Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Proponent: Radio Gold Pty Ltd

Works Approval: L8971/2016/1

Registered office:	Level 13 52 Martin Place SYDNEY NSW 2000
ACN:	162 869 276
Premises address:	Radio Gold Mine Mining Lease M77/633 SOUTHERN CROSS WA 6426 As depicted in Schedule 1.
Issue date:	Monday 8 August 2016
Commencement date:	Monday 15 August 2016
Expiry date:	Thursday 14 August 2036

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER), has decided to issue a works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations and legal requirements and that the Licence and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by: Clarrie Green
Licensing Officer

Decision Document authorised by: Tim Gentle
Manager Licensing

Contents

1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986.* Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

2 Administrative summary

Administrative details		
Application type	Works Approval ☐ New Licence ☒ Licence amendment ☐ Works Approval amendment ☐	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	6	150 000 kL per year
Application verified Application fee paid	Date: 19/05/2016 Date: 20/06/2016	
Works Approval has been complied with Compliance Certificate received	Yes☒ No☐ N/A☐ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☐ No☒	
Commercial-in-confidence claim outcome		
Is the proposal a Major Resource Project?	Yes☒ No☐	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☐ No☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Is the proposal subject to Ministerial Conditions?	Yes☐ No☒	Ministerial statement No:

		EPA Report No:
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)?	Yes☐ No☒ Department of Water consulted Yes ☐ No ☒	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☐ No☒ If Yes include details of which EPP(s) here.		
Is the Premises subject to any EPP requirements? Yes☐ No☒ If Yes, include details here, eg Site is subject to SO_2 requirements of Kwinana EPP.		

3 Executive summary of proposal and assessment

The Radio Gold Mine is located approximately 8km northeast of Bullfinch and 40km northwest of Southern Cross. Radio Gold Pty Ltd (Radio Gold), formerly Brightsun Enterprises Pty Ltd, is planning to investigate the feasibility of recommencing mining at the historical underground Radio Gold Mine deposit, which has been operated intermittently since 1918 to 1974. Bulk samples will be trucked offsite to a third party for test work and milling. Over the approximate 6 months to 2 years life of Radio Gold Mine, sampling investigations and potential future mining will progress below the water table and dewatering will be required.

Initially 58,000 KL of water will be removed at 3,500 KL per day to allow for mining, with a continued dewater rate of 260 KL per day to maintain access. Radio Gold plan to use some dewatering effluent for mine process water and dust suppression on roads as needed during the bulk sample activities. Groundwater sampling at locations around the deposit found the water to be hypersaline, with total dissolved solids (TDS) concentrations typical for the southern Goldfields at 100,000mg/L. Water in the old open pit is fresher than regional groundwater although remains saline with samples indicating a TDS concentration of 35,541 mg/L. The pH is 6.8 and the depth to the water table is in excess of 20m.

Dewater will be pumped via an existing vertical shaft and discharged through a pipeline to a containment dam in-built to the disused Tailings Storage Facility (TSF2) located approximately 500m to the south of the Radio deposit. The containment dam was constructed under Works Approval W5793/2015/1 by shifting the tailings from the middle and pushing them to the outer walls and making a dam within a dam. A geotechnical investigation of the tailings dam was undertaken by 4DGeotechnics Pty Ltd and found it suitable to accept this dewater as long as the water does not exceed 360mRL or a 2.5 m hydraulic head. Given that the initial discharge into the tailings dam will only occur for approximately 10 weeks, and it is unlikely that a 2.5m head will be maintained.

Power generation will be provided via a 250kVA generator and the small amount of sewage generated onsite will be taken off site and disposed of in a licenced facility.

The nearest surface water is Lake Deborah 13km north and Lake Baladjie 10km west. Drainage appears to be sheet flow or infiltration to groundwater. The nearest sensitive receptors, Carinta Homestead and Ennium Station are both approximately 20km from the site.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987*, and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Licence section	**Condition number L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
Premises operation	L1.2.1 – 1.2.4	DER's assessment and decision making are provided in Appendix A.	Application supporting documentation *Environmental Protection (Unauthorised Discharges) Regulations 2004*
Emissions general	N/A	No emission conditions have been placed on the Licence.	
Point source emissions to air including monitoring	N/A	No significant point source emissions to air will occur during the discharge of dewater to the containment dam.	Application supporting documentation General Provisions of the *Environmental Protection Act 1986*.
Point source emissions to surface water including monitoring	N/A	No significant point source emissions to surface water will occur during the discharge of dewater to the containment dam.	Application supporting documentation General Provisions of the *Environmental*

DECISION TABLE			
Licence section	**Condition number L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
			Protection Act 1986.

Point source emissions to groundwater including monitoring	N/A	No significant point source emissions to groundwater will occur during the discharge of dewater to the containment dam.	Application supporting documentation General Provisions of the *Environmental Protection Act 1986*.
Emissions to land including monitoring	N/A	No specified conditions relating to point source emissions to land are included in the Licence.	Application supporting documentation General Provisions of the *Environmental Protection Act 1986*.
Fugitive emissions	N/A	<u>Emission Description</u> *Emission:* Dust is generated from movement of vehicles during operation. *Impact:* Finer dust particles have the potential to be drawn deep within the lungs which can impact the health of nearby receptors. In addition dust settling on the stomata of native vegetation may impact the plant's ability to respire and photosynthesise. *Controls:* The premises is 20 km away from the nearest sensitive receptor. Water will be used for dust suppression on haul roads and open stockpiles while vehicle speed restrictions will also continue. <u>Risk Assessment</u> *Consequence: Minor* *Likelihood: Rare* *Risk Rating: Low* <u>Regulatory Controls</u> As the risk of impacts to human health and environment are assessed as 'Low' no further conditions have been applied to minimise dust from the premises.	Application supporting documentation General Provisions of the *Environmental Protection Act 1986*.
Odour	N/A	There are no significant odour emissions as a result of dewatering operations.	General Provisions of the *Environmental Protection Act 1986*.
Noise	N/A	There are no significant noise impacts expected from the construction of the dewatering dam as the site is approximately 20 km from the nearest residence. No specified	*Environmental Protection (Noise)*

		conditions are required for the Licence.	*Regulations 1997*
Monitoring general	L2.1.1 – 2.1.3	General monitoring conditions L2.1.1 to 2.1.3 have been applied to ensure that Radio Gold conduct groundwater monitoring in accordance with Australian Standards and within timeframes that allow for accurate assessment of trends. Condition 2.1.3 requires the ongoing recording of dewatering throughputs.	N/A
Monitoring of inputs and outputs	N/A	No monitoring of inputs or outputs is required under the Licence.	N/A
Process monitoring	N/A	No process monitoring conditions are required under the Licence.	N/A
Ambient quality monitoring	L2.2.1	**Seepage to groundwater – normal operations** DER's assessment and decision making are provided in Appendix A.	Application supporting documentation
Meteorological monitoring	N/A	No meteorological monitoring is required under the Licence.	N/A
Improvements	N/A	No improvement conditions are required for the Licence. Should seepage from the containment dam present a risk to groundwater and surrounding vegetation DER reserves the right to impose improvement conditions on the Licence to reduce that risk.	N/A
Information	L3.2.1	Radio Gold will be required to submit monthly water balance data and ambient groundwater quality data within the Annual Environment Report. Further information will also need to be submitted in relation to compliance with Licence conditions.	N/A
Licence Duration	-	This Licence will be issued for a period of 20 years in line with the expiry of Mining Lease 77/633, which expires in August 2036.	N/A

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
27/06/2016	Application advertised in West Australian (or other relevant newspaper)	No comments received	N/A
27/06/2015	Application referred to interested parties listed: Shire of Yilgarn Department of Mines and Petroleum	Comment from DMP advising they are happy for the licence to be issued and that the proponent is aware they cannot commence mining until a mining proposal is approved as per obligations under the *Mining Act 1978*.	Noted.
05/08/2016	Proponent sent a copy of draft instrument	One comment received advising DER that Brightsun Enterprises Pty Ltd changed to Radio Gold Pty Ltd on 15 June 2016 along with registered addres.	Occupier name updated along with registered address.

6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

Appendix A

Discharge to land – upset conditions

Emission Description

Emission: Dewatering effluent with a salinity of approximately 35,500 mg/L Total Dissolved Solids (TDS) being discharged to land from burst/leaking pipeline or from an overflow at containment infrastructure.

Impact: Saline water discharges may result in vegetation stress or death if not contained within already disturbed areas. No declared threatened or rare flora was identified in the "2010 Botanical Survey of Radio Mine" although the pipeline and TSF do intersect a Priority Ecological Community. The vegetated area between the open pit and containment facility, immediately adjacent to the dewatering pipeline is considered to be in degraded to good condition. Therefore the consequence of vegetation death in this area is deemed to be 'Moderate'.

Controls: The inner wall has been constructed with a minimum freeboard of 500 mm from the outer TSF2 embankment to prevent an overtopping of saline water from the containment facility. A minimum freeboard of 200 mm will be maintained within the containment dam during dewatering activities. Pipelines have also been laid within bunds and will be inspected daily for leaks, reducing the likelihood of a saline discharge to adjacent native vegetation. These controls reduce the likelihood of a discharge to land during upset conditions to 'Unlikely'.

Risk Assessment

Consequence: Moderate
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory Controls

Conditions 1.2.1 and 1.2.2 mimic the infrastructure requirements of Works Approval W5793/2015/1 and require Radio Gold to ensure that containment infrastructure, including bunding, is maintained. Typically containment infrastructure used to store environmentally hazardous materials such as saline water would be required to maintain a minimum 300 mm freeboard. As the containment infrastructure is located within a TSF where tailings are of a fine particle size (less than 75 µm) and high in silt and clay content, it is considered appropriate to require a 200 mm freeboard within the containment dam. Any overflow as the result of a heavy rainfall will be captured within the TSF, which has an additional 300 mm freeboard. In such a rare occurrence the particle size and type of the uncompacted tailings surrounding the containment dam is expected to reduce the potential for significant seepage to the saline groundwater, which varies in depths lower than 20 m below ground level (mbgl).

Daily freeboard and pipeline integrity inspections are also required under condition 1.2.3 to ensure Radio Gold continue to implement proposed controls and prevent unintended discharges.

Residual Risk

Consequence: Moderate
Likelihood: Rare
Risk Rating: Moderate

Seepage to groundwater – normal operations

Emission Description

Emission: Seepage of saline dewater and leached tailings constituents to groundwater.

Impact: Leach testing of tailings suggest that iron, aluminium, nickel and cadmium will be expressed from tailings in low concentrations under the pressure of a 2.5 m hydraulic head. However, arsenic, boron and Total Cyanide concentrations are likely to be high in any seepage water and surface waters within the containment dam. Due to the high salinity of the dewater it is unlikely that it will be consumed by native fauna.

Detailed geochemical test work of the tailings material undertaken in 2010, has shown that the tailings material has a pH of 8.0 and carbonates are forming in the TSF sediments, so no further acid will be generated. Overall there appear to be no significant problems with potential for Acid and Metalliferous Drainage (AMD).

Groundwater in beneath the TSF was sampled at two northern bores that indicated high TDS (average 123,500 mg/L) as well as elevated cadmium and nickel, at levels above the non-potable groundwater use and the long-term irrigation water levels. However, the two bores south of the TSF were found to be significantly fresher (average 1,600 mg/L) with below detectable or low metals concentrations. It is likely that the differences between these bores is the result of sampling errors where stratification occurred within the monitoring bores and a fresher column was sampled at the southern bores. Assuming that this is the case it is clear that alternative groundwater uses are extremely limited and the consequence of further contaminating groundwater is 'Minor'. In addition, there are no known or expected stygofauna species in the vicinity of the tailings dam due to the high salinities and elevated cadmium/nickel concentrations.

Seepage of dewater to groundwater has the potential to increase standing water levels to within the root zone of native vegetation which would likely result in vegetation stress or death due to the high natural salinity of groundwater. Surrounding the TSF there is mostly Atriplex Open Scrub which has a shallow root system. Adjacent to the south and north of TSF2 exist numerous *Eucalyptus corrugata* which are expected to have deeper root systems (approximately 20 m for larger trees) that may be impacted by seepage. Vegetation on the west of the TSF has been assessed in a 2010 Flora Report completely degraded.

Controls: Based on Radio Golds's 2014 Seepage Analysis Report that assumed a 2.5 m hydraulic head, compacted 30 cm clayey floor made of tailings and a TSF floor achieving a permeability of 1.0×10^{-9} m/s, seepage is predicted to take 1.4 years to reach the TSF floor and a further 15.6 years for any seepage to reach the base of the TSF. As the life of mine will be between 6 months and 2 years the likelihood of seepage reaching groundwater in excess of 20 mbgl during dewater discharges is considered rare. Following the cessation of discharges the hydraulic pressure on entrained liquids in the base of the TSF will decrease and seepage will continue but at a slower rate. Based on the above assumptions the likelihood of seepage would assessed as 'Unlikely' although uncertainties relating to data not being verified post-construction increase this likelihood to 'Possible'.

Risk Assessment

Consequence: Minor
Likelihood: Possible
Risk Rating: Moderate

Regulatory Controls

Ambient groundwater quality monitoring (condition 2.2.1) will be required on a quarterly basis to ensure that groundwater is not being impacted by saline dewater or leached tailings material. In addition, a monthly water balance will need to be conducted under condition 1.2.4 to ensure that the containment dam is operating as proposed and that any unexpected seepage can be managed appropriately.

Although mounding groundwater is not anticipated under normal operating conditions using the permeability assumptions above, standing water level limits are necessary to prevent the intrusion of the vegetative root zone with saline groundwater. To adequately protect nearby Eucalyptus trees this limit has been set at 8 mbgl with the expectation that groundwater levels directly beneath the containment dam are likely to decline at distance from TSF2 and fall below the root zone at the location of the nearest Eucalyptus species. Should groundwater levels at monitoring bores approach limit levels, Brightsun will be required to either manage discharges to avoid further rises or apply to conduct seepage recovery.

Note that DER has not assessed the stability of the TSF structure. This will be assessed by the Department of Mines and Petroleum in accordance with the *Mining Act 1978* and all current guidelines relating to tailings storage facility design.

Residual Risk
Consequence: Insignificant
Likelihood: Unlikely
Risk Rating: Low