Prepared for
Rumble Resources Ltd
ABN: 74 1482 142 60

AECOM

Western Queen Surface Water Assessment

12-Jun-2025
Western Queen Dewatering
Doc No. 60745106_ENV_RPT_RevA

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Western Queen Surface Water Assessment

Client: Rumble Resources Ltd

ABN: 74 1482 142 60

Prepared by

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12-Jun-2025

Job No.: 60745106

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Quality Information

Document	Western Queen Surface Water Assessment
Ref	60745106
Date	12-Jun-2025

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Executive Summary

Rumble Resources Ltd (Rumble), along with co-operation agreement partners, Bain, and MEGA Resources (MEGA), are proposing to commence mining operations within the Western Queen Mine, located approximately 90km northwest of Mount Magnet in Western Australia.

This surface water flood assessment, inclusive of an excess water discharge wetting front assessment, was completed to support ongoing approvals and water management for the proposed project.

The Western Queen Mine is located at the top of the local catchment just west of a major catchment divide running generally north-south. The area west of the major catchment divide drains to the northwest away from the Project site. The area east of the divide, drains eastward.

Within the local catchment, drainage across the proposed mine site follows a series of poorly defined flow paths that coalesce to the south of Western Queen South (WQS) into a northwest-draining creekline. Catchment areas upstream of the proposed infrastructure are relatively small meaning surface water management infrastructure will have to manage flows from mainly within the Project area.

Key surface water aspects and findings associated with the proposed project include:

Surface Water Management Infrastructure - Operations

Proposed surface water management measures during mining operations include:

- drainage channels to capture runoff and prevent standing water.
- sediment basins to temporarily intercept runoff to minimise the turbidity and release of suspended sediment.
- Flood protection bunds around both Western Queen North (WQN) and WQS pit edges will be required to limit the inflow of additional surface water runoff into the pit.
- In-pit drainage (direct rainfall) will be required to divert surface water runoff into dedicated sumps with pumps to dispose the runoff, potentially to alternative storage facility depending on water quality.
- Storage of abstracted water in a dedicated mine water storage pond suitable of storing two days capacity should be constructed to minimise sediment load (from in-pit sump pumping).
- Given the key risks to surface water are erosion, sedimentation of creeklines and impacts to riverine vegetation downstream, a surface water monitoring programme will be implemented.

Surface Water Management Infrastructure - Closure

At closure, all temporary mine site infrastructure will be removed, and the disturbed development footprints rehabilitated. The only permanent changes in landform are the waste rock dump and the open pit.

Proposed surface water management measures that will remain post-closure include:

- The surface water drainage channels around the southern open pit areas should remain and continue to drain into the sediment ponds. This is recommended to minimise the release of sediment from the newly rehabilitated open pit area and WRDs.
- Key sediment ponds should remain for up to 2 years following closure or until negligible material loss from rehabilitated and revegetated WRD and mine laydown areas is expected. They should then be removed and rehabilitated.
- At closure, the pit will need to be surrounded by an abandonment bund in line with DMIRS requirements. The bund will serve two purposes: maintain flows past the pit to minimise changes to flows and hydroperiods downstream, and the other being to maintain geotechnical integrity by preventing surface water from flowing over the pit crest.
- During the closure phase (typically five to ten years after the end of operations), opportunistic surface water quality testing should continue to support closure-related assessments of rehabilitation compliance.

Discharge to Local Creekline

With a predicted range of WQS groundwater inflows of between 2,300 to 3,200 kL/day, a mine water usage (dust suppression etc) up to about 800 kL/day, a total mine water excess may be up to about 2,400 kL/day over the duration of mining. The equates to a total dewatering volume is predicted to be between about 1,500 kL/day to 2,400 kL/day (up to 1.0 GL/annum) over the anticipated 608 days of mining. Should unforeseen high yielding structural features be encountered during mining, a worst-case dewatering requirement of 5,800 kL/annum has been predicted.

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

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 all simulated discharge rates (1,500 kL/day, 2,400 and 5,800 kL/day), a wetted front generally remains within the low flow channels.
- Under an estimated average discharge rate of 1,500 kL/day (total 0.9 GL), a wetted front extent of about 1.75km is predicted.
- 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 rates occur, a maximum 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.

The above results are consistent with predictions made for the adjacent Dalgaranga Gold Project by Spartan Resourced Limited, whereby wetting front modelling predicted a broader extent of about 2.5 km and up to about 500m wide for a 2.5 GL/annum (6,800 kL/day) approved discharge rate.

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 1).

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 1. 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 WQS and WQN, a number of technical studies are required to support mining approvals.

This report presents the findings of surface water flood assessment, inclusive of an excess water discharge wetting front assessment, to support ongoing approvals and water management for the proposed project.

1.1 Study Objectives

Based on the recent Department of Mine, Industry Regulation and Safety (DMIRS) mining proposal guidelines (March 2020a), the key requirements for the surface water assessment include:

- A description of the catchment area(s), including a map identifying the project area in relation to the catchment(s).
- A description of the surface hydrology of the project area and potentially affected downstream environment (e.g. ephemeral creeks, permanent creeks/rivers, playa lakes, wetlands, water holes).
- A description of the environmental values and beneficial uses of surface water.
- Details of any surface water management areas that the project intersects or may impact.
- The water quality characteristics of the surface hydrology of the area including salinity and pH.
- A description of the flooding characteristics of the area. Where flooding presents a risk to the environmental management of the proposal (including post-closure), appropriate flood modelling and mapping will be required.

The key objectives of the surface water flood modelling study include:

- Desktop surface water assessment - to establish the hydrology and drainage characteristics of the site.
- Flood modelling - high-level TUFLOW flood modelling to assess changes to surface water drainage and environmental values (if any) as a result of the proposed infrastructure during the baseline, operational and closure phases.
- Drainage infrastructure conceptual designs – identify water management infrastructure that will be required for the project.
- Flood modelling for direct creekline discharge options assessment - undertake high-level flood modelling of identified down-gradient drainage areas to assess implication of proposed creekline discharge options.

A desktop surface water assessment has been undertaken to establish the hydrology and drainage characteristics of the site.

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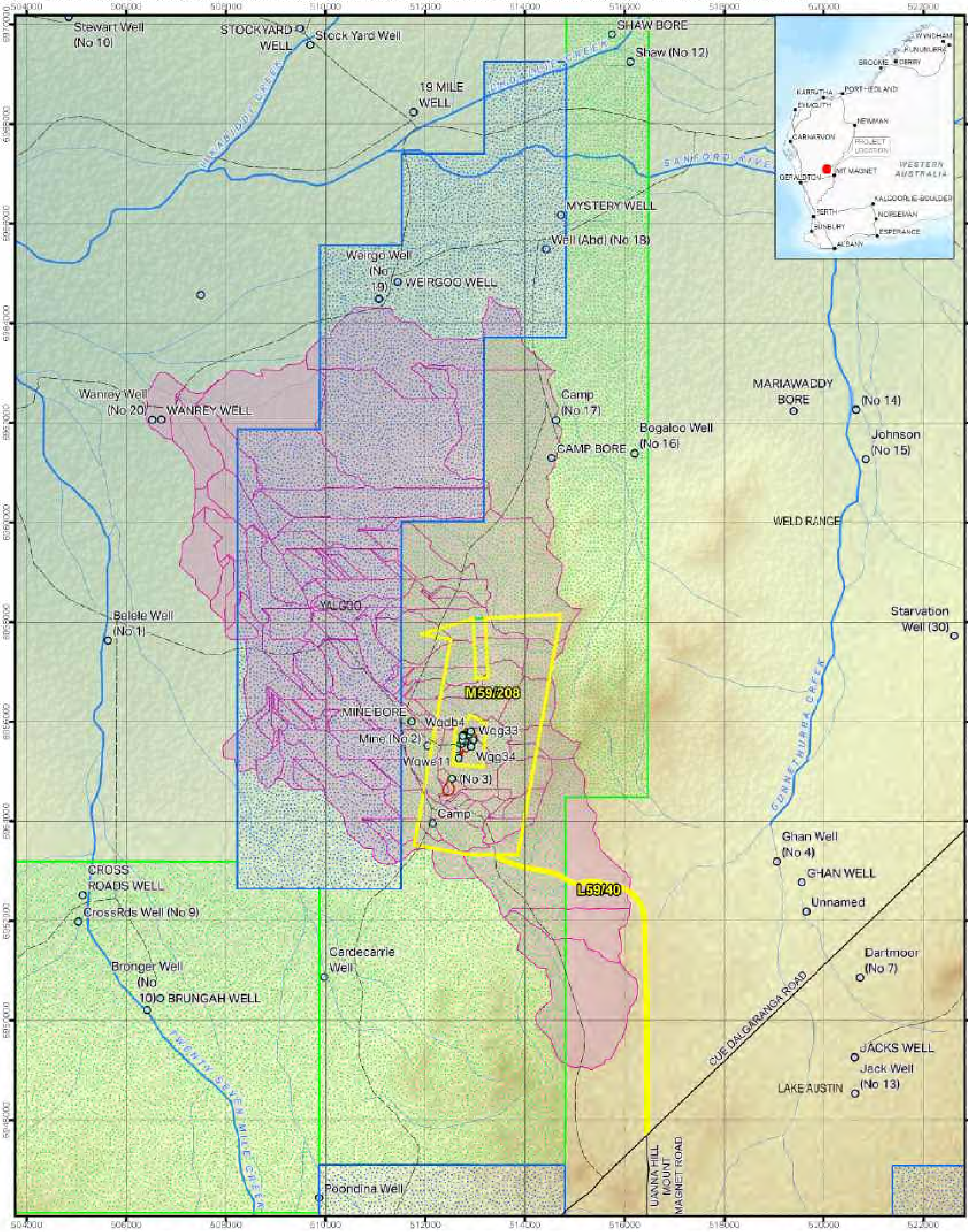

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GDA 1994 MGA ZONE 50

LEGEND
- Existing Pit Outlines
- Western Queen Tenements
- Rumble Resources Tenements
  - Live
  - Pending
- Catchment - Modelled
- Sub-catchment Modelled
- Lakes
- Major Watercourses
- Minor Road
- Track
- Regional Station Bores / Wells
- Elevation (m AHD) 500

Locality Plan

WESTERN QUEEN

WESTERN QUEEN SURFACE WATER ASSESSMENT

Figure 1

A4 size

2.0 Surface Water Characteristics

The site topography has been based on a LIDAR survey completed in April 2025. This survey data has been used to prepare a drainage map, identifying catchments and drainage lines and identify key surface water environmental values. These include rainfall records of nearest rainfall stations and determine the design rainfall depths for the site.

2.1 Rainfall

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).

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 1). 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.

The 50th percentile annual rainfall for the project area taken from the last 10 years of data is about 237mm (Table 2). For context, the annual rainfall for 2022 and 2023 was only 206mm and 152mm, representing extremely (below and just above the 25th percentile) dry years. Rainfall in 2015 and 2021 is the only recent year to have exceeded the 75th percentile.

Table 1 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**

Table 2 Monthly Rainfall Data from 1998 – 2023: Yoweragabbie Station No. 7095 (BoM, 2025)

Rainfall Stat	Monthly Rainfall (mm) (BoM, 1998-2023)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
max	160.7	161.2	185.5	194.6	186	122.8	103.2	105.3	100.8	60.2	54.1	112.4	534.6
mean	21.6	23.7	24	18.1	25.8	30.8	27.8	20	10.2	7.1	8.6	13.4	229.2
min	0	0	0	0	0	0	0	0	0	0	0	0	61.1
90th percentile	56	80	79	33	68	48	53	38	29	26	30	46	295
75th percentile	40	43	45	18	25	32	37	22	22	6	14	22	254
50th percentile	25	16	22	8	11	17	14	17	8	3	6	12	237
25th percentile	9	0	6	5	2	10	10	8	3	0	1	3	189
10th percentile	0	0	0	0	1	4	6	3	0	0	0	0	146

2.2 Evaporation

The long-term average monthly evaporation for the Western Queen mine is shown in Table 3. The annual pan evaporation for 2021 was recorded as 2,688mm at Mt Magnet (BoM, 2021). To estimate the evaporation from an open water body (storage / evaporation pond) the pan evaporation is adjusted by a regional pan factor and further adjusted for the salinity of the water. The resulting mean monthly open water evaporation is estimated at 2,121 mm per annum.

Table 3 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

2.3 Design Rainfall and IFD

For designing water management infrastructure for the site, the BoM recommends the use of the following rainfall Intensity-Frequency-Duration (IFD) relationship (BoM, 2024). The IFD data for the site is shown in Table 4.

Table 4 Intensity-Frequency-Duration of Rainfall at the Western Queen site. (BoM, 2024)

Duration	Depth (mm)						
	63.2% AEP	50% AEP	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP
1 hour	13.0	15.6	24.4	31.1	38.4	49.3	58.6
1.5 hour	14.8	17.7	27.8	35.5	43.8	56.3	67.0
2 hour	16.2	19.4	30.4	38.9	48.0	61.8	73.6
3 hour	18.4	22.0	34.5	44.2	54.7	70.5	84.0
4.5 hour	20.9	24.9	39.2	50.4	62.4	80.4	95.9
6 hour	22.8	27.2	43.0	55.2	68.6	88.3	105
9 hour	25.7	30.8	48.7	62.8	78.2	101	120

Duration	Depth (mm)						
	63.2% AEP	50% AEP	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP
12 hour	27.9	33.4	53.0	68.5	85.5	110	130
18 hour	31.0	37.2	59.3	76.8	96.1	123	145
24 hour	33.2	39.9	63.7	82.6	103	132	155
30 hour	34.8	41.8	66.9	86.8	109	138	162
36 hour	36.0	43.4	69.4	90.1	113	143	167
48 hour	37.8	45.6	73.0	94.7	119	149	174
72 hour	40.0	48.3	77.3	100.0	125	156	180
96 hour	41.4	50.0	80.0	103	128	159	184
120 hour	42.6	51.5	82.1	105	131	162	186
144 hour	43.7	52.8	84.0	108	133	164	189
168 hour	44.9	54.2	86.0	110	135	167	192

2.4 Surface Water Drainage

The Western Queen Mine is located at the top of the local catchment just west of a major catchment divide running generally north-south. The area west of the major catchment divide drains to the northwest away from the Project site. The area east of the divide, drains eastward. The surface water catchments and drainage lines are shown on Figure 1.

Within the local catchment, drainage across the proposed mine site follows a series of poorly defined flow paths that coalesce to the south of WQS into a northwest-draining creekline. Catchment areas upstream of the proposed infrastructure are relatively small meaning surface water management infrastructure will have to manage flows from mainly within the Project area.

2.5 Potential Surface Water Issues

2.5.1 Potential environmental receptors

Given the Project is located near the uppermost catchment divide, potential surface water receptors are more likely to be located downstream of the proposed project. These receptors may include riverine vegetation that is present in the creekline to the north (WQN) and south (WQS) of the Project. The source of the impact could be the presence of infrastructure that impedes runoff or re-directs it to other parts of the catchment that could change the availability of, or duration that surface water is present downstream. Disturbance of soils within the project footprint could initiate mobilisation of sediment from areas such as the waste rock dump (WRD).

2.5.2 Change in surface water environmental characteristics downstream (flow volumes)

Impact risks associated with changes to downstream flow volumes are considered minimal for the following reasons:

- The disturbed footprint area is small compared to the much larger drainage catchment that drains past the site to the west.
- The only part of the proposed project that will not contribute to surface water runoff are the open pits. The small reduction in runoff is expected to be compensated by the increased runoff from existing and proposed hardstand areas.

- The highly variable rainfall in the area results in a highly variable stream flow (seasonally and annually). The downstream receptors would therefore naturally be exposed to highly variable stream flows. The minimal change in stream flow volumes potentially caused by the proposed project would be indistinguishable downstream.

Over and above, the operational life of the project is only about 2-years. This very short duration means operational impacts are likely to occur within a short 2-seasonal cycle.

2.5.3 Change in surface water quality downstream (sediment load, chemical)

Potential impact sources within the project footprint that could alter the quality of surface water include:

- Disturbed areas where the soil is exposed to channelled runoff due to high local flow velocities. To mitigate this risk, runoff from the mine site will need to be directed to shallow sediment basins, which will be designed following IECA Best Practice Erosion and Sediment Control guidelines. These basins should be shallow enough to optimise sediment settling and facilitate maintenance, while also incorporating adequate storage for both runoff and sediment. Outlets should be designed to safely disperse treated runoff to downstream watercourses in a non-erosive manner.
- Water transferred between WQS and WQN contain salt at concentrations above natural surface water runoff. Similarly, surface water runoff from heavy vehicle refuelling areas may contain hydrocarbons. To minimise the risk to downstream surface water quality these water sources should not be released directly into the environment.
- Groundwater abstracted from WQS contains salt at concentrations similar to regional groundwater and natural surface water runoff. To minimise the risk to downstream surface water quality, groundwater released directly into the environment should be like for like and have minimal sediment loads. Given the short duration of the project, salt accumulated is not expected to be significant.

3.0 Surface Water Flood Modelling

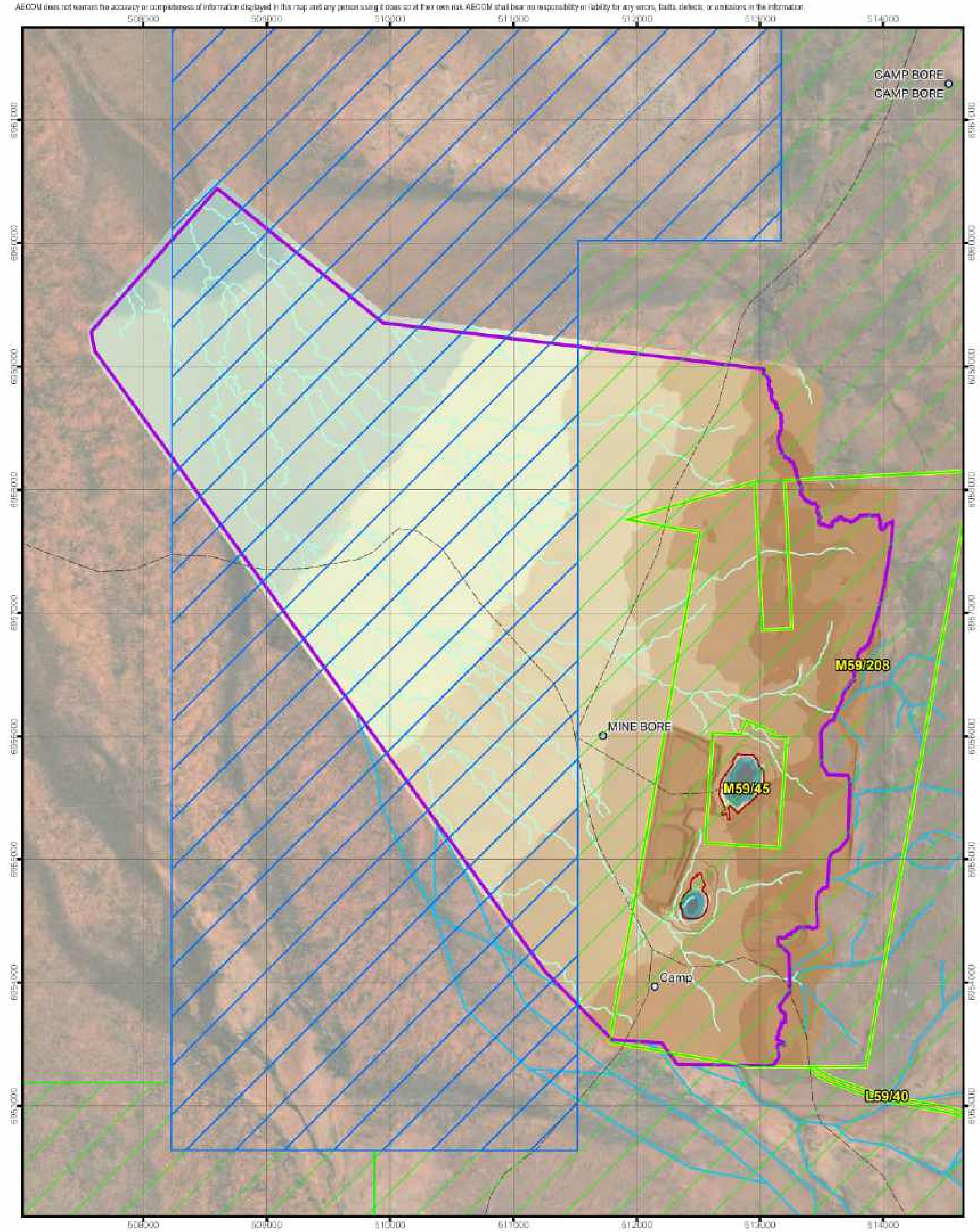
A two-dimensional hydraulic (TUFLOW) model was developed of the site to assess its drainage characteristics. The hydraulic and supporting hydrologic modelling approach is described by the section below.

3.1 Modelling Approach

An outline of the hydrologic (XP-RAFTS) modelling approach used by this project is provided by Table 5.

Table 5 Hydrologic Modelling Approach

Item	Description
Hydrologic Modelling Package	• Catchment SIM (3.61) • XP-RAFTS (2018.3) • Storm Injector (v1.4.0.0)
Catchment Delineation	Shuttle Radar Topography Mission (SRTM) Digital Elevation model (DEM) data and Catchment SIM was used to automatically delineate the XP-RAFTS catchments.
Design Rainfall Depths	BoM 2016 Intensity Frequency Duration (IFD) depths provided in Table 4 adjusted to present day (2025) rainfall conditions using Australian Rainfall and Runoff (ARR) Version 4.2 Shared Socioeconomic Pathways (SSP) 4.5 climate change adjustment factors.
Temporal Pattern Approach	ARR Version 4.2 ensemble temporal pattern approach with filtering to removed embedded bursts.
Temporal Pattern Selection	• Critical duration: the critical duration of each AEP design event is the duration that results in the highest peak flood condition level of the associated temporal pattern ensembles. • Critical temporal pattern: the temporal pattern that results in a peak flood condition level closest to the median flood condition level at the project area.
Areal Reduction Factor (ARF)	ARF = 1
Pre-burst Rainfall	Median pre-burst depths.
Losses	• Initial Loss (IL): 40 mm • Continuous Loss (CL): 3 mm/hour
Design Events	1% AEP (1 in 100-year event)



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LEGEND

- Existing Pit Outlines
- Western Queen Tenements
- Rumble Resources Tenements
  - Live
  - Pending
- TUFLOW Model Area
- Regional Station Bores / Wells
- Drainage Lines
- Modelled Drainage Lines
- Track

Elevation (m AHD)

- 352 - 360
- 360.1 - 365
- 365.1 - 370
- 370.1 - 375
- 375.1 - 380
- 380.1 - 385
- 385.1 - 390
- 390.1 - 395
- 395.1 - 400
- > 400

TUFLOW Model Domain

WESTERN QUEEN

WESTERN QUEEN SURFACE WATER ASSESSMENT

Figure 2

A4 size

An outline of the hydraulic (TUFLOW) modelling approach used by this project is provided by Table 6.

Table 6 TUFLOW Modelling Approach

Item	Description
Hydraulic analysis Approach	• TUFLOW HPC (2025-0-0) • 3 metre cell resolution
Model Extent	The model domain covers the area shown by Figure 2.
Terrain Models	Client supplied LASer (LAS) drone survey data processed into a 0.5 metre DEM using Global Mapper Geographical Information System (GIS) software.
Manning's n	**Manning's n Coefficients:** • Savannah (woodland): 0.068 • Savannah (grassland): 0.065
Boundary Conditions	**Inflow Boundaries** • A Rain-On-Grid (ROG) approach was adopted for all catchment areas within the TUFLOW model. • External model inflows from Storm Injector were applied using a single TUFLOW flow versus time (QT) type boundary at the upstream (northwestern) end of the TUFLOW model. **Outflow Boundaries** • TUFLOW automatically calculated Head versus Flow (HQ) boundary conditions were applied for all model inflows.
Design Event Simulation	All ARR 2019 ensemble point temporal patterns for all storm durations from 1 hour to 12 hours.
Design Event Simulation	1% AEP

3.2 Modelling Results

Peak 1% AEP depths and velocities at the Site are presented on Figure 3 and Figure 4.

Key observations show:

Western Queen North Pit (combined Duke, existing WQN and Princess):

- There is a drainage line running west towards the pit from the east, through the proposed Duke deposit area.
- An existing flow diversion bund directs water in the drainage line around the north of the existing pit in a north-westerly direction before the diverted flow rejoins the original drainage line further east.
- Depths within the diverted section of the drainage line range from 0.1 m to 1.0 m, with an average depth of 0.4 m.
- Velocities within the diverted extent of the drainage line range from 0.3 m/s to 1.1 m/s, with an average velocity of 0.7 m/s.

Western Queen South Pit:

- The pit is located near the confluence of three drainage lines.

- Flow in the northeastern drainage line is diverted southwest around the pit by an existing diversion bund, where it intersects the other two drainage lines. Depths within the diverted section of the drainage line range from 0.1 m to 0.9 m, with an average depth of 0.6 m. Velocities within the diverted extent of the drainage line range from 0.2 m/s to 1.2 m/s, with an average velocity of 0.6 m/s.
- Flow in the drainage line directly south of the pit is not contained within well-defined channels. Instead, water discharges northward toward the pit as broad (~550 m wide), shallow sheet flow, with an average depth of 0.1 m and velocity of 0.2 m/s.
- Runoff trapped within the diversion bund flows to a low point located between the waste dump and the southwestern boundary of the pit.

Cranes Pit:

- The pit is located in the top of the catchment with no apparent local drainage features.
- A drainage line located about 220 m south reports shallow sheet flow, with an average depth of 0.2 m and velocity of about 0.7 m/s.

Haul Road Access:

- There is a drainage line running west towards the existing WQN pit from the east, cutting across the proposed haul road, nearby the northwest corner of the proposed eastern waste dump.
- Predicted flood depths range up to about 0.7 m with a predicted velocity up to about 1.1 m/sec.
- To the south of WQS, the haul road crosses a mine drainage line with predicted flood depths of up to 0.4 m and a predicted velocity of up to 0.6 m/sec.

Proposed Magazine Area:

- The small drainage line running west towards the existing WQN pit from the east, runs just north of the proposed Magazine area.
- Predicted flood depths along the proposed access track range up to about 0.6 m with a predicted velocity up to about 1.3 m/sec.
- An area in the north-eastern corner of the proposed area reports a predicted flood depths up to about 0.2 m with a predicted velocity of about of <0.5 m/sec.

Proposed ROM Area:

- A main westerly flowing broad drainage line, located south of the existing WQS pit, cuts across the proposed ROM area.
- Predicted flood depths range up to about 0.5 m with a predicted velocity up to about 0.6 m/sec.

Proposed Office area:

- No drainage lines are apparent in the proposed office area.

A comparison between the proposed extensions of Western Queen North and South pit layouts and the baseline hydraulic modelling results highlights the need to extend the existing flow diversion bunds. Conceptual surface water management infrastructure that should be considered during operations and post-closure are presented in the following sections.

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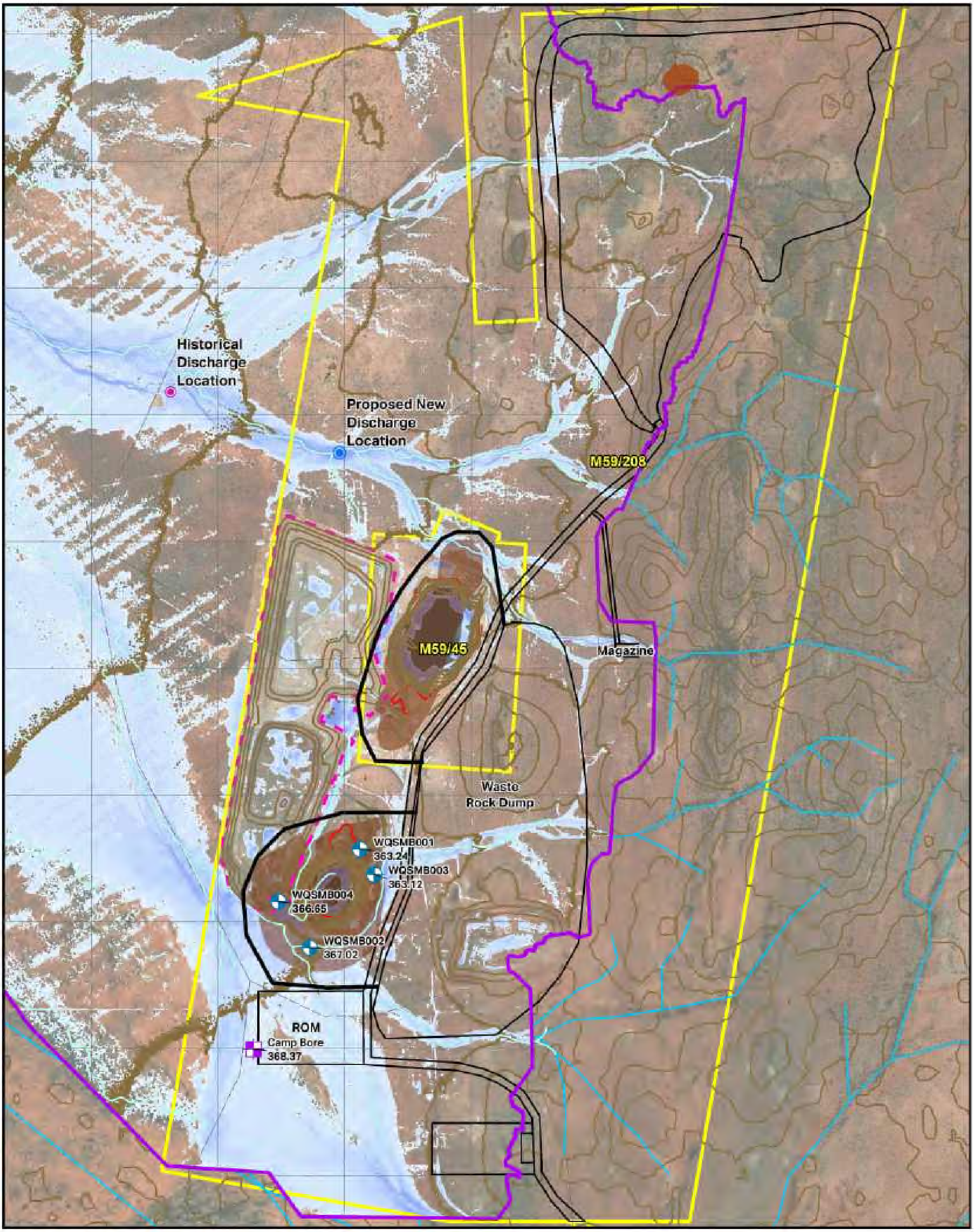

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0 100 200 300 400 metres
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LEGEND
- Western Queen Tenements
- Existing Pit Outline
- Proposed Pit
- TUFLOW Model Area
- Proposed Site Layout
- Existing Waste Dump
- Drainage Lines
- Modelled Drainage Lines
- Contours

Depth (m)
- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0

- Monitoring Bore
- Production Bore
- Historical Discharge Location
- Proposed New Discharge Location

Peak 1 Percent Annual Exceedance Probability (AEP) Depth

WESTERN QUEEN

WESTERN QUEEN SURFACE WATER ASSESSMENT

Figure 3

A4 size

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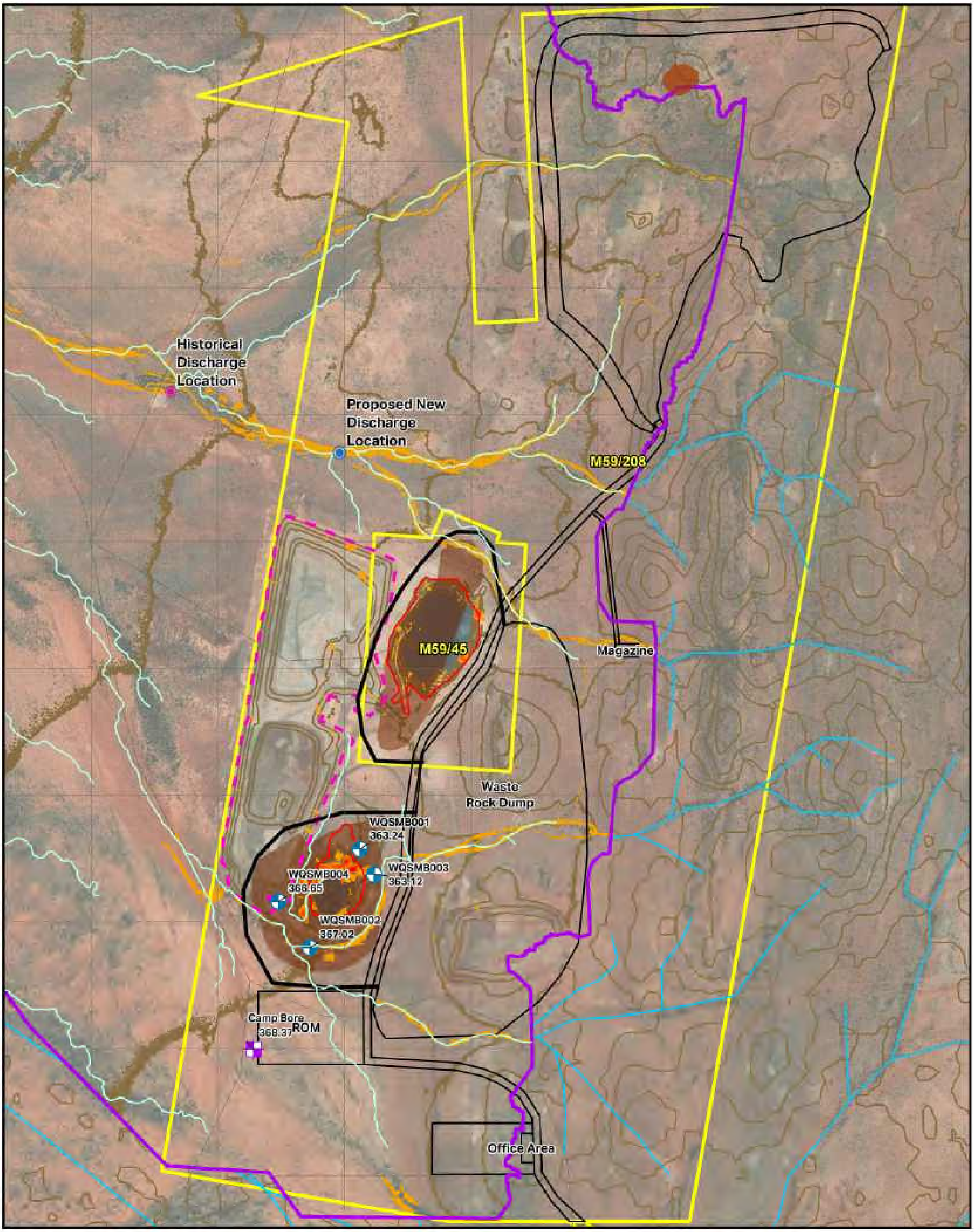

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1:20,000 (when printed at A4)

0 100 200 300 400 metres

GDA 1994 MGA ZONE 50

LEGEND
- Western Queen Tenements
- Existing Pit Outline
- Proposed Pit
- TUFLOW Model Area
- Proposed Site Layout
- Existing Waste Dump
- Drainage Lines
- Modelled Drainage Lines
- Contours
- Surface Water Flood Model Velocities (m/s)
  - < 1
  - 1 - 2
  - > 2
- Monitoring Bore
- Production Bore
- Historical Discharge Location
- Proposed New Discharge Location

Peak 1 Percent Annual Exceedance Probability (AEP) Velocity

WESTERN QUEEN

WESTERN QUEEN SURFACE WATER ASSESSMENT

Figure 4

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A4 size

4.0 Surface Water Management – Operations

4.1 Surface water management infrastructure

Proposed surface water management measures during mining operations are shown on Figure 5. These measures include:

- drainage channels to capture runoff and safely disperse it downstream.
- sediment basins to temporarily intercept runoff to minimise the turbidity and release of suspended sediment.
- diversion bunds to redirect runoff around infrastructure such as the open pit and WRD.
- capture and removal of rainfall within the open pit.

4.2 Diversion bund

A diversion bund is proposed around both the WQN and WQS open pits using the existing western WRD and the eastern WRD as shown on Figure 5 his bund should be constructed to minimise the risk of overtopping the pit crest for the safety of mine workers and geotechnical stability of the pit walls. The designs of these structures should consider closure requirements as detailed in Section 5.0.

4.3 Drainage channels

To minimise runoff-related changes to the catchment hydrology, a network of drainage channels is recommended to capture runoff from hard stand areas.

Toe drains around the waste rock dumps and mine laydown and workshop areas are recommended to collect and divert runoff that may carry high sediment loads. These toe drains should redirect this runoff to sediment basins (Figure 5).

The open pit intersects a natural drainage line and will block the flow of this natural channel. To divert the flow in the natural creek a surface water runoff diversion bund and drain is required around the southern corner of the open pit. This diversion bund and channel would need to be designed to carry the natural flow of the creek for at least a 20yr or higher rainfall event. The location and natural ground profile along the diversion channel are shown on Figure 5.

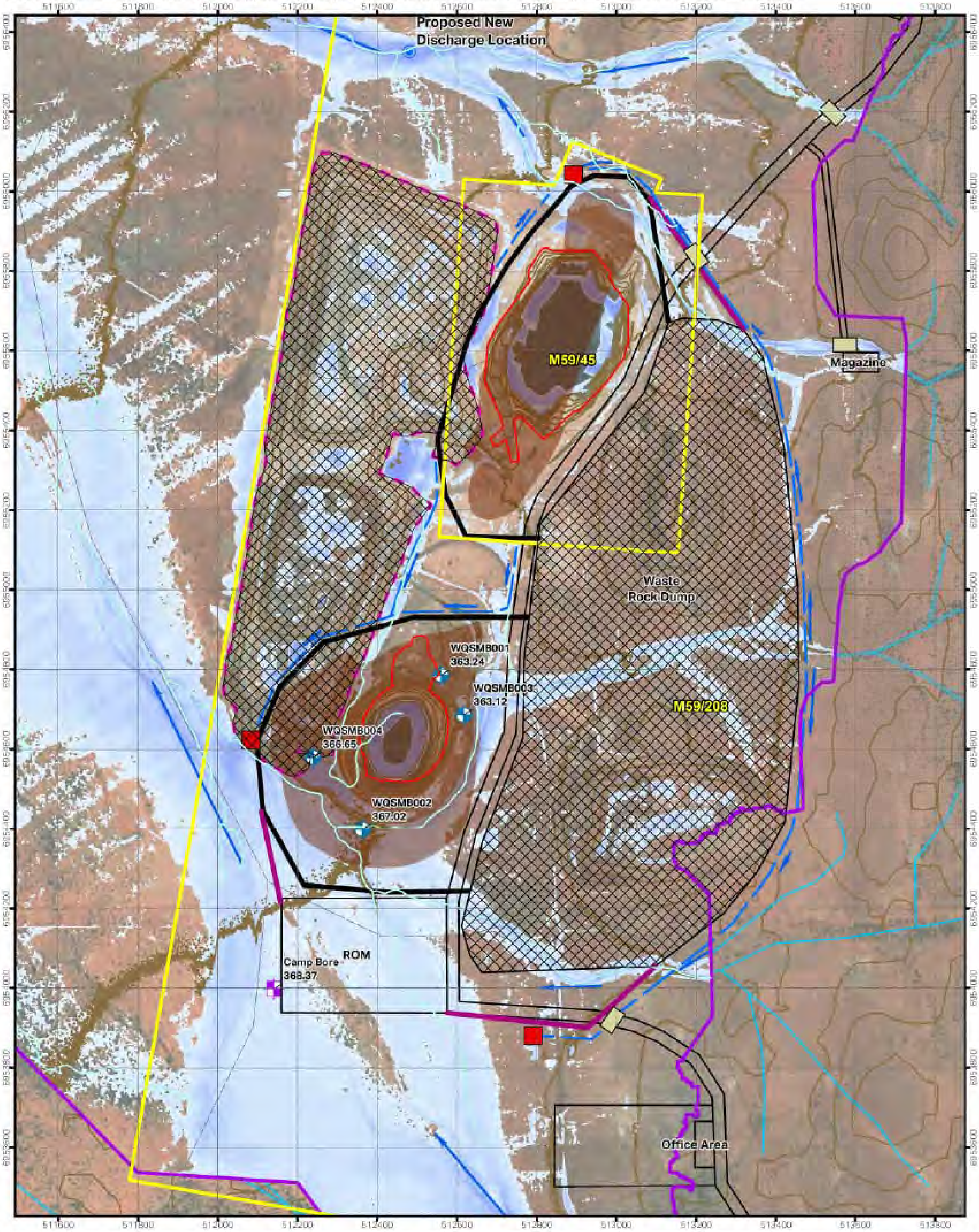
The flood modelling for the 100yr AEP, 1-hour event simulated the maximum water depths and maximum flow velocities at the natural drainage channels intersecting with the surface water diversion drain around the south-eastern corner of the WRD.

The results show that even for a 100yr AEP, 1-hour event the maximum water depth is a maximum of 0.43 m. This means that a relatively shallow by wide diversion channel would be the appropriate design. The simulated stream flow velocities at these locations are less than 1m/s. which means that anticipated stream flow velocities in the diversion channel are likely to be the same. Streamflow velocities of less than 1m/s do not have enough stream power to be erosive, therefore the channel does not require to be lined to prevent erosion.

4.4 Sediment ponds

Recommended locations of the sediment ponds are shown on Figure 5 These are located immediately downstream of disturbed areas and are intended to temporarily contain runoff that may contain elevated sediment.

Typically, the sediment ponds are sized to contain the first flush component of a rainfall event with a retention time of about 3 days. This retention time will allow any sediment to settle in the pond before water can be released into the downstream environment.



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LEGEND
- Western Queen Tenements
- Existing Pit Outline
- TUFLOW Model Area
- Proposed Site Layout
- Existing Waste Dump
- Waste Roack Dump
- Drainage Lines
- Modelled Drainage Lines
- Monitoring Bore
- Production Bore
- Proposed New Discharge Location
- Contours
- Surface Water Drainage Culvert
- Surface Water Runoff Detention and Sediment Pond
- SW Drainage Channel
- SW Drainage Flow Direction
- Flood Protection Bund

Flood Depth (m)
- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0

Conceptual Drainage Design: Operations

WESTERN QUEEN

WESTERN QUEEN SURFACE WATER ASSESSMENT

Figure 5

A4 size

The runoff from small runoff events would be retained in the sediment ponds and evaporate. Under these conditions, all surface flows will be retained in disturbed areas.

4.5 Direct rainfall on the Pit

Direct rainfall in the pit will runoff from the pit walls, ramps and floor and collected in a pit sump. The pit sump should be designed to be able to contain runoff to minimise delays to the mining schedule. The location of the sump should be carefully planned to allow access of a sump pump and discharge pipeline to proposed tanks or turkey's nest. As the sump will be a temporary structure during the operational phase, temporary in-pit drains may be required to direct runoff across the pit floor.

4.6 Surface water quality

Rainfall and surface water runoff are infrequent and, depending on the season, highly variable. The primary mechanism to manage surface water quality is to temporarily intercept runoff with sediment basins. The intent of these basins is to minimise the transportation of sediment from disturbed areas.

To minimise risks associated with leaks and spills of hydrocarbons, areas such as vehicle refuelling tanks, transfer areas and workshops should be bunded in line with current DMIRS regulations.

Leaks and spills of fuels or any other potentially contaminating substances should be minimised by implementing a hazardous materials management plan, which should be developed to comply with DMIRS and the Department of Water and Environmental Regulation (DWER) regulations.

4.7 Surface water monitoring

Given the key risks to surface water are erosion, sedimentation of creeklines and impacts to riverine vegetation downstream, the following monitoring programme is recommended:

- Undertake monthly visual observations of all drainage channels, diversion bunds and sediment basins to ensure they remain clear and are functioning as designed.
- Undertake monthly visual inspections of vegetation downstream to identify if it is being affected by runoff from the project site. If this occurs, undertake an assessment of the affected vegetation to determine if the change is significant and whether the surface water infrastructure needs to be modified to minimise further impact.
- Undertake monitoring, sampling and analyses as specified in Table 7. This programme should commence before construction starts to obtain data on the ambient quality of surface water in the area.

Table 7 Recommended Surface Water Monitoring Programme

Sites	Parameter Type	Parameters to be Measured	Frequency
Surface Water Quality Monitoring Points	Quality (field)	pH, EC, TDS, temperature	Opportunistic
	Surface Water Quality (laboratory)	**Physicochemical:** pH, EC, TSS, TDS, total acidity, total alkalinity, hardness **Major ions:** Na, K, Ca, Mg, HCO_3, CO_3, Cl, SO_4, NO_3, total nitrogen **Total & dissolved trace metals/ metalloids:** Al, As, Cd, Cr, Cu, Fe, Hg, Pb, Mn, Ni, Se and Zn	Opportunistic

Because of the short duration of the proposed Project, the results of the above monitoring programme should be reviewed as the results become available. The results should be incorporated into the annual environmental report in line with DMIRS requirements.

4.1 Recommendations

Further design development is recommended to refine the high-level conceptual design, with particular focus on:

- Geotechnical assessment of the bund to confirm stability and reduce the risk of settlement or structural failure.
- Provision of adequate freeboard to ensure the bund maintains a safe height margin above the design flood level.
- Incorporation of a new sediment basin within the bunded area to treat potentially sediment-laden runoff prior to discharge to the receiving environment.
- Design of internal drainage within the bund to direct surface runoff away from the pit and toward the sediment basin.
- Refinement of the alignment and geometry of the diversion drain to maintain discharge flow conditions similar to baseline levels.
- Application of appropriate surface treatments along the diversion drain to prevent erosion and minimise sediment transport to the receiving environment.

5.0 Surface Water Management – Closure

5.1 Surface water management infrastructure

At closure, all temporary mine site infrastructure will be removed, and the disturbed development footprints rehabilitated. The only permanent changes in landform are the waste rock dump and the open pit.

5.2 Drainage channels

The surface water drainage channels around the southern open pit areas should remain and continue to drain into the sediment ponds. This is recommended to minimise the release of sediment from the newly rehabilitated open pit area and WRDs. The designs of these channels should direct the first-flush runoff to the sediment basins. These drains may need to be cleared after the first few years during which the rehabilitated surface is undergoing revegetation.

The surface water diversion drain around the operational mine laydown areas may need to remain a permanent diversion of the reinstated upstream catchment area. The closure design of the diversion channels may well differ from the operational design as the operational stage of the project is less than three-years and the closure design will need to be sustainable for much longer into the future.

5.3 Sediment ponds

The location of the sediment ponds is shown Figure 6. Recommendations in relation to sediment basins after closure include:

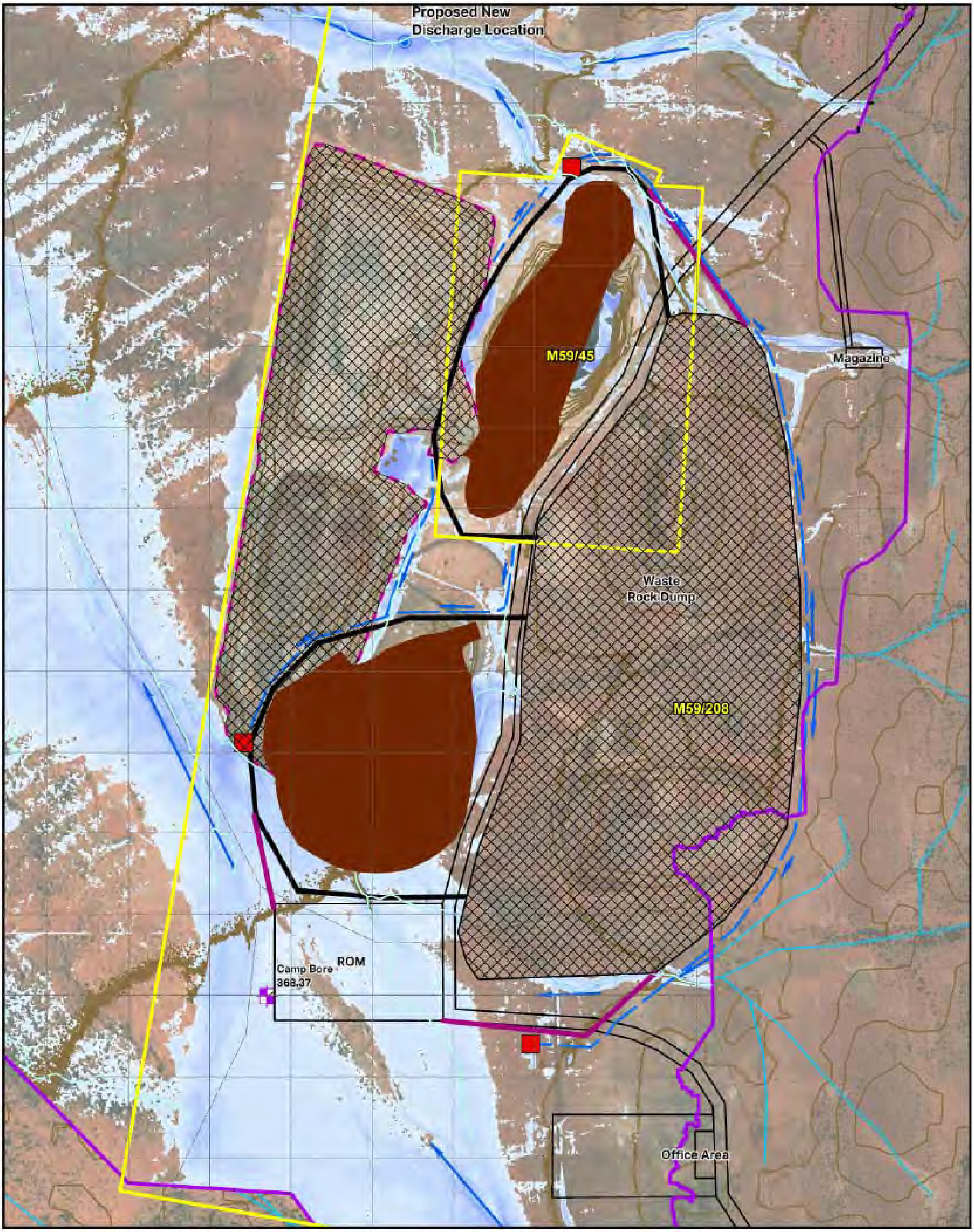
- A basin next to the eastern WRD that should remain for up to 2 years following closure or until negligible material loss from WRD is expected. They may need to be cleaned out after the first few years as they will capture more sediment-laden runoff during and immediately after the WRD is capped. Following this period, they can be removed and rehabilitated.
- The sediment basin down-stream of the open pit area should remain for up to 2 years following closure or until negligible material loss from rehabilitated and revegetated area is expected.
- One basin downstream (north) of the infrastructure area. This basin should remain active for up to 2 years during the closure phase to intercept most of the sediment from the newly rehabilitated surface. Minor changes may be required to allow this basin to function effectively once the drainage channels have been rehabilitated. The basins may need to be cleaned-out a few years into closure to ensure they continue to operate as designed. At the end of the closure phase, this basin could also be rehabilitated if required to meet closure criteria linked to the post closure hydrology.

5.4 Abandonment bund

At closure, the pit will need to be surrounded by an abandonment bund in line with DMIRS requirements. The bund will serve two purposes: maintain flows past the pit to minimise changes to flows and hydroperiods downstream, and the other being to maintain geotechnical integrity by preventing surface water from flowing over the pit crest. The bund design should incorporate erosion-resistant characteristics to ensure they remain in place and functional during the post-closure phase. This will mainly apply to the bund around the southern side of the pit where velocities are likely to remain higher than baseline. Typically, erosion is minimised by selecting durable waste rock to armour the bund, possibly in conjunction with widening the diversion channel to lower the channel velocity.

5.5 Surface water quality

After closure all potentially contaminating materials must be removed from the site or relocated to an approved repository. This may include soils that contain residues from former hydrocarbon storage and transfer areas, chemical storage sites and former ore stockpile areas. Due to the short duration of the proposed Project, this should be largely avoidable if comprehensive preventative measures are implemented, and monitored, and unplanned leaks and spills are carefully managed.



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0 50 100 150 200 metres

GDA 1994 MGA ZONE 50

LEGEND
- Western Queen Tenements
- TUFLOW Model Area
- Proposed Site Layout
- Existing Waste Dump
- Waste Roack Dump
- Drainage Lines
- Modelled Drainage Lines
- Production Bore
- Proposed New Discharge Location
- Contours
- Surface Water Runoff Detention and Sediment Pond
- SW Drainage Channel
- SW Drainage Flow Direction
- Flood Protection Bund

Flood Depth (m)
- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0

Conceptual Drainage Design: Closure

WESTERN QUEEN

WESTERN QUEEN SURFACE WATER ASSESSMENT

Figure **6**

A4 size

With the inclusion of the WRD toe drains and sediment traps around the WRD and north of the former infrastructure area, surface water quality downstream is unlikely to be adversely affected after closure. However, this will need to be demonstrated by monitoring before, during and after the operational phase and adapting closure designs to meet agreed closure outcomes.

5.6 Surface water monitoring

During the closure phase (typically five to ten years after the end of operations) the observations outlined in the monitoring programme in Section 4.7 should continue but at six-monthly frequency. Opportunistic surface water quality testing should continue to support closure-related assessments of rehabilitation compliance.

6.0 Discharge to Local Creekline

6.1 Excess Mine Water Rates and Water Quality

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. With a predicted range of WQS groundwater inflows of between 2,300 to 3,200 kL/day, a mine water usage (dust suppression etc) up to about 800 kL/day, a total mine water excess may be up to about 2,400 kL/day over the duration of mining. The equates to a total dewatering volume is predicted to be between about 1,500 kL/day to 2,400 kL/day (up to 1 GL/annum) 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) and 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.

As a result of mine dewatering, predicted drawdown may propagate up to 2 km from the WQS open pit. To assist mitigation of the drawdown impacts, and allow for management of mine water, it is proposed to discharge excess water to a local creekline (indicative location 511,813mE, 6,956,590mN) within the drawdown capture zone.

Importantly, prior to discharge, all abstracted water will require retention within a suitably designed transfer pond to minimise sediment loads. Minimising sediment where possible can also be achieved through abstraction from production bores rather than pit floor sump pumping. Minimising erosion at the outfall location will also be a requirement.

6.2 Flora and Vegetation Survey

A recent vegetation and fauna survey (Botanica, 2025) reported the proposed discharge area is comprised of the Jundee landscape system that is described as hardpan plains with variable mantles and minor sandy banks supporting weakly banded mulga scrublands. The survey did not identify any significant vegetation assemblages and concluded there was a low risk of potential terrestrial groundwater dependent ecosystems (GDE). Vegetation condition was reported as good (*low levels of grazing or slightly aggressive weeds*) within narrow creek channels to degraded (*severely impacted by grazing, and very frequent fires*) within the floodplain areas. Further down-gradient of the historical discharge location (about 2km distance), the vegetation condition was reported as very good (*some relatively slight signs of damage caused by human activities*). The closest station well, Wanrey Well, is about 7 km northwest of the proposed outfall location.

6.3 Wetting Front Modelling

To assess the footprint length and surface water expression (wetting front) arising from discharge of water to a local creek with discharging up to 1.5 GL/annum over the duration of the project, the projects developed steady state TuFlow surface water flood model was used. This modelling approach uses Manning's equation to estimate wetted perimeter, top width, velocity, and water depth and is considered a standard technique to estimate change in water level and water surface area associated with changes in discharge.

Importantly, this model down not consider groundwater and surface water interactions, and subsequent recharge to deeper aquifers, and loss through evapo-transpiration. The model results therefore like provide a worst-case scenario in terms of predicted wetting front extent.

With the above in mind, the change on the receiving environment associated with the proposed environmental discharge was evaluated for a dry weather case, where there is no rainfall, and a wet weather case, where there is runoff in the drainage lines.

Key assessment parameters are presented in Table 8.

Table 8 Creek Discharge Assessment Parameters

Parameter	TUFLOW Modelling Approach	Values	
		Dry Weather	Wet Weather
Discharge Location	Located northwest of Western Queen North at an ephemeral stream (512,480mE, 6,956,350mN).		
Discharge Rates	TUFLOW QT Boundary	1,500 kL/day (lower-case) 2,400 kL/day (likely-case) 5,800 kL/day (peak dewatering discharge)	
Design Storm Event	As per section 3.1.	N/A	20% AEP (~1 in 5 year)
Infiltration	TUFLOW initial and continuing infiltration soil loss	0.1 m/day (±0.05 to 0.20 m/day)	Evaporation effects assumed negligible due to saturated soil conditions.
Wetting front cutoff depth	Filtered in GIS.	0.05 m	0.05 m (default for rain-on-grid filtering)
Evaporation	Result adjustment applied in GIS.	Summer (Jan): 23.2 mm/day Winter (Jul): 7.8 mm/day	Evaporation effects assumed negligible.
Groundwater Level	Not modelled.	Estimated groundwater table ~15 m below natural ground level; considered deep enough to not influence surface water dynamics.	

6.4 Model Results

The downstream extent of surface water exposure from the creek discharge assessment under various wet and dry weather conditions in context with vegetation condition reported from the 2025 survey is presented on Figure 7. The 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.

Modelling results show the formation of disconnected ponded areas within the ephemeral stream, with increasing separation from the release point. This discontinuous ponding pattern reflects a limitation of the TUFLOW modelling approach, whereby evaporation and wetting front conditions are assessed post-simulation rather than dynamically.

Accordingly, the delineation of visible discharge extent downstream of the release point has been based on the observed maximum spacing between discrete ponded areas. A separation distance greater than 150 metres, with a continued divergence, has been adopted as the threshold beyond which surface discharge is considered no longer evident.

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 all simulated discharge rates (1,500 kL/day, 2,400 and 5,800 kL/day), a wetted front generally remains within the low flow channels.
- Under an estimated average discharge rate of 1,500 kL/day (total 0.9 GL), a wetted front extent of about 1.75km is predicted.
- 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 rates occur, a maximum 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.

The above results are consistent with predictions made for the adjacent Dalgaranga Gold Project by Spartan Resourced Limited, whereby wetting front modelling predicted a broader extent of about 2.5 km and up to about 500m wide for a 2.5 GL/annum (6,800 kL/day) approved discharge rate.

6.5 Risk Assessment

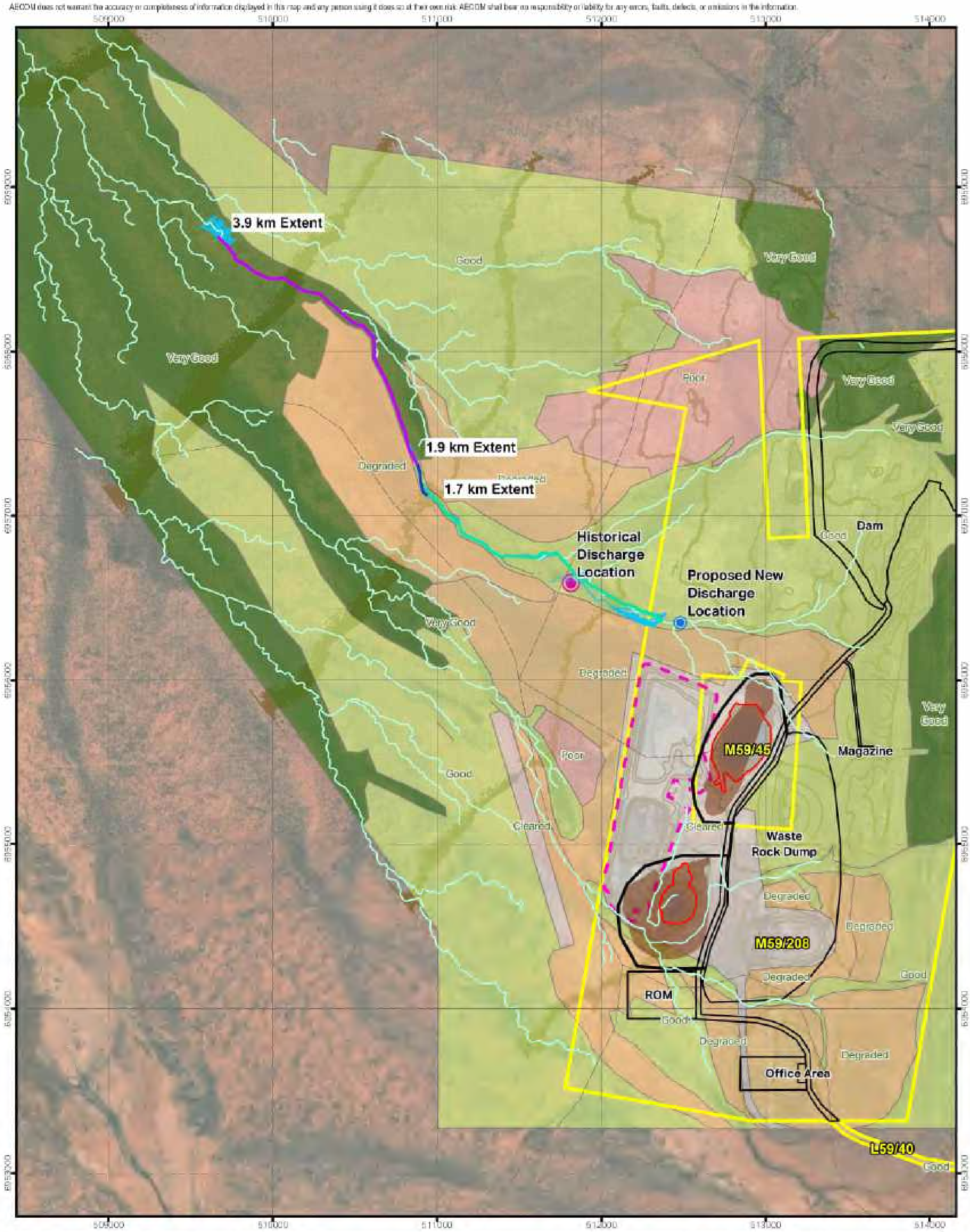
Risks of discharging excess water to the environment from the Western Queen mine to allow mining ore was reviewed in accordance with the potential source, pathway, and impact to receptors guideline (DWER 2020b).

Groundwater salinity in the WQS area has previously been reported to average about 2,100 mg/L TDS (between 1,050 mg/L TDS and 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.

Proposed operational control are provided in Table 10.

Table 9 Proposed Surface Water Related Controls

Emission	Source	Potential Pathway	Proposed Controls
Excess mine water	Discharge of excess mine water dewatered from the Western Queen pits to allow mining of ore	Direct discharge to land – overland run-off	Undertaken monitoring of vegetation health within the discharge wetting front.
			Transfer pond use to mitigate sediment loads prior to discharge.
		Discharge to land via pipeline – unforeseen pipeline ruptures	Use of high-density polyethylene (HPDE) pipeline. Flow meters installed at these start of the pipeline and at the outfall location to allow reconciliation of flow rates and leak detection.
		Erosion at the discharge point	Outfall designed to reduce velocity of flows and prevent erosion.



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0 100 200 300 400 metres

GDA 1994 MGA ZONE 50

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 SURFACE WATER ASSESSMENT

Figure 7

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6.6 Outfall Conceptual Design Options

A key consideration for the proposed excess mine water discharge is to minimise erosion at the discharge point. With the proposed discharge flow rates up to 2,400 kL/day or about 30 L/sec in mind, a number of initial conceptual erosion prevention options include (but not limited too):

- **Gravel lined (riprap) channel** - Riprap is used to stabilise areas with high erosive power by increasing surface roughness and slowing the velocity of runoff. Riprap is a permanent layer of large, angular stone, or boulders typically used to stabilise, and protect the soil surface against erosion and scour in areas of concentrated flow.

Plate 1 Gravel Lined Outfall/ Channel

- **Soak Wells** – gravel filled soak wells can provide an alternative option for minimising erosion at the discharge locations.

Plate 2 Soak Well Installation

- **Engineered outfall tank** – designed to reduce the flow velocity from a single pipeline and an allowance for the water to spread across over conveyor belt or similar material to prevent local erosion.

Plate 3 Engineering Outfall Tank

6.7 Operational Monitoring

No hydrologic model formulation can be entirely validated without comparison with field observations. After discharges have commenced, where possible, it is recommended that surface infiltration rates can be confirmed through calibration of the model to observed data. Monitoring of the wetting front extent will help with this model calibration. Proposed surface water related water monitoring is summarised in Table 10.

Table 10 Recommended Surface Water Monitoring Programme

Sites	Parameter Type	Parameters to be Measured	Frequency
Discharge Water Monitoring Points	Vegetation Health	Vegetation health survey	Quarterly
	Quality (field)	pH, EC, TDS, temperature	Daily
	Wetting Front Extent (field)	Visual estimate of wetting front distance from discharge location.	Weekly
	Quality (laboratory)	**Physicochemical:** pH, EC, TSS, TDS, total acidity, total alkalinity, hardness **Major ions:** Na, K, Ca, Mg, HCO_3, CO_3, Cl, SO_4, NO_3, total nitrogen **Total & dissolved trace metals/ metalloids:** Al, As, Cd, Cr, Cu, Fe, Hg, Pb, Mn, Ni, Se and Zn	Quarterly

6.8 Model Assumptions and Exclusions

The model was developed assuming the following:

- There are no point source discharges along the reach of the river other than the discharge from mine operations.

- Given the open landscape without dense vegetation, point potential evaporation data was used in this model.
- Surface infiltration rates are likely to vary considerably in the field between reaches and from published values, however, are considered appropriate prior to the commencement of discharges.

7.0 Conclusions

Rumble Resources Ltd (Rumble), along with co-operation agreement partners, Bain, and MEGA Resources (MEGA), are proposing to commence mining operations within the Western Queen Mine, located approximately 90km northwest of Mount Magnet in Western Australia.

This surface water flood assessment, inclusive of an excess water discharge wetting front assessment, was completed to support ongoing approvals and water management for the proposed project.

The Western Queen Mine is located at the top of the local catchment just west of a major catchment divide running generally north-south. The area west of the major catchment divide drains to the northwest away from the Project site. The area east of the divide, drains eastward.

Within the local catchment, drainage across the proposed mine site follows a series of poorly defined flow paths that coalesce to the south of Western Queen South (WQS) into a northwest-draining creekline. Catchment areas upstream of the proposed infrastructure are relatively small meaning surface water management infrastructure will have to manage flows from mainly within the Project area.

Key surface water aspects and findings associated with the proposed project include:

Surface Water Management Infrastructure - Operations

Proposed surface water management measures during mining operations include:

- drainage channels to capture runoff and prevent standing water.
- sediment basins to temporarily intercept runoff to minimise the turbidity and release of suspended sediment.
- Flood protection bunds around both Western Queen North (WQN) and WQS pit edges will be required to limit the inflow of additional surface water runoff into the pit.
- In-pit drainage (direct rainfall) will be required to divert surface water runoff into dedicated sumps with pumps to dispose the runoff, potentially to alternative storage facility depending on water quality.
- Storage of abstracted water in a dedicated mine water storage pond suitable of storing two days capacity should be constructed to minimise sediment load (from in-pit sump pumping).
- Given the key risks to surface water are erosion, sedimentation of creeklines and impacts to riverine vegetation downstream, a surface water monitoring programme will be implemented.

Surface Water Management Infrastructure - Closure

At closure, all temporary mine site infrastructure will be removed, and the disturbed development footprints rehabilitated. The only permanent changes in landform are the waste rock dump and the open pit.

Proposed surface water management measures that will remain post-closure include:

- The surface water drainage channels around the southern open pit areas should remain and continue to drain into the sediment ponds. This is recommended to minimise the release of sediment from the newly rehabilitated open pit area and WRDs.
- Key sediment ponds should remain for up to 2 years following closure or until negligible material loss from rehabilitated and revegetated WRD and mine laydown areas is expected. They should then be removed and rehabilitated.
- At closure, the pit will need to be surrounded by an abandonment bund in line with DMIRS requirements. The bund will serve two purposes: maintain flows past the pit to minimise changes to flows and hydroperiods downstream, and the other being to maintain geotechnical integrity by preventing surface water from flowing over the pit crest.
- During the closure phase (typically five to ten years after the end of operations), opportunistic surface water quality testing should continue to support closure-related assessments of rehabilitation compliance.

Discharge to Local Creekline

With a predicted range of WQS groundwater inflows of between 2,300 to 3,200 kL/day, a mine water usage (dust suppression etc) up to about 800 kL/day, a total mine water excess may be up to about 2,400 kL/day over the duration of mining. The equates to a total dewatering volume is predicted to be between about 1,500 kL/day to 2,400 kL/day (up to 1.0 GL/annum) over the anticipated 608 days of mining. Should unforeseen high yielding structural features be encountered during mining, a worst-case dewatering requirement of 5,800 kL/annum has been predicted.

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

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 all simulated discharge rates (1,500 kL/day, 2,400 and 5,800 kL/day), a wetted front generally remains within the low flow channels.
- Under an estimated average discharge rate of 1,500 kL/day (total 0.9 GL), a wetted front extent of about 1.75km is predicted.
- 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 rates occur, a maximum 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.

The above results are consistent with predictions made for the adjacent Dalgaranga Gold Project by Spartan Resourced Limited, whereby wetting front modelling predicted a broader extent of about 2.5 km and up to about 500m wide for a 2.5 GL/annum (6,800 kL/day) approved discharge rate.

8.0 References

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