



Application for Works Approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W6504/2021/1
Applicant	Norton Gold Fields Pty Limited
ACN	112 287 797
File Number	DER2018/001042-4
Premises	Binduli North Minesite Legal description Mining tenements M26/115, M26/243, M26/387, M26/420, M26/430, M26/445, M26/446, M26/447, M26/468, M26/474, M26/629, M26/833
Date of Report	22 July 2021
Decision	Works approval granted

A/MANAGER, RESOURCE INDUSTRIES

REGULATORY SERVICES

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

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1. Decision summary

This Decision Report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the Premises. As a result of this assessment, Works Approval W6504/2021/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Decision Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2.2 Application summary and overview of Premises

On 8 January 2021, Talis Consultants Pty Ltd (Talis), on behalf of Norton Gold Fields Pty Limited (Norton) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to undertake construction works relating to construction, commissioning and time limited operations of the following:

- Mine pit dewatering and subsequent transport of dewatered water via pipeline to neighbouring pits. Brine from the water treatment plant will also be discharged to neighbouring pits;
- Nano filtration water treatment plant (pre-constructed, commissioned and banded within a dedicated sea container);
- Crushing, screening and agglomeration of ore;
- On-site crushing, screening of material for road base / aggregate by mobile plant equipment;
- Conveyor and radial stacker for placing the agglomerated ore on heap leach pad;
- Construction and operation of a heap leach facility including leachate ponds and processing facility;
- Installation and operation of a diesel power generation facility;
- Chemical storage (associated with heap leach processing, and also diesel/LPG); and
- On-site landfilling activities.

The site is located 3.5 km west of the City of Kalgoorlie. The Prescribed Premises boundary is shown below in Figure 1 and a more detailed site layout is shown in Figure 2.

The Premises relates to the categories and assessed design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in Works Approval W6504/2021/1. The infrastructure and equipment relating to the premises categories and any associated activities which the department has considered in line with *Guidance Statement: Risk Assessments* (DER 2017) are outlined in Works Approval W6504/2021/1.

The premises is currently regulated under existing EP Act Part V licence L9048/2017/1. Once the construction of the works outlined in the works approval have been completed, the licence will require an amendment to allow ongoing operations once time-limited operations have expired.

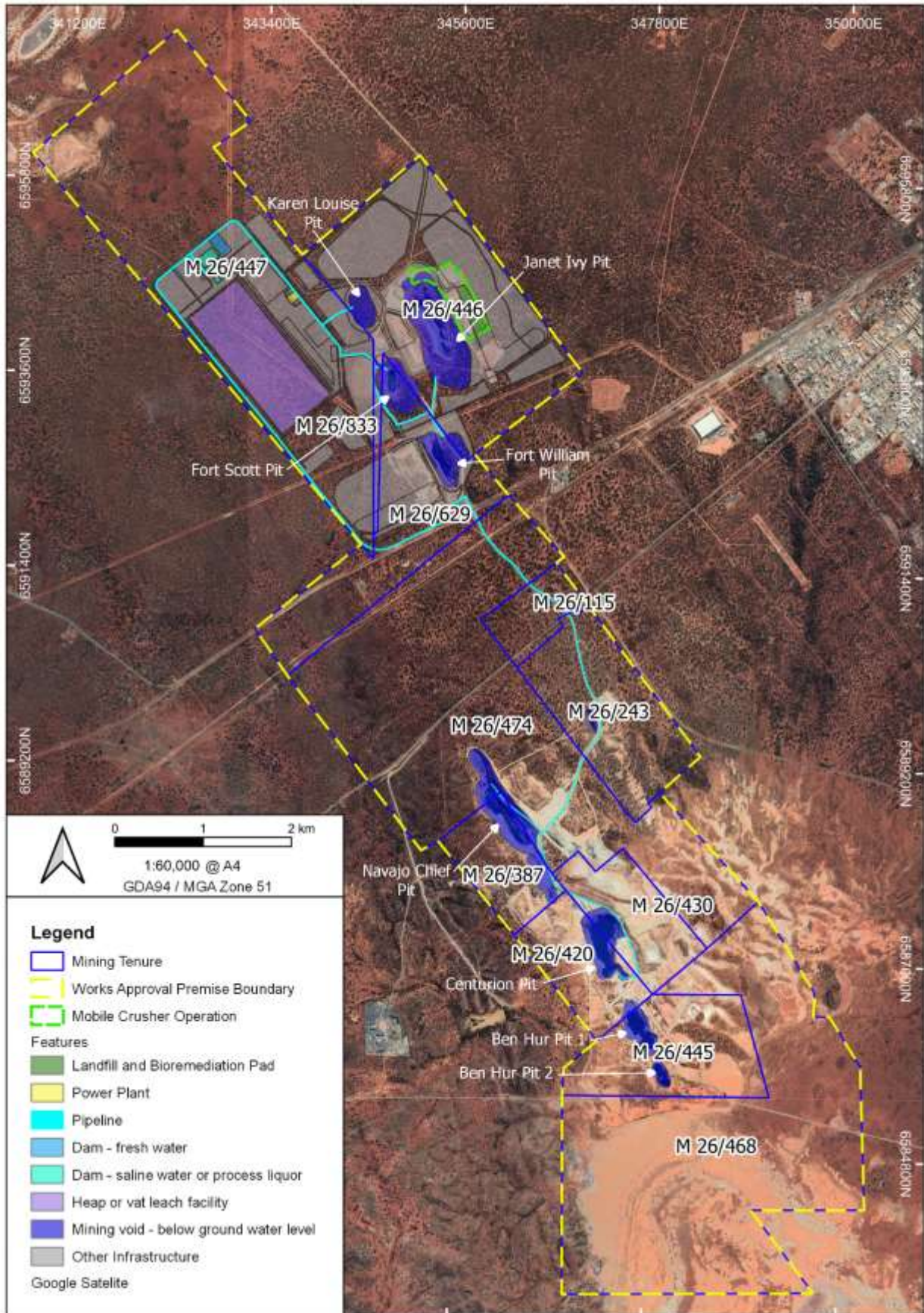


Figure 1: Prescribed Premises Boundary

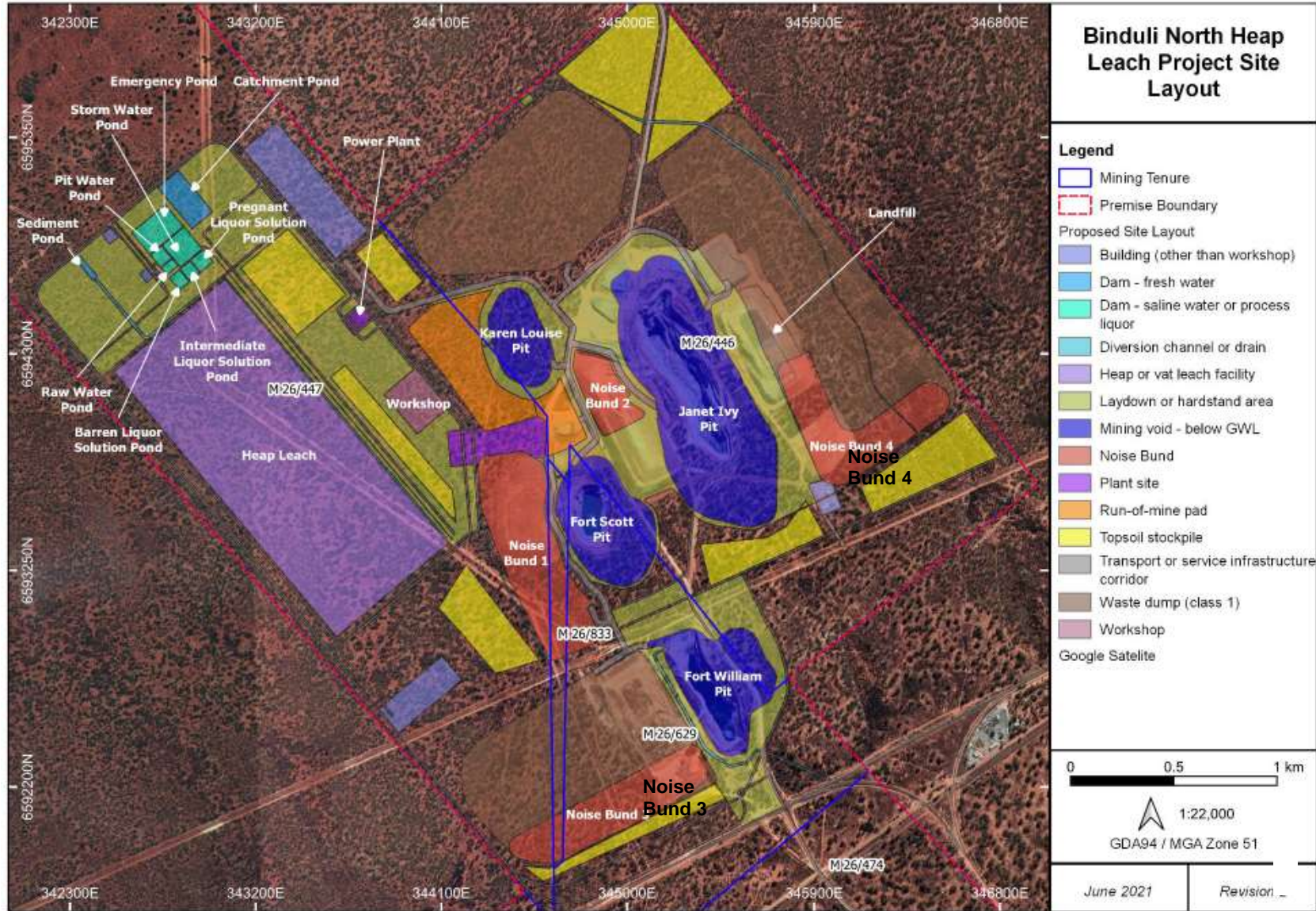


Figure 2: Detailed site map

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2.2.1 Category 5 Ore Crushing and Screening Circuit

The three-stage crushing circuit of the ore for the heap leach starts with screening operation feed by Grizzly feeder. Oversize material from the Grizzly will be crushed by a jaw crusher (primary crusher). The secondary crusher will be a cone crusher which is in closed circuit to ensure all the larger particles will be crushed before entering High Pressure Grinding Rollers (HPGR). HPGR's edge stream will be recirculated back to the feed. Final crushed ore will be delivered by conveyor to the surge bin before being fed to the agglomeration drum.

Throughput of the crushing and grinding circuit will be 800 tonnes per hour (t/h), or 5 million tonnes per annum (MTPA), with an estimated availability of 72%, operating up to 24 hours per day. The maximum size of ore will be 900 mm in any dimension, with an 80% passing (F80) size of 500 mm, using the following equipment:

- Primary crusher: metso C160
- Secondary crusher: Sandvick CH890i
- High Pressure Grinding Rolls: CITIC HPGR 20/13

Gold bearing ore will be stored on the Run of Mine (ROM) pad located adjacent to the primary crusher.

Fixed conveyors will be employed to transport ore between crushing stations.

The agglomeration drum receives the ore feed from the surge bin via a conveyor on which lime and cement are added to the ore. The ore is then agglomerated using barren solution from the downstream operation in the agglomeration drum.

Agglomerated ore then will be conveyed to the heap leach area via overland conveyors, then a series of grasshopper conveyors to a radial stacker which will stack the ore in a series of heap cells.

The crushing and screening circuit is shown in Figure 3 below.

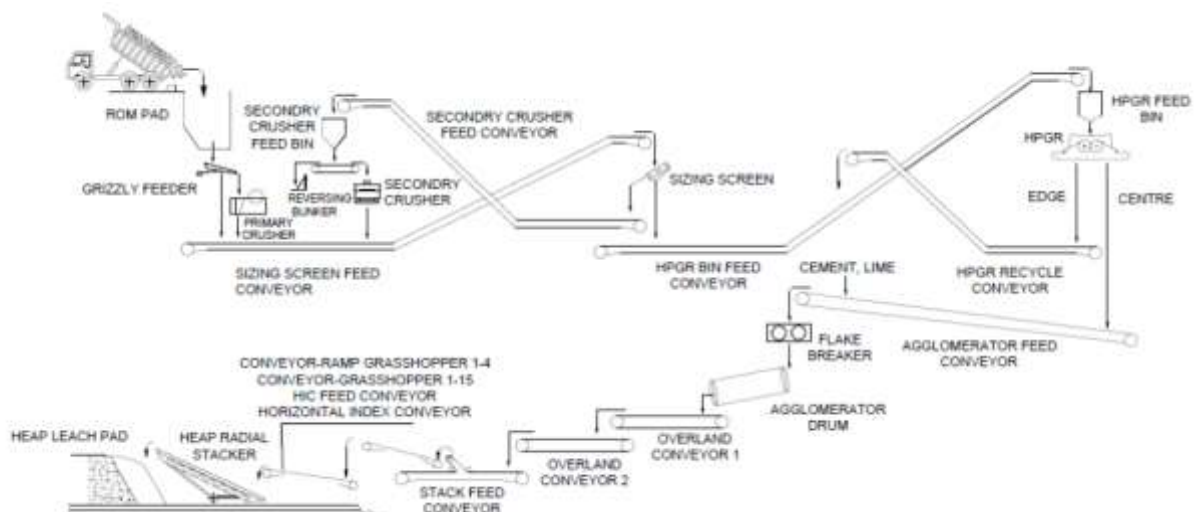


Figure 3: Ore Crushing and Screening Circuit

2.2.2 Category 6 Mine Dewatering Infrastructure

Dewatering of open pits will be required during operations to allow for safe mining. Pit dewatering will be the main supply of water for the heap leach operation. Pit dewater will be pumped to the Pit Water Dam (PWD) where it will be treated via the Water Treatment Plant (WTP). The treated water will be then discharge to the Raw Water Pond (RWP) for use in the heap leach and processing circuits. Brine from the WTP will be discharged to an existing pit not in use at Binduli North or Binduli South.

Mine dewatering is undertaken under Groundwater Licence GWL 167686(3).

Excess dewatering water will be discharged to deactivated mining pits located at Binduli North or Binduli South. There are four pits located at Binduli North (Janet Ivy, Fort William, Fort Scott and Karen Louise) and four pits located at Binduli South (Beaver, Centurion, Navajo Chief and Ben Hur). When dewatering does not meet the heap leach operational requirements, water will be pumped from one of the Binduli North pits to supplement the dewatering feed. The discharge and water supply pipelines to the Binduli South Pits will consist of dual pipeline to allow flexibility i.e. dewatering discharge or water supply.

Two pipelines are proposed to transfer water between the Binduli North and Binduli South pits. All proposed pipelines will make use of existing disturbance were possible to minimise impacts. Pipelines will be banded or buried and have leak detection and automatic cut-off fitted in case of leak or damage to the pipeline. Pipelines will be inspected twice daily during operations.

The proposed pipeline network is shown in Figure 1 above. The pipeline fabrication, installation and testing will comply with Australian standards as shown below:

- Installation: AS2033;
- Dimensional specification (fitting): AS4129 SDR 26 or AS4130; and
- Material specification: AS4131.

2.2.3 Category 7 Heap Leach Infrastructure

The proposed heap leach infrastructure is designed to process 5 million tonnes of gold-bearing ore per annum. 25 cells in total will be constructed side by side. Each cell will be 65 metres x 720 metres. The core design details of the heap leach extraction area, including closure profile is shown below.

Dimensions

- Max height of heap leach: 40 metres
- Number of lifts per cell: 4 lifts of 10 metres each
- Berm width: 7.5 metres
- Slope angle: 33.37 degrees
- Heap leach dimensions: 1,690 m x 720 m
- Total volume: 39,700,000 m³ (58.1 Mt)

Features

- Liner design: compacted soil layer, 1.5 – 2 mm High Density Polyethylene (HDPE) liner, cushion layer then ore layer
- Leak detection: inclined monitoring bores
- Reticulation system: cyanide solution applied via drippers, then the pregnant solution flows into each cell's collection box
- Bunding: the heap leach pad area will be banded to divert stormwater flow into a constructed diversion channel

All spent solution will be collected and recycled and reused in the productions. Processing solutions will be stored in series of dams as detailed in Table 1 below.

Table 1: Heap leach containment infrastructure

Holding dam/pond	Design description
Pit Water Dam (PWD)	<p>Area: 0.5 ha Volume: 18,491 m³ Liner: HDPE liner (1.5 mm) over a compacted soil layer (minimum 200 mm depth) minimum permeability of 3.5×10^{-15} m/s.</p> <ul style="list-style-type: none"> • Saline Water – Pit Dewatering Water 60,000-150,000 TDS. • The PWD will be constructed of mine waste and lined with HDPE. • The PWD will have a minimum freeboard of 0.5 m. • Water level will be managed by pit dewatering (excess pit dewater can be sent to Binduli South pits for disposal) and supplemented by water from Binduli North pits when pit dewatering is inadequate.
Raw Water Pond (RWP)	<p>Area: 0.3 ha Volume: 9,112 m³ Liner: HDPE liner (1.5 mm) over a compacted soil layer (minimum 200 mm depth) minimum permeability of 3.5×10^{-15} m/s.</p> <ul style="list-style-type: none"> • Saline Water – treated water from WTP 45,000 – 120,000 TDS. • The RWP will be constructed of mine waste and lined with HDPE. • The RWP will have a minimum freeboard of 0.5 m. • Water level will be managed by throughput of WTP.
Barren Liquor Pond (BLP)	<p>Area: 0.4 ha Volume: 13,053 m³ Liner: HDPE liner (1.5 mm) over a compacted soil layer (minimum 200 mm depth) minimum permeability of 3.5×10^{-15} m/s.</p> <ul style="list-style-type: none"> • Barren Liquor Solution– Water from RWP and Processing circuit, TDS up to 120,000 mg/L and containing cyanide. • The BLP will be constructed (61 m x 62 m) of mine waste and lined with HDPE. • The BLP will have a minimum freeboard of 0.5 m. • The weirs between ponds have been designed to pass a 1:100 year event with a freeboard above maximum flood level of 0.1 to 0.2m.
Intermediate Liquor Pond (ILP)	<p>Area: 0.4 ha Volume: 13,071 m³ Liner: comprise of hypernet sandwiched between a top layer of 1.5mm HDPE textured liner and a bottom layer of 1mm smooth HDPE liner with a minimum permeability of 3.9×10^{-15} m/s.</p> <ul style="list-style-type: none"> • Intermediate Liquor Solution – TDS up to 120,000 mg/L, contains cyanide and gold. • The ILP will be constructed (61 m x 62 m) of mine waste and lined with HDPE. • The ILP will have a minimum freeboard of 0.5 m. • The weirs between ponds have been designed to pass a 1:100 year event with a freeboard above maximum flood level of 0.1 to 0.2m.
Pregnant Liquor Pond (PLP)	<p>Area: 0.5 ha Volume: 17,645 m³ Liner: comprise of hypernet sandwiched between a top layer of 1.5mm HDPE textured liner and a bottom layer of 1mm smooth HDPE liner with a minimum permeability of 3.5×10^{-15} m/s. Pregnant Liquor Solution – TDS up to 120,000 mg/L, contains cyanide and gold.</p> <ul style="list-style-type: none"> • The PLP will be constructed (80 m x 61 m) of mine waste and lined with HDPE. • The PLP will have a minimum freeboard of 0.5 m. • The weirs between ponds have been designed to pass a 1:100 year event with a freeboard above maximum flood level of 0.1 to 0.2m.

Storm Water Pond (SWP)	<p>Area: 1.8 ha Volume: 79,620 m³ Liner: HDPE liner (1.5 mm) over a compacted soil layer (minimum 200 mm depth) minimum permeability of 3.5 x 10⁻¹⁵ m/s. The SWP will contain rainfall that runs off or seeps through the Heap Leach thus will contain elevated levels of Cyanide and gold. This water will be captured and re-used in the Heap leach operation.</p> <ul style="list-style-type: none"> • The SWP will be constructed (137 m x 130m) of mine waste and lined with HDPE.
Emergency Pond	<p>Area: 3.4 ha Volume: 105,380 m³ Liner: HDPE liner (1.5 mm) over a compacted soil layer (minimum 200 mm depth) minimum permeability of 3.5 x 10⁻¹⁵ m/s.</p> <ul style="list-style-type: none"> • The Emergency Pond will contain TDS up to 120,000, contains cyanide and gold. • The Emergency Pond will be constructed (212 m x 158 m) of mine waste and lined with HDPE.
2 x Surface water Catchment Ponds	<p>Ponds lined with compacted clay base with the following dimensions: (205 m x 205 m) – with storage volume 180,000 m³</p> <p>Two storm water catchment ponds will be constructed at the northern end of the Heap Leach area to capture rainfall runoff within the mining and processing area. This water may potentially be contaminated with hydrocarbons or sediment. The ponds will act as containment ponds for small rainfall events and sediment traps for larger rainfall events which will overflow to the environment.</p>

Pit dewater and make up water from Binduli South will be sent to the PWD. From there it will be fed into the WTP where treated water will be discharged to the RWP and wastewater will be discharged back to inactive pit voids. The RWP will be used to supplement the BLP which will also receive excess water from the carbon adsorption columns, elution, and gold room circuit.

Cyanide will be added to water from the BLP and reticulated onto the heap leach. Water will be circulated through the heap leach before returning to the ILP until the required gold concentration is reached and water sent to the PLP. From there it will be sent to the carbon adsorption columns, elution, and gold room circuit.

In addition, the SWP will capture rainwater that runs off or percolates through the heap leach. This water will be contaminated with heap leach solution and cannot be discharged to the environment. It will be reused in the heap leach circuit. An emergency pond will also be constructed to accommodate water from the ponds in the event of an extreme rainfall event or emergency that requires the emptying of any pond containing saline or process water.

In the on-site gold room, the carbon adsorption columns are acid washed and then run through the elution circuit (removed from carbon by cyanide solution), followed by electrowinning and smelting to produce gold dor. The carbon is regenerated in a kiln and then quenched and returned to the adsorption circuit. A flow diagram of the heap leach process is shown in Figure 4 below.

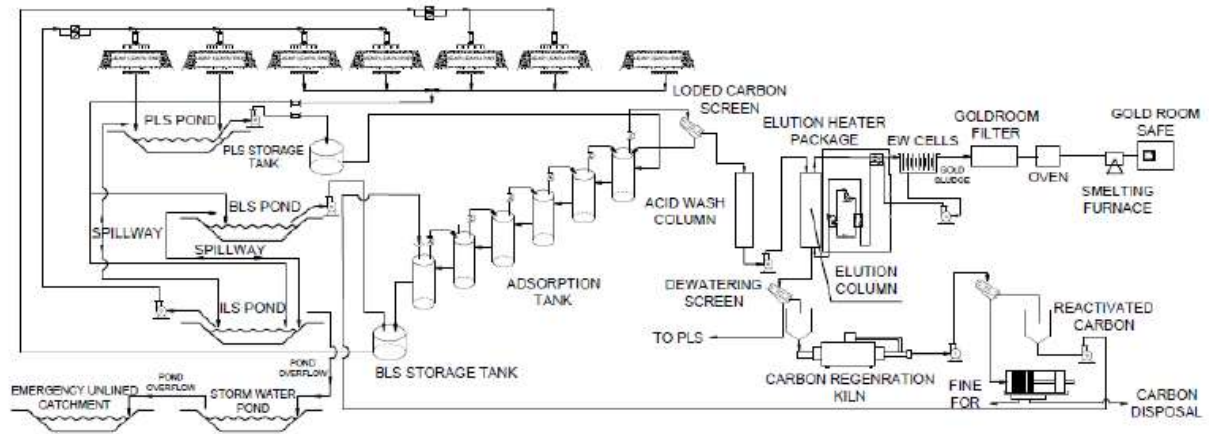


Figure 4: Heap leach flow diagram

Potential groundwater leakage from the heap leach pad and ponds will be monitored via four groundwater bores shown in Figure 5 below (labelled MB01 – 09). Prior to commissioning, bores MB01-MB09 will be sampled to establish baseline groundwater quality for standard physical/chemical properties, anions/cations and metals/metalloids. Monitoring of the groundwater will continue during time-limited operations. When the licence is amended to allow general operations, the groundwater monitoring will continue. The amended licence will sample specific bores depending on the results of the monitoring during time-limited operations.

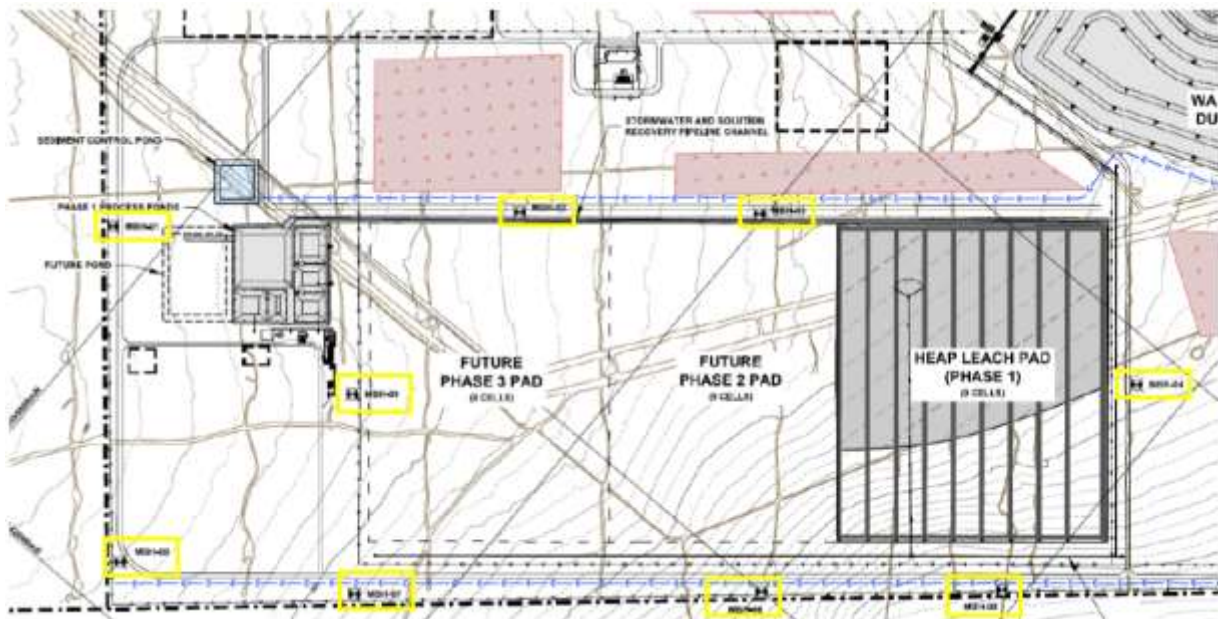


Figure 5: Heap leach groundwater monitoring bores

2.2.4 Category 12 Mobile Crushing and Screening

Category 12 activities are limited to activities undertaken by the mobile crushing and screening operation. The project will require on-going crushing and screening of up to 925,000 tonnes of waste rock material already located onsite over the expected 9 years life-of-mine. This material will be used for road base / aggregate.

The mobile equipment will be located on already disturbed ground and will be located adjacent to the landfill and bioremediation pads at the existing Janet Ivy east waste dump as shown in Figure 1 above.

A list of the mobile crushing and screening equipment is shown in Table 2 below.

Table 2: Mobile crushing and screening equipment

Type	Equipment	Throughput	Specifications
Terex Finlay	J1175 jaw crusher	250tph @75mm	1175mm jaw opening
Terex Finlay	C1550 cone crusher	350tph @ 37mm	1300mm cavity
Terex Finlay	C1545 cone crusher	250tph @ 25mm	1150mm cavity
Terex Finlay	C1540 cone crusher	200tph @ 20mm	1000mm cavity
Terex Finlay	984 screen	400tph capacity	3 deck horizontal screen
Terex Finlay	693 screen	250tph capacity	2 deck incline screen

2.2.5 Category 52 Electric Power Generation

A diesel fired power plant will be constructed with a 13 MW capacity (13 x 1 MW sets). The plant will be designed to run 10 of the 13 sets at 85% capacity (~10 MW) to provide power to the project. The remaining 3 sets will remain on standby. The power station will be located east of the heap leach pad as shown in Figure 2 above.

2.2.6 Category 64 Putrescible Landfill

A small landfill will be located immediately east of the Janet Ivy Pit as shown in Figure 2 above. The landfill will accept approximately 350 tonnes of inert and putrescible wastes per year generated on-site.

Waste streams will include general waste generated from site offices, crib rooms and workshops and inert waste (type 1 and 2) generated from mining/processing that is not able to be collected for recycling. Mining waste will also include up to 60 tyres per year for disposal. Where appropriate, the landfill will be managed in accordance with the *Environmental Protection (Rural Landfill) Regulations 2002*.

2.2.7 Other associated infrastructure

A bunded washdown bay on concrete hardstand will be constructed and installed within the workshop area. The washdown bay will be fitted with a silt trap and an oil water separator (OWS). This will treat washdown water prior to reuse via the agglomerate drum, used in processing or operational activities. All surplus contaminated waters will be removed off-site by a contractor and sent to a licensed facility for disposal or reuse.

Various chemicals and hydrocarbons will be required for the operation of the premises. A list of chemicals and hydrocarbons to be utilised in the process is shown below in Table 3.

A fully bunded bioremediation pad will be constructed and located immediately adjacent to the proposed landfill. Any hydrocarbon-contaminated soils will be stored on this pad until testing of the soil confirms the material meets the threshold for disposal as set out in the *Landfill Waste Classification and Waste Definitions 1996 (as amended 2019)*.

Table 3: Chemical and hydrocarbon information

Chemical	Bunding	Tank total volume
Cyanide	Fully bunded	120 kL (120 m ³)
Caustic	Fully bunded	40 m ³
LPG	N/A	6 x 7.5kL (45 m ³)
HCl	Fully bunded	25 m ³
Cement	N/A	220 m ³
Lime	N/A	100 m ³
Diesel (power generation)	Self-bunded, doubled lined container	160 kL (160 m ³)
Diesel (light vehicle and mining fleet refuelling)	Self-bunded, doubled lined container	2 x 110 kl (220 m ³)
Total Bulk Chemical Storage		930 m³

2.3 Part IV of the EP Act

On 23 December 2020, the applicant referred the proposal to the Environmental Protection Authority (EPA) pursuant to Section 38 of the *Environmental Protection Act 1986* (EP Act).

On 6 May 2021, the Executive Direction of EPA Services determined that the proposal would not be assessed under Part IV of the EP Act.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

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.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this Decision Report are detailed in Table 4 below. Table 4 also details the proposed control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 4: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Crushing of material, vehicle movements, lift-off from stockpiles and/or stored product, earthworks etc.	Air/windborne pathway	<ul style="list-style-type: none"> • Sprinklers on stockpiles; • onsite vehicle speeds limited; • water cart for wetting down of roads when required; and • regular visual inspections of the site.
Noise	Crushing and screening of material for construction, general construction activities.	Air/windborne pathway	Company Noise Management Plan (NMP) and complaints register.
Commissioning/Operation			
Dust	Crushing and screening of ore, vehicle movements, lift-off from stockpiles and/or stored product, landfill activities.	Air/windborne pathway	<ul style="list-style-type: none"> • Sprinklers on stockpiles; • water sprayers at crushing and screening circuit; • onsite vehicle speeds limited; • water cart for wetting down of roads when required; • regular visual inspections of the site; and • complaints management and investigation.
Noise	Mobile crushing and screening, ore crushing and screening circuit, power generation units.	Air/windborne pathway	<ul style="list-style-type: none"> • Company Noise Management Plan (NMP); • complaints register; and • 25 metre noise bunds at strategic noise generation equipment if required (additional information in section 3.3).
Sedimentation	Rainfall events causing sedimentation runoff into local water bodies.	Direct discharge to land	<ul style="list-style-type: none"> • Diversion bunds and a central drainage channel will be installed to manage surface water flow and mitigate potential flooding; • toe drains, bunds and sediment traps will be installed around waste rock dumps; and • all surface water management structures designed to minimum 10% Annual Exceedance Probability.
Hyper saline water	Mine dewatering pipeline	Direct discharge to land	<ul style="list-style-type: none"> • Telemetry shutoff and leak detection; • catch pits installed at low points; • pipelines bunded or buried; and • twice-daily inspections when operational.

Emission	Sources	Potential pathways	Proposed controls
Chemicals	Heap leach operations	Direct discharge to land	<ul style="list-style-type: none"> • Compacted soil and HDPE liner installed; • Leak detection via series of monitoring bores installed; and • Pad area bunded to direct all runoff into a diversion channel.
Odour	Class II and II landfill	Air/windborne pathway	All putrescible materials to be covered immediately upon disposal.
Air emission from burning tyres (in the event of a fire)			No more than 60 tyres to be stored and the landfill at any time. Fire-fighting equipment on standby on site.
Air emissions	Fuel burning for power generation	Air/windborne pathway	No controls proposed – size of generators and separation distance to sensitive receptors sufficient.
Hydrocarbons and chemicals	Storage and usage of hydrocarbons (diesel for generators and vehicles) and chemicals (cyanide, caustic, acids, lime) General spillage at workshop, refueling and wash down bays	Direct discharge to land	<ul style="list-style-type: none"> • Spill kit available on site; • appropriate bunding for chemical and hydrocarbon storage; • hardstands and bunding at washdown and workshop with oil/water separator; and • dispose of all contaminated waters to an off-site licensed facility.

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the applicant's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table 3 and Figure 6 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guidance Statement: Environmental Siting* (DER 2016)).

Table 5: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Residential receptors – various locations south east to south west of the premises.	Closest residential receptor 2.5 km from the proposed fixed plant. See Figure 6 below
Environmental receptors	Distance from prescribed activity
Kurrawang Nature Reserve - vested in the National Parks and Nature Conservation	Immediately west of the project area

Authority for the conservation of flora and fauna.	
Carnaby's Cockatoo (<i>Calyptorhynchus latirostris</i>): Breeding in tree hollows of Wandoo, Tuart, Jarrah, York gum, Karri and Marri. Foraging in woodlands, forests, riparian vegetation, heath, and Banksia woodland as well as introduced species.	Medium chance of appearing in woodlands within and surrounding project area
Malleefowl (<i>Leipoa ocellata</i>): Dense shrubland and low woodlands dominated by mallee vegetation.	Medium chance of appearing in shrublands within and surrounding project area
Various P2 and P3 classified significant flora within the project area.	High likelihood of occurrence within the project area
Critically Endangered - Arid Bronze Azure Butterfly (<i>Ogyris subterrestris petrina</i>)	Previously recorded – locally extinct
Critically Endangered - Inland Hairstreak Butterfly (<i>Jalmenus aridus</i>)	Previously recorded – locally extinct



Figure 6: Location of sensitive receptors

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 6.

Works Approval W6504/2021/1 that accompanies this Decision Report authorises construction and time-limited operations. The conditions in the issued Works Approval, as outlined in Table 6 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence amendment is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the operation of the Premises i.e. gold processing activities, landfilling, power generation etc. A risk assessment for the operational phase has been included in this Decision Report, however licence conditions will not be finalised until the department assesses the licence application.

Table 6: Risk assessment of potential emissions and discharges from the Premises during construction, commissioning and operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Construction								
Movement of machinery / vehicles on roadways and construction and installation of infrastructure.	Dust	Air/windborne pathway causing impacts to health and amenity	Residences located 2.5 km south-east of the project	Refer to Section 3.1	C = Slight L = Possible Low Risk	Y	Condition 1, Table 1, dust infrastructure controls	N/A
	Noise				C = Slight L = Possible Low Risk	Y	Condition 1, Table 1 included for noise controls	N/A
Commissioning								
Commissioning of ore crushing plant	Dust	Air/windborne pathway causing impacts to health and amenity	Residences located 2.5 km south-east of the project	Refer to Section 3.1	C = Slight L = Possible Low Risk	Y	Condition 1, Table 1, dust infrastructure controls	N/A
	Noise				C = Minor L = Possible Medium Risk	Y	Condition 1, Table 1, noise controls	N/A
Operation (including time-limited-operations operations)								
Category 5: Processing or beneficiation of metallic or non-metallic ore (ore crushing plant)								
Screening, crushing, unloading, loading and storage of material	Dust	Air/windborne pathway causing impacts to health and amenity	Residences 2.5km to the south-east	Refer to Section 3.1	C = Slight L = Possible Low Risk	Y	Condition 12, Table 4 included to control dust during time limited operations.	N/A

Risk Event					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Vehicle movements	Noise	Air/windborne pathway causing impacts to health and amenity	Residences 2.5km to the south-east		C = Minor L = Possible Medium Risk	N	<u>Conditions 15, 16, 17 and 18 included to monitor noise during time-limited operations.</u>	Noise monitoring is required to verify that the proposed noise barriers have assisted in complying with the EP Noise Regulations at the nearby sensitive receptors.
	Sediment- laden stormwater	Overland runoff potentially causing ecosystem disturbance or impacting surface water quality	Series of salt lakes ~2km north-west of the project site.		C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 1 included for stormwater controls (2 x surface water catchment ponds)	N/A
Category 6: Mine dewatering								
Mine dewater pipelines	Hyper-saline water discharge	Overland runoff potentially causing ecosystem disturbance and impacting on localised vegetation	Localised vegetation	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 1 included for the pipeline and services corridor in place, such as leak detection and secondary containment. Condition 8, Table 3 included to ensure leak detection is operating as designed. Condition 12, Table 4 included to inspect pipelines during time limited operations. <u>Conditions 13 and 14, Tables 5 and 6 included to authorise and monitor discharges of brine during time-limited operations.</u>	Discharge monitoring is required to manage groundwater levels and quality.

Risk Event					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Category 7: Vat or in situ leaching of material								
Heap leach operations	Leachate/spillage of contaminated liquids	Overland runoff, seepage or leachate potentially causing ecosystem disturbance or impacting surface/ground water quality	Series of salt lakes ~2km north-west of the project site. Groundwater located 30-80 metres below the surface	Refer to Section 3.1	C = Moderate L = Unlikely Medium Risk	N	Condition 1, Table 1, controls included in the works approval for heap leach pad and associated ponds. <u>Condition 4 included to ensure groundwater monitoring bores are correctly established.</u> <u>Condition 6 included to require monitoring of groundwater surrounding the heap leach.</u> Condition 8, Table 3 included to ensure heap leach pad is correctly established.	The correct establishment of the monitoring bores is essential to ensure monitoring accurately captures evidence of leaking at the heap leach facility. Monitoring is required to establish a base level of groundwater quality prior to heap leach activities. Groundwater monitoring during operations are required to manage any potential seepage from the heap leach pads and ponds.
	Dust	Air/windborne pathway causing impacts to health and amenity	Residences 2.5km to the south-east		C = Slight L = Possible Low Risk	Y	N/A	N/A
	Contaminated stormwater	Excess stormwater entering and overflowing ponds potentially causing ecosystem disturbance or impacting surface/ground water quality	Series of salt lakes ~2km north-west of the project site. Groundwater located 30-80 metres below the surface		C = Minor L = Possible Medium Risk	Y	N/A	N/A

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Risk Event					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Category 12: Screening, etc. of material (mobile screen)								
Screening, crushing, unloading, loading and storage of material Vehicle movements	Dust	Air/windborne pathway causing impacts to health and amenity	Residences 2.5km to the south-east	Refer to Section 3.1	C = Slight L = Possible Low Risk	Y	Condition 12, Table 4 included to control dust during time limited operations.	N/A
	Noise	Air/windborne pathway causing impacts to health and amenity	Residences 2.5km to the south-east		C = Minor L = Possible Medium Risk	N	<u>Condition 15, 16, 17 and 18 included to monitor noise during time limited operations.</u>	Noise monitoring is required to verify that the proposed noise barriers have assisted in complying with the EP Noise Regulations at the nearby sensitive receptors.
	Sediment-laden stormwater	Overland runoff potentially causing ecosystem disturbance or impacting surface water quality	Series of salt lakes ~2km north-west of the project site.		C = Minor L = Rare Low Risk	Y	N/A	N/A
Category 52: Electric power generation								
Operation of 10 x 1 MW diesel generators	Noise	Air/windborne pathway causing noise impacts	Residences 2.5km to the south-east	Refer to Section 3.1	C = Slight L = Possible Low Risk	N	<u>Condition 15, 16, 17 and 18 included to monitor noise during time limited operations.</u>	Noise monitoring is required to verify that the proposed noise barriers have assisted in complying with the EP Noise Regulations at the nearby sensitive receptors.
	Air emissions	Air/windborne pathway causing impacts to health	Residences 2.5km to the south-east	No credible pathway for air emissions to impact	C = Slight L = Rare	Y	N/A	N/A

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Risk Event					Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls	C = consequence L = likelihood			
		and amenity		receptors	Low Risk			
Category 64: Class II or III putrescible landfill site								
Class II and III landfill facility	Dust	Air/windborne pathway causing dust impacts	Residences 2.5km to the south-east	Refer to Section 3.1	C = Slight L = Possible Low Risk	Y	Condition 12, Table 4 included to manage landfill operations during time-limited operations.	N/A
	Odour	Air/windborne pathway causing odour impacts	Residences 2.5km to the south-east		C = Slight L = Rare Low Risk	Y	N/A	N/A
	Contaminated leachate from wastes	Infiltration to localised groundwater	Groundwater located 30-80 metres below the surface		C = Slight L = Possible Low Risk	Y	N/A	N/A
	Air emissions / smoke	Tyre fires causing smoke and airborne particles	Residences 2.5km to the south-east		C = Minor L = Rare Low Risk	Y	N/A	N/A
Other associated activities								
Storage and transport of hydrocarbons / chemicals	Hydrocarbons / chemicals	Overland runoff potentially causing ecosystem disturbance or impacting surface/ground water quality	Series of salt lakes ~2km north-west of the project site. Groundwater located 30-80 metres below the surface	Section 3.1	C = Minor L = Unlikely Medium Risk	Y	N/A	N/A

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

3.3 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 7.

Table 7: 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 8.

Table 8: 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> onsite impacts: low level offsite impacts local scale: minimal offsite impacts wider scale: not detectable Specific Consequence Criteria (for environment) likely to be met 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> onsite impact: minimal Specific Consequence Criteria (for environment) met 	<ul style="list-style-type: none"> 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.

3.4 Detailed risk assessment for Noise emissions

3.4.1 Identification and general characterisation of emission

During operations of the mine site, including activities related to this works approval, noise will be generated as an emission. The applicant has supplied an environmental noise impact assessment to determine if the noise emissions generated by activities on site will meet the assigned levels set in Table 1 of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations). The noise impact assessment considers all activities proposed at the premises in the modelling predictions, including activities that are not prescribed activities, such as mining.

3.4.2 Description of potential adverse impact from the emission

Noise emissions have the potential to affect the health and amenity of nearby sensitive receptors, especially during nighttime hours when background noise levels are lower. The proposed activities are to be undertaken 24 hours a day, 7 days a week.

3.4.3 Applicant controls

The noise impact assessment was conducted by Talis Consultants (Talis) and was undertaken using worst-case operational and night-time meteorological conditions. The noise impact assessment identified four sensitive receptors within 3 km of the fixed plant location as well as the nearby western outskirts of the City of Kalgoorlie/Boulder as having the potential to be impacted by noise from operations. These receptors are shown in Figure 6 above.

The modelling found that in worst-case scenarios and with no noise control measures, the predicted noise levels will meet the assigned levels at all receptors, apart from the three shown in Table 9 below.

Table 9: worst-case noise predictions (dB)

Receiver	LA10 Noise Levels		Exceedance (dB)
	Assigned (night-time) ¹	Predicted	
R3	31	48	17
R4	30	46	16
R6	31	34	3

Four noise bunds were included in the worst-case scenario noise modelling as noise control measures. The noise bunds are to be of earthen materials (waste rock) and be a minimum 25 metres high. The location of the four bunds are shown in Figure 2 above. The predicted noise levels, with the 25 metre high noise bunds, at the three receptors that previously exceeded the assigned levels is shown in Table 10 below. Modelling shows that with the inclusion of the noise bunds, noise levels at all sensitive receptors will meet the assigned limits as outlined in the Noise Regulations.

At the time of publication of this decision document, the applicant was in the process of negotiations to acquire the dwellings associated with receptors “R3” and “R4” such that they will no longer be considered “noise sensitive receptors”. Conditions in the Works Approval will allow the applicant to forgo the construction of the noise bunds only on the condition that receptors R3 and R4 are no longer considered sensitive receptors for the purposes of noise emissions from the premises and that they meet the assigned levels set out in the Noise Regulations at all remaining sensitive receptors.

Table 10: noise predictions with controls

Receiver	LA10 Noise Levels		Exceedance (dB)
	Assigned (night-time)	Predicted	
R3	31	31	Nil
R4	30	29	Nil
R6	31	27	Nil

Should the acquisition of receptors R3 and R4 not occur prior to time limited operations authorised under the works approval, the applicant will need to construct Noise bunds 1, 2 and 3 prior to the start of time limited operations, in order to ensure the assigned levels (during the day and at night) specified in the Noise Regulations can be complied with. Noise bund 4 is required to shield receptors from mining activities being undertaken near the Eastern Waste Rock Landform. As such, noise bund 4 will not be required to be built until prior to the beginning of activities in this area, which is expected to be two years after operations commence. A condition will be placed on the operating licence to ensure noise bund 4 is completed prior to activities commencing at the Eastern Waste Rock Landform.

All construction activities are to be undertaken in accordance with AS2436-2010: *Guide to noise and vibration control on construction, demolition and maintenance sites*. The applicant has committed to developing and submitting a Construction Noise Management Plan, which will be submitted to DWER at least 7 days prior to the commencement of any construction activities.

Noise monitoring at sensitive receptors R1, R2, R3 (if required), R4 (if required) and R6 will be undertaken during commissioning and time limited operations. If this monitoring suggests noise levels from operations are not meeting the assigned levels set in Table 1 of the Noise Regulations, the applicant has committed to increasing the height of noise bund 3 to 40 metres.

3.4.4 Consequence

Based upon the applicant's noise modelling data, noise emissions from a worst-case scenario have been modelled to meet the assigned levels set in the noise regs once the proposed noise bunds have been completed. Therefore, the Delegated Officer considers the consequence of the Risk Event to be **Minor**.

3.4.5 Likelihood of Risk Event

Based upon the Applicant's proposed controls and mining activities being undertaken day and night, the Delegated Officer has determined that the likelihood of noise emissions causing a disturbance to nearby sensitive receptors could occur at some time. Therefore, the Delegated Officer considers the likelihood of the Risk Event to be **Possible**.

3.4.6 Overall rating of noise emissions

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 7) and determined that the overall rating for the risk posed by noise emissions impacting on sensitive receptors is **Medium**.

4. Consultation

Table 11 provides a summary of the consultation undertaken by the department.

Table 11: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website (17/03/2021)	None received	N/A
Local Government Authority (City of Kalgoorlie-Boulder) advised of proposal on 23/03/2021	None received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 23/03/2021	DMIRS replied on 9/04/2021 stating/advising that the proposal was consistent with their mining proposal and they have no further comments.	N/A
Applicant was provided with draft documents on 3/06/2021	Refer to Appendix 1	Refer to Appendix 1
Applicant was provided with second draft documents on 7/07/2021	Applicant replied on 12/07/2021 with permeability of containment infrastructure.	Changes to the works approval was made to include the predicted permeability of the containment infrastructure.

5. Conclusion

Based on the assessment in this Decision Report, the Delegated Officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

References

1. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
2. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
3. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of Conservation & Land Management 1991, *Landnote 1/91*, Perth, Western Australia.

Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
Premises details (Category 52: Electric Power Generation)	Please update assessed design capacity to: <i>13MW capacity</i>	Changes made.
1. Table 1: 1. Ore crushing/ screening plant	Please update equipment: <i>Primary crusher: Metso C160 (or similar)</i> <i>Secondary crusher: Sandvick CH890i (or similar)</i> <i>High Pressure Grinding Rolls: CITIC GM200-130 (or similar)</i>	Changes made.
1. Table 1: 3. Pit water dam	Please amend to read: <i>Constructed to hold 18, 491m3, HDPE liner (1.5mm) over a compacted soil layer (minimum 200mm).</i> <i>Minimum freeboard of 0.5 metres.</i>	Changes made.
1. Table 1: 4. Raw water pond (RWP), barren liquor pond (BLP) intermediate liquor pond (ILP), pregnant liquor pond (PLP)	Please amend to read: <i>RWP and BLP must be lined with a HDPE liner (1.5mm) over a compacted soil layer (minimum 200mm).</i> <i>RWP – 9,112m3</i> <i>BLP – 13,053m3</i> <i>ILP and PLP will comprise of hypernet sandwiched between a top layer of 1.5mm HDPE textured liner and a bottom layer of 1mm smooth HDPE liner.</i> <i>ILP – 13,071m3</i> <i>PLP – 17,645m3</i> <i>Minimum design freeboard of 0.5 metres.</i>	Changes made.
1. Table 1: 5. Storm water pond (SWP) and emergency pond (EMP)	Please amend to read: <i>Each pond must be lined with a HPDE liner (1.5mm) over a compacted soil layer (minimum 200mm).</i> <i>SWP – 79,620m3</i> <i>EMP – 105,380m3</i>	Changes made.
1. Table 1: 7. Diesel power plant	Please amend to read:	Changes made.

Condition	Summary of applicant's comment	Department's response
	<i>13x1 megawatt generators [Cummins KA 50-G3 850KW] or equivalent.</i>	
1. Table 1: 8. Landfill	Additional information supplied detailing the dimensions of the landfill area.	Changes made.
1. Table 1: 9. Mobile crushing and screening	<p>Please amend to read: <i>Mobile crushing and screening machinery designed to process up to 925,000 tonnes per annual period consisting of the following machinery (or similar):</i></p> <ul style="list-style-type: none"> • <i>Terex Finlay J1175 Jaw crusher</i> • <i>Terex Finlay C1550 Cone crusher</i> • <i>Terex Finlay C1545 Cone crusher</i> • <i>Terex Finlay C1540 Cone crusher</i> • <i>Terex Finlay 693 2 deck screen</i> • <i>McCloskey R230 reclaimer screen</i> • <i>Two Telestack TS624 track stackers</i> • <i>PC450-8 Excavator</i> • <i>PC350-8 Excavator</i> • <i>CAT 980H Loader</i> 	Changes made.
1. Table 1: 11. Workshop area washdown bay	Additional information supplied detailing the disposal of contaminated waters.	Changes made.
1. Table 1: 13. Noise bund 1 - 3	<p>Request to amend to include (or similar):</p> <p><i>Noise bunds are to be constructed from earthen material (waste rock) or similar; and to be constructed and maintained at a height of at least 25m above the surrounding ground level where required to comply with the Environmental Protection (Noise) Regulations 1997.</i></p>	Changes made.
3.	<p>Please amend to:</p> <p><i>The Environmental Compliance Report required by condition 2, must include as a minimum the following:</i></p>	Changes made.
5. Table 2: Infrastructure	<p>Please amend listed infrastructure to:</p> <p><i>MBH-01 to MBH-09</i></p>	Changes made.
6.	<p>Please amend to read:</p> <p><i>The works approval holder must monitor the baseline ambient groundwater conditions in accordance with Table 8 in Schedule 2 and</i></p>	No changes made – the requirement to undertake bore sampling and reporting during the time-limited operations will establish a baseline level of groundwater parameters. The

Condition	Summary of applicant's comment	Department's response
	<i>record the results of all monitoring activity for a minimum of 4 monitoring bores.</i>	amended licence will then incorporate the relevant monitoring bores in the sampling regime.
12. Table 4: 4. Noise bund 1-3	Please amend to read: <i>Noise bunds are to be constructed from earthen material (waste rock) or similar; and to be constructed and maintained at a height of at least 25m above the surrounding ground level where required to comply with the Environmental Protection (Noise) Regulations 1997.</i>	Changes made. Noise bunds will only be required to be constructed if there is a possibility of an exceedance to the Environmental Protection (Noise) Regulations 1997 at all sensitive receptors.
20. (c)	Please amend to read: <i>The ambient groundwater monitoring results obtained during time limited operations under Table 8 Schedule 2 with a comparison to the baseline ambient groundwater conditions.</i>	No changes made – the monitoring of groundwater parameters during time-limited operations need to establish a baseline groundwater parameter level to then be compared with the relevant guidelines. This is to ensure that other uses of the resource are not impacted by the activities.
Schedule 1. Figure 1. Premises Map	Please replace with updated map as provided	Changes made.
Schedule 1. Figure 2. Key Infrastructure Map	Please replace with updated map as provided	Changes made.
Schedule 1. Figure 3. Monitoring Bores Map	Please replace with updated map as provided	Changes made.

Condition	Summary of applicant's comment	Department's response
Various – Applicant was asked to supply the predicted permeability of all containment infrastructure	Applicant replied with requested details	Expected permeability of HDPE-lined containment infrastructure included into works approval and decision report where appropriate.