Government of Western Australia
Department of Environment Regulation

Works Approval

Environmental Protection Act 1986, Part V

Works Approval Holder: Bungaroo South Pty Ltd

Works Approval Number: W5699/2014/1

Registered office: Level 1
15 Rheola Street
WEST PERTH WA 6005

ACN: 152 574 528

Premises address: Bungaroo South Mine
Mining Tenement M47/1464 and L47/681
HAMERSLEY RANGE WA 6716
as depicted in Schedule 1

Issue date: Wednesday, 24 February 2016

Commencement date: Monday, 29 February 2016

Expiry date: Sunday, 28 February 2021

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
05	Processing or beneficiation of metallic or non-metallic ore	50,000 tonnes or more per year	8,000,000 tonnes per annual period (dry) 10,000,000 tonnes per annual period (wet)
06	Mine dewatering	50,000 tonnes or more per year	4,500,000 tonnes per annual period
54	Sewage facility	100 cubic metres or more per day	135 cubic metres per day

Conditions
This Works Approval is subject to the conditions set out in the attached pages.

Date signed: 24 February 2016
.....
Alana Kidd
Manager Licensing – Resource Industries
Officer delegated under section 20
of the *Environmental Protection Act 1986*

Works Approval Conditions

1 General

1.1 Interpretation

1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 In the Works Approval, unless the contrary intention appears:

'Act' means the *Environmental Protection Act 1986;*

'annual period' means the inclusive period from 1 July until 30 June in the following year;

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

'CEO' for the purpose of correspondence means;

Chief Executive Officer
Department Administering the *Environmental Protection Act 1986*
Locked Bag 33
CLOISTERS SQUARE WA 6850
Email: info@der.wa.gov.au;

'Commissioning' means the process of operation and testing that verifies the works and all relevant systems, plant, machinery and equipment have been installed and are performing in accordance with the design specification set out in the works approval application;

'Premises' means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

'OPF' means ore processing facility;

'Schedule 1' means Schedule 1 of this Works Approval unless otherwise stated;

'Works Approval' means this Works Approval numbered W5699/2014/1 and issued under the Act;

'Works Approval Holder' means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval; and

'WWTP' means wastewater treatment plant.

1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.

1.1.4 Any reference to a guideline or code of practice in the Works Approval means the current version of the guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guidelines or code of practice made during the term of this Works Approval.

1.2 General conditions

1.2.1 The Works Approval Holder shall construct the works in accordance with the documentation detailed in Table 1.2.1:

Table 1.2.1: Construction Requirements[1]

Document	Parts	Date of Document
Works Approval Application Form	All	5 June 2014
Works Approval Application, Iron Ore Holdings Limited, Bungaroo South Pty Ltd, Buckland Project – Bungaroo South Mine, Mine Dewatering, Wastewater Treatment Plant, Ore Processing Facilities, Class II Landfill - Rev 1	All, including Drawings and Appendices	3 June 2014
Email correspondence titled "RE: Bungaroo South Mine – application for works approval – further information required", authored by Neil Dixon of Iron Ore Holdings Ltd	All, including Attachments	23 June 2014
Email correspondence titled "FW: 151204_DER_BSM_WAA_Responses_To_Enquiries", authored by Les Purves, BC Iron Limited	All, including Attachments	4 December 2015
Email correspondence titled "160223_W5699_BSM_WA_WWTP_Operational _Water_Quality_Targets", authored by Les Purves, BC Iron Limited	All	23 February 2016

Note 1: Where the details and commitments of the documents listed in condition 1.2.1 are inconsistent with any other condition of this works approval, the conditions of this works approval shall prevail.

1.2.2 The Works Approval Holder shall commission the OPF for a period not exceeding 4 months.

1.2.3 The Works Approval Holder shall commission the dewatering infrastructure for a period not exceeding 3 months.

1.2.4 The Works Approval Holder shall commission the WWTP for a period not exceeding 3 months.

2 Emissions

2.1.1 The Works Approval Holder shall ensure that where waste is emitted to land from the emission point in Table 2.1.1 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Works Approval.

Table 2.1.1: Emissions to land

Emission point reference and location on Map of emission points	Description	Source including abatement
Irrigation Area	Treated effluent is disposed of to a 3.3 hectare irrigation area	Treated effluent from WWTP

3 Improvements

3.1.1 The Works Approval Holder shall complete the improvements in Table 3.1.1 by the date of completion in Table 3.1.1.

Table 3.1.1: Improvement program

Improvement reference	Improvement	Date of completion
IR1	The Works Approval Holder shall, prior to commencing commissioning of the OPF, submit a commissioning plan to the CEO. The commissioning plan shall include details relating to: (a) the commissioning stages and expected timescales for commissioning; (b) expected emissions and discharges during commissioning and the environmental implications of the emissions; (c) how emissions and discharges will be managed during commissioning; (d) the monitoring that will be undertaken during the commissioning period; (e) how accidents or malfunctions will be managed; (f) start up and shut down procedures; and (g) reporting proposals including accidents, malfunctions and reporting against the commissioning plan. Commissioning shall be carried out in accordance with the commissioning plan.	2 months prior to the commencement of commissioning

4 Information

4.1 Reporting

4.1.1 The Works Approval Holder shall submit a compliance document to the CEO, following the construction of the OPF, dewatering infrastructure and WWTP and prior to commissioning of the same.

4.1.2 The compliance document shall:
(a) certify that the works were constructed in accordance with the conditions of the Works Approval; and
(b) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company.

4.1.3 The Works Approval Holder shall submit a commissioning report for the OPF and WWTP, to the CEO 1 month prior to the completion of commissioning.

4.1.4 The Works Approval Holder shall ensure the report includes;
(a) a summary of the environmental performance of the facility as installed, against the design specification set out in the Works Approval application;
(b) a review of performance against the Works Approval conditions; and
(c) where they have not been met, measures proposed to meet the design specification and/or Works Approval conditions, together with timescales for implementing the proposed measures.

4.2 Notification

4.2.1 The Works Approval Holder shall ensure that the parameters listed in Table 4.2.1 are notified to the CEO and are in accordance with the notification requirements of the table.

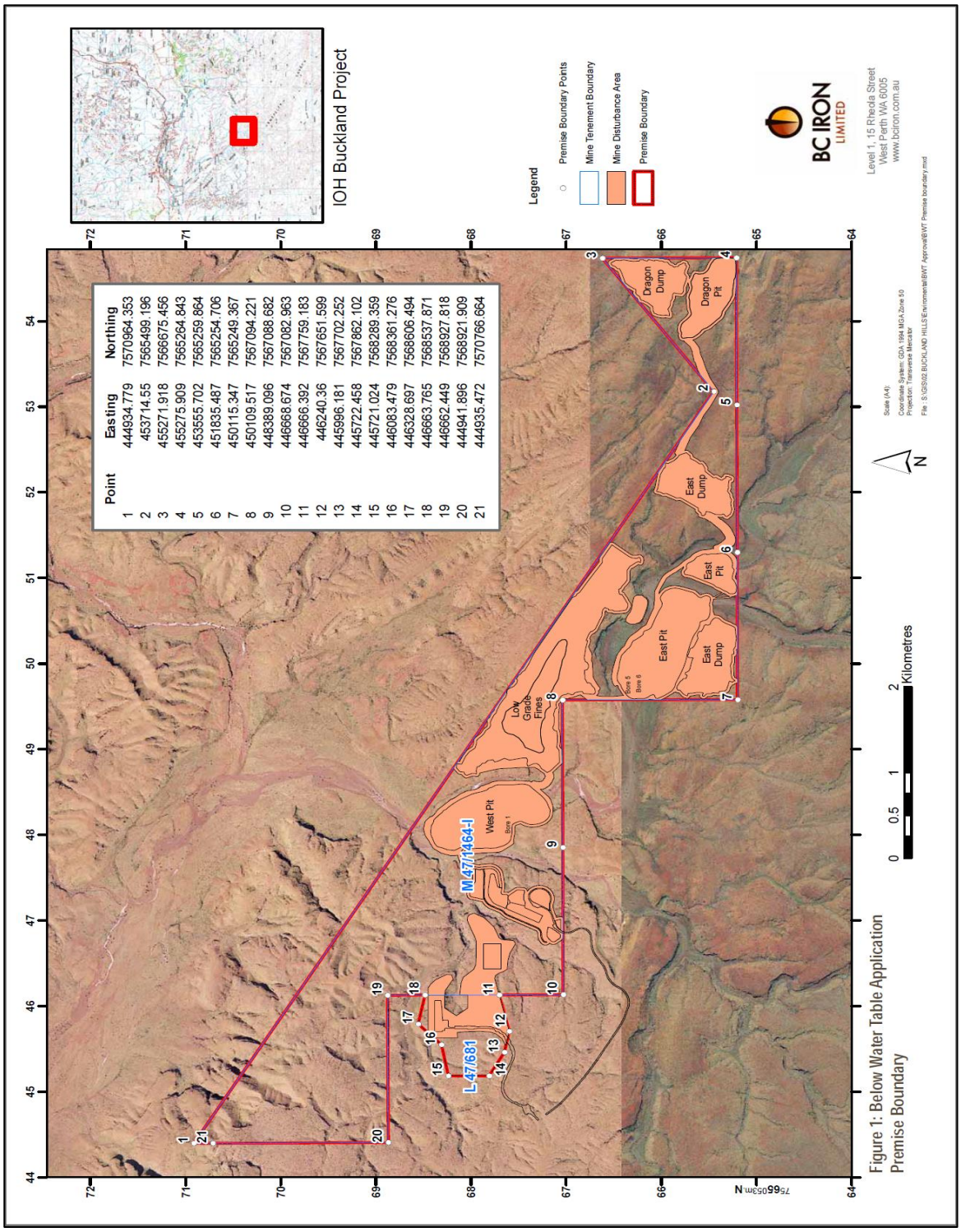
Table 4.2.1: Notification requirements

Condition or table (if relevant)	Parameter	Notification requirement	Format or form
1.2.2, 1.2.3 and 1.2.4	Commencement of commissioning	7 days prior to start	None specified
	Completion of commissioning	7 days after completion	

Schedule 1: Maps

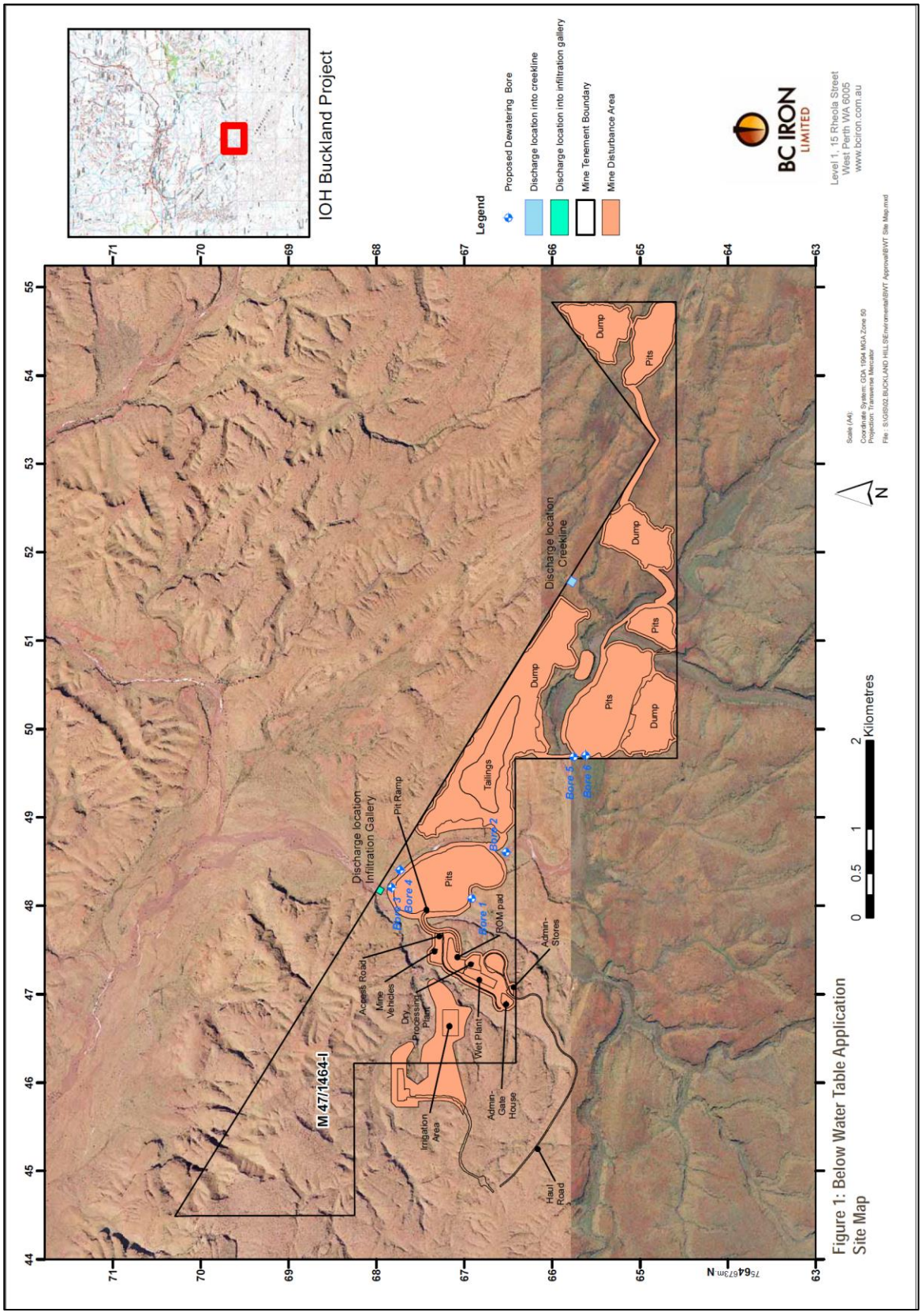
Premises map

The Premises is shown in the map below. The red line depicts the Premises boundary.



Map of emission points

The location of the emission point defined in Table 2.1.1 is shown below.



Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Proponent: **Bungaroo South Pty Ltd**

Works Approval: **W5699/2014/1**

Registered office:	Level 1 15 Rheola Street WEST PERTH WA 6005
ACN:	152 574 528
Premises address:	Bungaroo South Mine Mining Tenement M47/1464 and L47/681 HAMERSLEY RANGE WA 6716
Issue date:	Wednesday, 24 February 2016
Commencement date:	Monday, 29 February 2016
Expiry date:	Sunday, 28 February 2021

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.

Decision Document prepared by:	Carmen Standring/Sonya Poor Licensing Officer
Decision Document authorised by:	Alana Kidd Delegated Officer

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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**
	5	8,000,000 tonnes per year (dry) 10,000,000 tonnes per year (wet)
	6	4,500,000 tonnes per year
	54	135 cubic metres per day
Application verified Application fee paid	Date: 30/06/2014 Date: 18/07/2014	
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	N/A	

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: 960 EPA Report No:1496
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

Bungaroo South Pty Ltd (Bungaroo) is proposing to construct an iron ore mine the Bungaroo South Mining Project (Bungaroo Project) to include an ore processing facility (OPF), dewatering infrastructure and wastewater treatment plant (WWTP). The Bungaroo Project will be located around 45 kilometres (km) south-southeast of Pannawonica in the west Pilbara region of Western Australia. The Bungaroo Project is located within the Bungaroo Creek Water Reserve, which is a Priority 1 Public Drinking Water Supply Area (PDWSA) and the Bungaroo Creek Water Supply Borefield is located 19 km downstream of the Bungaroo Project.

OPF

Ore will be mined from three deposits, processed via the OPF and then trucked by road to the Cape Preston East Bulk Loading Facility for export to overseas customers (the Cape Preston East Bulk Loading Facility and Bungaroo Haul Road are the subject of separate works approval applications with the DER and as such will not be considered in this assessment).

The OPF will be a fixed plant consisting of a number of conveyors, crushing, washing and screening hubs. It will include both dry and wet operations, with the wet process circuit supported by a thickener/clarifier to remove waste fines from the washwater in order that the washwater can be re-used. The OPF has a design capacity of 8 million tonnes per annum (Mtpa) (dry) and 10 Mtpa (wet).

Waste Fines Storage Facility (WFSF)

For the first five to six years of wet processing at the Bungaroo Project, waste fines from the process water treatment plant will be stored in a WFSF, which will consist of two dams constructed on prepared areas to the north of the Bungaroo South Pits.

Dewatering

The Bungaroo Project will require dewatering of the Bungaroo South Channel Iron Deposits (CID) formation to access the iron ore resource. A network of dewatering bores will be installed along the CID to abstract up to 4,750,000 tonnes of water per year. Dewatered water will be used to supply the

needs of the mine, however, in the initial years, up to 4,500,000 tonnes will require disposal by infiltration back into the CID downstream of the mine. Where monitoring suggests that the infiltration process is not performing as required, discharge will occur via multiple discharge locations in minor creeklines. This is consistent with Ministerial Statement (MS) 960, which has the following dewater disposal through the water use hierarchy:

- Use on site;
- Subsurface reinjection (infiltration gallery); and
- Controlled discharge to surface drainage at multiple locations (creek lines) as a contingency measure only. Duration of surface discharge is not to exceed three months at any one time.

Bungaroo advised the Office of the Environmental Protection Authority (OEPA) via correspondence "RE: Iron Ore Holdings – Buckland Project – Ministerial Statement 960 – Water Disposal Hierarchy", dated 27 March 2015 of their intention to utilise the infiltration gallery as the preferred water disposal option. Correspondence from the OEPA dated 9 April 2015 stated that the methods proposed for surplus water disposal appeared to be consistent with the approved methods detailed in Schedule 1, Table 2 of MS 960.

WWTP

A self-contained WWTP will be constructed to treat wastewater generated from the accommodation village, Site Administration Area and Mine Service Area (office ablutions etc.). The WWTP will have a design capacity of 135 cubic metres (m^3) of wastewater, which after treatment, will be disposed of to a 3.3 hectare (ha) irrigation area located on upland areas away from the floodplain.

The proposed timeframe for the construction, commissioning and operation of the facilities is shown below in Table 1.

Table 1: Proposed timeframe for construction, commissioning and operation of the Bungaroo Project

Facility	Proposed timeframe*
OPF stage 1 (dry)	Construction – Quarter 1, 2017 Commissioning/operation – Quarter 3, 2018
Dewatering infrastructure	Construction/commissioning/operation – Quarter 1, 2017
WWTP	Construction/commissioning/operation – Quarter 2, 2017
OPF stage 2 (wet)	Construction – Quarter 4, 2019 Commissioning/operation – Quarter 3, 2020

*Subject to change

Potential emissions from construction and operation of the Bungaroo Project have been identified as fugitive dust, point sources emissions to surface water and groundwater and emissions to land. The works approval will be issued to Bungaroo for a period of 5 years. Bungaroo will need to submit compliance documents to DER after construction of the OPF, dewatering infrastructure and WWTP and apply under the *Environmental Protection Act 1986* for a licence to allow operations to commence.

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			
Works Approval / Licence section	**Condition number** **W = Works Approval** **L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
General conditions	W1.2.1 – W1.2.4. N/A.	**Construction** Condition relating to construction of the infrastructure in accordance with the supporting documents. The Bungaroo Project OPF, dewatering infrastructure and WWTP will be commissioned under the works approval. **Operation** DER's assessment and decision making are detailed in Appendix A.	General provisions of the *Environmental Protection Act 1986.* Works Approval application supporting documentation. *Environmental Protection (Unauthorised Discharges) Regulations 2004*.
Premises operation	N/A. Licence conditions.	**Construction** There are no premises operation conditions required for the works approval. **Operation** DER's assessment and decision making are detailed in Appendix B.	General provisions of the *Environmental Protection Act 1986.* Works Approval application supporting documentation. *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
Emissions general	N/A.	**Construction and Operation** There are no general emissions associated with the construction and operation of the Bungaroo Project. No general emission conditions are required to be added to the works approval or licence.	N/A.
Point source emissions to air including monitoring	N/A.	**Construction and Operation** There will be no point source emissions to air during construction and operation of the Bungaroo Project. No conditions relating to point source emissions to air or the monitoring of these emissions are required to be added to the works approval or licence.	General provisions of the *Environmental Protection Act 1986.*
Point source emissions to surface water including monitoring	N/A. Licence conditions.	**Construction** There will be no point source emissions to surface water during construction of the Bungaroo Project. No conditions are required to be added to the works approval. **Operation** DER's assessment and decision making are detailed in Appendix C.	General provisions of the *Environmental Protection Act 1986.* Works Approval application supporting documentation. *Environmental Protection (Unauthorised Discharges) Regulations 2004*. Ministerial Statement 960.
Point source emissions to groundwater including monitoring	N/A.	**Construction** There will be no point source emissions to groundwater during construction of the Bungaroo Project. No conditions are required to be added to the works approval.	General provisions of the *Environmental Protection Act 1986.* Works Approval

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
	Licence conditions.	**Operation** DER's assessment and decision making are detailed in Appendix D.	application supporting documentation. *Environmental Protection (Unauthorised Discharges) Regulations 2004*. Ministerial Statement 960.
Emissions to land including monitoring	W2.1.1. Licence conditions.	**Construction and Commissioning** Commissioning of the WWTP will be undertaken under the works approval. During this time emissions to land will occur, which will involve running wastewater through the facility to be treated, and irrigating the treated effluent to the irrigation area. A condition relating to the emission point to land has been added to the works approval. **Operation** <u>Emission Description</u> *Emission:* Treated wastewater discharged to the irrigation area. *Impact:* Contamination of surrounding land and surface water drainage systems. Potential impacts on ecology of adjacent surface water bodies from the addition of nutrients and pathogens. *Controls:* • Monitoring of the quality and volumes of treated wastewater being discharged to the irrigation area will be undertaken; • Only treated wastewater of acceptable standard (Table 2) shall be used for irrigation and only on the designated irrigation area; • The irrigation area will be designed, constructed and managed to	General provisions of the *Environmental Protection Act 1986.* Works Approval application supporting documentation. *Environmental Protection (Unauthorised Discharges) Regulations 2004*. *Environmental Protection (Controlled Waste) Regulations 2004.*

DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents

minimise the potential for surface runoff to the surrounding environment;

- The irrigation area will be located as far from the edge of the floodplain as possible and shall be bunded to prevent any surface drainage from the site;
- The irrigation system will not be operated during high rainfall events to prevent nutrient transport through surface water flow;
- The irrigation area will be fenced and sign posted as per Department of Health (DoH) guidelines; and
- The irrigation area is separated from the surrounding surface water environment (75 m from the nearest drainage line) and is 18 km from the closest Bungaroo Creek Water Supply Bores.

Table 2: WWTP operational water quality targets

Water quality parameter	Performance target
E.coli	<1,000 cfu/100 mL
Biochemical oxygen demand	<20 mg/L
Total suspended solids	<5 mg/L
Total nitrogen	<30 mg/L
Total phosphorus	<8 mg/L
pH	6.5-8.5
Turbidity	<5 NTU (95th percentile)
Disinfection	0.2-2.0 mg/L residual chlorine (tested in-situ)
Daily throughput max	135 m^3/day

Risk Assessment
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory Controls

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		A condition will be added to the licence, which will require the total volume of treated effluent discharged to the irrigation area to be recorded. Refer also to Appendix B under WWTP Regulatory Controls. Residual Risk *Consequence:* Minor *Likelihood:* Rare *Residual Risk Rating:* Low	
Fugitive emissions	N/A.	**Construction and Operation** DER's assessment and decision making are detailed in Appendix E.	General provisions of the *Environmental Protection Act 1986.* Works Approval application supporting documentation. *Environmental Protection (Unauthorised Discharges) Regulations 2004*.
Odour	N/A. N/A.	**Construction** There will be no odour emissions during construction of the Bungaroo Project. No conditions relating to odour are required to be added to the works approval. **Operation** Emission Description *Emission:* Odour from the biological breakdown of organic matter and from irrigation practices. *Impact:* Potential interference with the health, welfare, convenience, comfort or amenity of people off site.	General provisions of the *Environmental Protection Act 1986.* Works Approval application supporting documentation.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Controls: Bungaroo has committed to maintaining the WWTP in accordance with manufacturer's specifications. The WWTP will be completely enclosed and vents will be fitted with carbon filters to mitigate odour emissions. The irrigation area will be located downwind of sensitive receptors. Risk Assessment *Consequence*: Insignificant *Likelihood:* Rare *Risk Rating:* Low Regulatory Controls Odour emissions can be sufficiently regulated under section 49 of the *Environmental Protection Act 1986.* No conditions are required to be added to the licence. Residual Risk *Consequence*: Insignificant *Likelihood:* Rare *Residual Risk Rating:* Low	
Noise	N/A.	**Construction and Operation** During the construction and operation of the Bungaroo Project noise emissions should not be significant due to the appropriate setbacks from sensitive receptors and management commitments. Bungaroo has a statutory responsibility to comply with the *Environmental Protection (Noise) Regulations 1997*. No conditions relating to noise emissions are required to be added to the works approval or licence.	General provisions of the *Environmental Protection Act 1986.* Works Approval application supporting documentation. *Environmental Protection (Noise) Regulations 1997*.
Monitoring general	Licence conditions.	Conditions will be included on the licence to ensure Bungaroo complies with the Australian Standards when performing monitoring activities and that any	N/A.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		monitoring equipment is calibrated to ensure accurate results.	
Monitoring of inputs and outputs	N/A.	No conditions relating to the monitoring of inputs and outputs are required to be added to the works approval or licence.	N/A.
Process monitoring	N/A.	No conditions relating to the process monitoring are required to be added to the works approval or licence.	N/A.
Ambient quality monitoring	Licence conditions.	Bungaroo has committed to implementing a groundwater/surface water monitoring program to monitor abstracted water quality as well as depth and quality of groundwater over time. The monitoring of ambient surface water and groundwater should be adequately covered by MS 960, however DER will determine whether licence conditions relating to ambient monitoring (surface water and groundwater) are required, when the licence application is reviewed.	General provisions of the *Environmental Protection Act 1986.* Works Approval application supporting documentation. *Environmental Protection (Unauthorised Discharges) Regulations 2004*. Ministerial Statement 960.
Meteorological monitoring	N/A.	No conditions relating to meteorological monitoring are required to be added to the works approval or licence.	N/A.
Improvements	W3.1.1.	Bungaroo will need to provide a commissioning plan for the OPF, 2 months prior to the commencement of commissioning.	N/A.
Information	W4.1.1 – W4.1.4 and W4.2.1.	**Construction** Condition requiring the submission of compliance documents at the completion of construction of the OPF, dewatering infrastructure and WWTP and prior to commissioning of the same.	N/A.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
	Licence conditions.	Condition W4.1.3 requires Bungaroo to submit a commissioning report for the OPF and WWTP, 1 month prior to the completion of commissioning and condition W4.2.1 requires Bungaroo to notify the DER at the commencement and completion of commissioning for the OPF, dewatering infrastructure and WWTP. **Operation** Conditions regarding records, reporting and notification will be included on the licence.	
Works Approval Duration	N/A.	The works approval will be issued to Bungaroo for a period of five years to allow for the construction and commissioning of all infrastructures. Bungaroo are aware of their obligations to notify DER if there are any changes to the Bungaroo Project.	N/A.

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
11/08/2014	Application advertised in West Australian	No comments received	N/A
01/08/2014	Application referred to interested parties listed: • DoW • Shire of Ashburton	No comments received	N/A
23/12/2015	Proponent sent a copy of draft instrument	Comments were received on 23/02/2016. Works approval conditions W4.1.3 and W4.2.1. Decision document. The main area is the proponent's commitment to water disposal options and OEPA approval to use an infiltration gallery as the main disposal option with creek disposal as a contingency. Proponent requested via email dated 23/02/2016 that the WWTP performance targets be changed as they are too stringent and will be hard to adhere to once the WWTP is operational.	DER outlined to proponent the purpose of the conditions. Proponent decided to retain existing conditions. The only change made to the works approval instrument was to update the registered office address. Decision document updated to reference the infiltration gallery rather than subsurface reinjection. Correspondence from the OEPA dated 9 April 2015 stated that the methods proposed for surplus water disposal appears to be consistent with the approved methods detailed in Schedule 1, Table 2 of MS 960. WWTP operational water quality targets (Table 2) have been updated in line with proponent's request. The targets are still within the *National Water Quality Management Strategy, Australian Guideline for Sewerage Systems – Effluent Management* (ARMCANZ/ANZECC), 1997 and DoH *Guidelines for the Non-potable Uses of Recycled Water in Western Australia*, August 2011 for a low exposure risk level. Performance of the WWTP will be verified during commissioning and from the commissioning report required under condition W4.1.3.

6 Risk Assessment

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

Table 3: 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

General conditions

Emission Description

*Emission: S*tormwater potentially contaminated with sediment, ore, wastewater and hydrocarbons.

Impact: Contamination of surrounding land and surface water drainage systems. Possible impacts on the Bungaroo Creek Water Reserve and to the ecology of surface water from the addition of sediment, nutrients and hydrocarbons.

Controls: Stormwater

- The OPF and support areas will be located out of the creek floodplain and at least 50 metres (m) back from the edge of the mesa;
- The process area will be constructed to divert any sheet or channel flow around the site;
- The OPF area will be bunded to contain any spillages/overflows and collect incident stormwater;
- Stormwater from hardstand areas (e.g. vehicle refuelling, service and washdown areas) shall be managed separately from runoff from other areas;
- All runoff water from disturbed areas shall be collected in concrete or high density polyethylene (HDPE) lined retention ponds, sufficient to accommodate the maximum recorded rainfall intensity over a 24-hour period;
- The concrete sump shall be graded to allow for the collection of sediments and shall be designed and maintained with sufficient freeboard to accommodate a 20 year, 72-hour Average Recurrence Interval (ARI) event without overtopping;
- Retained water shall be tested and treated if necessary prior to being added to the process water circuit or used for dust suppression onsite;
- Sedimentation structures shall be fitted on any constructed drainage line prior to its discharge point to the environment. Structures should allow adequate retention time to reduce suspended sediment load prior to discharge and capacity shall be maintained through routine cleaning;
- Prior to any predicted severe storm event or cyclone, retention and sedimentation ponds shall be emptied and cleaned where possible;
- Oily water from the washdown bay and workshop areas shall be treated through systems that include adequate residence time for emulsions to break down; and
- Treated water will be stored in a lined holding tank/pond pending re-use.

Controls: Liquid chemical storage

- Storage will comply with applicable Dangerous Goods licenses or Codes of Practice;
- All minor storage will have secondary containment as per Australian Standard 1940-2001 *The Storage and Handling of Flammable and Combustible Liquids*; and
- No bulk storage facilities will be located within the Bungaroo Creek floodplain or within 30 m of the edge of the floodplain.

Risk Assessment

Consequence: Moderate
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory Controls

No conditions relating to stormwater management are required to be added to the licence. This can be sufficiently managed by Bungaroo's commitments and regulated under the *Environmental Protection Act 1986* and *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

No conditions relating to the storage of environmentally hazardous materials are required to be added to the licence. This can be adequately regulated by the *Dangerous Goods Safety Act 2004* and associated regulations.

Residual Risk
Consequence: Moderate
Likelihood: Unlikely
Residual Risk Rating: Moderate

Appendix B

Premises operation
OPF
For at least the first two and a half years, ore will be mined from above the water table and processed through a dry crushing and screening plant to produce a single 12 millimetre (mm) product (direct shipping ore). The moisture content of the ore mined from above the watertable will be approximately 9%.

To progress to mining ore below the watertable, the wet plant circuit will be added to the dry plant circuit once required, and will consist of two wet scrubbers (to remove gangue clay material from the ore) and a secondary wet double deck vibrating banana screen. A classification (de-sliming) and thickening installation will process ore from the secondary wet screening stream to separate ore and fines. Ore product discharged from the de-slime circuit cyclones will be dewatered to less than 12% moisture prior to being mixed with minus 12 mm product from secondary and tertiary screens, and will then be sent to the product stockpile at a combined moisture content of less than 10%.

The overflow from the de-sliming cyclones will contain around 9.5% solids (waste fines), which is then fed into the waste thickener, where a flocculant is added. Thickened fines (around 55% solids) will then be sent to a pumping tank for mixing with other lower solids content waste streams, such as process area sumps and overflows, prior to being pumped to the WFSF or backfill area. Overflow water will be sent to the process water pond for recycling.

WFSF
For the first five to six years of wet processing at the Bungaroo Project, waste fines from the process water treatment plant will be stored in a WFSF, which will consist of two dams constructed on prepared areas to the north of the Bungaroo South pits. A two pond system will enhance consolidation and drying of the fines, as well as reduce embankment heights required. Design of the two dams will comply with the *Mines Safety and Inspection Act 1994*, the Department of Mines and Petroleum, *Code of Practice for Tailings Storage Facilities in WA* (2013), the Department of Water (DoW), Water Quality Protection Guidelines and relevant ANCOLD guidelines and Australian Standards.

Once mining in the western pit is completed, waste fines from the OPF will then be disposed of to the pits as backfill in combination with waste rock. Waste fines from the WFSF will also be used to backfill the Bungaroo South pits, once contents have dried sufficiently to allow handling.

Emission Description
Emission: Overflow of tailings from WFSF or seepage to groundwater.

Impact: Contamination of surrounding land or groundwater from tailings seepage and mounding.

Controls:
- Combined capacity of the two dams will be sufficient to accommodate five years generation of fines with an additional one-year volume as a contingency, as well as freeboard and additional allowances for flood protection and earthquake hazard;
- The design storage allowance will be sufficient to accommodate the following:
  - The 100-year ARI wet season runoff (no evaporation, runoff coefficient being 1 and 70% of annual rainfall), which equates to 253 mm; and
  - The 100-year ARI, 72-hour cyclone event, which equates to 5.26 mm per hour over 72 hours or 379 mm
- An emergency spillway will be included in each embankment design;

- The height between the base of the spillway and the crest of the dam wall will be a minimum of 1 m (as a safeguard to accommodate settling or slumping for seismic events), with a minimum freeboard above the maximum operating level of the pond;
- The decant system to collect and return supernatant to the process water circuit for re-use has been designed to accommodate the rate of return flows, including the majority of rainfall;
- Any infiltration will be captured at the base of each valley in interception trenches or, as groundwater, which will flow towards the sites dewatering bores; and
- Seepage through the wall will be collected in toe drains and will along with any leachate recovered in the interception trenches, be monitored and pumped to the decant system for return to the process water circuit.

Risk Assessment
Consequence: Moderate
Likelihood: Possible
Risk rating: Moderate

Regulatory Controls
Conditions will be applied to the licence for the WFSF including containment infrastructure requirements, freeboard condition, inspection of infrastructure and an annual water balance.

Residual Risk
Consequence: Moderate
Likelihood: Unlikely
Residual Risk rating: Moderate

WWTP
A self-contained WWTP will be constructed to treat wastewater generated from the accommodation village. It will also receive sullage from the Site Administration and Mine Service Areas (via tanker). The wastewater will be treated to a tertiary level and held following chlorination pending disposal to a designated irrigation area (refer to Emissions to Land).

Emission Description
Emission: Untreated sewage gaining access to the environment.

Impact: Contamination of surrounding land and surface water drainage systems and potential impacts on the ecology of land and surface water from the addition of nutrients.

Controls:
- The WWTP is designed not to discharge any liquids to the environment under any operating conditions and includes provisions to retain likely spillages, such as those arising during maintenance operations and potential plant upset conditions;
- The WWTP will be fenced using 1.8 m high chain-link and will be fitted with red warning lights visible from all points around the fence line to indicate a system failure, tank high level or other fault;
- The WWTP will be equipped with a 200 m^3 holding tank to store treated effluent (approximately 1.5 days capacity) prior to irrigation and will be fitted with level indicators and alarms; and
- All sludge and other solid materials removed from the WWTP shall be transported offsite by a licensed contractor for disposal to an appropriately licensed facility.

Risk Assessment
Consequence: Insignificant
Likelihood: Rare
Risk Rating: Low

Regulatory Controls
Conditions will be added to the licence requiring the WWTP treated effluent to be monitored for Biochemical Oxygen Demand, Total Suspended Solids, pH, Total Nitrogen, Total Phosphorus and *E.coli* on a quarterly basis.

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

Appendix C

Point source emissions to surface water including monitoring
Where monitoring suggests that the infiltration gallery is not performing as required, discharge will occur via multiple discharge locations in minor creeklines. This system will consist of one or more pipelines running along the premises boundary with valved connections to discharge into the north facing steep rocky hillside watercourses.

Emission Description
Emission: Dewatered water to be discharged to multiple locations along minor creeklines within the Bungaroo Project (this is the contingency option if the infiltration gallery is not performing as required).

Impact: Scouring / erosion of creek banks and beds. The disposal of surplus mine dewater has the potential to impact the quality of surface water and groundwater downstream, specifically the Bungaroo Creek Water Supply Borefield, located 19 km downstream of the project area. Potential impacts to native vegetation from the extended presence of water in naturally ephemeral creeklines.

Controls: Discharge would be designed to meet the following objectives and criteria:
- At a rate that does not result in excessive erosion of the receiving drainage lines;
- Minimisation of the wetting front and associated soil waterlogging and vegetation change;
- No permanent or semi-permanent pooling of water around the discharge points or lower down the creekline;
- For a maximum of three months each year for any one drainage line; any increase beyond this timeframe would be preceded by a condition assessment of the receiving environment;
- Multiple discharge locations will be used on a rotating basis to reduce the potential for scouring and erosion;
- Discharge water quality criteria will be met to ensure surface water and groundwater quality in the area is not compromised; and
- Disposal to surface water systems will only ever be a temporary action until the infiltration gallery is reinstated.

Risk Assessment
Consequence: Minor
Likelihood: Possible
Risk Rating: Moderate

Regulatory Controls
A condition will be added to the licence for the emission discharge location. Bungaroo will be required to monitor the discharge locations for pH, Electrical Conductivity (EC) and record the volume of water discharged through this point.

The monitoring of surface water should be adequately covered by MS 960, though DER may still place conditions onto the licence relating to the monitoring of point source emissions to surface water.

Residual Risk
Consequence: Minor
Likelihood: Possible
Residual Risk Rating: Moderate

Appendix D

Point source emissions to groundwater including monitoring

Mining below the watertable can only proceed by dewatering of the CID aquifer intersected by the Bungaroo South pits. Dewatering would proceed at a rate of up to 4.75 gigalitres per annum (GL/a), which will occur mostly over the first five years of mining. However, recharge of the CID aquifer may occur following significant rainfall and dewatering would recommence as a result, continuing until the water level was once again below the base of the pit.

During the first five years, dewatering volumes will far exceed site water requirements and this surplus water will require disposal to the surrounding environment, using the option of recharging the groundwater table down gradient of the mining area via an infiltration gallery. Dewatering of the CID will be undertaken via a network of dedicated bores constructed along the perimeter of the western and eastern pits.

As a contingency, should the infiltration gallery not be performing as required, discharge of the dewatered water (which would have been infiltrated) will occur via multiple discharge points into minor creeklines (refer to Appendix C). The contingency disposal system will not be used permanently in place of the infiltration gallery.

The groundwater in the CID aquifer is fresh (EC < 700 microSiemens per centimetre) with a neutral to slightly alkaline pH. Given that dewatering will abstract water from the same aquifer it is recovered from, the quality of the infiltrated water is expected to be consistent with the receiving environment.

Water supply requirements (construction and operation) are expected to be up to 1.36 GL/a for processing, dust suppression and potable water supply. Raw water for the Bungaroo Project will be sourced from dewatering bores. Water will be pumped to a central storage tank for process and general use. Distribution will be via pumps and a steel and HDPE pipe network. The water table at this location is about 25-30 m below the ground level in a deep bed of alluvium, overlying CID. The system will consist of the following components:

- A balance tank and pipeline, designed and situated to produce a head loss large enough to ensure a positive pressure is maintained at the headworks and therefore prevent air entrainment into the aquifer during system operation;
- An in-line flow and quality (pH and EC) monitoring system;
- A constructed infiltration area consisting of trenches or sumps (infiltration gallery) located to maximise disposal volumes without compromising the environmental objectives; and
- A network of groundwater monitoring bores.

Emission Description

Emission: Discharge of excess dewater via infiltration to the underlying local aquifer, which is located within the Bungaroo Creek floodplain to reduce recirculation of water back into the pits.

Impact: Potential contamination of aquifer / groundwater should dewatered water become contaminated as a result of mining activities. Possible contamination of the PDWSA.

Controls:

- Only water direct from the dewatering bores and of acceptable quality shall be disposed to the infiltration gallery;
- Groundwater bores shall not be operated during recharge (flow) events; and
- In the event of the infiltration system or area becoming unworkable, surplus dewater will be directed to a number of contingency surface discharge points.

Risk Assessment
Consequence: Moderate
Likelihood: Possible
Risk Rating: Moderate

Regulatory Controls
A condition will be added to the licence for the infiltration gallery emission location. Monitoring conditions will be implemented to record the volume of water discharged via infiltration.

The monitoring of groundwater should be adequately covered by MS 960, though DER may still place conditions onto the licence relating to the monitoring of point source emissions to groundwater.

Residual Risk
Consequence: Moderate
Likelihood: Possible
Residual Risk Rating: Moderate

Appendix E

Fugitive emissions
Dust
Emission Description
Emission: Dust emissions are expected from the clearing and earthworks associated with construction of the OPF and the WWTP. Dust emissions may also be generated during commissioning and operation of the OPF, while crushing and screening ore.

Impact: Deterioration of local air shed. Dust emissions can be harmful to human health and the environment. Elevated Total Suspended Particulates (TSP) can impact ambient environmental quality resulting in amenity impacts and can smother vegetation. Particulate matter that is less than 10 (PM_{10}) or 2.5 ($PM_{2.5}$) micrometres in diameter can be drawn deep into the lungs causing human health impacts. The chemical and physical properties of the particles, the size of the particles and the duration of exposure are all factors, which have been linked to human health impacts. Those most at risk are the elderly, children and those with existing ailments.

Controls: Bungaroo has committed to implementing the following dust abatement measures during construction and operation phases:
- Minimising cleared areas;
- Restricting vehicle movements to designated areas and implementing speed limits to reduce potential for significant dust emissions;
- Use of a water cart onsite to apply water when earthworks are occurring and during windy conditions;
- Ensuring the ore is maintained at an optimal moisture content of around 9%;
- OPF to be fitted with dust mitigation measures such as sprayers at transfer points and utilising screens/enclosures to capture dust emissions when crushing ore;
- Crushing and screening of ore will be undertaken within crushing and screening houses designed to capture dust emissions; and
- The OPF will be situated approximately 700 m from the accommodation units to further minimise potential dust impacts.

Risk Assessment
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory Controls
Fugitive emissions of dust can be sufficiently regulated under section 49 of the *Environmental Protection Act 1986* and *Environmental Protection (Unauthorised Discharges) Regulations 2004.* No conditions are required to be added to the works approval or licence.

Residual Risk
Consequence: Minor
Likelihood: Unlikely
Residual Risk Rating: Moderate

Light
Light emissions should not be significant. The WWTP will be located away from the accommodation area and there are no other sensitive receptors in the vicinity of the WWTP. The design of the OPF is such that light spill to the surrounding environment will be minimised as far as practicable.