Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works Approval Number	W6002/2016/1
Works Approval Holder	Gruyere Management Pty Ltd
ACN	615 728 795
Registered business address	Level 5, 50 Colin Street WEST PERTH WA 6005
File Number	DER2016/001978
Duration	04/02/2017 to 03/02/2020
Date of amendment	05/07/2018
Prescribed Premises	Category 5 – Processing or beneficiation of metallic or non-metallic ore Category 52 – Electric power generation Category 73 – Bulk storage of chemicals, etc. Category 85 – Sewage facility
Premises	Gruyere Gold Project Mining tenement M38/1267 COSMO NEWBERY WA 6440

This amended Works Approval is granted to the Works Approval Holder, subject to the following conditions, on 5 July 2018, by:

Date signed: 5 July 2018

Alana Kidd

MANAGER, LICENSING (RESOURCE INDUSTRIES)

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Explanatory notes

These explanatory notes do not form part of this Works Approval.

Defined terms

Definition of terms used in this Works Approval can be found at the start of this Works Approval. Terms which are defined have the first letter of each word capitalised throughout this Works Approval.

Department of Water and Environmental Regulation

The Department of Water and Environmental Regulation (DWER) is established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the *Environmental Protection Act 1986* (WA) (EP Act). The Department also monitors and audits compliance with licences and works approvals, takes enforcement action and develops and implements licensing and industry regulation policy.

Works Approval

Section 52 of the EP Act provides that an occupier of any premises commits an offence if any work is undertaken on, or in relation to, the premises which causes the premises to become, or to become capable of being, Prescribed Premises, except in accordance with a works approval.

Section 56 of the EP Act provides that an occupier of Prescribed Premises commits an offence if Emissions are caused or increased or permitted to be caused or increased, or Waste, noise, odour or electromagnetic radiation is altered or permitted to be altered from Prescribed Premises, except in accordance with a works approval or licence.

Categories of Prescribed Premises are defined in Schedule 1 of the *Environment Protection Regulations 1987* (WA) (EP Regulations).

This Works Approval does not authorise any activity which may be a breach of the requirements of another statutory authority including, but not limited to, the following:

- conditions imposed by the Minister for Environment under Part IV of the EP Act;
- conditions imposed by DWER for the clearing of native vegetation under Part V, Division 2 of the EP Act;
- any requirements under the *Waste Avoidance and Resource Recovery Act 2007;*
- any requirements under the *Environmental Protection (Controlled Waste) Regulations 2004*; and
- any other requirements specified through State legislation.

It is the responsibility of the Works Approval Holder to ensure that any action or activity referred to in this Works Approval is permitted by, and is carried out in compliance with, statutory requirements.

The Works Approval Holder must comply with the Works Approval. Contravening a Works Approval Condition is an offence under s.55 of the EP Act.

Responsibilities of Works Approval Holder

Separate to the requirements of this Works Approval, general obligations of Works Approval Holders are set out in the EP Act and the regulations made under the EP Act. For example, the Works Approval Holder must comply with the following provisions of the EP Act:

- the duties of an occupier under s.61; and

- restrictions on making certain changes to Prescribed Premises unless the changes are in accordance with a Works Approval, Licence, closure notice or environmental protection notice (s.53).

Strict penalties apply for offences under the EP Act.

Reporting of incidents

The Works Approval Holder has a duty to report to the Department all Discharges of Waste that have caused or are likely to cause Pollution, Material Environmental Harm or Serious Environmental Harm, in accordance with s.72 of the EP Act.

Offences and defences

The EP Act and its regulations set out a number of offences including:

- Offence of emitting an Unreasonable Emission from any Premises under s.49.
- Offence of causing Pollution under s.49.
- Offence of dumping Waste under s.49A.
- Offence of discharging Waste in circumstances likely to cause Pollution under s.50.
- Offence of causing Serious Environmental Harm (s.50A) or Material Environmental Harm (s.50B).
- Offence of causing Emissions which do not comply with prescribed standards (s.51).
- Offences relating to Emissions or Discharges under regulations prescribed under the EP Act, including materials discharged under the *Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA).*
- Offences relating to noise under the *Environmental Protection (Noise) Regulations 1997 (WA).*

Section 53 of the EP Act provides that a Works Approval Holder commits an offence if Emissions are caused, or altered, from a Prescribed Premises unless done in accordance with a Works Approval, Licence or the requirements of a closure notice or an environmental protection notice.

Defences to certain offences may be available to a Works Approval Holder and these are set out in the EP Act. Section 74A(b)(iii) provides that it is a defence to an offence for causing Pollution, in respect of an Emission, or for causing Serious Environmental Harm or Material Environmental Harm, or for discharging or abandoning Waste in water to which the public has access, if the Works Approval Holder can prove that an Emission or Discharge occurred in accordance with a Works Approval.

This Works Approval specifies the Emissions and Discharges, and the limits and Conditions which must be satisfied in respect of specified Emissions and Discharges, in order for the defence to offence provision to be available.

Authorised Emissions and Discharges

The specified and general Emissions and Discharges from the Works authorised through this Works Approval are authorised to be conducted in accordance with the Conditions of this Works Approval.

Amendment of Works Approval

The Works Approval Holder can apply to amend the Conditions of this Works Approval under s.59 of the EP Act. An application form for this purpose is available from DWER.

The CEO may also amend the Conditions of this Works Approval at any time on the initiative

of the CEO without an application being made.

Duration of Works Approval

The Works Approval will remain in force for the duration set out on the first page of this Works Approval or until it is surrendered, suspended or revoked in accordance with s.59A of the EP Act.

Suspension or revocation

The CEO may suspend or revoke this Works Approval in accordance with s.59A of the EP Act.

Definitions and interpretation

Definitions

In this Works Approval, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
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.
Books	has the same meaning given to that term under the EP Act.
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the *Environmental Protection Act 1986* Locked Bag 33 Cloisters Square PERTH WA 6850 info@dwer.wa.gov.au
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.
Commission	means the process of operation and testing that verifies the Works and all relevant systems, plant, machinery and equipment associated with the TSF and WWTP have been installed and are performing in accordance with Table 2.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
Department Request	means a request for Books or other sources of information to be produced, made by an Inspector or the CEO to the Works Approval Holder in writing and sent to the Works Approval's address for notifications, as described at the front of this Works Approval, in relation to:

	(a) compliance with the EP Act or this Works Approval; (b) the Books or other sources of information maintained in accordance with this Works Approval; or (c) the Books or other sources of information relating to Emissions from the Premises.
Discharge	has the same meaning given to that term under the EP Act.
DWER	Department of Water and Environmental Regulation.
Emission	has the same meaning given to that term under the EP Act.
Environmental Harm	has the same meaning given to that term under the EP Act.
EP Act	means the *Environmental Protection Act 1986* (WA).
EP Regulations	means the *Environmental Protection Regulations 1987* (WA).
GCL	means geosynthetic clay liner.
HDPE	means high density polyethylene.
Implementation Agreement or Decision	has the same meaning given to that term under the EP Act.
Inspector	means an inspector appointed by the CEO in accordance with s.88 of the EP Act.
IWL	means integrated waste landform.
LPG	means Liquefied Petroleum Gas.
Material Environmental Harm	has the same meaning given to that term under the EP Act.
mRL	means metres Reduced Level.
Mtpa	means million tonnes per annum.
NTU	means Nephelometric Turbidity Units.
Pollution	has the same meaning given to that term under the EP Act.
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.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Serious Environmental	has the same meaning given to that term under the EP Act.

Harm	
TSF	means Tailings Storage Facility.
Unreasonable Emission	has the same meaning given to that term under the EP Act.
Waste	has the same meaning given to that term under the EP Act.
Works	refers to the Works described in Schedule 2, at the locations shown in Schedule 1 of this Works Approval to be carried out at the Premises, subject to the Conditions.
Works Approval	refers to this document, which evidences the grant of the works approval by the CEO under s.54 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.
WWTP	means Wastewater Treatment Plant.

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;

(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; and

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act.

Conditions

Infrastructure and equipment

1. The Works Approval Holder must install and undertake the Works for the infrastructure and equipment:

(a) specified in Column 1; and

(b) to the requirements specified in Column 2.

of Table 3 in Schedule 3.

2. The Works Approval Holder must not depart from the requirements specified in Column 2 of Table 3 in Schedule 3 except:

(a) where such departure does not increase risks to public health, public amenity or the environment; and

(b) all other Conditions in this Works Approval are still satisfied.

3. Subject to Condition 1, within 30 days of the completion of the Works specified in Column 1 of Table 3 in Schedule 3, 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 of Table 3 in Schedule 3 has been constructed with no material defects and to the requirements specified in Column 2 of Table 3 in Schedule 3.

4. Where a departure from the requirements specified in Column 2 of Table 3 in Schedule 3 occurs and is of a type allowed by Condition 2, the Works Approval Holder must provide to the CEO a description of, and explanation for, the departure along with the certification required by Condition 2(b).

5. The Works Approval Holder shall Commission the TSF and WWTP for a period of no longer than 3 months, following submission of the report required by Condition 3.

Emissions

6. The Works Approval Holder must not cause any Emissions from the Works authorised through this Works Approval except for specified Emissions and general Emissions described in Column 1 of Table 2, subject to the exclusions, limitations or requirements specified in Column 2, of Table 2.

Table 2: Authorised Emissions table

Column 1	**Column 2**
Emission type	**Exclusions/Limitations/Requirements**
Specified Emissions	
Discharge of tailings to the TSF	Subject to compliance with: • Rows 10 and 11 of Table 3 in Schedule 3; and • Conditions 1 to 5
Treated wastewater from the WWTP to the Spray field	Subject to compliance with: • Rows 12 and 13 of Table 3 in

Column 1	Column 2
Emission type	**Exclusions/Limitations/Requirements**
	Schedule 3; and • Conditions 1 to 5
General Emissions (excluding Specified Emissions)	
Emissions which arise from undertaking the Works set out in Schedule 3.	Emissions excluded from General Emissions are: • Unreasonable Emissions; or • Emissions that result in, or are likely to result in, Pollution, Material Environmental Harm or Serious Environmental Harm; or • Discharges of Waste in circumstances likely to cause Pollution; or • Emissions that result, or are likely to result in, the Discharge or abandonment of Waste in water to which the public has access; or • Emissions or Discharges which do not comply with an Approved Policy; or • Emissions or Discharges which do not comply with prescribed standard; or • Emissions or Discharges which do not comply with the conditions in an Implementation Agreement or Decision; or • Emissions or Discharges the subject of offences under regulations prescribed under the EP Act, including materials discharged under the Environmental P*rotection (Unauthorised Discharges) Regulations 2004*.

Record-keeping

7. The Works Approval Holder must maintain accurate Books including information, reports and data in relation to the Works and the Books must:

(a) be legible;

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

(c) be retained for at least 3 years from the date the Books were made;

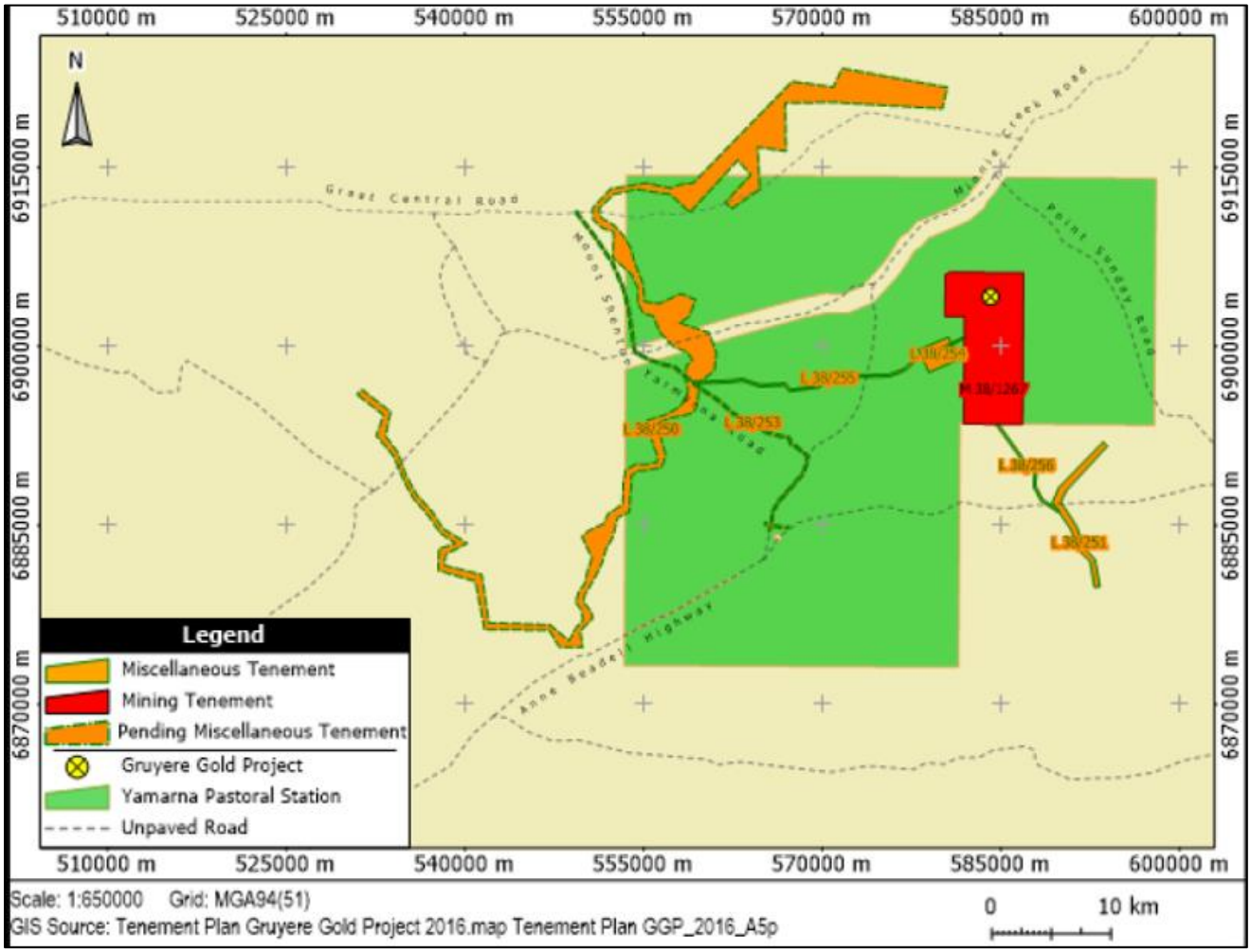
(d) be available to be produced to an Inspector or the CEO.

8. The Works Approval Holder must comply with a Department Request within 14 days from the date of the Department Request or such other period as agreed to by the Inspector or the CEO.

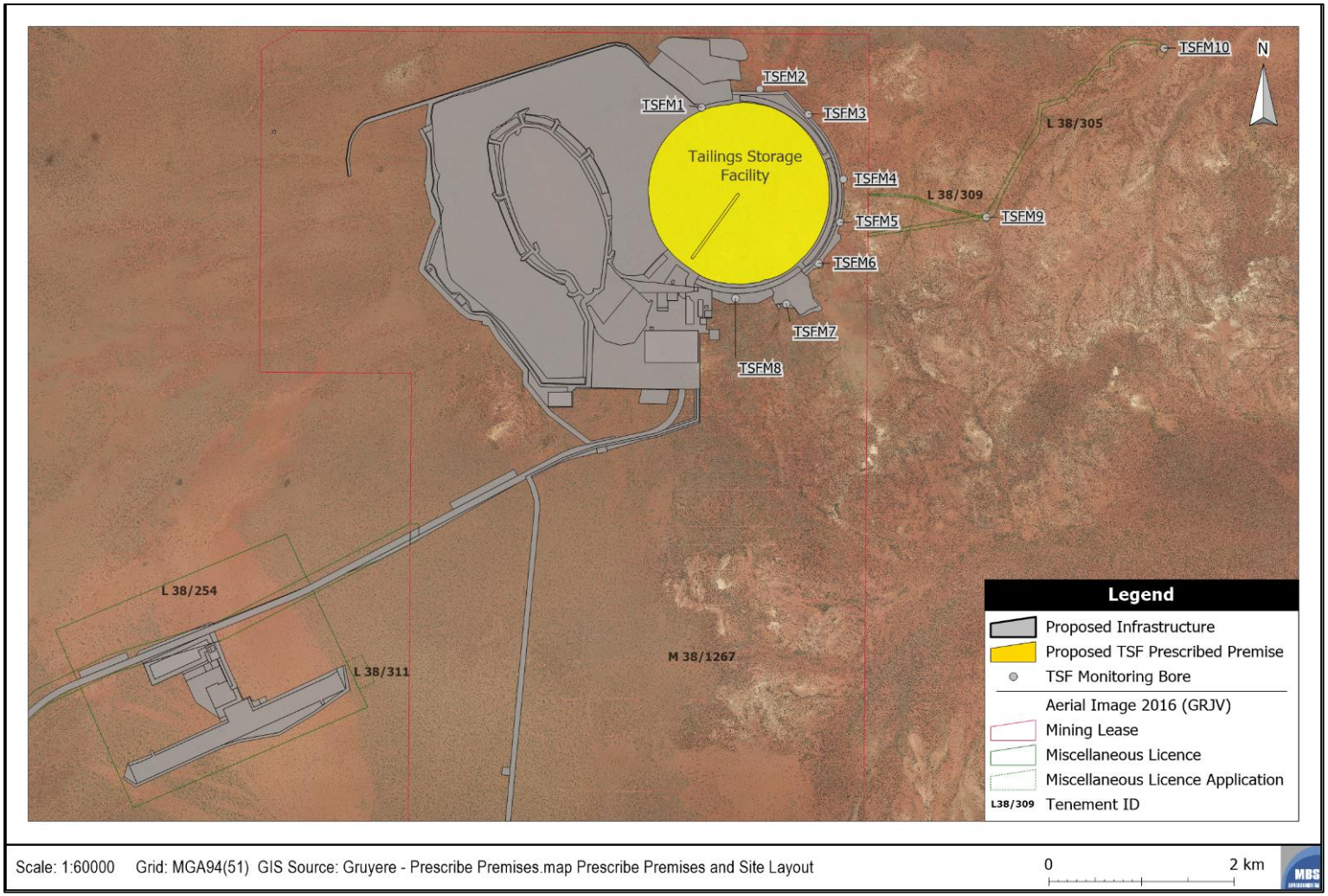
Schedule 1: Maps

Premises map

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

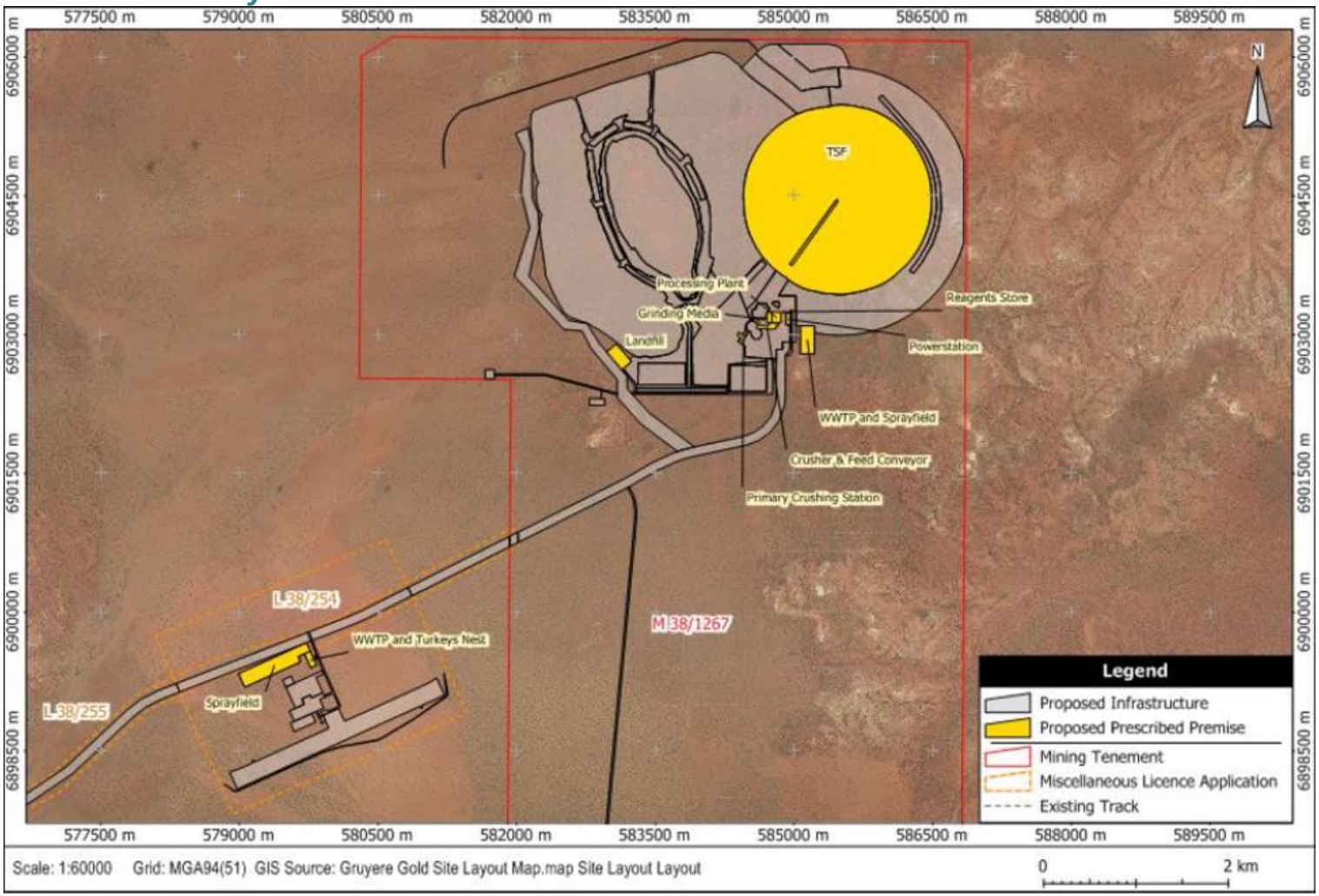


TSF monitoring locations

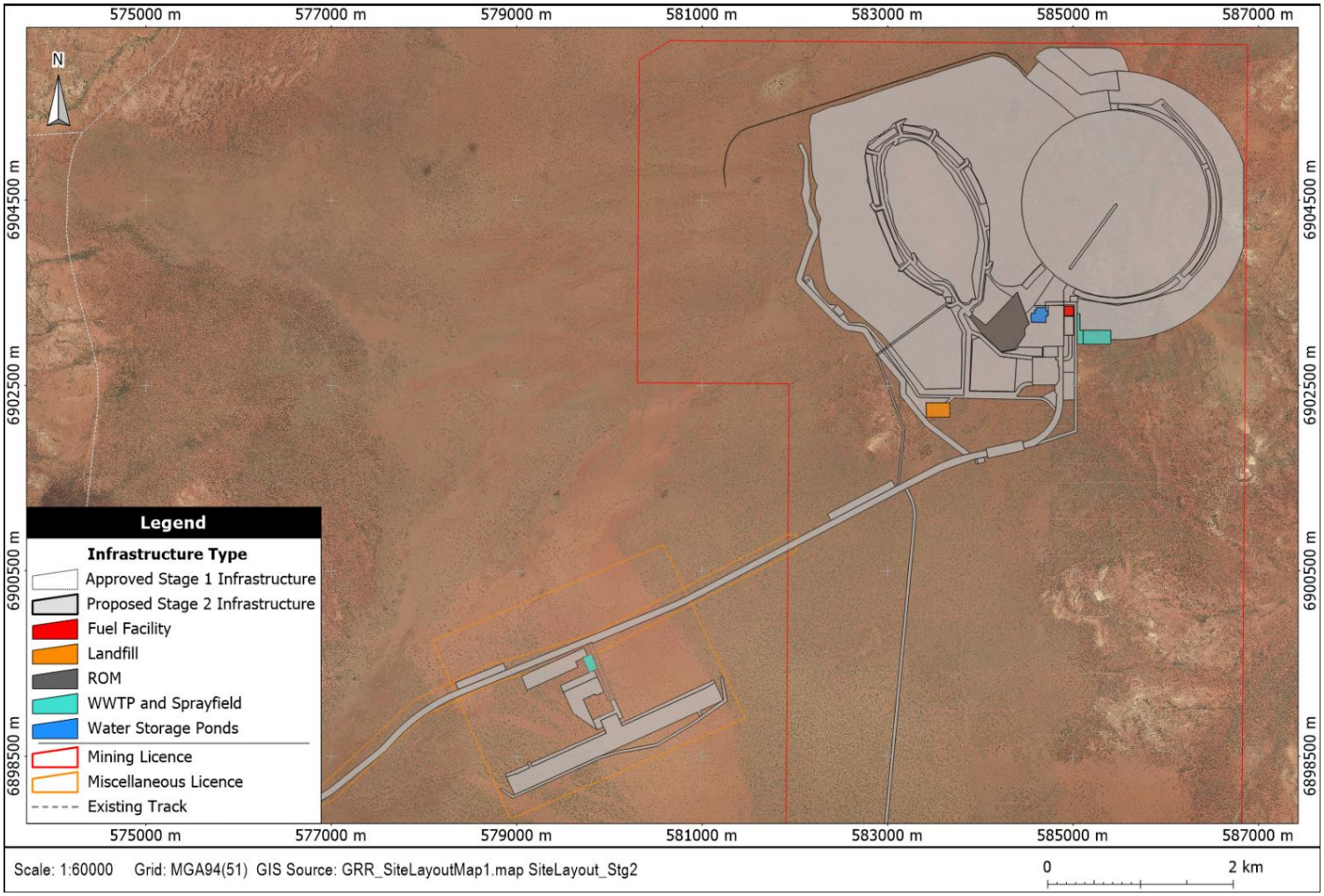


Schedule 2: Site Plans

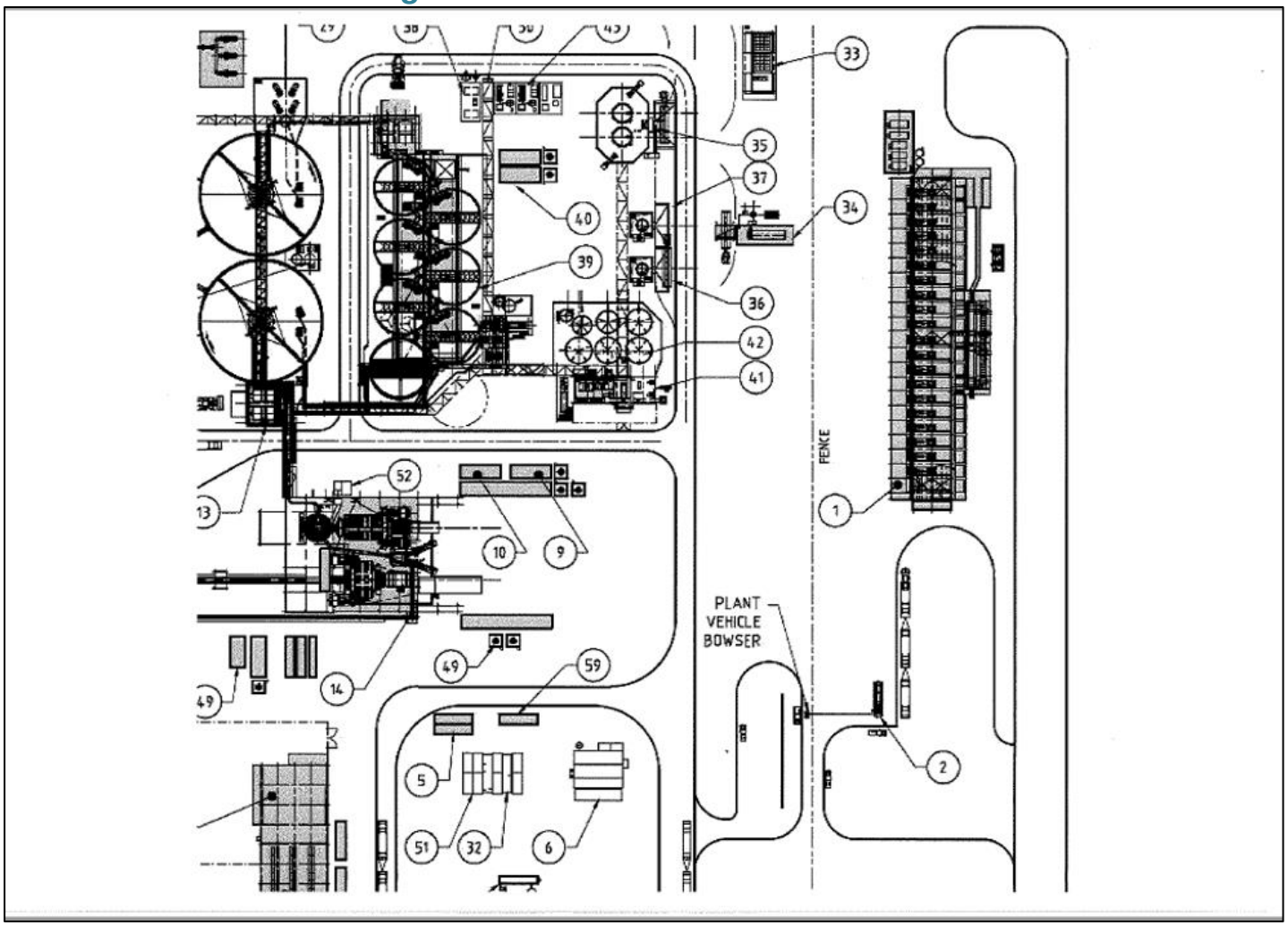
Site Plan 1 – Key infrastructure



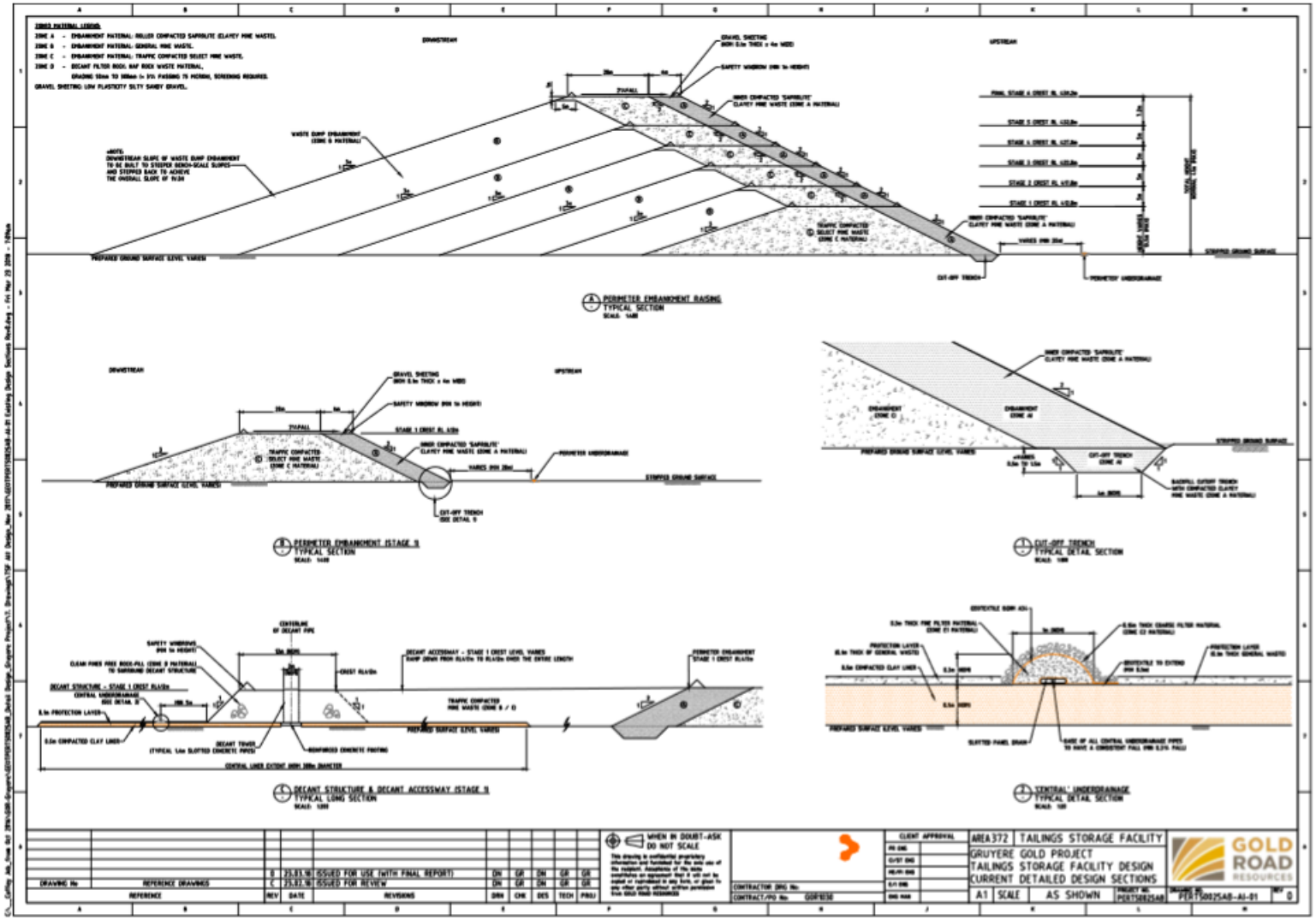
Site Plan 2 –Infrastructure locations



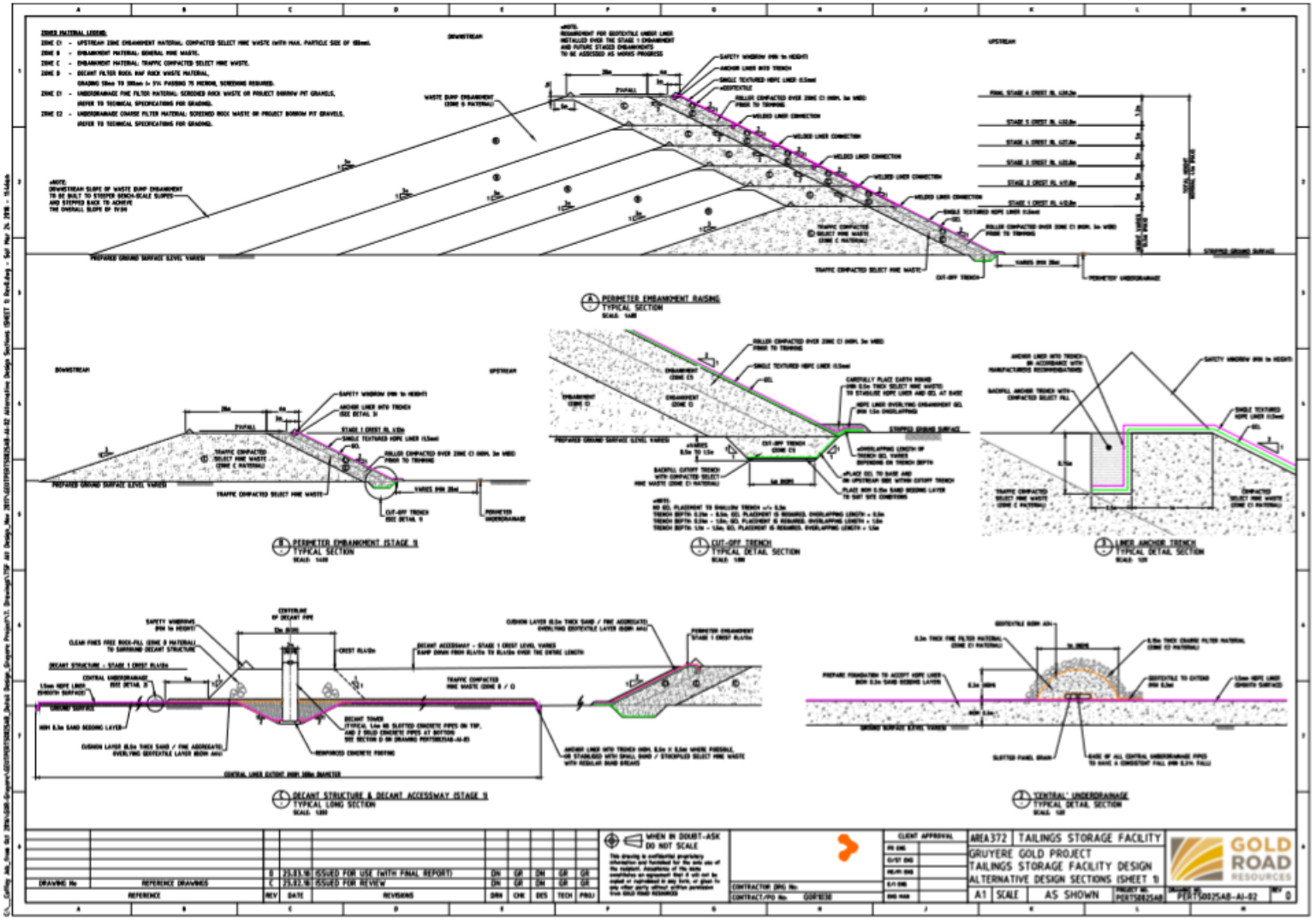
Site Plan 3 - WWTP arrangement



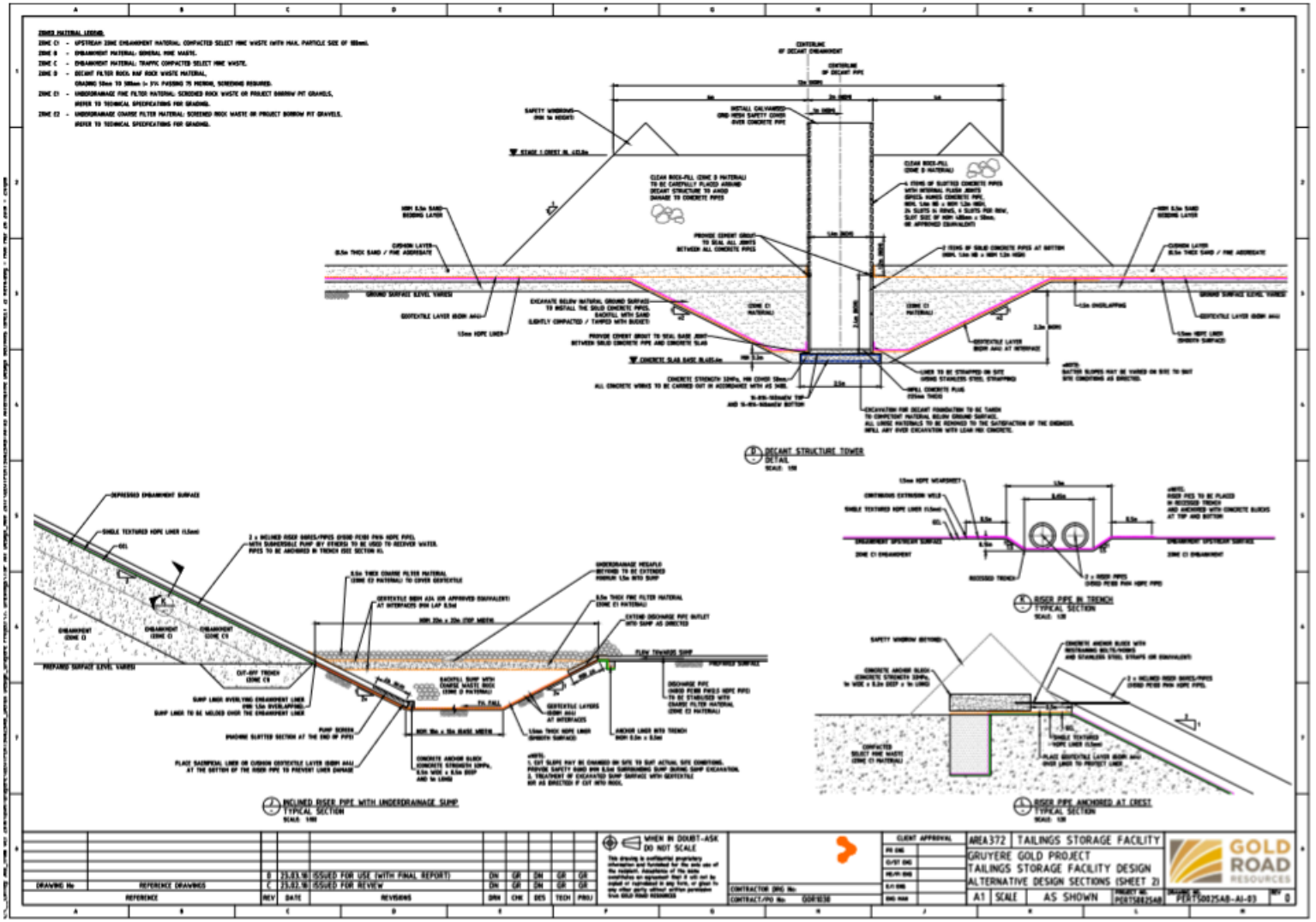
Site Plan 4 – Revised TSF Design (1 of 3)



Site Plan 5 – Revised TSF Design (2 of 3)



Site Plan 6 – Revised TSF Design (3 of 3)



Schedule 3: Works

Infrastructure and equipment

Infrastructure and equipment which are required to be built are listed in Table 3 as specified by Condition 1.

Table 3: Infrastructure and equipment requirements table

	Column 1	Column 2
	Infrastructure/ Equipment	**Requirements (design and construction)**
1	Stormwater containment	- Diversion bunds and culverts constructed to separate clean and potentially contaminated water.
2	All water storage ponds	- Lined with HDPE and freeboard markers installed.
3	Oil water separation system	- Constructed within a bunded area. - Constructed to treat all stormwater and wastewater likely to be contaminated with hydrocarbons.
4	All ore processing activities	- Contained within bunded areas. - Constructed to drain to sumps with recovery pumps.
5	Bulk Fuel Storage Facility	- Located on concrete or HDPE lined pads. - Bunded. - Constructed to drain to a sump. - Equipped with overfill detection systems.
6	Bulk Fuel Storage Facility Power station day tank, waste oil tank and lubricants Reagent area	- Designed and constructed in accordance with AS 1940 and AS 1692.
7	Diesel generators	- Sited within impermeable compounds.
8	Transformer stations	- Located in bunded areas which meet the requirements of AS 1940, AS 2067 and AS/NZS 3007.
9	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 600 mm.

	Column 1	Column 2
	Infrastructure/ Equipment	**Requirements (design and construction)**
		- Buried pipelines signposted. - Sumps located at low points along the pipeline route.
10	TSF	<u>TSF embankment, as shown in Site Plans 4, 5 and 6 in Schedule 2:</u> - IWL above ground TSF with a design storage capacity of 61.62 Mm^3 (92.43 Mtpa). - Stage 1 – Embankment level of 412 mRL. Starter embankment design comprises: - An 8 m wide upstream zone of traffic-compacted select mine waste Zone C (with maximum 100 mm particle size, be moisture conditioned and compacted in maximum 0.5 m layers) and Zone C1 (nominally 3 m wide and form the inner (upstream) zone to support the overlying liners) material); - A composite liner comprising a nominal 6 mm GCL (geosynthetic clay liner) and a 1.5 mm single textured HDPE liner placed on the prepared upstream face, anchored into a trench at the top and stabilised with mounded earth materials at the base; and - A 20 m wide (at the crest) zone of traffic-compacted select Zone C material. - Stage 2 - Embankment level of 417 mRL. - Stage 3 - Embankment level of 422 mRL. - Stage 4 - Embankment level of 427 mRL. - Stage 5 - Embankment level of 432 mRL. - Stage 6 - Embankment level of 439.2 mRL. - Designed to contain rainfall associated with a 1 in 100 year, 72 hour average recurrence interval event.
		<u>Central liner, as shown in Site Plan 4 in Schedule 2:</u> At the base of the TSF: • Placement of 1.5 mm smooth HDPE liner on sand layer of nominal 0.3 m thickness over the central liner area of radius 150 m; and • A top protection layer of sand/fines of nominal 0.5 m thickness and geotextile

	Column 1	Column 2
	Infrastructure/ Equipment	**Requirements (design and construction)**
		layer, placed over the HDPE liner.
		<u>Cut-off trench as shown in Site Plan 5 in Schedule 2:</u> - Designed with a 4m base width excavated beneath the perimeter embankment, lined with GCL on the base and the upstream slope of the excavation and backfilled with compacted select mine waste. - Trench excavated beneath the perimeter embankment to a nominal depth of 0.5 – 1.5 m with side cut batters of 1:1 (V:H).
		<u>Underdrainage system as shown in Site Plans 5 and 6 in Schedule 2:</u> - Designed for total maximum design flow of 6 L/s or 520 m^3/day. - Comprising perimeter underdrainage placed around the embankment upstream toe and an underdrainage network around the decant structure. - Central underdrainage piping network around the decant structure to the extent of a decant pond of nominal 150 m radius. This network will connect to underdrainage discharge pipes (160OD PE100 PN12.5 HDPE pipe) that report (by gravity) to the perimeter underdrainage sump. - The perimeter underdrainage pipe will be placed in a shallow trench nominally 0.2 m below the foundation stripped level. - Underdrainage lines will comprise of slotted pipe (150 and 450 Megaflow – slotted composite panel drain) covered in aggregate and wrapped in geotextile, stabilised with select rock-fill. - Flowmeter installed (or alternative) to allow volumes of seepage recovered from underdrainage system to be recorded. HDPE lined underdrainage sump will be: - Located immediately adjacent to the upstream embankment toe, and at the lowest point within the TSF basin; and - Sized to have a full storage capacity of

	Column 1	Column 2
	Infrastructure/ Equipment	**Requirements (design and construction)**
		585 m^3 and will be backfilled with select rock, resulting in an effective water storage capacity of 175 m^3.
		<u>Spigots for tailings deposition</u> Multiple spigots located on the upstream crest of the TSF perimeter embankment will be 60 m apart and comprise spigot off-take and valve assemblies discharging into conductor pipes.
		<u>Decant facility, as shown in Site Plans 4, 5 and 6 in Schedule 2:</u> - Constructed in stage 1 and raised in stages with the perimeter embankment. - Comprising slotted precast concrete pipes stacked vertically on one another and surrounded by selected clean rockfill. - Decant pump located within the central decant tower.
		<u>Tailings and return water pipelines</u> - Fitted with flow and leak detection sensors. - Slurry pipeline to have flanges at approximately 60 m intervals.
11	TSF monitoring system	- 3 pairs or six (3 by 2 no.) vibrating wire piezometers located at the base of the embankment. - Ten groundwater monitoring bores constructed at the following locations (as shown in the TSF monitoring location map in Schedule 1): TSFM1 585071N 6905388E; TSFM2 585697N 6905586E; TSFM3 586222N 6905314E; TSFM4 586598N 6904612E; TSFM5 586567N 6904146E; TSFM6 586331N 6903702E; TSFM7 585983N 6903262E; TSFM8 585433N 6903322E; TSFM9 588141N 6904200E; and

	Column 1	Column 2
	Infrastructure/ Equipment	**Requirements (design and construction)**
		TSFM10 590064N 6906027E.
12	WWTP	- MAK Water #MBBR-0035-C-X-X-X (as shown in the WWTP arrangement map in Schedule 2). - Containerised with external pump skids and tanks. - Contingency storage capacity for up to two days of normal flow. - Pump pits will have duty / standby macerating pumps, control panels and alarms. - Designed and constructed to meet the following emission standards: Biochemical Oxygen Demand <20 mg/L Total Suspended Solids <10 mg/L Total Nitrogen <3 0mg/L Total Phosphorus <8 mg/L Turbidity <5 NTU Chlorine Residual >0.2-2 mg/L pH 6.5-8.5 pH units *E.coli* <10 cfu/100 mL - Fenced and appropriately signposted.
13	Spray field	- Sized to 2 ha. - Fenced and appropriately signposted.

At the time of assessment, Emissions and Discharges from the Works listed in Table 4 were considered in the determination of the risk and related Conditions for the Works Approval.

Table 4: Authorised Works

Works	Specifications/Drawings
Processing plant producing gold with a capacity of 8,800,000 tonnes per year	Schedule 2: Site Plan 1 – Processing Plant.
TSF	Schedule 2: Site Plan 1 – TSF.
Power station consisting of:	Schedule 2: Site Plan 1 – Power Station.

Works	Specifications/Drawings
- 11 x Jenbacher J624 4.4 MW reciprocating gas engine generators with 10 or 11 emissions stacks located 12.5 m AGL; and - 2 x K2200 emergency diesel back-up generators with 2 emissions stacks located 5.1 m AGL.	
Bulk storage of fuel consisting of: - 1 x 55 kL (~50 m^3) self bunded diesel storage tank located at the gas power station; - 6 x 110 kL (~600 m^3 total capacity) self bunded diesel storage tanks for refuelling of light and heavy vehicles located directly north of the power station; and - 7 x 10 kL (~60 m^3 total capacity) self bunded oil storage tanks (total capacity 70 kL) located within the mining area workshops. Various ore processing reagents stored in designated reagent sheds or bulk storage units, including: - hydrochloric acid (70 m^3); - LPG (66 m^3); - sodium cyanide (440 m^3); and - sodium hydroxide (30 m^3).	Schedule 2: Site Plans 1 and 2.
MAK Water #MBBR-0035-C-X-X-X. 2ha sprayfield.	Schedule 2: Site Plans 1 and 2 – WWTP and Sprayfield.

Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Works Approval Amendment

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	W6002/2016/1
Applicant	Gruyere Management Pty Ltd
ACN	615 728 795
File Number	DER2016/001978
Premises	Gruyere Gold Project Mining tenement M38/1267 COSMO NEWBERY WA 6440
Date of Report	5 July 2018
Status of Report	Final

Table of Contents

1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
AGL	Above Ground Level
Annual Period	means a 12 month period commencing from 1 January until 31 December in the same year
Applicant	Gruyere Management Pty Ltd
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
Decision Report	refers to this document
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act
DMIRS	Department of Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force.
Existing Works Approval	The Works Approval issued under Part V, Division 3 of the EP Act and in force prior to this amendment

Term	Definition
GCL	geosynthetic clay liner
ha	hectare
HDPE	high density polyethylene
IWF	Integrated Waste Landform
kL	kilolitre
kV	kilovolt
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
Occupier	has the same meaning given to that term under the EP Act
OEPA	Office of the EPA
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Primary Activities	as defined in Schedule 2 of the Revised Works Approval
Review	this Works Approval review
Revised Works Approval	the amended Works Approval issued under Part V, Division 3 of the EP Act following the finalisation of this Review
RiWI Act	*Rights in Water and Irrigation Act 1914*
Risk Event	as described in *Guidance Statement: Risk Assessment*
RL	Reduced Level
RO	Reverse Osmosis
ROM	Run of Mine
SAG	semi-autogenous
TSF	Tailings Storage Facility

Term	Definition
w/w	weight per weight
WWTP	Wastewater Treatment Plant

2. Purpose and scope of assessment

On 5 April 2018 Gruyere Management Pty Ltd (Applicant) submitted an application (Gruyere, 2018a) to the Department of Water and Environmental Regulation (DWER) to amend the Existing Works Approval at the Gruyere Gold Project (Premises) issued under the *Environmental Protection Act 1986* (EP Act) for the following changes to the Tailings Storage Facility (TSF):

- A reduction in the number of TSF lifts from 7 to 6;
- Inclusion of a geosynthetic clay liner (GCL) and high density polyethylene (HDPE) liner;
- Inclusion of an underdrainage piping system; and
- Update to the TSF ambient groundwater monitoring bore locations (Gruyere, 2018b).

The Existing Works Approval assessed the emissions and discharges associated with the construction and operation of the following:

- Carbon in Leach (CIL) processing plant to produce Gold doré;
- 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.

The putrescible landfill assessed under the Existing Works Approval has been constructed with compliance documentation submitted on 14 July 2017. The landfill is now operational under Existing Licence L9000/2016/1.

This assessment has resulted in DWER issuing a Revised Works Approval W6002/2016/1 (Revised Works Approval) which is contained in Attachment 1.

2.1 Application details

Table 2 lists the documents submitted for this Review.

Table 2: Documents and information submitted for this Review

Document/information description	Date received
Gruyere Works Approval Amendment Application (Gruyere, 2018a) including: Application form; Attachment 1A – Tenement Register; Attachment 1C – Letter of Authorisation;	5 April 2018

Document/information description	Date received
Attachment 2 – Premises map; Attachment 3A – Memorandum, Works Approval Amendment for the Gruyere Tailings Storage Facility; Appendix 1: *Integrated Waste Landform Tailings Storage Detailed Design (92.4 Mt)* (GEOTPERT50025AB-AD), prepared by Coffey Corporate Services Pty Ltd for Gold Road Resources, 7 March 2017; Figures 1 to 8; Appendix A: *TSF Detailed Design Saprolite Testing – Materials Assessment* (GEOTPERT50025AB-AA), prepared by Coffey Geotechnics Pty Ltd for Gold Road Resources, 21 July 2016 *TSF Materials Assessment Report* (GEOTPERT50025AA-AI), prepared by Coffey Geotechnics Pty Ltd for Gold Road Resources, 1 July 2016 Appendix B: Tailings Testwork Results; Appendix C: Drawings; Appendix D: *Integrated Waste Landform Tailings Storage Construction Stage 1, Scope of Works and Technical Specification* (GEOTPERT50025AB-AA), prepared by Coffey Corporate Services Pty Ltd for Gold Road Resources, 24 February 2017; Appendix E: Schedule of Quantities (for all construction stages); Appendix F: Seepage Analysis (Output Plots); Appendix G: Stability Analysis (Output Plots); Appendix H: Deformation Analysis (Calculations) and Plaxis Output Plots; Appendix I: Water Balance Analysis (Calculations); Appendix J: Dam Break Analysis (Calculations); Appendix 2: *Memorandum for the Gruyere Project – Alternative Design – Lined TSF Rev0* (GEOTPERT50025AB-AI), from Coffey Services Australia Pty Ltd to Gruyere Management Pty Ltd, dated 26 March 2018; Attachment 4: Existing regulatory approvals and stakeholder consultation table; and Attachment 8A: Amendment application fee calculator.	
RE: Gruyere Works Approval Amendment Application, received from Jonathon Barker (MBS Environmental), including Prescribed Premises and Site Layout image (Gruyere, 2018b).	23 April 2018

3. Background

On 5 October 2016 Gold Road Resources Pty Limited submitted an application (Gold Road, 2016a) to the former Department of Environment Regulation (DER) for a works approval under the EP Act to develop an open pit mining operation to extract and process gold at the Premises, approximately 80 kilometres (km) north-east of Cosmo Newbery in the northeastern Goldfields region of Western Australia.

On 13 February 2017 a works approval amendment application (Transfer 2017) was submitted DER requesting the transfer of Works Approval W6002/2016/1 from Gold Road Resources Pty Limited to Gruyere Management Pty Ltd. On the 24 February 2017, Gruyere Management Pty Ltd provided written approval from Gold Road Resources Pty Limited supporting the transfer (Gruyere, 2017).

The Applicant acts as the manager and agent for on behalf of the Gruyere Project Joint Venture, 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 5,000 km^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 Revised Works Approval 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 3.

Table 3: 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 73	Bulk storage of chemicals etc.: premises on which acids, alkalis or chemicals that – (a) contain at least one carbon to carbon bond; and (b) are liquid at STP (standard temperature and pressure), are stored.	1,316 cubic metres (m^3) in aggregate
Category 85	Sewage facility: premises – (a) on which sewage is treated (excluding septic tanks); or	35 m^3 per day

	(b) from which treated sewage is discharged onto land or into waters.	

The Applicant will also be constructing the following infrastructure at the Premises 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.

4. Overview of Premises

4.1 Operational aspects

The operational aspects as defined within Gold Road, 2016a; MBS, 2016a; and Gruyere, 2018a 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:

- Run of Mine (ROM);
- Primary crushing;
- Crushed ore stockpile;
- Semi-autogenous (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 249 m^3 pregnant solution tanks and a 249 m^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 800 mm 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 1.

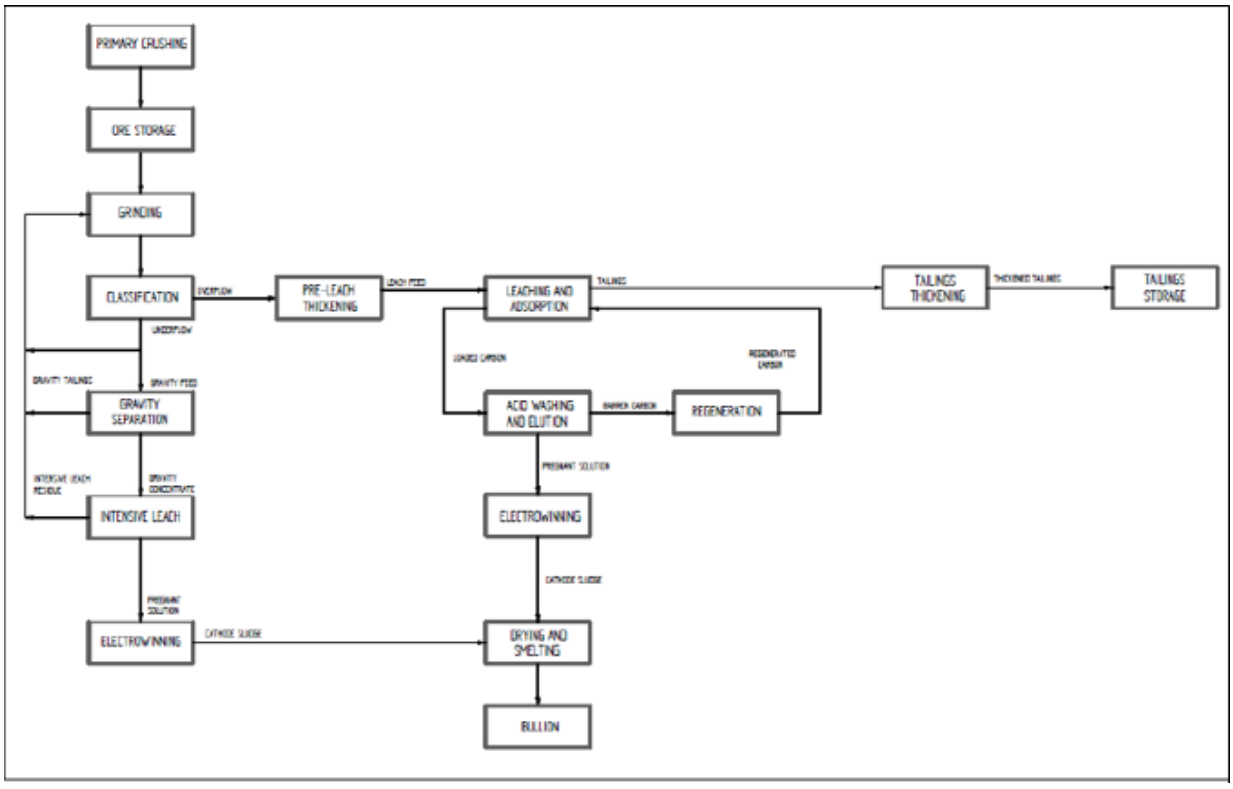


Figure 1: Processing Plant Flow Diagram

Processing Plant

Crushing, Conveying and Stockpiles

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 gold room.

Electrowinning will be carried out in a dedicated 800 mm x 800 mm 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 5,000 m^3 leaching tank and six 4,200 m^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.

TSF

A purpose built Integrated Waste Landform (IWL) (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.

Original studies undertaken at the Premises indicated a sufficient resource of clayey mine waste (saprolite) which was to be utilised to construct the upstream zone embankment and central liner areas of the TSF. Further studies and recent excavations on site has now identified that there may be insufficient suitable saprolite available from shallow pit area excavation for construction of these items, hence an alternative (HDPE and GCL) lined design is proposed (Gruyere, 2018a) as outlined in Table 21 (section 8.7.5).

TSF Design

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 million tonnes per annum (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 4 summarises the IWL storage capacity volumes over the life of the Premises.

The IWL TSF will be an above ground facility constructed in six stages comprising a starter embankment, then four lifts of 5 m and one lift of 7.2 m from the Stage 1 (starter) crest Reduced Level (RL) 412m to the final Stage 6 crest RL 439.2 m. The maximum embankment height of Stages 1 and 6 will be approximately 13.5 m and 41 m respectively.

Table 4: IWL Storage Capacity Volumes (Gruyere, 2018a)

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	5.94	5.94	8.91	1.1
2	417	207.6	8.02	13.96	20.94	2.59
3	422	212.8	10.28	24.24	36.36	4.61
4	427	218.0	10.53	34.77	52.15	6.72
5	432	223.2	10.80	45.56	68.33	8.87
6 (Final)	439.2	230.9	16.21	61.76	92.64	12.12

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 60 m 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, 2016b), confirming that the power station will be constructed using the gas power option only.

A 40 MW gas fired power station comprising 11 individual gas generator sets (gensets) each with a design capacity of 4 MW 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 4 MW. 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 35.7 MW with an average load of 32 MW 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 12.5 m above ground level (AGL) plus two stacks for the diesel gensets with the emission exhaust points located 5.1 m AGL.

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 5.

Table 5: Bulk storage of chemicals

Fuel type	Purpose	Storage infrastructure and location
Diesel	Supply to back up generators at gas power station	1 x 55 kilolitres (kL) self bunded storage tank located at the gas power station
Diesel	Refuelling heavy and light fleet vehicles	6 x 110 kL self bunded storage tanks located directly north of the power station
Oil	Equipment and maintenance purposes	7 x 10 kL 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 1940-2004 "The storage and handling of flammable and combustible liquids"*. 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 32 kL balance tank and a Moving Bed Bioreactor with waste streams directed to a sludge tank and a 32 kL treated effluent tank. The treated effluent tank will discharge by pump to a 2 hectare (ha) 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 6.

Table 6: 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

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 2 mm 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 32 kL 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.
- 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.

4.2 Infrastructure

The Premises infrastructure, as it relates to Category 5, 52, 73 and 85 activities, is detailed in Table 7 and with reference to the site layout (Figures 2 and 3). Information has been summarised from Gold Road, 2016a.

Table 7: Premises infrastructure

	Infrastructure	**Site Plan Reference**
	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 Mtpa of Gruyere fresh ore and up to 8.8 Mtpa 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	ROM pad and coarse ore stockpile	As shown in Figure 3: ROM
2	Primary Crushing Plant (open circuit gyratory crusher)	As shown in Figure 2: Processing Plant, Grinding Media, Crusher & Feed Conveyor and Primary Crushing Station
3	Two stage grinding circuit (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 4 m x 1-1.5 m cut-off trench, decant tower, decant return pipeline, seepage recovery sump, perimeter underdrain, underdrainage network and perimeter surface water diversion structure	As shown in Figure 2: TSF
10	Processing reagents (carbon, flocculant, hydrochloric acid, liquid petroleum gas, oxygen, sodium cyanide, sodium hydroxide, smelting fluxes, steel balls and quicklime)	As shown in Figure 2: Reagents Store
11	Containment ponds (HDPE lined process water pond and a sedimentation pond)	As shown in Figure 3: Water Storage Ponds

	Infrastructure	Site Plan Reference
	Prescribed Activity Category 52	
The Premises will generate and transmit power required for gold processing operations and associated activities on-site.		
1	40 MW power station comprised of 11 Jenbacher J624 4.4 MW reciprocating gas engine generators	As shown in Figure 2: Powerstation
2	2 x K2200 emergency diesel back-up generators	
3	1 x 55 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 55 kL (~50 m^3) self bunded diesel storage tank located at the gas power station	As shown in Figures 2 and 3: Powerstation and Fuel Facility
2	6 x 110 kL (~600 m^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 10 kL (~60 m^3 total capacity) self bunded oil storage tanks (total capacity 70 kL) located within the mining area workshops	
4	Various ore processing reagents, including: • hydrochloric acid (70 m^3); • Liquefied Petroleum Gas (LPG) (66 m^3). LPG will be reticulated via buried pipelines; • sodium cyanide (440 m^3); and • sodium hydroxide (30 m^3). Typical combined storage volumes of processing reagents that meet the description of Category 73 prescribed activity is	As shown in Figure 2: Reagents Store

	Infrastructure	Site Plan Reference
	approximately 606 m^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 35 m^3/day of sewage.		
1	Pump pits with duty/standby macerating pumps, control panel and alarms	As shown in Figures 2 and 3: WWTP and Sprayfield
2	Influent screen	
3	32 kL balance tank	
4	Influent feed pump	
5	Moving bed reactor	
6	9 kL sludge tank	
7	32 kL treated effluent tank	
8	2 ha spray field with above ground sprinkler arrangement	
9	Fencing around the boundary of the WWTP and spray field	

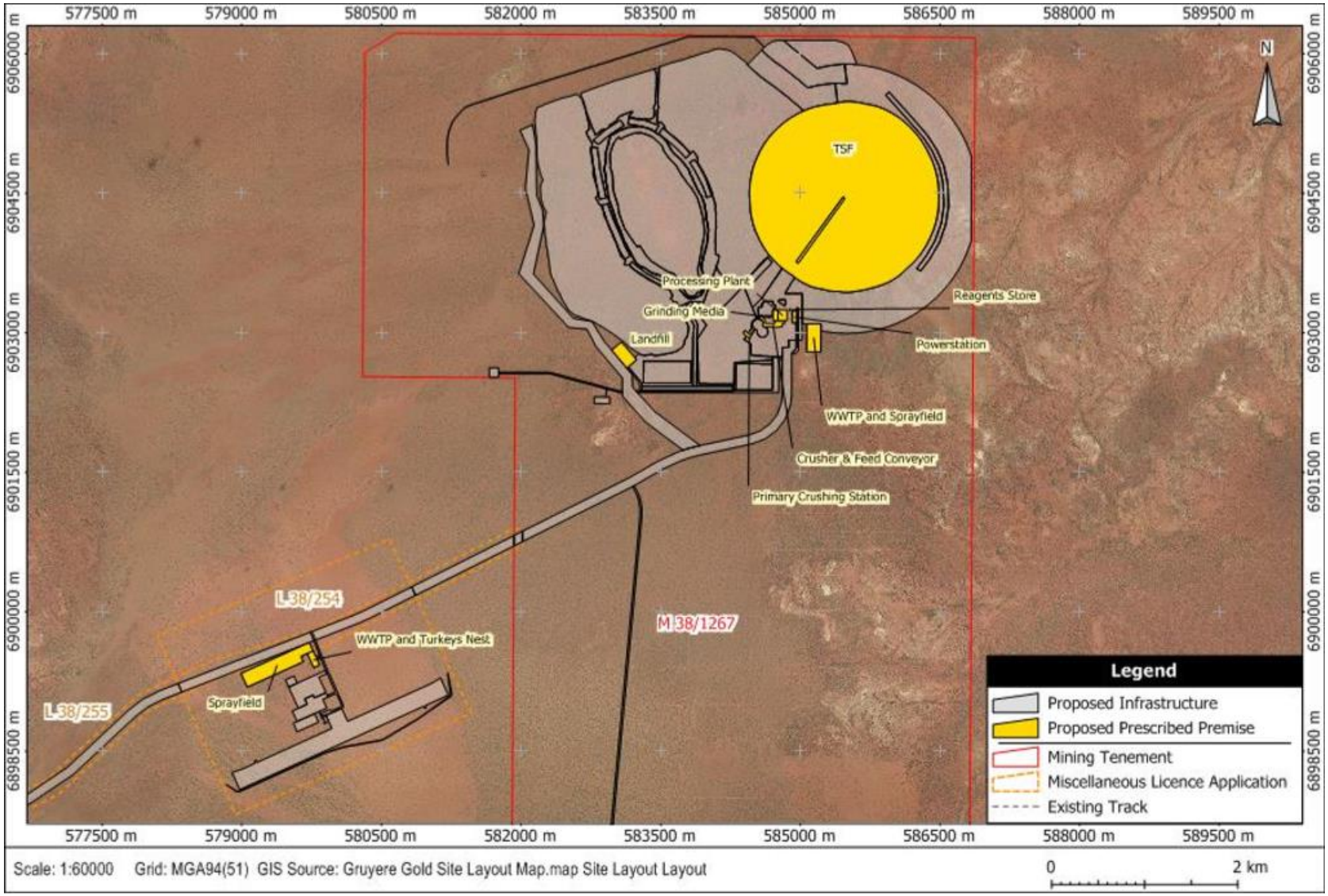


Figure 2: Site layout 1

Figure 3: Site layout 2

4.3 Exclusions to the Premises

Additional activities which will be occurring at the Premises but are not within the scope of this assessment include:

- Mining ore from open pits.
- Mine dewatering. This activity is not regulated by DWER 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.
- Treated effluent from the WWTP may be used for dust suppression on-site. This activity is not regulated by DWER and the Applicant requires approval from the Department of Health prior to this occurring.
- Abstraction of groundwater. This activity is regulated under the *Rights in Water and Irrigation Act 1914* (RiWI Act).
- 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 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 DWER, however the brine pipelines and the process water pond may be regulated by DWER.

5. Legislative context

Table 8 summarises approvals relevant to the assessment.

Table 8: Relevant approvals

Legislation	Number	Subsidiary	Approval
RiWI Act	GWL176189 and GWL177087	Gruyere Management Pty Ltd	Groundwater abstraction activities
Mining Act 1978	REG ID: 71094	Gruyere Management Pty Ltd	Mining Proposal Gruyere Project Gruyere Gold Mine, Anne Beadell and Yeo Borefields
	REG ID: 69619	Gruyere Management Pty Ltd	Gruyere gold Mine, Anne Beadell and Yeo Borefields Mining Proposal – Part 1
	REG ID: 67934	Gruyere Management Pty Ltd	Gruyere Gold and Anne Beadell Borefield Mining Proposal
	REG ID: 63733	Gold Road Resources Limited	Part 1 – Stage 2 Mining Proposal Gruyere Gold Project

5.1 Part IV of the EP Act

5.1.1 Background

Gold Road Resources Limited 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 Resources Limited 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.

5.1.2 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 2,260 ha of flora and vegetation within the development envelopes.

5.1.3 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 Resources Limited 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.

A change to the proposal approved under section 45C of the EP Act (associated with clearing and groundwater dewatering and abstraction) was signed on 4 September 2017 by the Chairman of the EPA.

5.2 Part V of the EP Act

5.2.1 Applicable regulations, standards and guidelines

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

The guidance statements which inform this assessment are:

- *Guidance Statement: Regulatory Principles (July 2015);*
- *Guidance Statement: Setting Conditions (October 2015);*
- *Guidance Statement: Decision Making (February 2017);*

- *Guidance Statement: Risk Assessments (February 2017);* and
- *Guidance Statement: Environmental Siting (November 2016).*

5.2.2 Works approval and licence history

Table 9 summarises the works approval and licence history for the Premises.

Table 9: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
W6002/2016/1	03/02/2017	New works approval for category 5 (gold processing plant and TSF), category 52 (power station), category 64 (landfill), category 73 (bulk fuel facility) and category 85 (sewage facility).
W6002/2016/1	4/04/2017	Transfer of works approval.
L9000/2016/1	4/08/2017	New licence for a category 54 WWTP at the miners accommodation village, constructed under W5997/2016/1.
L9000/2016/1	19/10/2017	Amendment Notice 1 Licence amendment to include the category 64 landfill constructed under W6002/2016/1.
L9000/2016/1	12/03/2018	Amendment Notice 2 Licence amendment to include category 12 for a mobile crushing and screening plant.
W6002/2016/1	5/07/2018	Works approval amendment to update TSF design and location of ambient groundwater monitoring bores.

5.2.3 Clearing

The clearing of native vegetation is not approved under the Revised Works Approval. The clearing of no more than 2,930 ha (which includes up to 15 ha of the groundwater dependent ecosystem DD-MWS1) within the 19,925 ha development envelope has been authorised under MS 1048.

6. Consultation

6.1 Original Works Approval

The original works approval 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 the former Department of Water (DoW) on 31 October 2016 and former Department of Mines and Petroleum (DMP) on 28 November 2016.

DER received the following advice from DoW on 17 November 2016 regarding Gold Road, 2016a:

- 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 Gold Road, 2016a:

- 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. The Applicant responded on 30 January 2017 (MBS, 2017b).

6.2 Revised Works Approval

A letter of referral for the Revised Works Approval was sent to the Department of Mines, Industry Regulation and Safety (DMIRS) on 2 May 2018 (relating to Gruyere, 2018a). DWER received the following comments from DMIRS (DMIRS, 2018) on 1 June 2018:

- The Gruyere Gold Project Mining Proposal (REG ID 71094) was approved under the *Mining Act 1978* on 15 February 2018, which included the construction and operation of the TSF;
- "*Gruyere Management Pty Ltd subsequently submitted a self-assessed 'Proforma for Notification of Minor Changes' to DMIRS on 15 February 2018. The minor changes captured modifications to the TSF liner, including utilisation of HDPE plastic lining as a replacement of saprolite (Zone A).*
- *A DMIRS Resource Safety Division (RSD) Geotechnical Inspector reviewed the proposed change and concluded that the proponent's assessment appeared to be valid. No further advice was recommended and no further Mining Act 1978 approvals were required in order for the proponent to implement the change*.
- *DMIRS notes that the proponent's 'Proforma for Notification of Minor Changes' did not include the reduction in a number of lifts from 7 to 6, however DMIRS considers that this change reduces the overall risk of the facility and does not require further Mining Act 1978 approvals.*
- *DMIRS has considered the Works Approval Amendment application and considers it to be generally consistent with the minor changes to the approved Mining Proposal".*

7. Location and siting

7.1 Siting context

The Premises is located approximately 80 km east of Cosmo Newbery and 150 km north-east of Laverton in Western Australia as shown in Figure 4. 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 6 km 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.

7.2 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 10. 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 25 km from the Premises at the old Yamarna homestead, which includes accommodation that can cater for up to 30 exploration personnel.

Table 10: 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 92 km to the west of the processing plant.

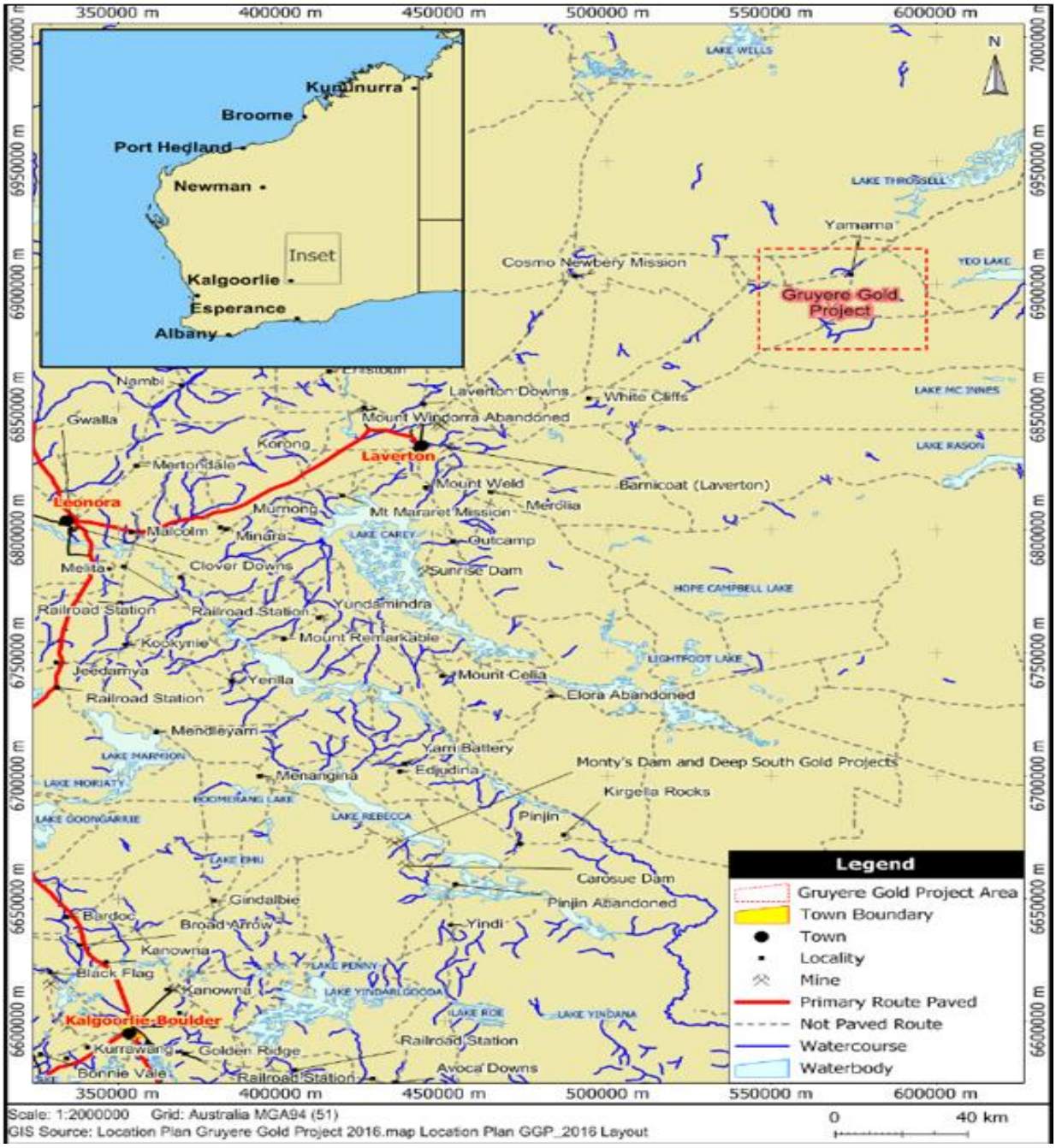


Figure 4: Regional location

7.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 11. Table 11 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guidance Statement: Environmental Siting.*

Table 11: Environmental values

Specified ecosystems	**Distance from the Premises**
Ramsar Sites in Western Australia	Lake Ballard is greater than 30 km to the south-west of the TSF.
Department of Biodiversity, Conservation and Attractions Managed Lands and Waters	Yeo Lake Nature Reserve boundary is located approximately 12 km east of the processing plant.
Threatened Ecological Communities and Priority Ecological Communities	There are no Threatened Ecological Communities or Priority Ecological Communities within or in a 30 km radius of the Premises.
Declared Rare Flora	There are no Declared Rare Flora within or in a 30 km radius of the Premises.
Biological component	**Distance from the Premises**
Threatened/Priority Flora	Two Priority Flora taxa *Calytrix warburtonensis* (Priority 2) and *Thryptomene nealensis* (Priority 3) were identified within M38/1267. Neither of these species has been identified in areas of proposed disturbance (Gold Road, 2016a).
Threatened/Priority Fauna	Database searches identified 21 species of conservation significance that have the potential to occur within the project area. Of these 21 species only two (Rainbow Bee-eater and Southern Marsupial Moles) were observed during the surveys. The Rainbow Bee-eater was recorded outside the project footprint and the Southern Marsupial Moles (Priority 4 species) were recorded during the borefield surveys. The Applicant has stated that "*habitat will be avoided through pipeline alignment and placement of the pipeline on the surface of dunes (with shallow covering) as opposed to a directional cut through the dune*" (Gold Road, 2016a).

7.4 Hydrogeology

Gold Road, 2016a 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 12 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 25 km to the west of the Premises. The Yeo Palaeochannel occurs within the Quaternary Deposits, being approximately 14 m 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.

Table 12: 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

7.5 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 13.

Table 13: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
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.	The Laverton Water Reserve provides potable water to the Laverton Town Water Supply.
Groundwater and groundwater salinity	Gold Road, 2016a states that groundwater can be located at an average depth of 65 m below ground level. Standing water	Groundwater salinity (Total Dissolved Solids) is 1,000 – 3,000 mg/L) which is considered brackish (Salinity

	levels measured in the exploration holes ranged between 30 m to 40 m depth. Recharge occurs via infiltration and through localised drainage systems during large rainfall events. There is a groundwater bore located approximately 6 km west of the Premises (based on available GIS dataset – WIN Groundwater Sites).	status classifications).
RiWI Act	The Premises is located in the Proclaimed Goldfields Groundwater Area.	N/A.
Watercourses	Reetz Creek and Lake Throssell are approximately 15 km to the south and north-east of the Premises respectively. There are a few unnamed, ephemeral and relatively minor watercourses which drain in a generally south-west to north-west direction towards Lake Throssell. According to DWER's GIS dataset there is a Major Tributary, Minor River and Minor Tributary (Watercourse – Minor, Non Perennial) approximately 26 km to the west, 14 km to the north and 25 km to the south-west of the Premises respectively	Unnamed creeks in the regional area are dry throughout the year except during periods of rain activity from seasonal thunderstorms and occasional cyclone remnants.

7.6 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 5.1.2 and 5.1.3).

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.

7.7 Soil type

DWER'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) (Northcote, 1960-68).

7.8 Meteorology

7.8.1 Regional climatic aspects

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

7.8.2 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 5. 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).

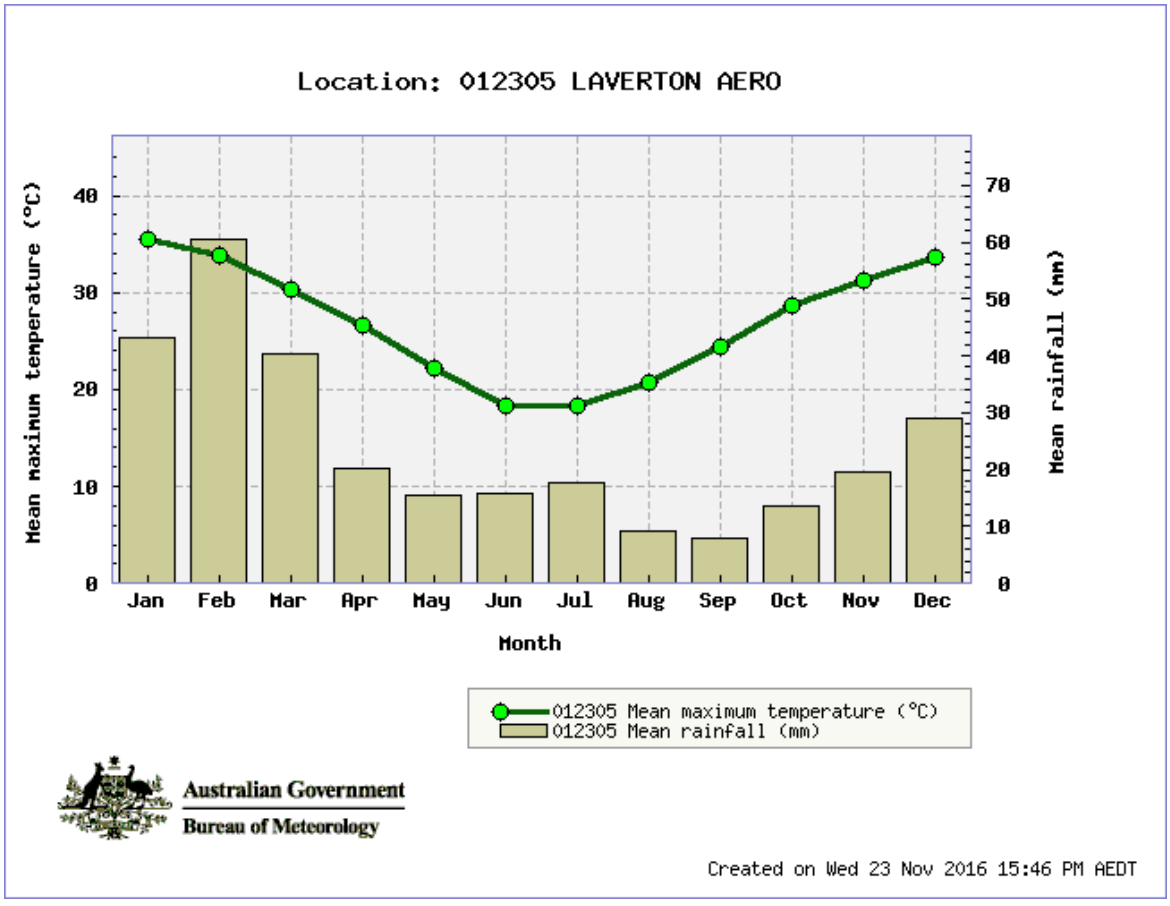


Figure 5: Mean temperatures and rainfall, Laverton Aero

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

8. Risk assessment

8.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through the Tables.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Tables 14 and 15 below.

Table 14. Identification of emissions, pathway and receptors during construction

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Construction, mobilisation and positioning of infrastructure for ore processing, TSF, power station and WWTP	Vehicle movements on unsealed access roads	Noise	No residences, sensitive land uses or specified ecosystems within 12 km of the Premises.	Air / wind dispersion	None	No	No receptor present.
		Dust	No residences, sensitive land uses or specified ecosystems within 12 km of the Premises.		None	No	No receptor present.
	Earthworks, construction of new buildings, plant and infrastructure	Noise	No residences, sensitive land uses or specified ecosystems within 12 km of the Premises.	Air / wind dispersion	None	No	No receptor present.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Dust	No residences, sensitive land uses or specified ecosystems within 12 km of the Premises.		None	No	No receptor present.
			Flora and vegetation.		Potential to be deposited on vegetation and may prevent photosynthesis and plant respiration	No	The Delegated Officer considers the natural dust tolerance of vegetation species should prevent vegetation impacts. There are also no Declared Rare Flora, Threatened Ecological Communities or Priority Ecological Communities within or in a 30 km radius of the Premises.
		Contaminated stormwater runoff	Soil and surface water drainage.	Stormwater runoff Direct discharges to land	Soil contamination and increased sedimentation	Yes – Refer to section 8.4	Contaminated 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 8.5	Potential soil contamination inhibiting vegetation growth and temporary loss of habitat.

Table 15: Identification of emissions, pathway and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
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 and sensitive land uses within 12 km of the Premises.	Air / wind dispersion	None	No	No receptor present.
			Flora and vegetation.		Potential to be deposited on vegetation and may prevent photosynthesis and plant respiration		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.
	Carbon regeneration Smelting	Gaseous and particulate emissions from carbon regeneration kiln and smelting furnace	No residences and sensitive land uses within 12 km of the Premises.	Air / wind dispersion	Poor ambient air quality	No	No adjacent receptors; potential OHS risk to workers to be managed under *Mines Safety and Inspection Act 1994*.
	All processing activities	Noise	No residences and sensitive land uses within 12 km of the Premises.	Air / wind dispersion	None	No	No receptor present.
		Contaminated stormwater runoff	Soil and surface water drainage.	Stormwater runoff from cleared and operational areas Direct discharges to land	Soil contamination, increase in sedimentation inhibiting vegetation growth and survival	Yes – Refer to section 8.4	Potential soil contamination inhibiting vegetation growth.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Leaks and spills of ore, hydrocarbons and chemicals	Terrestrial ecosystems adjacent to where the spillage has occurred.	Spillages of ore, direct discharges to land and infiltration to soils	Potential contamination of soil due to presence of hydrocarbons / chemicals and heavy metals Temporary loss of habitat	Yes – Refer to section 8.5	Potential soil contamination inhibiting vegetation growth and temporary loss of habitat.
	Process water pond	Overtopping or seepage of contaminated water. The process water pond will contain TSF return water; pit dewatering; brine from the RO plant; and Yeo Borefield water.	Terrestrial ecosystems adjacent to pond	Overflow from process water pond; seepage through liner	Soil and groundwater contamination	Yes – Refer to section 8.6	Overflow from ponds.
	Sedimentation pond	Contaminated water as the sedimentation pond will receive water from the thickener overflow and decant return from the TSF.	Terrestrial ecosystems adjacent to pond	Overflow from sedimentation pond; seepage through liner	Soil and groundwater contamination	Yes - Refer to section 8.6	Overflow from ponds.
	TSF	Tailings overflows from the TSF	Terrestrial ecosystems adjacent to the TSF.	Direct discharge to land and infiltration to soil	Soil contamination inhibiting vegetation growth and survival	Yes – Refer to section 8.7	Overflows of tailings from TSF.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Discharge of tailings through TSF embankment failure	No residences, sensitive land uses or specified ecosystems within 12 km of the Premises. 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 DMIRS under the *Mining Act 1978*.
		Tailings leachate seepage	Soil Subterranean fauna Groundwater	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 8.7	Potential to cause soil contamination, loss of vegetation and loss of habitat of subterranean fauna.
		Dust from surface containing tailings contaminants	No residences, sensitive land uses or specified ecosystems within 12 km of the Premises.	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 30 km radius of the Premises.
		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 8.7	Potential for soil contamination through release of tailings slurry/ tailings supernatant.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Category 52 Electric power generation	40 MW 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 12 km of the Premises.	Air / wind dispersion	Health and amenity	No	No sensitive receptors present. The Delegated Officer considers 5 km 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.	Direct discharge to land and infiltration to soil	Soil contamination	Yes – Refer to section 8.5	Potential soil contamination.
		Noise from the operation of the power station	No residences, sensitive land uses or specified ecosystems within 12 km of the Premises.	Air / wind dispersion	None	No	No receptors present.
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	Direct discharge to land and infiltration to soil	Soil contamination inhibiting vegetation growth and survival, and health impacts to fauna	Yes – Refer to section 8.5	Potential soil contamination inhibiting vegetation growth and temporary loss of habitat.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Spillage or discharge of hydrocarbons / chemical through pipeline, pump or tank leaks or failure				Yes - Refer to section 8.5	Potential soil contamination inhibiting vegetation growth.
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 8.8	Potential soil contamination from the release of untreated effluent.
	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 8.8	Potential for ponding in the irrigation area and increase in nutrient levels in soil if effluent is not treated to recommended levels.

8.2 Consequence and likelihood of risk events

A risk rating will be determined for Risk Events in accordance with the risk rating matrix set out in Table 16 below.

Table 16: Risk rating matrix

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

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 17 below.

Table 17: Risk criteria table

Likelihood		**Consequence**		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		**The following criteria has been used to determine the consequences of a Risk Event 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	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite 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	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite 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	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite 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	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite 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	• **onsite 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, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*

"onsite" means within the Prescribed Premises boundary.

8.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment table 18 below:

Table 18: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may 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.

8.4 Risk Assessment –Stormwater runoff

8.4.1 Description of stormwater runoff

Construction and Operation

Disturbed land and construction activities may result in turbid water and sediment being discharged on and off the Premises.

8.4.2 Identification and general characterisation of emission

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.

8.4.3 Description of potential adverse impact from the emission

Soil contamination may inhibit vegetation growth and cause health impacts to fauna. 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 12 km east of the processing plant.

8.4.4 Criteria for assessment

ANZECC and ARMCANZ, 2000 provide recommended trigger values for freshwater quality

and the *Assessment and management of contaminated sites* provides ecological and human health assessment levels for soil.

8.4.5 Applicant controls

Construction:

Diversion bunds will be constructed to separate clean and potentially contaminated water.

Operation:

The Applicant's controls in place to reduce and manage stormwater runoff during operation are listed below:

- Stormwater from operational areas will be collected and either reused within the operations or have contaminants removed prior to release to the environment;
- 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; and
- A Surface Water Management Plan will be implemented.

8.4.6 Consequence

The impact from contaminated stormwater runoff at the Premises could result in low level on-site impacts and minimal off-site impacts at a local scale. Therefore, the consequence is **minor**.

8.4.7 Likelihood of Risk Event

Based upon the distance to nearest receptors, groundwater located from 30 m below ground level and Yeo Lake approximately 12 km east, an environmental impact from stormwater runoff will probably not occur in most circumstances. Therefore, the likelihood of the consequence is **unlikely**.

8.4.8 Overall rating for stormwater runoff

Comparison of the consequence and likelihood ratings described above with the risk rating matrix (Table 16) determines the overall rating of risk for stormwater runoff at the Premises to be **medium**.

8.5 Risk Assessment – Spills and leaks of processing reagents and hydrocarbons and chemicals during operations

8.5.1 Description of spills/leaks of processing reagents and hydrocarbons and chemicals during operations

During wet processing of gold ore, processing reagents may overflow or be released to ground. Diesel fuel and oils released to ground during refuelling activities and from maintenance workshops associated with failures of bunding or sumps or catastrophic mechanical failures of tanks.

8.5.2 Identification and general characterisation of emission

Hydrocarbons, heavy metals, metalloids and hazardous chemicals.

8.5.3 Description of potential adverse impact from the emission

Soil, vegetation, surface water and groundwater ecosystems have the potential to become contaminated with hydrocarbons, heavy metals, metalloids and hazardous chemicals from

materials accidently spilt or discharged to ground.

8.5.4 Criteria for assessment

The *ANZECC* and *ARMCANZ, 2000* does not provide guideline values for petroleum oils. Hydrocarbons are detectable by odour at very low values.

8.5.5 Applicant controls

The Applicant's controls to manage spills and leaks of processing reagents, hydrocarbons and chemicals are set out in Table 19 below.

Table 19: Applicant's controls for spills and leaks of processing reagents, hydrocarbons and chemicals

Site Infrastructure	Description
Ore processing area	Ore processing activities conducted within bunded areas draining to sumps with recovery pumps. All ore residues around the concentrator will be periodically removed and either discharged to tails or fed through the plant.
Workshops	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.
Oil water separation systems	Constructed within a bunded area and designed to treat all stormwater and wastewater likely to be contaminated with hydrocarbons
Bulk Fuel Storage Facility; processing reagents and hydrocarbon and chemical storage	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. 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*.
Washdown facilities	Located on concrete pads.

Site Infrastructure	Description
	Constructed to drain to an oil water separation system. Heavy and light vehicles will be washed down at a purpose-built washdown facility. Sediment from the washdown pad will be collected in a concrete sump and washwater will be treated to separate solids and hydrocarbons.
Pipelines	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. All pipelines will be located within an earthen bund or buried to a depth of 600 mm 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. Periodic visual inspections of pipelines will be undertaken.
All	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.

8.5.6 Key findings

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.*

8.5.7 Consequence

The impact from spills and leaks of processing reagent, hydrocarbons and chemicals at the Premises could result in mid level on-site impacts and low level off-site impacts at a local scale. Therefore, the consequence is **moderate**.

8.5.8 Likelihood of Risk Event

Based upon the distance to nearest receptors, depth to groundwater and Applicant controls, the environmental impact from spills and leaks of processing reagents, hydrocarbons and chemicals will probably not occur in most circumstances. Therefore, the likelihood of the consequence is **unlikely**.

8.5.9 Overall rating for spills and leaks of processing reagents, hydrocarbons and chemicals

Comparison of the consequence and likelihood ratings described above with the risk rating matrix (Table 16) determines the overall rating of risk for spills and leaks of processing reagents, hydrocarbons and chemicals at the Premises to be **medium**.

8.6 Risk Assessment – Overflows from the ponds

8.6.1 Description of overflows from the ponds

A HDPE lined process water pond will store TSF return water, pit dewatering, brine from the RO plant and Yeo Borefield water. A sedimentation pond will be utilised to allow sediments to settle out prior to water entering the process water pond (MBS, 2017a). Releases to the environment may occur through overflows due to poor process controls or extreme rainfall events.

8.6.2 Identification and general characterisation of emission

Processing reagents such as flocculant, sodium cyanide and sodium hydroxide are used in the gold processing circuit. TSF return water mixed with smaller amounts of saline liquor and dissolved metals from the RO plant will be stored within the process water pond prior to being used in the processing plant.

8.6.3 Description of potential adverse impact from the emission

The release of process water from an overflow may inundate vegetation and impact on adjacent vegetation and result in localised soil contamination.

8.6.4 Criteria for assessment

ANZECC and ARMCANZ, 2000 provide recommended trigger values for freshwater quality and the *Assessment and management of contaminated sites* and *ASC NEPM* provides ecological and human health assessment levels for soil.

8.6.5 Applicant controls

Gold Road, 2016a and MBS, 2017a state that all water storage ponds will be HDPE lined and have freeboard markers installed. The process water pond will have a freeboard of 500 mm over and above the freeboard required to hold the volume of water associated with a 1:100 year, 72 hour storm event.

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

8.6.6 Consequence

The impact from overflows from the sedimentation and process water ponds at the Premises could result in mid level on-site impacts and low level off-site impacts at a local scale. Therefore, the Delegated Officer considers the consequence is to be **moderate**.

8.6.7 Likelihood of Risk Event

Based upon the distance to nearest receptors, depth to groundwater and Applicant controls, the environmental impact from an overflow of the ponds will probably not occur in most circumstances. Therefore, the likelihood of the consequence is **unlikely**.

8.6.8 Overall rating for overflows from the ponds

Comparison of consequence and likelihood ratings described above with the risk rating matrix (Table 16) determines the overall rating of risk for overflows from the ponds at the Premises to be **medium**.

8.7 Risk Assessment – TSF pipeline ruptures, overtopping and seepage during operation

8.7.1 Description of TSF pipeline ruptures, overtopping and seepage during operation

The TSF has a total design storage capacity of 61.62 Mm^3 (92.43 Mtpa) based on an assumed tailings dry density of 1.5 t/m^3 and 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.

All tailings produced from processing will be pumped in the form of a slurry (60 percent solids (by weight) (i.e. 40 percent water by weight)) from the process plant to the TSF via a large diameter HDPE pipe.

Decant water recovered from the TSF will be pumped back to the sedimentation pond and then to the process plant for re-use.

8.7.2 Identification and general characterisation of emission

Gold Road, 2016a 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. Elevated concentrations of selenium (0.07mg/L) and mercury (0.01mg/L) were recorded in the supernatant under the high salinity, high cyanide conditions of trial processing.

8.7.3 Description of potential adverse impact from the emission

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.

8.7.4 Criteria for assessment

Table 20 outlines the TSF design criteria and specifications (Gold Road, 2016a). The TSF has been designed in accordance with the *TSF Code of Practice* and *ANCOLD, 2012*.

Table 20: TSF design criteria and specifications

TSF	
Type	Engineered above ground
Footprint	TSF ~337 ha TSF monitoring bores, track, powerline ~172 ha
Height	41 m
Storage capacity	61.6 Mm^3 or 92.4 Mt
Tailings Density	Delivered at approximately 60 percent solids (by weight) Settling to a stored density of 1.5 t/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

8.7.5 Applicant controls

The Applicant's controls for the TSF as set out in Table 21 below (Gold Road, 2016a and

Gruyere, 2018a). The Applicant will also develop and implement a TSF Operating Manual to provide direction on the appropriate operation of the TSF.

Table 21: Applicant's controls for the TSF (refer to Figures 6, 7, 8 and 9 below)

Site infrastructure	Construction	Operation details
TSF Embankment	IWL above ground TSF with a design storage capacity of 61.62 Mm^3 (92.43 Mtpa). Stage 1 – Embankment level of 412 mRL. Stage 2 - Embankment level of 417 mRL. Stage 3 - Embankment level of 422 mRL. Stage 4 - Embankment level of 427 mRL. Stage 5 - Embankment level of 432 mRL. Stage 6 - Embankment level of 439.2 mRL. Designed to contain rainfall associated with a 1 in 100 year, 72 hour average recurrence interval event. Starter embankment design comprises: • An 8 m wide upstream zone of traffic-compacted select mine waste (Zone C (select material with maximum 100 mm particle size, be moisture conditioned and compacted in maximum 0.5 m layers) and Zone C1 (nominally 3 m wide and form the inner (upstream) zone to support the overlying liners) material); • A composite liner comprising a nominal 6 mm GCL and a 1.5 mm single textured HDPE liner placed on the prepared upstream face, anchored into a trench at the top and stabilised with mounded earth materials at the base; and • A 20 m wide (at the crest) zone of traffic-compacted select Zone C material. Subsequent future embankment stages will comprise: • A 28 m wide (at the crest) zone of Zone C, including a nominal 3 m wide Zone C1 material; • A 1.5 mm single textured HDPE	Freeboard of 500 mm over and above the freeboard required to hold the volume of water associated with a 1:100 year, 72 hour storm event. Stage 1 nominal operating water pond level at RL 406 m. Stage 6 nominal operating water pond level at RL 432 m. Design slopes of 1:2 (V:H) upstream and 1:3 (V:H) downstream slope from Stage 1 to 6. Daily inspections.

Site infrastructure	Construction	Operation details
	liner placed on the prepared upstream face, anchored into a trench at the top and welded to the HDPE of the previous raise at the base. A geotextile layer is proposed on the Zone C1 surface to provide additional cushioning/protection to the overlying HDPE liner, should the surface of Zone C1 not be suitable on which to line directly onto; and • A downstream zone of traffic compacted general Zone B material.	
Central liner	At the base of the TSF: • Placement of 1.5mm smooth HDPE liner on sand layer of nominal 0.3m thickness over the central liner area of radius 150 m; and • A top protection layer of sand/fines of nominal 0.5m thickness and geotextile layer, placed over the HDPE liner.	
Cut off-trench	4 m base width. Excavated beneath the perimeter embankment to a nominal depth of 0.5 – 1.5 m with side cut batters of 1:1 (V:H). Backfilled with low permeability Zone A material (clayey mine waste). If this material is not found it will be replaced by GCL on base and inside/upstream face of the trench (for trenches greater than 0.2 m depth), backfilled with compacted Zone C material. A nominal 150 mm sand bedding layer will be placed in the trench to provide a suitable surface for the placement of the GCL.	
Underdrainage system	Designed for a total maximum design flow of 6 L/s (or 520 m^3/day). Comprising perimeter underdrainage placed around the embankment upstream toe and an underdrainage network around the decant structure. Central underdrainage piping network around the decant structure to the extent of a decant pond of nominal 150 m radius. This network will connect to underdrainage discharge pipes (160OD PE100 PN12.5 HDPE pipe) that report	Underdrainage water collected via the underdrainage piping system will drain by gravity to an internal, single textured HDPE lined underdrainage sump. Water in the sump will be recovered by an inclined riser pipe (315OD PE100 PN16 HDPE pipe) housing a submersible pump to handle an estimated maximum flow of 2 L/s (or 165 m^3/day). The recovered underdrainage water will be returned to the tailings

Site infrastructure	Construction	Operation details
	(by gravity) to the perimeter underdrainage sump. The perimeter underdrainage pipe will be placed in a shallow trench nominally 0.2 m below the foundation stripped level. Underdrainage lines will comprise of slotted pipe (150 and 450 Megaflow – slotted composite panel drain) covered in aggregate and wrapped in geotextile, stabilised with select rock-fill. HDPE lined underdrainage sump will be: • located immediately adjacent to the upstream embankment toe, and at the lowest point within the TSF basin; and • sized to have a full storage capacity of 585 m^3 and will be backfilled with select rock, resulting in an effective water storage capacity of 175 m^3.	beach and hence to the decant system and back to the plant for re-use in the process facility or alternatively directly back to the plant via a dedicated pipeline.
Tailings pipeline	Large diameter HDPE pipeline. At the base of the TSF ramp, the pipe will divide into two distribution lines to distribute tailings around the facility. A third emergency line will be provided, to provide emergency discharge capability in the event that the two distribution lines are inoperable. Tailing and return water pipelines will be fitted with flow and leak detection sensors.	Daily inspections.
Tailings deposition	Multiple spigots located on the upstream crest of the TSF perimeter embankment will be 60 m apart and comprise spigot off-take and valve assemblies discharging into conductor pipes.	Sub-aerially and cyclically via multiple spigots. Tailings will be discharged in thin discrete layers not exceeding 300 mm thickness from numerous spigots at low velocity. Spigotting/tailings deposition will be carried out such that a tailings beach will form and the supernatant pond (from both rainfall events and tailings deposition) will be maintained around the central decant structure.
Decant facility	Constructed in stage 1 and raised in stages with the perimeter embankment. Comprising slotted precast concrete pipes stacked vertically on one another	Decant water recovered will be pumped back to the process plant for reuse. As tailings deposition and beach

Site infrastructure	Construction	Operation details
	and surrounded by selected clean rockfill. Decant pump located within the central decant tower.	development continues, the supernatant pond will shift further towards the central, permanent decant facility.
Monitoring system	Vibrating wire piezometers (VWPs): 3 pairs or six (3 by 2 no.) VWPs located at the base of the embankment. Groundwater monitoring bores (refer to Figure 9) (Gruyere, 2018b): Ten groundwater monitoring bores will be installed at the following locations: TSFM1 585071N 6905388E TSFM2 585697N 6905586E TSFM3 586222N 6905314E TSFM4 586598N 6904612E TSFM5 586567N 6904146E TSFM6 586331N 6903702E TSFM7 585983N 6903262E TSFM8 585433N 6903322E TSFM9 588141N 6904200E TSFM10 590064N 6906027E	VWPs to monitor the phreatic surface within the embankment. Quarterly ambient groundwater quality monitoring for the following parameters: sodium, potassium, calcium, magnesium, chloride, sulfate, bicarbonate, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, manganese, mercury, molybdenum, nickel, selenium, thallium, uranium, zinc, WAD cyanide and total cyanide.

8.7.6 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 revised design of the TSF incorporates measures to actively recover tailings liquor and reduce seepage by more than 94%.*
3. *Elevated selenium and mercury concentrations in tailings supernatant (above ANZECC 2000 livestock trigger values) were recorded from testwork under saline and high cyanide conditions.*
4. *The revised TSF design includes a HDPE liner for an area with radius 150 m, designed to capture area expected for the supernatant pond.*
5. *The TSF Operating Manual was not provided with the Application.*
6. *A freeboard of 500 mm will be maintained on the TSF.*
7. *10 monitoring bores will be established to monitor groundwater adjacent to the TSF to enable detection of seepage and groundwater mounding.*
8. *Process pipelines will be fitted with flow and leak detection sensors.*

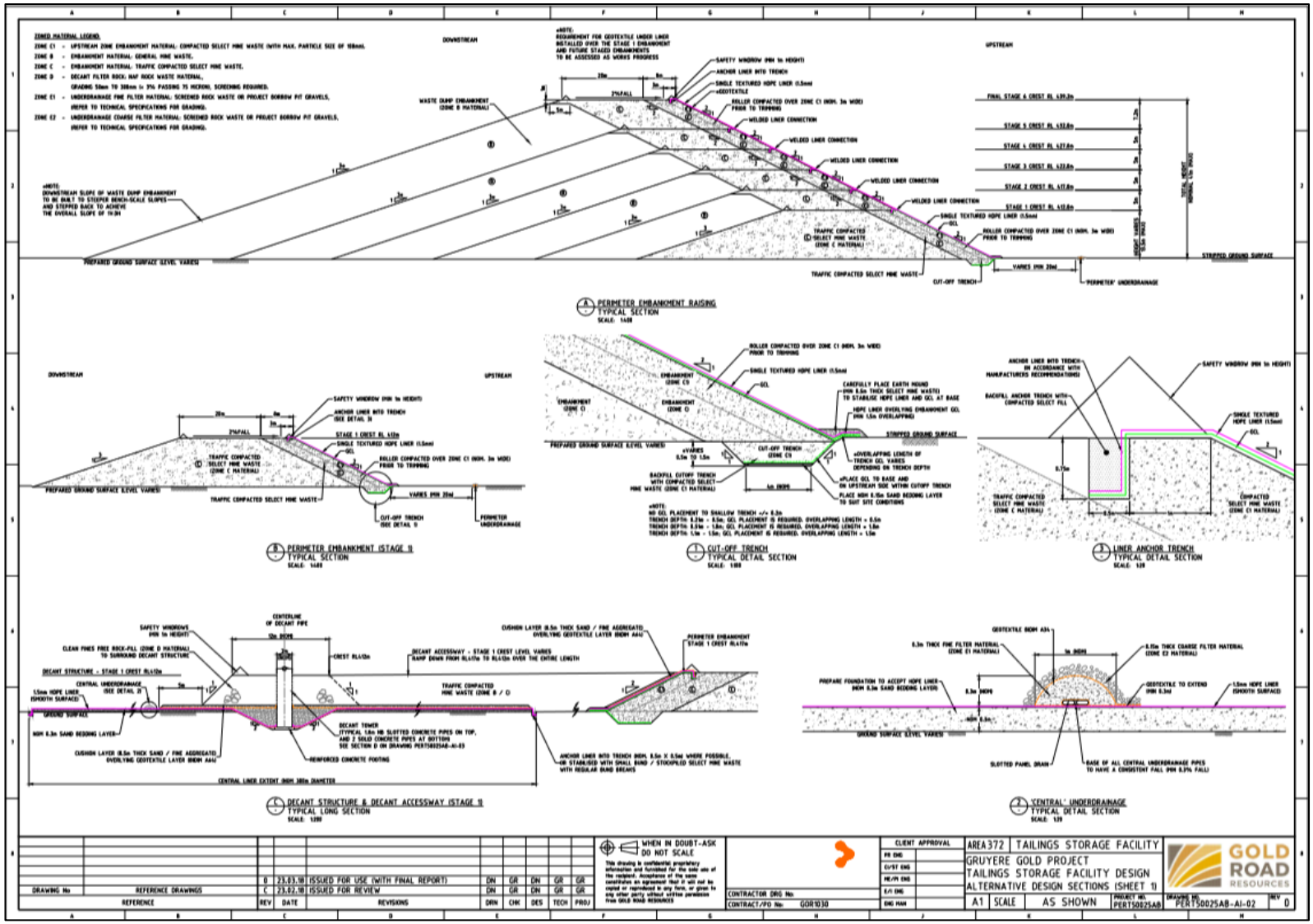


Figure 6: Revised TSF design, cut off trench and underdrainage featured

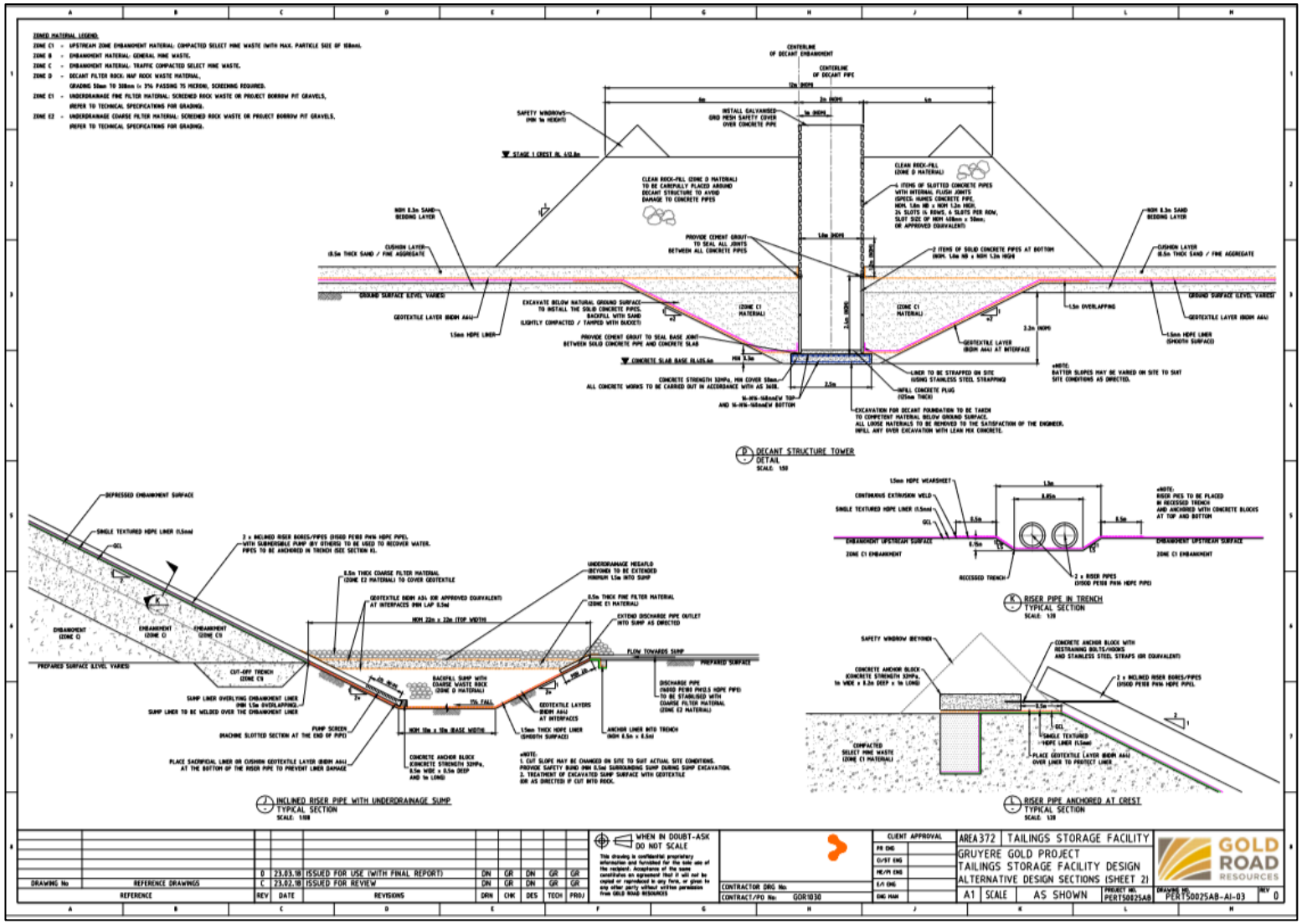


Figure 7: Revised TSF design, decant design and underdrainage sump featured

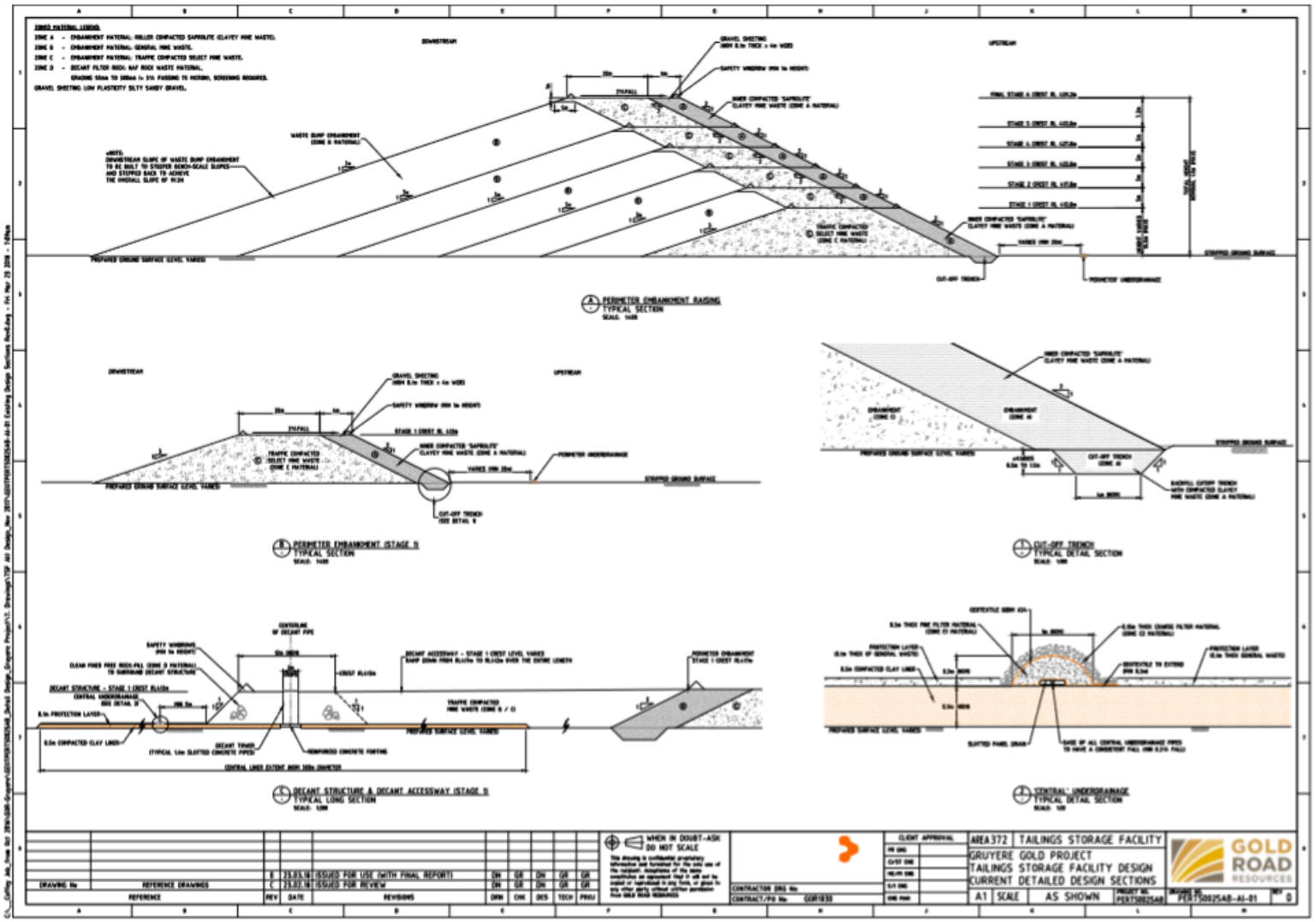


Figure 8: Revised TSF design, central liner and embankment design featured

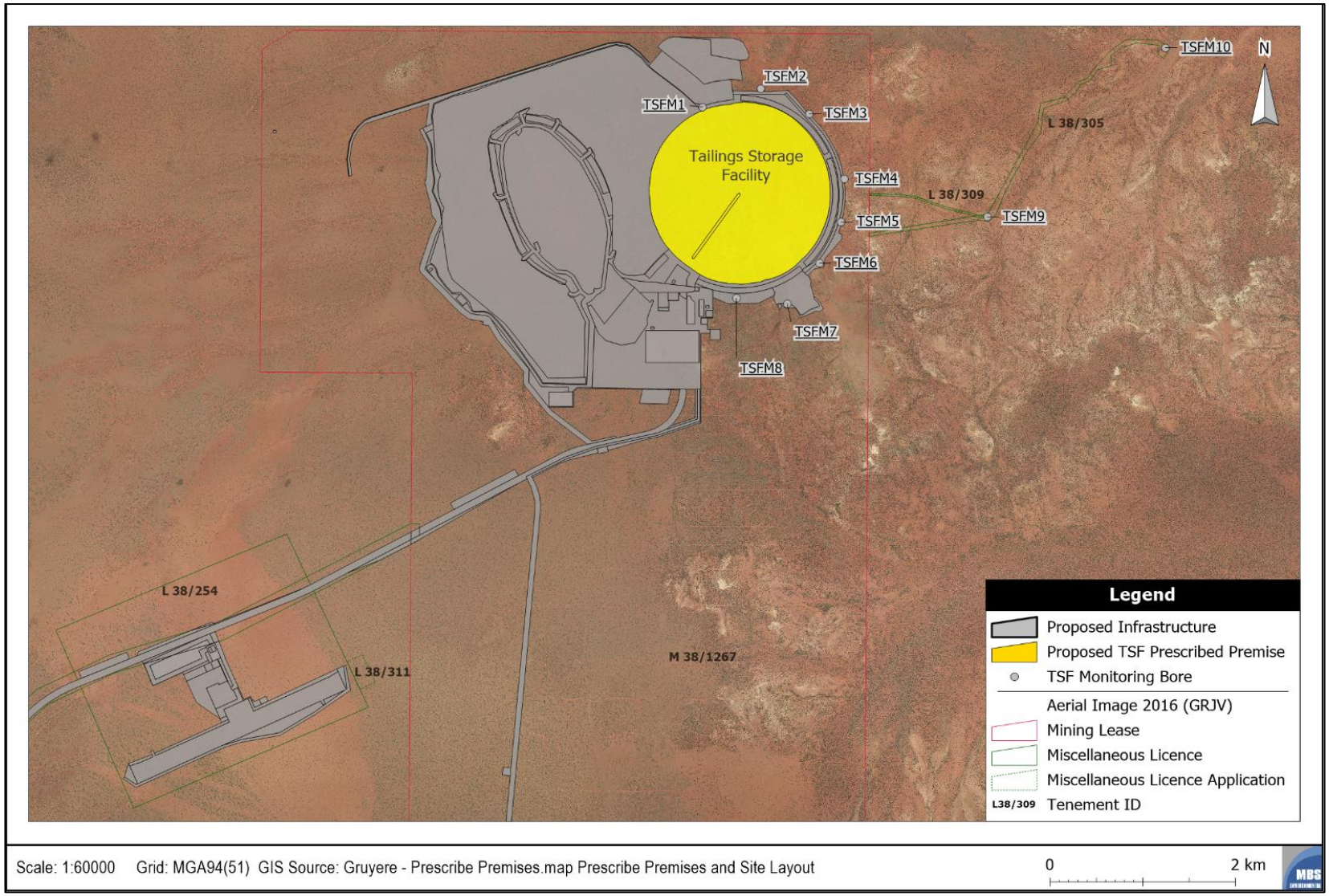


Figure 9: TSF monitoring bore locations

8.7.7 Consequence

The environmental impact of the TSF from seepage, overtopping and pipeline ruptures at the Premises could result in mid-level on-site impacts. Therefore, the consequence is **moderate**.

8.7.8 Likelihood of Risk Event

Based upon the distance to nearest receptors, depth to groundwater, tailings composition and Applicant controls, an environmental impact from TSF pipeline ruptures, overtopping and seepage will not occur in most circumstances. Therefore, the likelihood of the consequence is **unlikely**.

8.7.9 Overall rating for the TSF including pipeline ruptures, overtopping and seepage

Comparison of the consequence and likelihood ratings described above with the risk rating matrix (Table 16) determines the overall rating of risk for TSF pipelines rupturing, overtopping and seepage at the Premises to be **medium**.

8.8 Risk Assessment – WWTP rupture of pipes, storage tank failure and irrigation during operation

8.8.1 Description of WWTP rupture of pipes, storage tank failure and irrigation during operation

Sewage from the processing area will be treated through a WWTP with treated wastewater then discharged to an irrigation area. If the WWTP was to have a breakdown of pumps, rupture of pipes and tank failure, there is the potential for partially treated wastewater to be released to the environment.

8.8.2 Identification and general characterisation of emission

Treated wastewater may contain high levels of pathogens and nutrients which have been identified as key environmental hazards.

8.8.3 Description of potential adverse impact from the emission

Wastewater accidently discharged to the environment during the treatment process may cause soil contamination. If wastewater is discharged to the irrigation area prior to meeting emission standards this could lead to the facilitated growth of weeds, increase in nutrient levels in soil and ponding in the irrigation area.

8.8.4 Criteria for assessment

The Applicant has provided a commitment in Gruyere, 2016a that the WWTP will comply with a Low Exposure Risk Level (level of human contact) in accordance with *DoH, 2011* (refer to Table 6 for the effluent specifications).

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

8.8.5 Applicant controls

Gruyere, 2016a outlines the Applicant controls for sewage discharge from the rupture of pipes, tank failure and irrigation as outlined in Table 22 below.

Table 22: Applicant's controls for the WWTP and irrigation area

Site infrastructure	Construction	Operation details
WWTP	Modular Submerged Aeration Filter (SAF) WWTP (MAK Water (#MBBR-0035-C-X-X-X)). Containerized with external pump skids and tanks. Boundary of WWTP fenced with appropriately signposted entrance / exit gate. Contingency storage capacity for up to two days of normal flow if discharge is suspended while any problems are fixed. Remote monitoring and control capabilities. Pump pits will have duty / standby macerating pumps, control panels and alarms.	The wastewater will be treated before being discharged to a dedicated spray field. The WWTP will meet the following emission standards: Biochemical Oxygen Demand <20 mg/L Total Suspended Solids <10 mg/L Total Nitrogen <3 0mg/L Total Phosphorus <8 mg/L Turbidity <5 NTU Chlorine Residual >0.2-2 mg/L pH 6.5-8.5 pH units *E.coli* <10 cfu/100mL
Irrigation area	Sized to 2 ha. Irrigation area fenced and appropriately signposted.	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.

8.8.6 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.*

8.8.7 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 impact of WWTP pipe rupture, tank failure and the irrigation of treated wastewater will result in low level on-site impacts. Therefore, the consequence is **minor**.

8.8.8 Likelihood of Risk Event

Based upon the treatment applied to the wastewater prior to irrigation and Applicant controls,

an environmental impact from WWTP pipe ruptures, tank failure and the irrigation of treated wastewater will not occur in most circumstances. Therefore, the likelihood of the consequence is **unlikely**.

8.8.9 Overall rating for WWTP rupture of pipes, storage tank failure and irrigation

Comparison of the consequence and likelihood ratings described above with the risk rating matrix (Table 16) determines the overall rating of risk for discharges to land from the WWTP and spray field on sensitive receptors during operation to be **medium**.

8.9 Summary of acceptability and treatment of Risk Events

A summary of the risk assessment and the acceptability or unacceptability of the risk events set out above, with the appropriate treatment and control, are set out in Table 23 below. Controls are described further in section 9.

Table 23: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk Rating	Acceptability with ~~treatment~~ controls (conditions on instrument)
	Emission	**Source**	**Pathway / Receptor (Impact)**			
1	Contaminated stormwater	Ore processing and handling area Stormwater runoff Infrastructure drainage	Stormwater runoff from cleared and operational area potentially causing soil contamination and sedimentation	Stormwater management as detailed in section 8.4.5	Minor consequence Unlikely likelihood **Medium risk**	Acceptable subject to Applicant controls conditioned Diversion bunds to be constructed to separate clean and potentially contaminated water Subject to other regulatory controls, no operational controls required
2	Spills and leaks of processing reagents and hydrocarbons and chemicals	Ore processing and handling areas Hydrocarbon, reagent and chemical storage areas Breach of containment infrastructure and pipeline ruptures	Direct discharges to land potentially causing soil contamination, inhibiting vegetation growth and temporary loss of habitat for fauna	Refer to Applicant controls as detailed in section 8.5.5	Moderate consequence Unlikely likelihood **Medium risk**	Acceptable subject to regulatory controls Submission of compliance document to ensure that infrastructure has been constructed as per Gold Road, 2016a Subject to other regulatory controls, no operational controls required
3	Overflows from the process water pond and sedimentation pond	Water storage pond breaches	Overflow to ground or leak to soil and groundwater through liner	HDPE liner No discharge to the environment as it is a closed system Freeboard markers installed	Moderate consequence Unlikely likelihood **Medium risk**	Acceptable subject to Applicant controls conditioned Submission of compliance document to ensure liner and freeboard markers have been constructed as per assessed design Regular inspection of:

						• Freeboard; and • Liner integrity
4	TSF pipeline ruptures, overtopping and seepage	Rupture of pipelines (tailings and return water) Overflow of TSF tailings Seepage from TSF	Direct discharge to land potentially causing soil contamination inhibiting vegetation growth and survival Groundwater mounding Inundation of vegetation rooting zone and decrease in quality habitat of subterranean fauna	Refer to Applicant controls as detailed in section 8.7.5	Moderate consequence Unlikely likelihood **Medium risk**	Acceptable subject to regulatory Submission of compliance document to ensure that infrastructure has been constructed as per Gold Road, 2016a and Gruyere 2018a Requirements regarding operation of infrastructure and monitoring requirements
5	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 potentially causing soil contamination Facilitated growth of weeds Increase in nutrients in soil Ponding in irrigation area	Contingency storage capacity Alarms Water quality emission standards	Minor consequence Unlikely likelihood **Medium risk**	Acceptable subject to regulatory controls Submission of compliance document to ensure that infrastructure has been constructed as per Gold Road, 2016a Monitoring requirements for the licence

9. Regulatory controls

A summary of regulatory controls determined to be appropriate for the Risk Event is set out in Table 24. The risks are set out in the assessment in section 8 and the controls are detailed in this section. DWER will determine controls having regard to the adequacy of controls proposed by the Applicant. The conditions of the Works Approval will be set to give effect to the determined regulatory controls.

Table 24: Summary of regulatory controls to be applied

		Controls		
		9.1.1 – 9.1.5 Infrastructure and Equipment	**9.2.1 – 9.2.3 Operational requirements**	**9.2.4 – 9.2.5 Monitoring**
Risk Items (see risk analysis in section 8)	**1. Stormwater runoff**	●		
	2. Spills and leaks of processing reagents and hydrocarbons and chemicals	●		
	3. Overflows from the ponds	●	●	
	4. TSF pipeline ruptures, overtopping and seepage	●	●	●
	5. WWTP rupture of pipes, storage tank failure and irrigation	●	●	●

9.1 Works Approval controls

9.1.1 Stormwater infrastructure and equipment

The following infrastructure shall be constructed as proposed by the Applicant, as controls for stormwater management:

- Diversion bunds and culverts to separate clean and potentially contaminated water at the Premises.

9.1.2 Processing reagents and hydrocarbons and chemicals storage areas infrastructure and equipment

The following infrastructure (Table 25) should be constructed to manage the risk of spills and leaks from the reagents, hydrocarbons and chemical storage areas:

Table 25: Infrastructure requirements for reagents, hydrocarbon and chemical storage areas

Infrastructure	Requirements (Design and Construction)
All ore processing activities	Contained within bunded areas. Constructed to drain to sumps with recovery pumps.
Washdown facilities	Located on concrete pads. 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.
Bulk Fuel Storage Facility Power station day tank, waste oil tank and lubricants Reagent area	Designed and constructed in accordance with *AS 1940* and *AS 1692.*
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.*

9.1.3 Water storage ponds infrastructure and equipment

The following infrastructure (Table 26) should be constructed to manage overflows from the water storage ponds:

Table 26: Infrastructure requirements for the water storage ponds

Infrastructure	Requirements (Design and Construction)
Process water pond Sedimentation pond	HDPE lined freeboard markers installed

9.1.4 TSF infrastructure and equipment

The following infrastructure and equipment (Table 27) should be constructed to manage pipeline ruptures, overtopping and seepage from the TSF:

Table 27: Infrastructure requirements for the management of the TSF

Infrastructure	Requirements (Design and Construction)
TSF embankment	IWL above ground TSF with a design storage capacity of 61.62 Mm3 (92.43 Mtpa). Stage 1 – Embankment level of 412 mRL. Starter embankment design comprises:

Infrastructure	Requirements (Design and Construction)
	• An 8 m wide upstream zone of traffic-compacted select mine waste (Zone C (select material with maximum 100 mm particle size, be moisture conditioned and compacted in maximum 0.5 m layers) and Zone C1 (nominally 3 m wide and form the inner (upstream) zone to support the overlying liners) material); • A composite liner comprising a nominal 6 mm GCL and a 1.5 mm single textured HDPE liner placed on the prepared upstream face, anchored into a trench at the top and stabilised with mounded earth materials at the base; and • A 20 m wide (at the crest) zone of traffic-compacted select Zone C material. Stage 2 - Embankment level of 417 mRL. Stage 3 - Embankment level of 422 mRL. Stage 4 - Embankment level of 427 mRL. Stage 5 - Embankment level of 432 mRL. Stage 6 - Embankment level of 439.2 mRL. Designed to contain rainfall associated with a 1 in 100 year, 72 hour average recurrence interval event.
Central liner	At the base of the TSF: • Placement of 1.5mm smooth HDPE liner on sand layer of nominal 0.3 m thickness over the central liner area of radius 150 m; and • A top protection layer of sand/fines of nominal 0.5 m thickness and geotextile layer, placed over the HDPE liner.
Cut-off trench	Designed with a 4m base width excavated beneath the perimeter embankment, lined with GCL on the base and the upstream slope of the excavation and backfilled with compacted select mine waste to reduce the horizontal seepage losses. Excavated beneath the perimeter embankment to a nominal depth of 0.5 – 1.5 m with side cut batters of 1:1 (V:H).
Underdrainage system	Designed for a total maximum design flow of 6 L/s (or 520 m^3/day). Comprising perimeter underdrainage placed around the embankment upstream toe and an underdrainage network around the decant structure. Central underdrainage piping network around the decant structure to the extent of a decant pond of nominal 150 m radius. This network will connect to underdrainage discharge pipes (160OD PE100 PN12.5 HDPE pipe) that report (by gravity) to the perimeter underdrainage sump. The perimeter underdrainage pipe will be placed in a shallow trench nominally 0.2 m below the foundation stripped level. Underdrainage lines will comprise of slotted pipe (150 and 450 Megaflow – slotted composite panel drain) covered in aggregate and wrapped in geotextile, stabilised with select rock-fill. Flowmeter installed (or alternative) to allow volumes of seepage recovered from underdrainage system to be recorded. HDPE lined underdrainage sump will be:

Infrastructure	Requirements (Design and Construction)
	• located immediately adjacent to the upstream embankment toe, and at the lowest point within the TSF basin; and • sized to have a full storage capacity of 585 m^3 and will be backfilled with select rock, resulting in an effective water storage capacity of 175 m^3.
Spigots for tailings deposition	Multiple spigots located on the upstream crest of the TSF perimeter embankment will be 60 m apart and comprise spigot off-take and valve assemblies discharging into conductor pipes.
Decant facility	Constructed in stage 1 and raised in stages with the perimeter embankment. Comprising slotted precast concrete pipes stacked vertically on one another and surrounded by selected clean rockfill. Decant pump located within the central decant tower.
All pipelines	HDPE with welded joints. Incorporate isolation valves. Located within an earthen bund or buried to a depth of 600 mm. Buried pipelines signposted. Sumps located at low points along the pipeline route.
Process pipelines (tailings and return water)	Fitted with flow and leak detection sensors. Slurry pipeline to have flanges at approximately 60 m intervals.
Monitoring system	Vibrating wire piezometers (VWPs): 3 pairs or six (3 by 2 no.) VWPs located at the base of the embankment. Groundwater monitoring bores (refer to Figure 9) (Gruyere, 2018b): Ten groundwater monitoring bores will be installed at the following locations: TSFM1 585071N 6905388E TSFM2 585697N 6905586E TSFM3 586222N 6905314E TSFM4 586598N 6904612E TSFM5 586567N 6904146E TSFM6 586331N 6903702E TSFM7 585983N 6903262E TSFM8 585433N 6903322E TSFM9 588141N 6904200E TSFM10 590064N 6906027E

9.1.5 Landfill infrastructure and Equipment

The following infrastructure and equipment (Table 28) should be constructed to manage the landfill facility at the Premises:

Table 28: Infrastructure requirements for the management of the landfill

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

9.1.5 WWTP infrastructure and equipment

The following infrastructure and equipment (Table 29) should be constructed to manage pipeline ruptures, tank failure and irrigation at the WWTP:

Table 29: Infrastructure requirements for the management of the WWTP

Infrastructure	Requirements (Design and Construction)
WWTP	MAK Water #MBBR-0035-C-X-X-X to be constructed. Containerised with external pump skids and tanks. Contingency storage capacity for up to two days of normal flow. Pump pits will have duty / standby macerating pumps, control panels and alarms. 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 pH units (h) E.coli <10cfu/100mL
Spray field	Sized to 2 ha. Fenced and appropriately signposted.

9.1.6 Works Approval reporting

The Applicant has stated that the infrastructure will be constructed in accordance with Table 30 (Gold Road, 2016a).

Works will be completed progressively, with compliance reporting required for the TSF including all pipe work; WWTP; processing plant; power station; and bulk hydrocarbon storage facility. A suitably qualified person will be required to confirm each item of infrastructure specified in the works approval has been constructed to the specified requirements.

Commissioning of the process plant, TSF and WWTP is authorised under the Revised Works Approval for a three month period following the submission of the compliance report. The Applicant will need to amend L9000/2016/1 prior to the operation of the process plant, TSF,

WWTP, power station and bulk hydrocarbon storage facility.

Table 30: Proposed construction schedule

Stage	Infrastructure	Proposed Commencement
1	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

9.2 Licence controls

The following controls will be imposed as conditions on the Existing Licence to manage the risk of emissions during operation at the Premises. It should be noted that these controls are not final and will be subject to compliance with conditions of the Revised Works Approval and may change if additional information becomes available to further inform the risk assessment (as per *Guidance Statement: Risk Assessments*).

9.2.1 Operational requirements for the water storage ponds

Site Infrastructure	Management controls
Process water pond Sedimentation pond	Daily visual inspections. Freeboard of 500 mm over and above the freeboard required to hold the volume of water associated with a 1:100 year, 72 hour storm event.

9.2.2 Operational requirements for the TSF

Site Infrastructure	Management controls
TSF	Freeboard of 500 mm over and above the freeboard required to hold the volume of water associated with a 1:100 year, 72 hour storm event. Design slopes of 1:2 (V:H) upstream and 1:3 (V:H) downstream slope from Stage 1 to 6. Daily visual inspections. Operated according to the TSF Design Reports (Gold Road, 2016a and Gruyere, 2018a). Operated according to a TSF Operations Manual (to be implemented). Water balance over the TSF to be recorded and volumes of seepage recovered via underdrainage recorded.
TSF pipelines	Daily visual inspections. Telemetry.

9.2.3 Operational requirements for the WWTP

The Existing Licence authorises treated wastewater from the Premises to be discharged to the Spray Field subject to compliance with Licence conditions 2 to 11, which include infrastructure and equipment controls, waste acceptance, throughput restrictions, disposal requirements and treated wastewater limits for the existing WWTP.

The Applicant will be required to amend the Existing Licence to include the WWTP assessed under this Decision Report prior to its operation.

9.2.4 Monitoring requirements for the TSF

Site Infrastructure	Management controls
TSF	Quarterly ambient groundwater quality monitoring for the following parameters: sodium, potassium, calcium, magnesium, chloride, sulfate, bicarbonate, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, manganese, mercury, molybdenum, nickel, selenium, thallium, uranium, zinc, WAD cyanide and total cyanide. Annual water balance.

9.2.5 Monitoring requirements for the WWTP

The Existing Licence authorises treated wastewater from the Premises to be discharged to the Spray Field subject to compliance with Licence conditions 2 to 11. Existing Licence conditions 10 and 11 stipulate monitoring requirements for the existing WWTP.

The Applicant will be required to amend the Existing Licence to include the WWTP assessed under this Decision Report prior to its operation.

9.2.6 Licence reporting

An Annual Audit Compliance Report will be required to be submitted as a condition of the Existing Licence.

10. Determination of Works Approval conditions

The conditions in the Revised Works Approval in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions*.

Table 31 provides a summary of the conditions to be applied to this Revised Works Approval.

Table 31: Summary of conditions to be applied

Condition Ref	Grounds
Infrastructure and equipment Conditions 1, 2, 3, 4 and 5	These conditions are valid, risk-based and contain appropriate controls.
Emissions Condition 6	This condition is valid, risk-based and consistent with the EP Act.
Record-keeping Conditions 7 and 8	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

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

11. Applicant's comments

The Applicant was provided with the draft Revised Works Approval and Decision Report on 14 June 2018. The Applicant responded on 19 June 2018 (Gruyere, 2018c) and comments received have been considered by the Delegated Officer as shown in Appendix 2.

12. 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 Revised Works Approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Alana Kidd
Manager, Licensing (Resource Industries)
Delegated Officer
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	DWER records (A1326446)
2	Application forms x 2 Transfer works approval W5997/2016/1 and W6002/2016/1, received from Cressey Wallwork (Gold Road), 13 February 2017	Transfer 2017	DWER records (A1376522)
3	Assessment and management of contaminated sites, Contaminated sites guidelines, Department of Environment Regulation, December 2014	Assessment and management of contaminated sites	accessed at http://www.der.wa.gov.au
4	Australian Bureau of Statistics, 2011 Census Quickstats for Cosmo Newbery. Accessed 1 December 2016	2011 Census Quickstats	accessed at www.censusdata.abs.gov.au
5	Australian Standard AS 1692-2006 Steel tanks for flammable and combustible liquids	AS 1692	accessed at www.saiglobal.com
6	Australian Standard AS 1940-2004 The storage and handling of flammable and combustible liquids	AS 1940	
7	Australian Standard AS 2067-2008 Substations and high voltage installations exceeding 1 kV a.c.	AS 2067	
8	Australian/New Zealand Standard AS/NZS 3007:2013 Electrical equipment in mines and quarries-Surface installations and associated processing plant	AS/NZS 3007	
9	Department of Mines and Petroleum Code of Practice, Tailings storage facilities in Western Australia, 2013	TSF Code of Practice	accessed at www.dmirs.wa.gov.au
10	*Guidance Statement: Decision Making,* Department of Environment Regulation, February 2017	Guidance Statement: Decision Making	accessed at www.dwer.wa.gov.au

	Document title	In text ref	Availability
11	*Guidance Statement: Environmental Siting,* Department of Environment Regulation, November 2016	Guidance Statement: Environmental Siting	
12	*Guidance Statement: Regulatory principles,* Department of Environment Regulation, July 2015	Guidance Statement: Regulatory principles	
13	*Guidance Statement: Risk Assessments,* Department of Environment Regulation, February 2017	Guidance Statement: Risk Assessments	
14	*Guidance Statement: Setting Conditions,* Department of Environment Regulation, October 2015	Guidance Statement: Setting Conditions	
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	DWER records (A1181347)
16	Gruyere Power Station – DER query, received from Nicole Garbin, MBS Environmental, 30 November 2016	MBS, 2016b	DWER records (A1335788)
17	Gruyere Works Approval Amendment Application, received from Jonathon Barker (MBS Environmental), 5 April 2018	Gruyere, 2018a	DWER records (A1648886)
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	Ministerial 1048, Gruyere Gold Project, published on 29 December 2016	MS 1048	accessed at www.epa.wa.gov.au
21	National Environment Protection (Assessment of Site Contamination) Measure 1999	ASC NEPM	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	ANZECC and ARMCANZ, 2000	accessed at www.environment.gov.au

	Document title	In text ref	Availability
	Australia and New Zealand, 2000		
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	Northcote,K.H. with Beckmann,G.G., Bettenay,E., Churchward,H.M., Van Dijk,D.C., Dimmock,G.M., Hubble,G.D., Isbell,R.F., McArthur,W.M., Murtha,G.G., Nicolls K.D., Paton,T.R., Thompson,C.H., Webb,A.A. and Wright,M.J. (1960-1968). Atlas of Australian Soils, Sheets 1 to 10. With explanatory data (CSIRO Aust. and Melbourne University Press: Melbourne)	Northcote, 1960-68	accessed at http://www.asris.csiro.au
25	Priority Ecological Communities for Western Australia Version 24, Department of Parks and Wildlife, Species and Communities Branch, 24 June 2016	Parks and Wildlife, 2016	accessed at www.dpaw.wa.gov.au
26	RE: Applicant Notification – W6002/2016/1 – Notice of Proposed Amendment to Works Approval, received from Glenn Firth (Gruyere Management Pty Ltd), 19 June 2018	Gruyere, 2018c	DWER records (A1694245)
27	RE: Gruyere Gold additional information required, received from Jonathon Barker (MBS Environmental), 3 January 2017	MBS, 2017a	DWER records (A1354435)
28	RE: Gruyere Gold Project referral letter – DMP Comments, Department of Mines and Petroleum, 6 January 2017	DMP, 2017	DWER records (A1354855)
29	RE: Gruyere Gold Project – Information required, received from Nicole Garbin (MBS Environmental), 11 November 2016	MBS, 2016a	DWER records (A1324420)
30	RE: Gruyere Gold Project W6002 works approval application for comment, received from Jonathon Barker (MBS Environmental), 30 January 2017	MBS, 2017b	DWER records (A1366630)
31	RE: Gruyere Works Approval Amendment Application, received from Jonathon Barker (MBS Environmental), 23 April 2018	Gruyere, 2018b	DWER records (A1658713)
32	Report and recommendations of the Environmental Protection Authority, Gruyere Gold Project, Gold Road	Report Number 1587	accessed at www.epa.wa.gov.au

	Document title	In text ref	Availability
	Resources Limited, Report 1587, November 2016		
33	RE: W6002/2016/1 – Referral of a Works Approval Amendment – Request for Advice – Response, Department of Mines, Industry Regulation and Safety, 1 June 2018	DMIRS, 2018	DWER records (A1686213)
34	Understanding-salinity – Salinity status classifications, by total salt concentration table, Department of Water	Salinity status classification	accessed at http://www.water.wa.gov.au/water-topics/water-quality/managing-water-quality/understanding-salinity
35	20170224 – LTR to DER – Transfer Works Approval to Gruyere Management, received from Glenn Firth, dated 24 February 2017	Gruyere, 2017	DWER records (A1383080)

Appendix 2: Summary of Applicant's comments on risk assessment and draft conditions

Condition	Summary of Applicant's comments	DWER response
Works approval		
Table 3, item 10 for the Cut-off trench	The Applicant has requested that the wording below be updated to include the words in bold and remove the strikethrough word: Designed with a 4 m base width excavated beneath the perimeter embankment**, lined with GCL on the base and the upstream slope of the excavation** and backfilled with compacted ~~clayey~~ **select** mine waste.	DWER has changed the wording to that proposed by the Applicant.
Decision Report		
Section 8.7.1	The Applicant has requested that the wording below be updated to include the word in bold and remove the strikethrough words: Decant water recovered from the TSF will be pumped back to the ~~process water~~ **sedimentation** pond and then to the process plant for re-use.	DWER has changed the wording to that proposed by the Applicant.
Section 8.7.5 TSF Embankment Operation detail	The Applicant has stated that "*The operating pond level will be reported in the Operating Manual (in prep.), but it can be above the RL406m for Stage 1 and RL432m for Stage 6 while still satisfying the freeboard requirements*".	DWER has changed the wording to that proposed by the Applicant.

Condition	Summary of Applicant's comments	DWER response
	The Applicant has requested that the wording below be updated to include the word in bold and remove the strikethrough word: Stage 1 ~~normal~~ **nominal** operating water pond level at RL 406 m. Stage 6 ~~normal~~ **nominal** operating water pond level at RL 432 m.	
TSF Embankment Construction	The Applicant has requested that the wording below be updated to include the words in bold: A 1.5 mm single textured HDPE liner placed on the prepared upstream face, anchored into a trench at the top and welded to the HDPE of the previous raise at the base. A geotextile layer is proposed on the Zone C1 surface to provide additional cushioning/protection to the overlying HDPE liner**, should the surface of Zone C1 not be suitable on which to line directly onto**; and	
Tailings pipeline Construction	The Applicant has requested that the wording below be updated to include the words in bold and remove the strikethrough words: At the **base of the TSF ramp** ~~crest of the embankment~~, the pipe will divide into two distribution lines to distribute tailings around the facility. **A third emergency line will be provided, to provide emergency discharge capability in the event that the two distribution lines are inoperable.**	

Attachment 1: Revised Works Approval W6002/2016/1