Government of Western Australia
Department of Environment Regulation

Works Approval

Works Approval Number	W6002/2016/1
Works Approval Holder	Gold Road Resources Limited
Works Approval Holder ACN Number	109 289 527
Registered business address	Level 2, 26 Colin Street WEST PERTH WA 6005
Address for notifications	PO Box 1157 WEST PERTH WA 6872
Duration	**Commencement date** 04/02/2017 **Expiry Date** 03/02/2020
Prescribed Premises	Category 5 – Processing or beneficiation of metallic or non-metallic ore Category 52 – Electric power generation Category 64 – Class II putrescible landfill site Category 73 – Bulk storage of chemicals, etc. Category 85 – Sewage facility
Premises	Gruyere Gold Project Mining tenement M38/1267 COSMO NEWBERY WA 6440

This Works Approval is granted to the Works Approval Holder, subject to the following conditions, on 03/02/2017, by:

Date signed: 3 February 2017
Danielle Eyre
Senior Manager, Industry Regulation (Resource Industries)
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Premises Description

The ***Works Approval Holder*** is proposing to develop an open pit mining operation to extract and process gold from the Gruyere deposit, with ore being processed on site.

The ***Works Approval Holder*** will be carrying out activities at the ***Premises*** which fall within *Category 5 – Processing and beneficiation of metallic or non-metallic ore, Category 52 – Electric power generation, Category 64 – Class II putrescible landfill site, Category 73 – Bulk storage of chemicals, etc.* and *Category 85 – Sewage facility*, and as such the ***Premises*** is deemed a Prescribed Premises under the ***EP Act***.

Conditions

Environmental compliance

1. The ***Works Approval Holder*** must comply with the ***EP Act*** and all regulations prescribed under the EP Act applicable to the Premises including:

(a) The duties of an occupier under s 61;

(b) The duty to notify the ***CEO*** of ***discharges*** of waste under s 72; and

(c) Not causing, or doing anything that is likely to cause, an offence under the ***EP Act***,

except where the ***Works Approval Holder*** does something in accordance with a ***Condition*** which expressly states that a defence under s 74A of the ***EP Act*** may be available.

Premises

2. The ***Works Approval Holder*** must carry out the Works within the ***Premises*** in accordance with the requirements set out in Schedule 2.

3. This ***Works Approval*** applies to the ***Premises*** defined in the *Premises Description* Table, and as depicted in the Premises Map in Schedule 1.

Premises Description
Legal land description, reserve or tenement (all or part)
Mining tenement M38/1267 (all)

Location of Works

4. The ***Works Approval Holder*** must locate the Works generally in accordance with the Site Plans in Schedule 3.

Infrastructure and Equipment

5. Key items of infrastructure which are required to be built are listed in the *Infrastructure Requirements Table*. The ***Works Approval Holder*** must not depart from the requirements specified in column 2 of the Infr*astructure Requirements Table* except:

(a) where such departure is minor in nature and does not materially change or affect the infrastructure; or

(b) where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment;

and all other ***Conditions*** in this ***Works Approval*** are still satisfied.

Infrastructure Requirements	
Infrastructure	Requirements (Design and Construction)
Diversion bunds and culverts	- Constructed to separate clean and potentially contaminated water
All water storage ponds	- Lined and freeboard markers installed
Oil water separation system	- Constructed within a bunded area - Constructed to treat all stormwater and wastewater likely to be contaminated with hydrocarbons
All ore processing activities	- Contained within bunded areas and constructed to drain to sumps with recovery pumps
Bulk Fuel Storage Facility	- Located on concrete or ***HDPE*** lined pads - Bunded - Constructed to drain to a sump - Equipped with overfill detection systems
Power station day tank, waste oil tank and lubricants	- Located in bunded areas which meet the requirements of ***AS 1940***
Diesel generators	- Sited within impermeable compounds
Transformer stations	- Located in bunded areas which meet the requirements of ***AS 1940, AS 2067*** and ***AS/NZS 3007***
Reagent area	- Constructed with a sump pit to collect spills
Hydrocarbons and chemical storage areas	- Designed and constructed in accordance with ***AS 1940*** and ***AS 1692***
All pipelines (raw water, potable water, effluent and treated effluent, process and brine)	- ***HDPE*** with welded joints - Incorporate isolation valves - Located within an earthen bund or buried to a depth of 600mm - Buried pipelines signposted - Sumps located at low points along the pipeline route
TSF	- Designed to contain rainfall associated with a 1 in 100 year, 72 hour average recurrence interval event - Cut-off trench with a 4m base width excavated beneath the

Infrastructure Requirements	
Infrastructure	Requirements (Design and Construction)
	perimeter embankment and backfilled with compacted clayey mine waste - Trench excavated to a nominal depth of 1m to 1.5m (below prepared surface) with side cut batters of 1:1 (V:H)
Monitoring bores	- Eight groundwater monitoring bores constructed at the following locations: TSFM1 585428N 6905573E TSFM2 586120N 6905229E TSFM3 584710N 6905344E TSFM4 586596N 6904144E TSFM5 585974N 6903427E TSFM6 585459N 6903560E TSFM7 586105N 6903905E TSFM8 586374N 6904589E
Underdrainage	- Underdrainage piping system around the perimeter of the embankment upstream toe - Underdrainage piping network around the decant structure - Underdrainage lines to comprise slotted pipe covered in aggregate and wrapped in geotextile, stabilised with select rock-fill - Underdrainage system designed for total maximum flow of 9.5L/s or 820m^3/day - Sump sized to have a full storage capacity of 820m^3/day and located immediately adjacent to the upstream embankment toe
Pipelines	- Process pipelines (tailings and return water) fitted with flow and leak detection sensors - Slurry pipeline to have flanges at approximately 60m intervals
Landfill	- Landfill trench surrounded by an earthen bund of approximately 1m in height - Fenced - 3m firebreak
WWTP	- Containerised with external pump skids and tanks - Designed and constructed to meet the following emission standards: (i) Biochemical Oxygen Demand <20mg/L (ii) Total Suspended Solids <10mg/L

Infrastructure Requirements	
Infrastructure	Requirements (Design and Construction)
	(iii) Total Nitrogen <30mg/L (iv) Total Phosphorus <8mg/L (v) Turbidity <5NTU (vi) Chlorine Residual >0.2-2mg/L (vii) pH 6.5-8.5 pH units (viii) E.coli <10cfu/100mL - Fenced and appropriately signposted
Spray field	- Fenced and appropriately signposted

6. Subject to Condition 7, on completion of the Works, the ***Works Approval Holder*** must provide to the ***CEO*** engineering or building certification from a suitably qualified professional confirming each item of infrastructure or component of infrastructure specified in column 1 with the requirements specified in column 2, as set out in the *Infrastructure Requirements Table*, have been constructed with no material defects.

7. If any departures to the specified Works have occurred, the ***Works Approval Holder*** must provide the ***CEO*** with a list of departures which are certified as complying with Condition 5 at the same time, and from the same engineer, as the certification under Condition 6.

Records and Information

8. The ***Works Approval Holder*** must maintain accurate records including information, reports and data in relation to the Works.

9. All information and records required under this ***Works Approval*** must:

(a) be legible;

(b) if amended, be amended in such a way that the original and subsequent amendments remain legible or are capable of retrieval; and

(c) be retained for 6 years after the expiry of this ***Works Approval***.

Reports

10. If requested by the ***CEO*** from time to time, the ***Works Approval Holder*** must provide the ***CEO*** with reports or information relating to the Works, the ***Premises*** or any ***condition*** in this ***Works Approval*** (including data from any monitoring conditions or environmental risk assessment studies).

11. Reports or information must be in such form as the ***CEO*** may require in a ***CEO Request***.

Requests for Information

12. The ***Works Approval Holder*** must comply with a ***CEO Request***, within 7 days from the date of the ***CEO Request*** or such other period specified in the ***CEO Request***.

Definitions and Interpretation

Definitions

In this Works Approval, the following terms have the following meanings:

AGL means Above Ground Level.

AS 1692 means the Australian Standard AS 1692-2006 Steel tanks for flammable and combustible liquids.

AS 1940 means the Australian Standard AS 1940-2004 The storage and handling of flammable and combustible liquids.

AS 2067 means the Australian Standard AS 2067-2008 Substations and high voltage installations exceeding 1 kV a.c.

AS/NZS 3007 means the Australian/New Zealand Standard AS/NZS 3007:2013 Electrical equipment in mines and quarries-Surface installations and associated processing plant.

CEO for the purposes of notification means:

Chief Executive Officer
Department of Environment Regulation
Locked Bag 33 Cloisters Square
Perth WA 6850
info@der.wa.gov.au

CEO Request means a request made by the CEO to the Works Approval Holder in writing, sent to the Works Approval Holder's address for notifications, as described at the front of this Works Approval, in relation to:

(a) information, records or reports in relation to specific matters in connection with this Works Approval including in relation to compliance with any conditions and the calculation of fees (whether or not a breach of condition or the EP Act is suspected); or

(b) reporting, records or administrative matters:

  (i) which apply to all Works Approvals granted under the EP Act; or

  (ii) which apply to specified categories of Works Approvals within which this Works Approval falls.

cfu/100mL means colony-forming units per 100 millilitres.

Condition means a condition to which this Works Approval is subject under s 62 of the EP Act.

discharge has the same meaning given to that term under the EP Act and, in relation to waste or other matter, includes deposit it or allow it to escape, or cause or permit it to be, or fail to prevent it from being, discharged, deposited or allowed to escape.

EP Act means the *Environmental Protection Act 1986* (WA).

HDPE means high density polyethylene.

LPG means Liquefied Petroleum Gas.

NTU means Nephelometric Turbidity Units.

Premises refers to the premises to which this Works Approval applies, as specified at the front of this Works Approval and as shown on the map in Schedule 1 to this Works Approval.

TSF means Tailings Storage Facility.

WWTP means Wastewater Treatment Plant.

Works Approval refers to this document, which evidences the grant of Works Approval by the CEO under s 57 of the EP Act, subject to the conditions.

Works Approval Holder refers to the occupier of the Premises being the person to whom this Works Approval has been granted, as specified at the front of this Works Approval.

Interpretation

In this Works Approval:

(a) the words 'including', 'includes' and 'include' will be read as if followed by the words 'without limitation';

(b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

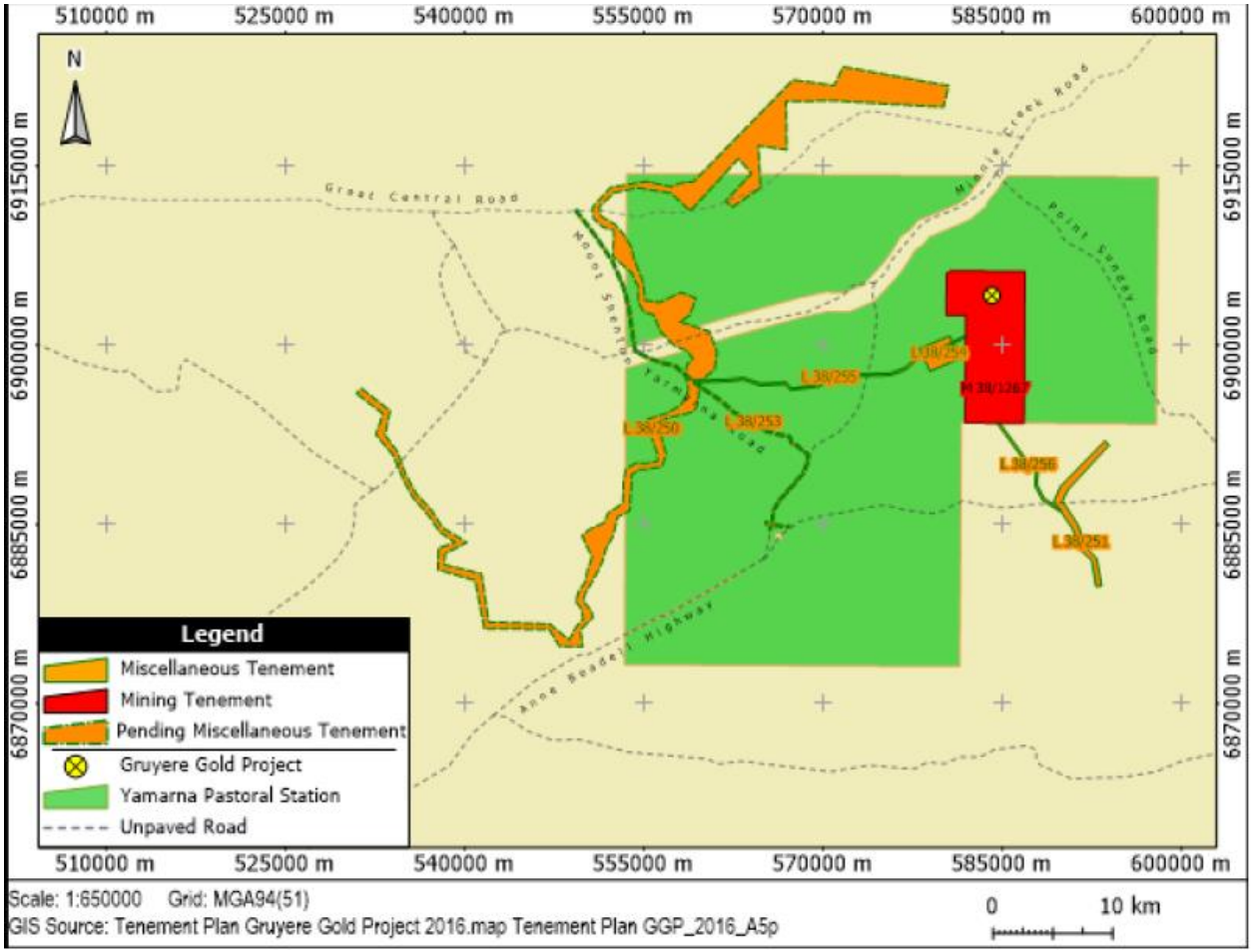
(c) where tables are used in a Condition, each row in a table constitutes a separate Condition; and

(d) any reference to an Australian or other standard, guideline or code of practice in this Works Approval means the version of the standard, guideline or code of practice in force at the time of granting of this Works Approval and includes any amendments to the standard, guideline or code of practice which may occur from time to time during the course of the Works Approval.

Schedule 1: Maps

Premises Map

The ***Premises*** is shown in the map below. The shaded red area depicts the boundary to the ***Premises***.



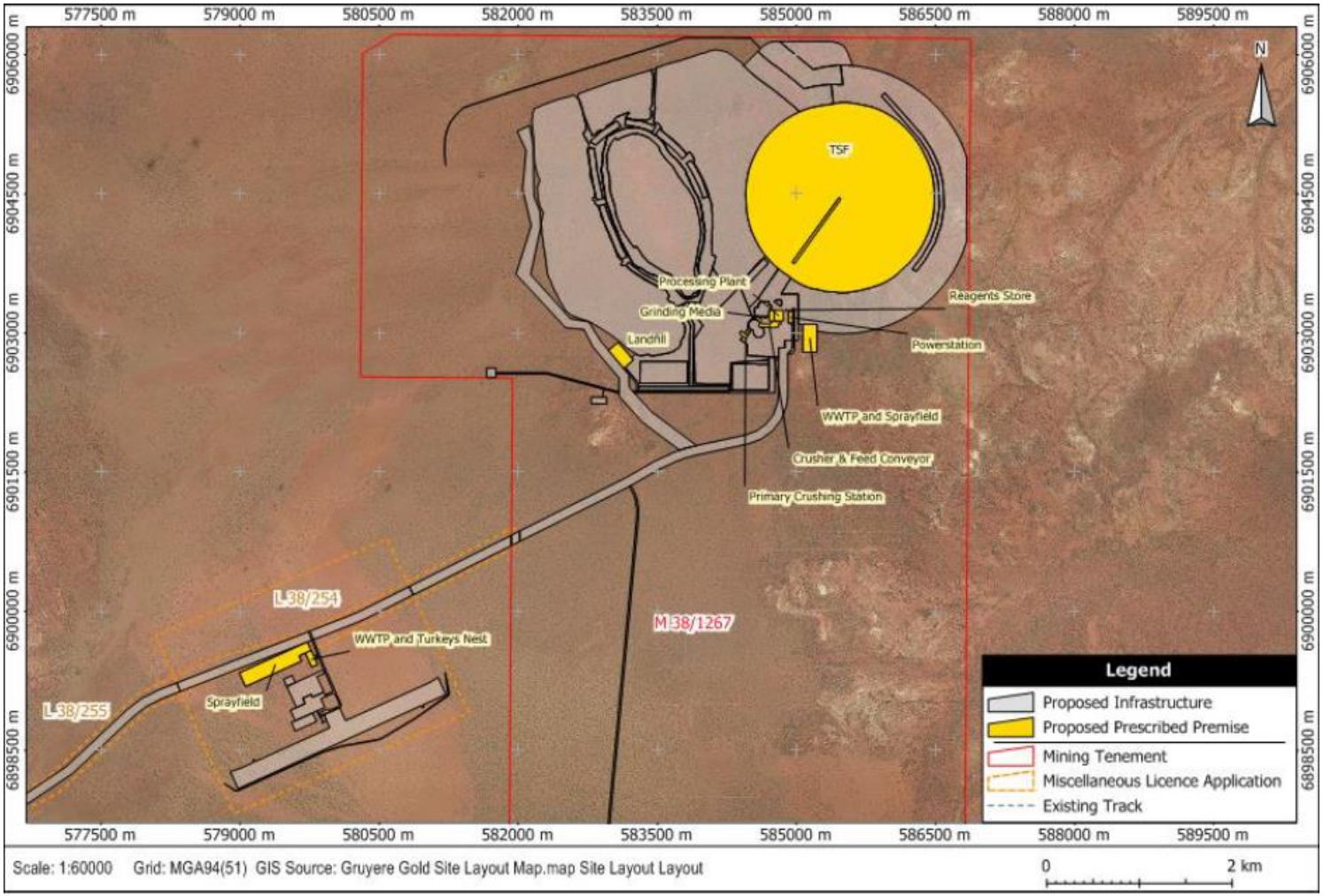
Schedule 2: Works

The Works to be carried out on the Premises are specified in the table below:

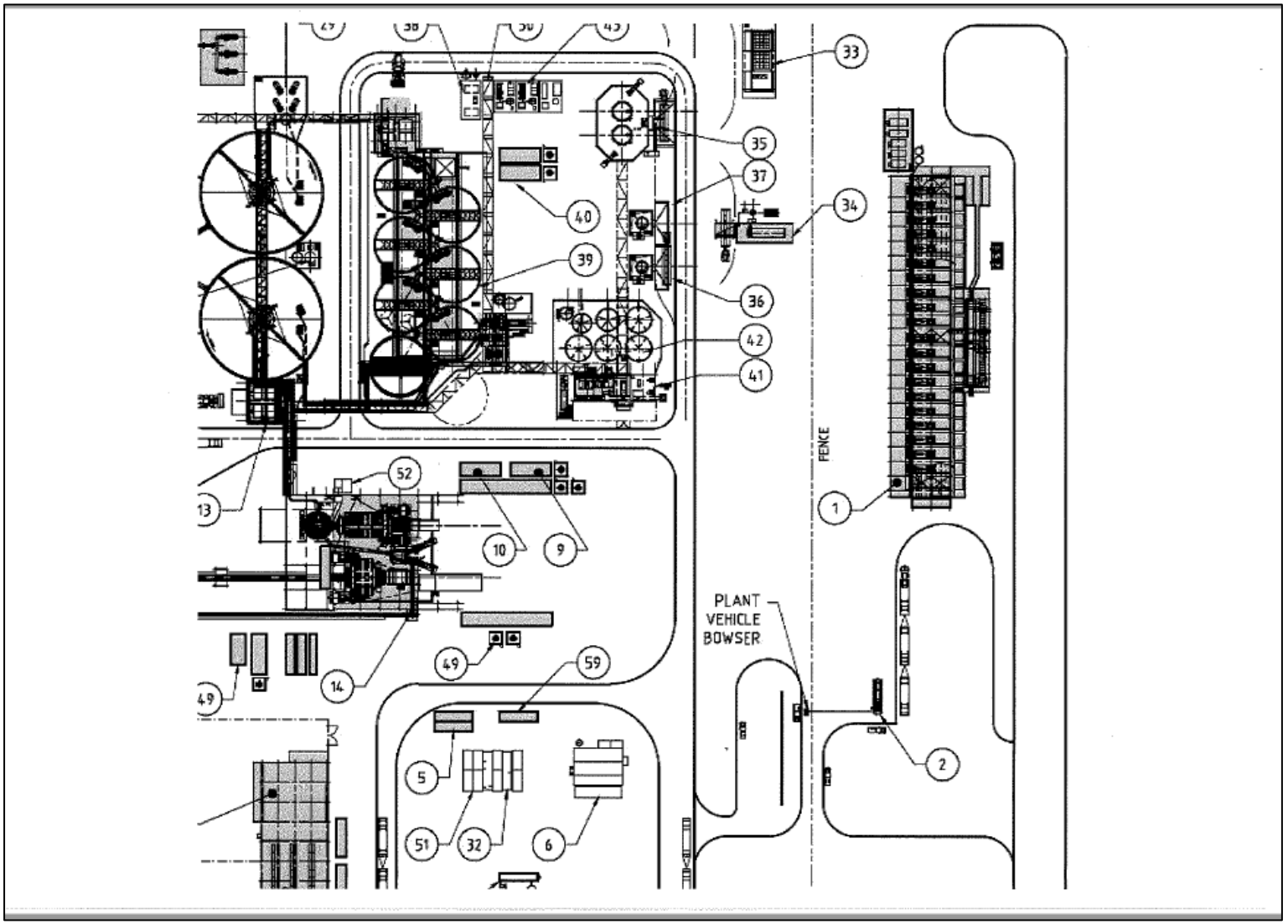
Item	Works	Specifications/Drawings
1	Processing plant producing gold with a capacity of 8,800,000 tonnes per year	Site Plan 1 – Processing Plant
2	***TSF***	Site Plan 1 - TSF
3	Power station consisting of: 11 x Jenbacher J624 4.4MW reciprocating gas engine generators with 10 or 11 emissions stacks located 12.5m ***AGL*** 2 x K2200 emergency diesel back-up generators with 2 emissions stacks located 5.1m ***AGL***	Site Plan 1 – Power Station Site Plan 2 – Number 1
4	250m x 150m landfill area	Site Plan - Landfill
5	Bulk storage of fuel consisting of: 1 x 55kL (~50m^3) self bunded diesel storage tank located at the gas power station 6 x 110kL (~600m^3 total capacity) self bunded diesel storage tanks for refuelling of light and heavy vehicles located directly north of the power station 7 x 10kL (~60m^3 total capacity) self bunded oil storage tanks (total capacity 70kL) located within the mining area workshops Various ore processing reagents stored in designated reagent sheds or bulk storage units, including: • hydrochloric acid (70m^3) • ***LPG*** (66m^3) • sodium cyanide (440m^3) • sodium hydroxide (30m^3)	Site Plan 2 – Location of 6 x 110kL tanks at number 2 Site Plan 1 – Reagents Store
6	MAK Water #MBBR-0035-C-X-X-X 2ha sprayfield	Site Plan 1 – WWTP and Sprayfield

Schedule 3: Site Plans

Site Plan 1



Site Plan 2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PLANT
VEHICLE
BOWSER
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Government of Western Australia
Department of Environment Regulation

Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Applicant:	**Gold Road Resources Limited**
ACN:	**109 289 527**
Works Approval Number:	**W6002/2016/1**
File Number:	**DER2016/001978**
Premises:	**Gruyere Gold Project** **Mining tenement M38/1267** **Cosmo Newbery WA 6440**
Date of report:	**Friday, 3 February 2017**
Status of Report	**Final**

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Definitions of terms and acronyms

Term	Definition
AGL	Above Ground Level
Annual Period	means a 12 month period commencing from 1 January until 31 December in the same year
Applicant	Gold Road Resources Limited
Application	The application submitted to DER by Gold Road Resources Limited consisting of reference document Gold Road, 2016a
BOM	Bureau of Meteorology
Category/Categories (Cat.)	categories of prescribed premises as set out in Schedule 1 of the EP Regulations
cfu/100mL	colony-forming units per 100 millilitres
CIL	Carbon in Leach
DER	Department of Environment Regulation
Decision Report	this document
Delegated Officer	An officer under section 20 of the EP Act
DMP	Department of Mines and Petroleum
DoW	Department of Water
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Gold Road	Gold Road Resources Limited
ha	hectare
HDPE	high density polyethylene
Issued Works Approval	The works approval issued under Part V, Division 3 of the EP Act following the finalisation of this assessment
IWF	Integrated Waste Landform
kL	kilolitre
kV	kilovolt

Term	Definition
LPG	Liquefied Petroleum Gas
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
Mtpa	million tonnes per annum
MW	megawatt
NTU	Nephelometric Turbidity Units
OEPA	Office of the EPA
Premises	Gruyere Gold Project
Primary Activities	is defined in DER's *Guidance Statement: Risk Assessments* to mean activities which fall within the description of the category of prescribed premises in Schedule 1 to the EP Regulations
prescribed premises	premises prescribed under Schedule 1 to the EP Regulations.
RiWI Act	*Rights in Water and Irrigation Act 1914*
RL	Reduced Level
RO	Reverse Osmosis
ROM	Run of Mine
SAG	semi-autogenous
TSF	Tailings Storage Facility
w/w	weight per weight
WWTP	Wastewater Treatment Plant

1. Purpose and scope of assessment

Gold Road Resources Limited (***Applicant***) has submitted an ***Application*** on 5 October 2016 for a works approval under the *Environmental Protection Act 1986* (***EP Act***) to develop an open pit mining operation to extract and process gold at the Gruyere Gold Project (***Premises***), approximately 80 kilometres (km) north-east of Cosmo Newbery in the northeastern Goldfields region of Western Australia.

This Decision Report assesses emissions and discharges associated with the construction and operation of the following:

- Carbon in Leach (***CIL***) processing plant to produce Gold doré;
- Tailings Storage Facility (***TSF***) and tailings pipeline infrastructure;
- Power Station;
- Putrescible Landfill Facility;
- Waste Water Treatment Plant (***WWTP***) to accommodate the requirements of the mining administration and processing plant areas; and
- Bulk storage of chemicals.

This assessment has resulted in the Department of Environment Regulation (DER) issuing Works Approval W6002/2016/1 (***Issued Works Approval***) which is contained in Attachment 1.

2. Background

The Applicant wholly owns the Premises, which is a greenfields gold deposit in the Yamarna greenstone belt of Western Australia. The Yamarna greenstone belt is a newly discovered gold region covering approximately 5,000km^2 on the eastern side of the Yilgarn Craton. The Premises is located on M38/1267, which is owned and managed by the Applicant.

The Application relates to the following ***primary activities*** at the Premises for the prescribed premises ***Categories*** as defined in Schedule 1 of the *Environmental Protection Regulations 1987 (**EP Regulations**)* as listed in Table 1.

The Applicant has recently been granted works approval W5997/2016/1 (6 January 2017) for the Gruyere Gold Project WWTP (Category 54) at the Accommodation Village, which is outside the scope of this Application.

Additional activities which will be occurring at the Premises include:

- Mining ore from open pits. This activity is not regulated by DER and is not included in the scope of this assessment.
- Abstraction of groundwater. This activity is not regulated by DER. The Department of Water (***DoW***) regulates this activity under the *Rights in Water and Irrigation Act 1914* (***RiWI Act***).
- Mine dewatering. This activity is not regulated by DER as it does not trigger category 6 under the EP Regulations because the mine dewater will not be discharged to the environment, but rather stored on-site for use in the process plant.
- Reverse Osmosis (***RO***) plant to treat approximately 1.2 million litres per day (ML/day) of slightly saline water (approximately 5,000 milligrams per litre (mg/L) Total Dissolved Solids) from the Anne Beadell borefield. Approximately 480 cubic metres (m^3) of brine will be produced by the RO plant each day, which will be pumped to the process water pond. Permeate will be pumped to the four potable water storage tanks. This activity is

not regulated by DER, however the brine pipelines and the process water pond may be regulated by DER.

- Treated effluent from the WWTP may be used for dust suppression on-site. This activity is not regulated by DER and the Applicant requires approval from the Department of Health prior to this occurring.

The Applicant will also be constructing the following infrastructure which is not within the scope of this assessment:

- Laboratory;
- Washdown and waste oil facility;
- Laydown and storage areas;
- Workshops and offices;
- Airstrip;
- Borefields;
- Explosives magazine;
- Bioremediation pad;
- Borrow pits and stockpiles;
- Roads and parking areas;
- Communication facilities (telephone, radio, internet); and
- Access roads and tracks.

Table 1: Prescribed Premises Categories

Classification of Premises	**Description**	***Approved premises production or design capacity or throughput***
Category 5	Processing or beneficiation of metallic or non-metallic ore: premises on which — (a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; or (b) tailings from metallic or non-metallic ore are reprocessed; or (c) tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam	8,800,000 (dry) tonnes per ***Annual Period***
Category 52	Electric power generation: premises (other than premises within category 53 or an emergency or standby power generating plant) on which electrical power is generated using a fuel	40 megawatt (***MW***) (natural gas)
Category 64	Class II putrescible landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer and as amended from time to time) is accepted for burial	1,400 tonnes per Annual Period
Category 73	Bulk storage of chemicals etc.: premises on which acids, alkalis or chemicals that –	1,316m^3 in aggregate

Classification of Premises	Description	*Approved premises production or design capacity or throughput*
	(a) contain at least one carbon to carbon bond; and (b) are liquid at STP (standard temperature and pressure), are stored	
Category 85	Sewage facility: premises – (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters	35m^3 per day

3. Overview of Premises

3.1 Infrastructure

The Premises infrastructure, as it relates to Category 5, 52, 64, 73 and 85 activities, is detailed in Table 2 and with reference to the site layout (Figure 1). Information has been summarised from the Application.

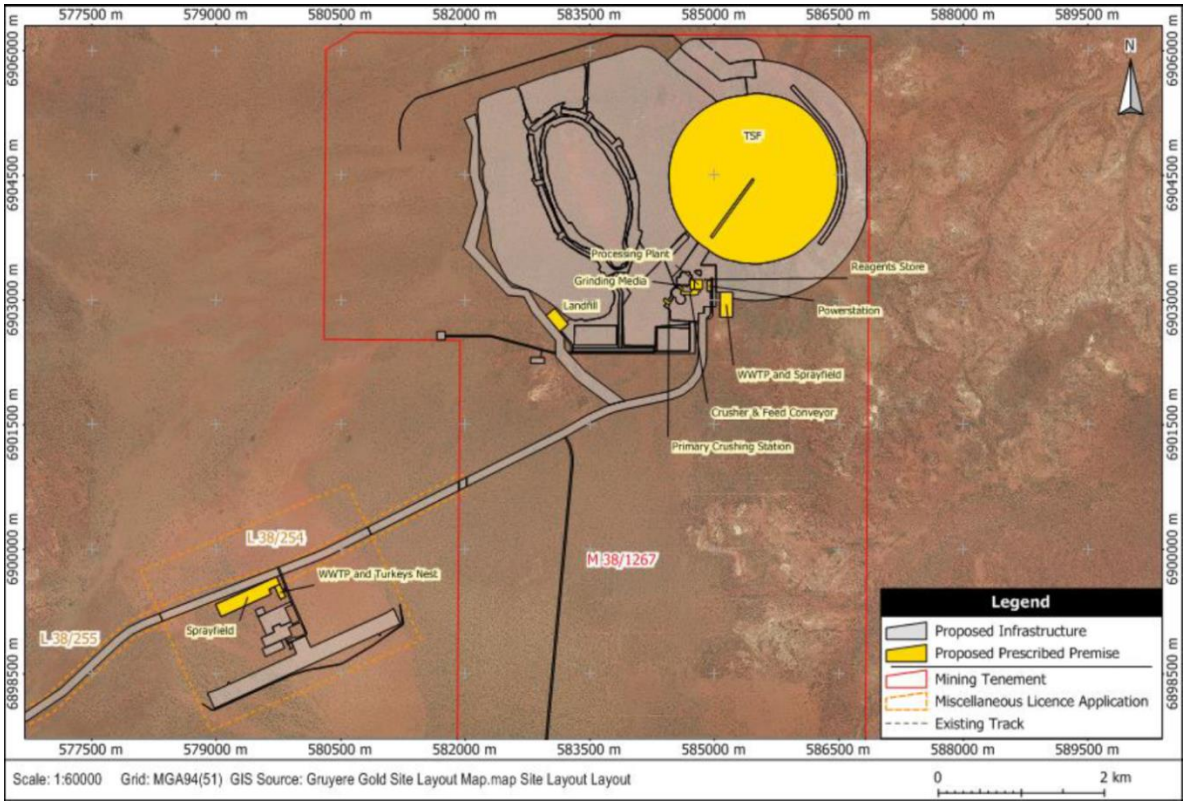
Table 2: Premises infrastructure

	Infrastructure
	Prescribed Activity Category 5
Mining will use conventional drill, blast, load and haul open pit mining methods. The CIL processing facility will be designed to process up to 7.5 million tonnes per annum (***Mtpa***) of Gruyere fresh ore and up to 8.8Mtpa of oxide ore. Tailings will be thickened and disposed of to an above ground TSF. The TSF will have a perimeter underdrain and an underdrainage network around the central decant which will report to a seepage recovery sump.	
1	Run of Mine (***ROM***) pad and coarse ore stockpile
2	Primary Crushing Plant (open circuit gyratory crusher)
3	Two stage grinding circuit (semi-autogenous (***SAG***) milling with pebble crushing and ball milling)
4	Gravity recovery circuit with intensive leach and dedicated electrowinning
5	Leaching and Adsorption (Hybrid CIL circuit that consists of a single stage of leaching and six stages of leaching and adsorption)
6	Thickening
7	Smelting
8	Carbon regeneration
9	Above ground TSF – waste fines slurry pipeline, perimeter embankment with 4m x 1-1.5m cut-off trench, decant tower, decant return pipeline, seepage recovery sump, perimeter underdrain, underdrainage network and perimeter surface water diversion structure

	Infrastructure
10	Processing reagents (carbon, flocculant, hydrochloric acid, liquid petroleum gas, oxygen, sodium cyanide, sodium hydroxide, smelting fluxes, steel balls and quicklime)
11	Containment ponds (high density polyethylene (***HDPE***) lined process water pond and a sedimentation pond)
	Prescribed Activity Category 52
The Premises will generate and transmit power required for gold processing operations and associated activities on-site.	
1	40MW power station comprised of 11 Jenbacher J624 4.4MW reciprocating gas engine generators
2	2 x K2200 emergency diesel back-up generators
3	1 x 55 kilolitre (***kL***) self bunded diesel storage tank with dual hose bowser and pipework (sufficient for three days running on minimum power)
	Prescribed Activity Category 64
All putrescible and inert waste type 1 (bricks and concrete) will be disposed of at the Class II unlined landfill facility. The landfill will have a capacity of 1,400 tonnes per annum.	
1	250m x 150m landfill area
2	Each cell will be approximately 30m long x 10m wide x 4m deep, surrounded by an earthen bund of 1m in height at surface level
3	Length of 30m which incorporates a ramp down into the trench
4	Firebreak at least 3m in width around the boundary of the facility
5	Fencing around the boundary of the facility
	Prescribed Activity Category 73
The Premises will include bulk storage of acids, alkalis and chemicals that contain at last one carbon to carbon bond and are liquid at standard temperature and pressure at various locations around the site:	
1	1 x 55kL (~50m^3) self bunded diesel storage tank located at the gas power station
2	6 x 110kL (~600m^3 total capacity) self bunded diesel storage tanks for refuelling of light and heavy vehicles located directly north of the power station
3	7 x 10kL (~60m^3 total capacity) self bunded oil storage tanks (total capacity 70kL) located within the mining area workshops
4	Various ore processing reagents, including: • hydrochloric acid (70m^3); • Liquefied Petroleum Gas (***LPG***) (66m^3). LPG will be reticulated via buried pipelines; • sodium cyanide (440m^3); and • sodium hydroxide (30m^3). Typical combined storage volumes of processing reagents that meet the description of Category 73

	Infrastructure
	prescribed activity is approximately 606m^3. Processing reagents will be stored in a designated reagents shed or bulk storage units.
	Prescribed Activity Category 85
Wastewater from the mill and processing area ablutions will be treated in a modular WWTP before being discharged to a dedicated spray field. The plant will have capacity to treat 35m^3/day of sewage.	
1	Pump pits with duty/standby macerating pumps, control panel and alarms
2	Influent screen
3	32kL balance tank
4	Influent feed pump
5	Moving bed reactor
6	9kL sludge tank
7	32kL treated effluent tank
8	2 hectare (***ha***) spray field with above ground sprinkler arrangement
9	Fencing around the boundary of the WWTP and spray field

Figure 1: Site layout



3.2 Operational aspects

The operational aspects as defined within the Application are detailed below.

Category 5 – Processing or beneficiation of metallic or non-metallic ore

The ore processing circuit will comprise of the following unit processes:

- ROM;
- Primary crushing;
- Crushed ore stockpile;
- SAG Milling;
- Ball Milling;
- Pebble crushing;
- Gravity recovery circuit with intensive leach and dedicated electrowinning;
- Thickening;
- Hybrid CIL circuit;
- Elution and gold recovery; and
- Tailings disposal.

The carbon handling and gold recovery system will comprise of the following:

- 18 tonne mild steel rubber lined acid wash column;
- 18 tonne stainless steel elution column;
- 6,500 kilowatt elution heater;
- A split Anglo American Research Laboratories (AARL) elution system with two 249m^3 pregnant solution tanks and a 249m^3 barren solution tank;
- 1.5 tonnes per hour carbon regeneration kiln and its associated quench tank;
- An eduction water system for carbon transfer including a recycle system with a settling cone to remove carbon fines from the circuit for bagging and subsequent treatment (by others);
- An electrowinning circuit with four 800 millimetres (mm) x 800mm electrowinning cells with each cell fitted with 12 cathodes and 13 anodes and supplied by a 1,200 ampere rectifier;
- A cathode washing station and filter to recover precious metal precipitate;
- An A300 smelting furnace and crucible to produce gold doré; and
- A secure goldroom with a vault and safe for the storage of bullion.

A process plant flow diagram is shown in Figure 2.

Processing Plant

<u>Crushing, Conveying and Stockpiles</u>

ROM ore will be trucked from the mine to an earth ROM pad and will be tipped directly into the primary crusher dump pocket or stockpiled on the ROM pad for reclaim at a later stage by front end loader. Any oversize material fed into the dump pocket will be fragmented by a fixed rock breaker to permit it to pass into the primary crusher.

A self-cleaning magnet located at the crusher discharge conveyor head chute will remove

magnetic tramp metal from the ore stream and discharge it into a tramp metal bin. The stockpile feed conveyor will discharge onto the open air coarse ore stockpile.

Crushed ore will be reclaimed from the crushed ore stockpile via three apron feeders under the stockpile discharging ore onto the mill feed conveyor which runs within the tunnel beneath the stockpile. The mill feed conveyor will feed the grinding circuit.

A 600 tonne lime silo, fitted with a variable speed rotary valve and a fixed speed drive weighing screw feeders, will dose lime onto the mill feed conveyor to provide protective alkalinity in the leaching and adsorption circuit.

Grinding and Classification

The mill feed conveyor will transport crushed ore to the two stage grinding circuit. The first stage will be a grate discharge SAG mill in open circuit with pebble crushing and the second stage will be an overflow discharge ball mill in closed circuit.

Gravity Recovery

The gravity circuit will consist of four centrifugal concentrators treating a portion of the cyclone underflow. Gravity concentrate will be leached intensively using a vendor supplied reactor to yield a pregnant solution from which precious metals will be recovered by electrowinning.

The cyclone underflow launder will have three separate compartments. Two of these compartments will feed the gravity circuit. These will operate in a staggered pattern so that while one unit is flushing the other units are collecting concentrate. The tailings from the gravity concentrators will return to the ball mill feed.

Concentrate from the gravity concentrators will discharge to the intensive leach reactor. The batch leach process will be initiated on a daily basis. After leaching, the residue will be returned to the mill discharge hopper by a centrifugal slurry pump and the pregnant solution will be forwarded to electrowinning located in the goldroom.

Electrowinning will be carried out in a dedicated 800mm x 800mm electrowinning cell fitted with 12 cathodes and 13 anodes. The cathodes will be stainless steel and the precious metal precipitate will be removed by washing the load cathodes in a cathode washing station and filtering the resulting sludge. The filter cake will be dried in an oven and then combined with fluxes and smelted to produce gold doré.

Leaching and Adsorption

After screening to remove trash, the cyclone overflow from the grinding circuit will be thickened and then leached with cyanide in a hybrid CIL circuit that consists of a single stage of leaching and six stages of leaching and adsorption. The total nominal pulp residence time in the hybrid CIL will be 24 hours.

The cyclone overflow from the grinding circuit will gravitate to one of two duty trash screens to remove trash after which it will be dosed with flocculant and thickened in the 38 metre (m) diameter Hi-rate thickener to 50 percent solids weight per weight (***w/w***). The thickener underflow will be pumped by centrifugal slurry pumps to the CIL tanks. The thickener overflow will gravitate to the process water pond via a sedimentation pond.

The leaching and adsorption circuit will consist of a single 5,000m^3 leaching tank and six 4,200m^3 CIL tanks. Cyanide will be stage dosed into the discharge of the leach tank and the first CIL tanks as required. Oxygen will be injected down the agitator shaft of the leach tank and the first two CIL tanks as required.

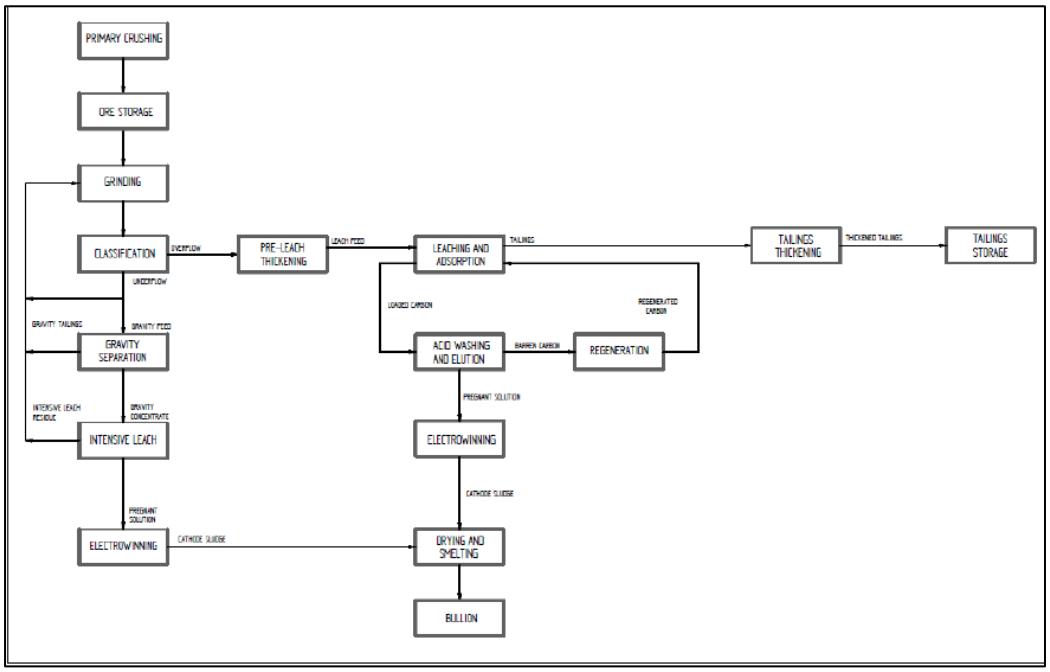
Tailings Disposal

Final tailings from the leaching and adsorption circuit will be screened to recover carbon fines and then thickened prior to being pumped to the TSF. The tailings from the leaching and adsorption circuit will gravitate to one of two duty tailing screens. Tailings screen oversize

(predominately carbon fines) will be collected into carbon bags for subsequent treatment. Tailings screen undersize will gravitate to the tailings thickener.

The contents of the tailings hopper will be pumped to the TSF by one of two pump trains, arranged in a duty/standby configuration, with each pump train consisting of two centrifugal slurry pumps in series. Decant return from the TSF will be returned to the process water pond via a sedimentation pond.

Figure 2: Processing Plant Flow Diagram



TSF

A purpose built Integrated Waste Landform (***IWF***) (i.e. a TSF built within a Waste Rock Landform) will be constructed in stages over the project life to store tailings from the processing plant. The IWL will be constructed immediately east of the pit and north-east of the processing plant.

<u>TSF Design</u>

The total design storage capacity will be 61,620,000m^3 (92.43 million tonnes) based on an assumed tailings dry density of 1.5 tonnes per m^3 and is based on a production rate of 8 to 8.2 Mtpa for the first 3 years which will reduce to 7.5 Mtpa for the remaining 9.2 years. The total storage life will be 12.2 years. Table 3 summarises the IWL storage capacity volumes over the life of the Premises.

The IWL TSF will be an above ground facility constructed in seven stages. The first six stages will comprise four lifts of 5m and one lift of 5.5m from the Stage 1 (starter) crest Reduced Level (***RL***) 412m to Stage 6 crest RL 437.5m and one small lift of 1.6m to the final Stage 7 crest of RL 439.1m. The maximum embankment height of Stages 1 and 7 will be approximately 14m and 41m respectively.

Table 3: IWL Storage Capacity Volumes

Stage	Embankment Crest RL (m)	Storage Area (ha)	Storage Volume (Mm^3)	Cumulative Storage Volume (Mm^3)	Cumulative Storage Capacity (Mt)	Cumulative Storage Life (Years)
1 (Starter)	412	203.0	5.98	5.98	8.98	1.1
2	417	207.6	8.18	14.16	21.25	2.6
3	422	212.8	10.29	24.45	36.67	4.7
4	427	218.0	10.54	34.99	52.48	6.8
5	432	223.2	10.80	45.78	68.67	9.0
6	437.5	229.1	12.17	57.96	86.94	11.5
7 (Final)	439.1	230.8	3.66	61.62	92.43	12.22

TSF Operation

Tailings will be pumped in the form of slurry from the process plant to the TSF via a large diameter HDPE pipe. At the crest of the embankment the pipe will divide into two distribution lines to distribute the tailings around the facility.

Tailings will be deposited into the TSF, sub-aerially from a slurry ring, located on the perimeter embankment of the facility. Spigots or discharge locations will be 60m apart and comprise spigot off-take and valve assemblies discharging into conductor pipes to deliver tailings to the beach level. Tailings deposition will be carried out such that the supernatant pond is maintained around the central decant structure and away from the perimeter embankments. This will allow water from the TSF to be removed from the TSF via an independent decant pump located within the central decant tower and pumped back to the processing plant.

Category 52 – Electric power generation

Correspondence was received 30 November 2016 (MBS, 2016c), confirming that the power station will be constructed using the gas power option only.

A 40MW gas fired power station comprising 11 individual gas generator sets (gensets) each with a design capacity of 4MW will be constructed to generate electricity for the Premises. Fuel will be supplied via a natural gas pipeline running from the Eastern Goldfields Gas pipeline to the mine site. The gas power station will include two emergency diesel back-up gensets each with a design capacity of 4MW. A 55,000 litre (L) self bunded diesel tank will be installed at the gas power station to provide emergency fuel supply for up to three days running on minimum power.

The design brief for the power station incorporates a peak load requirement of 35.7MW with an average load of 32MW and a reliability level of n-2 (i.e. two machines out of service) and provide this level of service in ambient conditions (de-rated for ambient temperature).

Emissions to air as a result of operation of the gas power station will be discharged via 10 or 11 stacks off the gas gensets with the exhaust points located 12.5m above ground level (***AGL***) plus two stacks for the diesel gensets with the emission exhaust points located 5.1m AGL.

Category 64 – Class II putrescible landfill site

A Class II unlined landfill will be constructed at the Premises to accept all putrescible and inert waste type 1 (bricks and concrete) in accordance with the *Landfill Waste Classification and*

Waste Definitions, 1996 and will have a design capacity of 1,400 tonnes per annum.

The landfill facility will be of a trench design, consisting of multiple cells created within a larger 250m x 150m landfill area. Each cell will be approximately 30m long by 10m wide by 4m deep. The design length of 30m incorporates a ramp down into the trench where waste can be deposited and then compacted prior to more waste being deposited. Each cell will be surrounded by an earthen bund of approximately 1m in height. A firebreak of at least 3m will also be maintained around the perimeter of the facility.

Category 73 – Bulk storage of chemicals, etc.

Bulk storage of chemicals will comprise a bulk hydrocarbon storage facility on the Premises in accordance with the design parameters shown in Table 4.

Table 4: Bulk storage of chemicals

Fuel type	Purpose	Storage infrastructure and location
Diesel	Supply to back up generators at gas power station	1 x 55kL self bunded storage tank located at the gas power station
Diesel	Refuelling heavy and light fleet vehicles	6 x 110kL self bunded storage tanks located directly north of the power station
Oil	Equipment and maintenance purposes	7 x 10kL self bunded storage tanks located within the mining area workshops

Fuel will be delivered to the premises by tanker trucks and stored in self bunded tanks compliant with *AS 1940*. The fuel bowser and delivery inlets will be situated on a concrete pad draining to a sump to connect any rain water or fuel spillage, which will then be pumped to the washdown bay oil water separator for treatment prior to discharge to the environment or on-site use (i.e. dust suppression).

Category 85 – Sewage facility

A WWTP will be constructed to treat wastewater from the mill and processing area ablutions. Wastewater will be collected via buried piping into suitably located pump pits and pumped to the balance tank at the WWTP. The WWTP will consist of a 32kL balance tank and a Moving Bed Bioreactor with waste streams directed to a sludge tank and a 32kL treated effluent tank. The treated effluent tank will discharge by pump to a 2ha spray field.

Effluent from the WWTP will be treated to a secondary level of treatment (Category C) in accordance with *NWQMS, 1997* and to comply with a Low Exposure Risk Level (level of human contact) in accordance with *DoH, 2011*, with effluent achieving the specifications detailed in Table 5.

The WWTP process is as follows:

Macerated sewage is pumped into the influent screen from the toilet facilities situated inside the mill and processing area. The influent screen removes suspended solid matter greater than 2mm in size. Solid matter removed from the influent screen is discharged via a chute to a solids bin below. Screened sewage passes through the influent screen and flows by gravity into the 32kL balance tank.

The balance tank receives mixed liquor return and recycle activated sludge from the bioreactor. The balance tank has an influent mixing pump to mix the wastewater inside the balance tank to ensure the wastewater is homogenous before pumping to the bioreactor.

Table 5: Effluent specifications

Analyte	Units	Value
Biochemical Oxygen Demand	mg/L	<20
Total Suspended Solids	mg/L	<10
Total Nitrogen	mg/L	<30
Total Phosphorus	mg/L	<8
Turbidity	***NTU***	<5
Chlorine Residual	mg/L	>0.2-2
pH	pH units	6.5-8.5
E.coli	***cfu/100mL***	<10

An influent feed pump supplies screened, mixed sewage and mixed liquor suspended solids to the bioreactor. The bioreactor serves as the primary unit for bulk organic (chemical oxygen demand and biochemical oxygen demand) and nitrogen removal, via anoxic and aerobic digestion.

The screened, mixed sewage and mixed liquor suspended solids from the balance tank is pumped to the aerobic tank where it is aerated. Air is introduced into the aerobic tank by aeration blowers.

The clarifier tank is inside the bioreactor. The clarifier removes heavier solids by means of settlement and separation from the liquid phase. The hopper bottom channels the sediment to the centre of the clarifier tank before the sediment is returned to the balance tank as recycle activated sludge or the sludge tank as waste activated sludge and is controlled by timer.

The tertiary chlorination system comprises a recirculation pump, which circulates the contents of the treated effluent tank on a continuous basis. Treated water will be delivered to the irrigation spray field via the treated effluent distribution pump set.

Proposed Construction Schedule

The Applicant has stated that the infrastructure will be constructed in accordance with Table 6 (Gold Road, 2016a).

The Applicant will be required to submit compliance documentation following the construction of each item of infrastructure (landfill facility, TSF including all pipe work, WWTP, processing plant, power station and bulk hydrocarbon storage facility) and apply to amend L9000/2016/1 prior to the operation and commissioning of each infrastructure.

Table 6: Proposed construction schedule

Stage	Infrastructure	Proposed Commencement
1	Landfill facility	Quarter 1 2017
	Mine dewatering infrastructure – turkeys nest and pipelines	Quarter 2 2017
2	Tailings Storage Facility	Quarter 4 2017

	WWTP and pipelines	Quarter 3 2017
3	Processing plant	Quarter 2 2017
	Tailings and return water pipelines	Quarter 1 2018
	Power station	Quarter 3 2017

4. Legislative context

4.1 Part IV of the EP Act

4.1.1 Background

Gold Road Resources Limited (***Gold Road***) referred a proposal to the Environmental Protection Authority (***EPA***) on 2 March 2016 to develop the Gruyere Gold Project. On 15 June 2016 the EPA set the level of assessment at Assessment on Proponent Information – Category A (API – A). The API document was reviewed by the EPA and the Report and Recommendations of the EPA (*Report Number 1587*) were released to the Minister for Environment (***Minister***) on 16 November 2016. Ministerial Statement (***MS***) *1048* granting approval for the project to be implemented was signed by the Minister on 29 December 2016.

On 24 August 2016 the EPA gave authorisation under section 41A(3) of the EP Act to Gold Road for the minor or preliminary works (Stage 1) for the construction of an accommodation camp, a WWTP with spray field, a turkey's nest dam, a temporary RO plant and an access road from the accommodation camp to the T-junction (located near the spray field) in addition to an access road from the T-junction to the mining lease.

4.1.2 Report Number 1587

The Minister's decision that the proposal may be implemented subject to conditions was informed by an EPA assessment (Assessment Number 2083), which produced *Report Number 1587*. In its assessment the EPA determined that the following were key environmental factors relating to the proposal:

- **Subterranean Fauna** – potential impacts on stygofauna habitat and species from the abstraction of groundwater from the Yeo and Anne Beadell borefields for production water, noting that abstraction of groundwater would be from the aquifer lying beneath the calcrete habitat of the stygofauna; and
- **Flora and Vegetation** – direct impacts from the clearing of 2,260ha of flora and vegetation within the development envelopes.

4.1.3 MS 1048

MS 1048 for the proposal to develop a below water table gold deposit and associated infrastructure at the Gruyere Gold Project was signed by the Minister on 29 December 2016 and has conditions (6-1 to 6-7) requiring Gold Road to prepare, submit and implement a Management-based Condition Environmental Management Plan with the objective of maintaining the biodiversity and ecological integrity of subterranean fauna in the Yeo Palaeochannel.

4.2 Other relevant approvals

4.2.1 Department of Mines and Petroleum

A Mining Proposal and Mine Closure Plan for Stage 1 of the Gruyere Gold Project, which included the construction of the accommodation village, WWTP and access roads and made reference to use of the existing Yamarna exploration camp landfill was submitted to the Department of Mines and Petroleum (***DMP***) on 28 September 2016. The Mining Proposal and Mine Closure Plan for Stage 1 were approved by the Executive Director, Environment Division of DMP on 19 October 2016.

DMP received a Stage 2 Mining Proposal (Reg ID 63733) for the Premises on 30 December 2016, which includes the TSF and processing plant. The Mining Proposal is currently under assessment by DMP (DMP, 2017).

4.2.2 Department of Water

Groundwater abstraction activities for the Premises are undertaken in accordance with the DoW groundwater licences GWL176189 and GWL177087 (Gold Road, 2016b).

4.3 Part V of the EP Act

4.3.1 Guidance Statements

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

DER Guidance Statements which inform this assessment are:

- Guidance Statement: Regulatory Principles (July 2015);
- Guidance Statement: Setting Conditions (October 2015);
- Guidance Statement: Land Use Planning (August 2016);
- Guidance Statement: Licence Duration (August 2016);
- Guidance Statement: Environmental Siting (November 2016);
- Guidance Statement: Decision Making (November 2016); and
- Guidance Statement: Risk Assessments (November 2016).

4.3.2 Works approvals

On 12 May 2016, the Applicant submitted an Application for a works approval for the Yamarna Exploration Camp Landfill, located on M38/435 and M38/436. W5973/2016/1 was issued for Category 89 on 12 September 2016.

On 4 October 2016, the Applicant submitted an Application for a works approval and licence for the Gruyere Gold Project WWTP (Stage 1), located on L38/254 and L38/255. W5997/2016/1 was issued for Category 54 on 6 January 2017. Licence L9000/2016/1 is still under assessment awaiting compliance documentation associated with W5997/2016/1.

4.3.3 Clearing

The clearing of native vegetation is not approved under the Issued Works Approval. The clearing of no more than 2,260ha (which includes up to 7ha of the groundwater dependent ecosystem DD-MWS1) within the 18,629ha development envelope has been authorised under *MS 1048*.

5. Consultation

The Application was advertised in the West Australian on 28 November 2016 for a comment period ending on 19 December 2016. A letter inviting comment was sent to the Shire of Laverton on 28 November 2016. No comments were received from the Shire of Laverton.

A letter of referral was sent to DoW on 31 October 2016 and DMP on 28 November 2016.

DER received the following advice from DoW on 17 November 2016 regarding the Application:

- DoW has issued a licence for groundwater exploration in relation to the Office of the EPA (***OEPA***) assessment of the project. A groundwater licence will not be issued until the OEPA have approved the project. The licence will be issued in accordance with the OEPA's conditions (DoW, 2016).

DER received the following comment from DMP on 6 January 2017 regarding the Application:

- DMP received a Stage 2 Mining Proposal for the TSF and processing plant at the Premises on 30 December 2016, which is currently under assessment by DMP. DMP considers that the construction and operation of the TSF can be managed under the *Mining Act 1978* (DMP, 2017).

DER referred the draft works approval and Decision Report on 23 January 2017 to the Applicant.

6. Location and siting

6.1 Siting context

The Premises is located approximately 80km east of Cosmo Newbery and 150km north-east of Laverton in Western Australia as shown in Figure 3. The Premises is located on the Yamarna Pastoral Lease, which is operated by the Applicant. Yamarna Station is in the process of being de-stocked and will be rested to improve the grazing rangeland capability.

The workforce for the Premises will be housed at the Accommodation Village located approximately 6km south-west of the Premises. As this Accommodation Village is operated by the Applicant, it will not be considered a sensitive land use or receptor.

6.2 Residential and sensitive premises

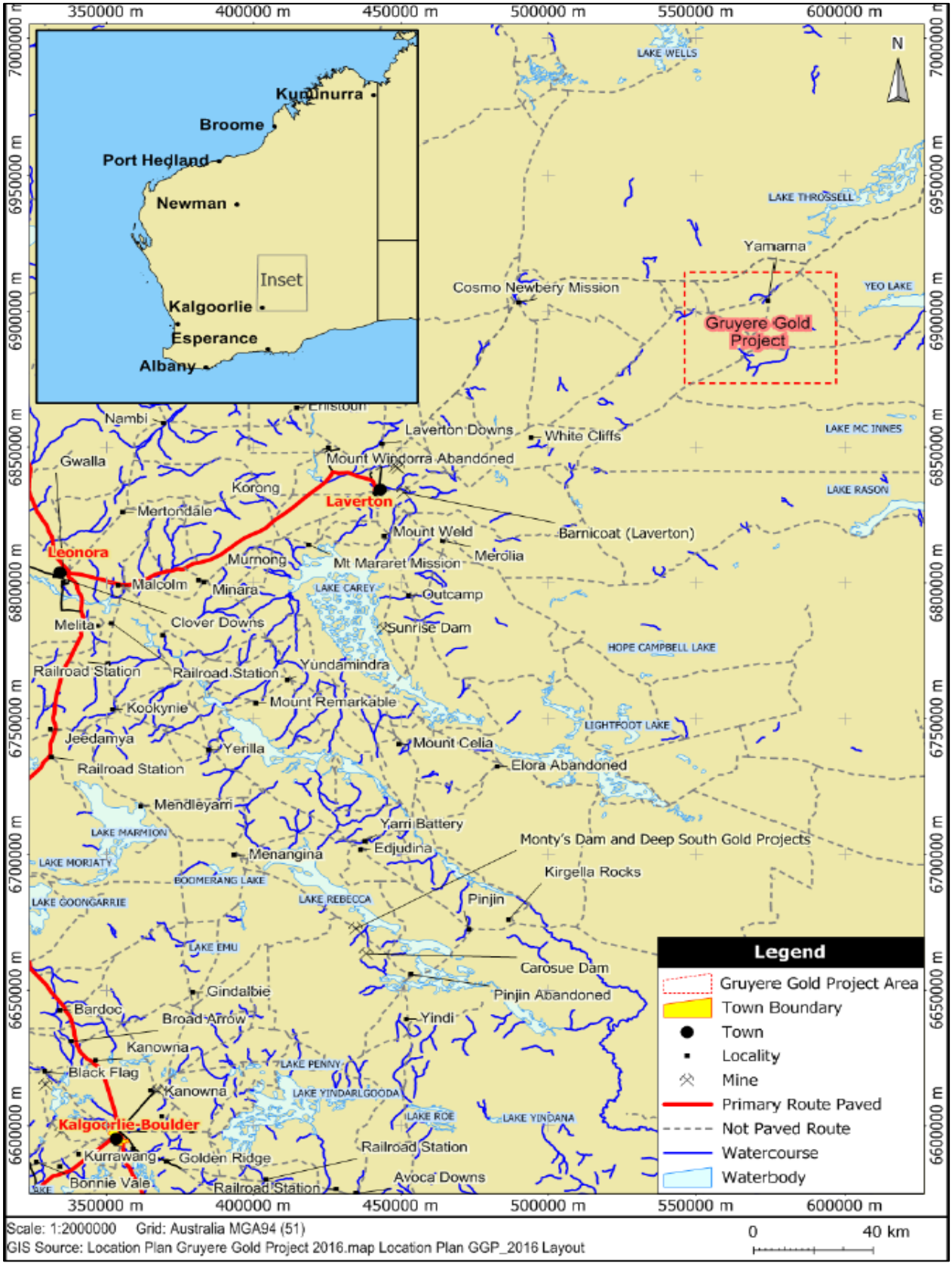
The distances to residential and sensitive receptors are detailed in Table 7. The closest residential area to the Premises is Cosmo Newbery, which has a population of approximately 74 people in 2011 (2011 Census Quickstats).

There are no existing facilities at the Premises. The Applicant has an exploration camp located approximately 25km from the Premises at the old Yamarna homestead, which includes accommodation that can cater for up to 30 exploration personnel.

Table 7: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Closest residential zoned premises (zoned settlement Shire of Laverton Planning Scheme No. 2)	The residential area of Cosmo Newbery is approximately 92km to the west of the processing plant

Figure 3: Regional location



6.3 Specified ecosystems

The distances to specified ecosystems in accordance with DER's Guidance Statement: *Environmental Siting* is shown in Table 8.

Table 8: Specified ecosystems

Specified ecosystems	Distance from the Premises*
Parks and Wildlife tenure	Yeo Lake Nature Reserve boundary is located approximately 12km east of the processing plant
Public Drinking Water Source Area (PDWSA)	There are no PDWSA within the Premises. The Priority 1 Laverton Water Reserve is approximately 140km south-west of the TSF
RAMSAR wetland – Lake Ballard	Greater than 30km to the south-west of the TSF
Declared Rare Flora	There are no Declared Rare Flora within or in a 30km radius of the Premises
Threatened Ecological Communities and Priority Ecological Communities	There are no Threatened Ecological Communities or Priority Ecological Communities within or in a 30km radius of the Premises

*DER's GIS database

6.4 Hydrogeology

The Application states that the geological units in the Gruyere region comprise Archean age basement of the Yilgarn Craton with scattered overlying Permian sedimentary deposits and Cenozoic deposits within the Yeo palaeodrainage.

Groundwater occurs within the Quaternary alluvial and calcrete aquifer, and the thicker confined Werillup Formation. The Perkolilli Shale between the Quaternary and Werillup Formation forms an aquitard between the two aquifers. Table 9 presents a summary of the aquifers present surrounding the Premises.

The nearest aquifer of significance to the Premises is the Yeo Palaeochannel, a calcrete aquifer, located approximately 25km to the west of the Premises. The Yeo Palaeochannel occurs within the Quaternary Deposits, being approximately 14m thick. Outside of the Yeo Palaeochannel, other aquifers are present within the weathered profile (saprolite and saprock) and fractured rock bedrock, however these are considered minor in comparison (Gold Road, 2016a).

Table 9: Summary of aquifer types in the Gruyere region

Aquifer	Geological Unit	Maximum Saturated Thickness (m)	Bore Yield (kL/day)	Aquifer Potential	Water Quality
Palaeovalley					
Alluvial and Calcrete	Quaternary Deposit	14	0 – 500	Low – Moderate	Brackish - Saline
Perkolilli Shale	Perkolilli Shale	29	-	Aquitard	-

Yeo Palaeochannel Aquifer	Werillup Formation	+81	200 – 2,000	High	Saline - Hypersaline
Permian					
Permian	Paterson Formation	+100	-	Low – Moderate	Brackish - Hypersaline
Archean Basement					
Archean Basement	Upper Saprolite	~50	-	Low	Brackish – Saline
	Lower Saprolite	~100	0 – 1,000	Low – Moderate	Brackish - Saline

6.5 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 10.

Table 10: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental Value
Groundwater and groundwater salinity	The Application states that groundwater can be located at an average depth of 65m below ground level. Standing water levels measured in the exploration holes ranged between 30m to 40m depth Recharge occurs via infiltration and through localised drainage systems during large rainfall events There is a groundwater bore located approximately 6km west of the Premises (based on available GIS dataset – WIN Groundwater Sites)	Groundwater salinity (Total Dissolved Solids) is 1,000 – 3,000) which is considered brackish (Department of Water, Salinity status classifications)
RiWI Act	The Premises is located in the Proclaimed Goldfields Groundwater Area	N/A
Watercourses	Reetz Creek and Lake Throssell are approximately 15km to the south and north-east of the Premises respectively According to DER's GIS dataset there is a Major Tributary, Minor River and Minor Tributary (Watercourse – Minor, Non Perennial) approximately 26km to the west, 14km to the north	There are a few unnamed, ephemeral and relatively minor watercourses which drain in a generally south-west to north-west direction towards Lake Throssell Unnamed creeks in the regional area are dry throughout the year except during periods of rain activity

Groundwater and water sources	Distance from Premises	Environmental Value
	and 25km to the south-west of the Premises respectively	from seasonal thunderstorms and occasional cyclone remnants

6.6 Other ecological characteristics

Baseline surveys undertaken for the Premises identified stygofauna populations within the mine site and borefield development envelopes. Within the Yeo Palaeochannel, the Quaternary Detritals aquifer in the Yeo Palaeochannel, which lies within colluvium, alluvium and saturated calcrete, are considered the main habitats for stygofauna. Stygofauna was identified by the EPA as a preliminary factor during the assessment of the Premises in both *Report Number 1587* and *MS 1048* (refer to sections 4.1.2 and 4.1.3).

Key Finding: The Delegated Officer has determined that potential impacts to subterranean fauna from abstraction of groundwater will be sufficiently regulated under Part IV of the EP Act.

6.7 Soil type

DER's GIS dataset identifies the soil in the area to be plains with longitudinal and ring dunes with interdune corridors, plains and occasional salt pans. The chief soils are the red earthy sands (Uc5.21) of the interdune plains and corridors. Associated are the red sands (Uc1.23) of the dunes which may also cover some interdune areas, where they may overlie laterite, or silcrete, or calcrete (kunkar).

6.8 Meteorology

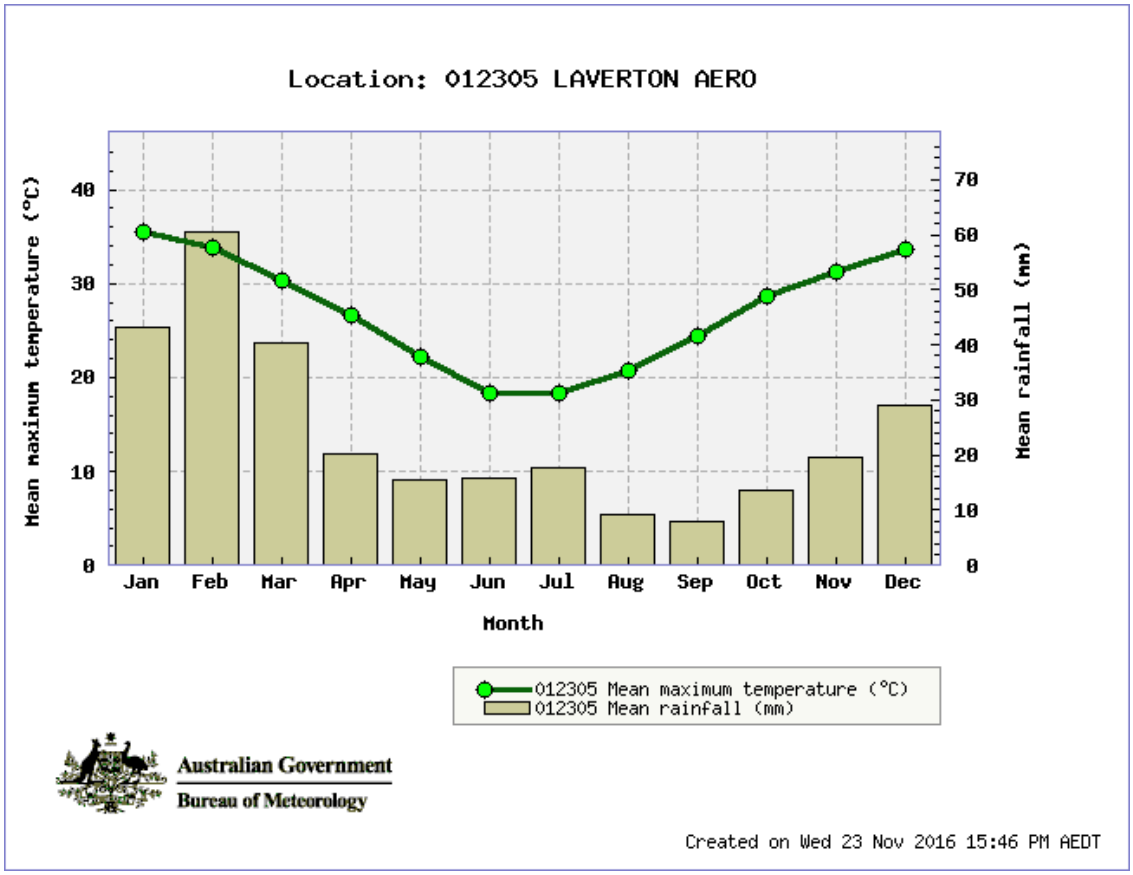
6.8.1 Regional climatic aspects

The Premises is located within the semi-arid zone of Western Australia with mild winters and hot summers (Gold Road, 2016a).

6.8.2 Rainfall and temperature

BOM, 2016 provides the mean rainfall and maximum temperatures for Laverton (mean maximum temperature 1991-2016 and mean rainfall 1994-2016) as shown in Figure 6. Annual rainfall in the semi-arid zone is highly variable and subject to drought periods. Rainfall is related both to locally generated thunderstorms and to dissipating tropical cyclones tracking south-east (Gold Road, 2016a).

Figure 6: Mean temperatures and rainfall, Laverton Aero



Source: Bureau of Meteorology website www.bom.gov.au

7. Risk assessment

7.1 Confirmation of potential impacts

Identification of key potential emissions, pathways, receptors and confirmation of potential impacts are set out in Tables 11 and 12 below. Tables 11 and 12 also identify which potential emissions will be progressed to a full risk assessment. Some potential emissions/impacts may not receive a full risk assessment where a potential receptor or pathway cannot be identified or where the emission/impacts are regulated under a MS.

Table 11: Identification of key emissions during construction

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
Source (see Section 3.1 for infrastructure references)	**Construction, mobilisation and positioning of infrastructure for ore processing, TSF, power station, landfill and WWTP**	Vehicle movements on unsealed access roads	Noise	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Health and amenity	No	No receptors present The Delegated Officer considers that the provisions of the *Environmental Protection (Noise) Regulations 1997* and section 49 of the EP Act are sufficient to regulate noise and dust emissions during construction
			Dust				No	
		Earthworks, construction of new buildings, plant and infrastructure	Noise	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Health and amenity	No	As above
			Dust				No	
			Spillages of hydrocarbons and sediment	Soil and surface water drainage	Stormwater runoff	Soil contamination inhibiting vegetation growth and survival and health impacts to fauna	Yes – Refer to section 7.4	Stormwater runoff
		Use and storage of hydrocarbons	Spills and breach of containment causing hydrocarbon or chemical discharge to land	Soil and vegetation adjacent at areas of spill or breach	Direct discharge to land	Soil contamination inhibiting vegetation growth and survival, and health impacts to fauna	Yes – Refer to section 7.4	Leaks and spills of hydrocarbons, chemicals and waste

Table 12: Identification of key emissions during operation

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
Source (see Section 3.1 for infrastructure references)	**Category 5** Processing or beneficiation of metallic or non-metallic ore	Operation of process plant, movement of ore product between these and the stockpiles via conveyors	Dust associated with ore processing, ROM pad, primary crushing, two stage grinding, conveyors and stockpiles	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Potential to be deposited on vegetation and may prevent photosynthesis and plant respiration	No	The Delegated Officer considers that the natural dust tolerance of vegetation species should prevent vegetation impacts There are no Declared Rare Flora, Threatened Ecological Communities or Priority Ecological Communities within or in a 30km radius of the Premises The Delegated Officer considers that the provisions of section 49 of the EP Act are sufficient to regulate dust emissions associated with ore processing during operation
			Noise associated with the process plant activities	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Amenity	No	No receptors present The Delegated Officer considers that the provisions of the *Environmental Protection (Noise) Regulations 1997* are sufficient to regulate noise emissions during operation
			Leaks and spills of ore, hydrocarbons and chemicals from processing and ore handling areas	Terrestrial ecosystems adjacent to where the spillage has occurred	Spillages of ore, stormwater runoff, direct discharges to land and infiltration to soils	Potential contamination of soil due to presence of hydrocarbons / chemicals and heavy metals	Yes – Refer to section 7.4	Stormwater runoff and leaks and spills of hydrocarbons, chemicals and waste

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
		Gravity recovery circuit with intensive leaching and electrowinning, leaching and adsorption, thickening, hybrid CIL circuit and elution	Gaseous emissions from process solutions including acid wash, elution columns, electrowinning cells, CIL tanks, barren and pregnant solution tanks	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Health and amenity	No	No sensitive receptors present
			Leaks and spills of chemicals from processing activities	Terrestrial ecosystems adjacent to where the spill has occurred	Stormwater runoff, direct discharge to land and infiltration to soils	Potential contamination of soil due to presence of chemicals and metals	Yes – Refer to section 7.4	Stormwater runoff and leaks and spills of hydrocarbons, chemicals and waste
		Smelting	Gaseous emissions from smelting furnace	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Health and amenity	No	No sensitive receptor present
		Carbon regeneration	Gaseous emissions from carbon regeneration kiln	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Health and amenity	No	No sensitive receptor present
		Process water pond	Overtopping or seepage of contaminated water, the process water pond will contain the following: TSF return water, pit dewatering, brine from the RO plant and Yeo Borefield water	Terrestrial ecosystems adjacent to ponds	Direct discharge to land and infiltration to soil	Potential contamination of soils due to the presence of hydrocarbons, chemicals and heavy metals	No	The Application states that all water storage ponds will be lined and have freeboard markers installed. The process water pond will have a freeboard of 500mm over and above the freeboard required to hold the volume of water associated with a 1:100 year, 72 hour storm event

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
		Sedimentation pond	Contaminated water as the sedimentation pond will receive water from the thickener overflow and decant return from the TSF				No	MBS, 2017a also states that water within the process water pond and sedimentation pond will be used in a closed loop system within the processing plant, therefore water from the ponds will not be discharged to the environment The Delegated Officer considers the factors listed above sufficient to ensure there is no discharge to the environment from the ponds, subject to the proposed standard of construction being achieved.
		TSF	Overtopping of TSF with tailings	Terrestrial ecosystems adjacent to the TSF	Direct discharge to land and infiltration to soil	Soil contamination inhibiting vegetation growth and survival, and health impacts to fauna	Yes – Refer to section 7.5	Overtopping of TSF
			Discharge of tailings through TSF embankment failure	No residences, sensitive land uses or specified ecosystems within 12km No surface water bodies in pathway of tailings Soil and vegetation in pathway of tailings	Direct discharge to land and infiltration to soil	Soil contamination inhibiting vegetation growth and survival, and health impacts to fauna	No	Managed by DMP under the *Mining Act 1978*

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
			Tailings leachate seepage	Soil Subterranean fauna	Seepage to ground adjacent to the TSF and seepage from the base of the TSF with infiltration into soils	Groundwater mounding Inundation of vegetation rooting zone and decrease in quality of habitat of subterranean fauna Soil contamination inhibiting vegetation growth and survival, and health impacts to fauna	Yes – Refer to section 7.5	TSF seepage
			Dust from surface containing tailings contaminants	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Potential to be deposited on vegetation and may prevent photosynthesis and plant respiration	No	The Delegated Officer considers that the natural dust tolerance of vegetation species should prevent vegetation impacts There are no Declared Rare Flora, Threatened Ecological Communities or Priority Ecological Communities within or in a 30km radius of the Premises The Delegated Officer considers that the provisions of section 49 of the EP Act is sufficient to regulate dust lift-off associated with the TSF during operation
			Spillage of tailings through leaks, pipeline ruptures or failure	Terrestrial ecosystems adjacent to the process plant, TSF and pipelines.	Direct discharge to land and infiltration to soil	Soil contamination inhibiting vegetation growth and survival, and health impacts to fauna	Yes – Refer to section 7.5	TSF pipeline ruptures and seepage

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
	Category 52 Electric power generation	40MW gas fired power station	Emissions to air of nitrogen oxides, sulfur oxides, carbon monoxide and volatile organic compounds	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Health and amenity	No	No sensitive receptors present. The Delegated Officer considers 5km to be a sufficient separation distance for emissions generated by power stations
			Spills and breach of containment causing hydrocarbon or chemical discharge to land	Terrestrial ecosystems adjacent to the spill	Stormwater runoff, direct discharge to land and infiltration to soil	Soil contamination	Yes – Refer to section 7.4	Stormwater runoff and leaks and spills of hydrocarbons, chemicals and waste
			Noise from the operation of the power station	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Amenity	No	No receptors present The Delegated Officer considers that the provisions of *Environmental Protection (Noise) Regulations 1997* are sufficient to regulate noise emissions of the power station during operation
	Category 64 Class II putrescible landfill site	Active Trench/Cell	Dust (vehicle movement and burial of waste)	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Health and amenity	No	No receptors present The Delegated Officer considers that the provisions of section 49 of the EP Act is sufficient to regulate dust emissions at the landfill during operation

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
			Noise from the operation of the machinery to cover waste etc.	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Amenity	No	No receptors present The Delegated Officer considers that the provisions of the *Environmental Protection (Noise) Regulations 1997* are sufficient to regulate noise emissions at the landfill during operation
			Windblown waste	Terrestrial ecosystems	Discharges to land from waste disposal	Windblown waste Soil contamination	Yes – Refer to section 7.6	Landfill waste disposal
			Seepage of leachate to soil	Terrestrial ecosystems	Seepage through the soil	Disrupt ecological processes in soil with excess organic nutrients, metals, and eutrophication	Yes – Refer to section 7.6	Landfill leachate
			Seepage of leachate to surface water	Surface water	Flow via surface water bodies	Disrupt ecological processes in surface water bodies with excess organic nutrients, metals, and eutrophication	No	The Delegated considers that the distance to sensitive waterbodies (Yeo Lake Nature Reserve, Reetz Creek and Lake Throssell), being in excess of 10km away is a sufficient separation distance for the landfill facility
			Odour	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Amenity	No	No receptors present
			Gaseous emissions from putrescible decomposition				No	No receptors present

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
	Category 73 Bulk storage of chemicals, etc.	Bulk storage of fuels and other chemicals (e.g. ore processing reagents)	Breach of containment causing hydrocarbon / chemical discharge to land and soil	Soil and vegetation	Stormwater runoff, direct discharge to land and infiltration to soil	Soil contamination inhibiting vegetation growth and survival, and health impacts to fauna	Yes – Refer to section 7.4	Stormwater runoff and leaks and spills of hydrocarbons, chemicals and waste
			Spillage or discharge of hydrocarbons / chemical through pipeline, pump or tank leaks or failure				Yes - Refer to section 7.4	Stormwater runoff and leaks and spills of hydrocarbons, chemicals and waste
	Category 85 WWTP	Treatment of sewage	Odour	No residences, sensitive land uses or specified ecosystems within 12km	Air / wind dispersion	Amenity	No	No receptors present The Delegated Officer considers that the provisions of section 49 of the EP Act are sufficient to regulate odour emissions at the WWTP during operation
		Sewage pipes and holding tanks	Sewage discharge from the rupture of pipes / overtopping and storage tanks failure	Vegetation adjacent to discharge area (Vegetation characteristic of the zone are mulga shrublands and spinifex grasslands with mallee)	Stormwater runoff, discharges to land and irrigation	Soil contamination	Yes – Refer to section 7.7	WWTP pipe ruptures or tank failure
		Irrigation of treated effluent	Treated effluent discharged to spray field for irrigation	Terrestrial ecosystems		Facilitated growth of weeds Increase in nutrient levels in soil Ponding in the irrigation area	Yes – Refer to section 7.7	WWTP irrigation

7.2 Risk Criteria

During the assessment the risk criteria in Table 13 below will be applied to determine a risk rating set out in this section 7.

Table 13: Risk Criteria

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

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the risk / opportunity occurring.		**The following criteria has been used to determine the consequences of a risk occurring:**		
			Environment	**Public Health* and Amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **on-site impacts**: catastrophic • **off-site impacts local scale**: high level or above • **off-site impacts wider scale:** mid-level or above • Mid to long term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **on-site impacts**: high level • **off-site impacts local scale**: mid-level • **off-site impacts wider scale**: low level • Short term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **on-site impacts**: mid-level • **off-site impacts local scale**: low level • **off-site impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **on-site impacts**: low level • **off-site impacts local scale**: minimal • **off-site impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **on-site impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting.*

* In applying public health criteria, DER may have regard to the Department of Health's, *Health Risk Assessment (Scoping) Guidelines* **"on-site"** means within the prescribed premises boundary.

7.3 Risk Treatment

DER will treat risks in accordance with the Risk Treatment Matrix in Table 14 below:

Table 14: Risk Treatment

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk event will not be tolerated. DER may refuse application.
High	Acceptable subject to multiple regulatory controls.	Risk event will be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled	Risk event is acceptable and will generally not be subject to regulatory controls.

7.4 Risk Assessment – Leaks, spills and stormwater runoff (Construction and Operation)

7.4.1 General hazard characterisation and impact

Stormwater at the Premises has the potential to become contaminated with sediments from processing, hydrocarbons, heavy metals, metalloids and hazardous chemicals and wastes during construction and operation, leading to contamination of land through direct contact or infiltration into soils. Similar impacts may be caused from spills or leaks of hydrocarbons, chemicals and wastes stored at the Premises.

Soil contamination may inhibit vegetation growth and cause health impacts to fauna. Contamination of groundwater is unlikely because depth to groundwater at the Premises is approximately 35-100m below ground level.

Stormwater runoff may also pick up sediment from cleared areas and result in smothering of nearby vegetation, impacting growth and survival. Rainfall events at the Premises are likely to be of short duration and high intensity, and large volume events can be experienced. Contaminated stormwater during rainfall events may be mobilised and transported within minor drainage systems on the Premises, potentially leading to localised or off-site impacts to sensitive ecosystems. Yeo Lake Nature Reserve boundary is located approximately 12km east of the processing plant.

7.4.2 Criteria for assessment

ANZECC and ARMCANZ, 2000 provide recommended trigger values for freshwater quality and DER's Guideline *Assessment and management of contaminated sites* provides ecological and human health assessment levels for soil.

7.4.3 Applicant controls

The Application outlines the Applicant controls in place to reduce and manage stormwater and leaks and spills of hydrocarbons, chemicals and waste as outlined in Tables 15 and 16 below.

Table 15: Applicant controls for stormwater runoff

Controls for stormwater	
Control	**Description**
Infrastructure Design or Construction Requirements	• Constructed to separate clean and potentially contaminated water • Where stormwater is likely to be contaminated with hydrocarbons, water will be directed to an oil water separation system prior to discharge to the environment or re-use on-site • All water storage ponds will be lined and freeboard markers installed
Management Plan	• A Surface Water Management Plan will be implemented
Monitoring	• Opportunistic monitoring of surface waters will be undertaken following rainfall events • Water quality and level monitoring will be conducted for all constructed water storage and collection ponds

Table 16: Applicant controls for hydrocarbons, chemicals and waste (including leaks and spills)

Control	**Description**
Infrastructure Design or Construction Requirements	• Ore processing activities conducted within bunded areas draining to sumps with recovery pumps • Where contaminants are likely to include hydrocarbons, water will be directed to an oil water separation system prior to discharge to the environment or on-site use • Workshop facilities (heavy, light vehicle and maintenance) will be located on concrete pads constructed to drain to an oily water separation system • Hydrocarbon spillages and leakages at the workshop facilities will be captured and managed through use of hydrocarbon absorbent materials • Heavy and light vehicle maintenance will occur within the workshops • Bulk Fuel Storage Facility will be equipped with overfill detection systems and bunded to prevent discharges to the environment • Bulk Fuel Storage Facility fuel bowsers and fuel delivery inlets will be located on concrete or HDPE–lined pads to contain drips and spills. The pads will drain to a sump to allow for collection of contaminants • Heavy and light vehicles will be washed down at a purpose-built

Control	Description
	washdown facility. Sediment from the washdown pad will be collected in a concrete sump and washwater will be treated to separate solids and hydrocarbons • Power station day tank, waste oil tank and lubricants will be located in a bund that complies with *AS 1940* • Diesel generators for the power station will be sited within impermeable compounds • Transformer stations will be located in bunded areas which meet the requirements of *AS 1940*, *AS 2067* and *AS/NZS 3007* • The reagent area will have a sump pump to collect spills • All hydrocarbon and chemical storage areas will be designed and constructed in accordance with *AS 1940* and *AS 1692* • Hydrocarbons including diesel fuel will be contained or stored in either an approved bunded area or in double skinned, self-bunded bulk tanks • All chemical reagents will be stored within tanks in appropriately bunded facilities whereby 110 percent of the largest vessel is contained and 25 percent of the total volume is contained according to *AS 1940* and *AS 1692* • Spill kits will be located throughout the Premises and employees trained in their use • Spills or leaks of fuels / oils will be contained within bunded areas and drain to a collection sump for removal and disposal to an appropriately licenced facility • Hydrocarbon contaminated waste will be segregated from other wastes and collected for off-site disposal by a licenced contractor • Hydrocarbon contaminated wastes (e.g. oil filters, rags, containers) will be kept in special containers for off-site disposal by a licenced contractor • A register of all hazardous materials imported to site or generated as a result of site activities will be maintained • All pipelines(raw water pipelines, potable water pipelines, effluent and treated effluent pipelines, process pipelines and brine pipelines) will be HDPE with welded joints • All pipelines will incorporate isolation valves at appropriate intervals • Periodic visual inspections of pipelines will be undertaken • All pipelines will be located within an earthen bund or buried to a depth of 600mm where necessary to prevent any interference with site drainage • Buried pipelines will be signposted • Sumps will be located at low points along the pipeline routes to contain material from pipeline leaks or ruptures
Requirements regarding Operation of Infrastructure	All ore residues around the concentrator will be periodically removed and either discharged to tails or fed through the plant

7.4.4 Key findings

The Delegated Officer has reviewed the information regarding stormwater runoff impacts from the premises and has found:

1. *The Surface Water Management Plan was not provided with the Application*
2. *Infrastructure will be constructed to separate clean and contaminated stormwater*
3. *All potentially contaminated water will be directed to an oil water separation system for treatment prior to discharge or re-use*
4. *All water storage ponds will be lined and have freeboard markers installed*

The Delegated Officer has reviewed the information regarding hydrocarbon, chemical and waste impacts from leaks and spills of waste at the Premises and has found:

1. *Hydrocarbon and chemical storage areas will comply with relevant Australian Standards*
2. *All pipelines(raw water pipelines, potable water pipelines, effluent and treated effluent pipelines, process pipelines and brine pipelines) will be HDPE with welded joints*
3. *Sumps will be located at low points along the pipeline routes to contain material from pipeline leaks or ruptures*

7.4.5 Consequence

The Delegated Officer has had regard to the nature and quantity of hazardous materials used on the Premises, the engineering / infrastructure controls in place and the distance to the nearest sensitive receptors (groundwater located from 30m below ground level and Yeo Lake approximately 12km east) and has determined that the impact of stormwater runoff and leaks and spills of hydrocarbons, chemicals and waste will result in low level on-site impacts and minimal off-site impacts at a local scale. Therefore, the Delegated Officer considers the consequence to be **minor**.

7.4.6 Likelihood of consequence

Based upon the distance to nearest sensitive receptors and Applicant controls the Delegated Officer has determined that the likelihood of stormwater runoff and leaks and spills of hydrocarbons, chemicals and waste impacting on soil, groundwater and surface water will probably not occur in most circumstances. Therefore, the Delegated Officer considers the consequence to be **unlikely**.

7.4.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 13) and determined that the overall rating for the risk of stormwater runoff and leaks and spills of hydrocarbons, chemicals and waste on sensitive receptors during construction and operation is **medium**.

7.5 Risk Assessment – TSF pipeline ruptures, overtopping and seepage (Operation)

7.5.1 General hazard characterisation and impact

There is the potential for discharges of tailings to the terrestrial environment through leaching, burst pipes or overtopping of the TSF embankments.

Seepage from the TSF is estimated to range between 50 and 100m^3/day for the Stage 1 embankment and up to 170 to 380m^3/day for the Stage 7 embankment. Seepage from the TSF has the potential to cause mounding of contaminated groundwater. Discharge of tailings through pipeline failure or embankment overtopping will impact upon adjacent vegetation through toxicity and physical smothering as well as sedimentation and contamination of surface water systems.

7.5.2 Criteria for assessment

Table 17 outlines the TSF design criteria and specifications (Gold Road, 2016a). The Application states that the TSF has been designed in accordance with *DMP, 2013* and *ANCOLD, 2012*.

Table 17: TSF design criteria and specifications

TSF	
Type	Engineered above ground
Footprint	TSF ~337ha TSF monitoring bores, track, powerline ~172ha
Height	41m
Storage capacity	61.6Mm^3 or 92.4Mt
Tailings Density	Delivered at approximately 60 percent solids (by weight) Settling to a stored density of 1.5t/m^3
Tailings Deposition Method	Sub-aerial deposition
Water Management System	Central decant system Perimeter and decant/central underdrainage system reporting to a recovery sump, which is pumped and returned to the processing plant Tailings recovery bores located on the eastern side of the TSF

7.5.3 Applicant controls

The Application outlines the Applicant controls for the TSF as set out in Table 18 below.

Table 18: Applicant controls for the TSF

Control	**Description**
Operating Manual	TSF Operating Manual developed and implemented to provide direction on the appropriate operation of the TSF
Infrastructure Design or Construction Requirements	• Designed to contain rainfall associated with a 1 in 100 year, 72 hour average recurrence interval event • Cut-off trench with a 4m base width excavated beneath the perimeter embankment and backfilled with compacted clayey mine waste to reduce the horizontal seepage losses • Trench excavated to a nominal depth of 1m to 1.5m (below prepared surface) with side cut batters of 1:1 (V:H)

Control	Description
	• Eight groundwater monitoring bores will be installed at the following locations: TSFM1 585428N 6905573E TSFM2 586120N 6905229E TSFM3 584710N 6905344E TSFM4 586596N 6904144E TSFM5 585974N 6903427E TSFM6 585459N 6903560E TSFM7 586105N 6903905E TSFM8 586374N 6904589E • Underdrainage piping system around the perimeter of the embankment upstream toe • Underdrainage piping network around the decant structure • Underdrainage lines comprise slotted pipe covered in aggregate and wrapped in geotextile, stablished with select rock-fill • Underdrainage system designed to adopt for total maximum design flow of 9.5 litres per second or 820m^3/day • Underdrainage water collected via the underdrainage piping system will drain by gravity to an internal underdrainage sump • The sump will be immediately adjacent to the upstream embankment toe • Sump has been sized to have a full storage capacity of 820m^3/day • Recovered underdrainage will be returned to the tailings beach and to the decant systems and back to the plant for re-use in the process facility • Process pipelines (tailings and return water) will be fitted with flow and leak detection sensors • Slurry pipeline will have flanges at approximately 60m intervals
Monitoring	Groundwater monitoring will be undertaken at 8 monitoring bores adjacent to the TSF to enable detection of seepage and groundwater mounding
Requirement of Operation of Infrastructure	500mm total freeboard
Restriction on Input	Design capacity of 8.8Mtpa

7.5.4 Key findings

The Delegated Officer has reviewed the information regarding the operation of the TSF and associated impacts and has found:

1. *Structural integrity of the TSF is regulated by DMP under the Mining Act 1978*
2. *The design of the TSF incorporates measures to actively recover tailings liquor and*

reduce seepage by more than 90%

3. *The TSF Operating Manual was not provided with the Application*
4. *A freeboard of 500mm will be maintained on the TSF*
5. *8 monitoring bores will be established to monitor groundwater adjacent to the TSF to enable detection of seepage and groundwater mounding*
6. *Process pipelines will be fitted with flow and leak detection sensors*

7.5.5 Consequence

All tailings produced from processing will be stored within the purpose built TSF. The tailings solids will be pumped to the TSF as a slurry at 60 percent solids (by weight) (i.e. 40 percent water by weight) (MBS, 2016b).

The Application states that samples of tailings were composited from a selection of 32 blended samples. A selection of four composite samples for geochemical assessment from the 32 metallurgical samples representing four ore areas across the pit area indicates that:

- Tailings samples had generally low levels of total sulfur (0.32 to 0.53 percent), with moderate amounts of sulfate-sulfur and estimated sulfide sulfur (non sulfate-sulfur) concentrations ranging from 0.02 to 0.40 percent.
- Levels of Acid Neutralisation Capacity (ANC) were moderate and sufficient to readily compensate for the marginal presence of reactive sulfides. ANC was identified to be predominantly present as readily reactive calcite (calcium carbonate ($CaCO_3$)).
- All tailings samples were classified as Non Acid Forming (NAF) with an alkaline reaction under simulated oxidation conditions (Net Acid Generation (NAG) pH of 9.4 to 10.8).
- Analysis of samples for total metals identified very low concentrations of environmentally significant metals and metalloids. While there was marginal enrichment in arsenic and selenium in some samples, concentrations are lower than most other gold deposits of the Yilgarn Craton.
- Fresh water leachates for all tailings samples were alkaline (pH 9.27 to 9.41), with moderate levels of soluble alkalinity (38 to 42mg/L as $CaCO_3$). Based on the raw water proposed to be used for site processing (21,000mg/L Total Dissolved Solids), tailings are also predicted to be saline to hypersaline, saturated with respect to gypsum and calcite and have a tendency to form a gypsum crust at or just below the tailings surface.
- Tailings are not expected to be spontaneously dispersive.
- Concentrations of soluble metals, metalloids and cyanide species were very low and at a 1:5 extraction ratio, well below *ANZECC and ARMCANZ, 2000* livestock health based drinking water guidelines.
- Based on results of dilute acid leach testing, primary metals that may be released from partial or complete oxidation of the low levels of available sulfidic materials in tailings, would be calcium (from subsequent acid neutralisation), iron and manganese – all of which are low toxicity metals with solubility dependent on final pH.

In addition a sample of supernatant from a 50 percent solids tailings slurry was examined to indicate the nature of tailings pore water during the operational phase of the TSF. Consistent with low levels of enrichment in the ore and tails, the supernatant was very low in most metals and metalloids. Selenium (0.07mg/L) and mercury (0.01mg/L) were selectively extracted under the high salinity, high cyanide conditions of trial processing, but for pore waters, these

concentrations are still considered low in relation *ANZECC and ARMCANZ, 2000* livestock drinking water guidelines.

The Delegated Officer has had regard to the information detailed above for tailings composition, Applicant controls and the distance to the nearest sensitive receptors (groundwater located from 30m below ground level and Yeo Lake approximately 12km east) and has determined that the impact of the TSF from seepage and pipeline ruptures will result in mid-level on-site impacts. Therefore, the Delegated Officer considers the consequence to be **moderate**.

7.5.6 Likelihood of consequence

Based upon the distance to nearest sensitive receptors and Applicant controls the Delegated Officer has determined that the likelihood of an environmental impact from TSF pipeline ruptures and seepage will not occur in most circumstances. Therefore, the Delegated Officer considers the consequence to be **unlikely**.

7.5.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 13) and determined that the overall rating for the risk of the TSF pipelines rupturing and seepage on sensitive receptors during operation is **medium**.

7.6 Risk Assessment – Landfill waste disposal and leachate (Operation)

7.6.1 General hazard characterisation and impact

All putrescible and inert waste type 1 (bricks and concrete) in accordance with the *Landfill Waste Classification and Waste Definitions 1996* will be disposed of into the Premises landfill (MBS, 2016a). The most significant impact of a landfill on the surrounding environment has been consistently identified as arising from leachate. Leachate discharges can enter the environment through seepage and runoff of contaminated stormwater from the active landfill area resulting in groundwater contamination.

Leachate quality varies throughout the operational life of the landfill and after its closure as well. During the early stages of waste degradation and leachate generation the composition is acidic and high in volatile fatty acids (the acetogenic phase). This acid leachate may dissolve other components of the wastes, such as heavy metals. The leachate also contains high concentrations of ammoniacal nitrogen and has both a high organic carbon concentration and a biochemical oxygen demand.

7.6.2 Criteria for assessment

Relevant land and groundwater quality criteria include the *ANZECC and ARMCANZ, 2000* for freshwater and marine waters, the *Landfill Waste Classification and Waste Definitions 1996* and *ASC NEPM*.

7.6.3 Applicant controls

The Applicant has the following controls in place to manage waste disposal and leachate at the landfill as set out in Table 19 below.

Table 19: Applicant controls for the landfill

Control	Description
Siting of Infrastructure	The location of the landfill has taken into consideration factors such as: • Visibility • Prevention of access by scavenging animals • Potential for flooding • Located 1km south west of the open mine pit
Infrastructure Design or Construction Requirements	• The landfill trench will be surrounded by an earthen bund of approximately 1m in height to prevent surface water runoff entering the cell • Trench design, consisting of multiple cells created within a larger 250m x 150m landfill area • Each cell will be approximately 30m long by 10m wide by 4m deep • The design length of 30m incorporates a ramp down into the trench where waste can be deposited and then compacted prior to more waste being deposited • The landfill area will be fenced to restrict unnecessary movements • Firebreak of at least 3m will be maintained around the perimeter of the landfill
Requirements regarding Operation of Infrastructure	• The landfill will be covered on a regular basis (at least monthly) • Any waste that is washed or blown outside of the landfill will be returned to the tipping area at least once every month
Restriction on Input	• Only putrescible waste and inert waste type 1 (bricks and concrete) will be disposed of at the landfill • No hydrocarbons and / or chemicals will be disposed of into the landfill facility • Design capacity of 1,400 tonnes per year

7.6.4 Key findings

The Delegated Officer has reviewed the information regarding the operation of the landfill and associated impacts and has found:

1. *Only putrescible and inert waste type 1 (bricks and concrete) in accordance with the Landfill Waste Classification and Waste Definitions 1999 are to be accepted at the landfill for disposal. The acceptance of waste for disposal not meeting the types permitted for disposal, may result in a breach of section 53 of the EP Act*
2. *Cap integrity of buried waste is important to reduce leachate generation*
3. *Detailed plans or specifications of the works relating to the landfill were not provided in the Application*

7.6.5 Consequence

Based on the information detailed above, distance to the nearest sensitive receptors and

groundwater level. The Delegated Officer has determined that the impact of waste disposal and leachate from the landfill will result in minimal off-site impacts on a local scale. Therefore, the Delegated Officer considers the consequence to be **minor**.

7.6.6 Likelihood of consequence

Based upon the distance to the nearest sensitive receptors and Applicant controls, the Delegated Officer has determined that the likelihood of an environmental impact from waste disposal and leachate associated with the landfill will not occur in most circumstances. Therefore, the Delegated Officer considers the consequence to be **unlikely**.

7.6.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 13) and determined that the overall rating for the risk of the landfill on sensitive receptors during operation is **medium**.

7.7 Risk Assessment – WWTP rupture of pipes, storage tank failure and irrigation (Operation)

7.7.1 General hazard characterisation and impact

The release of wastewater to the environment due to rupture of pipes, breakdown of pumps and irrigation may cause contamination of the surrounding soils. Treated wastewater may contain high levels of pathogens and nutrients which have been identified as key environmental hazards.

7.7.2 Criteria for assessment

The Applicant has provided a commitment in the Application that the WWTP will comply with a Low Exposure Risk Level (level of human contact) in accordance with *DoH, 2011* (refer to Table 5 for the effluent specifications).

Relevant land and groundwater quality criteria include *ANZECC and ARMCANZ, 2000* and the *NEPM ASC*.

7.7.3 Applicant controls

The Application outlines the Applicant controls for sewage discharge from the rupture of pipes, tank failure and irrigation as outlined in Tables 20 and 21 below.

Table 20: Applicant controls for sewage discharge from the rupture of pipes and tank failure

Control	Description
Siting of Infrastructure	• The land is not permanently or seasonally inundated or waterlogged, needs no artificial drainage or requires natural watercourses to be diverted • There is no Sensitive Water Resource within 500m of the WWTP • The WWTP is not within a Public Drinking Water Source Area, a wetland with defined conservation value, Environmental Protection Policy Lakes, Waterways Management Areas or other wetland
Infrastructure Design or Construction Requirements	• The wastewater will be treated in a modular Submerged Aeration Filter (SAF) WWTP (MAK Water (#MBBR-0035-C-X-X-X)) before being discharged to a dedicated spray field

Control	Description
	• The WWTP will be containerized with external pump skids and tanks • The WWTP will be designed and constructed to meet the following emission standards: (a) Biochemical Oxygen Demand <20mg/L (b) Total Suspended Solids <10mg/L (c) Total Nitrogen <30mg/L (d) Total Phosphorus <8mg/L (e) Turbidity <5NTU (f) Chlorine Residual >0.2-2mg/L (g) pH 6.5-8.5 (h) *E.coli* <10cfu/100mL • Boundary of WWTP fenced with appropriately signposted entrance / exit gate
Requirements regarding Operation of Infrastructure	• The WWTP will have contingency storage capacity for up to two days of normal flow if discharge is suspended while any problems are fixed • The WWTP will have remote monitoring and control capabilities • Pump pits will have duty / standby macerating pumps, control panels and alarms
Restriction on Input	Capacity to treat 35m^3/day of sewage

Table 21: **Applicant controls for irrigation of treated wastewater**

Control	Description
Siting of Infrastructure	• The land is not permanently or seasonally inundated or waterlogged, needs no artificial drainage or requires natural watercourses to be diverted • There is no Sensitive Water Resource within 500m of the spray field • The spray field is not within a Public Drinking Water Source Area, a wetland with defined conservation value, Environmental Protection Policy Lakes, Waterways Management Areas or other wetland
Infrastructure Design or Construction Requirements	• The irrigation area has been sized to 2ha • Spray field fenced and appropriately signposted
Requirements regarding Operation of Infrastructure	Effluent discharge from the WWTP will be managed to allow effluent to infiltrate or evaporate and prevent surface ponding or runoff from the irrigation area

7.7.4 Key findings

The Delegated Officer has reviewed the information regarding the risk of sewage discharge from WWTP rupture of pipes, storage tank failure and irrigation and has found:

1. *Untreated sewage will be appropriately stored with sumps located at low points along pipeline routes to capture and contain spills and leaks*
2. *The WWTP will have contingency storage capacity for up to two days of normal flow if discharge is suspended while any problems are fixed*
3. *Effluent discharge from the WWTP will be managed to allow effluent to infiltrate or evaporate and prevent surface ponding or runoff from the irrigation area*

7.7.5 Consequence

Based on the information detailed above and distance to the nearest sensitive receptors and that the wastewater will undergo treatment prior to discharge, the Delegated Officer has determined that the impact of WWTP pipe rupture, tank failure and the irrigation of treated wastewater will result in low level on-site impacts. Therefore, the Delegated Officer considers the consequence to be **minor**.

7.7.6 Likelihood of consequence

Based upon the treatment applied to the wastewater prior to irrigation and Applicant controls, the Delegated Officer has determined that the likelihood of an environmental impact from WWTP pipe ruptures, tank failure and the irrigation of treated wastewater will not occur in most circumstances. Therefore, the Delegated Officer considers the consequence to be **unlikely**.

7.7.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 13) and determined that the overall rating for the risk of discharges to land from the WWTP and spray field on sensitive receptors during operation is **medium**.

7.8 Summary of risk assessment and acceptability

A summary of the risk assessment and the acceptability of the risks with treatments are set out in Table 22 below. Controls are described further in section 8.

Table 22: Risk assessment summary

	Emission		Pathway and Receptor	Applicant controls	Impact	Risk Rating	Acceptability with treatment (conditions on instrument)
	Type	**Source**					
1	Leaks and spills of ore, hydrocarbons and chemicals and stormwater runoff	Ore processing and handling areas Breach of containment infrastructure and pipeline ruptures Washdown water Stormwater runoff Spillage of ore	Direct discharge to land and infiltration to soil	Infrastructure Design or Construction Requirements Management Plans Monitoring Requirement regarding Operation of Infrastructure	Soil contamination	Minor consequence Unlikely **Medium risk**	Acceptable subject to regulatory controls Construction Requirements for the works approval Requirements regarding operation of infrastructure and monitoring requirements for the licence
2	TSF pipeline ruptures, overtopping and seepage	Rupture of pipelines (tailings and return water) Overflow of TSF tailings Seepage from TSF	Direct discharge to land and infiltration to soil	Operating Manual Monitoring Infrastructure Design or Construction Requirements Requirement regarding Operation of Infrastructure Restriction on Input	Soil contamination Subterranean fauna Groundwater mounding Decrease in quality habitat of subterranean fauna	Moderate consequence Unlikely **Medium risk**	Acceptable subject to regulatory Construction Requirements for the works approval Requirements regarding operation of infrastructure and monitoring requirements for the licence

	Emission		Pathway and Receptor	Applicant controls	Impact	Risk Rating	Acceptability with treatment (conditions on instrument)
	Type	**Source**					
3	Windblown waste and leachate	Disposal of waste Leachate to soil	Discharges to land Seepage through soil	Siting of Infrastructure Infrastructure Design or Construction Requirements Requirements regarding Operation of Infrastructure Restriction on Input	Windblown waste Soil contamination Disruption to ecological processes in soil Increase in organic nutrients, metals, heavy metals and eutrophication	Minor consequence Unlikely **Medium risk**	Acceptable subject to regulatory controls Construction Requirements for the works approval Requirements regarding operation of infrastructure and restriction on input for the licence
4	WWTP rupture of pipes, storage tank failure and irrigation	Ruptures of pipes Overtopping of tanks due to failure of equipment Irrigation of treated effluent	Discharges to land	Siting of Infrastructure Infrastructure Design or Construction Requirements Requirements regarding Operation of Infrastructure Restriction on Input	Soil contamination Facilitated growth of weeds Increase in nutrients in soil Ponding in irrigation area	Minor consequence Unlikely **Medium risk**	Acceptable subject to regulatory controls Construction Requirements for the works approval Requirements regarding operation of infrastructure and restriction of input for the licence

8. Determined Regulatory Controls

A summary of the risks with corresponding controls are set out in Table 23. The risks are set out in the assessment in section 7 and the controls are detailed in this section 8. Controls will form the basis of conditions in the works approval set out in Attachment 1 and will be used to determine conditions in the subsequent licence.

Table 23: Summary of regulatory controls to be applied

		Controls	
		8.1 Infrastructure and Equipment (works approval only)	**8.2 Specified Action (licence only)**
Risk Items (see risk analysis in section 7)	**1. Leaks and spills of ore, hydrocarbons and chemicals and stormwater runoff**	●	●
	2. TSF pipeline ruptures, overtopping and seepage	●	●
	3. Windblown waste and leachate	●	●
	4. WWTP rupture of pipes, storage tank failure and irrigation	●	●

8.1 Infrastructure and Equipment (works approval only)

8.1.1 Leaks, spills and stormwater runoff Infrastructure and Equipment

The following environmental controls, infrastructure and equipment should be constructed to prevent and manage leaks and spills and stormwater runoff at the Premises. The specified infrastructure requirements have been derived from obligations of the Application and are considered necessary to ensure regulatory oversight and outline what has been assessed under the Issued Works Approval.

Infrastructure	Requirements (Design and Construction)
Diversion bunds and culverts	Constructed to separate clean and potentially contaminated water
All water storage ponds	Lined and freeboard markers installed
Oil water separation system	Constructed within a bunded area and designed to treat all stormwater and wastewater likely to be contaminated with hydrocarbons
All ore processing activities	Contained within bunded areas Constructed to drain to sumps with recovery pumps
Washdown facilities	Located on concrete pads

Infrastructure	Requirements (Design and Construction)
	Constructed to drain to an oil water separation system
Bulk Fuel Storage Facility	Located on concrete or HDPE lined pads Bunded Constructed to drain to a sump Equipped with overfill detection systems
Power station day tank, waste oil tank and lubricants	Located in a bund that complies with *AS 1940*
Diesel generators	Sited within impermeable compounds
Transformer stations	Located in bunded areas which meet the requirements of *AS 1940*, *AS 2067* and *AS/NZS 3007*
Reagent area	Sump pit to collect spills
Hydrocarbons and chemical storage areas	Designed and constructed in accordance with *AS 1940* and *AS 1692*
All pipelines (raw water, potable water, effluent and treated effluent, process and brine)	HDPE with welded joints Incorporate isolation valves Located within an earthen bund or buried to a depth of 600mm Buried pipelines signposted Sumps located at low points along the pipeline route

8.1.2 TSF Infrastructure and Equipment

The following environmental controls, infrastructure and equipment should be constructed to prevent pipeline ruptures, overtopping and seepage from the TSF. The specified infrastructure requirements have been derived from obligations of the Application and are considered necessary to ensure regulatory oversight and outline what has been assessed under the Issued Works Approval.

Infrastructure	Requirements (Design and Construction)
TSF	Designed to contain rainfall associated with a 1 in 100 year, 72 hour average recurrence interval event Cut-off trench with a 4m base width excavated beneath the perimeter embankment and backfilled with compacted clayey mine waste to reduce the horizontal seepage losses Trench excavated to a nominal depth of 1m to 1.5m (below prepared surface) with side cut batters of 1:1 (V:H)
Eight monitoring bores	Eight groundwater monitoring bores constructed at the following locations: TSFM1 585428N 6905573E TSFM2 586120N 6905229E

Infrastructure	Requirements (Design and Construction)
	TSFM3 584710N 6905344E TSFM4 586596N 6904144E TSFM5 585974N 6903427E TSFM6 585459N 6903560E TSFM7 586105N 6903905E TSFM8 586374N 6904589E
Underdrainage	Underdrainage piping system around the perimeter of the embankment upstream toe Underdrainage piping network around the decant structure Underdrainage lines to comprise slotted pipe covered in aggregate and wrapped in geotextile, stablished with select rock-fill Underdrainage system designed to adopt for total maximum design flow of 9.5 litres per second or 820m^3/day Sump sized to have a full storage capacity of 820m^3/day and located immediately adjacent to the upstream embankment toe
Pipelines	Process pipelines (tailings and return water) fitted with flow and leak detection sensors Slurry pipeline to have flanges at approximately 60m intervals

8.1.3 Landfill Infrastructure and Equipment

The following environmental controls, infrastructure and equipment should be constructed to manage the landfill facility at the Premises. The specified infrastructure requirements have been derived from obligations of the Application and are considered necessary to ensure regulatory oversight and outline what has been assessed under the Issued Works Approval.

Infrastructure	Requirements (Design and Construction)
Landfill	Landfill trench surrounded by an earthen bund of approximately 1m in height Landfill area 250m x 150m Fenced 3m firebreak

8.1.4 WWTP Infrastructure and Equipment

The following environmental controls, infrastructure and equipment should be constructed to prevent and manage pipeline ruptures, tank failure and irrigation at the WWTP. The specified infrastructure requirements have been derived from obligations of the Application and are considered necessary to ensure regulatory oversight and outline what has been assessed under the Issued Works Approval.

Infrastructure	Requirements (Design and Construction)
WWTP	MAK Water #MBBR-0035-C-X-X-X to be constructed Containerised with external pump skids and tanks

Infrastructure	Requirements (Design and Construction)
	Designed and constructed to meet the following emission standards: (i) Biochemical Oxygen Demand <20mg/L (ii) Total Suspended Solids <10mg/L (iii) Total Nitrogen <30mg/L (iv) Total Phosphorus <8mg/L (v) Turbidity <5NTU (vi) Chlorine Residual >0.2-2mg/L (vii) pH 6.5-8.5 pH units (viii) E.coli <10cfu/100mL Fenced and appropriately signposted
Spray field	Sized to 2ha Fenced and appropriately signposted

8.2 Specified Action (licence only)

The licence will include conditions regarding the operation of the specified infrastructure and equipment consistent with the controls proposed by the Applicant and detailed in section 7. Additional conditions to specify monitoring and reporting requirements will also be included to ensure that impacts and associated risk remain within the predicted range.

9. Appropriateness of Works Approval conditions

The conditions in the Issued Works Approval in Attachment 1 have been determined in accordance with DER's *Guidance Statement on Setting Conditions*.

Condition Ref	Grounds
Environmental Compliance Condition 1	Environmental compliance is a valid, risk-based condition to ensure appropriate linkage between the works approval and the EP Act.
Premises Conditions 2 and 3	These conditions are valid, risk-based and consistent with the EP Act.
Location of Works Condition 4	This condition is valid, risk-based and consistent with the EP Act.
Infrastructure and Equipment Conditions 5, 6 and 7	These conditions are valid, risk-based and contain appropriate controls (see section 8.1).
Records and Information Conditions 8 and 9	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.
Reports Conditions 10 and 11	
Requests for Information Condition 12	

DER notes that it may review the appropriateness and adequacy of controls at any time, and that following a review, DER may initiate amendments to the works approvals under the EP Act.

10. Applicant's comments

The Applicant was provided with the draft decision report and draft issued works approval on 23 January 2017. The Applicant's comments were received by DER in writing on 30 January 2017. Appendix 2 contains a summary of the Applicant's comments and the Delegated Officer's consideration.

11. Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this decision report (summarised in Appendix 1).

Based on this assessment, it has been determined that the Issued Works Approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Danielle Eyre
Senior Manager – Industry Regulation (Resource Industries)
An officer delegated under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key Documents

	Document Title	In text ref	Availability
1	Application for a Works Approval under the Environmental Protection Act 1686 (W6002/2016/1), Department of Water, 17 November 2016	DoW, 2016	DER internal
2	Australian Bureau of Statistics, 2011 Census Quickstats for Cosmo Newbery. Accessed 1 December 2016	2011 Census Quickstats	accessed at www.censusdata.abs.gov.au
3	Australian Standard AS 1692-2006 Steel tanks for flammable and combustible liquids	AS 1692	accessed at www.saiglobal.com
4	Australian Standard AS 1940-2004 The storage and handling of flammable and combustible liquids	AS 1940	
5	Australian Standard AS 2067-2008 Substations and high voltage installations exceeding 1 kV a.c.	AS 2067	
6	Australian/New Zealand Standard AS/NZS 3007:2013 Electrical equipment in mines and quarries-Surface installations and associated processing plant	AS/NZS 3007	
7	Department of Mines and Petroleum Code of Practice, Tailings storage facilities in Western Australia, 2013	DMP, 2013	accessed at www.dmp.wa.gov.au
8	DER *Guidance Statement on Decision Making,* November 2016		accessed at www.der.wa.gov.au
9	DER *Guidance Statement on Environmental Siting,* November 2016		
10	DER *Guidance Statement on Licence duration,* August 2016		
11	DER *Guidance Statement on Regulatory principles,* July 2015		
12	DER *Guidance Statement on Risk Assessments,* November 2016		
13	DER *Guidance Statement on Setting Conditions,* October 2015		
14	DER Guideline *Assessment and*		

	Document Title	In text ref	Availability
	management of contaminated sites, Contaminated sites guideline, December 2014		
15	Gruyere Gold Project – Gruyere Works Approval and Licence Amendment M38/1267, L38/254 and L38/255, prepared for Gold Road Resources Limited by MBS Environmental, October 2016	Gold Road, 2016a	DER internal
16	Gruyere Gold Project – Minor or Preliminary Works Stage 1: Accommodation Village and Access Road L38/254 and L38/255, prepared for Gold Road Resources Limited by MBS Environmental, September 2016	Gold Road, 2016b	DER internal
17	Gruyere Power Station – DER query, received from Nicole Garbin, MBS Environmental, 30 November 2016	MBS, 2016c	DER internal
18	Guidelines for the Non-potable Uses of Recycled Water in Western Australia, Department of Health, August 2011	DoH, 2011	accessed at www.health.wa.gov.au
19	Guidelines on Tailings Dams, Planning, Design, Construction, Operation and Closure, May 2012	ANCOLD, 2012	accessed at www.ancold.org.au
20	Landfill Waste Classification and Waste Definitions 1996 (As amended December 2009), Department of Environment and Conservation	Landfill Waste Classification and Waste Definitions 1996	accessed at www.der.wa.gov.au
21	National Environment Protection (Assessment of Site Contamination) Measure 1999	NEPM ASC	accessed at www.legislation.gov.au
22	National Water Quality Management Strategy, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000	ANZECC and ARMCANZ, 2000	accessed at www.environment.gov.au
23	National Water Quality Management Strategy, Australian Guidelines for Sewerage Systems Effluent Management, Agriculture and Resource Management Council of Australia and New Zealand and Australian and New Zealand Environment and Conservation Council, 1997	NWQMS, 1997	accessed at www.environment.gov.au
24	Priority Ecological Communities for Western Australia Version 24, Department	Parks and Wildlife,	accessed at

	Document Title	In text ref	Availability
	of Parks and Wildlife, Species and Communities Branch, 24 June 2016	2016	www.dpaw.wa.gov.au
25	RE: Gruyere Gold additional information required, received from Jonathon Barker (MBS Environmental), 3 January 2017	MBS, 2017a	DER internal
26	RE: Gruyere Gold Project – Information required, received from Nicole Garbin (MBS Environmental), 23 November 2016	MBS, 2016b	DER internal
27	RE: Gruyere Gold Project referral letter – DMP Comments, Department of Mines and Petroleum, 6 January 2017	DMP, 2017	DER internal
28	RE: Gruyere Gold Project – Information required, received from Nicole Garbin (MBS Environmental), 11 November 2016	MBS, 2016a	DER internal
29	RE: Gruyere Gold Project W6002 works approval application for comment, received from Jonathon Barker (MBS Environmental), 30 January 2017	MBS, 2017b	DER internal
30	Report and recommendations of the Environmental Protection Authority, Gruyere Gold Project, Gold Road Resources Limited, Report 1587, November 2016	Report Number 1587	accessed at www.epa.wa.gov.au
31	Statement that a Proposal may be implemented (*Environmental Protection Act 1986*), Statement No. 1048, Gruyere Gold Project, published on 29 December 2016	MS 1048	
32	Understanding-salinity – Salinity status classifications, by total salt concentration table, Department of Water	DoW, Salinity status classification	accessed at http://www.water.wa.gov.au/water-topics/water-quality/managing-water-quality/understanding-salinity

Appendix 2: Summary of Applicant's Comments on Risk Assessment and Draft Conditions

Comments received	Environmental risk/condition	DER consideration of risk:
Applicant – Comment on Works Approval Condition 5 - Infrastructure Requirements for all pipelines (raw water, potable water, effluent and treated effluent, process and brine) Applicant – Comment on Decision Report Table 16 and Infrastructure Requirements for Leaks, spills and stormwater runoff Infrastructure and Equipment	The Applicant has requested that the statement for all pipelines be changed to read: "Located within an earthen bund ~~and~~ *or* buried to a depth of 600mm" The Applicant stated that this was incorrectly worded in the Application and that normally TSF pipelines remain above ground within an earthen bund whilst others such as raw water/effluent and potable water pipelines are either buried or placed in an earthen bund (depending on locations and other infrastructure such as road crossing etc.) (MBS, 2017b)	Noted and accepted
Applicant – Comment on Decision Report Section 4.1.2 Report Number 1587	The Applicant requested the following be removed: **Flora and Vegetation** – direct impacts from the clearing of 2,260ha of flora and vegetation within the development envelopes	Report Number 1587 identified subterranean fauna and flora and vegetation as key environmental factors (pages 7 and 17). The Delegated Officer considers that based on this the statement will be retained
Applicant – Comment on Decision Report Section 4.1.3 MS 1048	The Applicant requested the removal of the following: *Report Number 1587* recommended conditions relating to subterranean fauna ~~and flora and vegetation~~.	No conditions were set within MS 1048 regarding flora and vegetation The Delegated Officer considers that based on this the statement "*Report Number 1587* recommended conditions relating to subterranean fauna and flora and vegetation" can be removed

Attachment 1: Issued Works Approval W6002/2016/1