

Permit

Environmental Protection Act 1994

Environmental authority EPML00562913

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: EPML00562913

Environmental authority takes effect on 03 March 2020

Environmental authority holder(s)

Name(s)	Registered address
AUCTUS RESOURCES PTY LTD	Level 1, 21 Kintail Road APPLECROSS WA 6153 Australia

Environmentally relevant activity and location details

Environmentally relevant activity/activities	Location(s)
Schedule 3 21: A mining activity that is an ineligible ERA, other than a mining activity mentioned in items 9 to 20	
Ancillary 63 - Sewage Treatment 1: Operating sewage treatment works, other than no-release works, with a total daily peak design capacity of (b-i) more than 100 but not more than 1500EP if treated effluent is discharged from the works to an infiltration trench or through an irrigation scheme	
Ancillary 08 - Chemical Storage 2: Storing 50t or more of chemicals of dangerous goods class 6, division 6.1 under subsection (1)(b)	

Environmentally relevant activity/activities	Location(s)
Ancillary 16 - Extraction and Screening 3: Screening, in a year, the following quantity of material (c) more than 1,000,000t	ML20640, ML20658, ML4910, ML4911, ML4921, ML4928, ML4977, ML5176, ML5319
Ancillary 60 - Waste disposal 2: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(b) (a) less than 2000t	
Ancillary 16 - Extraction and Screening 2: Extracting, other than by dredging, in a year, the following quantity of material (c) more than 1,000,000t	
Schedule 3 16: Mining gold ore	
Schedule 3 18: Mining lead, silver or zinc separately or in any combination	
Ancillary 15 - Fuel burning Using fuel burning equipment that is capable of burning at least 500kg of fuel in an hour	
Ancillary 31 - Mineral processing 2: Processing, in a year, the following quantities of mineral products, other than coke (b) more than 100,000t	
Schedule 3 17: Mining copper ore	

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days);

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term 'duty to notify'.

Take effect

Please note that, in accordance with section 200 of the EP Act, an EA has effect:

- a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority-on the nominated day; or
- b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or
- c) otherwise-on the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the *Sustainable Planning Act 2009* or an SDA Approval under the *State Development and Public Works Organisation Act 1971*), this EA will not take effect until the additional authorisation has taken effect.

If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.

Teale Gibbs
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Date issued: 03 March 2020

Enquiries:
Minerals Business Centre
Department of Environment and Science

Phone: 07 4222 5352
Email: ESCairns@des.qld.gov.au

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Conditions of environmental authority**SCHEDULE OF CONDITIONS**

This environmental authority consists of the following schedules of conditions:

<u>Schedule</u>	<u>Issue</u>	<u>Page</u>
Schedule A	- General	7
Schedule B	- Air	16
Schedule C	- Land and Rehabilitation	21
Schedule D	- Regulated Structures	34
Schedule E	- General and Regulated Waste Management	40
Schedule F	- Noise	46
Schedule G	- Water	50
Schedule H	- Sewage Treatment	86
Schedule I	- Definitions	87
Schedule J	- Plans/Maps	99

SCHEDULE A - GENERAL**Activity**

- (A1) This environmental authority authorises environmental harm referred to in the conditions. Where there is no condition or this environmental authority is silent on a matter, the lack of a condition or silence does not authorise environmental harm.
- (A2) In carrying out the mining activity authorised by this environmental authority, the holder of this environmental authority must comply with Table A1 (Authorised Mining Activities) as depicted in Schedule J – Figures 2a (Red Dome/Mungana – Domain Map) and 2b (King Vol -General Arrangements Map).

Table A1 (Authorised Mining Activities)

Mine Domain	Mine Feature Name	Tenure Type and Number	Centroid Coordinate (GDA94, zone 55k)	Maximum disturbance area (ha)	Purpose of Mine Feature
Dams	Red Dome Tailings Storage Facility	ML5176	224837E; 8103945N	47.8	Storage of tailings from historic Red Dome mine
	Mungana Tailings Storage Facility	ML5176	221907E; 8014623N	147.0	Storage of tailings from polymetallic minerals processing at Mungana
	Red Dome Sediment Dam	ML5176	223514E; 8104531N	4.0	Containment of sediment from Red Dome impoundment system
	Plant Site Sediment Dam	ML5176	221483E; 8106232N	5.0	Collect runoff from admin and processing areas
	Mungana Process Pond	ML5176	221584E; 8106448N	0.5	Supply process water from underground mine

Mine Domain	Mine Feature Name	Tenure Type and Number	Centroid Coordinate (GDA94, zone 55k)	Maximum disturbance area (ha)	Purpose of Mine Feature
	Mungana Mine Water Dam	ML5176 ML4928	222014E; 8106104N	5.0	Storage of water from underground mine
	Raw Water Dam	ML5176	221808E; 8105786N	42.9	Storage and supply of clean runoff from around the operations
	King Vol Clean Water Dam	ML20658	206268E; 8125463N	5.5	Clean water storage
	King Vol Mine Water Dam	ML20658	207160E; 8125492N	5.2	Mine water storage
	King Vol Sediment Dam	ML20658	207311E; 8125838N	3.12	Sediment control
	Surface Infrastructure Sediment Trap	ML20658	207490E; 8125567N	0.1	Sediment control

Mine Domain	Mine Feature Name	Tenure Type and Number	Centroid Coordinate (GDA94, zone 55k)	Maximum disturbance area (ha)	Purpose of Mine Feature
Waste	Red Dome Western Waste Dump	ML5176 ML4928 ML4977	223190E; 8105113N	40.5	Rehabilitated waste rock emplacement from historic Red Dome mine
	Red Dome Southern Waste Dump	ML5176	223000E; 8104543N	71.7	Rehabilitated waste rock emplacement from historic Red Dome mine
	Red Dome North Western Waste Dump	ML4928	223046E; 8105627N	26.6	Rehabilitated waste rock emplacement from historic Red Dome mine
	MGOPD Waste Rock Dump	ML5176 ML20640	220872E; 8106609N	122.7	Not in current plan
	King Vol Waste Rock Dump	ML20658	207171E; 8125672N	2.5	Store mineral waste
	Topsoil stockpiles	ML20658	207129E; 8125913N. 207171E; 8125873N. 20747E; 8125352N. 207500E; 8125352N.	0.7	Store topsoil for rehabilitation
Run of Mine (ROM)	Mungana ROM pad	ML5176 ML4928	222144E; 8106255N	8.8	Stockpile polymetallic ore ahead of processing
	King Vol ROM	ML20658	207248E; 8125729N	0.9	Temporarily store ore and PAF material
Processing area	Mungana Processing	ML5167	221678E; 8106399N	25.3	Infrastructure for treatment of polymetallic ores
Extraction	King Vol box cut	ML20658	207223E; 8125530N	0.5	Access to the King Vol underground mine
Ancillary Infrastructure	Mungana Workshop and Portal	ML5176	221961E; 8106480N	2.0	Repair and maintenance of mine plant and equipment
	STP Administration and STP Mining	ML5176	221697E; 8106278N and	0.2	Sewage treatment, Offices, Washrooms, Warehouse, etc.

Mine Domain	Mine Feature Name	Tenure Type and Number	Centroid Coordinate (GDA94, zone 55k)	Maximum disturbance area (ha)	Purpose of Mine Feature
			221609E; 8106764N		
	Historic Mungana Administration	ML5176	221595E; 8106861N	13.3	Offices. Washrooms, warehouse etc.
	The Gap (Access track)	ML5176 ML4928	223831E; 8104797N	9.9	Traffic
	Waste Disposal (incineration of explosive packaging)	ML5176	222112E; 8106383N	TBA ¹	Incineration
	Fuel storage	ML5176	221574E; 8106804N	0.1	Storing diesel and lubricants
	Lower Opera Creek to Raw Water Dam	ML5176	222763E; 8105060N	34.7	No purpose, under rehabilitation, historic mining disturbance
	Mungana Waste Disposal Area	ML4928	222427E; 8106075N	1.0	Waste disposal
	King Vol Explosives Storage Yard	ML20658	206864E; 8126006N	0.3	Store explosives
	King Vol Mine Infrastructure area	ML20658	207515E; 8125629N	0.9	Storage, buildings, parking and helipad
	King Vol Fuel storage and power generation	ML20658	207425E; 8125579N	0.1	Storage, refuelling and power supply
	King Vol Roads and tracks	ML20658	207635E; 8125449N	6.8	Access
	King Vol Infrastructure area above box cut	ML20658	207138E; 8125542N	0.3	Mine infrastructure above box cut
	King Vol Water Management Infrastructure	ML20658	206151E; 8125792N	6.1	Management of site water

Mine Domain	Mine Feature Name	Tenure Type and Number	Centroid Coordinate (GDA94, zone 55k)	Maximum disturbance area (ha)	Purpose of Mine Feature
	King Vol Road train loadout	ML20658	206909E; 8126016N	0.6	Parking
	King Vol Waste Disposal Trench	ML20658	206939E; 8125986N	1.0	Waste disposal
	King Vol Emergency camp	ML20658	207312E; 8124875N	0.3	Accommodation
	King Vol Construction laydown area	ML20658	206856E; 8125520N	0.5	Storage of equipment and materials
	King Vol Laydown area	ML20658	207363E; 8125644N	0.8	Storage of equipment and materials
Voids	Red Dome Open Pit	ML5176 ML4928 ML4977	223800E; 8105457N	38.9	Historic mining void
	MGOPD Open Pit	ML5176 ML5319 ML20640	221424E; 8107355N	53.9	Not in current plan
Exploration	Access Tracks and Exploration	ML4910 ML4911 ML4921 ML4928 ML4977 ML5176 ML5319 ML20640	222569E; 8105182N ²	45.0	Enable mineral exploration
	King Vol Access Tracks and Exploration	ML20658	Whole of lease area	3.0	Exploration of resource
	King Vol Exploration yard	ML20658	206864E; 8126006N	0.2	Exploration of resource
Conservation	Fauna Conservation Zones	ML5319 ML5176 ML4977	221370E; 8107741N 221832E; 8107482N	0.1	Fauna conservation

Mine Domain	Mine Feature Name	Tenure Type and Number	Centroid Coordinate (GDA94, zone 55k)	Maximum disturbance area (ha)	Purpose of Mine Feature
			222456E; 8106710N 224612E; 8104950N		
	Historic Sites (Non-Indigenous)	ML4928	222569E; 8105182N ²	0.2	Non-Indigenous heritage Conservation
Red Dome Historic Disturbance	Red Dome Fixed Plant	ML5176 ML4977	224221E; 8105074N	12.4	Rehabilitated historic processing area
	Red Dome accommodation and offices	ML5176 ML4977	224448E; 8105251N	9.4	Rehabilitated historic offices area
	Red Dome Roche Workshop	ML5176 ML4977	224165E; 8104512N	4.8	Rehabilitated historic workshop area
	Red Dome Heap Leach Pads	ML5176 ML4977	224099E; 8104326N	23.8	Rehabilitated heap leach pads. Potential gold ore reserve
	Red Dome Heap Leach Impoundment System	ML5176	223575E; 8104433N	9.1	Collect and store runoff from around heap leach pads (includes RD sediment dam)
	Red Dome Process Ponds	ML5176	224384E; 8104835N	2.2	Rehabilitated historic process water ponds

¹ Detail to be provided to the administering authority prior to construction.

² Centroid coordinate for the access tracks, exploration and non-indigenous cultural heritage areas are taken from the centre of the mining leases at Red Dome/Mungana and King Vol.

(A3) Access to the licensed place via land authorised for that purpose by the *Mineral Resources Act 1989* is subject to the conditions of this environmental authority.

Maintenance of Measures, Plant and Equipment

(A4) The holder of this environmental authority must:

- install measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority;
- maintain such measures, plant and equipment in a proper condition; and
- operate such measures, plant and equipment in a proper manner.

Monitoring and Reporting

(A5) Any management or monitoring plans, systems, programs or reports required to be developed and implemented by a condition of this environmental authority must be reviewed for effectiveness in

minimising the likelihood of environmental harm on an annual basis and amended immediately if required.

- (A6) Monitoring records or reports required under this environmental authority must be maintained and be readily accessible at the licensed place for a period of not less than five (5) years.
- (A7) The holder of this environmental authority must upon request from the administering authority, supply monitoring records, plans and reports in the form and by the means requested by the administering authority within five (5) business days, or a timeframe as otherwise agreed to by the administering authority.
- (A8) All monitoring referred to in this environmental authority must be undertaken by an appropriately qualified and experienced person using monitoring equipment that is accurately calibrated and maintained in accordance with manufacturer's specifications.
- (A9) All analysis and tests required to be conducted under this environmental authority must be carried out by a laboratory that has NATA certification for such analysis and tests, except as otherwise authorised by the administering authority.

Financial Assurance

- (A10) Financial assurance must be lodged with the administering authority in the amount, the form and within the time required by the administering authority.

Risk Management

- (A11) The holder of this environmental authority must develop and implement a risk management system for the mining activity which mirrors the content requirements of the Standard for Risk Management (ISO31000:2009) or the latest edition of an Australian Standard for Risk Management by 31 December 2017.

Emergency Response/Contingency

- (A12) Prior to the commencement of mining or processing the holder of this environmental authority must develop and implement an emergency response/contingency plan to respond to emergency events and incidents. The emergency response/contingency plan must address the following matters at a minimum:
 - (a) response procedures to be implemented to prevent or minimise the risk of environmental harm arising from emergency events and incidents;
 - (b) response procedures to minimise the extent and duration of environmental harm caused by emergency events and incidents;
 - (c) the practices and procedures to be employed to restore the environment or mitigate any environmental harm caused;
 - (d) the resources to be used in response to an emergency event or incident;
 - (e) procedures to investigate the cause of any emergency events and incidents, including releases, and remedial actions to reduce the likelihood of a recurrence of similar events;
 - (f) the provision and availability of documented procedures to staff attending any emergency event or incident to enable them to effectively respond;

- (g) training of staff that will be called upon to respond to emergency events and incidents to enable them to effectively respond;
- (h) timely and accurate reporting of the circumstance and nature of emergency events and incidents to the administering authority in accordance with conditions of this environmental authority;
- (i) procedures for accessing monitoring points during emergency events or incidents; and
- (j) procedures to notify any potentially impacted stakeholder who may be affected by emergency events or incidents.

Notification of Emergencies, Incidents and Exceptions

- (A13) The holder of this environmental authority must notify the administering authority by written notification within twenty-four (24) hours, after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority.
- (A14) The holder of this environmental authority must notify the occupiers or registered owners of affected land and any other potentially impacted stakeholder as soon as reasonably practicable after becoming aware of any incident, exceedance or release that has the potential to impact on environmental values or breaches any condition of this environmental authority concerning releases of contaminants to the environment.
- (A15) Within ten (10) business days following the initial notification of an emergency or incident further written advice must be provided to the administering authority, including the following:
 - a) results and interpretation of any samples taken and analysed; and
 - b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm; and
 - c) proposed actions to prevent a recurrence of the emergency or incident.

Transition to New Standards

- (A16) Where a condition of this environmental authority requires compliance with a standard, policy or guideline published externally to this environmental authority and the standard is amended or changed subsequent to the issues of this environmental authority the holder of this environmental authority must:
 - a) comply with the amended or changed standard, policy or guideline within two years of the amendment or change being made, unless a different period is specified in the amended standard or relevant legislation, or where the amendment or change relates specifically to regulated structures referred to in condition D1, the time specified in that condition.
 - b) until compliance with the amended or changed standard, policy or guideline is achieved, continue to remain in compliance with the corresponding provision that was current immediately prior to the relevant amendment or change.

Complaints

- (A17) Records must be kept of all environmental complaints received about the mining activity including the following details:

- (a) name, address and contact number of the complainant;
- (b) time and date of complaint;
- (c) reasons for the complaint;
- (d) investigations undertaken;
- (e) conclusions formed;
- (f) actions taken to resolve the complaint;
- (g) any abatement measures implemented; and
- (h) person responsible for resolving the complaint.

- (A18) The holder of this environmental authority must, when requested by the administering authority, undertake relevant specified monitoring within a reasonable timeframe nominated or agreed to by the administering authority to investigate any complaint of environmental harm. The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures, where implemented, must be provided to the administering authority within 10 business days of completion of the investigation, or no later than 10 business days after the end of the timeframe nominated by the administering authority to undertake the investigation.

Third Party Auditing

- (A19) The holder of this environmental authority must:
- a) By 31 December 2017, obtain from an appropriately qualified person a report on compliance with the conditions of this environmental authority;
 - b) Obtain further such reports at regular intervals, not exceeding three-yearly intervals, from the completion of the report referred to above; and
 - c) Provide each report to the administering authority within 90 days of its completion.

Exploration

- (A20) All exploration activities carried at the licensed place must comply with each of the Standard Environmental Conditions contained in the most recent version of the *Eligibility criteria and standard conditions for exploration and mineral development projects (ESR/2016/1985)*.
- (A21) Notwithstanding condition 13 of the *Eligibility criteria and standard conditions for exploration and mineral development projects (ESR/2016/1985)*, the holder of this environmental authority is permitted to conduct exploration activities within 1 kilometre but not within 100 metres of the Chillagoe – Mungana Caves National Park (Category A Environmentally Sensitive Area).
- (A22) The holder of this environmental authority is permitted to carry out monitoring, environmental investigation and environmental management works within 100m of the Chillagoe – Mungana Caves National Park (Category A Environmentally Sensitive Area).

Matter of State Environmental Significance

- (A23) Significant residual impacts to prescribed environmental matters located on King Vol are not authorised under this environmental authority or the *Environmental Offsets Act 2014*.

King Vol Underground Extraction

- (A24) Extraction of ore or decline development in the King Vol underground mine on ML20658 must not occur at a depth greater than 680 metres BGL.

END OF CONDITIONS FOR SCHEDULE A

SCHEDULE B – AIR

General

- (B1) Unless authorised by this environmental authority, the release of noxious or offensive odour, dust or any other airborne contaminant resulting from the mining activity must not cause environmental harm.

Transportation

- (B2) The holder of this environmental authority must ensure that vehicles (including trains) used for transporting bulk materials on or from the licensed place have appropriate load preparation to prevent the spillage and/or loss of particulate matter and/or windblown dust during transport.

Point Source Releases to Air

- (B3) Point source emissions to air must only be released to the atmosphere from the release points specified in **Table B1 (Release Points)**.

Table B1 (Release Points)

Release Point	Minimum Release Height above ground (m)	Minimum exit velocity (m/s)	Contaminant Parameter	Contaminant Limit	Frequency of Monitoring
Scrubber Stack serving the smelter plant	15	6	Total Solid Particulates (TSP)	50 mg/Nm ³ dry	Once within three months of commencing smelting; and, as requested by the administering authority thereafter.
			Oxides of Sulphur (sulphur dioxide and sulphur trioxide as SO ₂ equivalent)	300 mg/Nm ³ (dry)	
			Total Heavy Metals ¹ (Note 1)	1 mg/Nm ³ (dry)	

¹ Total heavy metals includes the elements antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium, tin, vanadium, or any compound containing one or more of those elements.

- (B4) The release of contaminants to the atmosphere must not exceed the contaminant limit for any parameter specified in the **Table B1 (Release Points)** and must be:
- (a) directed vertically upwards with no impedance; and
 - (b) be released in accordance with the velocity and minimum release height specified in **Table B1 (Release Points)**.
- (B5) Emissions from the 'Scrubber Stack serving the smelter plant' must be monitored in accordance with the frequency of monitoring and for all contaminant parameters specified in **Table B1 (Release Points)**.
- (B6) Monitoring undertaken for condition B5 must:
- (a) Be in accordance with:
 - i. The current edition of the administering authority's Air Quality Sampling Manual. If monitoring requirements are not described in the EHP's Air Quality Sampling Manual, monitoring protocols must be in accordance with a method as approved by New South Wales EPA, Victorian EPA or United States EPA;
 - ii. Australian Standard AS 4323.1 - 1995 "Stationary source emissions Method 1: Selection of sampling provisions".
 - (b) Include, but not be limited to the following tests:
 - i. Gas velocity, volume and mass flow rate;
 - ii. Temperature and pressure; and
 - iii. Water vapour concentration.
 - (c) Include recording of details pertaining to:
 - i. Plant throughput rate at time of sampling;
 - ii. Fuel type and consumption rate;
 - iii. Any factors that may influence odour and particulate emissions;
 - iv. The gaseous and/or particulate treatment system operating status; and
 - v. Reference to the actual test methods and accuracy.
- (B7) By 28 July 2017, the holder of this environmental authority must develop, implement and keep records of, a Stack Emission Monitoring Program (SEMP) to monitor and record the release of contaminants in accordance with condition B5. A copy of the SEMP must be provided to the administering authority on request.

Ambient Air Quality and Dust Deposition Monitoring

- (B8) Contaminant concentrations must not exceed any of the following limits when measured at any sensitive or commercial place:
- a) Dust deposition of 120 milligrams per square metre per day, averaged over one month, when monitored in accordance with the most recent version of Australian Standard AS3580.10.1

Methods for sampling and analysis of ambient air—Determination of particulate matter—
Deposited matter – Gravimetric method.

- b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometres (PM₁₀) suspended in the atmosphere of 50 micrograms per cubic metre over a 24-hour averaging time, when monitored in accordance with the most recent version of either:
 - 1. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM₁₀ high volume sampler with size-selective inlet – Gravimetric method, or
 - 2. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM₁₀ low volume sampler—Gravimetric method, or
 - 3. Or an alternative method as agreed to in writing by the administering authority.
- c) A concentration of particulate matter suspended in the atmosphere of 90 micrograms per cubic metre over a 1 year averaging time, when monitored in accordance with the most recent version of AS/NZS3580.9.3:2003 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method.

(B9) The holder of this environmental authority must develop and implement a dust deposition monitoring program at the monitoring locations specified in **Table B2 (Dust Deposition Monitoring Sites)** and shown in **Schedule J – Figure 3 (Air Quality Monitoring Sites)** at the monitoring frequency and for the contaminants specified in **Table B3 (Dust Deposition Trigger Values and Limits)**.

Table B2 (Dust Deposition Monitoring Sites)

Site	Easting (GDA 94 MGA - Zone 55)	Northing (GDA 94 MGA - Zone 55)	Monitoring Location
Compliance Monitoring Site			
Eclipse Cave (CH21) ¹	221835	8107425	South-west side of Eclipse Tower. The cave entrance is adjacent to the access track and at the base of the karst. The entrance is 'A' shaped and approximately 4-5m tall.
Piano cave (CH17) ¹	223403	8106129	Southern side of Piano Tower. The cave entrance is the base of the tower.
Mungana 2 Cave	221429	8107708	Near the top of the Mungana 2 karst, at the southern end. Access is gained via the eastern talus slope of the karst. The entrance faces east and is at the base of the upper limestone outcrop.
Red Dome 5 Cave	224518	8104917	The western face of Red Dome 5 karst, approximately 20m up the moderately sloped face with a large recessed opening. Another entrance is approximately 30m south-east of this entrance.
Reference Monitoring Site			
Reference site 1	224687	8103560	100m south of Red Dome Tailings Storage Facility

¹ CH number indicates Chillagoe Cave Club cave designation. Entrance to these caves are marked by a small red metal marker containing a 'CH' number.

(B10) The mining activity must not cause the exceedance of any dust deposition limit specified in **Table B3 (Dust Deposition Trigger Values and Limits)** at any:

- a) Sensitive or commercial place; or
- b) Compliance monitoring site specified in **Table B2 (Dust Deposition Monitoring Sites)**.

Table B3 (Dust Deposition Trigger Values and Limits)

Contaminant	Limit Type/Measurement Period	Trigger Level	Air Quality Limit	Frequency of Monitoring
Dust Deposition				
Arsenic and its compounds as arsenic ¹	Annual average	4 ³ µg/m ² /day	-	Monthly
Cadmium and its compounds as cadmium ¹	Annual average	2 ³ µg/m ² /day	-	
Copper and its compounds as copper ¹	Annual average	330 ³ µg/m ² /day		

Contaminant	Limit Type/Measurement Period	Trigger Level	Air Quality Limit	Frequency of Monitoring
Lead and its compounds as lead ¹	Annual average	100 ⁴ µg/m ² /day	250 ⁵ µg/m ² /day	
Dust deposition ⁶ (total insoluble matter)	Monthly average	-	120 ⁵ mg/m ² /day	

¹ Metal analysis must be carried out in accordance with a methodology sufficient to produce representative results capable of comparison against the respective limits & trigger values.

³ Trigger levels based on First General Administrative Regulation Pertaining to the Federal Emission Control Act (Technical Instructions on Air Quality Control – TA Luft) (Table 6 page 29).

⁴ Determined based on TA Luft lead deposition guidelines and the HIL A soil investigation levels from NEPC (1999) Table 5-A.

⁵ World Health Organisation – Air Quality Guidelines for Europe Second Edition, 2000 (Chapter 6 page 152).

⁶ Monitored in accordance with the most recent version of the relevant Australian Standard "AS 3580.10.1 Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method" of 2003 (or most recent edition).

- (B11) In the event of any monitoring showing exceedance of dust deposition trigger values or limits specified in **Table B3 (Dust Deposition Trigger Values and Limits)**, the holder of this environmental authority must:
- (a) complete an investigation to identify the potential cause of the exceedance and the potential for environmental harm being caused or likely to be caused by the exceedance; and
 - (b) provide a written report to the administering authority within three (3) months of the date of the original exceedance, outlining:
 - (i) details of the investigation carried out; and
 - (ii) actions taken to prevent environmental harm.

Meteorological Monitoring

- (B12) The holder of this environmental authority must establish a permanent automatic meteorological station to continuously measure and record wind speed and direction, temperature and rainfall data.

Abrasive Blasting and Metal Surface Coating

- (B13) Abrasive blasting activities must be carried out using measures that prevent or minimise contaminants, including abrasive blasting media, solvents and paint, being released to the receiving environment.
- (B14) Only abrasive blasting waste consisting of garnet and surface coating wastes consisting of dried mastic paint flakes may be disposed of at the licensed place within the Mungana Tailings Storage Facility or at a facility licensed to take this material.

END OF CONDITIONS FOR SCHEDULE B

SCHEDULE C - LAND and REHABILITATION**General**

- (C1) Other than as authorised under this environmental authority, contaminants must not be released to land in a manner which constitutes environmental harm.

Rehabilitation Objectives

- (C2) Land disturbed by mining must be rehabilitated in accordance with Table C1 (Rehabilitation Requirements).

Table C1 (Rehabilitation Requirements)

Mine Domain & Feature ID (refer Schedule J - Figure 2a and Figure 2b)	Surface area (ha) of domain	Total disturbance of surface area (ha) of domain, for the life of the mine ($\pm 10\%$)	Post-mine land description	Post mine land capability ¹	Rehabilitation Goals	Land Use Acceptance Criteria
Red Dome/Mungana						
1 Red Dome Open Pit	38.5	38.5	Water Storage	VI		The void containing water suitable for stock or better
2 Red Dome Western Waste Dump	40.5	40.5	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
3 Red Dome Southern Waste Dump	71.7	71.7	L.I.G. and Bushland Airstrip	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3 Use as an airstrip
4 The Gap (access track)	9.9	9.9	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3

Mine Domain & Feature ID (refer Schedule J - Figure 2a and Figure 2b)	Surface area (ha) of domain	Total disturbance of surface area (ha) of domain, for the life of the mine ($\pm 10\%$)	Post-mine land description	Post mine land capability ¹	Rehabilitation Goals	Land Use Acceptance Criteria
5 Red Dome Fixed Plant	12.4	12.4	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
6 Red Dome Process Water Ponds	2.2	2.2	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
7 Lower Opera Ck to Raw Water Dam	34.7	34.7	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
8 Red Dome Accommodation and Offices	9.4	9.4	L.I.G. ²	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
9 Red Dome TSF	47.8	47.8	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3 with the exception of criteria for tree and shrub density and diversity on the TSF cap

Mine Domain & Feature ID (refer Schedule J - Figure 2a and Figure 2b)	Surface area (ha) of domain	Total disturbance of surface area (ha) of domain, for the life of the mine ($\pm 10\%$)	Post-mine land description	Post mine land capability ¹	Rehabilitation Goals	Land Use Acceptance Criteria
10 Red Dome Roche Workshop	4.8	4.8	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
11 Red Dome Heap Leach Pads	23.8	23.8	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
12 Red Dome Heap Leach Impoundment System	9.1	9.1	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
13 Raw Water Dam	42.9	42.9	Water Storage	VI		As per Condition C3
14 Red Dome North Western Waste Dump	26.6	26.6	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3

Mine Domain & Feature ID (refer Schedule J - Figure 2a and Figure 2b)	Surface area (ha) of domain	Total disturbance of surface area (ha) of domain, for the life of the mine ($\pm 10\%$)	Post-mine land description	Post mine land capability ¹	Rehabilitation Goals	Land Use Acceptance Criteria
15 Access Tracks and Exploration	943.5	45.0	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
16 Mungana Open Pit	53.9	53.9	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
17 Fauna Conservation Zones	32.6	0.1	L.I.G. ² and Bushland ³	No change in land capability.		As per Condition C3 for the disturbed area. For the area undisturbed by the mining activity undisturbed area (32.5) the integrity attribute is the only success criteria to be satisfied for sections of the Domain.
18 Historical Sites (Non Indigenous)	10.3	0.2	L.I.G. ² , Bushland ³ , Historical site.	No change in land capability.		As per Condition C3 for the disturbed area. For the area undisturbed by the mining activity undisturbed area (10.1) the integrity attribute is the only success criteria to be satisfied for sections of the Domain.
19 Mungana Workshop and Portal	2.0	2.0	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3

Mine Domain & Feature ID (refer Schedule J - Figure 2a and Figure 2b)	Surface area (ha) of domain	Total disturbance of surface area (ha) of domain, for the life of the mine ($\pm 10\%$)	Post-mine land description	Post mine land capability ¹	Rehabilitation Goals	Land Use Acceptance Criteria
20 Mungana ROM Pad and stockpiles	17.9	8.8	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
21 MGOPD Waste Rock Dump	122.7	122.7	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
22 Mungana Processing	31.6	25.3	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
23 Mungana TSF	147.0	147.0	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
24 Mungana Administration and Access	14	14	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3

Mine Domain & Feature ID (refer Schedule J - Figure 2a and Figure 2b)	Surface area (ha) of domain	Total disturbance of surface area (ha) of domain, for the life of the mine ($\pm 10\%$)	Post-mine land description	Post mine land capability ¹	Rehabilitation Goals	Land Use Acceptance Criteria
25 Mungana Waste Disposal Area	1.0	1.0	L.I.G. ² and Bushland ³	Greater than 20% of all disturbed land will be class VI or better; No more than 30% of all disturbed land is capability VIII.		As per Condition C3
King Vol						
King Vol Box Cut		0.5	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Waste Rock Dump		2.5	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Topsoil Stockpile		0.7	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
ROM		0.9	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Clean Water Dam		5.5	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Mine Water Dam		5.2	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Sediment dam		3.1	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Surface infrastructure sediment Trap		0.1	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Explosives storage yard		0.3	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Mine infrastructure area		0.9	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Fuel storage and power generation		0.1	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13

Mine Domain & Feature ID (refer Schedule J - Figure 2a and Figure 2b)	Surface area (ha) of domain	Total disturbance of surface area (ha) of domain, for the life of the mine ($\pm 10\%$)	Post-mine land description	Post mine land capability ¹	Rehabilitation Goals	Land Use Acceptance Criteria
Roads and tracks		6.8	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Infrastructure area above box cut		0.3	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Water Management Infrastructure		6.1	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Access tracks and exploration		3.0	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Exploration yard		0.2	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Road train loadout		0.6	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Waste Disposal Trench		1.0	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Emergency camp		0.3	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Construction laydown area		0.5	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Laydown area		0.8	TBA ⁴	TBA ⁴	Safe, non-polluting, stable and self-sustaining	As per the requirements of condition C13
Remnant vegetation consistent with Regional Ecosystem 9.11.8a - Terrestrial Groundwater Dependent Ecosystem ⁵		0.8	TBA ⁴	TBA ⁴	Safe, non-polluting, stable, self-sustaining and remnant vegetation consistent with regional ecosystem 9.11.8a - Terrestrial Groundwater Dependent Ecosystem ⁵	As per the requirements of condition C13

1 Land Capability defined by Rosser *et al* (1974) *Land Capability Classification for Agricultural Purposes*. Division of Land Utilisation Technical Bulletin No. 14 QDPI.

2 L.I.G. (Low Intensity Grazing) defined by criteria listed in Land Use Acceptance Criteria.

3 Bushland defined by criteria listed in Land Use Acceptance Criteria.

- 4 Detail to be provided to the administering authority by 15 July 2018.
- 5 As depicted in Figure 5 (NRA mapped RE 9.11.8a with the LoM 0.2 m drawdown contour) in the document entitled "King Vol Project Potential Impact to Environmental Values of Groundwater Dependent Ecosystems - Addendum 1".

Grazing and Bushland Rehabilitation Outcome

- (C3) Areas which are to be rehabilitated to Low Intensity Grazing and Bushland must generate a self-sustaining vegetation with projective cover, species composition and species distribution as defined by the criteria in Table C2 (Rehabilitation Success Criteria).

Table C2 (Rehabilitation Success Criteria)

Attribute	Criteria	Monitoring Methods
Density	Groundcover biomass and tree density is equal to, or greater than, 50% of that of the corresponding measure in analogue sites of equivalent capability.	Vegetation Community (Biomass, Composition and Structure)
Diversity	Species richness is to be equal to, or greater than, 50% of that of analogue sites of equivalent capability. Minimum requirement is: (i) Minimum of 3 groundcover species and 3 tree and shrub species (ii) 70% or more of tree and shrub species will be native (iii) the remaining 30% or less of tree and shrub species must comprise of recognised pasture species and agreed upon in the Post Mine Land Use Plan	Vegetation Community (Biomass, Composition and Structure)
Integrity	70% or more of tree and shrub species will be native and weeds are controlled as required under the Land Protection (Pest and Stock Route Management) Act 2002. The remaining 30% or less of tree and shrub species must comprise of recognised pasture species and agreed upon in the Post Mine Land Use Plan	Vegetation Community (Biomass, Composition and Structure)
Productivity	Groundcover biomass is equal to, or greater than, 50% of that of analogue sites of equivalent capability.	Vegetation Community (Biomass)
Landform stability	(i) erosion will not prevent the reinstatement of the nominated land capability and land use (ii) minimising the extent of rill erosion to depth less than 300mm. Gullies will be accepted such that they do not prevent achievement of desired land capability and do not exceed 2m in depth, are as wide as deep; and (iii) gullies would not be accepted in areas covered by less than 3 metres of cover / capping material eg tailings dam and other areas where potentially harmful material has been buried; and (iv) grazing and or bushland is possible on final land form; (v) void slopes are not to exceed 65 degrees in consolidated material.	Erosion Gully monitoring Vegetation Community (Surface Cover) Land Capability

Attribute	Criteria	Monitoring Methods
Self sustaining	(i) groundcover biomass and tree density is equal to, or greater than, 50% of that of the corresponding measure in analogue sites of equivalent capability for 3 consecutive years. (ii) greater than 5 individuals of either shrub, grass or tree species will be volunteers or 2nd generation volunteers and not weeds.	Vegetation Community (include flowering fruiting and seedlings in collection of community composition and structure data).
PMLU	(i) grazing and or bushland is possible on the final landform. (ii) void and Raw Water Dam containing water suitable for stock. (iii) land capability proportions (as defined in Schedule - C Table 1) for each domain achieved. (iv) potential grazing intensity exceeds 1 beast / 40 Ha.	Land capability Vegetation Community (Biomass)

Source: NRA 2004 - Red Dome 2004 rehabilitation monitoring report

- (C4) The holder of this environmental authority must mine in accordance with the Conservation Zones and defined in Figures 3a of the Mungana Gold Open Pit Project Environmental Management Plan (September 2011).
- (C5) Rehabilitation must commence progressively in accordance with the plan of operations.

Disturbance to Land

- (C6) When carrying out the mining activity the holder of this environmental authority must:
- (a) avoid, minimise or mitigate (in order of preference) any impacts on areas of sensitive vegetation or other areas of ecological value;
 - (b) minimise the risk of injury, harm, or entrapment to wildlife and stock;
 - (c) minimise disturbance to land that may otherwise result in land degradation;
 - (d) prior to carrying out any disturbance activities, make all relevant staff, contractors or agents carrying out those activities, aware of the location of any Category A, B or C Environmentally Sensitive Area (ESA) and the relevant requirements of this environmental authority;
 - (e) if significant disturbance to land is unavoidable, the holder of this environmental authority must clear vegetation in a way which minimises fragmentation; and
 - (f) manage cleared vegetation so that it is stockpiled in a manner that facilitates salvage, respreading or burning and does not impede vehicle, stock or wildlife movements.

Topsoil

- (C7) Topsoil and subsoils must be stripped and stockpiled ahead of mining to a depth determined from soil surveys to ensure that useable soil resources are preserved for rehabilitation.
- (C8) Topsoil and subsoil stockpiles must be managed to ensure stability and to minimise the release of contaminants. Measures must include:

- (a) vegetating stockpiles;
 - (b) minimising the height of stockpiles; and
 - (c) re-using stockpiles as soon as possible.
- (C9) A topsoil inventory which identifies the topsoil requirements for the mining project and availability of suitable topsoil on site must be detailed in the Plan of Operations.

Chemicals and Flammable or Combustible Liquids

- (C10) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases, flammable or combustible liquids and dangerous goods must be stored and handled in accordance with the current, relevant Australian Standard where such is applicable.
- (C11) Where no relevant Australian Standard exists, store such materials within an effective on-site containment system.
- (C12) Minimise the potential for contamination of land and waters by diverting stormwater around contaminated areas and facilities used for the storage of chemicals and flammable or combustible liquids.

Post Mine Land Use Plan

- (C13) By 15 July 2018, the current Post Mine Land-use Plan ('PMLUP') that describes how the rehabilitation objectives in condition C2 will be achieved must be updated, documented and implemented for all stages of the mining activities. The PMLUP must at minimum include:
- a) Schematic representation of the proposed final land form inclusive of site drainage features;
 - b) Details of proposed slope design and erosion and sediment controls;
 - c) Proposed cover designs for encapsulation of waste material, including performance criteria;
 - d) Proposed re-vegetation methods inclusive of plant species selection, propagation methods and establishment of suitable plant growth medium (i.e. top soil);
 - e) Materials balance for all rehabilitation requirements including available top soil and material suitable for encapsulating waste in accordance with the proposed encapsulation methodology;
 - f) Geotechnical, geochemical and hydrological studies necessary to demonstrate likely success of proposed rehabilitation methodology to achieve the required rehabilitation outcomes;
 - g) An investigation of proposed residual voids including potential for generation/mobilisation of contaminants, potential pathways for release of contaminants to waters (including groundwater) and a long-term void water balance model; and
 - h) A rehabilitation monitoring program sufficient to identify if required rehabilitation outcomes have been achieved.

Residual Void Studies

- (C14) The holder of this environmental authority must:

- a) Submit a revised residual void model within 12 months of commencing mining of Mungana Gold Open Pit Development, giving due regard to comments made by the administering authority;
- b) The model in a) must be subject to review each subsequent five years;
- c) Any amendment to the approved residual void model that may arise from the reviews in a) or b) must be based on any significant changes to groundwater characteristics or other data considered relevant by the administering authority that becomes available from the groundwater monitoring program; and
- d) Notwithstanding obligations under a), b) or c) the holder of the environmental authority must undertake residual void water balance modelling during mine closure planning, in consultation with the administering authority, to ensure assumptions regarding surface water runoff and groundwater ingress are suitable for the site.

(C15) Complete an investigation into residual voids and submit a report to the administering authority within 12 months of commencing mining of Mungana Gold Open Pit Development proposing acceptance criteria to meet the outcomes in condition C16 and landform design criteria for review and comment by the administering authority.

The investigation must at a minimum include the following:

- (a) a study of options available for minimising final void area and volume;
- (b) develop design criteria for rehabilitation of final voids;
- (c) a void hydrology study, addressing the long-term water balance in the voids, connections to groundwater resources and water quality parameters in the long term;
- (d) a study of the measures to protect the residual voids, un-compacted overburden and workings from the “probable maximum flood” level based on the Bureau of Meteorology’s “probable maximum precipitation” forecast for the locality;
- (e) a pit wall stability study, considering the effects of long-term erosion and weathering of the pit wall and the effects of significant hydrological events;
- (f) a study of void capability to support native flora and fauna; and
- (g) a proposal/s for end of mine void rehabilitation success criteria and final void areas and volumes.

Note: These studies must be undertaken during the life of the mine, and will include detailed research and modelling.

Residual Void Outcome

(C16) Residual voids must not cause any environmental harm to land, surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence of the residual void itself, and subject to any other condition within this environmental authority.

Rehabilitation Monitoring Program

(C17) A rehabilitation monitoring program must be implemented by an appropriately qualified person upon commencement of rehabilitation identified in Table C1 (Rehabilitation Requirements).

- (C18) The holder of this environmental authority must conduct rehabilitation monitoring in accordance with the program developed in condition C17 including sufficient spatial and temporal replication to enable scientifically justifiable conclusions to be made, as established in the rehabilitation monitoring program.
- (C19) Verification of rehabilitation success is to be carried out for each domain. Monitoring must be carried out for each domain at a minimum sampling intensity of 1:15,000 and must include sufficient replication to enable statistical analysis of results at an acceptable power as established in the rehabilitation monitoring program.

Infrastructure

- (C20) All buildings, structures, mining equipment and plant erected and/or used for the mining activity must be removed from the site prior to surrender, except where agreed in writing by the landowner.

Contaminated Land

- (C21) Before applying for surrender of a mining lease, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the mining lease which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use.

Contaminated Water Release to Land

- (C22) Contaminated water released to land must be monitored in accordance with Table C3 (Contaminant release limits to land) and must not exceed the release limits in Table C3 (Contaminant release limits to land).

Table C3 (Contaminant release limits to land)

Contaminant	Unit	Release Limit	Limit Type	Frequency
pH	pH units	6.0-9 ¹	Range	Monthly
EC	µs/cm	1,000	Maximum	Monthly
Cyanide as un-ionised HCN, measured as [CN] ³	µg/L	7	Maximum	Monthly
Metals and Metalloids²				
Total Arsenic	mg/L	2.0	Maximum	Monthly
Total Cadmium	mg/L	0.05	Maximum	Monthly
Total Cobalt	mg/L	0.1	Maximum	Monthly
Total Copper	mg/L	5.0	Maximum	Monthly
Total Lead	mg/L	5.0	Maximum	Monthly
Total Molybdenum	mg/L	0.05	Maximum	Monthly
Total Selenium	mg/L	0.05	Maximum	Monthly
Total Zinc	mg/L	5.0	Maximum	Monthly

1. Default trigger values – from ANZECC/ARMCANZ (2000), 'General water uses – pH' Section 4.2.10.1.

2. Default trigger values – from ANZECC/ARMCANZ (2000), agricultural irrigation water short-term trigger value (up to 20 years) triggers for heavy metals and metalloids, Table 4.2.10.

3. Extracted from Table 3.4.1 of the Australian and New Zealand guidelines for fresh and marine water quality (ANZECC & ARMCANZ 2000), trigger values for 95% Species protection.

- (C23) Contaminants must only be released to land in accordance with the conditions of this approval and at the following locations:
- a) At King Vol, within the nominated areas identified in Schedule J – Figure 6 (Water Management Layout); and
 - b) At Mungana, within the approved TSF domain (23) identified in Schedule J Figure 2a(Red Dome/Mungana – Domain Map) at a rate of up to 2ML per day until 31st December 2023; and
 - c) Other land within the boundaries of ML20658 for the purpose of dust suppression and/or fire fighting.
 - d) Other land within the boundaries of ML4910, ML4911, ML4921, ML4928, ML4977, ML5176, ML5319 and ML20640 for the purposes of dust suppression in areas draining to on-site water storages and/or firefighting.
- (C24) The irrigation of contaminants to land must be carried out in a manner such that:
- a) Drainage to groundwater and or subsurface flows of contaminants to surface waters are prevented;
 - b) Surface pondage and or run-off of contaminants is prevented;
 - c) Degradation of soil structure does not result in environmental harm;
 - d) Soil sodicity and/or the build-up of heavy metals and/or metalloids in the soil and/or subsoil does not result in environmental harm;
 - e) Spray drift does not occur beyond the identified limits of the areas identified in Condition C23;
 - f) Impacts to vegetation do not occur (e.g. die back)
- (C25) All contaminants released to land must be monitored at the frequency and for the parameters specified in Table C3 (Contaminant release limits to land).
- (C26) The daily volume of contaminants released to land must be measured and records kept of the volumes of contaminants released.

END OF CONDITIONS FOR SCHEDULE C

SCHEDULE D - REGULATED STRUCTURES (including structures containing mineral waste)**Assessment of consequence category**

- (D1) The consequence category of any structure must be assessed by a suitably qualified and experienced person in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ERS/2016/1993)* at the following times:
- a) prior to the design and construction of the structure, if it is not an existing structure; or
 - b) prior to any change in its purpose or the nature of its stored contents.
- (D2) A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.
- (D3) Certification must be provided by the suitably qualified and experienced person who undertook the assessment, in the form set out in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ERS/2016/1993)*.

Design and Construction of a Regulated Structure

- (D4) Conditions D5 to D9 inclusive do not apply to existing structures.
- (D5) All regulated structures must be designed by, and constructed¹ under the supervision of, a suitably qualified and experienced person in accordance with the requirements of the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ERS/2016/1993)*.
- (D6) Construction of a regulated structure is prohibited unless:
- a) the holder has submitted a consequence category assessment report and certification to the administering authority; and
 - b) certification for the design, design plan and the associated operating procedures has been certified by a suitably qualified and experienced person in compliance with the relevant condition of this authority.
- (D7) Certification must be provided by the suitably qualified and experienced person who oversees the preparation of the design plan, in the form set out in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ERS/2016/1993)*, and must be recorded in the Register of Regulated structures.
- (D8) Regulated structures must:
- a) be designed and constructed in compliance with the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*;
 - b) be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of:
 - i. flood waters from entering the regulated dam from any watercourse or drainage line; and
 - ii. wall failure due to erosion by flood waters arising from any watercourse or drainage line.
 - c) must meet the hydraulic performance criteria stated in Table D1 - Hydraulic Performance Criteria for Regulated Structures

¹ **Certification** of design and construction may be undertaken by different persons.

- (D9) Certification by the suitably qualified and experienced person who supervises the construction must be submitted to the administering authority on the completion of construction of the regulated structure, and state that:
- (a) the 'as constructed' drawings and specifications meet the original intent of the design plan for that regulated structure; and
 - (b) construction of the regulated structure is in accordance with the design plan.

Table D1 (Hydraulic Performance Criteria for Regulated Structures)

Name of Regulated Dam	Spillway Capacity AEP	Design Storage Allowance AEP	Mandatory Reporting Level AEP
Red Dome Tailings Storage Facility	1-in-10,000 year ARI	Nil (Surface has been rehabilitated)	N/A
Mungana Tailings Storage Facility (Cell 1 to Cell 4)	Probable Maximum Flood (PMF)	1-in-100 year ARI, 2 month wet season	1-in-100 year ARI, 72 hour event ¹
King Vol Mine Water Dam	1 in 1000 year ARI, 1 hr duration	1 in 20 year ARI, 2 month wet season	1 in 10 year ARI, 72 hr event ¹
King Vol Sediment Dam	1 in 1000 year ARI, 1 hr duration	1 in 20 year ARI, 2 month wet season	1 in 10 year ARI, 72 hr event ¹

1 Refers to the level below the spillway crest, required to contain either the AEP (design risk) 72hr storm or the AEP (design risk) wave allowance, whichever is lower.

- (D10) All affected persons must be provided with a copy of the emergency action plan in place for each regulated structure:
- a) for existing structures that are regulated structures, within 10 business days of this condition taking effect;
 - b) prior to the operation of the new regulated structure; and
 - c) if the emergency action plan is amended, within 5 business days of it being amended.

Operation of a regulated structure

- (D11) Operation of a regulated structure, except for an existing structure, is prohibited unless the holder has submitted to the administering authority in respect of regulated structure, all of the following:
- a) one paper copy and one electronic copy of the design plan and certification of the 'design plan' in accordance with condition D6;
 - b) a set of 'as constructed' drawings and specifications;
 - c) certification of the 'as constructed drawings and specifications' in accordance with condition D9;

- d) where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the Design Storage Allowance (DSA) volume across the system, a copy of the certified system design plan;
- e) the requirements of this authority relating to the construction of the regulated structure have been met;
- f) the holder has entered the details required under this authority, into a register of regulated structures; and
- g) there is a current operational plan for the regulated structure.

(D12) For existing structures that are regulated structures:

- a) where the existing structure that is a regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, the holder must submit to the administering authority within 12 months of the commencement of this condition a copy of the certified system design plan including that structure; and
- b) There must be a current operational plan for the existing structures.

(D13) Each regulated structure must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in compliance with the current operational plan and, if applicable, the current design plan and associated certified 'as constructed' drawings.

Mandatory Reporting Level

- (D14) Conditions D15 to D18 inclusive only apply to Regulated Structures which have not been certified as low consequence category for 'failure to contain – overtopping'.
- (D15) The mandatory reporting level (MRL) must be marked on a regulated dam in such a way that during routine inspections of that dam, it is clearly observable.
- (D16) The holder of this environmental authority must, as soon as practical and within forty-eight (48) hours of becoming aware, notify the administering authority when the level of the contents of a regulated dam reaches the MRL.
- (D17) The holder of this environmental authority must, immediately on becoming aware that the MRL has been reached, act to prevent the occurrence of any unauthorised discharge from the regulated dam.
- (D18) The holder must record any changes to the MRL in the Register of Regulated Structures.

Design Storage Allowance

- (D19) The holder must assess the performance of each regulated dam or linked containment system over the preceding November to May period based on actual observations of the available storage in each regulated dam or linked containment system taken prior to 1 July of each year.
- (D20) By 1 November of each year, storage capacity must be available in each regulated dam (or network of linked containment systems with a shared DSA volume), to meet the DSA volume for the dam (or network of linked containment systems).
- (D21) The holder must, as soon as possible and within forty-eight (48) hours of becoming aware that the regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, notify the administering authority.

- (D22) The holder must, immediately on becoming aware that a regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.

Annual Inspection Report

- (D23) Each regulated structure must be inspected each calendar year by a suitably qualified and experienced person.
- (D24) At each annual inspection, the condition and adequacy of all components of the regulated structure must be assessed and a suitably qualified and experienced person must prepare an annual inspection report containing details of the assessment and include recommended actions to ensure the integrity of the regulated structure or a positive statement that no recommendations are required.
- (D25) The suitably qualified and experienced person who prepared the annual inspection report must certify the report in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1933)*.
- (D26) The holder must: Within 20 business days of receipt of the annual inspection report, provide to the administering authority:
- a) The recommendations section of the annual inspection report; and
 - b) If applicable, any actions being taken in response to those recommendations; and c) If, following receipt of the recommendations and (if applicable) recommended actions, the administering authority requests a full copy of the annual inspection report from the holder, provide this to the administering authority within 10 business days of receipt of the request.

Transfer arrangements

- (D27) The holder must provide a copy of any reports, documentation and certifications prepared under this authority, including but not limited to any Register of Regulated Structures, consequence assessment, design plan and other supporting documentation, to a new holder on transfer of this authority.

Decommissioning and Rehabilitation

- (D28) Regulated structures must not be abandoned but be either:
- a) decommissioned and rehabilitated to achieve compliance with Schedule C of this environmental authority; or
 - b) be left in-situ for a use by the landholder provided that:
 - i) it no longer contains contaminants that will migrate into the environment; and
 - ii) it contains water of a quality that is demonstrated to be suitable for its intended use(s); and
 - iii) the holder of the environmental authority and the landholder agree in writing that the
 - dam will be used by the landholder following the cessation of the environmentally relevant activity(ies); and
 - landholder is responsible for the dam, on and from an agreed date.

- (D29) Each regulated structure named in column 1 of Table D2 (Basic Details of Regulated Structures), must be consistent with the details noted in columns 2 through to and including column 7 of Table D2 (Basic Details of Regulated Structures).

Table D2 (Basic Details of Regulated Structures)

Regulated Structure	Hazard Category	Maximum surface area at the spillway (Ha)	Maximum volume (m ³)	Maximum depth (m)	Spillway Level (m AHD)	Purpose
Red Dome Tailings Storage Facility	High	30	7,000,000	39	360.0	Storage of Cyanide tailings
Mungana Tailings Storage Facility (Cell 1)	High	28.1	2,605,000	21.9	321.4	Storage of tailings containing cyanide
Mungana Tailings Storage Facility (Cell 2 to Cell 4)	High	TBA ¹	TBA ¹	TBA ¹	TBA ¹	Storage of tailings containing cyanide
King Vol Mine Water Dam	Significant	25.9	118,300	10.8	258.8	Mine water storage
King Vol Sediment Dam	Significant	10.1	74,000	10.6	238.6	Sediment control

¹ Detail to be provided to the administering authority prior to commencement of construction.

Register of Regulated Structures

- (D30) A Register of Regulated Structures must be established and maintained by the environmental authority holder for each regulated structure.
- (D31) The environmental authority holder must provisionally enter the required information in the Register of Regulated Structures when a design plan for a regulated structure is submitted to the administering authority.
- (D32) The environmental authority holder must make a final entry of the required information in the Register of Regulated Structures once compliance with condition D11 has been achieved.
- (D33) The environmental authority holder must ensure that the information contained in the Register of Regulated Structures is current and complete on any given day.
- (D34) All entries in the Register of Regulated Structures must be approved by the chief executive officer for the environmental authority holder, or their delegate, as being accurate and correct.
- (D35) The environmental authority holder must, at the same time as providing the annual return, supply to the administering authority a copy of the records contained in the Register of Regulated Structures, in the electronic format required by the administering authority.

Red Dome Tailings Storage Facility Management

- (D36) The holder of this environmental authority must implement a procedure that prescribes maintenance, management and monitoring of seepage from the Red Dome TSF.
- (D37) The holder of this environmental authority must monitor the rate of seepage from the Red Dome tailings storage facility and rainfall at the site on a daily basis.
- (D38) The holder of the Environmental Authority must take all reasonable and practical measures to ensure that discharges from the Red Dome Tailings Storage Facility leachate pipe does not form precipitates on the pit wall.
- (D39) The holder of this Environmental Authority shall maintain and operate seepage collection works for the Red Dome Tailings Storage Facility, seepage waters collected can be returned to the process circuit.
- (D40) The holder of this Environmental Authority shall maintain and operate seepage collection works for the Red Dome Tailings Storage Facility to ensure that all leachate escaping from the Red Dome Tailings Storage Facility is ultimately directed to the Red Dome Pit. No release of contaminants to land is authorised.
- (D41) Upon commissioning of a gold cyanidation extraction plant as part of minerals processing at Red Dome/Mungana, free standing liquor within the Mungana TSF outside of the decant pond must be monitored weekly when there is liquor present, and it must not exceed 10mg/L Weak Acid Dissociable (WAD) cyanide for 3 out of 5 consecutive samples.
- (D42) The decant pond within the Mungana TSF is authorised to contain liquor at a maximum of 20mg/L WAD cyanide while mortality rates are acceptable with respect to condition D43 in the opinion of the administering authority.
- (D43) Upon disposal of tailings into the tailings storage facility, the holder of this environmental authority must inspect the tailings storage facility weekly to identify and register any fauna mortalities. This information will be made available to the administering authority upon request and within forty eight (48) hours of the discovery of any fauna mortalities. Details of mortalities will include but not be limited to:
- a) animal species of the discovery of any fauna mortality;
 - b) number of animals;
 - c) location; and
 - d) likely cause of death.
- (D44) If in the opinion of the administering authority, the mortality rate referred to in condition D43 is unacceptable, the holder of this environmental authority will be required to develop and implement an action plan to reduce the mortality rate and provide the action plan to the administering authority within one (1) month of the plan being required.
- (D45) The decant pond on the Mungana TSF must be developed and maintained to limit access by birds and other native fauna.

END OF CONDITIONS FOR SCHEDULE D

SCHEDULE E - GENERAL AND REGULATED WASTE MANAGEMENT**Non Mineral Waste Management Program**

- (E1) A waste management program must be developed and implemented prior to the commencement of mining or processing and maintained for all mining activity at the licensed place. The waste management program must be submitted to the administering authority upon request. The program must include:
- (a) a description of the mining activity that may generate waste;
 - (b) waste management control strategies including;
 - i) recording of the types and amounts of wastes generated by the mining activity;
 - ii) segregation of the wastes;
 - iii) storage of the wastes;
 - iv) transport of the wastes; and
 - v) monitoring and reporting matters concerning the waste.
 - (c) the hazard characteristics of the wastes generated including disposal procedures for hazardous wastes;
 - (d) a program for reusing, recycling or disposing of all wastes;
 - (e) how the waste will be dealt with in accordance with the waste management hierarchy, including a description of the types and amounts of waste that will be dealt with under each of the waste management practices in the waste management hierarchy (i.e. avoidance, reuse, recycling, energy recovery, disposal);
 - (f) procedures for identifying and implementing opportunities to minimise the amount of waste generated, promote efficiency in the use of resources and improve the waste management practices employed;
 - (g) procedures for dealing with accidents, spills, and other incidents that may impact on waste management;
 - (h) details of any accredited management system employed, or planned to be employed, to deal with the waste;
 - (i) how often the performance of the waste management practices will be assessed;
 - (j) the indicators or other criteria on which the performance of the waste management practices will be assessed; and
 - (k) staff training and induction to the waste management program.

Waste Disposal

- (E2) All general and regulated waste other than authorised under condition E3, E11 and E16, must be removed from the site to a facility that is lawfully able to accept the waste.

Waste Disposal (Red Dome/Mungana)

- (E3) The only waste that can be disposed of on site is waste generated on site and is limited to:
- (a) waste rock;

- (b) tailings;
 - (c) tyres; and
 - (d) construction and demolition waste, which includes bricks, pavers, concrete, scrap metal, glass, plasterboard, cardboard, paper and timber.
- (E4) Construction and demolition waste deposited in the active waste disposal trench must be compacted and covered with a layer of inert material following placement of the waste into the trench.
- (E5) Litter control methods must be effectively implemented at the active waste disposal trench.
- (E6) The active waste disposal trench must be constructed, designed, engineered and operated to minimise the generation of leachate including a system of diversion drains or embankments to divert surface waters away from any area where contact with wastes or sources of contamination may occur.
- (E7) Prior to constructing a waste disposal trench Schedule J – Figure 5a (Waste Disposal Trenches) is required to be updated. Any waste disposal trench constructed must be maintained in accordance with the waste disposal area identified in Schedule J – Figure 5a (Waste Disposal Trenches). Notwithstanding any other condition of this environmental authority, such records must be maintained until the administering authority approves the surrender of this environmental authority.
- (E8) Incineration of explosive packaging and handling material must be undertaken in accordance with documented procedures that are to be included in the Waste Management Program, detailed in condition E1 that ensures:
- (a) only these materials will be incinerated on site;
 - (b) incineration is conducted in an environmentally sound manner, in a designated area / facility;
 - (c) practices are in place to minimise nuisance from smoke and ash;
 - (d) procedures are developed and implemented on how ashes will be dealt with after incineration; and
 - (e) a contingency plan is developed and implemented if nuisance is caused by incineration.
- (E9) Unless operating in accordance with condition E8, waste must not be burnt or taken off site and burnt.

Waste Disposal (King Vol)

- (E10) Construction and demolition waste (bricks, pavers, scrap metal, glass, plasterboard, cardboard/paper, timber) disposed of at the licensed place at a rate of less than 50 tonnes per year must only be disposed of in the waste disposal trench constructed within the soil profile located on King Vol as depicted in Schedule J – Figure 5b (King Vol waste disposal trenches) and must:

- (a) take effective measures to ensure that all wastes disposed of at the licensed place are not disposed of:
 - i. beyond the active waste disposal trenches; and
 - ii. into waters or leachate collected at the base of the waste disposal trenches.
- (b) ensure that wastes deposited in the active waste disposal trenches are consolidated, compacted and covered with a layer of inert earthen material or other non-combustible inert material.
- (c) provide relocatable litter screens or other methods of litter control at the active waste disposal trenches in order to effectively capture paper or other wind-blown litter generated by waste disposal activities.
- (d) conduct waste disposal operations in a nuisance free manner, particularly regarding mosquito breeding and rat harbourage and breeding.
- (e) operate and manage the active waste disposal trenches to minimise the generation of leachate including a system of suitable diversion drains or embankments to divert surface waters away from any area where contact with wastes or contaminants may occur.
- (f) Maintain a record of the location of the waste disposal trenches used for waste disposal.

Regulated Waste

- (E11) Regulated waste, other than that authorised to be disposed of on site under this authority, must only be removed and transported from the site by a person who holds a current authority to transport such wastes to a facility that is lawfully able to accept the waste under the *Environmental Protection Act 1994*.
- (E12) Regulated waste generated in the mining activity can be temporarily stored on site prior to removal provided it is for a period no longer than six (6) months and it is stored in a manner to prevent risk of fire or contamination of land or waters.
- (E13) Each container of regulated waste stored awaiting movement from the licensed place must be clearly marked to identify the contents.
- (E14) Where regulated waste is removed from the licensed place, the holder of this environmental authority must ensure that:
 - (a) Records are kept of the following:
 - (i) the date, quantity and type of waste removed; and
 - (ii) name of the regulated waste transporter that removed the waste; and
 - (iii) the intended treatment/disposal destination of the waste.

Note: Records of documents maintained in compliance with a waste tracking system established under the *Environmental Protection Act 1994* or any other law for regulated waste will be deemed to satisfy this environmental authority condition.
- (E15) If the holder of this environmental authority becomes aware that a person has removed regulated waste from the licensed place and disposed of the regulated waste in a manner which is not authorised by this environmental authority or improper or unlawful, then the holder of this environmental authority must, as soon as practicable, notify the administering authority of all relevant facts, matters and circumstances known concerning the disposal.

- (E16) Notwithstanding condition E3, sewage sludge generated at the Chillagoe village sewage treatment plant may be disposed of at the Mungana Tailings Storage Facility.

Tailings Disposal

- (E17) Tailings must be managed in accordance with procedures contained within the current plan of operations. These procedures must include provisions for:
- a) containment of tailings
 - b) the management of seepage and leachates both during operation and the foreseeable future
 - c) the control of fugitive emissions to air
 - d) a program of progressive sampling and characterisation to identify acid producing potential and metal concentrations of tailings
 - e) maintaining records of the relative locations of any other waste stored within the tailings
 - f) rehabilitation strategy
 - g) monitoring of rehabilitation, research and/or trials to verify the requirements and methods for decommissioning and final rehabilitation of tailings, including the prevention and management of acid mine drainage, erosion minimisation and establishment of vegetation cover.

Capping System Plan

- (E18) One (1) month following deposition of tailings in the tailings storage facility the holder of this environmental authority must commence trials to establish suitable capping systems for infrastructure on site including but not limited to the tailings storage facility and waste rock dumps.
- (E19) Two (2) years following deposition of tailings in the tailings storage facility and once every two (2) years thereafter the holder of this environmental authority must submit a report to the administering authority detailing the success and findings from the capping system trials required in condition E18.
- (E20) Four (4) years following deposition of tailings in the tailings storage facility the holder of this environmental authority must submit to the administering authority a report nominating the most appropriate capping system based on results from trials required in condition E18. The holder of this environmental authority must give due consideration to any comments made on the capping system plan by the administering authority and amend the capping system plan accordingly.

Waste Rock Disposal

- (E21) By 31 March 2017, the holder of this environmental authority must develop, implement and submit to the administering authority a waste rock management plan.
- (E22) Waste rock disposal must not occur on the site unless the holder of this environmental authority has submitted to the administering authority a waste rock management plan. The waste rock management plan must be certified by an appropriately qualified person, to ensure the plan has addressed the requirements of this environmental authority in accordance with best practice environmental management.
- (E23) The waste rock management plan must include:

- (a) a detailed design of the waste rock dumps;
 - (b) characterisation of the waste rock to predict the quality of runoff and seepage generated, including salinity, acidity, alkalinity, dissolved metals, metalloids and non-metallic inorganic substances;
 - (c) a program of progressive sampling to validate pre-mine waste rock characterisation. The waste rock sampling program must include validation of salinity, acid and alkali producing potential and metal concentrations including antimony, arsenic, boron, cadmium, chromium, cobalt, copper, lead, molybdenum, selenium, silver, zinc and fluoride;
 - (d) where the acid rock drainage potential/neutral mine drainage potential of waste rock material has not been conclusively determined, geochemical kinetic testing must be conducted to indicate oxidation rates, potential reaction products and effectiveness of control strategies;
 - (e) records must be maintained of all waste rock characterisation and disposal including contingency planning for the management of acid rock/neutral mine drainage;
 - (f) a materials balance and disposal plan demonstrating how potentially acid forming and acid forming waste rock will be selectively placed and/or encapsulated to minimise the generation of acid mine drainage;
 - (g) a materials balance and disposal plan demonstrating how waste rock that has a potential to generate neutral and/or saline mine drainage will be selectively placed and managed to minimise the generation of neutral and/or saline mine drainage;
 - (h) a sampling program to verify encapsulation and/or placement of potentially acid forming and acid forming waste rock and waste rock that has a potential to generate neutral mine drainage;
 - (i) how often the performance of the plan will be assessed;
 - (j) a rehabilitation strategy which meets the rehabilitation objectives specified in Schedule C of this environmental authority; and
 - (k) monitoring of rehabilitation, research and/or trials to verify the requirements and methods for decommissioning and final rehabilitation of the placed materials, including the prevention and management of acid mine drainage, erosion minimisation and establishment of vegetation cover.
- (E24) Waste rock dumps must be constructed and maintained in accordance with the drawings identified in Table E1 (Waste Rock Dump Design Plans).

Table E1 (Waste Rock Dump Design Plans)

Drawing Number ¹	Description
Figure 5a-5f	Plan location of Waste Rock Dumps (WRD) with respect to other site infrastructure (author: AWA)

1 Figures referenced from the Mungana Gold Open Pit Development Environmental Management Plan (September 2011)

- (E25) The waste rock dumps must be designed, constructed and maintained to prevent any water other than incidental rainfall from entering the waste rock dump.
- (E26) Any seepage from waste rock dumps must be captured and directed to the processing plant, Mine Water Dam, Mungana TSF or open pit.

- (E27) Only waste rock that does not cause acid, neutral or saline mine drainage may be used for the construction of temporary or permanent structures within the operation areas.

PAF Waste Rock Storage (General)

- (E28) The waste rock stockpile must be constructed to prevent any surface water runoff entering the stockpile.
- (E29) Any seepage from the waste rock stockpile must be directly discharged to the Mine Water Dam.

PAF Waste Rock Storage (Mungana underground development and King Vol)

- (E30) PAF waste rock must be disposed of to the underground voids and managed in accordance with the conditions of this environmental authority.

PAF Waste Rock Storage (King Vol)

- (E31) PAF waste rock can only be temporarily stored on the King Vol ROM in accordance with the following requirements:
- a) no more than 60,000 tonnes of PAF waste rock can be stored on the King Vol ROM at any time;
 - b) no PAF waste rock can be stored on the King Vol ROM after 1 January 2025; and
 - c) records must be kept of the amount and storage time for PAF waste rock stored on the King Vol ROM.

PAF Waste Rock Storage (Mungana Gold Open Pit Development)

- (E32) PAF waste rock awaiting placement in the waste rock dump must only be stored on the ROM pad and for no longer than two (2) weeks after it was initially deposited on the ROM pad.

Tyre Storage and Disposal

- (E33) Tyres stored awaiting disposal or transport for take-back and recycling or waste-to-energy options must be stockpiled in volumes less than 3m in height and 200m² and at least 10m from any other tyre storage area.
- (E34) Fire prevention measures must be implemented including the removal of all combustible materials, including grass and vegetation, within a 10m radius of any tyre storage area.
- (E35) Subject to demonstrating to the administering authority that no other use higher in the waste management hierarchy can be practicably implemented, waste tyres generated from the mining activity may be disposed of on site in non-acid forming waste rock dumps or underground stopes.

END OF CONDITIONS FOR SCHEDULE E

SCHEDULE F - NOISE**General**

- (F1) Unless authorised by this environmental authority, noise from the mining activity must not cause environmental nuisance at any sensitive place or commercial place.
- (F2) In the event of a complaint made to the administering authority (considered in the opinion of an authorised officer to be neither frivolous or vexatious) about noise generated in carrying out the licensed activity and the noise is considered by the administering authority to be an unreasonable noise, the holder of this environmental authority must take action to ensure that it will not in the future cause unreasonable noise.

Noise Monitoring

- (F3) Ensure that noise generated by the mining activity does not cause the criteria in Table F1 (Noise Limits) to be exceeded at any sensitive place or commercial place.

Table F1 (Noise Limits)

Noise Level dB(A) measured as:	Monday to Saturday			Sundays and Public Holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
L_{A10} , adj, 10 mins	BG+5	BG+5	BG+3	BG+5	BG+5	BG+0
L_{A1} , adj, 10 mins	BG+10	BG+10	BG+5	BG+10	BG+10	BG+5

Note: In the event that the measured background noise level (BG) is less than 25 dB(A), then 25 dB(A) can be substituted for the measured background level.

- (F4) When requested by the administering authority, noise monitoring and recording must be undertaken within a timeframe nominated by the administering authority to investigate any complaint of environmental nuisance at any sensitive place or commercial place and the results must be provided to the administering authority within ten (10) business days following completion of monitoring.
- (F5) Noise monitoring and recording must include the following descriptor characteristics and matters:
- $L_{AN,T}$ (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins);
 - Background noise L_{A90} ;
 - The level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels;
 - Atmospheric conditions including temperature, relative humidity and wind speed and directions;
 - Effects due to any extraneous factors such as traffic noise;
 - Location, date and time of monitoring;
 - If the complaint concerns low frequency noise, $Max L_{pLIN,T}$; and

- (h) If the complaint concerns low frequency noise, one third octave band measurements in dB(LIN) for centre frequencies in the 10 - 200 Hz range.

- (F6) The method of measurement and reporting of noise levels must comply with the most recent edition of the administering authority's Noise Measurement Manual or the most recent version of AS1055 *Acoustics – Description and measurement of environmental noise*.

Air Blast & Ground Vibration

- (F7) The holder of this environmental authority must ensure that blasting does not cause the limits for peak particle velocity and air blast overpressure in Table F2 (Blasting Noise Limits) to be exceeded at any sensitive place or commercial place.

Table F2 (Blasting Noise Limits)

Blasting noise limits	Sensitive or commercial place limits
Airblast overpressure	Piano, Red Dome 4 and Red Dome 5 caves ¹ : 115 dB (Linear) Peak for nine (9) out of ten (10) consecutive blasts initiated and not greater than 120 dB (Linear) Peak at any time. Eclipse cave section of Chillagoe National Park and Mungana 2 ¹ : 140dB (Linear) Peak.
Ground vibration peak particle velocity	Piano, Red Dome 4 and Red Dome 5 caves ¹ : 5mm/second peak particle velocity for nine (9) out of ten (10) consecutive blasts and not greater than 10 mm/second peak particle velocity at any time. Eclipse cave section of Chillagoe National Park and Mungana 2 ¹ : 25mm/second peak particle velocity.

¹ Measured 10m from the entrance of nominated caves.

- (F8) The holder of this environmental authority must develop and implement a blast monitoring program at the nearest sensitive place identified as locations in Table B3 (Air Quality Monitoring Sites) at least 3 months prior to any blasting taking place at the Mungana Open Pit to monitor compliance with Table F2 (Blasting Noise Limits).
- (F9) Where blast monitoring detects non-compliance with Table F2 (Blasting Noise Limits):
- (a) take steps to ensure compliance is achieved by subsequent blasts; and
 - (b) continue to monitor all consecutive blasts until at least three (3) successive blasts comply with Table F2 (Blasting Noise Limits).
- (F10) The holder of this environmental authority must undertake vibration monitoring upon request by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of an authorised officer) of environmental nuisance at any sensitive place or commercial place.

- (F11) The results of the investigation conducted in accordance with condition F10 must be provided to the administering authority on request.
- (F12) The method of measurement and reporting of vibration levels must comply with the most recent edition of the administering authority's guideline *Noise and vibration from blasting*.

Airblast Overpressure

- (F13) If monitoring indicates exceedance of the relevant limits in Table F2 (Blasting Noise Limits) then the holder of this environmental authority must immediately implement airblast overpressure abatement measures to ensure that airblast overpressure from the activity does not result in further environmental nuisance.
- (F14) When requested by the administering authority, airblast overpressure monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within ten (10) business days to the administering authority following completion of monitoring.
- (F15) Airblast overpressure monitoring must include the following descriptors, characteristics and conditions:
 - (a) location of the blast(s) within the mining area (including which bench level);
 - (b) atmospheric conditions including temperature, relative humidity and wind speed and direction; and
 - (c) location, date and time of recording.
- (F16) The method of measurement and reporting of airblast overpressure levels must comply with Appendix J of AS 2187.2-2006.
- (F17) The ground vibration transducer (or array) must be attached to a buried block so as to ensure good coupling with the ground. The mass shall be buried so that its upper most surface is at the same level as the ground surface.
- (F18) The ground vibration transducer (or array) must be placed at the same point at which the air blast is monitored.
- (F19) A Blast Management Plan must be developed, which
 - (a) is prepared prior to commencement of any blasting and made available to the administering authority on request; and
 - (b) provides for at least the following:
 - (i) procedures for charging blasting holes.
 - (ii) initiation and sequencing design guidelines.
 - (iii) actions to be taken if levels of induced air over pressure or ground vibration approach the maximum permissible levels.
 - (iv) actions to prevent environmental harm in a defined Conservation Zone.

(v) initial monitoring at designated locations including Mungana 2, Eclipse Tower (Eclipse Cave), Piano Tower (Piano Cave) and Red Dome 5 limestone karsts. Monitoring is to comprise:

- up to 5 blasts are monitored over a 3 month period
- all 5 locations are monitored over a 8 month period

(vi) Monitoring is to be continued for each blast at any monitoring location where the peak particle velocity is expected to exceed 5 mm per second

(vii) The initial monitoring sequence is to be repeated if the blast instantaneous charge is increased.

END OF CONDITIONS FOR SCHEDULE F

SCHEDULE G - WATER**Red Dome/Mungana****General**

- (G1) Contaminants that will, or have the potential to cause environmental harm, must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.
- (G2) Releases to waters must be undertaken so as to minimise erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.

Water Quality Monitoring Metadata

- (G3) The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format when requested:
- (a) the date and time when the sample was taken;
 - (b) the monitoring point where the sample was taken;
 - (c) the measured or estimated daily quantity of the contaminants released from all release points;
 - (d) the release flow rate at the time of sampling for each release point;
 - (e) the results of all monitoring and details of any exceedances of the conditions of this environmental authority; and
 - (f) all water quality monitoring data.

Stream Flow Monitoring

- (G4) The holder of this environmental authority must establish stream cross-section and discharge data at the locations specified in Table G1 (Stream Flow Monitoring). Stream discharge data is to be reviewed by 31 August each year to adjust for changes in stream cross-section. For the purpose of Schedule G, flow events are determined in Table G4 (Contaminant Release During Flow Events) by data recorded at the relevant stations specified in Table G1 (Stream Flow Monitoring).

Table G1 (Stream Flow Monitoring)

Receiving water description	Release point	Gauging station description	Easting(GDA 94 MGA – Zone 55)	Northing (GDA 94 MGA – Zone 55)	Flow recording Frequency
Welcome Creek	OCS 6: Raw Water Dam (via Opera Creek)	Level Staff	220550	8104919	Minimum of weekly or daily during discharge events.

Mine-affected Water Release Events

- (G5) The release of mine-affected waters must only occur from the release points specified in Table G2 (Contaminant Release Points) and depicted in Schedule J – Figure 1 (Monitoring Points).

Table G2 (Contaminant Release Points)

Release points	Easting (GDA 94 MGA - Zone 55)	Northing (GDA 94 MGA - Zone 55)	Contaminant source	Receiving waters description
OCS 6: Raw Water Dam spillway	221622	8105682	Raw Water Dam	Opera Creek
Southern Waste Rock Dump Wetland	222083	8104132	Seepage water from Southern Waste Rock Dump	Welcome Creek

- (G6) Unless otherwise permitted under the conditions of this environmental authority, the release of mine-affected water to receiving waters must only take place in accordance with the criteria specified in Table G4 (Contaminant Release During Flow Events) for the release point(s) specified in Table G2 (Contaminant Release Points).
- (G7) Unless otherwise permitted under the conditions of this environmental authority, the release of mine-affected water to receiving waters must not exceed the release rates and limits stated in Table G4 (Contaminant Release During Flow Events) and Table G5 (End of Pipe Release Limits) when measured at the monitoring points specified in Table G2 (Contaminant Release Point) for each quality characteristic specified in Table G5 (End of Pipe Release Limits).
- (G8) The holder of this environmental authority must submit to the administering authority 80th percentile reference values (>18 data points) in accordance with ANZECC 2000 methodology, specific to surface water for Welcome Creek for all parameters listed in Table G3 (Contaminant Release Monitoring), along with seasonal flow rates gathered from the gauging stations listed in Table G1 (Stream Flow Monitoring) within 12 months of recommencement of mining or processing.
- (G9) The release of contaminants to waters from the authorised release points must be monitored at the locations specified in Table G2 (Contaminant Release Points) for each quality characteristic and at the frequency specified in Table G3 (Contaminant Release Monitoring).

Table G3 (Contaminant Release Monitoring)

Quality Characteristic	Unit	Monitoring Frequency ^{1,4}
Physicochemical		Routine based sampling: Monthly
Electrical conductivity	µS/cm	
pH	pH units	
Turbidity	NTU	
Water Hardness (CaCO ₃)	mg/L	
Chlorophyll α^6	µg/L	
Major Cations & Anions		Event based sampling of discharge:
• Sulphate (SO ₄ ²⁻)	mg/L	

• Nitrate (as N)	µg/L	One sample must be taken within twelve (12) hours of a release event or flow event commencing. A second sample must be taken between twelve (12) and twenty four (24) hours after the release event or flow event commences.
• Ammonia (as N)	µg/L	
• WAD Cyanide	µg/L	
• Fluoride	µg/L	
Metals & Metalloids (measured as total and dissolved)^{2,3,5}		Where a release or flow event has a duration of twenty four (24) hours or greater, samples must be taken daily for one (1) week, and weekly thereafter until the release or flow event ceases.
Antimony	µg/L	
Arsenic	µg/L	
Cadmium	µg/L	
Cobalt	µg/L	
Copper	µg/L	
Lead	µg/L	
Molybdenum	µg/L	
Selenium	µg/L	
Zinc	µg/L	
Silver ⁶	µg/L	
Boron ⁶	µg/L	
Chromium ⁶	µg/L	
Organics		
Oils and greases	(visual)	

- 1 A release or flow event is a release of water from a release point as specified in Table G2 (Contaminant Release Points).
- 2 Grab sampling is the preferred method for sampling collection, however the use of remote sampling techniques such as automated methods is acceptable, except for the use of establishing reference data.
- 3 The reference data set must be based on grab samples.
- 4 Monitoring during discharge events will only be conducted where safe access can be gained.
- 5 For grab samples all metals and metalloids must be measured as total (unfiltered) and dissolved (filtered) – filtering should be conducted in the field.
- 6 To be monitored for 3 consecutive surface water samples to determine the need for ongoing monitoring. These parameters were elevated above average crustal abundance in geotechnical work in the EIS dated 19 November 2010.

Table G4 (Contaminant Release During Flow Events)

Receiving water description	Release point	Flow event	Maximum release rate for all combined release points	Release limit
Welcome Creek	OCS 6:Raw Water Dam (via Opera Creek)	Low flow ¹ - A flow event period of at least four (4) days, with one day of at least 0.1m ³ /s ⁴ average flow.	Low flow ¹ - Release may occur during a low flow event and for up to 4 weeks after the natural low flow event ceases. Maximum total release rate: ²	As specified in Table G5 (End of Pipe Release Limits)

		Maximum flow rate of 1m ³ /s ⁴	- Post low flow is 100L/s - No restrictions during low flow event	As specified in Table G5 (End of Pipe Release Limits)
		High flow - Minimum natural river flow of more than 1m ³ /s ⁴	Maximum release rate of 2% (1:50 dilution) of river flow if water quality meets relevant standards in Table G5 (End of Pipe Release Limits). Maximum total release rate:² - No restrictions during high flow event Maximum release rate of 5% (1:20 dilution) of river flow if water quality meets relevant standards in Table G5 (End of Pipe Release Limits). Maximum total release rate:² - No restrictions during high flow event	

- 1 Release of contaminants that meets the quality characteristics of the release limits for low flow as specified in Table G5 (End of Pipe Release Limits) may occur at any time during any high flow event in the river, with no restrictions on volumes release.
- 2 Maximum total release rate from all release points.
- 3 The downstream compliance point for each release point is specified in Table G6 (Receiving Water Reference Sites, Downstream Compliance Monitoring Points and Downstream Monitoring Points)
- 4 The holder of this environmental authority to provide stream flow following the first wet season after the recommencement of mining or processing.

(G10) Releases must not cause water quality to exceed the low flow release limits listed in Table G5 (End of Pipe Release Limits) when monitored at the downstream compliance points listed in Table G6 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points).

Table G5 (End of Pipe Release Limits)

Quality Characteristic ¹	Release limit ² for Low flow	Release limit for high flow ³	
		1:20 dilution (5%) release limits	1:50 dilution (2%) release limits
Physicochemical			
Electrical Conductivity (µS/cm)	680 ⁴	TBA ¹¹	TBA ¹¹

pH (pH units)	6 ⁶ (minimum) 7.6 ⁴ (maximum)	TBA ¹¹	TBA ¹¹
Turbidity (NTU)	30 ⁴	TBA ¹¹	TBA ¹¹
Water Hardness (CaCO ₃) (mg/L)	For interpretation purposes		
Major Cations & Anions			
Sulphate (SO ₄ ²⁻) (mg/L)	5.4 ⁴	TBA ¹¹	TBA ¹¹
Nitrate ⁵ (as N) (µg/L)	30 ⁶ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Ammonia (as N) (µg/L)	10 ⁴	TBA ¹¹	TBA ¹¹
Free Cyanide(µg/L)	7 ⁶ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
WAD Cyanide(µg/L)	80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Fluoride(µg/L)	212 ⁴	TBA ¹¹	TBA ¹¹
Metals & Metalloids			
Total Antimony (µg/L)	9 ¹⁰ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Total Arsenic ⁹ (µg/L)	13 ⁶ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Total Cadmium (µg/L)	0.2 ⁶ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Total Cobalt (µg/L)	1.4 ¹⁰ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Total Copper (µg/L)	1.4 ⁶ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Total Lead (µg/L)	3.4 ⁶ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Total Molybdenum (µg/L)	34 ¹⁰ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Total Selenium (µg/L)	5 ⁶ or 80 th percentile ⁷ of reference ⁸ , whichever is higher	TBA ¹¹	TBA ¹¹
Total Zinc (µg/L)	13 ⁴	TBA ¹¹	TBA ¹¹
Organics			
Oils and greases	No visible film		

- 1 All metals and metalloids must be measured as dissolved (filtered) concentrations.
- 2 The release limits are based on default trigger limits or the 80th percentile of reference system, whichever is the higher. Where appropriate the default trigger values may be hardness adjusted in accordance with ANZECC/ARMCANZ (2000) section 7.4.4.
- 3 No high flow release is authorised until relevant reference data has been submitted as detailed in condition G12 and appropriate release limits have been populated in this table.
- 4 Site-specific trigger level calculated from pooled routine data from reference sites OMC2, WCref1, BelC01 and RH1 (>18 data points).
- 5 The trigger value is the value for Total Oxides of Nitrogen as there is no specific value for nitrate.
- 6 Default trigger values – from ANZECC/ARMCANZ (2000) trigger values for aquatic ecosystems indicative of slightly-to-moderately disturbed tropical Australian upland river ecosystems Tables 3.3.4 and Table 3.4.1 (*high reliability* trigger values) and *moderate* or *low* reliability trigger values (Section 8.3) if no value available in Table 3.4.1.
- 7 80th percentiles calculated using ANZECC (2000) methodology (section 7.4.4.1).
- 8 Reference sites defined in Table G7 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points).
- 9 Speciated arsenic concentrations for As (III) and As (V) only required if 13 µg/L is exceeded - note that the sample bottle requirements for As (total species) and As (speciated) may differ.
- 10 Interim (low reliability) value from ANZECC (2000) Section 8.3.7.1.
- 11 To be updated when the holder of this environmental authority provide sufficient reference data for Welcome Creek.

Annual Review of Release Limits

- (G11) By 1 July each year the holder of this environmental authority must provide the administering authority an update of monitoring data and associated contaminant limits specified in Schedule G of this environmental authority, incorporating monitoring data obtained during the previous twelve (12) months.

Receiving Waters Monitoring

- (G12) If a release of mine-affected waters cause an exceedance of the low flow release limits listed in Table G5 (End of Pipe Release Limits) when monitored at the downstream compliance points listed in Table G6 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points), the holder of this environmental authority must compare the downstream results to the reference site results and:
- (a) where the trigger values, identified as the low flow release limits listed in Table G5 (End of Pipe Release Limits) are not exceeded then no action is to be taken; or
 - (b) where the downstream results exceed low flow release limits listed in Table G5 (End of Pipe Release Limits) for any quality characteristic, compare the results of the downstream site to the data from background monitoring sites and;
 - (i) if the downstream result is less than the background monitoring site data, then no action is to be taken;
 - (ii) if the result is greater than the background monitoring site data, complete an investigation into the potential for environmental harm and provide a written report to the administering authority within 3 months, outlining:
 - i. details of the investigations carried out;
 - ii. details of the environmental impacts observed; and
 - iii. actions taken to prevent environmental harm.

Note: Where an exceedance of a release limit has occurred and is being investigated, in accordance with part (b) of this condition, no further reporting is required for subsequent trigger events of an equal-to or lesser extent for that quality characteristic.

- (G13) An estimate of the daily quantity of contaminants released from each release point must be based on available measured data recorded at the monitoring points in Table G2 (Contaminant Release Points).
- (G14) The holder of this environmental authority must monitor the quality of the receiving waters as specified in Table G6 (Receiving Water Reference Sites and Downstream Compliance Monitoring Points) and shown in Schedule J – Figure 1 (Monitoring Points) for each quality characteristic and at the frequency stated in Table G3 (Contaminant Release Monitoring).

Table G6 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points)

Monitoring Points	Receiving Waters Location Description	Easting (GDA 94 MGA - Zone 55)	Northing (GDA 94 MGA - Zone 55)
Reference¹ Monitoring Points			
WCref1	Welcome Creek	220 618	8 104 755
OMC2	One Mile Creek	220 700	8 107 924
RH1 ²	Welcome Creek (Tributary of Welcome Creek at Red Hill, west of the leases)	218 749	8 108 381
BelC01 ²	Belgravia Creek (in the Red Cap catchment approximately 50m downstream of the Cathedral Caves, north of the leases)	224 772	8 108 150
LJref (sediment sampling only)	Lady Jane Creek (upstream of mining disturbance)	223 311	8 105 879
Downstream Compliance Monitoring Points			
WCS 2	Opera Creek (100m downstream of the Raw Water Dam Spillway)	221 493	8 105 587
WCS 3	Welcome Creek (50m downstream of the confluence with Opera Creek)	220 468	8 105 058
LC7	Lily Creek (350m downstream from the Red Dome TSF spillway)	225 292	8 104 120
Site 9	Welcome Creek (downstream of the Mungana TSF spillway)	220 550	8 104 919
OMC4 ²	One Mile Creek (downstream of from the Mungana WRD)	220 165	8 106 806

Site 10	Welcome Creek 1.5km upstream from site 9 (downstream from the Mungana TSF)	221 540	8 104 257
---------	--	---------	-----------

- 1 Reference sites must:
 - (a) be from the same bio-geographic and climatic region;
 - (b) have similar geology, soil types and topography;
 - (c) contain a range of habitats similar to those at the test sites;
 - (d) have a similar flow regime; and
 - (e) not be so close to the test sites that any disturbance at the test site also results in a change at the reference site.
- 2 Monitoring is required to commence at these sites prior to commencement of development of the Mungana Gold Open Pit Development.

Stream Sediment

- (G15) Sediment quality of receiving waters and reference waters must be monitored at the locations defined in Table G6 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring points) and identified on Schedule J – Figure 1 (Monitoring Points) and for the parameters defined in Table G7 (Stream Sediment Trigger and Contaminant Levels).
- (G16) If the quality characteristics of sediments exceed any of the trigger levels specified in Table G7 (Stream Sediment Trigger and Contaminant Levels), the holder of this environmental authority must compare the downstream site to the data from reference monitoring sites and:
- (a) if the level of contaminants at the downstream site does not exceed the reference monitoring site data, then no action is to be taken; or
 - (b) if the level of contaminants at the downstream site is greater than the reference monitoring site data, complete an investigation in accordance with the ANZECC and ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority within three (3) months, outlining:
 - (i) details of the investigations carried out;
 - (ii) details of the environmental impacts observed; and
 - (iii) actions taken to prevent environmental harm.
- Note: Where an exceedance of a release limit has occurred and is being investigated, in accordance with part (b) of this condition, no further reporting is required for subsequent trigger events of an equal-to or lesser extent for that quality characteristic.*
- (G17) All stream sediment sampling must be undertaken in accordance with the most recent version of Australian Standard AS 5667.12 *Guidance on Sampling of Bottom Sediments*.
- (G18) The sediment quality contaminant limit specified in Table G7 (Stream Sediment and Contaminant Levels) must not be exceeded at the downstream sediment quality compliance points identified in Table G6 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points).

Table G7 (Stream Sediment Trigger and Contaminant Levels)

Parameter ¹	Unit	Trigger Level	Contaminant Limit	Monitoring frequency
Fluoride	mg/kg	Reference value ²	3 times the reference ² value	

Parameter ¹	Unit	Trigger Level	Contaminant Limit	Monitoring frequency
Total Cyanide	mg/kg	Reference value ²	3 times the reference ² value	Twice a year (Once at the end of the wet season, and once at the end of the dry season)
Antimony	mg/kg	2 ³ or reference value ² , whichever is higher	25 ⁴ or 3 times the reference ² , whichever is higher	
Arsenic	mg/kg	20 ³ or reference value ² , whichever is higher	70 ⁴ or 3 times the reference ² , whichever is higher	
Cadmium	mg/kg	1.5 ³ or reference value ² , whichever is higher	10 ⁴ or 3 times the reference ² , whichever is higher	
Cobalt	mg/kg	Reference value ²	3 times the reference ² value	
Copper	mg/kg	65 ³ or reference value ² , whichever is higher	270 ⁴ or 3 times the reference ² , whichever is higher	
Lead	mg/kg	50 ³ or reference value ² , whichever is higher	220 ⁴ or 3 times the reference ² , whichever is higher	
Molybdenum	mg/kg	Reference value ²	3 times the reference ² value	
Selenium	mg/kg	Reference value ²	3 times the reference ² value	
Zinc	mg/kg	200 ³ or reference value ² , whichever is higher	410 ⁴ or 3 times the reference ² , whichever is higher	
Particle size distribution	For interpretation purposes			

1 All samples must be sieved to the sand fraction (63 – 2000µm) prior to analysis.

2 Reference sites are defined in Table G6 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points)

3 ANZECC/ARMCANZ (2000) Interim Sediment Quality Guidelines (ISQG) – low values based on total concentrations in sediments

4 ANZECC/ARMCANZ (2000) ISQG – high values based on total concentrations in sediments

Receiving Environment Monitoring Program (REMP)

(G19) A Receiving Environment Monitoring Program (REMP) must be developed and implemented by 31 June 2017.

(G20) The REMP will monitor, identify and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity. This must include monitoring the effects of the mine on the receiving environment periodically (under natural flow conditions) and while mine affected water is being discharged from the site.

Note: For the purposes of the REMP, the receiving environment is the waters and connected waterways of Welcome Creek, One Mile Creek, Lily Creek and connected waterways within 2 kilometres downstream of the release.

(G21) A REMP Design Document that addresses the requirements of the REMP must be prepared and made available to the administering authority upon request.

- (G22) A report outlining the findings of the REMP, including all monitoring results and interpretations must be prepared annually and made available on request to the administering authority. This must include an assessment of background reference water quality, the condition of downstream water quality compared against water quality objectives, and the suitability of current discharge limits to protect downstream environmental values.
- (G23) Until the REMP as required by condition G19 is developed and implemented, the current REMP prevails.

Water Management Plan

- (G24) A Water Management Plan must be developed by an appropriately qualified person and implemented.

Erosion and Sediment Control

- (G25) Prior to commencement of mining or processing, an Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activity on the licensed place to prevent or minimise erosion and the release of sediment to receiving waters and the contamination of storm water.
- (G26) Until the Erosion and Sediment Control Plan as required by condition G25 is developed and implemented, the current Erosion and Sediment Control Plan prevails.

Groundwater

Monitoring Bore Construction, Maintenance and Decommissioning

- (G27) Groundwater monitoring bores must be constructed, maintained and decommissioned in accordance with methods prescribed in the latest edition of the Agriculture and Resource Management Council of Australia and New Zealand manual titled *Minimum Construction Requirements for Water Bores in Australia*.
- (G28) Oil-based drilling fluids, oil-based additives, synthetic based drilling fluids or synthetic based additives must not be used in the construction of groundwater monitoring bores.
- (G29) Remedial measures must be taken immediately if the holder of this environmental authority becomes aware that either monitoring bore construction, maintenance or decommissioning have resulted in a change in groundwater quality, groundwater levels or have caused the interconnection of aquifers.
- (G30) If the quality characteristics as measured in the compliance bores listed in **Table G8 (Groundwater monitoring locations and frequency)** exceed any of the trigger levels specified in **Table G9 (Groundwater trigger levels and Contaminant Limits)**, the holder of this environmental authority must compare the results from the compliance bores to the data from the reference bores and:
- (a) if the level of contaminants as measured in the compliance bore does not exceed the reference bore results, then no action is to be taken;
 - (b) if the level of contaminants at the compliance bore is greater than the reference bore results, complete an investigation in accordance with the ANZECC & ARMICANZ 2000, into the potential for environmental harm and provide a written report to the administering authority within three (3) months, outlining:
 - i. details of the investigations carried out;
 - ii. details of environmental impacts observed, and

iii. actions taken to prevent environmental harm.

Note: Where an exceedance of a release limit has occurred and is being investigated, in accordance with part (b) of this condition, no further reporting is required for subsequent trigger events of an equal-to or lesser extent for that quality characteristic.

Table G8 (Groundwater monitoring locations and frequency)

Monitoring point	Easting (GDA 94 MGA - Zone 55)	Northing (GDA 94 MGA - Zone 55)	Surface RL (m) ³	Monitoring frequency
Reference Bores				
WB14: Located north of Mungana, off the mine lease. Potable water source.	221 536	8 107 969	324.6	Quarterly – water quality Monthly – Levels
TBA ⁴	TBA ³	TBA ³	TBA ³	Quarterly – water quality Monthly – Levels
Compliance Bores				
OB53: NP Monitoring bore near National Park Boundary	222915	8106174	328.3	Monthly – Levels
TD17r	224754	8103619		Quarterly – water quality Monthly – levels
OC6: Opera Creek	222569	8105289	313.4	Quarterly – water quality Monthly – levels
WB6: Pit inflows. Located between Red Dome Pit and the National Park boundary.	223924	8105764	346.3	Quarterly – water quality Monthly – levels
New Bore: NP monitoring bore located between OB53 and the Mungana Pit	TBA ³	TBA ³	TBA ³	Quarterly – water quality Monthly – levels
Monitoring Bores				
TD4: Red Dome TSF eastern saddle dam. Located north-west of the TSF, outside of the fence.	225624	8103769	331.4	Quarterly – water quality Monthly – levels

TD8: Red Dome TSF eastern saddle dam. Located downslope of TD4.	225732	8103676	330.3	Quarterly – water quality Monthly – levels
HL1: Red Dome heap leach area. Located at the beginning of the heap leach launders.	224254	8104092	354.3	Quarterly – water quality Monthly – levels
SP1: Red Dome process ponds. Located downslope of the storm pond.	223431	8104506	335.1	Quarterly – water quality Monthly – levels
924: Mungana decline area.	221520	8107246	345.6	Quarterly – water quality Monthly – levels
925: Mungana decline area. Located adjacent to access road.	221794	8107088	331.9	Quarterly – water quality Monthly – levels
926: North of Mungana decline.	221654	8107156	359.2	Monthly – levels.
928: North of Mungana Decline area.	221610	8107398	340.5	Quarterly – water quality Monthly – levels
929: Mungana decline area.	221312	8107408	349.6	Monthly – levels.
WB999: Mungana decline area.	221791	8107140	337.8	Monthly – levels.

1 Reference sites must:

- (a) be from the same bio-geographic and climatic region;
- (b) have similar geology, soil types, topography and flow regime; and
- (c) not be so close to the test sites that any disturbance at the test site also results in a change at the reference site.

2 RL measurement to be taken from top of bore casing to the nearest 5cm.

3 Detail to be provided to the administering authority prior to commencement of mining or processing.

(G31) Groundwater from Compliance Bores identified in **Table G8 (Groundwater monitoring locations and frequency)**, must not exceed any of the contaminant limits defined in **Table G9 (Groundwater trigger levels and Contaminant Limits)**.

Table G9 (Groundwater Trigger Levels and Contaminant Limits)

Quality characteristic ¹	Contaminant trigger level ⁷	Contaminant limit
Electrical conductivity (µS/cm)	435 ⁸ or 80 th percentile ⁵ of reference ³ , whichever is higher. TD17r: 1493 ¹²	1000 ⁹ or 95 th percentile ⁵ of reference ³ , whichever is higher.

Quality characteristic ¹	Contaminant trigger level ⁷	Contaminant limit
pH (pH units)	Minimum: 6.0 ² or 20 th percentile ⁵ of reference ³ , whichever is the lower	5 (minimum)
	Maximum: 7.5 ² or 80 th percentile ⁵ of reference ³ , whichever is the higher. OC6: 8.4 ¹² TD17r: 7.97 ¹²	9 ⁹ (maximum)
Water hardness (CaCO ₃) (mg/L)	Interpretation purposes only	
Sulphate (SO ₄ ²⁻) (mg/L)	80 th percentile ⁵ of reference ³	500 ¹⁰ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Nitrate (as N) (µg/L)	80 th percentile ⁵ of reference ³ or 30 ² , whichever is higher	11000 ¹¹ or 95 th percentile ⁵ of reference ³ , whichever is higher. TD17r: 24700 ⁹
Ammonia (as N) (µg/L)	80 th percentile ⁵ of reference ³ or 6 ² , whichever is higher	500 ¹⁴ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Free Cyanide (µg/L)	80 th percentile ⁵ of reference ³ or 7 ² , whichever is higher	22 ¹⁵ or 95 th percentile ⁵ of reference ³
WAD Cyanide (µg/L)	80 th percentile ⁵ of reference ³	500 ¹⁵ or 95 th percentile ⁵ of reference ³
Fluoride (µg/L)	80 th percentile ⁵ of reference ³	1500 ¹⁰ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Antimony (µg/L)	80 th percentile ⁵ of reference ³ or 9 ¹² , whichever is higher	30 ¹⁰ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Arsenic (µg/L)	80 th percentile ⁵ of reference ³ or 13 ^{2,13} , whichever is higher	70 ¹⁰ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Cadmium (µg/L)	80 th percentile ⁵ of reference ³ or 0.2 ² , whichever is higher	10 ⁶ or 95 th percentile ⁵ of reference ³ , whichever is higher. OC6, WB6: 2 ¹⁴

Quality characteristic ¹	Contaminant trigger level ⁷	Contaminant limit
Cobalt (µg/L)	80 th percentile ⁵ of reference ³ or 1.4 ¹² , whichever is higher	1000 ⁶ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Copper (µg/L)	80 th percentile ⁵ of reference ³ or 1.4 ² , whichever is higher TD17r: 108 ¹¹	1000 ⁶ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Lead (µg/L)	80 th percentile ⁵ of reference ³ or 3.4 ² , whichever is higher	100 ⁶ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Molybdenum (µg/L)	80 th percentile ⁵ of reference ³ or 34 ¹² , whichever is higher	50 ¹⁴ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Selenium (µg/L)	80 th percentile ⁵ of reference ³ or 11 ² , whichever is higher	20 ⁶ or 95 th percentile ⁵ of reference ³ , whichever is higher.
Zinc (µg/L)	80 th percentile ⁵ of reference ³ or 8 ² , whichever is higher	20000 ⁶ or 95 th percentile ⁵ of reference ³ , whichever is higher.

- 1 All metals and metalloids must be measured as dissolved (filtered).
- 2 Default trigger values – from ANZECC/ARMCANZ (2000) trigger values for aquatic ecosystems indicative of slightly-to-moderately disturbed tropical Australian upland river ecosystems Tables 3.3.4 and Table 3.4.1 (*high reliability* trigger values) and *moderate* or *low* reliability trigger values (Section 8.3) if no value available in Table 3.4.1.
- 3 Reference sites as specified in Table G8 (Groundwater monitoring locations and frequency).
- 4 For aquatic ecosystem protection, based on QWQG 2009, Table G.4, Gulf zone.
- 5 80th and 95th percentiles are calculated using ANZECC 2000 methodology.
- 6 For protection of livestock drinking water, based on ANZECC 2000
- 7 Contaminant trigger values may be adjusted for water hardness (30mg/L calcium carbonate) in accordance with Table 3.4.3 of ANZECC. The hardness modified trigger values (HMTV) will be compared with the contaminant trigger values specified in Table G9 and if the monitoring result exceeds the HMTV it will then constitute an exceedance of the trigger values specified in Table G9. An investigation will then be required under condition G30 of this environmental authority.
- 8 Based on DERM information resulting from the review of water quality in the Fitzroy Basin.
- 9 Maximum value recorded in bore TD17r.
- 10 Contaminant Limit based on NHMRC (2006) Recreational Water Guidelines (10 x ADWG (assumed use swimming)).
- 11 80th percentile of historical (pre impact) data for this bore. This figure may be updated if monitoring indicates that no impacts are occurring (i.e. the pre impact data set increases) or if additional historical data is identified.
- 12 Interim (low reliability) value from ANZECC (2000) Section 8.3.7.1.
- 13 Speciated arsenic concentrations can be included for analysis from the outset, or alternatively, an arsenic (total species) sample can be determined with analysis for As (III) and As (V) only required if 13 µg/L is exceeded - note that the sample bottle requirements for As (total species) and As (speciated) may differ.
- 14 Contaminant limit based on drinking water quality guidelines in ADWG (2011).
- 15 Based on *Implementation Guidance for the International Cyanide Management Code, International Cyanide Management Institute, Standard Practice 4.5.*

Mungana TSF groundwater monitoring

(G32) Groundwater quality and standing water level must be monitored:

- (a) at the locations specified in **Table G10 - Groundwater monitoring locations and frequency**; and
 - (b) at the frequencies specified in **Table G10 - Groundwater monitoring locations and frequency**; and
 - (c) for the quality characteristics identified in **Table G11 - Groundwater contaminant limits** for the aquifer in which the bore is located.
- (G33) Groundwater in any compliance bore specified in **Table G10 - Groundwater monitoring locations and frequency** must not exceed the corresponding limit A specified in **Table G11 – Groundwater contaminant limits** on any five (5) consecutive sampling occasions.
- (G34) Groundwater in any compliance bore specified in **Table G10 - Groundwater monitoring locations and frequency** must not exceed the corresponding limit B specified in **Table G11 – Groundwater contaminant limits** on any three (3) consecutive sampling occasions.

Note: Consecutive sampling occasions means any number of sampling results obtained sequentially regardless of frequency and includes resampling events as required by Condition G35.

Table G10 – Groundwater monitoring locations and frequency

Monitoring Point	Location (GDA94, Zone 55k)		Bore Details			Monitoring Frequency	
	Latitude	Longitude	Total Depth (m)	Depth to Surface RL (m) ^[1]	Screened interval RL (m)	Standing Water Level	Groundwater Quality
Dargalong Metamorphics							
Compliance bores							
GWMTD1: Mungana TSF. Monitoring bore approximately 50m down gradient of the Mungana TSF wall.	221456	8104490	32.0	297.2	13.0-32.0	Monthly	Quarterly
GWMTD2: Mungana TSF. Monitoring bore approximately 250m down gradient of the Mungana TSF wall.	221253	8104445	34.0	295.2	14.4-32.5	Monthly	Quarterly

1 RL must be measured to the nearest 5cm.

Table G11 – Groundwater contaminant limits

Quality Characteristic	Unit	Limits		Limit Type ¹
		A	B	
GW MTD01				
Water hardness (CaCO ₃)	(mg/L)	NA	NA	Interpretation purposes only
Major anions and cations	(mg/L)	NA	NA	Interpretation purposes only

Quality Characteristic	Unit	Limits		Limit Type ¹
		A	B	
pH	pH Units	6.92 – 7.32	6.86 – 7.70	Range (field) Limit A: 20 th percentile to 80 th percentile Limit B: 5 th percentile to 95 th percentile
Electrical Conductivity	(µS/cm)	1,335	1,418	Maximum Limit A: 80 th percentile Limit B: 95 th percentile
Sulphate	(mg/L)	99	120	Maximum Limit A: 80 th percentile Limit B: 95 th percentile
Fluoride	(µg/L)	1,300	1,400	Maximum Limit A: 80 th percentile Limit B: 95 th percentile
Nitrate (as N)	(µg/L)	7,200	NA	Maximum Limit A: Guideline ²
Ammonia (as N)	(µg/L)	900	NA	Maximum Limit A: Guideline ²
Cyanide Free	(µg/L)	7	NA	Maximum Limit A: Guideline ²
Cyanide WAD	(µg/L)	500	NA	Maximum Limit A: Guideline ³
Antimony	(µg/L)	9	NA	Maximum (dissolved) Limit A: Guideline ²
Arsenic	(µg/L)	13	NA	Maximum (dissolved) Limit A: Guideline ^{2, 4}
Cadmium	(µg/L)	0.2	NA	Maximum (dissolved) Limit A: Guideline ²
Cobalt	(µg/L)	1.4	NA	Maximum (dissolved) Limit A: Guideline ²
Copper	(µg/L)	1.4	NA	Maximum (dissolved) Limit A: Guideline ²
Lead	(µg/L)	3.4	NA	Maximum (dissolved) Limit A: Guideline ²
Molybdenum	(µg/L)	34	NA	Maximum (dissolved) Limit A: Guideline ²
Selenium	(µg/L)	5	NA	Maximum (dissolved) Limit A: Guideline ²
Zinc	(µg/L)	31	NA	Maximum (dissolved) Limit A: Guideline ²
GW MTD02				
Water hardness (CaCO ₃)	(mg/L)	NA	NA	Interpretation purposes only
Major anions and cations	(mg/L)	NA	NA	Interpretation purposes only
pH	pH Units	7.02 - 7.52	6.97 – 7.83	Range (field) Limit A: 20 th percentile to 80 th percentile Limit B: 5 th percentile to 95 th percentile
Electrical Conductivity	(µS/cm)	1,400	1,504	Maximum Limit A: 80 th percentile Limit B: 95 th percentile
Sulphate	(mg/L)	132	206	Maximum Limit A: 80 th percentile Limit B: 95 th percentile
Fluoride	(µg/L)	2,400	2,600	Maximum Limit A: 80 th percentile Limit B: 95 th percentile
Nitrate (as N)	(µg/L)	7,200	NA	Maximum Limit A: Guideline ²
Ammonia (as N)	(µg/L)	900	NA	Maximum

Quality Characteristic	Unit	Limits		Limit Type ¹
		A	B	
				Limit A: Guideline ²
Cyanide Free	(µg/L)	7	NA	Maximum Limit A: Guideline ²
Cyanide WAD	(µg/L)	500	NA	Maximum Limit A: Guideline ³
Antimony	(µg/L)	9	NA	Maximum (dissolved) Limit A: Guideline ²
Arsenic	(µg/L)	13	NA	Maximum (dissolved) Limit A: Guideline ^{2,4}
Cadmium	(µg/L)	0.2	NA	Maximum (dissolved) Limit A: Guideline ²
Cobalt	(µg/L)	1.4	NA	Maximum (dissolved) Limit A: Guideline ²
Copper	(µg/L)	1.4	NA	Maximum (dissolved) Limit A: Guideline ²
Lead	(µg/L)	3.4	NA	Maximum (dissolved) Limit A: Guideline ²
Molybdenum	(µg/L)	11	12	Maximum (dissolved) Limit A: 80 th percentile Limit B: 95 th percentile
Selenium	(µg/L)	5	NA	Maximum (dissolved) Limit A: Guideline ²
Zinc	(µg/L)	31	NA	Maximum (dissolved) Limit A: Guideline ²

1 Limits are derived from control data.

2 Extracted from Table 3.4.1 of the Australian and New Zealand guidelines for fresh and marine water quality (ANZECC & ARMCANZ 2000), trigger values for toxicants for typical slightly-to-moderately disturbed freshwater environments. The 80% species protection value is applied for zinc, as the site specific data is frequently in excess of the 95% species protection value. Molybdenum, cobalt and antimony are freshwater low reliability trigger values extracted from section 8.3.7 Detailed descriptions of chemicals. Nitrate (as N) toxicity value for the protection of 95% freshwater species is based on the revised calculation by Chris Hickey (National Institute of Water & Atmospheric Research Ltd, memorandum dated 30 September 2002).

3 Based on *Implementation Guideline for the International Cyanide Management Code, International Cyanide Management Institute, Standard Practice 4.5*.

4 Speciated arsenic concentrations can be included for analysis from the outset or alternatively, an arsenic (total species) sample can be determined with analysis for As(III) and As(V) only if required if 13 µg/L is exceeded – note that the sample bottle requirements for As (total species and As (speciated) may differ.

(G35) If groundwater measured at any compliance bore specified in **Table G10 - Groundwater monitoring locations and frequency** exceeds the corresponding limit B specified in **Table G11 – Groundwater contaminant limits** on one (1) sampling occasion the environmental authority holder must resample the groundwater within the compliance bore for all exceeding parameters within 10 business days of receipt of results.

Annual Groundwater Monitoring Report

(G36) The holder of this environmental authority must complete an annual groundwater monitoring report by 1 July each year and submit this report to the administering authority upon request. The report must be prepared by an appropriately qualified person and must address the following requirements as a minimum:

- analyses of groundwater chemistry and hydrogeological data for all groundwater monitoring bores required in condition G30 and G32;
- identify exceedance of any contaminant trigger levels or limits listed in Table G9 (Groundwater Trigger Levels and Contaminant Limits) and in Table G11 (Groundwater contaminant limits);

- (c) discuss effectiveness of the current groundwater monitoring regime and any improvements that could be made to ensure early detection of impacts to groundwater;
 - (d) detail proposed actions and timeframes to undertake further investigation of potential environmental impacts for any exceedance identified;
 - (e) detail proposed mitigation measures for any detected impact to groundwater resulting from the mining activity;
 - (f) changes in groundwater levels plotted as a function of time to identify seasonal patterns and possible draw-down effects;
 - (g) groundwater elevation contours and flow direction; and
 - (h) interpretation and discussion of exceedance of any contaminant trigger levels or limits listed in Table G9 (Groundwater Trigger Levels and Contaminant Limits) and in Table G11 (Groundwater contaminant limits) and the implications for compliance with this environmental authority.
- (G37) The method of sampling of groundwater must comply with that set out in the latest edition of the Administering Authority's Water Quality Sampling Manual.

Raw Water Dam

- (G38) The water quality in the raw water dam must be managed to ensure that the water quality in the dam is maintained or improved. Discharges from the licensed activity into the raw water dam are only permitted if the water quality of the discharged is equal to or better than the water quality in the raw water dam.

Onsite Water Storages

- (G39) Waters onsite must be monitored at the locations defined in Table G12 (Onsite Water locations and water storage monitoring locations) for parameters in Table G13 (Onsite Water limits) and at a frequency of:

For the routine monitoring of onsite water locations:

- Quarterly
- Red Dome Pit annually

Table G12 (Onsite Water locations and water storage monitoring locations)

Monitoring Point	Easting (GDA 94 MGA - Zone 55)	Northing (GDA 94 MGA - Zone 55)
E6A: Opera Creek. 100 metres downstream of the Red Dome Sediment Dam	223383	8104488
OCS 6: Raw Water Dam at the spillway	221622	8105682
Red Dome Sediment Dam:	223477	8104472

Sediment Dam (located downstream of the heap leach pads, pregnant pond and barren pond).		
Mine Water Dam: Dam that receives water from Mungana Decline.	222020	8106145
Mungana TSF: Tailings Storage.	221930	8104960
Mungana TSF Seepage Sump: Downstream of Mungana TSF West wall.	221749	8104781
Mungana Process Water pond: Plant Process water.	221569	8106449
Mungana Plant Site Sediment Dam: Downstream of the Mungana process and concentrate storage area and the Process Water Pond	221531	8106239
Red Dome Pit	223840	8105462

- (G40) In the event that waters defined in Table G12 (Onsite Water locations and water storage monitoring locations) exceed the contaminant limits defined in Table G13 (Onsite Water Limits), the holder of this environmental authority must implement measures to prevent access to waters by all livestock and minimise access by native fauna.

Table G13 (Onsite water limits)

Parameter	Unit	Test Value	Contaminant Limit
pH	pH unit	Range	Greater than 4 ⁵ , less than 9 ⁵
EC	µS/cm	Maximum	5970 ¹
Sulphate	mg/L	Maximum	1000 ¹
Fluoride	µg/L	Maximum	2000 ¹
Nitrate	µg/L as N	Maximum	90000 ¹
Ammonia	µg/L as N	Maximum	500 ³
WAD Cyanide	µg/L	Maximum	Mungana TSF: refer to conditions D37 – D38 All other dams: 50 ⁶
Antimony ²	µg/L	Maximum	30 ⁴

Parameter	Unit	Test Value	Contaminant Limit
Arsenic ²	µg/L	Maximum	500 ¹
Cadmium ²	µg/L	Maximum	10 ¹
Cobalt ²	µg/L	Maximum	1000 ¹
Copper ²	µg/L	Maximum	1000 ¹
Lead ²	µg/L	Maximum	100 ¹
Molybdenum ²	µg/L	Maximum	150 ¹
Zinc ²	µg/L	Maximum	20000 ¹
Selenium ²	µg/L	Maximum	20 ¹

- 1 Contaminant limit based on the stock water quality guidelines in ANZECC (2000).
- 2 Concentrations are for total metals concentrations only, not soluble metals.
- 3 Due to unavailability of stock water quality limit a contaminant limit based on drinking water quality guidelines in ADWG (2004) is used.
- 4 Due to unavailability of stock water quality limit a contaminant limit based on NHMRC (2006) Recreational Water Guidelines (10 x ADWG (assumed use swimming)) is used.
- 5 Page 4.2-15 of ANZECC (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".
- 6 Based on Implementation Guidance for the International Cyanide Management Code, International Cyanide Management Institute, Standard Practice 4.5.

Mungana Caves National Park Aquifers – Spring Tower Complex

- (G41) During construction of the Mungana Open Pit, aquifers associated with the Spring Tower Complex are not permitted to be intersected. In the event of the intersection of an aquifer reasonably expected to be part of the Spring Tower Complex, the administering authority must be notified in accordance with condition A13 of this environmental authority.

Saline, Acid and Metalliferous Drainage

- (G42) The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline, acid and/or metalliferous mine drainage as a result of the mining activity.
- (G43) By 1 September 2018, the environmental authority holder must submit an amendment application under section 224 of the *Environmental Protection Act 1994* to the administering authority proposing contaminant limits in accordance with **Table G11 (Groundwater contaminant limits)** for all groundwater water quality monitoring bores specified in **Table G8 (Groundwater monitoring locations and frequency)**.

Applicability of conditions

- (G44) Conditions G1 – G43 are only applicable to Red Dome/Mungana.

King Vol

- (G45) Contaminants that will, or have the potential to cause environmental harm, must not be released directly or indirectly to any receiving waters except as permitted under the conditions of this environmental authority.

- (G46) The environmental authority holder must ensure that the mining activities are conducted in a manner that protects all environmental values of receiving waters.

Water Quality Monitoring Metadata

- (G47) The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format when requested:
- (a) the date and time when the sample was taken;
 - (b) the monitoring point where the sample was taken;
 - (c) the measured or estimated daily quantity of the contaminated water released from all release points;
 - (d) the release flow rate at the time of sampling for each release point;
 - (e) the results of all monitoring and details of any exceedances of the conditions of this environmental authority; and
 - (f) all water quality monitoring data.

Stream Flow Monitoring

- (G48) The holder must ensure stream flow gauging stations are installed, operated and maintained to determine and record stream flows at the locations and flow recording frequency specified in Table G14 (Stream Flow Monitoring).

Table G14 (Stream Flow Monitoring)

Receiving water description	Release points	Gauging station description	Easting(GDA 94 MGA – Zone 55)	Northing (GDA 94 MGA – Zone 55)	Flow recording Frequency ¹
Bowler Creek	King Vol Clean Water Dam	Level staff	208212	8125827	Minimum of daily during the release of contaminants
Bowler Creek tributary (western boundary)	King Vol Mine Water Dam	Level staff	205521	8125980	
Archies Creek (adjacent to Burke Development Road)	King Vol Sediment Dam	Level staff	207175	8126504	

1 Flow recording frequency must be sufficient to determine compliance with condition G50.

Contaminated Water Release Events

- (G49) The release of contaminants to waters must only occur from the release points specified in Table G15 (Contaminant Release Points).
- (G50) The release of contaminants to waters must not exceed any quality characteristic release limit specified in Table G16 (Release Limits).

- (G51) The environmental authority holder must ensure that the release of contaminants to waters is monitored in accordance with the requirements specified in Table G16 (Release Limits).
- (G52) During contaminant release to waters, the environmental authority holder must ensure that:
- For a release at a dilution factor of $<1:20$, there is natural flow in the relevant receiving waters immediately upstream of the release point for the duration of the release event; or
 - For a release at a dilution factor of $1:20$ - $1:50$, the flow rate in the relevant receiving waters immediately upstream of the release point is at least twenty (20) times the release rate; or
 - For a dilution factor of $>1:50$, the flow rate in the relevant receiving waters immediately upstream of the release point is at least fifty (50) times the release rate.

Table G15 (Contaminant Release Points)

Release points	Easting (GDA 94 MGA - Zone 55)	Northing (GDA 94 MGA - Zone 55)	Contaminant source	Receiving waters description
King Vol Clean Water Dam Spillway	206239	8125230	Mine dewatering via production bores	Bowler Creek tributary (western boundary)
King Vol Mine Water Dam Spillway	205757	8126026	Mine dewatering via the decline, production bores and Sediment Dam	Bowler Creek tributary (western boundary)
King Vol Sediment Dam	207403	8125721	Surface infrastructure ROM pad and waste rock dump and mine dewatering via decline	Bowler Creek tributary (adjacent to Burke Development Road)
Bowler Creek Pipeline	208090	8125200	Clean Water Dam	Bowler Creek

Table G16 (Release Limits)

Quality Characteristic ¹	Release limits ^{2, 10, 11}			Monitoring
	Dilution factor of <1:20	Dilution factor of 1:20 – 1:50	Dilution factor of >1:50	
Electrical Conductivity (µS/cm)	1,000 ³			Event based sampling: One sample must be taken within twelve (12) hours of a release event or flow event commencing. A second sample must be taken between twelve (12) and twenty four (24) hours after the release event or flow event commences.
pH (pH units)	6.0 ⁴ (minimum) 8.5 ⁸ (maximum)			
Turbidity (NTU)	15 ⁹			
Water Hardness (CaCO ₃) (mg/L)	For interpretation purposes			
Sulphate (SO ₄ ²⁻) (mg/L)	250 ⁸			
Nitrate ⁴ (as N) (mg/L)	11.5 ^{8, 12}			
Ammonia (as N) (µg/L)	411 ^{8, 12}			Where a release or flow event has a duration of twenty four (24) hours or greater, samples must be taken daily for one (1) week, and weekly thereafter until the release or flow event ceases.
Fluoride(µg/L)	1,500 ¹⁴			
Antimony (µg/L)	95 th percentile ⁵ of reference ⁶ (dissolved)	Maximum of 10 times the 95 th percentile ⁵ of reference ⁶ (dissolved)	Maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	
Arsenic ⁸ (µg/L)	500 ⁷ (total); and, 95 th percentile ⁵ of reference ⁶ (dissolved)	500 ⁷ (total); and, maximum of ten (10) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	500 ⁷ (total); and, maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	
Cadmium (µg/L)	2 ⁸ (total); and, 95 th percentile ⁵ of reference ⁶ (dissolved)	2 ⁸ (total); and, maximum of ten (10) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	2 ⁸ (total); and, maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	

Cobalt (µg/L)	1,000 ⁷ (total); and, 95 th percentile ⁵ of reference ⁶ (dissolved)	1,000 ⁷ (total); and, maximum of ten (10) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	1,000 ⁷ (total); and, maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)
Copper (µg/L)	1,000 ⁷ (total); and, 95 th percentile ⁵ of reference ⁶ (dissolved)	1,000 ⁷ (total); and, maximum of ten (10) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	1,000 ⁷ (total); and, maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)
Lead (µg/L)	10 ⁸ (total); and, 95 th percentile ⁵ of reference ⁶ (dissolved)	10 ⁸ (total); and, maximum of ten (10) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	10 ⁸ (total); and, maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)
Molybdenum (µg/L)	50 ⁸ (total); and, 95 th percentile ⁵ of reference ⁶ (dissolved)	50 ⁸ (total); and, maximum of ten (10) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	50 ⁸ (total); and, maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)
Selenium (µg/L)	10 ⁸ (total); and, 95 th percentile ⁵ of reference ⁶ (dissolved)	10 ⁸ (total); and, maximum of ten (10) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	10 ⁸ (total); and, maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)
Zinc (µg/L)	3,000 ⁸ (total); and, 95 th percentile ⁵ of reference ⁶ (dissolved)	3,000 ⁸ (total); and, maximum of ten (10) times the 95 th percentile ⁵ of reference ⁶ (dissolved)	3,000 ⁸ (total); and, maximum of twenty five (25) times the 95 th percentile ⁵ of reference ⁶ (dissolved)
Oils and greases	No visible film		

1. For water quality, all metals and metalloids must be measured as both 'total' (from analysis of an unfiltered sample) and 'dissolved' (from analysis of a field filtered sample). The relevant method is specified in brackets for each contaminant where applicable.
2. The release limits are based on default trigger limits or the 95th percentile of reference system, whichever is the higher. Where appropriate the default trigger values may be hardness adjusted in accordance with ANZECC/ARMCANZ (2000) section 7.4.4.
3. "Response of stream macroinvertebrates to changes in salinity and the development of a salinity index", Horrigan et al (2005), Marine and Freshwater Research.
4. Default trigger values – from ANZECC/ARMCANZ (2000) trigger values for aquatic ecosystems indicative of slightly-to-moderately disturbed tropical Australian upland river ecosystems Tables 3.3.4 and Table 3.4.1 (*high reliability* trigger values) and *moderate* or *low* reliability trigger values (Section 8.3) if no value available in Table 3.4.1.

5. 95th percentiles calculated using ANZECC/ARMCANZ (2000) methodology (section 7.4.4.1).
6. Reference sites defined in Table G17 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points).
7. Default trigger values – from ANZECC/ARMCANZ (2000) section 4.3.3.4 trigger values for livestock drinking water.
8. Australian Drinking Water Guidelines (version 3.2) – Table 10.4 – Guideline values for physical and chemical characteristics.
9. Default trigger values – from ANZECC/ARMCANZ (2000) trigger values for aquatic ecosystems indicative of slightly-to-moderately disturbed tropical Australian upland and lowland rivers Table 3.3.5.
10. Where the 95th percentile of a Release Limit is exceeded at a Downstream Compliance Monitoring Point and the Reference Monitoring Point also exceeds this concentration during the release/flow event, the value of the Reference Monitoring Point applies as the water quality Release Limit for the duration of the event.
11. Site-specific Release Limits for water quality (95th percentile of reference site concentration) must be calculated in accordance with QWQG (2009) and ANZECC (2000) methodology if sufficient monitoring data is available. The environmental authority holder must maintain a database documenting all relevant water quality monitoring data and calculation of 95th percentiles adopted as water quality Release Limits.
12. Values converted to Nitrate (as N) and Ammonia (as N).

- (G53) The rate and daily quantity of contaminated water released from each release point must be measured and recorded.
- (G54) The release of contaminants to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.

Receiving Waters Monitoring

- (G55) The quality of receiving waters must be monitored at the locations specified in Table G17 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points) as depicted in Schedule J Figure1b (King Vol - Monitoring Points) and in accordance with the requirements specified in Table G18 (Receiving waters trigger levels and contaminant limits).
- (G56) Quality characteristics measured in receiving waters must not exceed the contaminant limit specified in Table G18 (Receiving waters trigger levels and contaminant limits).
- (G57) If the exceedance of any trigger level listed in Table G18 (Receiving waters trigger levels and contaminant limits) is identified in receiving waters, the holder of this environmental authority must compare the downstream results to the reference site results and:
- (a) if the downstream result is less than the background monitoring site data, then no action is to be taken;
 - (b) if the result is greater than the background monitoring site data, complete an investigation into the potential for environmental harm and provide a written report to the administering authority within 3 months, outlining:
 - i. details of the investigations carried out;
 - ii. details of the environmental impacts observed; and
 - iii. actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger value has occurred and is being investigated, in accordance with part (b) of this condition, no further reporting is required for subsequent trigger events of an equal-to or lesser extent for that quality characteristic.

Table G17 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points)

Monitoring Points	Receiving Waters Location Description	Easting (GDA 94 MGA - Zone 55)	Northing (GDA 94 MGA - Zone 55)
Reference¹ Monitoring Points			
KV03	Archies Creek	207183	8126531
M04	Ashton Creek	209761	8124664
Downstream Compliance Monitoring Points			
KV04	Bowler Creek	206149	8124874
KV05	Bowler Creek	207858	8123226
M01	Archies Creek	208038	8125227
MO5	Bowler Creek	208269	8124950

1 Reference sites must:

- (a) be from the same bio-geographic and climatic region;
- (b) have similar geology, soil types and topography;
- (c) contain a range of habitats similar to those at the test sites;
- (d) have a similar flow regime; and
- (e) not be so close to the test sites that any disturbance at the test site also results in a change at the reference site.

Table G18 (Receiving waters trigger levels and contaminant limits)

Quality Characteristic	Water Quality ^{2, 15}		Monitoring Frequency
	Trigger Levels ¹⁴	Contaminant Limit ¹⁴	
Electrical Conductivity (µS/cm)	500 ¹³ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	1,000 ³	- Routine based sampling: Monthly - Event based sampling of discharge: One sample must be taken within twelve (12) hours of a release event or flow event commencing. A second sample must be taken between twelve (12) and twenty four (24) hours after the release event or flow event commences.
pH (pH units)	6.0 ⁵ (minimum) or 20 th percentile ⁶ of reference ⁷ , whichever is lower 7.5 ⁵ (maximum) or 80 th percentile ⁶ of reference ⁷ , whichever is higher	6.0 ⁵ (minimum) 8.5 ¹² (maximum)	
Turbidity (NTU)	15 ¹⁰ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	95 th percentile ⁶ of reference ⁷	

Water Hardness (CaCO ₃) (mg/L)	For interpretive purposes only		Where a release or flow event has a duration of twenty four (24) hours or greater, samples must be taken daily for one (1) week, and weekly thereafter until the release or flow event ceases.
Major Cations & Anions			
Sulphate (SO ₄ ²⁻) (mg/L)	80 th percentile ⁶ of reference ⁷	250 ¹²	
Nitrate (as N) (mg/L)	7.2 ¹⁶ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	11.5 ^{4,12}	
Ammonia (as N) (µg/L)	80 th percentile ⁶ of reference ⁷	411 ^{4,12}	
Fluoride(µg/L)	80 th percentile ⁶ of reference ⁷	1,500 ¹²	
Metals & Metalloids ¹			
Antimony (µg/L)	9 ⁹ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	95 th percentile ⁶ of reference ⁷ (dissolved)	
Arsenic ⁸ (µg/L)	13 ⁵ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	500 ¹¹ (total); and, 95 th percentile ⁶ of reference ⁷ (dissolved)	
Cadmium (µg/L)	0.2 ⁵ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	2 ¹² (total); and, 95 th percentile ⁶ of reference ⁷ (dissolved)	
Cobalt (µg/L)	1.4 ⁹ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	1,000 ¹¹ (total); and, 95 th percentile ⁶ of reference ⁷ (dissolved)	
Copper (µg/L)	1.4 ⁵ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	1,000 ¹¹ (total); and, 95 th percentile ⁶ of reference ⁷ (dissolved)	
Lead (µg/L)	3.4 ⁵ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	10 ¹² (total); and, 95 th percentile ⁶ of reference ⁷ (dissolved)	
Molybdenum (µg/L)	34 ⁹ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	50 ¹² (total); and, 95 th percentile ⁶ of reference ⁷ (dissolved)	

Selenium (µg/L)	5 ⁵ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	10 ¹² (total); and, 95 th percentile ⁶ of reference ⁷ (dissolved)	
Zinc (µg/L)	8 ⁵ or 80 th percentile ⁶ of reference ⁷ , whichever is higher	3,000 ¹² (total); and, 95 th percentile ⁶ of reference ⁷ (dissolved)	
Organics			
Oils and greases	No visible film		

1. For water quality, all metals and metalloids must be measured as both 'total' (from analysis of an unfiltered sample) and 'dissolved' (from analysis of a field filtered sample). All trigger levels are based on dissolved metal concentrations; for water quality objectives, the relevant method is specified in brackets for each contaminant where applicable.
2. Water quality levels and limits are based on default trigger limits or the 80th and 95th percentile of reference system, whichever is the higher. Where appropriate the default trigger values may be hardness adjusted in accordance with ANZECC/ARMCANZ (2000) section 7.4.4.
3. *"Response of stream macroinvertebrates to changes in salinity and the development of a salinity index"*, Horrigan et al (2005), Marine and Freshwater Research.
4. Values converted to Nitrate (as N) and Ammonia (as N).
5. Default trigger values – from ANZECC/ARMCANZ (2000) trigger values for aquatic ecosystems indicative of slightly-to-moderately disturbed tropical Australian upland river ecosystems Tables 3.3.4 and Table 3.4.1 (*high reliability* trigger values) and *moderate* or *low* reliability trigger values (Section 8.3) if no value available in Table 3.4.1.
6. 80th and 95th percentiles calculated using ANZECC (2000) methodology (section 7.4.4.1).
7. Reference sites defined in Table G17 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points).
8. Speciated arsenic concentrations for As (III) and As (V) only required if 13 µg/L is exceeded - note that the sample bottle requirements for As (total species) and As (speciated) may differ.
9. Interim (low reliability) value from ANZECC (2000) Section 8.3.7.1.
10. Default trigger values – from ANZECC/ARMCANZ (2000) trigger values for aquatic ecosystems indicative of slightly-to-moderately disturbed tropical Australian upland and lowland rivers Table 3.3.5.
11. Default trigger values – from ANZECC/ARMCANZ (2000) section 4.3.3.4 trigger values for livestock drinking water.
12. Australian Drinking Water Guidelines (version 3.2) – Table 10.4 – Guideline values for physical and chemical characteristics.
13. For aquatic ecosystem protection, based on QWQG 2009, Table G.4, Gulf zone.
14. Where the 80th/95th percentile of a water quality Trigger Level/Contaminant Limit is exceeded at a Downstream Compliance Monitoring Point and the Reference Monitoring Point also exceeds this concentration during the release/flow event, the value of the Reference Monitoring Point applies as the water quality Trigger Level/Contaminant Limit for the duration of the event.
15. Site-specific Trigger Levels and Contaminant Limits for water quality (80th and 95th percentile of reference site concentration) must be calculated in accordance with QWQG (2009) and ANZECC (2000) methodology if sufficient monitoring data is available. The environmental authority holder must maintain a database documenting all relevant water quality monitoring data and calculation of 80th/95th percentiles adopted as water quality Trigger Levels and Contaminant Limits.
16. As per the updated nitrate toxicity value in Hickey (2002) *Nitrate Guideline Values in ANZECC 2000*, Memorandum from the National Institute of Water and Atmospheric Research (NIWA) NZ, 30 September 2002.

Stream Sediment

- (G58) Sediment quality of receiving waters must be monitored at the locations defined in Table G17 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring points) as depicted in Schedule J – Figure 1b (Monitoring Points) and for the parameters defined in Table G19 (Stream Sediment Trigger and Contaminant Levels).
- (G59) If the quality characteristics of sediments exceed any of the trigger levels specified in Table G19 (Stream Sediment Trigger Levels and Contaminant Limits), the holder of this environmental authority must compare the downstream site to the data from reference monitoring sites and:
- (a) if the level of contaminants at the downstream site does not exceed the reference monitoring site data, then no action is to be taken; or
 - (b) if the level of contaminants at the downstream site is greater than the reference monitoring site data, complete an investigation in accordance with the ANZECC and ARMCANZ 2000

methodology, into the potential for environmental harm and provide a written report to the administering authority within three (3) months, outlining:

- (i) details of the investigations carried out;
- (ii) details of the environmental impacts observed; and
- (iii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger value has occurred and is being investigated, in accordance with part (b) of this condition, no further reporting is required for subsequent trigger events of an equal to or lesser extent for that quality characteristic.

(G60) All stream sediment sampling must be undertaken in accordance with the most recent version of Australian Standard AS 5667.12 *Guidance on Sampling of Bottom Sediments*.

(G61) The sediment quality contaminant limit specified in Table G19 (Stream Sediment Trigger Levels and Contaminant Limits) must not be exceeded in receiving waters.

Table G19 (Stream Sediment Trigger Levels and Contaminant Limits)

Parameter	Unit	Trigger Level ^{1,5}	Contaminant Limit ^{1,5}	Monitoring frequency
Fluoride	mg/kg	2 times the reference ² value	3 times the reference ² value	Twice a year (Once during the wet season, and once during the dry season)
Antimony	mg/kg	2 ³ or 2 times the reference ² value, whichever is higher	25 ⁴ or 3 times the reference ² , whichever is higher	
Arsenic	mg/kg	20 ³ or 2 times the reference ² value, whichever is higher	70 ⁴ or 3 times the reference ² , whichever is higher	
Cadmium	mg/kg	1.5 ³ or 2 times the reference ² value, whichever is higher	10 ⁴ or 3 times the reference ² , whichever is higher	
Cobalt	mg/kg	2 times the reference ² value	3 times the reference ² value	
Copper	mg/kg	65 ³ or 2 times the reference ² value, whichever is higher	270 ⁴ or 3 times the reference ² , whichever is higher	
Lead	mg/kg	50 ³ or 2 times the reference ² value, whichever is higher	220 ⁴ or 3 times the reference ² , whichever is higher	
Molybdenum	mg/kg	2 times the reference ² value	3 times the reference ² value	
Selenium	mg/kg	2 times the reference ² value	3 times the reference ² value	

Parameter	Unit	Trigger Level ^{1,5}	Contaminant Limit ^{1,5}	Monitoring frequency
Zinc	mg/kg	200 ³ or 2 times the reference ² value, whichever is higher	410 ⁴ or 3 times the reference ² , whichever is higher	
Particle size distribution	For interpretation purposes			

1. Sediment sampling, analysis and interpretation of results must be conducted in a manner consistent with the 'Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines, CSIRO (May 2013)' and 'AS 5667.12:1999 (R2016) - Guidance on Sampling of Bottom Sediments'.
2. Reference sites are defined in Table G17 (Receiving Water Reference Monitoring Points and Downstream Compliance Monitoring Points).
3. Interim Sediment Quality Guidelines (SQG) – low values in Table 2 and the decision tree framework in Figure 1 of CSIRO (May 2013).
4. SQG – high values in Table 2 and the decision tree framework in Figure 1 of CSIRO (May 2013).
5. For sediment quality, compliance site monitoring results are to be compared:
 - a) Directly to the guideline values from the *Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines*, CSIRO (May 2013), if insufficient reference site monitoring data is available; or
 - b) The relevant reference site monitoring data, which must be normalised to account for any difference in particle size distribution (i.e. conduct a fractionated sediment analysis based on comparing the metals concentrations of the <63µm sediment fraction with the >63µm to <2mm sediment fraction).

Receiving Environment Monitoring Program (REMP)

- (G62) By 31 June 2017, the environmental authority holder must develop and implement a Receiving Environment Monitoring Program (REMP) to monitor, identify and describe any adverse impacts to environmental values of receiving waters due to the authorised mining activity. This must include monitoring the effects of the mine on the receiving environment periodically and while contaminants are being discharged from the site. For the purposes of the REMP, the receiving environment is the waters of Bowler Creek, Archie Creek, Ashton Creek and connected or surrounding waterways within 2km downstream of the release. The REMP should encompass any sensitive receiving waters or environmental values downstream of the authorised mining activity that will potentially be directly affected by an authorised release of mine affected water.
- (G63) A REMP Design Document that addresses the requirements of the REMP must be prepared and made available to the administering authority upon request.
- (G64) A report outlining the findings of the REMP, including all monitoring results and interpretations must be prepared annually and made available on request to the administering authority. This must include an assessment of background reference water quality, the condition of downstream water quality compared against water quality objectives, and the suitability of current discharge limits to protect downstream environmental values.

Water Management Plan

- (G65) A Water Management Plan must be developed by an appropriately qualified person and implemented.

Erosion and Sediment Control

- (G66) An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to prevent or minimise erosion and the release of sediment to receiving waters and the contamination of storm water.

Groundwater

- (G67) The extraction of groundwater must not cause environmental harm to any groundwater dependant ecosystem or other environmental value outside the predicted groundwater drawdown as depicted in **Figure 7 (King Vol Predicted Groundwater Drawdown and Groundwater Bore Network)**.

Monitoring Bore Construction, Maintenance and Decommissioning

- (G68) The construction, maintenance and management of groundwater monitoring bores must be undertaken in a manner that prevents or minimises impacts to the environment and ensures the integrity of the bores to obtain representative samples of the targeted aquifer.

Groundwater Management Program

- (G69) A *Groundwater Management Program* must be developed and certified by an appropriately qualified person and implemented by the environmental authority holder prior to extraction of groundwater for mine dewatering.
- (G70) The *Groundwater Management Program* required by condition G69 must include adequate monitoring of all receiving waters to determine compliance with all conditions of this environmental authority by an appropriately qualified person and achieve the following objectives:
- be capable of detecting any impacts to groundwater levels and groundwater quality due to the mining activity;
 - determine compliance with condition G67;
 - ensure all potential groundwater impacts due to the mining activity are identified, mitigated and monitored; and
 - Identify any deviation from the predicted groundwater drawdown impacts as depicted in **Figure 7 (King Vol Predicted Groundwater Drawdown and Groundwater Bore Network)**.
- (G71) The *Groundwater Management Program* required by condition G69 must be reviewed by 1 July each year by an appropriately qualified person. The annual review must include:
- an assessment against the objectives in condition G70;
 - recommended actions including timeframes for implementation, to ensure that any groundwater impacts not authorised under this environmental authority are prevented;
 - interpretation and discussion of exceedance of any contaminant trigger levels or contamination limits listed in Table G21 (Groundwater Trigger Levels and Contaminant Limits).
- (G72) In relation to the annual review required by *condition G71*, the environmental authority holder must:
- upon receipt of the annual review, implement any recommendations from the review within the recommended timeframes; and
 - upon request, provide the administering authority a copy of the annual review and written notification of actions being taken to address any recommendations from the annual review, including any changes necessary to the Groundwater Management Program.
- (G73) Groundwater quality and levels must be monitored at the locations and frequencies specified in Table G20 (Groundwater monitoring locations and frequency) as depicted in Schedule J – Figure 4b (King Vol

- Groundwater Monitoring Bore Network) for all quality characteristics specified in Table G21 (Groundwater Trigger Levels and Contaminant Limits).

Table G20 (Groundwater monitoring locations and frequency)

Monitoring point	Easting (GDA 94 MGA – Zone 55)	Northing (GDA 94 MGA – Zone 55)	Surface AHD (m)	Screened interval (m AHD)	Monitoring frequency
Reference Bores¹					
KVMB004B	206445	8126152	251.59	203.59- 191.59	Quarterly – water quality Monthly – Levels ²
Compliance Bores					
KVMB002A	207352	8124823	246.47	Not screened	Quarterly – water quality Monthly – Levels ²
KVMB002B	207347	8124872	247.32	187.32- 169.32	Quarterly – water quality Monthly – Levels ²
KVMB003	208138	8123766	243.48	177.48- 159.48	Quarterly – water quality Monthly – Levels ²
KVMB007r	207334	8125553	250.25	202.25- 190.25	Quarterly – water quality Monthly – Levels ²
KVMB008	206463	8125058	253.90	205.90- 193.90	Quarterly – water quality Monthly – Levels ²
Monitoring Bores					
KVMB001A	206816	8125556	254.29	200.29- 170.29	Quarterly – water quality Monthly – Levels ²
KVMB001B	206930	8125465	256.96	190.96- 166.96	Quarterly – water quality Monthly – Levels ²
KVMB006B	206803	8125744	258.82	222.82- 210.82	Quarterly – water quality Monthly – Levels ²
KVMB009 North-west extent of drawdown	TBA ³	TBA ³	TBA ³	TBA ³	Quarterly – water quality Monthly – Levels ²
KVMB010 North extent of drawdown (Eastern Limestone)	TBA ³	TBA ³	TBA ³	TBA ³	Quarterly – water quality Monthly – Levels ²

KVMB011 South extent of drawdown (Eastern Limestone)	TBA ³	TBA ³	TBA ³	TBA ³	Quarterly – water quality Monthly – Levels ²
KVMB012 East extent of drawdown	TBA ³	TBA ³	TBA ³	TBA ³	Quarterly – water quality Monthly – Levels ²

1 Reference sites must:

- be from the same bio-geographic and climatic region;
 - have similar geology, soil types, topography and flow regime; and
 - not be so close to the test sites that any disturbance at the test site also results in a change at the reference site.
- 2 All measurements for groundwater levels are to be taken from the top of the bore casing to the nearest 5cm and adjusted for the bore casing height.
- 3 Detail to be provided to the administering authority prior to the dewatering of groundwater below 200 meters BGL.

(G74) Groundwater from Compliance Bores identified in Table G20 (Groundwater monitoring locations and frequency), must not exceed any of the contaminant limits defined in Table G21 (Groundwater Trigger Levels and Contaminant Limits).

Table G21 (Groundwater Trigger Levels and Contaminant Limits)

Quality characteristic	Contaminant trigger level ^{13, 14}	Contaminant limit ^{13, 14}
Electrical conductivity (µS/cm)	500 ⁴ or 80 th percentile ⁵ of reference ³ , whichever is higher	1,000 ⁸
pH (pH units)	6.0 ² (minimum) or 20 th percentile ⁵ of reference ³ , whichever is lower	6.0 ² (minimum)
	7.5 ² (maximum) or 80 th percentile ⁵ of reference ³ , whichever is higher	8.5 ¹¹ (maximum)
Water hardness (CaCO ₃) (mg/L)	Interpretation purposes only ⁷	
Major cations and anions	Interpretation purposes only	
Sulphate (SO ₄ ²⁻) (mg/L)	80 th percentile ⁵ of reference ³	250 ¹¹
Nitrate (as N) (mg/L)	7.2 ¹⁸ or 80 th percentile ⁵ of reference ³ , whichever is higher	11.5 ^{11, 12}
Ammonia (as N) (µg/L)	80 th percentile ⁵ of reference ³	411 ^{11, 12}
Fluoride (µg/L)	80 th percentile ⁵ of reference ³	1,500 ¹¹
Metals and Metalloids¹		

Quality characteristic	Contaminant trigger level ^{13, 14}	Contaminant limit ^{13, 14}
Antimony (µg/L)	9 ⁹ (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	95 th percentile ⁵ of reference ³ (dissolved)
Arsenic (µg/L) ¹⁰	13 ² (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	500 ⁶ (total); and, 95 th percentile ⁵ of reference ³ (dissolved)
Cadmium (µg/L)	0.2 ² (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	2 ¹¹ (total); and, 95 th percentile ⁵ of reference ³ (dissolved),
Cobalt (µg/L)	1.4 ⁹ (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	1,000 ⁶ (total); and, 95 th percentile ⁵ of reference ³ (dissolved),
Copper (µg/L)	1.4 ² (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	1,000 ⁶ (total); and, 95 th percentile ⁵ of reference ³ (dissolved),
Lead (µg/L)	3.4 ² (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	10 ¹¹ (total); and, 95 th percentile ⁵ of reference ³ (dissolved),
Molybdenum (µg/L)	34 ⁹ (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	50 ¹¹ (total); and, 95 th percentile ⁵ of reference ³ (dissolved),
Selenium (µg/L)	5 ² (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	10 ¹¹ (total); and, 95 th percentile ⁵ of reference ³ (dissolved),
Zinc (µg/L)	8 ² (dissolved) or 80 th percentile ⁵ of reference ³ , whichever is higher	3,000 ¹¹ (total); and, 95 th percentile ⁵ of reference ³ (dissolved),

- 1 For water quality, all metals and metalloids must be measured as both 'total' (from analysis of an unfiltered sample) and 'dissolved' (from analysis of a field filtered sample). All trigger levels are based on dissolved metal concentrations; for water quality objectives, the relevant method is specified in brackets for each contaminant where applicable.
- 2 Default trigger values – from ANZECC/ARMCANZ (2000) trigger values for aquatic ecosystems indicative of slightly-to-moderately disturbed tropical Australian upland river ecosystems Tables 3.3.4 and Table 3.4.1 (*high reliability* trigger values) and *moderate* or *low* reliability trigger values (Section 8.3) if no value available in Table 3.4.1.
- 3 Reference sites as specified in Table G20 (Groundwater monitoring locations and frequency).
- 4 For aquatic ecosystem protection, based on QWQG 2009, Table G.4, Gulf zone.
- 5 80th and 95th percentiles are calculated using ANZECC 2000 methodology.
- 6 For protection of livestock drinking water, based on ANZECC 2000 section 4.3.3.4 trigger values for livestock drinking water.
- 7 Contaminant trigger values may be adjusted for water hardness (30mg/L calcium carbonate) in accordance with Table 3.4.3 of ANZECC. The hardness modified trigger values (HMTV) will be compared with the contaminant trigger values specified in Table G21 and if the monitoring result exceeds the HMTV it will then constitute an exceedance of the trigger values specified in Table G21. An investigation will then be required under condition G75 of this environmental authority.
- 8 Based on toxicity studies "*Response of stream macroinvertebrates to changes in salinity and the development of a salinity index*", *Horrigan et al (2005)*, Marine and Freshwater Research.
- 9 Interim (low reliability) value from ANZECC (2000) Section 8.3.7.1.
- 10 Speciated arsenic concentrations can be included for analysis from the outset, or alternatively, an arsenic (total species) sample can be determined with analysis for As (III) and As (V) only required if 13 µg/L is exceeded - note that the sample bottle requirements for As (total species) and As (speciated) may differ.
- 11 Contaminant limit based on drinking water quality guidelines in ADWG (2011). Australian Drinking Water Guidelines (version 3.2) – Table 10.4 – Guideline values for physical and chemical characteristics.
- 12 Values converted to Nitrate (as N) and Ammonia (as N).
- 13 Where the 80th/95th percentile of a water quality Trigger Level/Contaminant Limit is exceeded at a Compliance Bore and the Reference Bore(s) also exceeds this concentration during the sampling event, the value of the Reference Bore applies as the water quality Trigger Level/Contaminant Limit for the duration of the event.

- 14 Site-specific Trigger Levels and Contaminant Limits for water quality (80th and 95th percentile of reference site concentration) must be calculated in accordance with QWQG (2009) and ANZECC (2000) methodology if sufficient monitoring data is available. The environmental authority holder must maintain a database documenting all relevant water quality monitoring data and calculation of 80th/95th percentiles adopted as water quality Trigger Levels and Contaminant Limits.
- 15 As per the updated nitrate toxicity value in Hickey (2002) *Nitrate Guideline Values in ANZECC 2000*, Memorandum from the National Institute of Water and Atmospheric Research (NIWA) NZ, 30 September 2002.

Exceedance investigation

- (G75) If the quality characteristics as measured in the compliance bores listed in Table G20 (Groundwater monitoring locations and frequency) exceed any of the trigger levels specified in Table G21 (Groundwater Trigger levels and Contaminant Limits), the holder of this environmental authority must compare the results from the compliance bores to the data from the reference bores and:
- (a) if the level of contaminants as measured in the compliance bore does not exceed the reference bore results, then no action is to be taken;
 - (b) if the level of contaminants at the compliance bore is greater than the reference bore results, complete an investigation in accordance with the ANZECC & ARMCANZ 2000, into the potential for environmental harm and provide a written report to the administering authority within three (3) months, outlining:
 - i. details of the investigations carried out;
 - ii. details of environmental impacts observed, and
 - iii. actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with part (b) of this condition, no further reporting is required for subsequent trigger events of an equal-to or lesser extent for that quality characteristic.

- (G76) If groundwater drawdown is determined to be greater than the predicted groundwater drawdown depicted in **Figure 7 (King Vol Predicted Groundwater Drawdown and Groundwater Bore Network)**, the environmental authority holder must:
- a) notify the administering authority within 24 hours; and
 - b) conduct an investigation to establish whether any environmental harm has been caused to any groundwater dependent ecosystems or other environmental value in accordance with the ANZECC & ARMCANZ 2000 methodology and provide a written report to the administering authority within three (3) months, outlining:
 - i. details of the investigations carried out;
 - ii. details of environmental impacts observed, and
 - iii. actions taken to prevent environmental harm.
- (G77) Prior to the dewatering of groundwater below 200 meters BGL, a *Subterranean Fauna Monitoring and Management Program* must be developed by an appropriately qualified person and implemented by the environmental authority holder in accordance with the *Guideline for the Environmental Assessment of Subterranean Aquatic Fauna*.
- (G78) The *Subterranean Fauna Monitoring and Management Program* required by **condition G77** must include adequate monitoring of stygofauna in all groundwater potentially impacted by the mining activities and must achieve the following objectives:
- a) Identify and describe subterranean fauna species present;
 - b) Assess and describe predicted impacts to subterranean fauna identified;
 - c) Recommend impact mitigation and minimisation measures for the fauna identified;
 - d) Monitor and record the effects of the mining activity on the subterranean fauna species; and

- e) Recommend actions, including timeframes for implementation, to ensure that any impacts to subterranean fauna not authorised under this environmental authority, are prevented.

Water Reuse

- (G79) Contaminants may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party (with the consent of the third party).

Applicability of conditions

- (G80) Conditions G45 – G79 are only applicable to King Vol.

END OF CONDITIONS FOR SCHEDULE G

SCHEDULE H – SEWAGE TREATMENT**Sewage Treatment**

- (H1) All effluent released from the sewage treatment plants must be monitored at the frequency and for the parameters specified in Table H1 (Sewage effluent quality targets for dust suppression and irrigation).

Table H1 (Sewage effluent quality targets for dust suppression and irrigation)

Parameter	limit	Units	Limit type	Monitoring frequency
Total suspended solids	30	mg/l	4 out of 5 consecutive samples.	Six monthly
	50		Maximum	
Biological oxygen demand	20	mg/l	4 out of 5 consecutive samples.	Six monthly
	30		Maximum	
pH between	6.5	pH unit	Range	Monthly
	8.5			
Faecal coliforms	1,000	CFU/100	Median ¹	Quarterly
	4,000		Maximum	
Free residual chlorine level	0.2	mg/L	Range	Monthly
	0.7			

1 Median of at least 5 but no more than 10 consecutive samples

- (H2) Sewage effluent must not exceed sewage effluent release limits defined in Table H1 (Sewage effluent quality targets for dust suppression and irrigation).
- (H3) Sewage effluent used for dust suppression or irrigation must not cause spray drift or over spray to any odour sensitive place.
- (H4) Sewage effluent from sewage treatment facilities must be reused or evaporated and must not be directly or indirectly released to any receiving waters.

END OF CONDITIONS FOR SCHEDULE H

SCHEDULE I – DEFINITIONS

Words and phrases used throughout this Environmental Authority are defined below except where identified in the *Environmental Protection Act 1994* or subordinate legislation. Where a word or term is not defined, the ordinary English meaning applies, and regard should be given to the Macquarie Dictionary.

“acceptance criteria” means the measures by which actions implemented are deemed to be complete. The acceptance criteria indicate the success of the decommissioning and rehabilitation outcomes or remediation of areas which have been significantly disturbed by the environmentally relevant activities. Acceptance criteria may include information regarding:

- a) stability of final land forms in terms of settlement, erosion, weathering, pondage and drainage;
- b) control of geochemical and contaminant transport processes;
- c) quality of runoff waters and potential impact on receiving environment;
- d) vegetation establishment, survival and succession;
- e) vegetation productivity, sustained growth and structure development;
- f) fauna colonisation and habitat development;
- g) ecosystem processes such as soil development and nutrient cycling, and the recolonisation of specific fauna groups such as collembola, mites and termites which are involved in these processes;
- h) microbiological studies including recolonisation by mycorrhizal fungi, microbial biomass and respiration;
- i) effects of various establishment treatments such as deep ripping, topsoil handling, seeding and fertiliser application on vegetation growth and development;
- j) resilience of vegetation to disease, insect attack, drought and fire;
- k) vegetation water use and effects on ground water levels and catchment yields.

“acid mine drainage (AMD)” means any contaminated release emanating from a mining operation formed through a series of chemical and biological reaction, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining operations.

“acid rock drainage” means any contaminated release emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of the mining activity.

“AEP” means the Annual Exceedance Probability, which is the probability that at least one event in excess of a particular magnitude will occur in any given year.

“affected person” means someone whose drinking water can potentially be impacted as a result of discharges from a dam or their life or property can be put at risk due to dwellings or workplaces being in the path of a dam break flood.

“airblast overpressure” means energy transmitted from the blast site within the atmosphere in the form of pressure waves. The maximum excess pressure in this wave, above ambient pressure is the peak airblast overpressure measured in decibels linear (dBL).

“ambient (or total) noise” at a place, means the level of noise at the place from all sources (near and far), measured as the Leq for an appropriate time interval.

“annual inspection report” means an assessment prepared by a suitably qualified and experienced person containing details of the assessment against the most recent consequence assessment report and design plan (or system design plan);

- (a) against recommendations contained in previous annual inspections reports;
- (b) against recognised dam safety deficiency indicators;
- (c) for changes in circumstances potentially leading to a change in consequence category;
- (d) for conformance with the conditions of this authority;
- (e) for conformance with the ‘as constructed’ drawings;
- (f) for the adequacy of the available storage in each regulated dam, based on an actual observation or observations taken after 31 May each year but prior to 1 November of that year, of accumulated sediment, state of the containment barrier and the level of liquids in the **dam** (or network of linked containment systems);
- (g) for evidence of conformance with the current operational plan.

“annual exceedance probability” or “AEP” the probability that at least one event in excess of a particular magnitude will occur in any given year.

“appropriately qualified person” means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods or literature.

“assessed” or “assessment” by a suitably qualified and experienced person in relation to a consequence assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment:

- (a) exactly what has been assessed and the precise nature of that determination;
- (b) the relevant legislative, regulatory and technical criteria on which the assessment has been based;
- (c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- (d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

“associated works” in relation to a dam, means:

- a) operations of any kind and all things constructed, erected or installed for that dam; and
- b) any land used for those operations.

“authority” means environmental authority (mining activities) under the *Environmental Protection Act 1994*.

“BGL” means *“Below Ground Level”*.

“blasting” means the use of explosive materials to fracture:

- a) rock, coal and other minerals for later recovery; or
- b) structural components or other items to facilitate removal from a site or for reuse.

“**bunded**” means within bunding consistent with Australian Standard 1940.

“**certification**”, “**certifying**” or “**certified**” means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by this Manual, including design plans, ‘as constructed’ drawings and specifications, construction, operation or an annual report regarding regulated structures, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).

“**CFU**” means colony forming units.

“**chemical**” means:

- a) an agricultural chemical product or veterinary chemical product within the meaning of the *Agricultural and Veterinary Chemicals Code Act 1994* (Commonwealth); or
- b) a dangerous good under the dangerous goods code; or
- c) a lead hazardous substance within the meaning of the *Workplace Health and Safety Regulation 1997*; or
- d) a drug or poison in the Standard for the Uniform Scheduling of Drugs and Poisons prepared by the Australian Health Ministers’ Advisory Council and published by the Commonwealth; or
- e) any substance used as, or intended for use as:
 - i.a pesticide, insecticide, fungicide, herbicide, rodenticide, nematocide, miticide, fumigant or related product; or
 - ii.a surface active agent, including, for example, soap or related detergent; or
 - iii.a paint solvent, pigment, dye, printing ink, industrial polish, adhesive, sealant, food additive, bleach, sanitiser, disinfectant, or biocide; or
 - iv.a fertiliser for agricultural, horticultural or garden use; or
 - v.a substance used for, or intended for use for mineral processing or treatment of metal, pulp and paper, textile, timber, water or wastewater; or
 - vi.manufacture of plastic or synthetic rubber.

“**commercial place**” means a work place used as an office or for business or commercial purposes, which is not part of the mining activity and does not include employees accommodation or public roads.

“**construction**” or “**constructed**” in relation to a dam includes building a new dam and modifying or lifting an existing dam, but does not include investigations and testing necessary for purposes of preparing a design plan.

“**contaminate**” means to render impure by contact or mixture.

“**contaminated**” means the substance has come into contact with a contaminant.

“**contaminant**” A contaminant can be:

- a) a gas, liquid or solid; or
- b) an odour; or
- c) an organism (whether alive or dead), including a virus; or
- d) energy, including noise, heat, radioactivity and electromagnetic radiation; or
- e) a combination of contaminants.

“control measure” means any action or activity that can be used to prevent or eliminate a hazard or reduce it to an acceptable level.

“consequence” in relation to a structure as defined, means the potential for environmental harm resulting from the collapse or failure of the structure to perform its primary purpose of containing, diverting or controlling flowable substances.

“consequence category” means a category, either low, significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1993)*.

“dam” means a land-based structure or a void that contains, diverts or controls flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and **associated works**.

“dam crest volume” means the volume of material (liquids and/or solids) that could be within the walls of the dam at any time when the upper level of that material is at the crest level of that dam. That is, the instantaneous maximum volume within the walls, without regard to flows entering or leaving (for example, via spillway).

“design plan” is a document setting out how all identified consequence scenarios are addressed in the planned design and operation of a regulated structure.

“design storage allowance” or **“DSA”** means an available volume, estimated in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1993)* published by the administering authority, must be provided in a dam as at 1 November each year in order to prevent a discharge from that dam to an **annual exceedance probability (AEP)** specified in that Manual.

“Designer” for the purposes of a regulated dam, means the certifier of the design plan for the regulated dam.

“domestic waste” means waste, other than domestic clean-up waste, green waste, recyclable waste, interceptor waste or waste released to a sewer, produced as a result of the ordinary use or occupation of domestic premises.

“dwelling” means any of the following structures or vehicles that is principally used as a residence:

- a) a house, unit, motel, nursing home or other building or part of a building; or
- b) a caravan, mobile home or other vehicle or structure on land; or
- c) a water craft in a marina.

“effluent” treated waste water released from sewage treatment plants.

“emergency action plan” means documentation forming part of the operational plan held by the holder or a nominated responsible officer, that identifies emergency conditions that sets out procedures and actions that will be followed and taken by the dam owner and operating personnel in the event of an emergency. The actions are to minimise the risk and consequences of failure, and ensure timely warning to affected persons and the implementation of protection measures. The plan must require dam owners to annually review and update contact information when required.

“environmental authority holder” means the holder of this environmental authority.

“environmentally relevant activity” means an environmentally relevant activity as defined under Section 18 of the *Environmental Protection Act 1994* and listed under Schedule 2 of the *Environmental Protection Regulation 2008*.

“Existing structure” means a structure that was in existence prior to the adoption of this schedule of conditions under the authority.

“Extreme Storm Storage” – means a storm storage allowance determined in accordance with the criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1993)* published by the administering authority

“flowable substance” means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

“foreseeable future” is the period used for assessing the total probability of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptable probability of failure before that time.

“general waste” means waste other than regulated waste.

“hazard” in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

“hazard category” means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland (DME 1995).

“hazardous waste” means a substance, whether liquid, solid or gaseous that, if improperly treated, stored, disposed of or otherwise managed, is likely to cause environmental harm.

“hydraulic performance” means the capacity of a regulated dam to contain or safely pass flowable substances based on the design criteria specified for the relevant consequence category in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1993)*.

“infrastructure” means water storage dams, roads and tracks, buildings and other structures built for the purpose and duration of the conduct of the environmentally relevant activities, but does not include other facilities required for the long term management of the impact of those activities or the protection of potential resources. Such other facilities include dams other than water storage dams, waste dumps, voids, or stockpiles and assets, that have been decommissioned, rehabilitated, and lawfully recognised as being subject to subsequent transfer with ownership of land.

“King Vol” means the mining project located at ML20658.

“land capability” as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

“land suitability” as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

“land use” term to describe the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

“landfill” means land used as a waste disposal site for lawfully putting solid waste on the land.

“levee” means an embankment that only provides for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from releases from other works, during the progress of those stormwater or flood flows or those releases; and does not store any significant volume of water or flowable substances at any other times.

“licensed place” means the mining activities carried out at the mining tenements detailed in Table A1 (Authorised Mining Activities) (page 4) of this environmental authority.

“mg/L” means milligrams per litre.

“mandatory reporting level or MRL” means a warning and reporting level determined in accordance with the criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1993)* published by the administering authority.

“Manual” means the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1993)* published by the administering authority.

“mineral” means a substance which normally occurs naturally as part of the earth’s crust or is dissolved or suspended in water within or upon the earth’s crust and includes a substance which may be extracted from such a substance, and includes:

- a) clay if mined for use for its ceramic properties, kaolin and bentonite;
- b) foundry sand;
- c) hydrocarbons and other substances or matter occurring in association with shale or coal and necessarily mined, extracted, produced or released by or in connection with mining for shale or coal or for the purpose of enhancing the safety of current or future mining operations for coal or the extraction or production of mineral oil therefrom;
- d) limestone if mined for use for its chemical properties;
- e) marble;
- f) mineral oil or gas extracted or produced from shale or coal by in situ processes;
- g) peat;
- h) salt including brine;
- i) shale from which mineral oil may be extracted or produced;

- j) silica, including silica sand, if mined for use for its chemical properties;
- k) rock mined in block or slab form for building or monumental purposes;
But does *not* include:
 - l) living matter;
 - m) petroleum within the meaning of the *Petroleum Act 1923*;
 - n) soil, sand, gravel or rock (other than rock mined in block or slab form for building or monumental purposes) to be used or to be supplied for use as such, whether intact or in broken form;
 - o) water.

“**ML**” means megalitres.

“**mL**” means millilitres.

“**Modification or modifying**” (see definition of ‘construction’)

“**NAF waste rock**” means non-acid forming waste rock.

“**NATA**” means National Association of Testing Authorities, Australia.

“**natural flow**” means the flow of water through waters caused by nature.

“**noxious**” means harmful or injurious to health or physical well being.

“**offensive**” means causing reasonable offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive, other than trivial harm.

“**operational plan**” includes:

- (a) normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA allowance);
- (b) contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the regulated structure.

“**PAF waste rock**” means potentially acid forming waste rock and includes any mined material with the potential for nett generation of acidity; where there is uncertainty regarding the materials acid-forming potential, it must be treated as PAF waste rock until demonstrated otherwise.

“**peak particle velocity (ppv)**” means a measure of ground vibration magnitude which is the maximum rate of change of ground displacement with time, usually measured in millimetres/second (mm/s). “process water” means water used or produced during the mineral development activities.

“**predicted groundwater drawdown**” means the predicted groundwater drawdown of 0.2m in the uppermost aquifer potentiometric surface as depicted in Schedule J **Figure 7 (King Vol Predicted Groundwater Drawdown and Groundwater Bore Network)**.

‘prescribed environmental matters’ is defined in section 10 of the *Environmental Offsets Act 2014*, limited to the matters of State environmental significant listed in schedule 2 of the *Environmental Offsets Regulation 2014*.

“progressive rehabilitation” means rehabilitation (defined below) undertaken progressively or a staged approach to rehabilitation as mining operations are ongoing.

“receiving environment” means all groundwater, surface water, land, and sediments that are not disturbed areas authorised by this environmental authority.

“receiving waters” means all waters that are impacted or may be impacted by the mining activities, including groundwater.

“recommencement of mining” is any activity conducted on site that removes/extracts ore or waste rock material from ML4901, ML4911, ML4921, ML4928, ML4977, ML5176, ML5319 and/or ML20640.

“recommencement of processing” is any activity where ore is processed, crushed, treated, leached or concentrated on ML4901, ML4911, ML4921, ML4928, ML4977, ML5176, ML5319 and/or ML20640.

“Red Dome/Mungana” means the mining project located at ML4910, ML4911, ML4921, ML4928, ML4977, ML5176, ML5319 and ML20640.

“register of regulated structures” includes:

- (a) Date of entry in the register;
- (b) Name of the dam, its purpose and intended/actual contents;
- (c) The consequence category of the dam as assessed using the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (*ESR/2016/1993*);
- (d) Dates, names, and reference for the design plan plus dates, names, and reference numbers of all document(s) lodged as part of a design plan for the dam;
- (e) Name and qualifications of the suitably qualified and experienced person who certified the design plan and 'as constructed' drawings;
- (f) For the regulated dam, other than in relation to any levees –
 - i. The dimensions (metres) and surface area (hectares) of the dam measured at the footprint of the dam;
 - ii. Coordinates (latitude and longitude in GDA94) within five metres at any point from the outside of the dam including its storage area
 - iii. Dam crest volume (megalitres);
 - iv. Spillway crest level (metres AHD).
 - v. Maximum operating level (metres AHD);
 - vi. Storage rating table of stored volume versus level (metres AHD);
 - vii. Design storage allowance (megalitres) and associated level of the dam (metres AHD);
 - viii. Mandatory reporting level (metres AHD);
- (g) The design plan title and reference relevant to the dam;

- (h) The date construction was certified as compliant with the design plan;
- (i) The name and details of the suitably qualified and experienced person who certified that the constructed dam was compliant with the design plan;
- (j) Details of the composition and construction of any liner;
- (k) The system for the detection of any leakage through the floor and sides of the dam;
- (l) Dates when the regulated dam underwent an annual inspection for structural and operational adequacy, and to ascertain the available storage volume for 1 November of any year;
- (m) Dates when recommendations and actions arising from the annual inspection were provided to the administering authority;
- (n) Dam water quality as obtained from any monitoring required under this authority as at 1 November of each year.

“regulated dam” means any dam in the significant or high consequence category as assessed using the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1933) published by the administering authority.

“regulated structure” means any structure in the significant or high consequence category as assessed using the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933) published by the administering authority. A regulated structure does not include:

- a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container;
- a sump or earthen pit used to store residual drilling material and drilling fluid only for the duration of drilling and well completion activities;
- a flare pit

“regulated waste” means non-domestic waste mentioned in schedule 7 of the *Environmental Protection Regulation 2008* (whether or not it has been treated or immobilised), and includes:

- a) for an element – any chemical compound containing the element; and
- b) anything that has contained the waste.

“rehabilitation” the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land.

“residual drilling material” means waste drilling materials including muds and cuttings or cement returns from well holes and which have been left behind after the drilling fluids are pumped out.

“residual void” means an open pit resulting from the removal of ore and/or waste rock which will remain following the cessation of all mining activities and completion of rehabilitation processes.

“the holder” means the holder of this environmental authority

“release event” means a surface water discharge from water storages or contaminated areas on the licensed place.

“representative” means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activity.

“RL” means reduced level, relative to mean sea level as distinct from depths to water.

“saline mine drainage” The movement of waters, contaminated with salt(s), as a result of the mining activity.

“self sustaining” means an area of land which has been rehabilitated and has maintained the required acceptance criteria without human intervention for a period nominated by the administering authority.

“sensitive place” means:

- a) a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
- b) a motel, hotel or hostel; or
- c) an educational institution; or
- d) a medical center or hospital; or
- e) a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 1992* or a World Heritage Area; or
- f) a public park or gardens.

“significant disturbance” – includes land;

- (a) if it is contaminated land; or
- (b) it has been disturbed and human intervention is needed to rehabilitate it;
 - (i) to a state required under the relevant environmental authority; or
 - (ii) if the environmental authority does not require the land to be rehabilitated to a particular state – to its state immediately before the disturbance.

Some examples of disturbed land include:

- (a) areas where soil has been compacted, removed, covered, exposed or stockpiled;
- (b) areas where vegetation has been removed or destroyed to an extent where the land has been made susceptible to erosion; (vegetation and topsoil)
- (c) areas where land use suitability or capability has been diminished;
- (d) areas within a watercourse, waterway, wetland or lake where the mining activity occur;
- (e) areas submerged by tailings or hazardous contaminant storage and dam/structure walls in all cases;
- (f) areas under temporary infrastructure. Temporary infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after the mining activity have ceased; or
- (g) areas where land has been contaminated and a suitability statement has not been issued.

However, the following areas are not included:

- (a) areas off lease (e.g. roads or tracks which provide access to the mining lease);
- (b) areas previously significantly disturbed which have achieved the rehabilitation outcomes;
- (c) by agreement with the administering authority, areas previously significantly disturbed which have not achieved the rehabilitation objective(s) due to circumstances beyond the control of the mine operator (such as climatic conditions);
- (d) areas under permanent infrastructure. Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads

etc) which is to be left by agreement with the landowner. The agreement to leave permanent infrastructure must be recorded in the Landowner Agreement and lodged with the administering authority;

- (e) disturbances that pre-existed the grant of the tenure unless those areas are disturbed during the term of the tenure.

‘significant residual impact’ is defined in section 8 *Environmental Offsets Act 2014*.

“spillway” means a weir, channel, conduit, tunnel, gate or other structure designed to permit discharges from the dam, normally under flood conditions or in anticipation of flood conditions.

“stable” in relation to land, means land form dimensions are and will remain within tolerable limits now and in the foreseeable future. Issues to be properly considered in regard to whether or not the landform is stable include geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), erosion resistance and geochemical stability with respect to seepage, leachate and related contaminant generation.

“structure” means dam or levee.

“suitably qualified and experienced person” in relation to regulated structures means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience:

- for regulated dams, an RPEQ who is a civil engineer with the required qualifications in dam safety and dam design.
- for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments.

Note: It is permissible that a suitably qualified and experienced person obtain subsidiary certification from an RPEQ who has demonstrated competence and relevant experience in either geomechanics, hydraulic design or engineering hydrology.

“system design plan” means a plan that manages an integrated containment system that shares the required DSA volume across the integrated containment system.

“tolerable limits” means a range of parameters regarded as being sufficient to meet the objective of protecting relevant environmental values. For example, a range of settlement for a tailings capping, rather than a single value, could still meet the objective of draining the cap quickly, preventing pondage and limiting infiltration and percolation.

“trivial harm” means environmental harm which is not material or serious environmental harm and will not cause actual or potential loss or damage to property of an amount of, or amounts totalling more than \$5,000.

“µS/cm” means micro siemens per centimetre.

“void” means any constructed, open excavation in the ground.

“waste management hierarchy” has the meaning given by the Environmental Protection (Waste Management) Policy 2000.

“waste water” means used water from the activity, process water or contaminated storm water.

“watercourse” has the meaning in Schedule 4 of the Environmental Protection Act 1994 and means a river, creek or stream in which water flows permanently or intermittently—

(a) in a natural channel, whether artificially improved or not; or

(b) in an artificial channel that has changed the course of the watercourse.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

“water quality” means the chemical, physical and biological condition of water.

“waters” includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, and groundwater and any part thereof.

“wet season” means the time of year, covering one or more months, when most of the average annual rainfall in a region occurs. For the purposes of DSA determination this time of year is deemed to extend from 1 November in one year to 31 May in the following year inclusive.

END OF DEFINITIONS FOR SCHEDULE I

Figure 2a (Red Dome/Mungana - Domain Map)

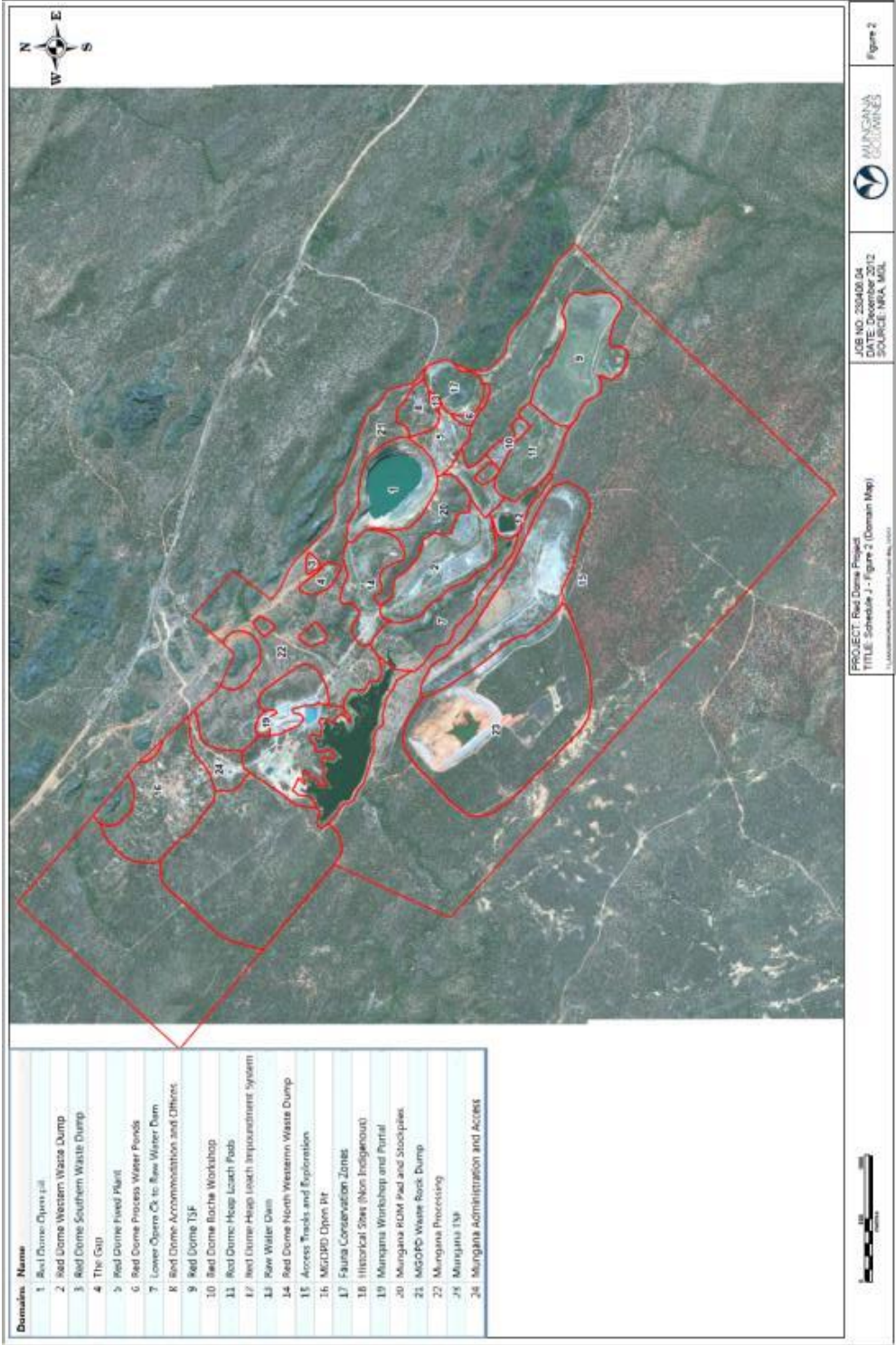


Figure 3 (Air Quality Monitoring Sites)

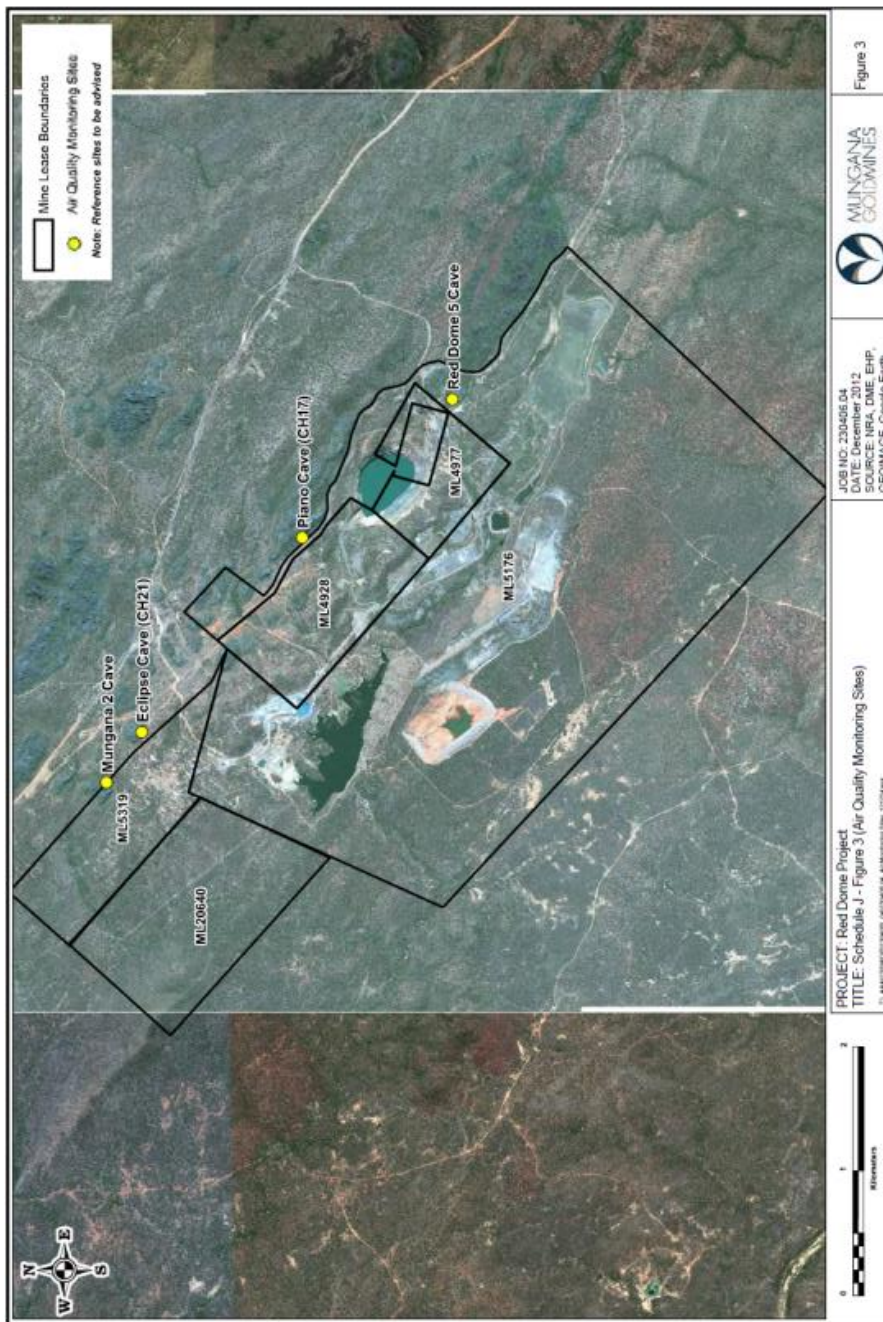


Figure 4a (Red Dome/Mungana - Groundwater Monitoring Bore Network)

Figure 4b (King Vol - Groundwater Monitoring Bore Network)

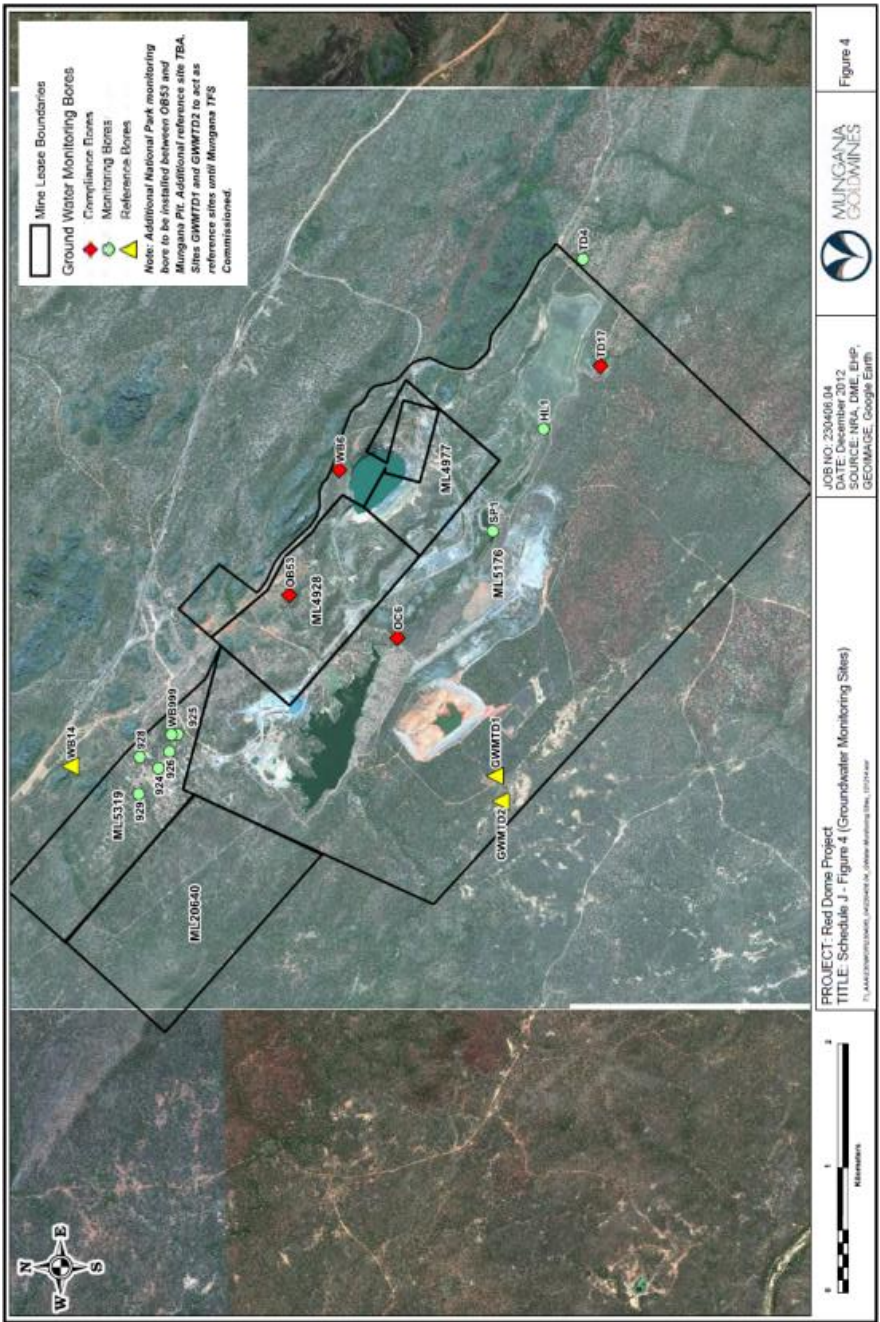


Figure 5a (Red Dome/Mungana Waste Disposal Trenches)

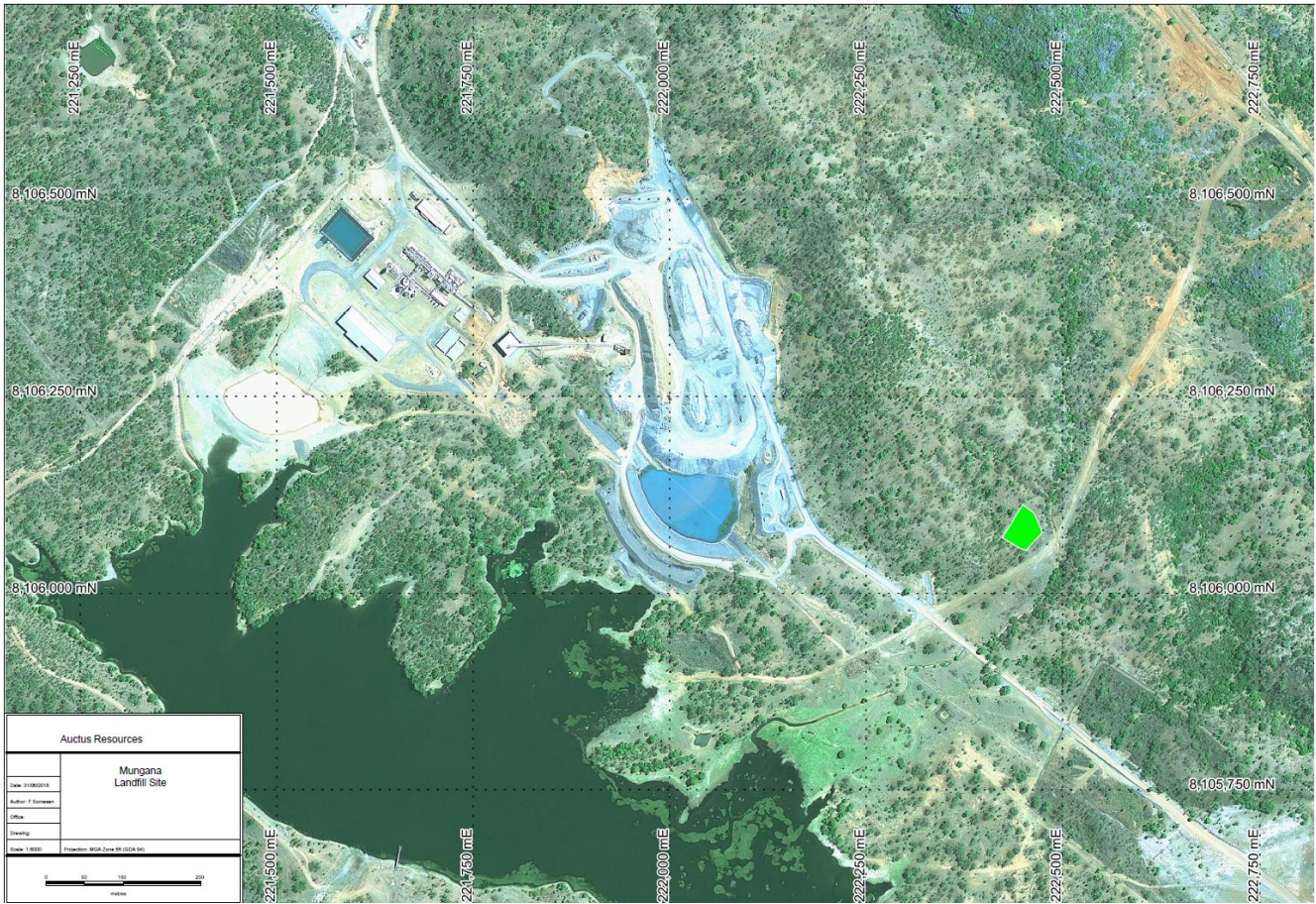


Figure 5b (King Vol Waste Disposal Trenches)

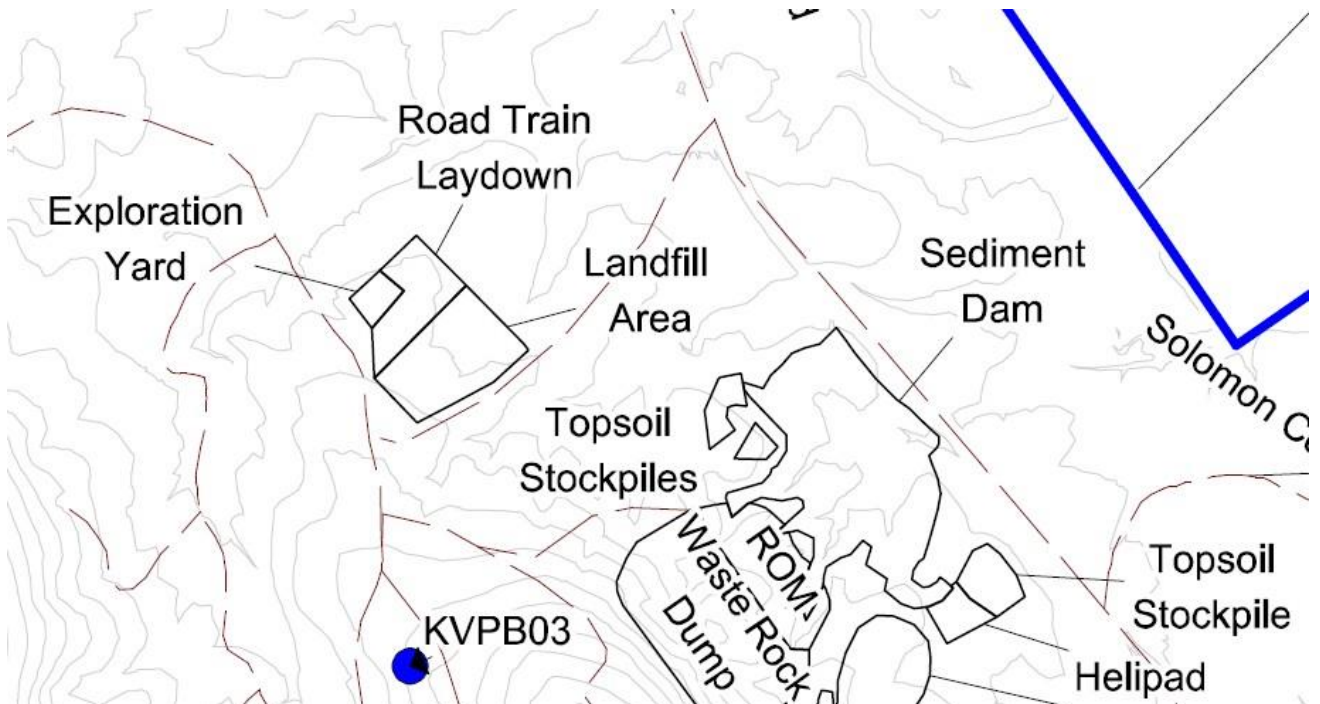
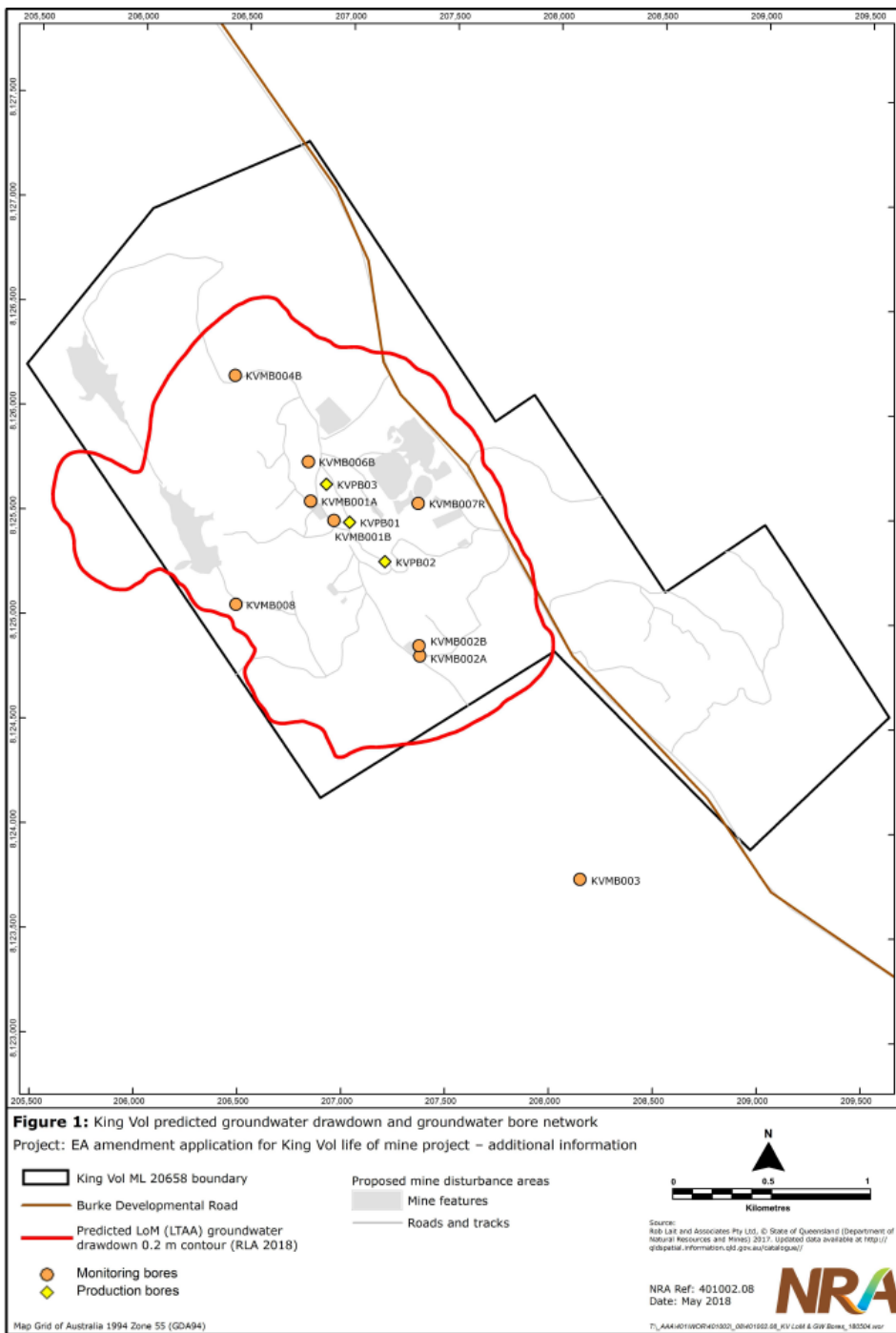


Figure 7 (King Vol Predicted Groundwater Drawdown and Groundwater Bore Network)

END OF SCHEDULE J

END OF ENVIRONMENTAL AUTHORITY