



Application for Works Approval

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

Works Approval Number W6472/2020/1

Applicant Pantoro South Pty Ltd

ACN 633 003 737

File Number DER2020/000594

Premises Norseman Gold Project
1 Phoenix Road, Norseman WA 6443

Being part mining tenements M63/11, M63/13, M63/14, M63/15, M63/36, M63/42, M63/43, M63/44, M63/48, M63/68-I, M63/133-I, M63/140-I, M63/142, M63/155, M63/156, M63/214, M63/218, M63/258, M63/259 and M63/275

As defined by the Premises map attached to the issued works approval

Date of Report 6 October 2021

Decision Works approval granted

Lauren Edmands

MANAGER RESOURCE INDUSTRIES

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 Norseman Gold Project (premises). As a result of this assessment, works approval W6472/2020/1 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 18 November 2020, Pantoro South Pty Ltd (applicant) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act). The premises is currently licensed under L8612/2011/1. The premises is approximately 1.5 km west of the town of Norseman.

The site has been in care and maintenance since 2016 and the works proposed as part of this works approval form part of the plan to move into a redevelopment/construction stage before operations recommence.

The application is to undertake construction works relating to items that include processing infrastructure, dewatering, landfills, and a crushing and screening plant. Specifics on the proposed works for each category are listed below.

The premises relates to the categories and assessed production/design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in Works Approval W6472/2020/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guidance Statement: Risk Assessments* (DER 2017) are outlined in Works Approval W6472/2020/1.

2.2.1 Category 5

L8612/2011/1 currently authorises a throughput of 700,000 tonnes per year, and the applicant proposes an increase to 1,500,000 tonnes per year. A summary of proposed works for category 5 can be found in Table 1, and is visualised in Figure 1.

Table 1 Overview of proposed works for category 5

Proposed infrastructure or changes	Specifics
Processing plant (Figure 1)	<ul style="list-style-type: none"> • Increased throughput from 700,000 to 1,500,000 tonnes per annum <p><u>Crushing circuit</u></p> <ul style="list-style-type: none"> • Replacement of primary jaw crusher (primary crusher conveyor retained) • Existing primary crushing circuit refurbished: refurbishment of ROM bin, apron feeder, dribble chute, stacker conveyor, vibrating feeder chute, stockpile discharge conveyor, crusher control room • Construction of secondary and tertiary crushing circuit and associated infrastructure <p><u>Mill circuit</u></p> <ul style="list-style-type: none"> • Construction of new ball mill circuit and associated infrastructure
Processing plant associated infrastructure (Figure 1)	<p><u>Additional water storages (including stormwater management)</u></p> <ul style="list-style-type: none"> • 3 new lined dams (2000 m³ each): raw water, process water, environmental dam/process plant event dam • Reagent's area (for acid, caustic, cyanide)
TSF4 embankment raise	<ul style="list-style-type: none"> • Stage 3: 309 m (4 m raise) • Stage 4: 312 m including construction of 2 saddle dams to 312 m (saddle dams made of compacted tailings and compacted waste rock) • Stage 5: 315 m (including saddle dams)
TSF4 associated infrastructure	<ul style="list-style-type: none"> • Perimeter drainage system to intercept seepage before reaching perimeter embankment • 4 seepage recovery bores, 30 m deep

Phoenix processing plant

Background

Concerns regarding the containment of contaminated stormwater and process materials (spills) from the existing processing plant have been previously identified (Amendment Notice 1 (AN1), issued 2019). An improvement condition to address contaminated stormwater in L8612/2011/1, has not been actioned due to the processing plant being non-operational, as noted in AN1. As part of AN1, a condition was added to the existing licence (condition 1.3.13) requiring a report assessing integrity of the liquor and contaminated stormwater facilities, and the establishment of an adequate containment system. As the condition relates to the existing processing plant, and new works are proposed, including new stormwater management infrastructure, this condition does not apply to the new processing plant. This will be amended in the future licence amendment.

Proposed works

The majority of the existing processing plant is proposed to be demolished, while the primary crushing circuit will be refurbished.

The proposed redevelopment of the processing plant results in higher throughput and consists of a combination of gravity gold recovery and cyanidation. Ore to be processed includes, but is not limited to, the following sources: existing open pit mines (Slippers, Gladstone/Everlasting, Scotia) and underground mines (OK and Scotia).

The process plant has a throughput capacity of 1,000,000 tonnes per year based on single source hardest ore, with a grind size of 75 µm. The crushing circuit has a maximum throughput of 1,500,000 tonnes per year. The applicant proposes to process ore from different sources, which can result in varying maximum throughput depending on composition. A throughput

increase to 1,500,000 tonnes per year is therefore proposed. An overview of the new processing plant layout is shown in Figure 1.

The new processing plant proposes additional stormwater infrastructure to ensure contaminated runoff will be captured. Stormwater will be captured in the existing runoff drain and will then report to a proposed environmental/process plant events dam (2000 m²), via the existing Transfer point 1 (former Lake Bower). Transfer point 1 acts as sediment trap and can be flushed out. Overflow from this events dam will be captured in the existing triceptor tank system, which will be upgraded to include an environmental filter. Overflow will be captured in the existing high-density polyethylene (HDPE) lined dam (490 m²). According to supporting information provided by the applicant, the surface area that can drain to this dam equates to 4.02 Ha, which has the capacity of 2.5 times of potentially contaminated water run-off.

The process plant will be fed by the proposed raw water dam and process water dam. The raw water will be supplied from the existing borefield (GWL61134). The process water dam consists of recycled water streams such as thickener tailings overflow stream, TSF decant water, environmental dam reclaims water and raw water tank transfer.

Tailings Storage Facility 4

The existing tailings storage facility (TSF4) has not received tailings since 2016. The current embankment height is RL305 m. Current tailings level are approximately at RL302 m. Embankment raises are required to accommodate additional tailings from proposed operations. Details on the embankment raises are listed in Table 1. Additional seepage and drainage infrastructure is proposed.

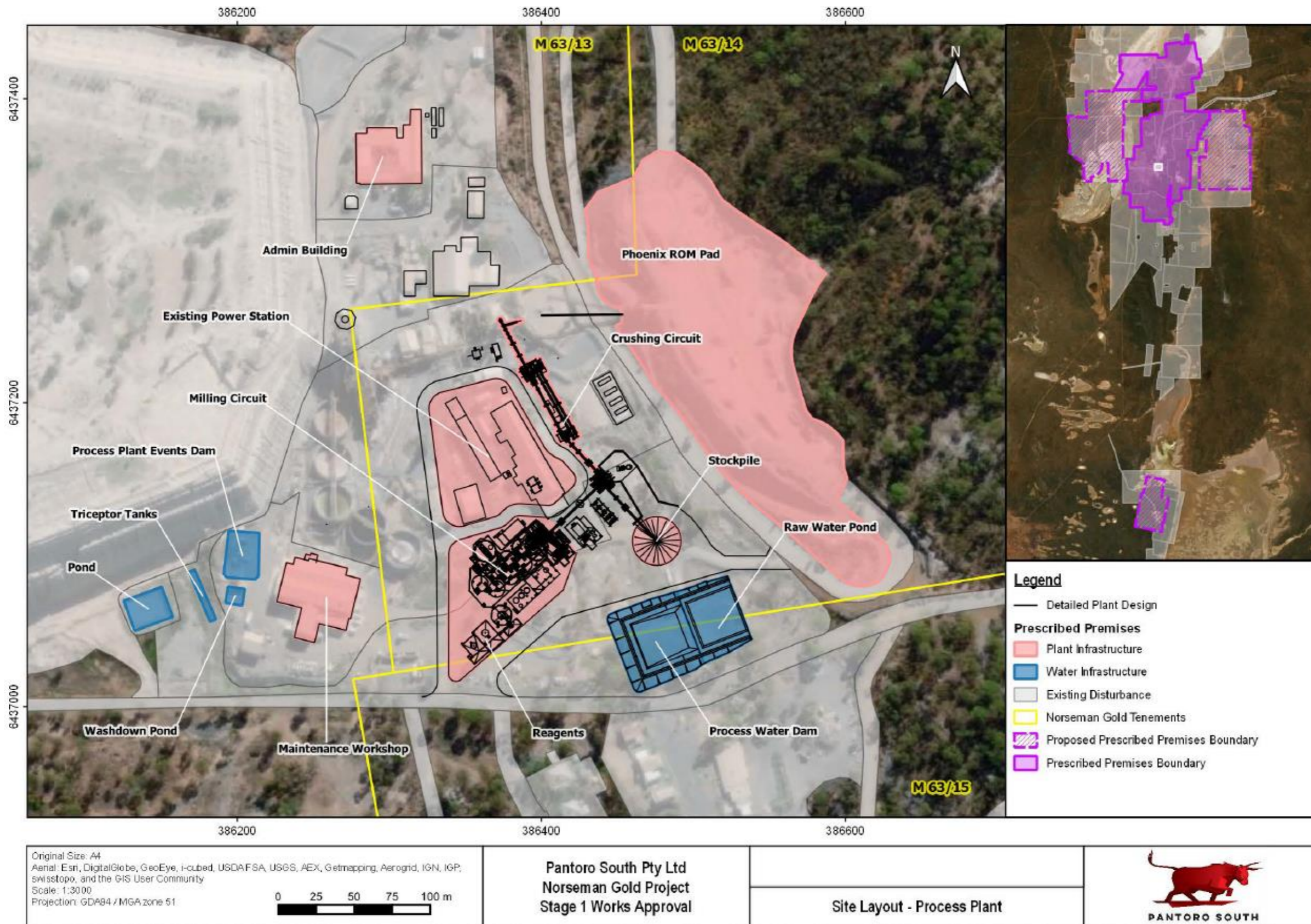


Figure 1 Proposed works for the processing plant

2.2.2 Category 6

L8612/2011/1 currently authorises up to 2,000,000 tonnes per year, and the applicant has proposed an additional dewater volume of 380,000 tonnes per year (into Lake Dundas). L8612/2011/1 currently authorises dewater discharge from North Royal pit, HV1 pits, North Royal and Harlequin underground operations into Lake Cowan (W1). The applicant proposes that Daisy pit and Gladstone/Everlasting (GEV) pit are added as dewatering sources to Lake Cowan. OK Underground dewater to Bullen underground and the Process Plant. An overview of dewatering is summarised in Table 2.

Table 2 Overview of proposed dewatering for category 6

Dewater source	Discharge location and method	Proposed (and existing) infrastructure
Existing Scotia pits	Dewater existing pits, water to be used for dust suppression	<ul style="list-style-type: none"> • New dewatering pipeline <ul style="list-style-type: none"> ○ From Scotia pit(s) to dewatering pond ○ from dewatering pond to Lake Dundas • New dewatering pond (max capacity 1800 m³) with pump
Scotia pit (to be constructed, encompassing three existing pits)	Lake Dundas (new discharge point) In-pit pumping and pumping from existing underground workings	
OK Underground	Dewater into two (existing OK pond 1 and pond 2, total area of 0.3 ha, regulated under current licence L8612/2011/1) dewatering ponds for reuse in mining operations; Dewater into processing plant and into Bullen underground	<ul style="list-style-type: none"> • New dewater pipeline <ul style="list-style-type: none"> ○ from OK Underground to existing OK pond 1 ○ from OK pond 1 to process plant and/or to Bullen underground • Two existing dewatering ponds with pumps (OK pond 1, OK pond 2) • Existing pipeline between OK pond 1 and pond 2
Slippers Main pit	Lake Cowan Groundwater abstraction via two production bores intersecting North Royal underground, north of North Royal pit.	<ul style="list-style-type: none"> • New dewater pipeline <ul style="list-style-type: none"> ○ From dewatering bores to HV1 discharge pipeline. • Two new bores north of North Royal pit with bore pumps • Dewater from bores pumped through pipeline to existing discharge channel at Lake Cowan
Daisy pit and Gladstone/Everlasting (GEV) pit	Lake Cowan Via existing pipelines from Daisy pit and Gladstone pits	<ul style="list-style-type: none"> • New dewater pipeline <ul style="list-style-type: none"> ○ from Daisy pit to new dewatering infrastructure (incl water transfer station) ○ from GEV pit to new dewatering infrastructure

Dewater source	Discharge location and method	Proposed (and existing) infrastructure
		<p>(incl water transfer station)</p> <ul style="list-style-type: none"> ○ from new dewatering infrastructure (incl water transfer station) to new water transfer station ○ from new water transfer station to new tank to existing Lake Cowan discharge channel ● Groundwater drawn from new dewatering bores (location not yet confirmed), pit pontoon or pit sump pumped in new pipeline (telemetry controls) to new poly lined steel tank and to new transfer station (with tank and pump) ● From transfer station to tank new located between North Royal pit and existing discharge channel to discharge to North Royal pit or Lake Cowan

Discharge into Lake Cowan will recommence with proposed dewatering from Slippers and GVE pit. The discharge is proposed via HDPE lined channel.

2.2.3 Category 85

Wastewater from the accommodation village is treated by an existing system that consists of septic tanks and two evaporation ponds. The applicant proposes to upgrade the existing treatment system with the addition of an aerobic treatment tank that has a capacity of 65m³ per day.

The described activity meets the throughput criteria for category 85 which applies to a throughput of more than 20 but less than 100 m³ per day set out in Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations).

The applicant has outlined that the detailed design and specifics of the change to the existing wastewater treatment system (addition of the new aerobic tank) will be determined as part of the process for approval under the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*. Limited information has been provided by the applicant about the system.

Following information has been provided regarding the proposed wastewater treatment plant (WWTP):

- Make and model subject to contract and procurement tendering and is not available to DWER during this assessment
- Treated wastewater will be discharged to existing evaporation ponds and excess water to an irrigation area
- Output parameters for influent and effluent are not available to DWER during this assessment; however it was stated that effluent will be comparable to 'standard class 3' which is comparable

to Class C standards as per *National Water Quality Management Strategy, Australian Guidelines for Sewage Systems – Effluent Management (Agriculture and Resource Management Council of Australia and New Zealand and New Zealand Environment and Conservation Council) 1997*.

- The proposed irrigation area is 2 ha, no discharge rate is available to DWER during this assessment.

Due to limited information on the additions to the wastewater system and potential emissions and discharges, an assessment of the operation of the system is not able to be completed at this time. An assessment has been carried out only for the construction of the system. The works approval will not authorise time limited operations for the wastewater system.

The applicant will need to supply additional information to enable an assessment of the operation. This information should be provided as part of a licence amendment application to operate the wastewater system. It is expected that the following details are provided as part of the licence application:

- details and specifications of the unit,
- evidence of approval under the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*,
- drawings/figures,
- how it will be incorporated into the existing system,
- output parameters of the plant (effluent), and
- information about the irrigation area including justification of size.

2.2.4 Category 64

The premises currently operates two landfills (Harlequin and Bullen landfill), and has an approved capacity of 500 tonnes per year. The applicant proposed an increase to 4 500 tonnes per year.

Additional infrastructure is proposed as set out in Table 3 and . Following approximate waste throughput is proposed:

- inert waste: 2 500 tonnes per annum
- putrescible waste: 2000 tonnes per annum
- asbestos: 800 tonnes of asbestos waste in total

Table 3 Proposed and existing landfills

Proposed landfill	Existing waste description	Proposed waste description
Harlequin landfill	Inert type 2 (tyres)	Inert type 1, inert type 2 (tyres), clean fill, putrescible Expansion of landfill
Bullen landfill	Inert type 1, inert type 2 (tyres), clean fill, putrescible	No change Expansion of landfill
Butterfly landfill	N/A	Inter type 1, putrescible, special waste type 1 (asbestos demolition) waste (within designated area) Expansion of landfill
GEV landfill Within proposed GEV waste rock dump	N/A	Class II/III Inter type 1, Inert type 2 (tyres), putrescible
OK landfill Within existing OK waste rock dump		

Proposed landfill	Existing waste description	Proposed waste description
Scotia landfill Within proposed Scotia waste rock dump (Type 2 waste) Near proposed ROM pad (Type 1 waste)		

2.2.5 Category 70

A mobile crushing and screening plant is proposed to process waste rock from Harlequin, Bullen, OK and Scotia waste rock dumps, for onsite use. Activities are undertaken on the working level of each waste rock dump, in a bunded area. The plant has an average throughput of 120 tonnes per day, and an average annual throughput between 5000 tonnes and 50 000 tonnes per annum. Crushed material will be stockpiled on site, within the bunded area. According to additional information provided as part of this assessment, crushing and screening works are proposed during day shift only.

The crushing and screening plant design specifics are unavailable as the mining tender is pending, according to the applicant.

Confirmation of the design and details of the mobile screening plant are required to be provided to the department once confirmed.

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	Earthworks and light vehicle/ mobile equipment movements	Air/windborne pathway	<ul style="list-style-type: none"> • Regular watering of unsealed surfaces • Topsoil stripping and spreading activities restricted during high winds if dust cannot be adequately suppressed • Vehicles kept on designated roads • Vehicle speed limits to reduce dust generation • Regular inspections to evaluate effectiveness of dust mitigation, corrective actions if required • Disturbed surfaces progressively rehabilitated wherever practicable to minimise wind erosion • Water applied during ore crushing and the ROM pad. Sprays are fitted to the tipping area of the crusher to ensure ore remains moist during crushing activities • Bunded work area for crushing and screening activities • Water sprays on stockpiles • A Dust Management Plan (March 2021) was provided, key aspects summarised below <p><u>Dust Management Plan (Pantoro South Pty Ltd, 2021)</u></p> <ul style="list-style-type: none"> • Dust suppression measures implemented as required during construction
Noise			Noise management plan will be developed for the construction period
Operation Category 5			
Dust	Processing plant	Air/windborne pathway	<ul style="list-style-type: none"> • Dust suppression sprays and dust extraction fans/filters particularly for: ROM bin, primary crusher, primary crushed ore stockpile, classifying screen, cone crusher, fine ore surge bin reclaim circuit • Water cart sprays for dust suppression used for stockpiles • A Dust Management Plan (March 2021) was provided, key aspects summarised below <p><u>Dust Management Plan (Pantoro South Pty Ltd, 2021)</u></p> <ul style="list-style-type: none"> • Regular watering of unsealed surfaces to prevent dust • Dust suppression measures implemented as required during operations • Water applied at ROM pad during ore crushing • Dust sprays fitted on crushing and screening circuit • Water cart for dust suppression where required • No crushing and screening activities during strong winds

Emission	Sources	Potential pathways	Proposed controls
Noise		Air/windborne pathway	<ul style="list-style-type: none"> Regular maintenance of vehicles and equipment Where possible mufflers, other noise attenuating equipment installed and maintained on plant, vehicles and equipment Noise mitigation via noise bunds and walls will ensure compliance with the <i>Environmental Protection (Noise) Regulations 1997</i> according to acoustic assessment provided (Herring Storer 2020) Noise management plan will be developed
Contaminated runoff, process water, stormwater		Direct infiltration into soil and groundwater	<ul style="list-style-type: none"> Processing activities conducted on bunded hardstand Existing storm water run-off drain and sump structure retains run off which then reports to lined environmental dam/process plant dam; overflow reports to existing triceptor tank system which will be upgraded with environmental filter. Surface water reporting to existing drain and sump water recovery system located next to workshop and to new environmental dam Fauna egress points on all proposed dams Dams (raw-, process-, environment/process dam) HDPE lined, freeboard, water level controlled by telemetry system, recovery pumps Environment/process dam sized for maximum event and includes overflow to wash-down bay water recovery system and HDPE lined dam where excess water can be reclaimed by pump for re-use
Reagents	Storage of quicklime, sodium cyanide, activated carbon, hydrochloric acid, sodium hydroxide (caustic), leach aid, flocculant	Direct discharge to land – storage leak/rupture	<ul style="list-style-type: none"> Quicklime silo with dust collector and extractor cyanide, caustic and hydrochloric acid solution stored individually in bunded areas with dedicated sump pumps
Leachate containing cyanide and elevated metals and metalloids	TSF4	Seepage into soil and groundwater	<ul style="list-style-type: none"> Four seepage recovery bores east of TSF4 Perimeter drainage system Groundwater levels and quality monitored in accordance with current licence
Tailings and return water containing elevated metals and metalloids	TSF4 pipelines (tailings and return)	Direct discharge to land – pipeline leak/rupture	<ul style="list-style-type: none"> Tailings and return water pipelines bunded and fitted with flow sensors to detect loss of content Daily inspection of pipelines for damage

Emission	Sources	Potential pathways	Proposed controls
Operation Category 6			
Dewater	<ul style="list-style-type: none"> • Pipeline from Slippers and GEV pit to Lake Cowan • Pipeline OK to processing plant and Bullen underground • Pipeline from Scotia to Lake Dundas Overflow from pits	Direct discharge to land – pipeline leak/rupture	<ul style="list-style-type: none"> • Dewatering reporting to pumping stations consisting of large steel and HDPE lined tanks or HDPE lined dams • Pipeline placed within v drain on land to capture potential spills • Contaminated or saline water flow pipelines are bunded or buried and fitted with leak detection devices capable of shutting the pumping system down • Pipeline pressure monitoring interlocked with the pump, resulting in shut down of pumping if flow drops below certain level • Discharge to Lake Dundas fitted with dispersion manifold to minimise erosion • Discharge pond kept away from lake edges to minimise impacts to riparian vegetation • Minimum 5 m freeboard for pit to pit transfers • Water storage dams lined with HDPE or equivalent Minimum 0.3 m freeboard for water storage dams
	Scotia pit(s) to Lake Dundas		<ul style="list-style-type: none"> • Annual environmental assessment for discharge related changes to Lake Dundas ecological value (September – November) • Annual report including current ecosystem condition of Lake Dundas, assessments of change over time and recommendations for management and/or further surveys/monitoring required <u>Littoral vegetation monitoring:</u> <ul style="list-style-type: none"> • 2 sites on shoreline of small basin (LSC02, LSC08) (Figure 13) • 8 additional locations within and outside of small basin (Figure 13) • Height, percentage foliage cover (PFC) recorded for each species present in quadrat • Total vegetation cover, cover of shrubs and trees (>2m tall) and shrubs (< 2 m) • Photographs from lake edge towards foredune for comparison with past and future surveys;

Emission	Sources	Potential pathways	Proposed controls
			<p><u>Water and sediment quality monitoring:</u></p> <ul style="list-style-type: none"> • Eight sites (including 2 control sites, Figure 13) • Water in situ measurements including pH, EC, temperature • Water parameters (NATA) including: nutrients, dissolved metals, ions, TDS • Sediment parameters (NATA) including: nutrients, dissolved metals, ions, TDS, moisture content, pH, EC <p><u>Aquatic biota resting stages</u></p> <ul style="list-style-type: none"> • Diatoms (taxonomy- species level where possible and enumeration) <p>From sediment of each playa site (Figure 13) to identify algal spores, eggs of aquatic invertebrates and dormant propagules (resting stages)</p>
Hypersaline water with elevated levels of contaminants	Use of mine dewater for onsite dust suppression	Overspray or runoff from Dust suppression operations (e.g. action of spraying water)	Dewatering reporting to pumping stations consisting of large None specified
	Pipeline or storage tank leak/rupture causing discharge to surrounding environment	Direct discharge to land – pipeline leak/rupture	<ul style="list-style-type: none"> • Tanks and ponds equipped with automated level control (telemetry controls) • Dewatering reporting to pumping stations consisting of large steel and HDPE lined tanks or HDPE lined dams • Pipelines within earthen bunds (except on salt lakes) to ensure spillage is contained • Pipeline pressure monitoring interlocked with the pump, resulting in shut down of pumping if flow drops below certain level • Minimum 5 m freeboard for pit to pit transfers • Minimum 0.3 m freeboard for water storage dams
	Scotia pit	Direct discharge to Lake Dundas	<ul style="list-style-type: none"> • Discharge to Lake Dundas fitted with dispersion manifold to minimise erosion • Discharge pond kept away from lake edges to minimise impacts to riparian vegetation • Water and sediment quality monitoring, and littoral vegetation monitoring as per the Annual environmental assessment for discharge related changes to Lake Dundas ecological value (September – November)
Operation Category 64			
Asbestos	Butterfly landfill (designated area)	Air/windborne pathway	<ul style="list-style-type: none"> • Asbestiform demolition waste wrapped or contained appropriately

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Emission	Sources	Potential pathways	Proposed controls
			<ul style="list-style-type: none"> asbestos and asbestos containing material is unloaded and placed within designated cell of landfills GPS location of each load will be recorded for all asbestos loads Plastic wrapped and covered with minimum of 150 mm of fill
Windblown waste	Gladstone/Everlastin g, OK, Scotia, Harlequin and Butterfly landfill	Air/windborne pathway	Fenced to prevent windblown waste and fauna access
Inert type 2 waste-tyres Putrescible waste		Seepage to soils and groundwater	<ul style="list-style-type: none"> Covered in batched separated from each other by at least 100 mm of soil and final soil cover of minimum 500 mm of soil Cover with 100 mm type 1 inert waste or soil on weekly basis Stormwater diverted away from landfill Waste volumes will be monitored
Contaminated stormwater			
Operation Category 85			
Effluent discharge	WWTP	Direct discharge to land	Alarms for aerobic treatment tank air blower and discharge pump
Operation Category 70			
Dust	Crushing and Screening activities	Air/windborne pathway	<ul style="list-style-type: none"> Crush and screening operations (including stockpiles) undertaken on bunded areas within waste rock dumps Dust suppression activities undertaken as part of mining operations Stockpiles within the bunded area where crushing and screening activities take place Stockpiles dust suppression via water carts when required
Noise			Works conducted for aggregate crushing and screening on day shift only
Sediment laden stormwater and potentially contaminated stormwater		Direct discharge to land	Crushing and screening operations will be undertaken on the working level of each waste rock dump and will be bunded.
Other activities			
Leachate/runoff /hydrocarbon contaminated soil/water	Bioremediation facilities	Direct discharge/seepage and overland runoff	<ul style="list-style-type: none"> Pads will have earthen bunds to control runoff Constructed and maintained in accordance with existing licence conditions for L8612/2011/1 (conditions 1.3.3 and 1.3.9)
Dust and odour		Air/windborne pathway	

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 5 and 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
Town of Norseman	Approx. 1.5 km west of processing plant
BP Roadhouse	Approx. 1.85 km northwest of the processing plant
Norseman Tourist Park	Approx. 1.74 km northwest of the processing plant
Norseman Visitor Centre	Approx. 1.35 km west of the processing plant
Industrial Lot	Approx. 1.96 km southwest of the processing plant
Aboriginal Heritage area	Multiple Aboriginal registered sites and Aboriginal heritage places within proposed works footprint. These sites are regulated under the <i>Aboriginal Heritage Act 1972</i> , and outside of scope for this works approval assessment. These receptors are therefore not assessed in this decision report.
Environmental receptors	Distance from prescribed activity
Native vegetation (including Eucalyptus trees)	Immediately south-east of TSF4
<p>Fifteen conservation significant fauna potentially occur in the NGP area. These include:</p> <p>Three Threatened species: –</p> <ul style="list-style-type: none"> • Curlew Sandpiper (<i>Calidris ferruginea</i>) – <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act) - Critically Endangered and Migratory • Chuditch (<i>Dasyurus geoffroii</i>) – EPBC Act (Vulnerable), • Malleefowl (<i>Leipoa ocellata</i>) – EPBC Act (Vulnerable). <p>One Specially Protected species: –</p> <p>Peregrine Falcon (<i>Falco peregrinus</i>) – BC Act (Other Specially Protected).</p> <p>Five Priority species: –</p>	Within prescribed premises boundary

Human receptors	Distance from prescribed activity
<ul style="list-style-type: none"> • Lake Cronin Snake (<i>Paroplocephalus atriceps</i>) – Priority 3 • Hooded Plover (<i>Thinornis cucullata</i>) – Priority 4. • Inland Western Rosella (<i>Platycercus icterotis xanthagenys</i>) – Priority 4. • Central Long-eared Bat (<i>Nyctophilus major tor</i>) – Priority 3. • Western Brush Wallaby (<i>Notamacropus irma</i>) – Priority 4. <p>Following short range endemic (SRE) species identified in desktop studies were recorded in the field survey:</p> <ul style="list-style-type: none"> • <i>fmillipede Atelomastix sp. 'B03'</i>. <p>This species is expected to be widespread throughout multiple habitats in the region and not restricted solely to Project areas.</p> <p>As stated in the application: <i>The remaining three confirmed, three likely and 12 possible SRE species (four mygalomorph spiders, four land snails, two pseudoscorpions, two isopods, and one millipede) were not recorded.</i></p> <p><i>An additional five conservation significant invertebrates (widespread, non-SRE species) were identified in the desktop assessment, but none were recorded during the field survey.</i></p>	
<p>Lake Dundas (Scotia dewatering discharge point-new) Invertebrates</p> <p>Two aquatic biota resting stage taxa were recorded from the Lake Dundas sampling sites in July 2020: the antheridia of <i>Chara</i> charophyte algae and cysts of <i>Parartemia</i> brine shrimp.</p> <p>Both taxa were recorded within the small basin and in the greater Lake Dundas north basin. Abundance was low in the small basin compared to north basin sites. These species are currently not listed on the DBCA Threatened and Priority Fauna Rankings.</p> <p>Seven diatom species were recorded from Lake Dundas sediment samples collected in July 2020. All seven diatom species recorded in this survey have been collected elsewhere in the Goldfields region.</p>	<p>Within the Premises boundary to west and north of Scotia pit</p>
<p>Lake Cowan</p>	<p>Within the Premises boundary</p>

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 2.3. 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 2.3), 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 W6472/2020/1 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 ongoing operation of the Premises i.e. category 5, 6, 85, 64 and 70. 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 amendment application.

Table 6: Risk assessment of potential emissions and discharges from the premises during construction and operation

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			
Construction								
Construction of TSF embankments, dams, ponds, wastewater treatment system, landfills, including installation of pipelines, new plant etc.	Dust	Air/windborne pathway causing impacts to health and amenity	Town of Norseman is ~ 3km to the NW of TSF4, 2.4km north of OK underground mine and 1.5 km west of processing plant	Refer to Section 2.3.1	C = Slight L = Possible Low Risk	Y	Condition 1 – Infrastructure requirements Condition 2 – TSF4 lift stages requirements <u>Condition 3 and 4 – compliance reporting requirements</u>	N/A
	Noise			Refer to Section 2.3.1	C = Slight L = Possible Low Risk	Y	N/A	N/A

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			
Operation (including time-limited-operations)								
Additional tailings deposition into TSF4	Leachate containing cyanide and elevated metals and metalloids	Seepage of leachate from TSF4 causing contamination of surrounding soil and groundwater Groundwater mounding resulting in impacts on native vegetation	Groundwater, surrounding soil and vegetation (incl Eucalyptus trees) south-east of TSF4	Refer to Section 2.3.1	C = Major L = Possible High Risk	N	Condition 1 – Infrastructure requirements Condition 2 – TSF4 lift stages requirements <u>Condition 3 and 4 – compliance reporting requirements</u> <u>Condition 5 – Seepage management report</u> <u>Conditions 7 – 9 – time limited operations commencement and duration requirement.</u> Condition 10 – Time limited operations requirements <u>Condition 12 and 14 – groundwater monitoring</u> <u>Condition 14-18 – standard record and general reporting conditions</u>	Refer to section 2.5.1
	Tailings and process water with elevated metals and metalloids	Direct discharge to land - leaks/pipe bursts causing contamination / degradation of surrounding soil and groundwater with impacts on vegetation growth and	Groundwater, surrounding soil and vegetation	Refer to Section 2.3.1	C = Minor L = Possible Medium Risk	Y	Condition 1 –Infrastructure requirements <u>Condition 3 and 4 – compliance reporting requirements</u> <u>Conditions 7 - 9– time limited operations commencement and duration requirement.</u> <u>Condition 15-19 – standard record and</u>	The Applicant's infrastructure controls have been conditioned within the works approval in accordance with Guidance statement: Risk Assessments (DER 2017). Some additional regulatory requirements apply to reporting and time limited operations commencement and duration. These are standard conditions required for most works' approvals for TSFs. The premises licence has existing

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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				
		survival					<u>general reporting conditions</u>	<p>conditions relating to the regulation of spills and leaks from pipelines. These include:</p> <ul style="list-style-type: none"> • Requirement for all pipelines to have secondary containment and be equipped with telemetry and pressure systems or have automatic cut outs (condition 1.3.1). • Pipelines inspected for integrity daily (condition 1.3.5). <p>The conditions outlined above adequately regulate the risk of spills or leaks from pipelines and therefore no additional regulatory controls will be required during time limited operation under this works approval.</p>
Operations of processing plant, water storage and process water	Contaminated process water, reagents	Direct discharge to land - leaks/pipe bursts, contaminated surface water runoff from processing plant causing contamination of surrounding soil and groundwater	Groundwater, surrounding soil and vegetation	Refer to Section 2.3.1	C = Moderate L = Possible Medium Risk	Y	<p>Condition 1 – Infrastructure requirements</p> <p><u>Condition 3 and 4 – compliance reporting requirements</u></p> <p><u>Conditions 7 - 9– time limited operations commencement and duration requirement.</u></p> <p><u>Condition 15-19 – standard record and general reporting conditions</u></p>	<p>The applicant's infrastructure controls have been conditioned within the works approval in accordance with Guidance statement: Risk Assessments (DER 2017). The premises licence has existing conditions relating to the regulation of spills and leaks from pipelines. These include:</p> <ul style="list-style-type: none"> • Requirement for all pipelines to have secondary containment and be equipped with telemetry and pressure systems or have automatic cut outs (condition 1.3.1). • Requirement for recovery of spills outside of an engineered containment system (condition 1.2.2) <p>No additional regulatory controls will be required during time limited operation under this works approval.</p>
	Contaminated	Seepage or overflow from	Groundwater, surrounding soil and	Refer to Section	C = Moderate	Y	Condition 1 – Infrastructure	The premises licence has an existing condition relating to the containment

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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				
	process water	water storage dams causing contamination of surrounding soil and groundwater	vegetation	2.3.1	L = Possible Medium Risk		requirements Condition 10 – Time limited operations requirements	system/s at the processing plant for process water. Condition 1.3.13 requires that a report assessing the integrity of processing liquor and stormwater containment is completed before operations at the plant commence. The applicant will need to demonstrate compliance with the existing licence condition 1.3.13 and ensure that for the new infrastructure (ponds) that the time limited operations requirements of maintaining freeboard and specific materials contained within the infrastructure are met.
	Dust	Air/windborne pathway causing impacts to health and amenity	Town of Norseman is ~ 3km to the NW of TSF4, 2.4km north of OK underground mine, 4.7km to SE of Cobbler pit and 1.5 km west of processing plant	Refer to Section 2.3.1	C = Moderate L = Possible Medium Risk	Y	Condition 10 – Time limited operations requirements	N/A
	Noise			Refer to Section 2.3.1	C = Moderate L = Possible Medium Risk	Y	Condition 1 –Infrastructure requirements Condition 10 – Time limited operations requirements	The acoustic assessment within the application indicates that noise from the processing plant operations can be managed to comply with the assigned noise levels, as specified in the <i>Environmental Protection (Noise) Regulations 1997</i> at the three nearest residences if acoustic barrier walls are positioned on the residential side of plant/infrastructure and also used to attenuate the run of mine operations.

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				
Source: Mine dewater Activities: Onsite dust suppression.		Overspray or runoff from ongoing use of mine dewater for dust suppression (e.g. action of spraying saline water) impacting on native vegetation and soil ie soils becomes dispersive, reduced vegetation health or death	Native vegetation Soil	No controls proposed	C = Slight L = Unlikely Low Risk	Y	N/A	The premises licence has existing conditions relating to the regulation of saline water used for dust suppression. It includes the requirement to minimise damage to surrounding vegetation. No additional regulatory controls will be required during time limited operation under this works approval.
Source: Mine dewater Activities: Pipeline or storage tank/ponds leak/rupture causing discharge to surrounding environment.	Hypersaline and contaminated dewater	Direct discharge impacting/ causing reduced health or death of native vegetation, local fauna and impacts to surrounding ecosystems.	Native vegetation Soil Fauna	Refer to Section 2.3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1 –Infrastructure requirements (<u>Pipeline material and standards</u>) Condition 10 – Time limited operations requirements	The applicant's infrastructure controls have been conditioned within the works approval including lining of ponds and level control equipment. The requirement for the pipelines to be high density polyethylene and meet Australian standards has been added by the department. The premises licence has existing conditions relating to the regulation of spills and leaks from pipelines. These include: <ul style="list-style-type: none"> • Requirement for all pipelines to have secondary containment and be equipped with telemetry and pressure systems or have automatic cut outs (condition 1.3.1); and • Requirement for daily visual inspections to check the integrity of the pipelines (condition 1.3.5). Time limited operations requirements apply for maintaining freeboard.

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				
Source: Mine dewater Activities: dewater discharge into Lake Dundas		Direct discharge into Lake impacting ecosystem	Lake Dundas Native vegetation Fauna	Refer to Section 2.3.1	C = Moderate L = Possible Medium Risk	N	<p><u>Condition 3 and 4 – compliance reporting requirements</u></p> <p><u>Condition 6 - Lake Dundas Aquatic Biota assessment report</u></p> <p><u>Conditions 7 - 9– time limited operations commencement and duration requirement.</u></p> <p>Condition 10 – Time limited operations requirements</p> <p>Condition 11 – Authorised discharge points</p> <p><u>Condition 13 - 14 – sediment and surface water monitoring</u></p> <p><u>Condition 15-19 – standard record and general reporting conditions</u></p>	Refer to section 2.6
Source: Mine dewater from Daisy, OK underground and GEV pits Activities: dewater discharge into Lake Cowan and Bullen underground	Hypersaline and contaminated dewater	Direct discharge into Lake impacting ecosystem	Lake Cowan Native vegetation Fauna		C = Moderate L = Possible Medium Risk	Y	<p><u>Condition 3 and 4 – compliance reporting requirements</u></p> <p><u>Conditions 7 - 9– time limited operations commencement and duration requirement.</u></p> <p>Condition 10 – Time limited operations requirements</p> <p>Condition 11 – Authorised discharge points</p> <p><u>Condition 15-19 – standard record and</u></p>	The premises licence permits the discharge of up to 2 million tonnes onto Lake Cowan. There is no change to the volume of dewater discharge. Mine dewater from Daisy and GEV pits will be included as sources for dewater for disposal onto Lake Cowan. OK underground dewater to Bullen underground and the Process Plant. The water quality of dewater from these pits is comparable to the quality of dewater discharged when the site was operational (between 2009 and 2015).

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			
							<u>general reporting conditions</u>	
Class II or III putrescible landfill	Dust	Air/windborne pathway causing impacts to health and amenity	Town of Norseman, other human receptors (min 1.35 km distance)	Refer to Section 2.3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1 –Infrastructure requirements Condition 10 – Time limited operations requirements	The Applicant's infrastructure controls have been conditioned within the works approval. The premises licence has existing conditions relating to the regulation of waste processing, fencing, cover requirements and windblown waste. These are contained within conditions 1.3.9 – 1.3.12. Conditions during TLO has been included to specify waste types at the different landfills including disposal of Class III waste (asbestos).
	Odour							
	Leachate and contaminated stormwater	Direct infiltration impacting surrounding soil, groundwater and native vegetation	Soil, vegetation, fauna	Refer to Section 2.3.1	C = Minor L = Possible Medium Risk			
Crushing and screening	Noise	Air/windborne pathway causing impacts to health and amenity	Town of Norseman is ~ 3km to the NW of TSF4, 2.4km north of OK underground mine, 4.7km to SE of Cobbler pit and 1.5 km west of processing plant	Refer to Section 2.3.1	C = Moderate L = Possible Medium Risk	Y	Condition 1 –Infrastructure requirements Condition 10 – Time limited operations requirements	The premises licence does not have existing conditions for this infrastructure. Time limited operations requirements apply for location of infrastructure and use of dust suppression systems. It is recommended that when being under assessment for inclusion into the licence that a condition permitting the removal and relocation of the plant at the set locations on a as needed basis is included to accommodate for the various locations where crushing and screening will occur.
	Dust							
	Sediment laden stormwater and potentially contaminated stormwater	Overland runoff potentially causing ecosystem disturbance	Vegetation, fauna	Refer to Section 2.3.1	C = Slight L = Possible Low Risk			

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				
Bioremediation of hydrocarbon contaminated soils	Dust Odour	Air/windborne pathway causing impacts to health and amenity	Town of Norseman is ~ 3km to the NW of TSF4, 2.4km north of OK underground mine, 4.7km to SE of Cobbler pit and 1.5 km west of processing plant	Refer to Section 2.3.1	C = Slight L = Possible Low Risk	Y	N/A	The premises licence has existing conditions relating to the regulation of bioremediation facility location and management. These are contained within conditions 1.3.3 and 1.3.9.
	Leachate/runoff /hydrocarbon contaminated soil/water	Direct discharge/seepage and overland runoff potentially causing ecosystem disturbance	Vegetation, fauna, soil	Refer to Section 2.3.1	C = Minor L = Possible Medium Risk			

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 Additional regulatory controls - TSF 4

The Applicant's infrastructure controls have been conditioned within the works approval in accordance with *Guidance statement: Risk Assessments* (DER 2017). Some additional regulatory requirements apply to reporting and time limited operations commencement and duration. These are standard conditions required for most works approvals for TSFs.

The site's licence has existing conditions relating to the regulation of seepage impacts from TSF4. These include:

- Standing water level limit of 4 mgbl within monitoring bores (existing condition 3.4.1);
- Requirement to implement a groundwater recovery response that includes conversion of a monitoring bore into a seepage recovery bore to capture seepage (based on standing water levels results);
- Annual water balance required to be reported for the TSF (existing condition 1.3.8); and
- Groundwater monitoring program to assess changes in groundwater levels and quality (existing condition 3.4.1)

The licence will require an amendment to specify the TSF4 operating heights and stages 3 -5.

Controls in addition to the conditions outlined above are required to adequately regulate the impact of seepage from the raised TSF4. Given this, additional regulatory controls will be required during time limited operation under this works approval, refer to the sections below for further details.

3.3.1 Detailed risk assessment for seepage from TSF4

TSF4 has not been receiving tailings since 2016. Historical and recent monitoring data shows that seepage from TSF4 has caused groundwater mounding and contamination with heavy metals. A network of groundwater monitoring bores around TSF4 (see Figure 2) are used to monitor groundwater levels and quality.

Monitoring bore PB2 was successfully drilled in September 2019 as part of an improvement program for TSF4 seepage.

While tailings are authorised to be deposited into TSF4 under the existing licence, additional tailings resulting from proposed embankment raises may add to the already occurring seepage, further impacting the environment.

3.3.2 Current seepage

The most recent Annual Environmental Report (AER 2020) submitted to the department (Pantoro South Pty Ltd, 2020) indicates frequent exceedances of the standing water level limit of 4 meters below ground level (as per L8612/2011/1) in monitoring bores MB2 and MB10 (Figure 2). The newest monitoring bore PB2 (drilled 2019) was reported to also exceed the current standing water level limit applying to other monitoring bores as per licence. It should be noted that the monitoring bore PB2 is not yet listed on the licence and will need to be included through a licence amendment.

The licence requires regular tree health monitoring around all TSFs. Vegetation health monitoring around TSF4 recorded several tree deaths from 2015 onwards, which corresponds to the high/rising standing water level in MB10, as suggested in AER 2020. The main reason stated for tree death was saline water, which caused 52% of recorded tree deaths.

Most recent groundwater monitoring data shows several monitoring bores (MB2-4, MB7, MB8, MB10, Figure 2) with elevated dissolved metal concentration, particularly:

- Aluminium (0.07-2100 mg/L)
- Arsenic (0.01-0.02 mg/L)

- Copper (0.02-1.03 mg/L)
- Iron (0.06-2.90 mg/L)
- Manganese (0.027-175 mg/L)
- Cadmium (0.01-0.04 mg/L)
- Cobalt (0.02-11.30 mg/L)
- Lead (0.01-0.05 mg/L)
- Nickel (0.02-8.10 mg/L)
- Zinc (0.1-1.66 mg/L)

Monitoring bores in proximity to TSF4 show groundwater as highly saline with total dissolved solids concentrations between 25 000 mg/L and 171 000 mg/L. The Weak Acid Dissociable Cyanide limit of 0.8 mg/L (as set out in the licence) is not currently being exceeded as reported in AER 2020.

An Electromagnetic Survey was undertaken to map areas of mounded hypersaline groundwater, which identified a potential leakage pathway east of TSF4. Recovery bores are proposed to be installed in the identified target area.

The applicant has proposed to lift the TSF4 embankment from RL305 m to RL315 m (in 3 stages). Additional tailings deposited into TSF4 will increase the already occurring seepage.

3.3.3 Regulatory controls

The works approval includes the following additional regulatory controls during time limited operation:

- Monitoring of ambient groundwater at bore PB2 (parameters and limits as per current licence);
- Installation of four seepage recovery bores before time limited operations can commence; and
- Submission of a seepage management report following time limited operations.

3.3.4 Rating of this risk event

Taking into consideration that seepage is currently occurring, licence limits are exceeded and adverse impacts such as tree deaths has been identified, the Delegated Officer has considered the consequence to be **Major**.

Seepage is occurring while TSF4 has been not actively receiving tailings, and the deposition of material with raised embankments will further add to impacts. The efficiency of proposed controls are yet to be evaluated, and therefore the Delegated Officer has considered the likelihood as **Possible**.

The Delegated Officer has compared the consequence and likelihood of this risk event and determined the overall rating as **High**. Based on this rating, the risk event is subject to multiple regulatory controls.

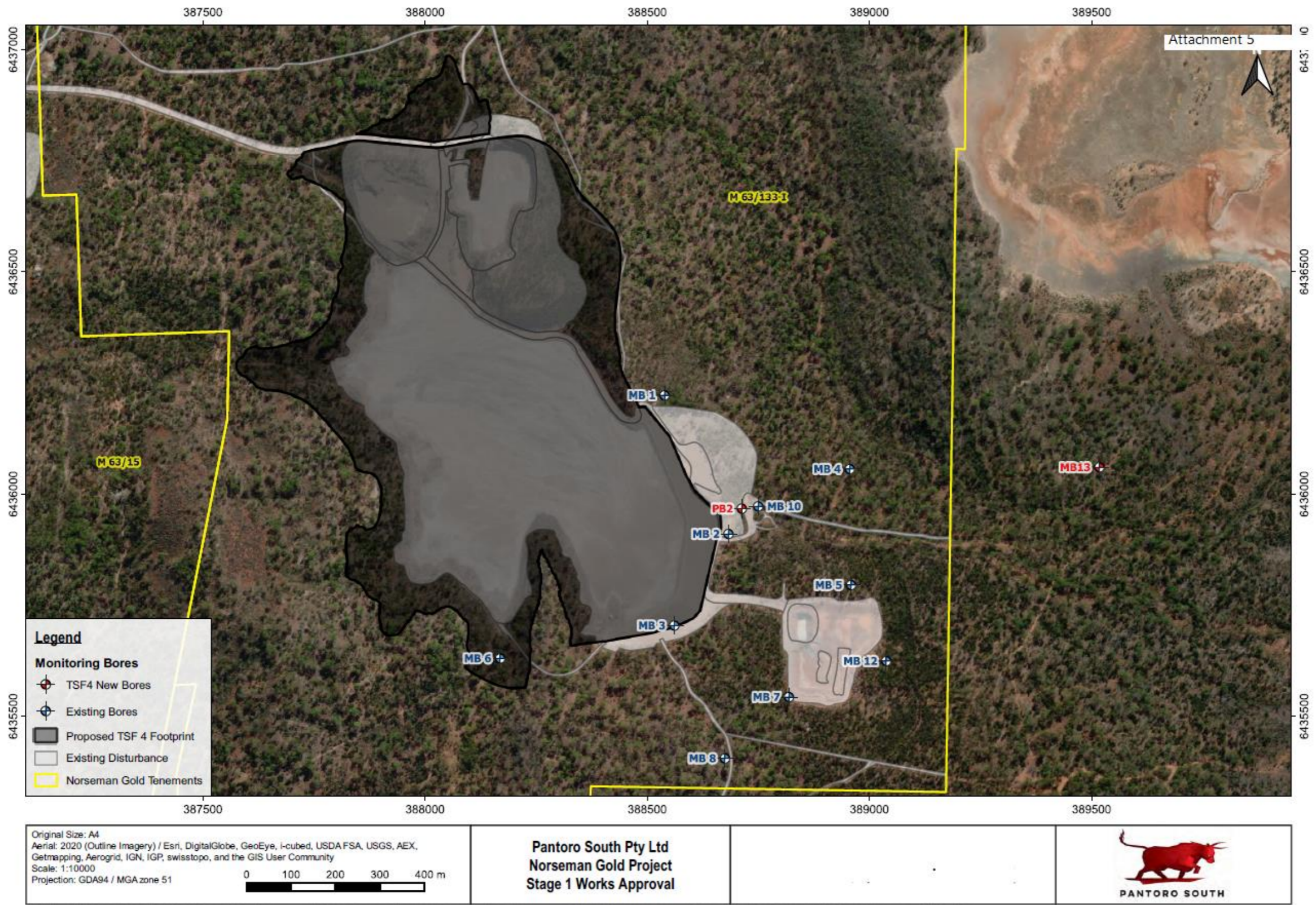


Figure 2 Existing TSF4 monitoring bores

3.4 Detailed risk assessment for discharge into Lake Dundas

Lake Dundas is a salt lake located in the southern side of the premises, and is proposed as a new discharge point for dewater from Scotia pit. The Scotia deposit has been mined open cut and underground since the 1890's and consists of three main pits (existing Scotia pits) and several waste rock dumps.

The dewatering from the Scotia deposit is proposed in the following stages:

- 1) Dewater from the existing Scotia pits
 - dewatering is required from two pits to facilitate gold mining
 - dewater rate of 10 – 30 L per second over a period of 12 months is predicted
 - dewatering rate from the existing Scotia pits is proposed to be at such rate that water is re-used for dust suppression and not discharged into Lake Dundas
- 2) Dewater from new Scotia pit
 - new Scotia pit is then constructed (900 m x 200 m x 150 m), consisting of three phases of cut-backs (North, Central, Southern) to the existing Scotia pits
 - in-pit bore will then be established to intersect with existing underground works and to dewater and discharge into Lake Dundas

Discharge is proposed into a small basin that joins Lake Dundas, which equivalentes approximately 0.22 % of the total lake surface.

Lake Dundas is a large, ephemeral salt lake which holds water after intense rain fall event. The applicant provided a Lake Dundas Aquatic Biota Baseline Assessment (WRM, 2020), to establish current condition and aquatic ecological value of the proposed discharge point.

3.4.1 Dewater characterisation from existing Scotia pits

Pit water analysis from the existing Scotia pits indicates several exceedances of metal concentrations when comparing to inshore marine ecosystem guideline levels (ANZG 2018) (Table 7). Additionally, Electrical Conductivity (EC) and related ions are higher in Scotia pit water compared to Lake Dundas. Total nitrogen (TN) and Total Phosphorous (TP) concentrations exceed guideline values in the dewater.

3.4.2 Receptor Lake Dundas

A small basin of Lake Dundas is proposed to be the discharge area for dewatering activities (LDP1 and LDP2).

Three sampling sites were investigated to support the application. Generally, water quality was hypersaline with exceedances of nutrients TP and TN (Table 7) when compared to guideline levels (ANZG 2018). Sediment samples showed guideline exceedances for Ni, and Cr, likely due to natural enrichment from the upstream catchment.

According to the Aquatic Biota Baseline Assessment, metals in pit water of greatest risk to aquatic biota are Pb, Zn and Cu. While Ni is exceeded and may have low bioavailability, uncertainties about risk to sensitive aquatic species is uncertain and not well understood. Discharge could result in salt crust formation, adversely impacting aquatic biota. Increases in Ca and Mg may increase water hardness.

Riparian vegetation

According to supporting documentation provided with the application, seven vegetation types were identified within the Lake Dundas area as part of an assessment undertaken (Biota 2020). Five different Eucalyptus open forest vegetation types were recorded. The majority of

the study area was comprised of 'pristine' vegetation with no signs of human disturbance or presence of introduced flora. Discharge activities can lead to degradation of riparian vegetation at Lake Dundas.

Aquatic biota

In the provided assessment, seven diatom species were recorded from Lake Dundas, which was noted to be higher to control sides from Lake Cowan, which is used for dewater discharge from current operations regulated under L8612/2011/1.

Additionally, two biota resting stage taxa were identified in the small basin and greater north basin: *Chara* charophyte algae and cyst of the *Parartemia* brine shrimp. No threatened or priority fauna were recorded in Lake Dundas. Elevated heavy metal concentrations from the pit water may impact the food web, via transfer from brine shrimp to waterbirds.

Internal technical experts have reviewed the provided aquatic biota baseline assessments, which identified some aspects of the assessments which require further confirmation to inform potential impacts from dewater discharge into Lake Dundas:

- Potential errors in resting stage identification
 - propagules identified as 'antheridia' of *Chara* sp. may be misclassified and could be crustacean resting stages (indication of *Branchinella* spp. cyst)
 - some *Branchinella* species are listed as priority, and have been located close to Lake Dundas; further identification required
- viability of egg bank unknown
 - requires emergence data to understand site specific salinity ranges
- confirmation of *Parartemia* species to determine salinity ranges required to meet all life stages

Table 7 Dewater and receptor water and sediment quality. Red shaded: exceeds some guideline values (80%, 95 or 99%) and are elevated compared to Lake Dundas;

Parameter	Scotia pits (Ranges from samples taken at 1.5, 10, 20 m) [mg/L]	Lake Dundas Water quality [mg/L]	Lake Dundas Sediment [mg/kg]
pH	7.24-7.27	7.19-8.15	6.4-7
EC [μ S/cm]	240 000–242 000	136 000-226 000	21 900–56 700
Nitrate & Nitrite (N-NOx)	0.20-0.21	<0.01	<0.25-4.7
Total nitrogen (TN)	0.20-0.21	0.8-1.9	60-940
Total Phosphorous (TP)	<0.10-03.27	0.03	88-270
Antimony (Sb)	<0.005	<0.005	N/A
Arsenic (As)	0.0172-0.0184	<0.05	3.1-9.3
Cadmium (Cd)	0.009-0.0116	<0.005	<0.05-0.18
Cobalt (Co)	0.0048-0.0087	<0.005	5-15

Parameter	Scotia pits (Ranges from samples taken at 1.5, 10, 20 m) [mg/L]	Lake Dundas Water quality [mg/L]	Lake Dundas Sediment [mg/kg]
Chromium (Cr III)	<0.005	<0.01	21-90
Copper (Cu)	<0.01-0.045	<0.005-0.009	9.5-31
Manganese (Mn)	0.278-0.376	0.02-0.23	N/A
Mercury (Hg)	<0.0002	<0.005	<0.02
Nickel (Ni)	0.041-0.043	<0.05	11-50
Lead (Pb)	0.176-0.182*	N/A	5.6-14
Selenium (Se)	0.011-0.012	<0.05	0.12-0.59
Zinc (Zn)	0.0442-0.492	<0.05	12-50
Carbonate (CO ₃)	<1	<1	<10
Calcium (Ca)	965-1040	574-845	560-63 000
Chloride (Cl)	142 000- 144 000	67 600- 186 000	38 000- 110 000
Bicarbonate (HCO ₃)	95-99	29-35	12-36
Potassium (K)	588-600	N/A	N/A
Magnesium (Mg)	9040-9310	3830-4420	4400-25 000
Sodium (Na)	102 000 – 106 000	37 200-115 000	16 000 – 57 000
Sulphate (S-SO ₄)	8650-8820	5560-8110	5700- 170 000

*Exceeds guideline value, but no water sample measurements for Lake Dundas available

3.4.3 Applicant controls

The applicant provided an ecological monitoring programme as part of further information during the assessment of this application. An annual environmental assessment for discharge related changes to Lake Dundas ecological values is proposed and includes:

- Sample collection (water, sediment, diatoms and aquatic biota resting stages)
- Littoral vegetation condition assessment (species richness, foliage cover and condition)
- Laboratory (NATA accredited) analysis of water and sediment quality of the lake
- Laboratory assessment of aquatic biota values (diatoms and biota resting stages)
- Annual environmental assessment report outlining current ecosystem conditions of Lake Dundas with assessment over time; and
- Recommendations for management and/or further surveys/monitoring required

Eight play sites for sediment quality, water quality (if present), aquatic biota resting stages and

diatoms monitoring are proposed. Two sites (LDP7, LDP8) are unlikely to receive impacts from discharge and will act as control sites. Ten littoral vegetation sites were nominated for monitoring.

3.4.4 Regulatory controls

To ensure no adverse impact on identified biota in Lake Dundas, further confirmation on the viability and identification of the present organism are required prior to discharging from existing Scotia pits and the new Scotia pit. This will confirm any potential errors identified by internal technical experts and ensure correct identification. These conditions are required to be fulfilled prior to commencing time limited operations.

The applicant proposes sediment, water quality aquatic biota and littoral vegetation monitoring at Lake Dundas. Proposed parameters were included in the instrument to be monitored during time limited operations.

3.4.5 Rating of this risk event

Taking into consideration that dewater discharge shows elevated metals, exceeding relevant guideline values, the Delegated Officer has considered the consequence to be **Moderate**.

The discharge into the small basin of Lake Dundas may mix with the broader area of the lake potentially resulting in adverse impacts. Additional assessments are required, and monitoring will further add to the understanding of potential impacts. The Delegated Officer has considered the likelihood as **Possible**.

The Delegated Officer has compared the consequence and likelihood of this risk event and determined the overall rating as **Medium**. Based on this rating, the risk event is subject to regulatory controls.

4. Consultation

Table 8 provides a summary of the consultation undertaken by the department.

Table 8: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website (21/12/2020)	None received	N/A
Shire of Dundas advised of proposal (18/12/2020)	<p>15/01/2020 – Summary of comments provided:</p> <p>Main concerns:</p> <ul style="list-style-type: none"> - No Public Consultation - Hospital and patients will be directly exposed to mining activity - There is a few significant Nagdju Cultural/Heritage sites - The area forms part of the tourist drive - There is an airstrip in close proximately of the Mine site. 	<p>The application was advertised on the department's website and direct interest stakeholders were contacted directly.</p> <p>The department offered an extension to the stakeholder comment period to 5 February 2021 and again to 23 February 2021. No comments in addition to the comments provided on 15 January 2021 were submitted.</p> <p>Aboriginal registered sites and Aboriginal heritage places are not within the scope of the assessment. These sites are regulated under the Aboriginal Heritage Act 1972.</p> <p>Section 2.6 outlines a risk assessment from the construction and operation at the premises.</p>
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal (18/12/2020)	No comment received	N/A
Department of Planning, Lands and Heritage advised of proposal (18/12/2020)	Refer to Appendix 1	Refer to Appendix 1
Ngadju Native Title Aboriginal Corporation RNTBC advised of proposal (2/2/2021)	Refer to Appendix 1	Refer to Appendix 1
Applicant was provided with draft documents on 1/10/2021	The applicant provided comments to DWER on 4/10/2021. These comments were primarily administrative in nature and have not altered the risk profile or conditions proposed.	Comments have been incorporated

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. Pantoro South Pty Ltd, 2020. Norseman Gold Project Annual Environmental Report L8612/2011/1 (A1964151)
5. Pantoro South Pty Ltd, 2020. Norseman Gold Project Works Approval Application, Supporting document (A1955884)
6. WRM (Wetland Research & Management), 2020 Lake Dundas Aquatic Biota Baseline Assessment July 2020 (A1955884)
7. Herring Storer, 2020 Acoustic Assessment Norseman Gold Process Plant Redevelopment (A1955884)

Appendix 1: Summary of stakeholder consultation comments

Summary of stakeholder comments	Department's response
<p><u>Department of Planning, Lands and Heritage</u></p> <ul style="list-style-type: none"> Confirmation that proposed works intersect with Aboriginal sites which require approvals under <i>Aboriginal Heritage Act 1972</i> 	Noted.
<p><u>Ngadju Conservation Aboriginal Corporation (provided 23/02/21)</u></p> <ul style="list-style-type: none"> Main concern about the proposed Cobbler Mine Pit near Lake Cowan Women's bush tucker site on edge of Lake Cowan within footprint of Cobbler mine Concerns about footprint of mine on spiritual significance of Lake Cowan, restricted access to site 	<p>DWER undertakes regulatory functions under Part V, Division 3 of the EP Act. The department identifies emissions occurring on prescribed premises from activities listed under a category as set out in Schedule 1 of the EP Regulations. Relevant emissions and discharges are then assessed in accordance with the departmental Guideline: Risk assessments.</p> <p>The key concerns raised by this stakeholder refer to the proposed Cobbler pit and the mine footprint in the application. These are not emissions or discharges which are within the scope of the department's assessment.</p>
<p><u>Ngadju Native Title Aboriginal Corporation (NNTAC) (provided 4/03/21)</u></p> <ul style="list-style-type: none"> Works relating to Cobbler mine will impact registered site 2920/W00304 (<i>Aboriginal Heritage Act 1972</i>, WA) which requires consent Request to DWER to add following conditions to the works approval: <ul style="list-style-type: none"> Surveys to be undertaken by applicant in relation to the Cobbler mine area through NNTAC No ground disturbing works to be undertaken prior to completing the above survey 	<p>The applicant withdrew all activities associated with Cobbler mine on 20 September 2021. The premises boundary does not include Cobbler mine.</p>

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY	
Application type	
Works approval	<input checked="" type="checkbox"/>
Date application received	19 November 2020
Applicant and Premises details	
Applicant name/s (full legal name/s)	Pantoro South Pty Ltd
Premises name	Central Norseman Gold
Premises location	M63/11, M63/13, M63/14 , M63/15, M63/36, M63/42, M63/43, M63/44, M63/48, M63/68-I, M63/133-I, M63/140-I, M63/142, M63/155, M63/156, M63/214, M63/218, M63/258, M63/259 and M63/275.
Local Government Authority	Shire of Dundas
Application documents	
HPCM file reference number:	DER2020/000594
Key application documents (additional to application form):	<ul style="list-style-type: none"> • NORSEMAN GOLD PROJECT WORKS APPROVAL <i>Prescribed Premises Categories: 5 (Processing of Ore), 6 (Mine Dewatering), 54 (Wastewater Treatment Plant), 64 (Landfills) & 70 (Crushing and Screening), Version 1.0, Prepared by Pantoro South Pty Ltd, dated 18 November 2020 (A1955884);</i> • NORSEMAN GOLD PROJECT COMMISSIONING PLAN <i>Prescribed Premises Categories: 5 (Processing of Ore), 6 (Mine Dewatering), 54 (Wastewater Treatment Plant), 64 (Landfills) & 70 (Crushing and Screening), Version 1.0, Prepared by Pantoro South Pty Ltd, dated 18 November 2020 (A1955889);</i> • Cost of works (A1955890); • Pantoro Letter of Authority (A1955888); • ASIC summary (A1955887); • Proof of occupier status (A1955886).
Scope of application/assessment	

Summary of proposed activities or changes to existing operations.

Works approval – for construction and commissioning of following infrastructure/ equipment:

Category 5:

- **Upgrades to processing plant:**

i. In the crushing circuit, redevelopment will consist of:

- Replacement of the primary jaw crusher.
- Refurbishment of the ROM bin, apron feeder, dribble chute, stacker conveyor, vibrating feeder chute, stockpile discharge conveyor and crusher control room.
- Construction of a new secondary and tertiary crushing circuit including MCC building and transformer compound, classifying screen feed conveyor, crushing classifying screen, secondary crusher feed conveyor, tertiary crusher feed conveyor, secondary crusher, secondary crusher feed bin, tertiary crusher and tertiary crusher feed bin, fine ore conveyor, fine ore surge bin and fine ore surge bin overflow chute.

ii. **In the mill circuit, redevelopment will consist of:**

- Construction of a new ball mill circuit including mill MCC building and transformer compound, mill feeder, stacking conveyor, lime silo, mill feed conveyor and gold recovery area.

iii. **Construction of supporting infrastructure in the processing plant will consist of:**

- construction of a lined process water dam (2,000 m3 comprising recycled water streams such as the thickener tailings overflow stream, TSF decant water, environmental dam reclaims water, ,
- construction of lined environmental dam (2.000 m3) (accommodating surface water flows from process plant) and raw water tank overflow (process water make-up));
- construction of associated pipelines; and
- construction of reagents area (acid, caustic and cyanide).

iv. **construction of wet process plant**

- **Upstream raise of TSF4** in following stages to provide additional storage capacity of 5MTPA:

- i. Stage 3: Upstream raise of the main embankment to RL309m (4m raise);
- ii. Stage 4: Upstream raise of the main embankment to RL312m and construction of two saddle dams (South Saddle and Northeast Saddle) to RL312m (3m raise); and
- iii. Stage 5: Upstream raise of the main embankment, South Saddle and Northeast Saddle dams and construction of the Northwest and North saddle dams to RL315m (3m raise).

- associated pipelines and installation of 4 new recovery

bores.

Category 6:

- Additional dewatering sources (Daisy pit, GEV pit and Cobbler pit) and water transfer lines to be included for discharge to Lake Cowan (Licenced emission point under L8612/2011/1);
- Additional dewatering source (OK Underground) and water transfer line to new emission points (Bullen Underground and the process/raw water storage facility);
- Additional dewatering source (Scotia pit) and water transfer line to a new emission point (Lake Dundas); and
- Pit to pit transfers.

Category 54:

- Upgrade to the existing accommodation village WWTP with irrigation of treated wastewater to existing ponds and an irrigation field; and
- Upgrade of the Harlequin WWTP with disposal of treated wastewater to two 30 m leach drains. The existing evaporation ponds will be decommissioned.

Category 64:

- Addition of a landfill at Butterfly to accept inert type 1 waste, putrescible waste and Special waste type 1 (asbestos demolition waste);
- Addition of a landfill at Bullen waste rock dump to accept inert type 1 and 2 (tyres) waste and putrescible waste;
- Construction of new landfills within OK, Harlequin, GEV, and Scotia waste rock dumps to accept inert type 1 and 2 (tyres) waste and putrescible waste;
- Construction of a new landfill at Cobbler within an existing borrow pit to accept type 1, type 2, and putrescible waste;
- Increase the licence capacity for waste disposal from 500 tonnes per annum to 4,500 tonnes per annual period

Category 70:

- Mobile crushing and screening of waste rock from Harlequin, Bullen, OK and Scotia waste rock dumps (WRDs) for use onsite, including blast hole stemming.

Works approval seeking – changes to prescribed premises boundary (L8612) to facilitate operation of proposed works as above.

Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Proposed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 5:	Proposed- Increase from 70,000 TPA to 1,000,000 TPA	
Category 6	Proposed- Increase by 380,000TPA to authorise dewatering discharge to Lake Dundas	
Category 54	Proposed- Increase by 65kL to authorise additional WWTP	
Category 64	Proposed- Increase to 4500 TPA	
Category 70	Not currently authorised	

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	This application was referred to EPA by a third party, relating to Aboriginal heritage matters. On 20/09/2021 the EPA published its decision not to assess the proposal under Part IV of the EP Act.
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Certificate of title <input type="checkbox"/> General lease <input type="checkbox"/> Expiry: Mining lease / tenement <input checked="" type="checkbox"/> Expiry: various Other evidence <input type="checkbox"/> Expiry:
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Approval: Expiry date: If N/A explain why? Mining tenement
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: TBC Applicant intends to submit clearing permit application in Q4 2021.

<p>Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Application reference No: N/A Licence/permit No: N/A Applicant has indicated that licence is not required. Comments will be sought from DWER- Regional Delivery Directorate as part of consultation process.</p>
<p>Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Application reference No: Licence/permit No: GWL61134(8) approves an annual abstraction of up to 6,500,000 kL from the Goldfields combined, fractured rock west, fractured rock aquifer. Comments will be sought from DWER- Regional Delivery Directorate as part of consultation process.</p>
<p>Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Name: N/A Type: Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/></p>
<p>Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/></p>
<p>Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p><i>Dangerous Goods Safety Act 2004 Environmental Protection (Controlled Waste) Regulations 2004</i></p>
<p>Is the Premises within an Environmental Protection Policy (EPP) Area?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>If Yes include details of which EPP(s) here.</p>
<p>Is the Premises subject to any EPP requirements?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Classification possibly contaminated – investigation required (PC–IR) Date of classification: 13 September 2010</p>