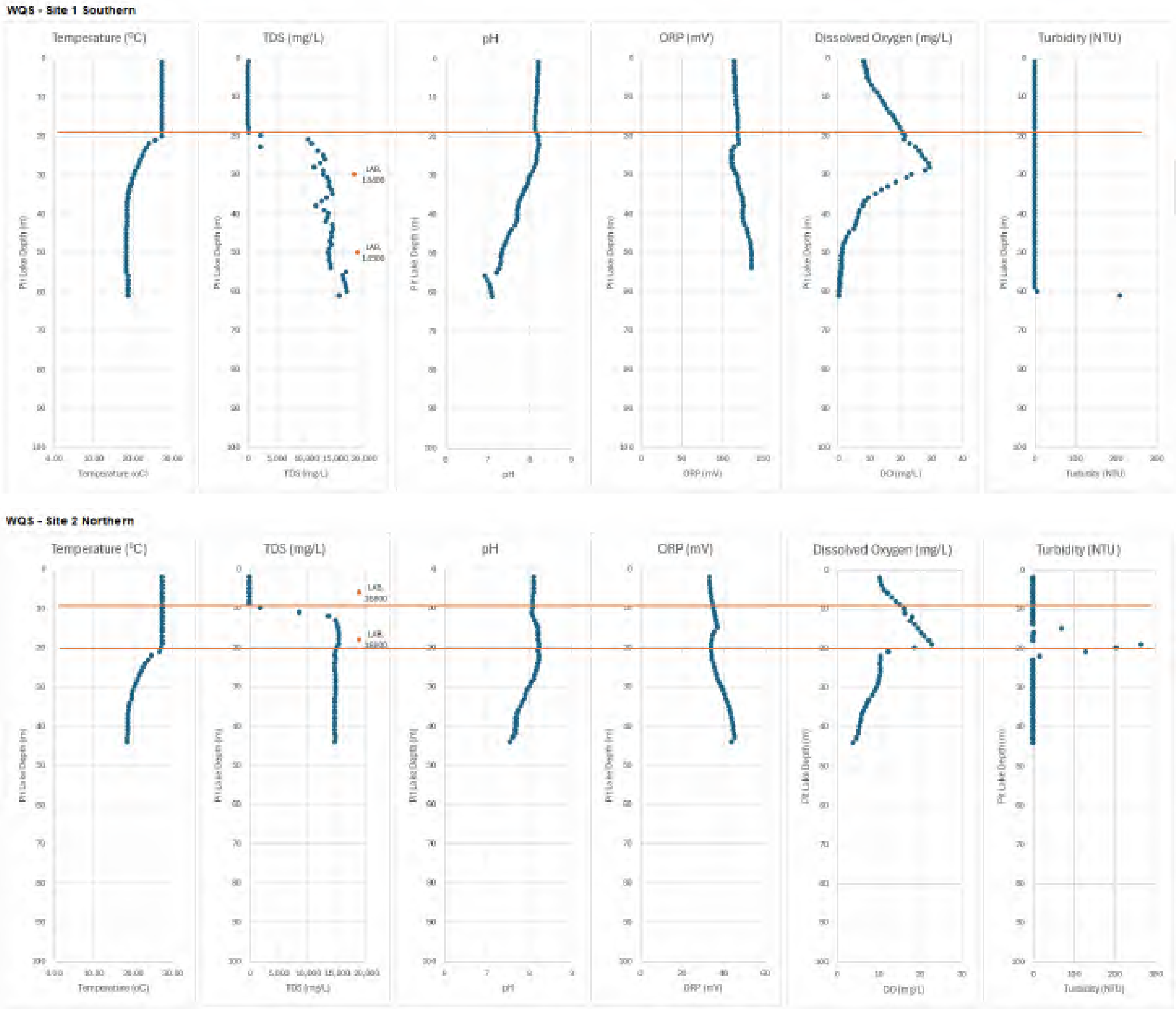


Figure 9 Western Queen South – Pit Lake Profile Plots

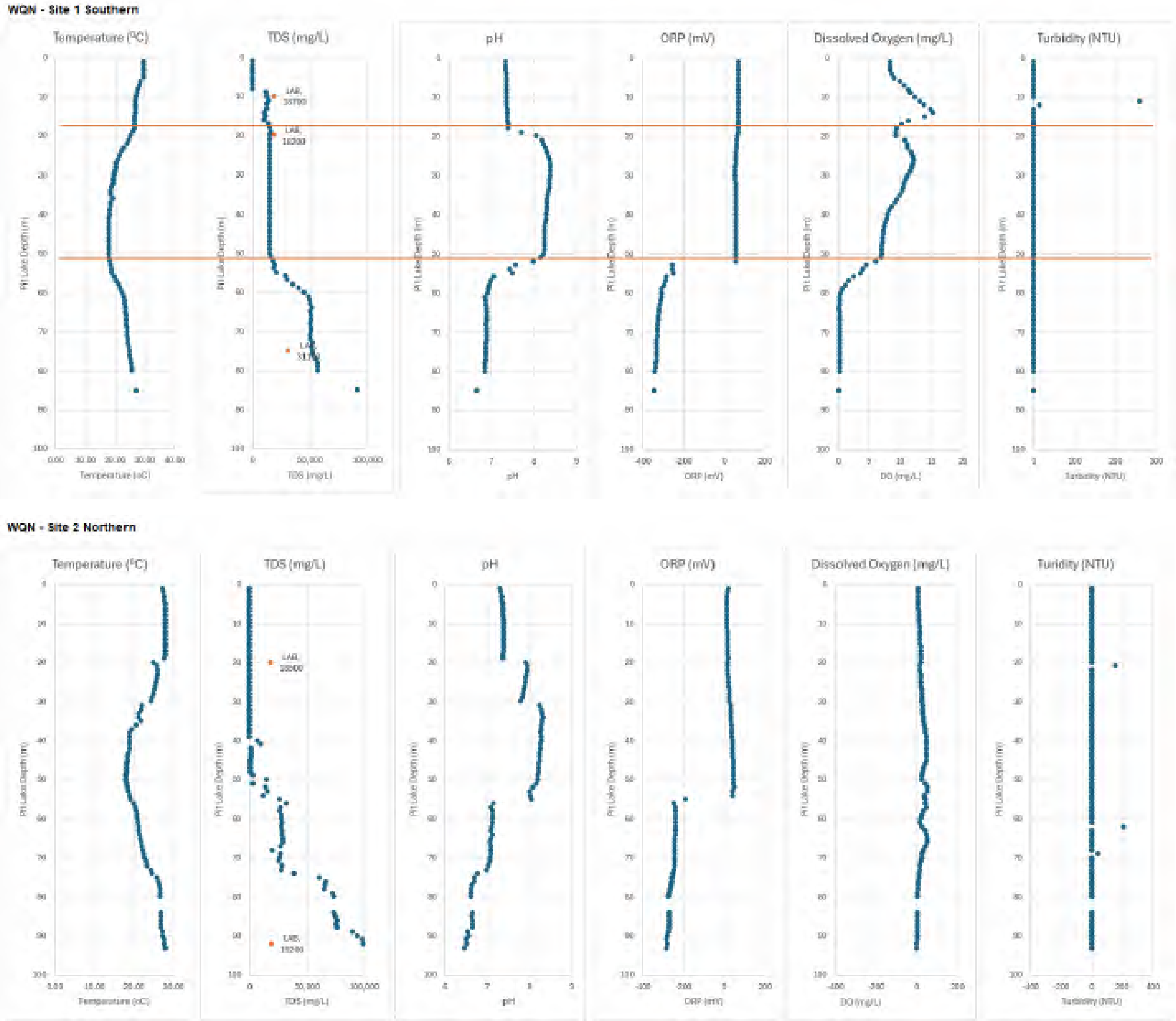


Figure 10 Western Queen North – Pit Lake Profile Plot

Table 12 Pit Lake Water Quality - Analyte Exceedances

Analyte	Criteria 1 Limit (mg/L)	Criteria 1 Exceedance Location	Criteria 1 Highest Exceedance %	Criteria 2 Limit (mg/L)	Criteria 2 Exceedance Location	Criteria 2 Highest Exceedance %
Aluminium	0.0008			5	WQN3	492
Antimony	0.009					
Arsenic				0.5		
Cobalt	0.0014	WQN3, WQS4	4,500	1		
Molybdenum	0.034	WQN1,2,5	112	0.15		
Uranium	0.0005	WQN1-5	1,800	0.2		
Vanadium	0.006	WQN1-5	1,833			
Zinc				20		
Sulfate as SO4 (Turbidimetric) (filtered)				1,000	WQN3	170
TDS				2,000	All	1,555

3.3 Groundwater

3.3.1 Groundwater Quality Profiles

Insitu field water quality measurements in existing bores (Camp Bore, WQSMB001, WQSMB002, WQSMB003, and WQSMB004) and were collected using a downhole Aqua TROLL 600 Multiparameter Sonde. All bores were located in the WQS area, with no existing bores located in the WQN area. Whilst groundwater levels were measured in open exploration holes, water quality profiles could not be completed in the angled open holes.

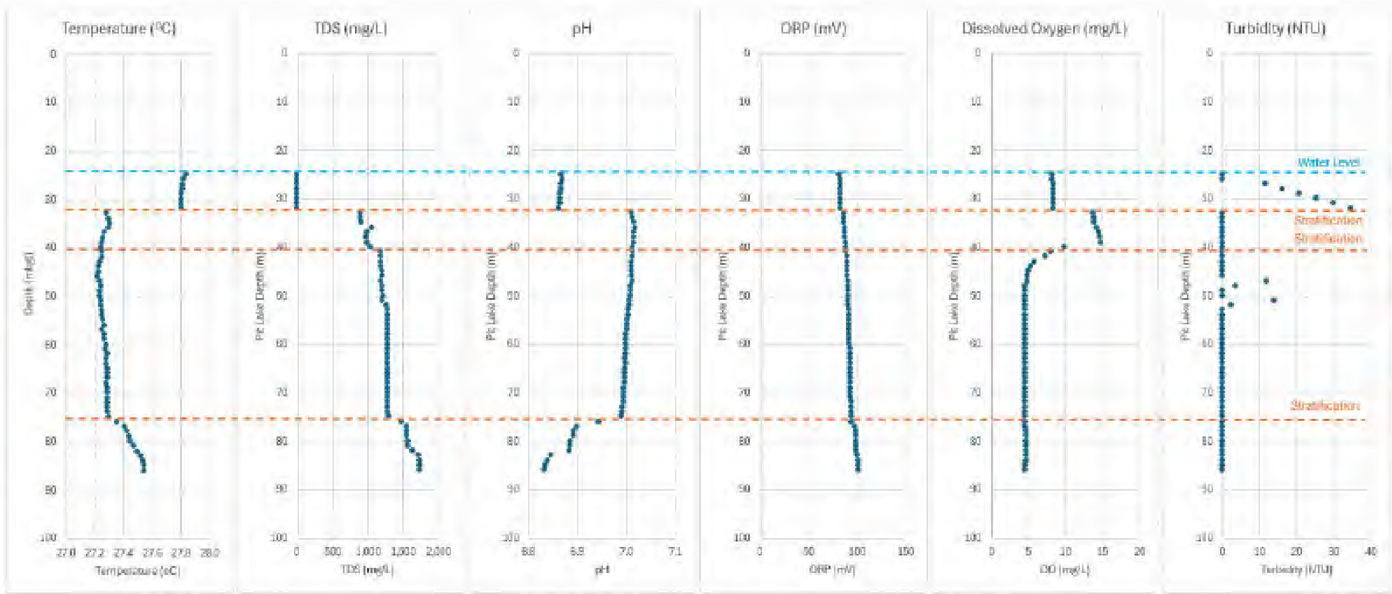
Measured parameters included temperature, salinity (TDS), pH, redox potential resistivity, dissolved oxygen, and turbidity. Profile plots are presented in Figure 10. The local groundwater quality data shows:

- Camp Bore likely represents natural groundwater quality and outside the potential influence of the pit lakes.
- Camp Bore salinity averages approximately 1,300 mg/L TDS throughout the water column, with a slight increase in salinity up to 1,700 mg/L TDS from 75m bgl.
- The general groundwater column quality is stratified with uniform salinity observed below about 45m depth (about 10m below the measured static water table).
- The groundwater column reports a general neutral pH (a general pH 6 to pH 7).
- Water quality spatial patterns appear to be the result of links to pit lakes. WQSMB001 reported salinity up to 12,400 mg/L TDS and likely a result of a direct geological structural linked to the pit lake.
- Dissolved oxygen concentrations in both ends of WQS and the southern end of WQN report increasing concentrations to 20 to 30m depths. This may indicate a rainfall recharge event occurred given this aligns with elevated turbidity in the water column.

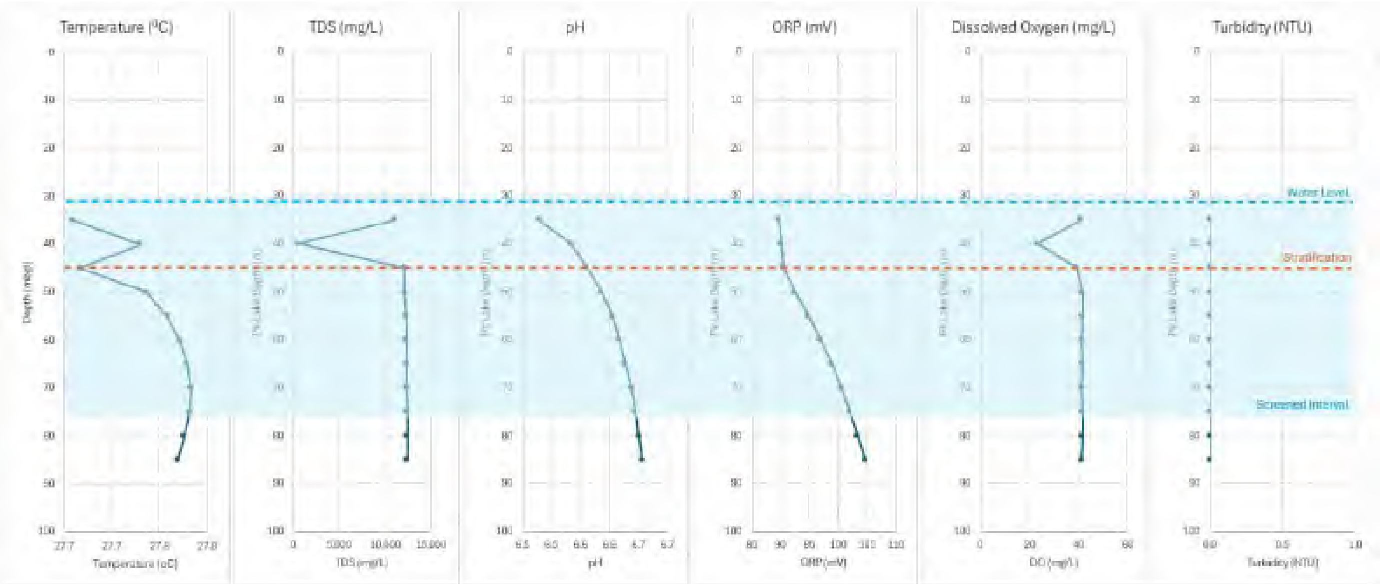
Groundwater quality profile results are presented on Figure 9.

In conclusion, native local groundwater salinity in the WQS area ranges between 1,300 and 1.700 mg/L TDS. These concentrations are significantly lower than pit lake measurements (18,000 mg/L).

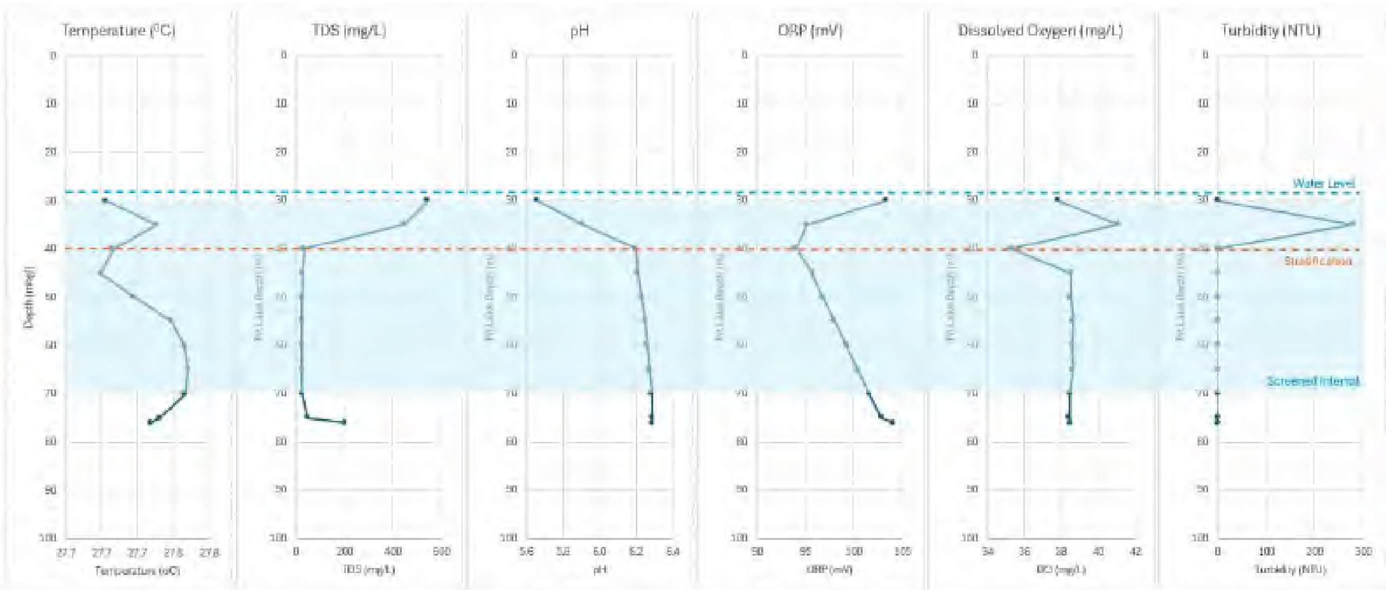
CAMP BORE



WQSMB001



WQSMB003



WQSMB004

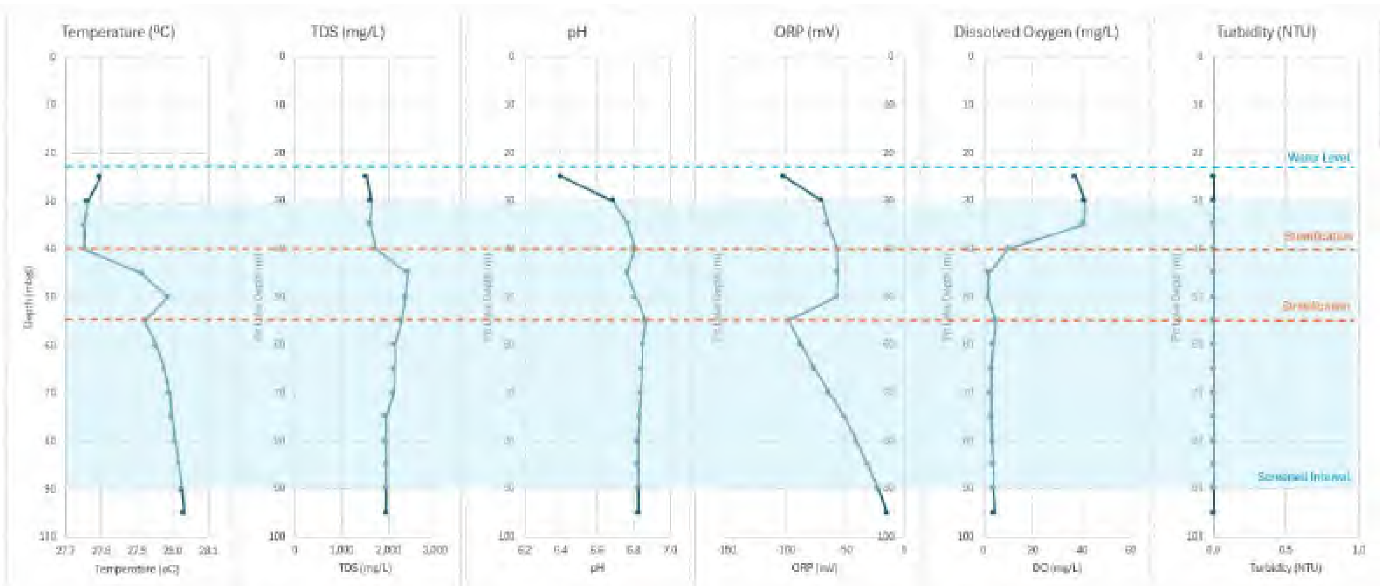


Figure 11 Groundwater Quality – Downhole Water Quality Profile Plots

3.3.2 Groundwater Levels

Based on the LIDAR elevation model surveyed in 2020, pit lake water levels were estimated to be 362m AHD in WQS and 362m AHD in WQN. Pit lake levels in past surveys in 2019 reported pit lake elevations of 361m AHD in WQS and 360m AHD in WQN.

Groundwater levels were also measured in selected open groundwater monitoring bores and exploration holes during the February 20205 site visit (Table 13).

Groundwater contours (Figure 8) were based on water levels within the existing monitoring bores surrounding WQS (WQSMB001-4) and in ongoing exploration holes on site. The exploration holes were drilled at 60^{o} and have been vertically corrected to account for the drill angle. Groundwater levels ranged between 356.96 mAHD (WQRC222) in the north and 380.14 mAHD (WQRC205) in the centre of the site. Levels for WQS monitoring bores ranged from 363.12 (WQSMB003) in the northeast and 367.02 (WQSMB002) in the south. The general groundwater flow regime is from south to north.

3.1 Surface Water Catchment Reconnaissance

During the site visit several surface water features, creeks and the Sanford River were inspected historical discharge areas and make observations of local low-flow and flood plan catchment characteristics for potential locations for excess water discharge.

At the time of the reconnaissance, all creekbed locations inspected were dry, however there where was evidence of significant salt deposition observed in some local catchments, particularly within the Sanford Riverbed. These areas reported salt crust in main low-flow channels.

However, a surface water sample was later collected by Rumble Personnel on 18 April 2025 and sent to ALS Environmental Laboratory for analysis. Sample results report hypersaline water with a salinity concentration of 238,000 mg/L TDS, well above all project related pit water and groundwater. Water quality results are provided in Appendix A.

The remnants of a historical discharge pipeline infrastructure were identified approximately 1.2 km from the WQN open pit. Most pipelines were observed to be either above ground and damaged or below ground, partially exposed and infilled with sediment.

Locations and photographs of surface water features and historical discharge infrastructure observed during the site reconnaissance are presented on Figure 12 and Table 14.

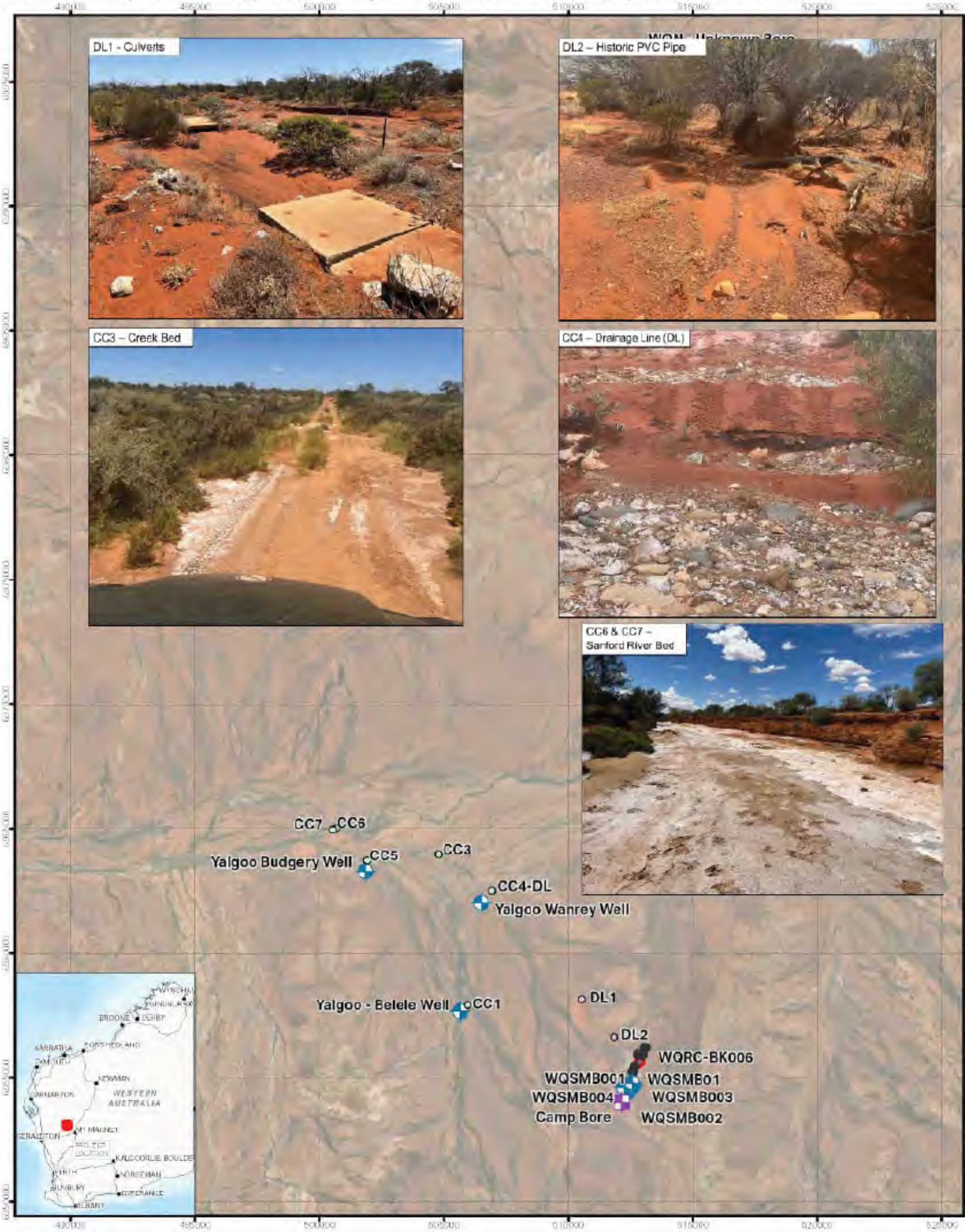
Table 13 Summary of Surface Water Sites

Site	Easting (mE MGA)	Northing (mN MGA)	Type	Description
CC1	505,958	6,957,903	Creek Crossing	Creek bed located near Yalgoo - Belele Well. No observed salt scalding.
CC3	504,789	6,963,963	Creek Crossing	Creek bed with observed salt scalding.
CC4-DL	506,937	6,962,515	Creek Crossing	Creek bed with observed broken PVC piping. Piping is noted to be infilled from silt build up.
CC5	501,928	6,963,722	Creek Crossing	Creek crossing with observed salt scalding.
CC6	500,662	6,965,010	Creek Crossing	Sandford riverbed with notably large salt deposits on dry riverbed (as of Feb 2025).
CC7	500,529	6,964,951	Creek Crossing	
DL1	510,536	6,958,151	Discharge Line	Historic concrete culverting along former drainage line.
DL2	511,846	6,956,626	Discharge Line	Historic PVC piping present (damaged) along former drainage line.
Sandford River	511,540	6,967,562	Ponded Water	Water Sample collected by Rumble Personnel (18/4/2025) and sent for laboratory analysis

Table 14 Western Queen Groundwater Levels (February 2025)

Location Name	Type	Easting (mE MGA)	Northing (mN MGA)	2025 LIDAR Ground Elevation (m AHD)	Base (mbgl)	Screened Interval (mbgl)	Top Of Casing (m)	Vertical Static Water Level (mbgl)	Static Water Level (m AHD)	Average In Situ Salinity (mg/L TDS)
WQN	Pit Lake	-	-	392.00	-	-	-	32.00	360.00	18,800
WQS	Pit Lake	-	-	390.00	-	-	-	29.00	361.00	18,400
Camp Bore	Production Bore	512,141	6,953,998	390.70	89.30	unknown	0.38	23.25	367.45	1,300
Yalgoo - Belele Well	Station Well	505,647	6,957,658	*385.00*	8.80	open hole	0.12	3.16	381.84	-
Yalgoo Budgery Well	Station Well	501,847	6,963,279	*365.00*	2.60	open hole	0.00	2.50	362.50	-
Yalgoo Wanrey Well	Station Well	506,495	6,962,017	*375.00*	6.07	open hole	0.76	-0.80	375.80	-
WQN - Unknown Bore	Monitoring Bore	512,645	6,995,628	390.92	20.00	open hole	0.00	15.02	375.90	-
WQSMB001	Monitoring Bore	512,560	6,954,786	394.19	78.20	30-78	0.30	30.46	363.73	12,500
WQSMB002	Monitoring Bore	512,363	6,954,398	389.72	28.30	30-90	0.60	22.20	367.52	-
WQSMB003	Monitoring Bore	512,617	6,954,686	391.40	74.00	30-72	0.30	28.10	363.30	-
WQSMB004	Monitoring Bore	512,239	6,954,579	389.33	90.40	30-90	0.00	22.70	366.63	2,000
WQRC205	Exploration hole	512,588	6,955,230	392.19	-	open hole	-	12.44	379.75	-
WQRC201	Exploration hole	512,658	6,955,453	391.98	-	open hole	-	29.08	362.90	-
WQRC198	Exploration hole	512,793	6,955,923	390.95	-	open hole	-	23.83	367.12	-
WQRC222	Exploration hole	512,980	6,955,907	392.42	-	open hole	-	33.25	359.17	-
WQRC-BK006	Exploration hole	513,096	6,956,203	391.76	-	open hole	-	32.02	359.74	-
WQRC-BK005	Exploration hole	513,077	6,956,198	391.60	-	open hole	-	31.95	359.65	-

magl – meters above ground level
mbgl – meters below ground level
m AHD – meters Australian Height Datum



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DATE MODIFIED 07 MAR 2025 | APPROVED BY J FOWLER

N

1:200,000

GDA 1994 MGA ZONE 50

LEGEND

- Pit Outlines
- Exploration hole
- Monitoring Bore
- Production Bore
- Monitoring Bore
- Creek Crossing
- Discharge Line

Regional Bores and Surface Water Features

WESTERN QUEEN

Western Queen Dewatering Assessemnt

Figure

12

A4 size

4.0 Groundwater Assessment

4.1 Conceptual Hydrogeological Model

The conceptual hydrogeological model has been compiled based on findings from the literature review and site observations. The schematic cross section is presented on Figure 13.

- The average annual rainfall over the past 10 years is about 217.5mm, with an annual evaporation up to 2,600mm.
- In the Goldfields Region, groundwater is typically recharged by infiltration in elevated areas where fractured bedrock is exposed or in low-lying areas where surface water persists allowing prolonged periods for infiltration to occur. Groundwater flow generally follows topography to regional low-lying areas that form discharge zones (river pools, salt lakes and salinas).
- Infiltration from rainfall is inferred to recharge groundwater at very low rates. It is common in arid zones that recharge only occurs after rainfall events (over one or successive days) of about 50mm or more. In our experience net recharge often ranges between 0.5 and 1.0 percent of the annual rainfall. This is a however a simplification of actual conditions that result from infrequent large or prolonged rainfall events.
- The pre-mining water level was reported at about 355m RL (35mbgl) to the north of WQN and about 367m RL (23mbgl) in WQS.
- The pre-mining historical regional groundwater flow direction is in a north-north-east direct.
- Current (February 2025) local groundwater levels range from highest around the south (Camp Bore 367m AHD; 23.25mbgl) to 360m AHD (32.0 mbgl) to the north (WQRC-BK006).
- Stratigraphic units in order of increasing depth:
    - Alluvial and aeolian superficial sediments (**Aquifer were saturated**)- Local ferricrete formations may be preferential pathways that transmit rainfall recharge to low lying areas.
    - Saprolite clay (**Aquitard**) - Extremely weathered saprolitic clay that is normally of low to very low hydraulic conductivity and forms an aquitard when below the water table.
    - Saprock (**Aquifer where saturated**)– moderately weathered bedrock, varying between being an aquitard to aquifer of low to moderate hydraulic conductivity. Locally, the saprock interval maybe transmissive along contact zones and/ or fault or shear zones.
    - Fresh bedrock (**Aquitard**) - generally massive and non-fractured and is regarded as a regional aquitard that is expected to yield little groundwater.
- The alluvial sediments occur to a depth of about 5mbgl (385m AHD) on the northern side of WQS and about 27mbgl (363m AHD) on the southern side. Surface water infiltration into these shallow deposits is probably an important mechanism for local groundwater recharge.

Locally enhanced permeability along a north-south shear zone (Western Queen shear zone) may provide groundwater connectivity between WQN and WQS. Associated hydrogeological characteristics include:

- The fracturing intensity and saprock thicknesses were found to be widely variable between drillholes. Both were enhanced at contact zones between rock types and the Western Queen shear zone.
- Typical of fractured rock groundwater environments, aquifers associated with saprock, and geological structures are irregular, inhomogeneous, and anisotropic.
- Historical groundwater inflows at WQN and WQS were linked to lithological contact zones and rock fractures associated with local geological shear zones and structures.
- Based on AECOM’s experience in similar settings in the Goldfields Region, the apertures of fractures in fresh bedrock and their transmissivity tend to decrease with depth.

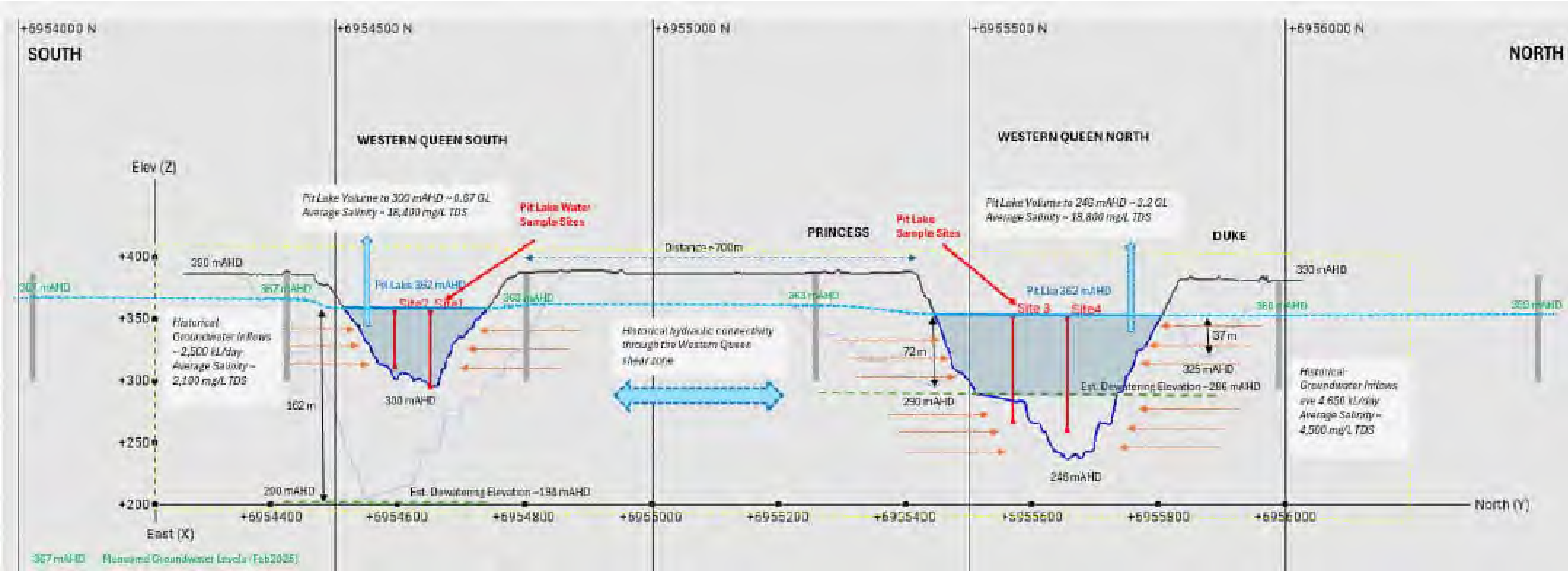

Figure 13 Conceptual Hydrogeological Model

- Current pit lake elevations are estimated at approximately 362m RL for both pits.
- Based on in situ water quality sampling, pit lake salinity is approximately 18,400mg/L TDS for WQS and 18,800mg/L TDS for WQN.
- Hydraulic properties derived from WQN pumping tests reported an adopted Transmissivity value of 75 m^2/day to 84 m^2/day and a Storage Coefficient of 0.013 (dimensionless).
- No aquifer tests have been reported at WQS, however the Specific Yield (Sy) of 0.02 was derived from WQN.
- The high transmissivity value of 84 m^2/day determined for WQN was not considered appropriate for WQS. An aquifer transmissivity of 30m^2/day and hydraulic conductivity of 0.5 m/day were estimated by Morgan (2000).
- Historical dewatering abstraction of up to 54 L/sec (4,650 kL/day) were reported from WQN (Morgan, 1999) and 30 L/sec or 2,500 kL/day during mining of WQS (Morgan, 2000).
- Historical groundwater is reportedly fresh to slightly brackish, sodium chloride type with TDS concentrations at WQN ranging up between 2,000 mg/L and 10,660 mg/L (average 4,500 mg/L TDS) and between 1,200 mg/L and 3,700mg/L (average 2,100mg/L TDS) at WQS. Groundwater is generally neutral to slightly alkaline pH (pH 7.9 to 8.1).
- Heavy metals are mostly below the detection limits set by ALS Environmental laboratory indicating that heavy metals are not of environmental concern.
- An east to west surface water drainage feature that once crossed the WQS pit is now bunded to divert flows around the WQS pit. Ponding behind this bund may be contributing to local recharge during higher rainfall events that could be expressing as seepage in the nearby wall of the WQS pit.

Figure 14 presents a schematic conceptual cross-section, focusing on the WQS hydrogeology.

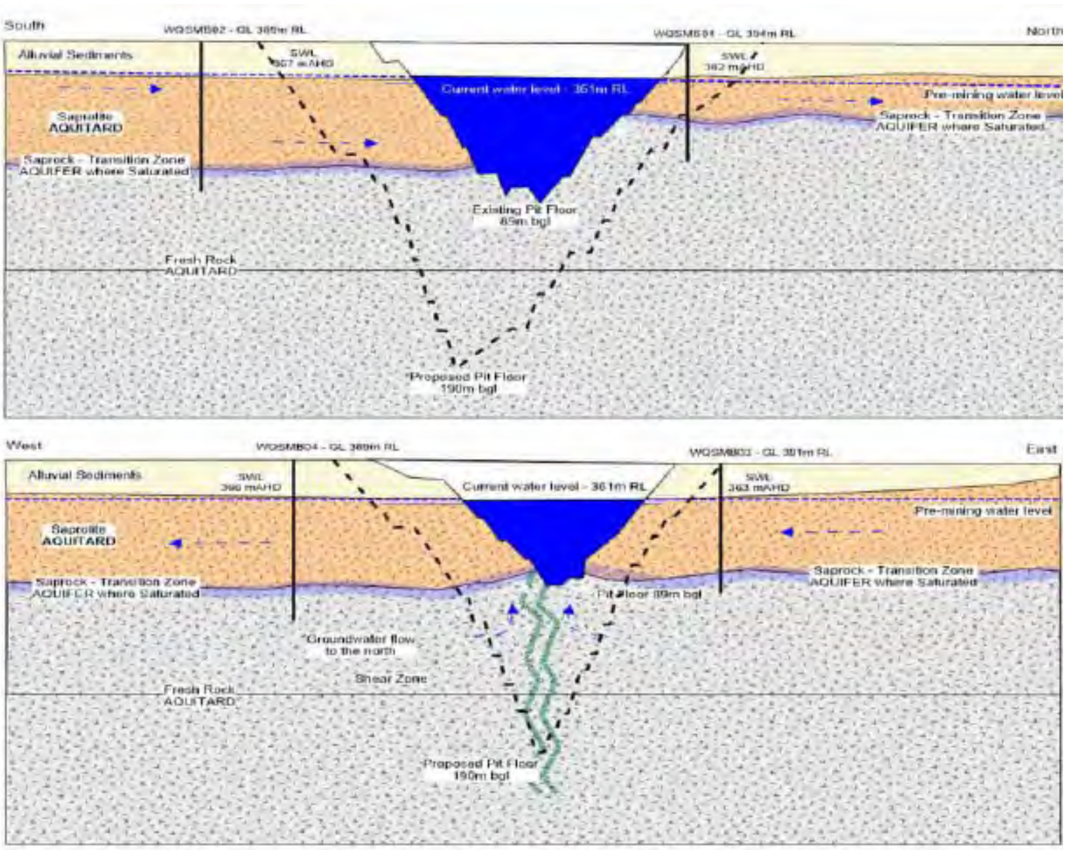

Figure 14 WQS - Conceptual Hydrogeological Cross Section

5.0 Dewatering Assessment

The following characteristics usually define cost effective and efficient dewatering strategies for typical fractured rock environments in the Western Australian goldfields:

- Aquifer zones are irregular, inhomogeneous and anisotropic, meaning dewatering must target sometimes narrow or discrete fractured intervals that are connected and drain to broader and less permeable materials beside and above them.
- Shallow water table aquifers within upper alluvial sediments (vuggy ferruginous clay) overlying saprolite can give rise to continuous seepage and rewetting of open pit walls where they are exposed.
- Abstraction from the saprock often drains relatively large volumes of groundwater stored in overlying saturated saprolite and transmits it as seepage to pit walls. Larger thicknesses of saturated saprolite along geological shears also store large volumes of groundwater but are of low permeability meaning flows from these deep structures can persist for longer periods than general saprock exposures elsewhere around the pit.
- Discrete zones of highly fractured rock along contact zones and geological shear zones and structures are often preferential and sometimes deeper flow paths for groundwater entering pits.
- The high degree of anisotropy and hydraulic connectivity between geological shears and structures can lead to discrete and sometimes irregular pathways for groundwater to enter pits.

5.1 Pit Lake Dewatering

Proposed mine development includes:

- Princess deposit south of the existing WQN pit
- Duke deposit north of the existing WQN pit
- Extension and deepening of existing WQS pit

The key focus for the proposed re-development is the WQS expansion. The smaller proposed WQN Princess and Duke cut-backs are still been evaluated and may have pit floors above the water table and therefore require minimal dewatering. The WQS expansion will be required the existing WQS pit to be dewatered with mining proposed to 200m AHD.

As part of the mining requirements to achieve required depths within WQS, the pit lake in WQS is proposed to be transferred to the pit lake in WQN. The elevated salinity (18,400 mg/L TDS) in WQS, is equivalent to water current stored in WQN, however has been deemed unsuitable for discharge direct to local creeks and streams. However, with a salinity concentration ranging between approximately 1,000 mg/L and 3,700 mg/L TDS and similar to local groundwater characteristics, managing future excess WQS groundwater inflows will also include discharge to local creeks.

Table 15 presents a summary of current and proposed pit volumes and water storage capacities.

5.1.1 Western Queen North

5.1.1.1 Pit Volumes

To a low pit crest estimated at 390m AHD, WQN pit has a total volume of approximately 5,745,000 m^3. The pit currently holds approximately 3,177,000 kL or 3.2 Gigalitres (GL) of water (based on a pit lake elevation estimate of 362m AHD). For use as a future water storage facility, it is proposed to allow a total water storage capacity to within 3m of the low pit crest. At this proposed 1.5m below low pit crest elevation of 388.5m AHD, an additional water storage capacity of about 2,209,000 kL or 2.2 GL is available to manage project related excess water.

Table 15 Summary of Pit Lake Volumes and Water Storage Capacities

Void	Option	Total Current Pit Volume	Proposed Total Pit Volume	Current Stored Water Volume	Total Volume 1.5m Below Low Pit Crest of 390m AHD	Remaining Water Storage Capacity to 1.5m Below Low Pit Crest of 390m AHD
		m^3 (or kL)				
WQN	Current WQN	5,754,000	-	3,177,000	5,422,000	2,409,000
	Princess Deposit (290m AHD)	-	1,093,000	-	1,013,000	-
	Duke Deposit (325m AHD)	-	430,000	-	396,000	-
	WQN - Including Extensions	**-**	**7,277,000**	**-**	**6,832,000**	**3,818,000**
WQS	WQS	2,122,000	-	672,000	1,913,000	1,344,000
	WQS Proposed Extension	**-**	**8,817,000**	**-**	**8,319,000**	**-**

Importantly, the 1.5m below low pit crest elevation allows for buffer capacity (about 330,000 kL) to negate any risk of overtopping from high rainfall events. Although the area is heavily degraded from past mining, this maximum pit lake water elevation minimises potential impacts on local vegetation as a result of the mounded groundwater (about 25m) within the pit (Figure 14).

5.1.1.2 Pit Water Quality

Based on laboratory results, the current pit lake water quality exhibits:

- TDS between 18,200 mg/L and 31,100 mg/L. The highest TDS value was encountered form the sample (WQN3) at 75m depth but was not the deepest sample taken (92m, 19,200 mg/L). It is possible this sample may have a higher TDS due to the sample bailer hitting the side walls of the pit. TDS concentrations have exceeded ANZECC 2000 Livestock DW Low Risk Trigger Values.
    - Excluding the sample at 75m, average TDS for the pit is 18,600 mg/L.
- pH ranging from 8.14 to 8.34. Generally, pH was found to be decreasing with depth of water.
- Exceedances in metal content compared to screened criteria mentioned in Section 3.2 and were found generally throughout the water column. Exceeded metal concentrations include Aluminium, Cobalt, Molybdenum, Uranium and Vanadium. There was also a sulphate exceedance noted in sample at 75m depth.

5.1.2 Western Queen South

5.1.2.1 Pit Volumes

Similar to WQN, WQS has an estimated low pit crest of 390m AHD, with a total current volume of approximately 2,122,000 m^3. The pit currently holds approximately 672,000 kL or 0.7 Gigalitres (GL) of water (based on a pit lake elevation estimate of 362m AHD).

With the proposed dewatering strategy of moving water stored in WQS to WQN, the 0.7 GL of water is significantly less that the available remaining capacity of WQN or 2.2 GL.

5.1.2.2 Pit Water Quality

Based on laboratory results, the current pit lake water quality exhibits similar water characteristics as WQN pit water and therefore concluded as like for like. Key WQS pit water quality characteristics include:

- TDS between 18,400 mg/L and 18,900 mg/L. The highest TDS value was encountered at the deepest point in the sampled water column (WQS2) at 50m. Average TDS is 18,725 mg/L.
- pH ranging from 7.63 to 8.22.
- Similar exceedances in metal content compared to screened criteria as reported for WQN. However, exceeded metal concentrations was only reported for Cobalt at 18m depth (WQS4).

5.2 Groundwater Modelling

A simplified analytical groundwater model was developed to determine indicative dewatering rates and drawdown extents for the proposed WQS development. These models incorporate the following:

- simplified geological layering and groundwater flow paths.
- an indicative groundwater table
- simplified pit voids and depths
- dewatering requirements based on indicative mine schedule for each open pit (Mega, 2025).

The lower- and upper-case range provides an envelope within potential groundwater inflows are likely to be within. Based on the above, Table 14 presents analytical model inputs and Table 15 presents a summary of the refined range of hydraulic properties for the key local aquifer units for each domain.

An analytical groundwater modelling solution, ANSDIMAT (www.ansdimat.com, 2024), was used to predict groundwater inflow to the proposed open pit.

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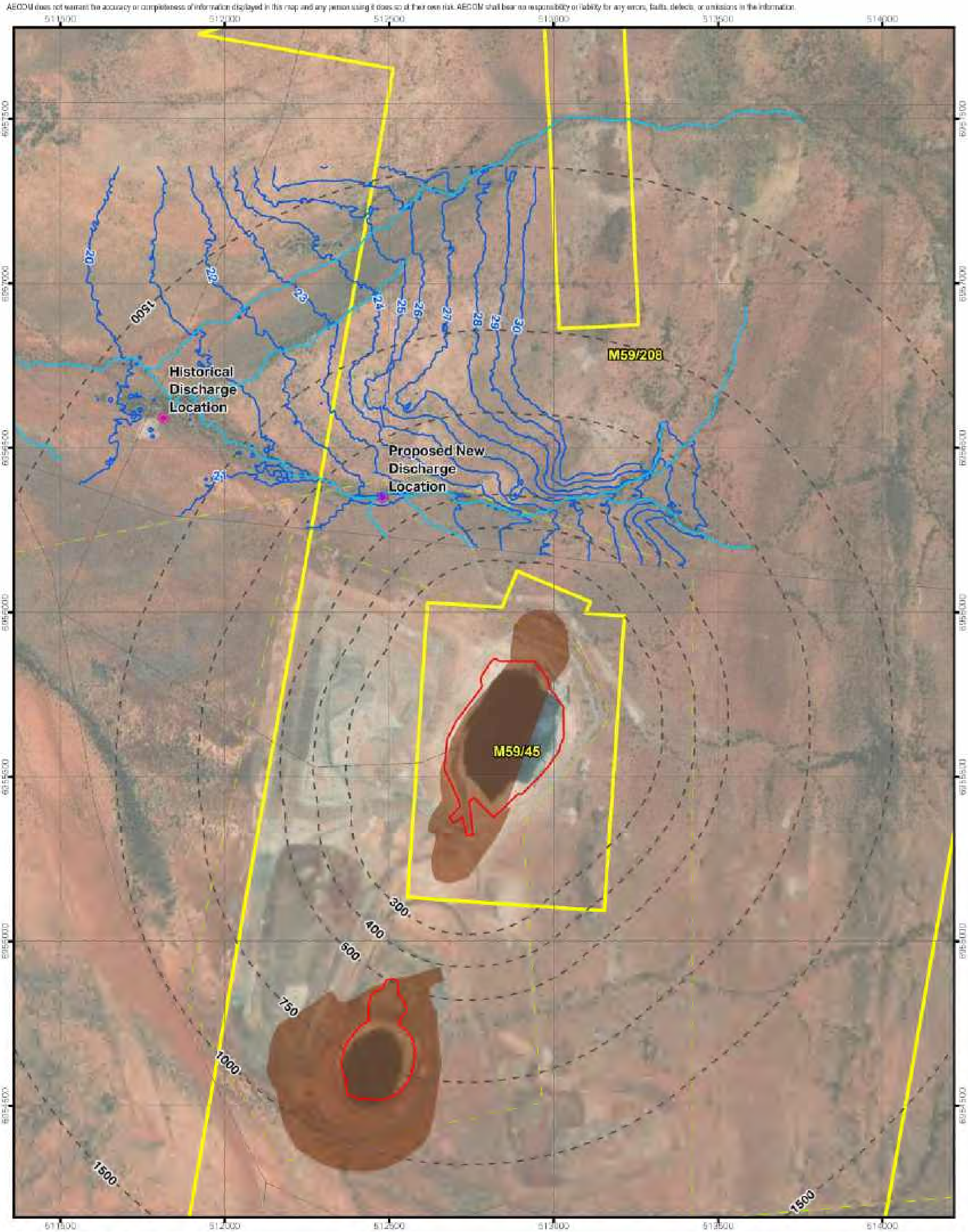

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PROJECT ID 60716551 CREATED BY ROBMCGREGOR
DATE MODIFIED 05 JUN 2025 APPROVED BY G.BROPHY

N

1:15,000

0 100 200 300 400

metres

GDA 1994 MGA ZONE 50

LEGEND

- Western Queen Tenements
- Existing Pit Outline
- Proposed Pit
- Pit Buffers
- Impact Zone
- Model Drainage Lines
- Inferred Depth to Water Contours (m)
- Site_Labels (Query)
- Label
- Historical Discharge Location
- Proposed New Discharge Location

Modelled Predicted Depth to Groundwater Contours

WESTERN QUEEN

WESTERN QUEEN DEWATERING ASSESSMENT

Figure 15

A4 size

Table 16 **Summary of Analytical Modelling Inputs**

Proposed Open Pit	Est. Length	Est. Width	Est. Pit Area	Est. Ground Level Elevation	Est. Max Pit Floor Elevation	Est. Pit Dewatering Depth	Est. Depth to Water	Est. Groundwater Level Elevation	Est. Drawdown Required	Indicative Dewatering Durations	Saprolite/ Saprock Aquifer Thickness	Fresh Aquifer Thickness	Est. Fresh Rock Aquifer Thickness	Total Aquifer Thickness
	(m)	(m)	(m^2)	(m AHD)	(m AHD)	*(incl. +6m)* (m)	(m bgl)	(m AHD)	(m)	(Days)	(m)	(m)	(m)	(m)
WQS Development	550	390	214,500	390	200	196	28	362	168	608	60	135	78	195

Table 17 **Summary of Local Domain Hydraulic Properties**

Proposed Open Pit	Ave. Bulk Transmissivity (T) (m^2/day)		Ave. Bulk Hydraulic Conductivity (k) (m/day)				Specific Yield		Storage Coefficient
	lower	upper	lower		upper		lower	upper	
			k, m/day	kz, m/day	k, m/day	kz, m/day	Sy		
WQS Development	4	8	0.02	0.002	0.04	0.004	0.01	0.01	0.01

Key assumptions for the modelling are:

- Open pit dimensions were based on footprints provided as SHP file (*HMY_WQ_PitOutlines_region.shp*, provided February 2025).
- Proposed pit depths were based on the pit shells provided (*WQS_mga_pit1403-ascon-eom-final1.dtm*, provided February 2025).
- Proposed mine durations for WQS of 577 days (*WQ pit BENCH BY BENCH.xlsx*, Mega, 2025).
- Pseudo steady-state groundwater inflow rates have been based on final predicted inflows at the end of the indicative mining duration. Higher short-term inflow rates are possible at the beginning of dewatering.
- Dewatering elevations set at 6 m below the maximum pit floor.

Bulk hydraulic conductivity estimated based on saturated thickness for each pit location.

Table 18 presents a summary of predicted range of groundwater inflows, with graphical plots of predicted groundwater inflows with time for each proposed open pit presented on Figure 16.

Table 18 Summary of Preliminary Dewatering Modelling Results

Deposit	Run No.	Conceptual Model	Simulation Type	Scenario[1]	Simulated Number of Bores	Drawdown	Estimated Dewatering Duration[2]	Average Abstraction Rate	
						(m) +6m		(kL/day)	L/sec
WQS	1	Confined Partially Penetrating Strip no-flow boundary	2,500m wide strip no-flow boundary to promote flow along structural feature	Lower-case	6	195	608 days	2,300 to 3,200	27 to 37
	2			Upper-case		195		3,600 to 5,800	42 to 67

Note [1] – lower and upper-cases based on hydraulic property range
Note 2 - Mega, 2025

Observations from the WQS analytical groundwater modelling include:

- Higher predicted dewatering rates of between approximately 2,300 kL/day (27 L/sec) and 5,800 kL/day (67 L/sec) from the proposed WQS open pit due to a deeper proposed depth, larger excavated area/volume and dewatering elevation (200 mAHD).
- A total estimated annual abstraction volume of between:
  - 666 ML/annum and 1,300 ML/annum for a 1-year period.
  - 1,400 ML/annum and 2,700 ML/annum for a 1.6-year period.
- Predicted drawdown (1 m contour) extends up to 1.7 km in the lower-case and 2.0 km in the upper-case scenarios.
- Predicted drawdown will remain within the M59/208 lease boundary.

A plot of predicted drawdown extent for the lower-case scenario is presented on Figure 17.

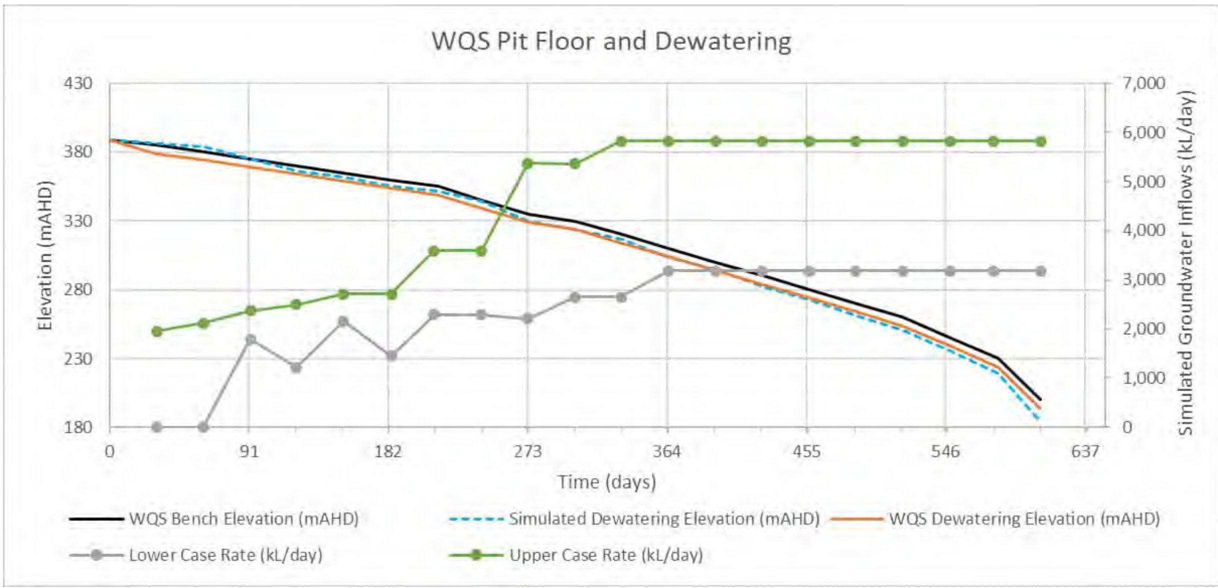

Figure 16 WQS Predicted Groundwater Inflows

A composite of predicted groundwater inflows for the proposed WQS mine schedule is presented on Figure 16**.** Abstraction rates with time, to meet the mine schedule are presented in Table 17. Based on the predictive modelling, an indicative reasonable case (lower-case) maximum abstraction is predicted to be up to about 1.0 GL/annum.

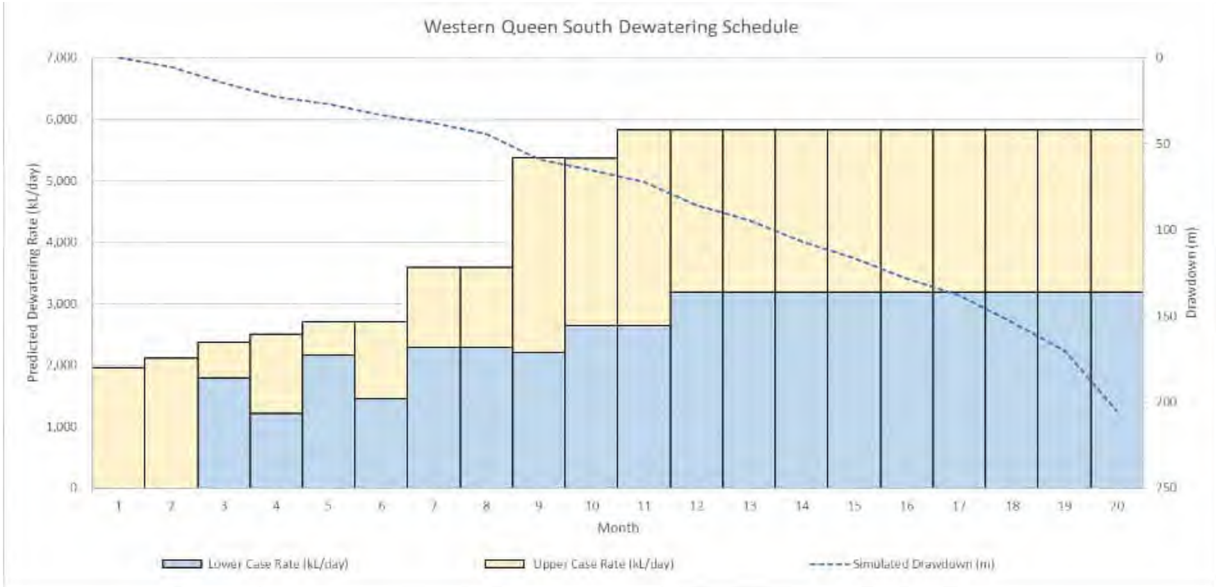

Figure 17 Predicted Dewatering Schedule

The combined lower- and upper-case predicted drawdown footprints for the WQS pit are presented on Figure 18. This figure shows the predicted drawdown forms a hydraulic sink and a capture zone that covers the following areas:

- WQN pit lake area, with potential drawdown up to 20m that may result in recirculation of stored water.
- The Camp Bore area with a water level drawdown up to 50m that may negate future use.
- The proposed excess water discharge location that may result in a proportion flowing back towards the hydraulic sink.

Table 19 Summary of WQS Predicted Dewatering Rates

Time (days)	Simulated Drawdown (m AHD)	Model results-Lower case (kL/day)	Model results-Lower case (L/sec)	Model results-Upper case (kL/day)	Model results-Upper case (L/sec)
31	0	0	0	1,959	23
61	5	0	0	2,116	24
92	15	1,795	21	2,376	28
122	22	1,218	14	2,502	29
153	27	2,157	25	2,710	31
184	33	1,450	17	2,710	31
212	38	2,292	27	3,598	42
243	44	2,292	27	3,598	42
273	59	2,215	26	5,375	62
304	65	2,648	31	5,362	62
334	72	2,648	31	5,831	67
365	85	3,187	37	5,831	67
396	94	3,187	37	5,831	67
426	107	3,187	37	5,831	67
457	116	3,187	37	5,831	67
487	128	3,187	37	5,831	67
518	138	3,187	37	5,831	67
549	154	3,187	37	5,831	67
577	170	3,187	37	5,831	67
608	205	3,187	37	5,831	67

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PROJECT ID	60746551	CREATED BY	ROB.MCGREGOR
DATE MODIFIED	05 JUN 2025	APPROVED BY	G.BROPHY

1:25,000 (when printed at A4)

0 100 200 300 400 metres

GDA 1994 MGA ZONE 50

LEGEND

- Western Queen Tenements
- Existing Pit Outline
- Proposed Pit
- Drainage Lines
- Fences
- Existing Monitoring Bore
- Existing Production Bore
- Modelled Lower Predicted Groundwater Contours
- Modelled Upper Predicted Groundwater Contours
- Historical Discharge Location
- Proposed New Discharge Location
- Inferred fault
- Shear
- Regional Structures (500k)

Modelled Predicted Groundwater Contours

WESTERN QUEEN

WESTERN QUEEN DEWATERING ASSESSMENT

Figure 18

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A4 size

6.0 Fractured Rock Dewatering Options

Advanced pit dewatering and mine water management aims to improve mine production safety and efficiency by creating dry, stable operating environments. The following presents dewatering options based on:

- local groundwater conceptual hydrogeological model.
- an understanding that the local hydrogeological characteristics and dewatering options and opportunities are formed around low permeability and low groundwater yielding, compartmentalised fractured rock environments.
- historical dewatering strategy and reported challenges and geotechnical issues.
- experience from other Western Australian Goldfields operations in similar hydrogeological conditions, whereby nuisance groundwater impacts the mine's productivity.

The benefits of efficient mine dewatering include maintaining workable dry conditions to avoid flooding and provide more efficient operational conditions such as improved trafficability and digging, better blasting conditions, and reduced moisture content of ore, product and waste. In addition, where possible, effective advanced dewatering promotes more geotechnically stable conditions by reducing in-pore water pressures, allowing steeper side slopes and increased factors of safety, and reducing erosion and piping of weak zones in slopes.

6.1 Defining Options

Following completion of the hydrogeological assessment, it is apparent that local characteristics will drive the success of future dewatering management options to minimise groundwater related impacts to mining productivity. These characteristics include:

- The key groundwater flow paths to the pits are oriented vertically and horizontally along zones of fractured rock associated with rock contact zones and faults.
- A deeper fractured rock environment with a high degree of spatial variability in permeability as evident in drilling and by slug tests during site investigation.

Importantly, depressurisation and dewatering management options are based on identified constraints and success factors including:

- efficiency of groundwater recovery i.e. design based on yields.
- optimal spacing of drain holes (if required) based on targets identified from available datasets.
- location of dewatering options / methods based on other constraints i.e. mine schedules, and long-term access.
- passive (gravity drainage to a central sump/s) vs. active abstraction (sump or bore abstraction).
- dewatering systems compatible with mine closure.
- constructability i.e. accessing groundwater in a fractured, compartmentalised bedrock environment.

Several potential dewatering methods identified include:

- **Option 1: Dewatering Bores** – to abstract groundwater from deeper flow paths in-pit or ex-pit, depending on their depth, interconnectedness and permeability. Their effectiveness can be limited in deep fractured rock settings due to the low hydraulic conductivity and often compartmentalised nature of these aquifers. In-pit bores are often sacrificial and only effective for short periods.
- **Option 2: Shallow Sumps** – to intercept gravity drainage from seeps and drain holes on the pit floor.
- **Option 3: Preferentially Sloped Pit Floor** – to allow for gravity drainage across a sloped pit floor to strategically placed sumps, potentially on deep permeable structures to intercept groundwater inflows.

- **Option 4: Horizontal Drain Holes** – to gravity drain and depressurise rock contacts and fault zones behind pit walls to improve geotechnical stability using a system of closely spaced interconnected drain holes.

Several management options were considered to meet the project objectives. These are defined in the following section.

6.1.1 Option 1: Dewatering from Bores

Historically, dewatering at WQN was initially undertaken using dewatering bores installed external to the open pit development. To complement these bores, dewatering was also achieved through pumping from an existing open shaft. In-pit sumps pumping was also completed as a final strategy. There are no historical reports reporting the using of horizontal drains in WQN.

The main dewatering strategy undertaken for WQS was the use of in-pit sump pumping. No dewatering bores were installed following little success in intersecting holes with suitable yields. It was apparent that higher than expected groundwater inflows were encountered as mining progressed through the Saprock/ Transitional material. Significant pit wall instability was reported during mining of WQS.

To complement WQS sump pumping, horizontal drainholes were also installed to reduce pit wall pore pressures noting groundwater inflows averaging around 2,600 kL/day (30 L/sec) for the duration of mining.

Based on the propagation of groundwater level drawdown during initial test pumping and dewatering, it was reported connectivity between WQN and WQS was evident.

With the above in mind, potential ex-pit dewatering bore locations should be established during the period of pit lake pumping and drain-down. These bores should be equipped to maintain dewatered conditions once the void has been drained. Investigations should be targeted based on historical findings such as, in order of priority:

- Target for one bore north and one bore south of WQS along the north-south shear zone.
- Test the potentially high yielding zone on the South-east of WQS pit.
- Target south of WQN to capture potential groundwater flows from the mounded WQN pit lake to minimise water flow back to WQS via the known shear zone.
- All investigation holes should target shears and structural features at depth to allow long-term dewatering below the proposed pit floor.

If groundwater exploration proves successful (based on sufficient yields and aquifer thickness), separate production bores should be drilled and cased using nominal 200mm steel casing. Production dewatering bores should be equipped with electrical submersible pumps, flow meters and dip tubes to allow measurement of groundwater levels.

Typical bore construction details include:

- Nominal depths typically 80m deep but up to 200m deep if deeper fractured rock zones intersected.
- Drill at nominal 150mm diameter to assess groundwater yields are suitable for production bore installation.
- Ream exploration bore to nominal 300mm diameter hole.
- Install 200 mm diameter casing with a minimum of four slotted lengths (4 x 6m) spread over the water bearing zone identified from the exploration hole results.
- Hang the casing under tension and backfill the annulus with gravel.
- Develop the bore until non-turbid water flows.
- Perform pumping tests to determine pumping duty rate and drawdown influence for efficient dewatering.

Figure 19 presents a typical fractured rock dewatering bore design.

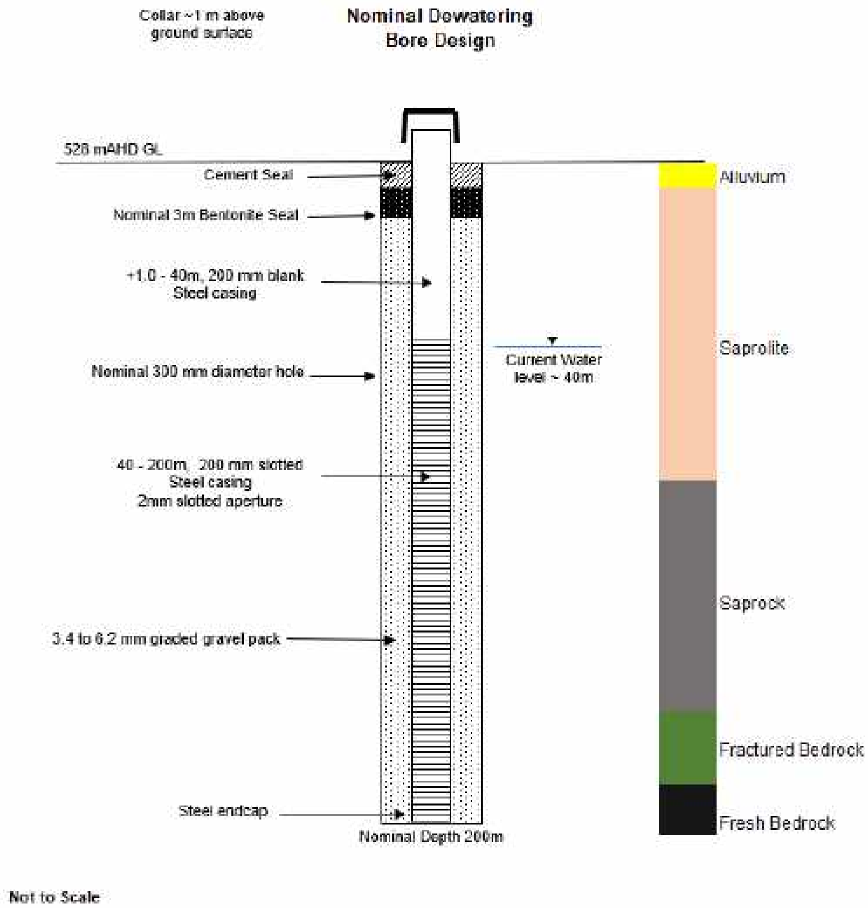


Figure 19 Dewatering Bore Conceptual Design

6.1.1 Option 2: Dewatering from Shallow Sumps

The shallow sumps are aimed at targeting both localised groundwater and surface water drainage on the pit floor only. Ideally shallow sumps should:

- be situated in low-lying areas on the pit floor to allow for passive gravity drainage.
- include a sump pumping system that maintains a pumping water level of about 3.5 mbgl i.e. not allowing the sump to fill before it is emptied, to promote drainage of the pit floor.
- be connected to direct the abstracted water to a dedicated tank or turkey's nest outside the open pit via a rising main pipeline. As mining progresses to deeper depths, a booster pumping system may be required to transfer all sump abstractions from the pit.
- receive gravity-fed drainage from horizontal drain holes (if required) via dedicated collector pipelines.
- include infrastructure to record the abstraction rate and volume data to allow for efficient management and regulatory reporting.

Due to the nature of the bedrock material, it is likely a rock breaker would be required to extend sumps to the maximum depth possible. This may need to be preceded by targeted blasting where sump locations can be maintained for longer periods.

Based on historical exploration and the nature of the fractured bedrock, sump pumping rates up to 2,600 kL/day (30 L/sec) may be required in the short-term (if not external bore dewatering bores are installed). Local experience suggests the rates will decline as the local groundwater storage is removed. Therefore, a pumping system capable of variable pumping rates will be required to meet the dewatering objective.

Figure 20 presents the conceptual shallow sump design.

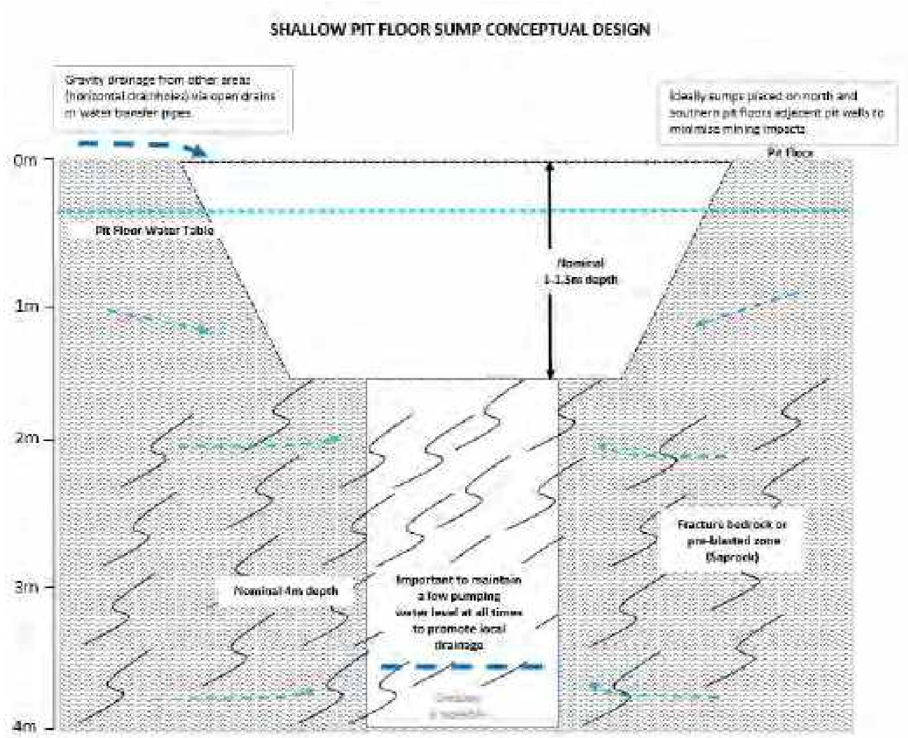


Figure 20 Shallow Sump Conceptual Design

6.1.1 Option 3: Preferentially Sloped Pit Floor

In compartmentalised, fractured rock environments where the fractures are poorly interconnected this can be a challenge. To achieve passive drainage of the pit floor, sump locations should not only target local groundwater flow features i.e., faults where possible, but also be designed in the lowest areas of the pit floor.

An opportunity to have a slightly sloped pit floor or advanced mining in one or both ends of the pit may be advantageous for maximising mining productivity. This approach would allow groundwater levels to be pumped and maintained at lower elevations result in dry pit floor areas.

The effectiveness of this option may be constrained by how many permeable fractures are exposed across the pit floor that the sloped pit can direct the inflows to. Another potential constraint will be to maintain positive drainage to the sumps in a dynamic pit floor setting.

6.1.2 Option 4: Pit Wall Depressurisation via Horizontal Drain holes

A previously undertaken in prior mining campaigns at Western Queen, a depressurisation strategy to improve geotechnical stability by lowering pore pressures in the saprolite and saprock units was accomplished using horizontal drain holes. These drain holes are drilled into the pit slopes to allow water pressures to reduce passively by bleeding off small quantities of shallow groundwater into the pit.

Few details are available with the previous implementations of horizontal drains, however, drain holes should:

- be targeted towards rock contact and / or fault zones.
- be drilled to target the zones between 50 mbgl and 75 mbgl and hole depths of up to 50m.
- be drilled at a slightly upward angle (5 degrees) into the pit face to allow groundwater to free drain out into the pit.
- be drilled at hole collar spacings in the range of 20 to 50 m depending on azimuth of adjacent holes.
- include sealed headworks to allow discharges to be piped to the pit floor sump.

Uncontrolled groundwater flows from horizontal drain holes may pose a future pit wall stability risk in areas of highly weathered material. Figure 21 presents a typical horizontal drain hole design system concept.

6.2 Assessment of Options

The options considered include:

- **Option 1: Dewatering Bores** – to abstract groundwater from deeper flow paths in-pit or ex-pit, depending on their depth, interconnectedness and permeability. Their effectiveness can be limited in deep fractured rock settings due to the low hydraulic conductivity and often compartmentalised nature of these aquifers. In-pit bores are often sacrificial and only effective for short periods.
- **Option 2: Shallow Sumps** – to intercept gravity drainage from seeps and drain holes on the pit floor.
- **Option 3: Preferentially Sloped Pit Floor** – to allow for gravity drainage across a sloped pit floor to strategically placed sumps, potentially on deep permeable structures to intercept groundwater inflows.
- **Option 4: Horizontal Drain Holes** – to gravity drain and depressurise rock contacts and fault zones behind pit walls to improve geotechnical stability using a system of closely spaced interconnected drain holes.

Key considerations associated with each of the options are presented in Table 20.

A cost effective and efficient dewatering system may incorporate elements of several of the above options. Dewatering options are often implemented within a framework of adaptive management, with monitoring data used to guide refinement in the system through time.

In context to the local characteristics (fractured rock environment), the constructability and maintenance of sumps may be a challenge. Based on successful outcomes in similar environments from strategically placed sumps and bores, it is recommended to focus future dewatering management on refinement of these options within the context of short-term and medium-term mine planning.

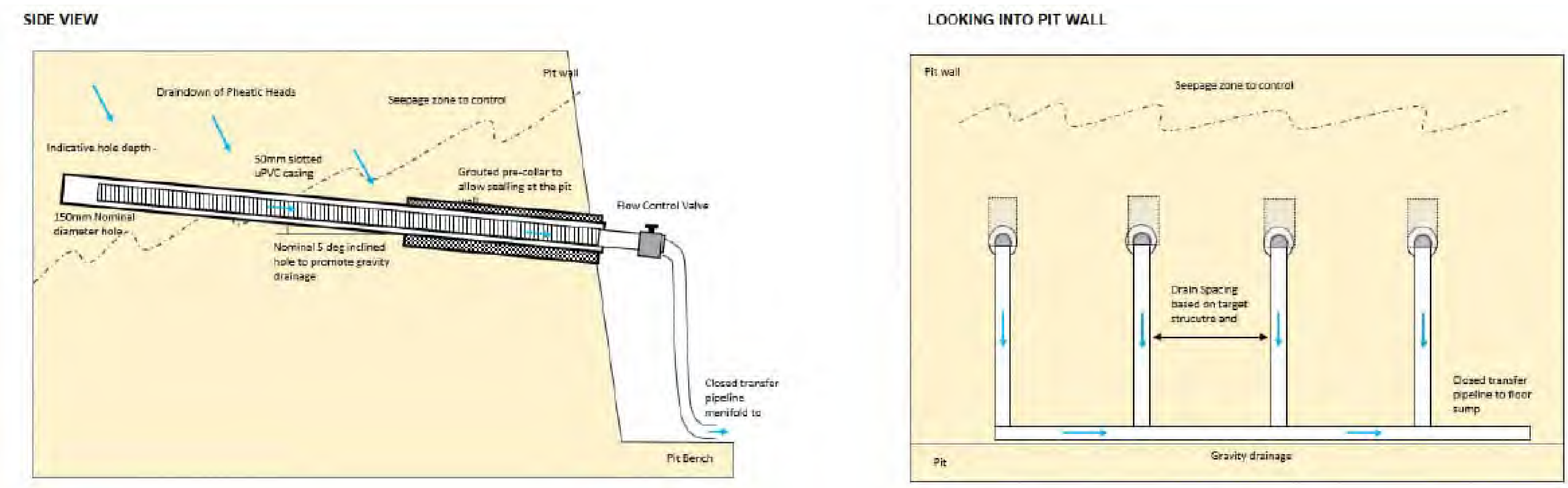


Figure 21 Horizontal Drain Hole Conceptual Design

Table 20 Dewatering Option Considerations

Key Consideration	Description
Short-term Mine Plan Reduces Water Logging of Pit Floors from Direct Inflow and Wall Seepages (0 to 0.5 year)	• Option 1 provides opportunities to dewater ex-pit via strategically placed bores assuming the intersected fractures are connected to deep fractures within the pit. • Option 2 provides a solution for shallower zones accessible from the pit floor. • Option 3 may not be feasible in early mine developments but could be increasingly effective as the pit depth progresses below the water table. • Option 4 addresses geotechnical drainage of groundwater inflows at elevated heads behind pit walls. A closed drainage system to an in-pit sump minimises uncontrolled water on pit walls and ponding on pit floors causing ponding and dewatering issues.
Medium-term Mine Plan Reduces Water Logging of Pit Floors from Direct Inflow and Wall Seepages (0.5 to 1.6 years)	• Option 1 with bores positioned outside active mine areas to provide ongoing dewatering as required. In low-permeability environments drawdown from the bores may be limited meaning they should be located within the pit. Ex-pit bores are most effective where the aquifers extend into the pit. Bores may also intercept groundwater flows within the saprock aquifer that would otherwise discharge into the pit, but this often constrained by saturated thickness and permeability. • Option 2 only provides a solution for the shallower flow paths on the pit floor and is likely to be effective at a local scale. • Option 3 provides opportunities to manage groundwater inflows by positive drainage towards one or both ends of the pit floor, minimising impacts to mine productivity. • Option 4 with pre-planned, passive gravity-drained water including controlled transfer to a sump can provide ongoing wall depressurisation and reduce ponding on pit walls and the floor. This option must be pre-planned before site access becomes limited.
Constructability	• All options will intersect varying degrees of fracturing and depth of fracturing. Some areas may intersect shallow fresh bedrock that will limit excavation depths achievable. • Option 1 requires prospective yields from suitable aquifer intervals from exploration drilled holes to allow efficient dewatering bore installations. • Option 2, and Option 3 may require excavation into fresh but fractured bedrock that can hard to excavate and will require a rock-breaker or similar method. • Option 3 will require incorporation into mine plans and schedules. • Option 4 requires installation of drain holes on pre-planned benches prior to pit floor elevations are progressed deeper. Drainages will need to be conducted to a sump that may require ongoing modification and maintenance.
Cost	• The concept level construction cost estimates are as follows: Option 1: \$100,000/ 80 m deep steel cased ex-pit dewatering bore Option 2: \$50,000/ shallow sump Option 4: \$50,000/ 50 m deep drainhole

Key Consideration	Description
Risk	Key risks for each of the options are as follows: • Option 1: (dewatering bores) - variability in permeability of the fractured rock formation may lead to poor yielding dewatering bores and drawdowns that do not reach the pit. • Option 2 (shallow sumps): - effectiveness depends on permeability and connectedness of local fractures. - construction and cost risks associated with excavations. - maintenance of the sumps within active mine areas on pit floor. • Option 3: (preferentially sloped pit floor/ advanced mining) - Challenges with mining being able to implement option within a pre-existing mine plan and mining schedule. • Option 4 (horizontal drainholes): - construction and cost risks associated with collaring then casing deep horizontal drain holes. - limited interconnectivity within the fractured rock leading to low seepage recovery rates and variable depressurisation influence.

6.3 Mine Dewatering Risks

Consistent with other Goldfield WA mine developments, it is apparent, there is significant variability in the groundwater characteristics of the fractured rock environment. Historically, several areas intersected weathered and fractured bedrock of lower permeability resulting in lower rates of depressurisation behind the pit walls as dewatering progressed. Smaller drawdowns mean the phreatic surface may be close to the pit walls. This has in the past and may lead to future potentially higher geotechnical stability risks associated with hydraulic loadings in areas where seepage is still emanating from the pit walls.

Following this review, the key water related risks to the proposed open pit mine developments include:

- failure to achieve timely dewatering: potentially leading to a disruption meeting mine plans as per design, requiring systems that enable rapid upscale of capacity.
- maintaining adequate operational infrastructure to capture and removal of rainfall runoff and surface water flooding from high rainfall events within the pit in a timely fashion to minimise impacts on mining productivity.
- focusing on implementing a dewatering plan to manage low groundwater yields on the pit floor that result in impacts to mining productivity.
- not moving from a focus from intermittent shallow sump pumping to more of a focus on keeping groundwater levels well advanced of pit floor elevations to promote vertical drainage and dry mining conditions.
- not implementing successful depressurisation of pit walls to meet slope stability constraints i.e. the phreatic surface levels behind the pit walls.
- not implementing a closed capture and removal of ongoing groundwater inflows from spatially variable seepage zones within pit walls to limit ponding and erosion on inaccessible benches as the mine progresses with depth.

It is typical that a staged approach to mine dewatering and pit wall depressurisation is implemented along with targeted monitoring to allow the success and continual improvement of the plan.

7.0 Dewatering Management Strategy

Mining below the water table requires a mine dewatering plan or strategy that supports the capture and removal of groundwater (and surface water) inflows to facilitate dry mining conditions in active areas. It should also facilitate the depressurisation of unconsolidated soil material in the vicinity of open pit slopes and connected parts of the pit floors.

Because aquifers and aquitards do not release stored groundwater instantly, dewatering and depressurisation needs to be carried out ahead of mining to allow the flow system to drain before the inflows interfere with mining operations. The geotechnical stability on pit designs is dependent (to some degree) on drained or significantly depressurised slopes.

Similar to historical dewatering requirements, to enable re-mining of the WQS deposit, several groundwater related activities will be required including:

- pit lake dewatering
- advanced open pit dewatering
- management of excess abstracted mine water.

Figure 21 presents a schematic of the conceptual water management strategy.

Historical pit dewatering infrastructure (bores, sumps, horizontal drains, and creek discharge) at WQN and WQS were driven by estimates of potential groundwater inflow from initial desktop studies (Morgan, 2000, MWES, 2012b).

Furthermore, a geotechnical assessment completed in 2012 (Peter O'Bryan and Associates, 2012), included water related management recommendations that would drained/ depressurise the wall rock conditions. These recommendations included:

- drilling sub-horizontal (± 10^0) depressurisation (weep) holes once mining has progressed to the pre-mining water table. The initial depressurisation holes were to be drilled around the periphery of the pit at that level.
- The depressurisation holes were to be drilled to a length of ≥ 25m, which is inferred to be the minimum length which could conceivably be involved in slope instability.

It is important that the success and effectiveness of dewatering and depressurisation is monitored. Monitoring recommendations included:

- Installing several vertical groundwater monitoring bores (nominal 50mm diameter) along perpendicular transects nearby the main groundwater inflow zones and dewatering infrastructure (sumps, and bores) with monitoring bores located outside the pit crest and on suitable benches and the pit floor. Groundwater level monitoring aim at measuring groundwater level changes behind the pit wall.
- Installing several vertical groundwater monitoring bores (nominal 50mm diameter) parallel to the pit wall and near high groundwater inflow zones i.e. near horizontal drain holes, to determine the success of drain-down of water levels behind the pit walls. Monitoring results can help refine the dewatering/ depressurisation schemes as required to minimise potential future pit wall instability.

To complement the above historical recommendations, a conceptual dewatering scheme is outlined below.

7.1 Pit Lake Dewatering and Water Storage

To allow future deepening of the WQS open pit, the water stored within the existing pit will need to be removed. Historically, excess water has been stored within the WQN open pit located approximately 700m north of WQS. Based on the current pit lake level of 362m RL in WQS, an estimated stored water volume is at about 0.7 GL.

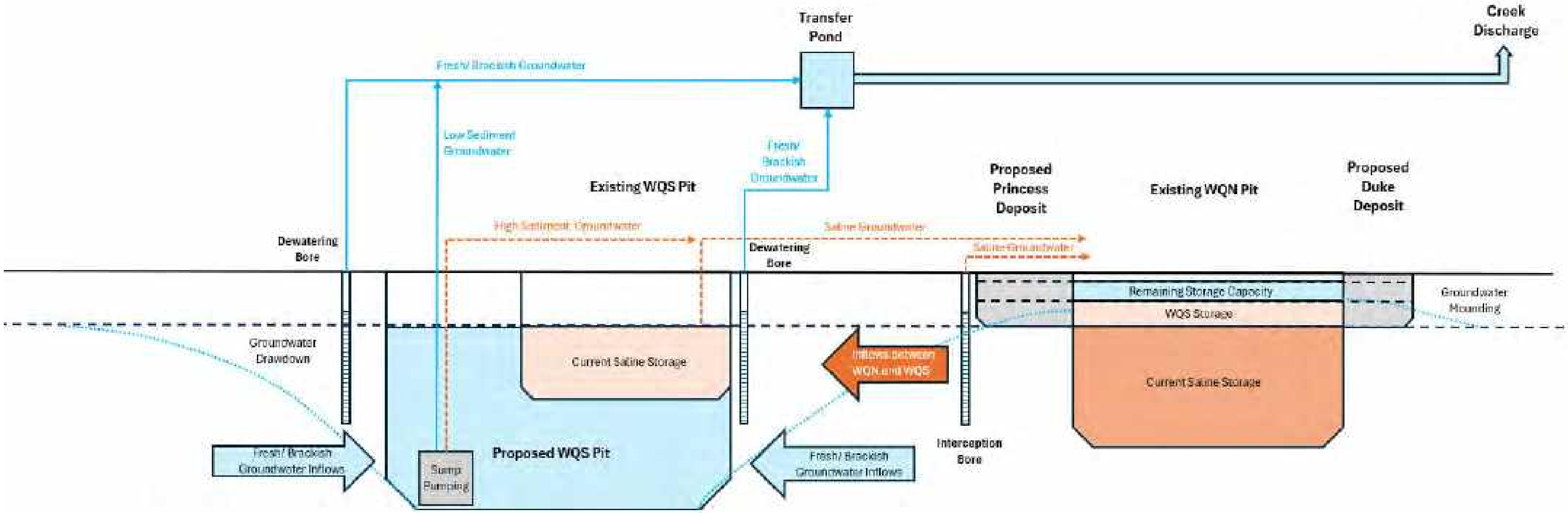


Figure 22 Conceptual Water Management Strategy Schematic

Pit lake dewatering is typically undertaken using a pontoon type pumping system. To minimise pit wall stability issues and allow groundwater water to drain and pore pressures to be lowered, it is recommended the pit lake be emptied over a period at least 90 days. Over the 90-day period an expected additional 0.2GL of dewater water from groundwater inflows is estimated, based on the assumed 2,200 kL/day, and an additional estimated 500 kL/day form interconnection between WQN and WQS. This equates to a total up to 1.0GL, that may require abstraction to allow access to the pit floor.

The water quality characteristics in both pits has been measured and are very similar and at lower pit lake elevations, suspended sediments will likely increase however, no environmental impact is foreseen with this water transfer strategy.

In our experience at other WA goldfields operations, the maximum pit lake elevation is defined by potential mounding related impacts on local vegetation and the groundwater resource, along with having enough remaining capacity to limit over-topping from high rainfall events. A high-level assessment of the propagation of predicted mounding from WQN reported groundwater levels are predicted to remain below about 20m bgl in the northern areas at distances of about 200m. Figure 14 presents predicted mounding controls to justify the 1.5m below the low pit crest of 390m AHD. Furthermore, at this proposed pit lake elevation, there is an estimated remaining storage capacity of about 330,000 kL.

With a reported current pit lake level in WQN of 362m RL the available storage volume in WQN is estimated at about 2.4GL, 1.5m below the current pit crest. With the proposed Princess and Duke pit developments, this may increase the total WQN storage capacity up to about 3.8 GL.

Transferring about 1.0GL (130 L/sec over a 90-day period) from WQS to WQN will reduce the remaining storage capacity to about 1.4GL, which allows for ongoing disposal of excess poorer quality mine water (>15,000 mg/L TDS) from dewatering WQS if required.

Based on the historical records for WQN, the current pit lake level (362m AHD) is above the assumed baseline groundwater level of about 355m RL. This suggests groundwater is already mounded relative to the regional water table and is currently in equilibrium with WQS current pit lake level (362m AHD). This will change as a result of water from WQS being stored in the WQN void.

There will be an expected change in cone of depression for both pits, with WQN shrinking and WQS expanding, due to the transfer of pit water. Due to the hydraulic connectivity of WQN and WQS through the Western Queen Shear Zone, it is also expected that groundwater inflows to WQS will increase in the North of the pit, and possibly in the region of the existing monitoring bore WQSMB001. WQSMB001 was the only monitoring bore that exhibited high TDS/ saline water quality. A strategically placed dewatering bore, close to WQN, may limit this recirculation back to WQS.

Although the immediate area around WQN is highly degraded in terms of vegetation as a result of historical mining operations, given the baseline groundwater was about 35mbgl, and the local vegetation had no dependency on groundwater it is unlikely that further mounding will cause impact to local vegetation while the water table remains below 3mbgl.

External groundwater level and quality monitoring may be required to confirm the extent and risks associated with mounding outside the open pit confines, particularly after the transfer of pit water from WQS to WQN.

Once the dewatering discharges to WQN cease, saprolitic and alluvial deposits that were temporarily saturated may become unstable as the pit lake level recovers if high hydrostatic pressures persist.

During abstraction, pumping rates and volumes should be recorded daily. Furthermore, survey of the pit lake elevation, at least weekly, will help predict remaining storage capacities and manage ongoing pit lake water transfers throughout the development.

7.2 Pit Dewatering

Based on previously reported dewatering challenges at WQS, the recommended dewatering strategy seeks to:

- Dewater ahead of mining to avoid difficult mining conditions i.e. boggy pit floor
- Lower pore pressures in the pit walls through targeted horizontal drains
- Control pit wall seepage and horizontal drain inflows through a closed collect system to minimise uncontrolled drainage to the pit floor and flows across benches
- Dewater using targeted ex-pit dewatering bores if feasible, to minimise disruption to mining.
- Targeting sumps in areas where inflows from geological shears will persist and pumping to minimise the accumulation of groundwater and surface water runoff.

Potential ex-pit dewatering bore locations should be established during the period of pit lake pumping and drain-down. These bores should be equipped to maintain dewatered conditions once the void has been drained. Investigations should be targeted based on historical findings such as, in order of priority:

- Target for one bore north and one bore south of WQS along the north-south shear zone.
- Test the potentially high yielding zone on the South-east of WQS pit.
- All investigation holes should target shears and structural features at depth to allow long-term dewatering below the proposed pit floor.

7.3 Integration with Mine Planning

A key consideration for the design and implementation of the dewatering system is the space available in-pit to install the water control infrastructure. This should integrate with mine planning and the geotechnical program, and consider the following:

- Provision for safely accessing areas for the drilling and installation of horizontal drainholes, pipelines and collection sumps, given the heavy vehicle production traffic, working below pit slopes and potentially on pit benches.
- Sequencing of the installation of the dewatering infrastructure (sumps, horizontal drainholes and bores) with the mining schedule.
- Provision of sufficient lead time for the installed system to achieve the targeted level of dewatering or depressurisation.
- Provision of ongoing access for maintenance of the dewatering and depressurisation infrastructure (i.e. pumps, generators, reticulation pipelines or drainage ditches).
- Carefully selecting locations of the dewatering and depressurisation installations so they will remain online and not be destroyed or decommissioned until they have served their purpose.
- Redundancy in the depressurisation infrastructure to allow for blockages and or unplanned destruction and access flexibility to accommodate changes to the mine plan.

Early planning and consideration of potential changes to the mine design usually alleviates many of the issues. While slope depressurisation is also a form of dewatering, inflows from the slopes can be managed if allowance for them to be collected and directed to sumps is allowed for in the mine plan. Access to and timely installation of in-pit dewatering infrastructure is a common challenge to open pit operations. In this case, target identification, timely site access, and longevity of dewatering infrastructure requires ongoing integration with the mine plan and operations.

The focus for Western Queen dewatering has been aimed at targeting potential seepage zones within the proposed pit to capitalise on opportunities to dewater by ex-pit dewatering bores, installing sumps and drain holes. Proposed options and plans are presented below.

7.4 Stage 1- Short-term Plan – Dewatering Infrastructure Installation

- Mine Dewatering
  - Install Dewatering Bores

    Groundwater yields measured from historical dewatering suggest there are opportunities for operating dewatering bore(s) in the proposed WQS pit areas. In addition, a recovery bore is also recommended between WQN and WQS, to intercept increased groundwater inflow caused by the heightened pit lake in WQN (following water transfer from WQS). Further details for bore installations are provided in Section 8.0.

  - Install and Pump Shallow Sumps

    Given the low groundwater inflow volumes, install short-term in-pit sumps to gravity drain nearby pit floor areas. Sumps should be installed in areas at the lowest pit floor elevations and be configured to receive local groundwater and surface water runoff from pit walls and benches (where no horizontal drains are installed) via open drains and other sumps or piped drainage systems. Pumping water levels should be maintained at the lowest elevation possible and run continuously to allow for drainage beneath the pit floor. Allowing a sump to recover does not maintain an effective dewatering influence on the local aquifer.

  - Map wet and dry blast holes.

    As mining progresses, it is recommended to map groundwater occurrences to develop an understanding of the relationships between groundwater occurrence and geological and/or structural features. This should identify relationships to be established to guide sump locations and depths across the pit floor in the future. We recommend that the mapping records each hole as a simple visual traffic light (Red = wet; Amber= damp; Green= dry). The results can be interrogated in 3D along with other groundwater observations to optimise sump locations in the future.

- Geotechnical Depressurisation
  - Construct Permanent Drain Holes (if required)

    This task focuses on local groundwater bearing structures exposed at or nearby pit wall areas that yield long-term seepage inflows. Targets for horizontal drain holes should be based primarily on geotechnical risks and consider the results from monitoring data, and presence of saturated oxide materials. The drain holes should be constructed using casing and headworks that are installed to allow controlled discharge via a sealed transfer pipe to minimise future pit wall saturation and erosion from uncontrolled seepage over the pit walls. Gravity drainage from a manifold (where multiple holes are in proximity) to a sump at lower elevation will allow the water to be sustainably and continuously removed from the pit, in conjunction with surface water runoff.

7.5 Stage 2- Medium-term Plan – Infrastructure Upgrades and Maintenance

- Mine Dewatering Upgrades
  - Optimise Pit Floor

    Opportunities should be considered to promote in-pit drainage to one or more sumps. This may require the installation of deeper drains across the pit floor, potentially in previously blasted areas where the connectivity of the fractures will be higher. Such optimisations should, where possible be supported by directing groundwater (and surface water) inflows to deep sumps, also in areas where deeper blasting has occurred to increase fracture density and connectivity.

- Geotechnical Depressurization Upgrades
  - Construct Horizontal Drain Holes in High-Risk Areas (if required)

    Additional horizontal drain holes should be installed where there are unacceptable geotechnical risks. Additional holes should be equipped to monitor the phreatic surface and hence the presence of saturated oxide or otherwise weak materials.

7.6 Stage 3- Long term plan- Production bore dewatering

Using production bores to lower the surrounding water table by pumping groundwater from the surrounding area. This will decrease groundwater ingress to the open pit as well as serve to stabilise the pit wall.

- Pump rates for each pit are to be determined through pump tests.
- Environmental considerations require frequent monitoring (pH and salinity) of water extracted.
- Pump maintenance and infrastructure (power) is required.

8.0 Dewatering Bore Considerations

Given historical water related challenges that lead to cessation of mining due to pit wall stability issues, it is recommended a number of activities are undertaken to help inform local ground water conditions and implementation of a cost-effective solution for managing groundwater inflows during future development of WQS.

It is recommended to identify potential ex-pit dewatering bore locations during the period of pit lake pumping and drain-down. Investigations should be targeted based on historical findings such as, in order of priority:

- Target for one bore north and one bore south of WQS along the north-south shear zone.
- Test the potentially high yielding zone on the South-east of WQS pit.
- Test the potential of a recovery bore between WQN and WQS, to intercept increased groundwater inflow caused by the heightened pit lake in WQN.
- All investigation holes should target shears and structural features at depth to allow long-term dewatering below the proposed pit floor.

Any groundwater related drilling exploration could be aligned to ongoing mineral explorations programs. It is recommended that open hole conventional circulation type drilling method is used to identify aquifer intervals and test aquifer yields. The drill hole dimeter should be a minimum of 150mm to minimise backpressure restricting groundwater airlifts. Given we are targeting groundwater of various salinities, there may be a requirement to contain drill water in purpose dug sumps.

Based on our current understanding, indicative locations and nominal depths for the recommended vertical exploration holes and monitoring locations are provided in Table 21.

Table 21 Nominal Groundwater Exploration Locations – Pit Dewatering

Priority	Hole ID	Easting (MGA)	Northing (MGA)	Indicative Depth (m bgl)	Target
Indicative Dewatering Bore Locations					
1	Bore WQN1	512,633	6,955,156	120	WQN Water Interception
2	Bore N1	512,482	6,954,910	120	Northern Shear Target
3	Bore S1	512,397	6,954,299	120	Southern Shear Target
4	Bore S2	512,656	6,954,551	120	Southern Contact Target
Indicative Dewatering Monitoring Bore Locations					
1	MB1	512,219	6,954,320	120	South of WQS between pit and Camp Bore
2	MB2	512,150	6,964,800	120	West of WQS
3	MB3	512,677	6,954,750	120	East of WQS, contact zone
4	MB4	512,626	6,955,149	120	North of WQS, shear zone
Indicative Mounding Monitoring Bore Locations					
5	MB5	513,060	6,956,200	50	North of WQN, shear zone
6	MB6	513,224	6,955,691	50	Between WQN and proposed discharge location
7	WQN	512,645	6,955,628	20	West of WQN, existing bore

The following is recommended to assist with identifying aquifer intervals, yields and details for constructing dewatering bores:

- Lithological logging in a water context (both identification of wet and dry zones) – key observations to be recorded include degree of weathering, nature of fracturing, observed staining and apertures of fracture planes, zones of unfractured rock.
- Mapping aquifers and aquitards by identifying the base of saprolite and base of saprock
- Record first water strike (likely close to the nominal water table at about 23mbgl)
- Measure groundwater airlift yields after each 6m drill rod using a bucket (of known volume) and stopwatch at the drill rig cyclone or a V-notch weir.
- Measure field groundwater pH and salinity (as Electrical Conductivity) each 6m interval.
- Record any drillers observations regarding water occurrence, changes in penetration rate, intersected fractured zones.

Results of this site work will inform the final dewatering strategy and if ex-pit dewatering bores will be effective. If successful, dewatering bores can be planned at suitable adjacent locations. Dewatering bores should be constructed using nominal 200 mm steel casing, slotted between 25 and 80m)possibly up to 200m if deep structures are intersected) and stabilised back to surface using annular graded gravel pack. Bores should be completed in accordance with the "*Minimum standards for the construction of water bores in Australia*" (ADIA, 2020).

The above nominal details should be confirmed by a hydrogeologist on site and adjusted as required to construct the bores based on site-specific data.

With no existing monitoring bores located around WQN and the four existing monitoring bores within the proposed open pit development area at WQS, dedicated groundwater monitoring bores will be required. Indicative monitoring bore locations for dewatering, and mounding is presented in Table 21 and should be considered to allow groundwater levels for both operational (dewatering and geotechnical) and environmental purposes. Nominal bore construction should include:

- Nominal 50mm internal diameter class 9 uPVC blank casing
- Nominal 50mm internal diameter class 9 uPVC slotted casing. Slots can be hand cut or 1mm aperture.
- Backfill the annulus with graded gravel pack (nominal size 3.4-6.4mm).
- Backfill the annulus above gravel pack using bentonite pellets.
- Provide surface protection of PVC casing.

Following the completion of drilling, survey the collar location, top of casing elevation and ground elevation.

Each location will monitor the water table of the deep fractured rock aquifer.

Regulatory approvals will be required for all dewatering abstractions. Compliance monitoring will be required and generally linked to a site-specific Groundwater Operating Strategy (GOS). Monitoring commitments generally include measurement of abstraction rates and volumes (flow meters), groundwater levels (bores), sump levels, and quality (bores and sumps) to assess any changes to the groundwater resource during and after abstraction.

9.0 Excess Water Storage Options

Following disposal of higher salinity (18,000 mg/L TDS) WQS pit lake stored water (totalling about 1.0GL) to WQN, it is estimated WQN will have a remaining void capacity of about 1.5GL (without Duke and Princess extensions). With a predicted range of WQS groundwater inflows of between 2,300 to 4,500 kL/day, a total dewatering volume is predicted to be between about 1.4 and 2.7 GL over the anticipated 608 days of mining. Groundwater salinity in the WQS area has previously been report to average about 2,100 mg/L TDS (maximum 3,700 mg/L TDS).

With the above in mind, several alternative excess water management options have been identified and in order of priority, include:

- Mine water use – road watering, dust suppression, etc.
- Environmental discharge to local creekline – reserved for fresh brackish groundwater (<2,100 mg/L TDS).
- Additional Storage within WQN – reserved for water salinity above 15,000 mg/L TDS.
- Environmental discharge to the Sandford River – measure salinity over 200,000 mg/L TDS.
- Use of mechanical evaporators on WQN to allow more storage capacity (if required).
- Dedicated evaporation pond (if required).
- Future discharge to the Sandford River.

Having multiple water discharge options allows the project to manage water quality constraints (salinity) outside the priority option to discharge local groundwater to the environment via local creeklines.

9.1 Mine Water Re-use

Previously up to about 800 kL/day (10 L/sec) was used during mining for dust suppression on site (Morgan, 1999). Using these estimates for water usage, the total mine excess may average about 1.5 GL over the duration of mining, possibly up to 3.5 GL. Although not likely a uniform volume per day, this however this equates to an average excess of about 2,400 kL/day or 28 L/sec, possibly up to 5,800 kL/day or 67 L/sec.

Given the groundwater quality is fresh to brackish (1,200 mg/L to 3,700 mg/L TDS; average 2,100 mg/L TDS), it is proposed to discharge excess mine water to a local creekline to mitigate dewatering drawdown proportion.

In addition to local groundwater discharge, it has been recommended to install a dewatering bore south of WQN to minimise recirculation back to WQS of mounded water via the shear zone. It is anticipated abstraction from this bore may be used for mine water requirements and/ or redirected back to WQN.

9.2 Environmental Discharge

As a result of mine dewatering, predicted drawdown may propagate up to 2 km from the WQS open pit. To help mitigate some of the drawdown impacts, it is proposed to discharge excess water to a local creekline (indicative location 512,600mE, 6,956,288mN) within the drawdown capture zone (Figure 20).

A recent vegetation and fauna survey (Botanica, 2025) at the Western Queen project area did not identify any significant vegetation assemblages and a low risk of potential terrestrial groundwater dependent ecosystems (GDE) in the adjacent floodplain areas. The closest station well, Wanrey Well, is about 7 km northwest and down-gradient of the proposed outfall location.

Importantly, prior to discharge, all abstracted water will required retention within a suitably designed transfer pond to minimise sediment loads. Minimising sediment can be achieved through abstraction from production bores.

To assess the extent at the potential wetting front with discharging over the duration of the project, a surface water flood model was used. The model was based on a 1:20 year rainfall event. Details of the flood modelling are presented in a separate report, Western Queen Surface water Assessment, (AECOM, 2025). Model results are presented on Figure 21 and relevant findings from this assessment include:

- Under the lower discharge rate of 1,500 kL/day (total 1.0 GL), a wetted front extent of 1.75km is predicted and generally remains within the low flow channel.
- Under an estimated average discharge rate of 2,400 kL/day (total 1.5 GL), a wetted front extent of 2.0km is predicted.
- Under the extreme discharge rate of 5,800 kL/day (total 3.5 GL), should unforeseen higher dewatering rate occur, a wetted front extent of up to about 3.9km is predicted.
- Discharge generally remains within low-flow channels and in areas bounded by areas reporting degraded to good vegetation condition close to the proposed discharge location to very good further west of the project.

The wet weather assessment found that mine water releases do not affect baseline (non-mine-related) flooding conditions. This is because the mine's contribution—0.03 m^3/s (2,400 kL/day)—is negligible compared to the natural baseline flow of 1.75 m^3/s at the release point. Therefore, mine discharges during wet weather are not expected to adversely impact the receiving environment.

9.3 Existing Pit Storage

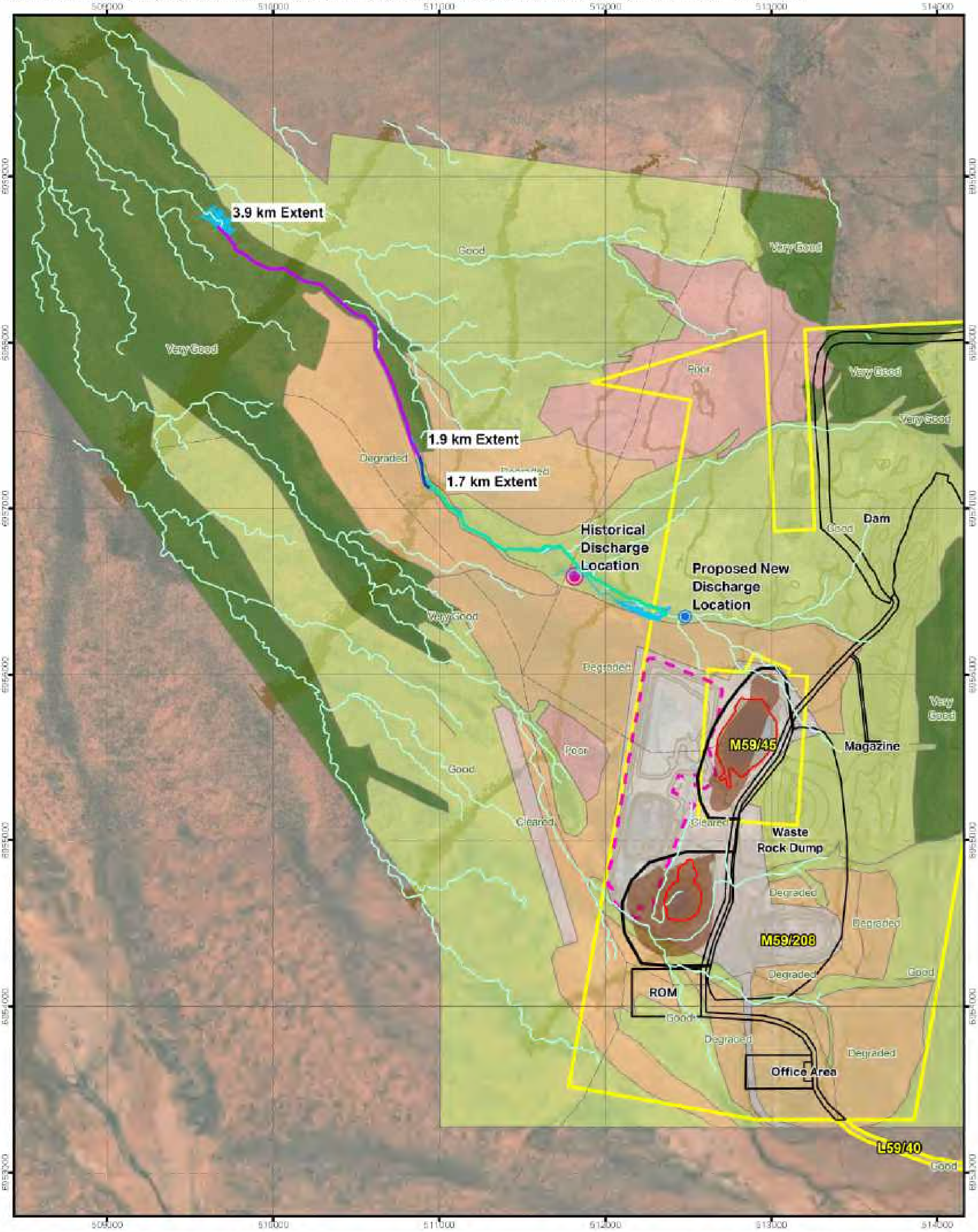
Following disposal WQS pit lake water to WQN, it is estimated WQN will have a remaining void capacity of between 1.4GL and 2.8GL (inclusive of Princess and Duke extensions). As part of the dewatering strategy, this capacity allows for unforeseen higher salinity or higher sediment loaded water to be transferred rather than discharging at the proposed creek outfall.

Based on the water balance, at the lower-case (1.4GL), the remaining storage capacity of WQN has the capacity to accommodate up to 86% of the predicted remaining excess water (2,400 kL/day) over the 608 days.

9.4 Mechanical Evaporators

If required, to allow further storage capacity in WQN, the implementation of mechanical evaporators could be included in the excess mine water strategy. Examples of mechanical evaporators include industrial-grade sprinklers and enhanced evaporators such as mister-fogger units.

- Sprinklers have a lower evaporative capacity primarily because they generate a larger droplet size, have a lower throughput rate and effective evaporative footprint than mister-fogger units. By way of an example, a recent project considered sprinkler array that, in an arid setting, could, under optimum conditions evaporate between about 550 kL/day that incorporated about 100 sprinklers discharging about 780 kL/day. To achieve this rate throughout the year, the number of sprinklers (and area) would be about 270 in the cooler months and 70 in the hotter months.
- Mister-fogger units are generally sold in sizes reflecting their fan throughput rate. The efficiency is mainly dependent on the discharge rate, droplet size and prevailing temperature, humidity, wind speed and operating time (hours per day). A recent project in an arid, east Pilbara setting considered units with throughputs of between 1,080 and 2,160kL/day and efficiency factors ranging from 30 to 60% (a likely performance envelope for this site). Monthly efficiencies will vary between cooler months with higher humidity and hotter months with lower humidity.



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metres
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LEGEND

- Western Queen Tenements
- Existing Pit Outline
- Proposed Pit
- Proposed Site Layout
- Existing Waste Dump
- Contours
- Modelled Flow Areas
- Winter 5800 kl/day Extent
- Winter 2400 kl/day Extent
- Winter 1500 kl/day Extent

Vegetation Condition
- Very Good
- Good
- Degraded
- Poor
- Cleared

Conceptual Creek Discharge

WESTERN QUEEN

WESTERN QUEEN DEWATERING ASSESSMENT

Figure
23

A4 size

9.5 Potential Local Evaporation Pond

A further option to manage excess water if to construct an evaporation pond in the cranes pit area. Evaporation rates average around 250mm/month during the summer months and 100mm/month during the cooler winter months (Section 2.1). This option is yet to be developed further given the potential size required to allow adequate shortage capacity, potential design requirements and environmental impacts.

Examples of conceptual pond sizes are presented in Table 22.

Table 22 Potential Evaporation Pond Dimensions and Capacities

Rectangular Pond Dimensions (m)							
1m Depth			Area	2m Depth			Area
Length (m)	Width (m)	Volume (m3)	Hectares	Length (m)	Width (m)	Volume (m3)	Hectares
1,500	800	1,200,000	120	1,000	600	1,200,000	60
2,200	1,100	2,420,000	242	2,000	600	2,400,000	120
3,000	1,450	4,350,000	435	2,200	1,000	4,400,000	220

9.1 Sandford River Discharge

It is understood that discharge to the Sandford River was undertaken in the early periods of mine dewatering given limited options to develop the project with significant excess water management requirements. Little information is available outside a licenced approval to discharge 5,000 kL/day with a maximum salinity of 15,000 mg/L TDS, to a location about 9.3 km from the mine.

To complement the above, if higher salinity (>15,000 mg/L TDS), are encountered in volumes greater than the capacity of WQN or WQS, an alternative option may require evaluation. Historically, it was reported that the Sandford River is hypersaline.

This was further confirmed during the site reconnaissance in February 2025 where salt crusts had formed in the riverbed (Table 11). This information was complemented with a surface water ponded sample collected in April 2025 reporting a salinity concentration of over 200,000 mg/L TDS.

Due to the perceived challenges with managing excessive salt loadings with discharge of higher salinity water (>15,000 mg/L TDS), this option has not been progressed.

10.0 Operational Monitoring Requirements

10.1 Groundwater Operating Strategy

Under Statewide operational policy 5.08 – Use of operating strategies in the water (DWER, 2011), applicants for water licenses may be required to submit an operating strategy to address water management issues. The operating strategy presents the licensee's commitments and responsibilities in managing the impacts of taking and using water on the environment and other water users. A strategy often includes the licensee's proposed monitoring schedule, and contingency plans developed to protect the environment (including other water users), and the licensee's reporting commitments.

In context with the proposed Western Queen project, as a general guideline DWER will require a strategy where:

- The taking of water may impact upon the environmental values or other water users.
- The volume of water to be taken is significant, generally where the allocation sought is greater than 1.0 GL/annum.
- The water resource being accessed requires stringent management.
- Water is abstracted from several sources or from a large number of bores and requires careful management.
- In the opinion of the department, it is necessary to fulfil the requirements of the Rights in Water and Irrigation Act, 1914.

Given mine dewatering requirements is estimated at 1.0 GL/annum, which will be drawn from , open pits, potential dewatering bores and in-pit sumps, a Groundwater Operating Strategy (GWOS) will be required.

10.2 Preliminary Groundwater Monitoring Program

Monitoring is required before abstraction commences to establish baseline conditions and during operations to identify impacts upon the groundwater environment. Groundwater monitoring should:

- Identify any dewatering of the aquifers associated with mine dewatering.
- Identify any impacts upon the aquifers associated with dewatering activities.
- Identify drawdowns at any environmentally sensitive areas or impacts to the groundwater resource.

A recommended monitoring program includes:

- pit lake weekly abstraction pumping rates and volumes.
- WQN monthly surveyed pit lake elevation.
- weekly groundwater levels in proposed monitoring bores.
- weekly abstraction rates and volumes from dewatering bores, horizontal drains, and sumps.
- Weekly groundwater salinity prior to discharge to the environment.
- quarterly abstracted groundwater quality (pH, electrical conductivity, total dissolved solids, major ions, and dissolved metals).

11.0 Predicted Water Table Recovery on Closure

Following mine closure and cessation of mine dewatering, the extent of the residual drawdown impact zone formed by the extended area and depth of WQS pit is required to assess post-closure impacts and risks for Western Queen. A preliminary mine pit lake water balance assessment has been undertaken to provide an indicative estimate of the rate at which available waters (groundwater and rainfall runoff) will inflow into the various pit voids after mine closures. Results of the water balance assessments identified that the residual post-closure drawdown footprint associated with the pits will create a hydraulic sink.

To provide a potential range of pit-lake filling rates and final levels, average rainfall of 217 mm/annum was used which represented the average for the last available 10 years (2014 – 2023, BoM Station No. 7095). It is noted that the range of rainfall experienced over these years (146 mm to 295 mm, 10th–90th percentiles) could represent a fluctuation of potential pit-lake post-closure water levels.

11.1 Predicted Water Table Recovery and Quality on Closure

A basic lumped-parameter Mine Water Filling Model (MIFM) (Banks, 2001) was used to provide an indicative transient assessment of the proposed final void pit-lakes. This model was applied to guide how quickly and to what elevations, the final void may be inundated by surface water and groundwater water inflows. This model relied on three key concepts:

- The steady-state aquifer inflow rates of the main hydro-stratigraphic units and head-dependence of groundwater these inflow rates.
- The cross-sectional area of the void at different water level elevations.
- Surface area–dependent water exchanges within the final void due to rainfall, runoff, and evaporation effects.

Predictive assessments of rates of filling of the final void have been completed, by applying the summarised water balance parameters. The model concept was programmed into a computer spreadsheet environment that provided graphical output of transient pit-lake water level elevations. Each assessment extended to steady-state conditions, thus providing estimates of the final pit-lake level and salinity. Outcomes from the model included:

- Transient changes in pit-lake levels based on balances between groundwater inflows, runoff, and evaporation losses.
- Pit-lake salinity based on the quality of the current pit lake, groundwater inflows and runoff and the concentration effects of evaporation.

The volumes and surface areas of each pit were calculated based on the open pit shell data (*WQ PITS - WESTERN QUEEN PITS_02 PIT DESIGN_QUEEN241028_DTM.dxf,* provided April 2025). The open pit shell data was used to calculate 1m vertical elevation increments in the void volumes and surface areas.

Evaporation was calculated by applying 2,200 mm/annum (pan evaporation rate) to pit lakes. The corresponding evaporation losses at given surface areas was used as a quantitative check against the indicative groundwater inflows and water balance results.

11.2 Post-Closure Pit Lake Level

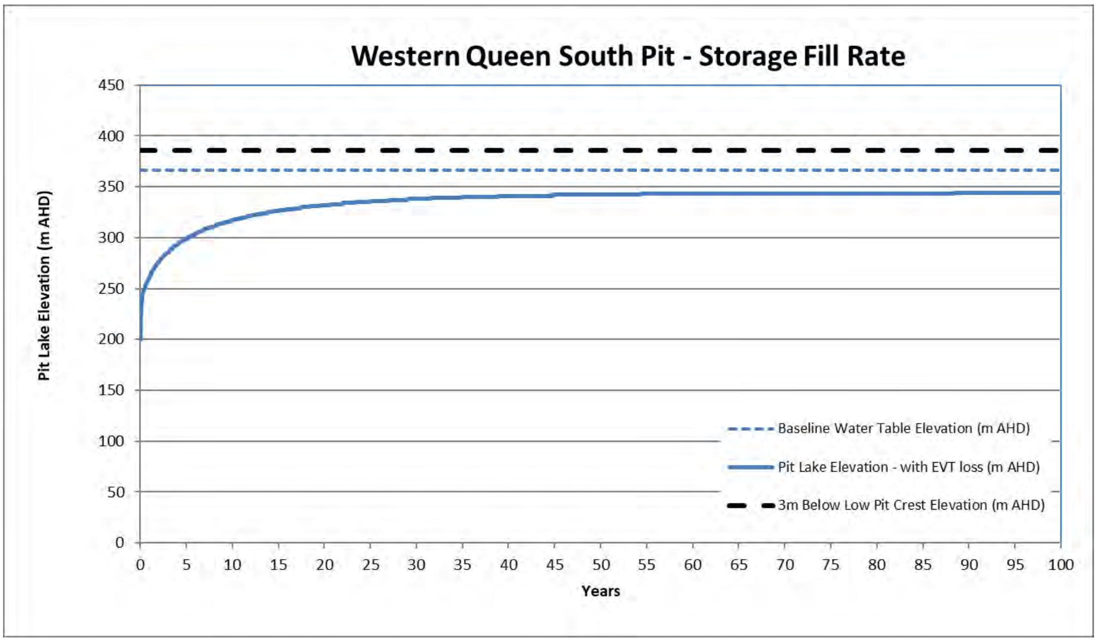
Detailed results of pit lake water balance for the WQS open pit are presented below. As WQN development is yet to be finalised, results have not been modelled. The WQS pit would result in pit lake levels below surrounding baseline groundwater levels, due to groundwater inflows at or close to evaporation losses. A summary of residual pit lake drawdown is presented in Table 23.

Findings from the WQS water balance assessment include:

- The open pit will potentially take close to 54 years to fill to steady-state conditions.

- A final pit lake elevation of 343m AHD, equivalent to the surface area whereby evaporation losses equal water inflows, is predicted.
- An average residual post-closure drawdown of 23m below the baseline groundwater table and will form a hydraulic groundwater sink.
- Long-term evaporative losses from the pit lake surface area are estimated at about 8,429 kL/annum.
- With groundwater inflow salinity concentrations up to 3,700 mg/L, the residual mine pit lake salinity is expected to become saline at around 30,000 mg/L after approximately 86 years post-closure.

Hydrographs of the WQS pit lake filling, and estimated salinity are shown on Figure 24**.**



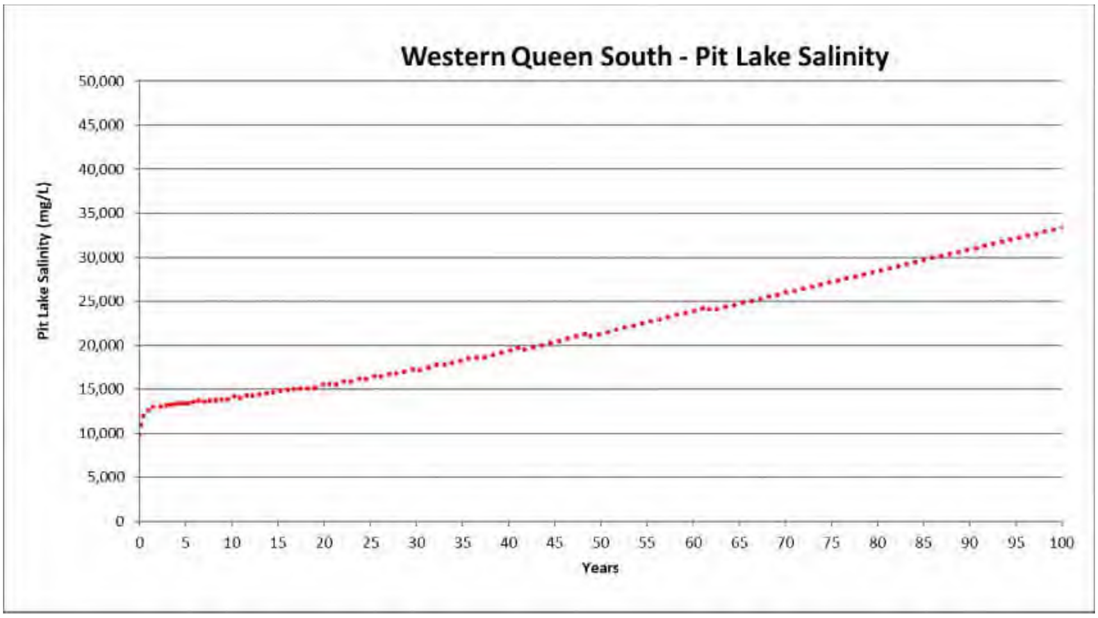


Figure 24 WQS Pit – Post- Closure Residual Pit Lake Fill Rate and Salinity

Table 23 Summary of Residual WQS Pit Lake Drawdown

Description	WQS Pit
Max Pit Lake Fill Level (m AHD)	343
Years to Reach Steady State	55
Estimated Residual Pit Freeboard - Overtopping (low pit crest to maximum fill level)(m)	55
Residual Difference from Baseline (m)	18
Final Pit Surface Area (m^2)	224,688
Residual Evaporation Loss (kL/annum)	8,429
Post-Closure Groundwater Flow	Groundwater Sink
External Factors	None
Potential for poor water quality to develop due to evapo-concentration	Potential
Potential to contaminate groundwater if quality is poor and level is too high	None
Potential for unstable materials to release; Solutes through oxidation, weathering, and erosion	Unknown
Potential for geotechnical pit wall instability	Potential on NE face, where historical failures have occurred.
Potential for human and birdlife interaction	Unknown
Post-Closure Volume of Freeboard – Overtopping (m^3)	5,393,724
Pit Lake Over-Topping during extreme climatic events	Unlikely
Potential for post-closure environmental impacts	Unlikely
Comments	Closure assessment may need to be revisited if more groundwater inflows are encountered during mining.

12.0 Conclusions

The proposed Western Queen Development includes the development of up to four open pits (WQS, Princess, Duke, and Cranes deposits). Historical mining at both WQN and WQS have resulted in pit lakes formation that required dewatering prior to proposed open pit development.

Conceptual Groundwater Model

Based on the literature review, the conceptual hydrogeology of the project includes:

- The local ground elevation around 390m AHD.
- The pre-mining water level was reported at about 355m RL (35mbgl) to the north of WQN and about 367m RL (23mbgl) in WQS.
- Regional groundwater flow generally follows topography and flows to regional low-lying areas in the west associated with present day drainages and ultimately discharges towards the north-western Sandford River.
- The average annual rainfall is about 217 mm, with annual evaporation up to 2,600 mm.
- Stratigraphic units in order of increasing depth:
  - Alluvial and aeolian superficial sediments (Aquifer where saturated) - Local ferricrete formations may be preferential pathways that transmit rainfall recharge to low lying areas.
  - Saprolite clay (Aquitard) - Extremely weathered saprolitic clay that is normally of low to very low hydraulic conductivity and forms an aquitard when below the water table.
  - Saprock (Aquifer where saturated) - moderately weathered bedrock, varying between being an aquitard to aquifer of low to moderate hydraulic conductivity. Locally, the saprock interval maybe transmissive along contact zones and/or fault or shear zones.
  - Fresh bedrock (Aquitard) - generally massive and non-fractured and is regarded as a regional aquitard that is expected to yield little groundwater.
- The alluvial sediments occur to a depth of about 5mbgl (385m AHD) on the northern side of WQS and about 27mbgl (363m AHD) on the southern side. Surface water infiltration into these shallow deposits is probably an important mechanism for local groundwater recharge.
- The fracturing intensity and saprock thicknesses were found to be greater at contact zones between rock types and the mineralised zones.
- The high transmissivity value determined for WQN of 84 m^2/day was not considered appropriate for WQS. An aquifer transmissivity of 30m^2/day and hydraulic conductivity of 0.5 m/day were estimated by Morgan (2000).
- Based on in situ water quality sampling, pit lake salinity is approximately 18,400mg/L TDS for WQS and 18,800mg/L TDS for WQN.
- Historical dewatering abstraction of up to 54 L/sec or 4,650 kL/day were reported from WQN (Morgan, 1999) and 30 L/sec or 2,500 kL/day during mining of WQS (Morgan, 2000).
- Historical groundwater is reportedly fresh to slightly brackish, sodium chloride type with TDS concentrations at WQN ranging up between 2,000 mg/L and 10,660 mg/L (average 4,500 mg/L TDS) and between 1,200 mg/L and 3,700mg/L (average 2,100mg/L TDS) at WQS. Groundwater is generally neutral to slightly alkaline pH (pH 7.9 to 8.1).

Pit Lake Water Transfer

WQN currently holds approximately 3.2 Gigalitres (GL) of water and an additional water storage capacity of about 2.4 GL to a point 1.5m below the pit crest. With the proposed Princess and Duke pit developments, this may increase total WQN capacity up to 3.8 GL.

The WQS pit currently holds approximately 672,000 kL or 0.7 Gigalitres (GL) of water (based on a pit lake elevation estimate of 362m AHD). To allow future deepening of the WQS open pit, the water stored within the existing pit will be transferred to WQN.

The water quality characteristics in both pits have been measured and are very similar. However, at lower pit lake elevations, suspended sediments will likely increase, though no environmental impact is foreseen with this water transfer strategy.

To minimise pit wall stability issues and allow groundwater to drain and pore pressures to be lowered, it is proposed the pit lake be emptied over a period at least 90 days. Over the 90-day period an expected additional 0.2GL of dewatered water from groundwater inflows is estimated, based on the assumed 2,200 kL/day inflows, and an additional estimated 500 kL/day form interconnection between WQN and WQS. This equates to a total of up to 1.0GL (about 130 L/sec), that may require abstraction to allow access to the WQS pit floor.

The maximum WQN pit lake elevation has been defined by potential mounding-related impacts on local vegetation and the groundwater resource, along with having enough remaining capacity to limit over-topping from high rainfall events. A high-level assessment of the propagation of predicted mounding from WQN reported groundwater levels are predicted to remain below about 20m bgl in the northern areas at distances of about 200m.

Groundwater Dewatering

Simplified analytical groundwater models have been completed to determine indicative dewatering rates and maximum drawdown extents for WQS. Dewatering for WQN will require the pit lake to be partially lowered and the proposed Cranes development is above the water table. Findings from the predictive WQS groundwater modelling are summarised below.

Table 24 Summary of Predicted Dewatering Estimates

Deposit	Estimated Dewatering Duration[1]	Predicted Steady-State Abstraction Range		Predicted Total Project Abstraction Volume	Predicted Drawdown Distance - 1 m contour	Comments
		(kL/day)	L/sec	(GL)	(m)	
WQS	608 days	2,300 to 5,800	27 to 67	1.4 to 2.7	1,700 to 2,000	Drawdown will propagate to the adjacent WQN and proposed discharge location

Note [1] – MEGA, 2025

Based on the modelling, an indicative reasonable case (lower-case) maximum abstraction is predicted to be up to about 1.5 GL/annum.

Dewatering Strategy

The recommended dewatering strategy should seek to dewater ahead of mining to avoid difficult mining conditions, i.e. boggy pit floor, lower pore pressures in the pit walls through targeted horizontal drains, and control pit wall seepage and horizontal drain inflows through a closed collect system to minimise uncontrolled drainage to the pit floor and flows across benches.

Dewatering options considered include:

- Option 1: Dewatering Bores – to abstract groundwater from deeper flow paths in-pit or ex-pit, depending on their depth, interconnectedness, and permeability. Their effectiveness can be limited in deep fractured rock settings due to the low hydraulic conductivity and often compartmentalised nature of these aquifers. In-pit bores are often sacrificial and only effective for short periods. Opportunities to dewater in advance of mining from bores exist as per details in Section 6.1.1.
- Option 2: Shallow Sumps – to intercept gravity drainage from seeps and drain holes on the pit floor.

- Option 3: Preferentially Sloped Pit Floor – to allow for gravity drainage across a sloped pit floor to strategically placed sumps, potentially on deep permeable structures to intercept groundwater inflows.
- Option 4: Horizontal Drain Holes – using a system of closely spaced interconnected drain holes to gravity drain and depressurise rock contacts and fault zones behind pit walls to improve geotechnical stability.

Mine Water Management Strategy

Several alternative excess water management options have been identified and in order of priority, include:

- Mine water use – road watering, dust suppression, etc.
- Environmental discharge to local creekline – reserved for fresh to brackish groundwater (<2,100 mg/L TDS).
- Additional storage within WQN – reserved for water salinity above 15,000 mg/L TDS.
- Use of mechanical evaporators on WQN to allow more storage capacity (if required).
- Dedicated evaporation pond (if required).
- Future discharge to the Sandford River.

Having multiple water discharge options allows the project to manage water quality constraints (salinity) outside the option to discharge local groundwater to the environment via local creeklines.

Following disposal of higher salinity (18,000 mg/L TDS) WQS pit lake stored water (totalling about 1.0GL) to WQN, it is estimated WQN will have a remaining void capacity of about 1.5GL (without Duke and Princess extensions). With a predicted range of WQS groundwater inflows of between 2,300 to 4,500 kL/day, a total dewatering volume is predicted to be between about 1.4 and 2.7 GL over the anticipated 608 days of mining.

Previously up to about 800 kL/day (10 L/sec) was used during mining for dust suppression on site (Morgan, 1999). Using these estimates for water usage, the total mine excess may be up to about 1.5 GL over the duration of mining. Although not likely a uniform volume per day, this equates to an excess of up to about 2,400 kL/day or 28 L/sec.

Mine Water Management – Environmental Discharge

Groundwater salinity in the WQS area has previously been reported to average about 2,100 mg/L TDS (maximum 3,700 mg/L TDS) and is of high quality (lower salinity) than that measured in other areas within the Western Queen areas. With this in mind, excess groundwater is proposed to be discharged to the environment over a duration of up to about 1.7 years.

A recent vegetation and fauna survey (Botanica, 2025) at the Western Queen project area did not identify any significant vegetation assemblages and a low risk of potential terrestrial groundwater dependent ecosystems (GDE) in the adjacent floodplain areas. The closest station well, Wanrey Well, is about 7 km northwest and down-gradient of the proposed outfall location.

Surface water modelling was undertaken to assess sensitivity of the predicted wetting front extent with discharge rates. The model was based on a 1:20 year rainfall event and relevant findings from this assessment include:

- Under the lower discharge rate of 1,500 kL/day (total 1.0 GL), a wetted front extent of 1.75km is predicted and generally remains within the low flow channel.
- Under an estimated average discharge rate of 2,400 kL/day (total 1.5 GL), a wetted front extent of 2.0km is predicted.

- Under the extreme discharge rate of 5,800 kL/day (total 3.5 GL), should unforeseen higher dewatering rate occur, a wetted front extent of up to about 3.9km is predicted.

The wet weather assessment found that mine water releases do not affect baseline (non-mine-related) flooding conditions. This is because the mine's contribution—0.03 m^3/s (2,400 kL/day)—is negligible compared to the natural baseline flow of 1.75 m^3/s at the release point. Therefore, mine discharges during wet weather are not expected to adversely impact the receiving environment.

Post Closure - Residual Drawdown

Results of the post closure water balance identified that the residual post-closure drawdown footprint associated with the WQS pit will create a hydraulic sink. Details are provided below:

Table 25 Post Closure – Residual Drawdown

Description	WQS Pit
Max Pit Lake Fill Level (m AHD)	343
Years to Reach Steady State	55
Estimated Residual Pit Freeboard - Overtopping (low pit crest to maximum fill level)(m)	55
Residual Difference from Baseline (m)	18
Final Pit Surface Area (m^2)	224,688
Residual Evaporation Loss (kL/annum)	8,429
Post-Closure Groundwater Flow	Groundwater Sink
External Factors	None
Potential for poor water quality to develop due to evapo-concentration	Potential
Potential to contaminate groundwater if quality is poor and level is too high	None
Potential for unstable materials to release; Solutes through oxidation, weathering, and erosion	Unknown
Potential for geotechnical pit wall instability	Potential on NE face, where historical failures have occurred.
Potential for human and birdlife interaction	Unknown
Post-Closure Volume of Freeboard – Overtopping (m^3)	5,393,724
Pit Lake Over-Topping during extreme climatic events	Unlikely
Potential for post-closure environmental impacts	Unlikely

13.0 References

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14.0 Standard Limitations

AECOM Australia Pty Limited (AECOM) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Rumble Resources Ltd and only those third parties who have been authorised in writing by AECOM to rely on the report.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the contract dated February 2025.

The methodology adopted and sources of information used by AECOM are outlined in this the Report.

Where this report indicates that information has been provided to AECOM by third parties, AECOM has made no independent verification of this information unless required as part of the agreed scope of work. AECOM assumes no liability for any inaccuracies in or omissions to that information.

This Report was prepared between February and June 2025. The information in this report is considered to be accurate at the date of issue and is in accordance with conditions at the site at the dates sampled. Opinions and recommendations presented herein apply to the site existing at the time of our investigation and cannot necessarily apply to site changes of which AECOM is not

aware and has not had the opportunity to evaluate. This document and the information contained herein should only be regarded as validly representing the site conditions at the time of the investigation unless otherwise explicitly stated in a preceding section of this report. AECOM disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

This report contains information obtained by inspection, sampling, testing or other means of investigation. This information is directly relevant only to the points in the ground where they were obtained at the time of the assessment. The borehole logs indicate the inferred ground conditions only at the specific locations tested. The precision with which conditions are indicated depends largely on the uniformity of conditions and on the frequency and method of sampling as constrained by the project

budget limitations. The behaviour of groundwater and some aspects of contaminants in soil and groundwater are complex. Our conclusions are based upon the analytical data presented in this report and our experience. Future advances in regard to the understanding of chemicals and their behaviour, and changes in regulations affecting their management, could impact on our conclusions and recommendations regarding their potential presence on this site.

Where conditions encountered at the site are subsequently found to differ significantly from those anticipated in this report, AECOM must be notified of any such findings and be provided with an opportunity to review the recommendations of this report.

Whilst to the best of our knowledge information contained in this report is accurate at the date of issue, subsurface conditions, including groundwater levels can change in a limited time.

Therefore, this document and the information contained herein should only be regarded as valid at the time of the investigation unless otherwise explicitly stated in this report.

Except as required by law, no third party may use or rely on, this Report unless otherwise agreed by AECOM in writing. Where such agreement is provided, AECOM will provide a letter of reliance to the agreed third party in the form required by AECOM.

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It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the relevant property.

Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

Appendix A

Laboratory Results

CERTIFICATE OF ANALYSIS

Work Order	: **EP2502565**	Page	: 1 of 8
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	[redacted]	[redacted]	
Address	: LEVEL 15 58 Mounts Bay Road PERTH WA, AUSTRALIA		
Telephone	: ----		
Project	: 60745106	Date Samples Received	: 21-Feb-2025 11:30
Order number	: 60745106	Date Analysis Commenced	: 21-Feb-2025
C-O-C number	[redacted]	Issue Date	: 28-Feb-2025 14:41
Sampler			
Site	: Western Queen		
Quote number	: EN/004/23		
No. of samples received	: 9		
No. of samples analysed	: 9		

[redacted]

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]		

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EK061G/EK067G (TKN/TP): LOR for samples EP2502565-005 and -008 raised due to possible sample matrix interference.
- EG020: Metal LOR raised for various elements on various samples due to high TDS content.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WQS1	WQS2	WQS3	WQS4	WQN1
			Sampling date / time	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00
Compound	CAS Number	LOR	Unit	EP2502565-001	EP2502565-002	EP2502565-003	EP2502565-004	EP2502565-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.86	7.78	7.63	8.22	8.14
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	24600	25000	25700	25100	25900
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	18400	18900	18800	18800	19200
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	82	99	62	81	90
Total Alkalinity as CaCO3	----	1	mg/L	82	99	62	81	90
ED040F: Dissolved Major Anions								
Silicon as SiO2	14464-46-1	0.1	mg/L	64.7	67.4	66.3	66.9	49.4
ED040T: Total Major Anions								
Silicon	7440-21-3	0.05	mg/L	31.0	32.6	32.8	32.1	25.1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	830	830	846	855	984
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	8580	8140	8310	8440	8720
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	619	629	640	644	583
Magnesium	7439-95-4	1	mg/L	602	613	622	626	580
Sodium	7440-23-5	1	mg/L	3650	3750	3770	3790	4090
Potassium	7440-09-7	1	mg/L	101	103	103	104	94
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.02	<0.02	0.04	0.05	0.10
Antimony	7440-36-0	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	7440-38-2	0.001	mg/L	<0.002	<0.002	<0.002	0.008	<0.002
Boron	7440-42-8	0.05	mg/L	1.04	1.02	1.09	1.33	1.39

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WQS1	WQS2	WQS3	WQS4	WQN1
			Sampling date / time	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00
Compound	CAS Number	LOR	Unit	EP2502565-001	EP2502565-002	EP2502565-003	EP2502565-004	EP2502565-005
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued								
Barium	7440-39-3	0.001	mg/L	0.234	0.238	0.249	0.261	0.222
Beryllium	7440-41-7	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium	7440-43-9	0.0001	mg/L	<0.0002	<0.0002	<0.0002	0.0015	<0.0002
Cobalt	7440-48-4	0.001	mg/L	<0.002	<0.002	<0.002	0.006	<0.002
Chromium	7440-47-3	0.001	mg/L	<0.002	<0.002	<0.002	0.006	0.002
Copper	7440-50-8	0.001	mg/L	0.005	0.004	<0.002	0.006	<0.002
Manganese	7439-96-5	0.001	mg/L	0.002	0.058	0.004	0.008	0.023
Nickel	7440-02-0	0.001	mg/L	<0.002	0.004	<0.002	0.008	0.004
Lead	7439-92-1	0.001	mg/L	<0.002	<0.002	<0.002	0.006	<0.002
Selenium	7782-49-2	0.01	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Vanadium	7440-62-2	0.01	mg/L	<0.02	<0.02	<0.02	<0.02	0.02
Zinc	7440-66-6	0.005	mg/L	<0.010	<0.010	0.016	0.011	0.060
Molybdenum	7439-98-7	0.001	mg/L	0.015	0.015	0.016	0.016	0.037
Strontium	7440-24-6	0.001	mg/L	10.5	11.0	11.1	11.3	9.00
Thallium	7440-28-0	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	7440-61-1	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	0.005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG050T: Total Hexavalent Chromium								
Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EG051GUF: Ferrous Iron by Discrete Analyser - Unfiltered								
Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EG053TG-MS: Total Ferric Iron by ICPMS and DA								
Ferric Iron	----	0.05	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	1.0	1.0	1.0	1.0	1.6
EK055G: Ammonia as N by Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WQS1	WQS2	WQS3	WQS4	WQN1
			Sampling date / time	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00
Compound	CAS Number	LOR	Unit	EP2502565-001	EP2502565-002	EP2502565-003	EP2502565-004	EP2502565-005
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser - Continued								
Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.44	0.11	0.07	0.29
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.01	0.05	0.05	0.24
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	1.28	0.98	1.17	1.17	8.19
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	1.30	0.99	1.22	1.22	8.43
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.8	1.0	0.6	1.0
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.7	1.8	2.2	1.8	9.4
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	1.36	1.39	1.36	0.02	<0.02
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01
Reactive Phosphate	14625-44-2	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	261	249	253	258	268
ø Total Cations	----	0.01	meq/L	242	248	250	251	257
ø Ionic Balance	----	0.01	%	3.81	0.26	0.70	1.24	2.12

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WQN2	WQN3	WQN4	WQN5	----
			Sampling date / time	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	----
Compound	CAS Number	LOR	Unit	EP2502565-006	EP2502565-007	EP2502565-008	EP2502565-009	----
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.31	8.18	8.34	8.23	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	24900	43700	24700	25000	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	18500	31100	18200	18700	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	2	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	92	152	88	89	----
Total Alkalinity as CaCO3	----	1	mg/L	93	152	91	89	----
ED040F: Dissolved Major Anions								
Silicon as SiO2	14464-46-1	0.1	mg/L	53.7	48.5	53.0	54.8	----
ED040T: Total Major Anions								
Silicon	7440-21-3	0.05	mg/L	26.1	104	25.8	27.0	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	940	1700	934	935	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	7990	14000	8010	8310	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	580	582	577	589	----
Magnesium	7439-95-4	1	mg/L	571	789	565	576	----
Sodium	7440-23-5	1	mg/L	3850	8240	3850	3870	----
Potassium	7440-09-7	1	mg/L	116	287	116	117	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.03	24.6	0.19	<0.02	----
Antimony	7440-36-0	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	----
Arsenic	7440-38-2	0.001	mg/L	<0.002	0.005	<0.002	<0.002	----
Boron	7440-42-8	0.05	mg/L	1.41	1.39	1.44	1.44	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WQN2	WQN3	WQN4	WQN5	----
			Sampling date / time	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	----
Compound	CAS Number	LOR	Unit	EP2502565-006	EP2502565-007	EP2502565-008	EP2502565-009	--------
				Result	Result	Result	Result	----
EG020T: Total Metals by ICP-MS - Continued								
Barium	7440-39-3	0.001	mg/L	**0.228**	**0.394**	**0.203**	**0.233**	----
Beryllium	7440-41-7	0.001	mg/L	<0.002	<0.005	<0.002	<0.002	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0002	**0.0004**	<0.0002	<0.0002	----
Cobalt	7440-48-4	0.001	mg/L	<0.002	**0.063**	<0.002	<0.002	----
Chromium	7440-47-3	0.001	mg/L	**0.003**	**0.901**	**0.008**	**0.003**	----
Copper	7440-50-8	0.001	mg/L	<0.002	**0.112**	<0.002	<0.002	----
Manganese	7439-96-5	0.001	mg/L	**0.008**	**0.668**	**0.006**	**0.003**	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.372**	**0.004**	<0.002	----
Lead	7439-92-1	0.001	mg/L	<0.002	**0.010**	<0.002	<0.002	----
Selenium	7782-49-2	0.01	mg/L	<0.02	<0.02	<0.02	<0.02	----
Vanadium	7440-62-2	0.01	mg/L	**0.03**	**0.11**	**0.02**	**0.03**	----
Zinc	7440-66-6	0.005	mg/L	**0.023**	**0.071**	**0.011**	<0.010	----
Molybdenum	7439-98-7	0.001	mg/L	**0.037**	**0.033**	**0.034**	**0.038**	----
Strontium	7440-24-6	0.001	mg/L	**7.69**	**7.30**	**7.06**	**8.24**	----
Thallium	7440-28-0	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	----
Uranium	7440-61-1	0.001	mg/L	**0.005**	**0.009**	**0.005**	**0.006**	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EG050T: Total Hexavalent Chromium								
Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EG051GUF: Ferrous Iron by Discrete Analyser - Unfiltered								
Ferrous Iron	----	0.05	mg/L	<0.05	**3.41**	<0.05	<0.05	----
EG053TG-MS: Total Ferric Iron by ICPMS and DA								
Ferric Iron	----	0.05	mg/L	<0.10	**55.3**	**0.37**	<0.10	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.6**	**1.5**	**1.6**	**1.6**	----
EK055G: Ammonia as N by Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WQN2	WQN3	WQN4	WQN5	----
			Sampling date / time	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	18-Feb-2025 00:00	----
Compound	CAS Number	LOR	Unit	EP2502565-006	EP2502565-007	EP2502565-008	EP2502565-009	--------
				Result	Result	Result	Result	----
EK055G: Ammonia as N by Discrete Analyser - Continued								
Ammonia as N	7664-41-7	0.01	mg/L	0.04	1.03	0.03	0.04	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.25	0.19	0.22	0.28	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	8.35	6.54	8.27	8.29	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	8.60	6.73	8.49	8.57	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	3.8	0.8	0.6	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	9.3	10.5	9.3	9.2	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.04	0.12	<0.02	0.02	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.04	0.01	0.01	----
Reactive Phosphate	14625-44-2	0.10	mg/L	<0.10	0.12	<0.10	<0.10	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	247	433	247	256	----
ø Total Cations	----	0.01	meq/L	246	460	246	248	----
ø Ionic Balance	----	0.01	%	0.09	2.95	0.30	1.50	----

CERTIFICATE OF ANALYSIS

Work Order	: **EP2507111**	Page	: 1 of 5
Client	: **AECOM AUSTRALIA PTY LTD**	[redacted]	
Contact	[redacted]		
Address	: LEVEL 15 58 Mounts Bay Road PERTH WA, AUSTRALIA		
Telephone	: ----		
Project	: 60745106 - 3.1	Date Samples Received	: 07-May-2025 09:30
Order number	: 60745106 -3.1	Date Analysis Commenced	: 07-May-2025
C-O-C number	: ----	Issue Date	: 15-May-2025 12:15
[redacted]			
Site	: Western Queen		
Quote number	: EN/004/23		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

[redacted]

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EG020: Metals LOR for sample EP2507111-001 raised due to high TDS content.
- EG051GUF (Unfiltered Ferrous Iron): LOR raised for sample #1 due to possible sample matrix interference.
- EG035: LOR raised for Hg on sample EP2507111- 001 due to high TDS content.
- EG035: Poor matrix spike recovery obtained for Mercury on sample EP2507111- 001 due to possible matrix interference. Results have been confirmed by re-preparation and re-analysis.
- ED040: SiO2 LOR raised for sample EP2507111-001 due to possible matrix interference.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Sanford River	----	----	----	----
			Sampling date / time	18-Apr-2025 14:30	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2507111-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.79	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	227000	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	238000	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	106	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	106	----	----	----	----
ED040F: Dissolved Major Anions								
Silicon as SiO2	14464-46-1	0.1	mg/L	<5.0	----	----	----	----
ED040T: Total Major Anions								
Silicon	7440-21-3	0.05	mg/L	63.1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	8370	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	143000	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	1940	----	----	----	----
Magnesium	7439-95-4	1	mg/L	4160	----	----	----	----
Sodium	7440-23-5	1	mg/L	88100	----	----	----	----
Potassium	7440-09-7	1	mg/L	1460	----	----	----	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	34.2	----	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.052	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.052	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.052	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Sanford River	----	----	----	----
			Sampling date / time	18-Apr-2025 14:30	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2507111-001	--------	--------	--------	--------
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS - Continued								
Barium	7440-39-3	0.001	mg/L	**0.488**	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	**0.0090**	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.086**	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.052	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.052	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.052	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**1.27**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	**0.498**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.052	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.52	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**40.4**	----	----	----	----
Thallium	7440-28-0	0.001	mg/L	<0.052	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.052	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.52	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.262	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**19.7**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0005	----	----	----	----
EG050T: Total Hexavalent Chromium								
Hexavalent Chromium	18540-29-9	0.01	mg/L	**0.02**	----	----	----	----
EG051GUF: Ferrous Iron by Discrete Analyser - Unfiltered								
Ferrous Iron	----	0.05	mg/L	<1.00	----	----	----	----
EG053TG-MS: Total Ferric Iron by ICPMS and DA								
Ferric Iron	----	0.05	mg/L	**56.7**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.6**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Sanford River	----	----	----	----
			Sampling date / time	18-Apr-2025 14:30	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2507111-001	--------	--------	--------	--------
				Result	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser - Continued								
Ammonia as N	7664-41-7	0.01	mg/L	0.46	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.81	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	22.0	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	22.8	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	7.7	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	30.5	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	1.25	----	----	----	----
Total Phosphate	----	0.10	mg/L	3.82	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	----	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	4210	----	----	----	----
ø Total Cations	----	0.01	meq/L	4310	----	----	----	----
ø Ionic Balance	----	0.01	%	1.16	----	----	----	----

About AECOM

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle – from advisory, planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivaled technical and digital expertise, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a Fortune 500 firm and its Professional Services business had revenue of $14.1 billion in fiscal year 2024. See how we are delivering sustainable legacies for generations to come at aecom.com and @AECOM.

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