Decision Report

Application for Works Approval

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

Choose an item.	W6665/2022/1
Applicant	Venturex Sulphur Springs Pty Ltd
ACN	113 177 432
File number	DER2022/000125
Premises	Suphur Springs Zinc Copper Project Mining Tenements M45/494, M45/653 and M45/1001 MARBLE BAR WA 6760 As defined by the coordinates in Schedule 1 of the works approval As defined by the premises maps attached to the issued works approval
Date of report	08/09/2022
Decision	Works approval granted

Carmen Standring

Digitally signed by Carmen Standring
Date: 2022.09.08 16:10:55 +08'00'

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 W6665/2022/1 has been granted.

2. Purpose and scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) 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 Overview of premises

Venturex Sulphur Springs Pty Ltd (the Applicant) is proposing to construct, commission and operate the Sulphur Springs Zinc-Copper Project (the premises), which is a greenfield mine and ore processing development located 57 km west of Marble Bar in the Pilbara region of Western Australia. The Applicant proposes to produce zinc and copper concentrates which will be transported to Port Hedland for export.

Dewatering of the mine will be required, however, this water will be stored within water storage ponds onsite and will not require discharge to the environment, therefore, Category 6 of the *Environmental Protection Regulations 1987* will not be triggered.

2.3 Application summary

On 18 March 2022, the Applicant 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 an ore processing plant, tailings storage facility (TSF), Class II landfill, and wastewater treatment plant (WWTP) at the premises. The premises is approximately 57 km west of Marble Bar.

The premises relates to categories 5, 64 and 85 and assessed design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6665/2022/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in works approval W6665/2022/1.

The proposed layout for Sulphur Springs is shown on Figure 1, along with the areas specific to the Works Approval Application.

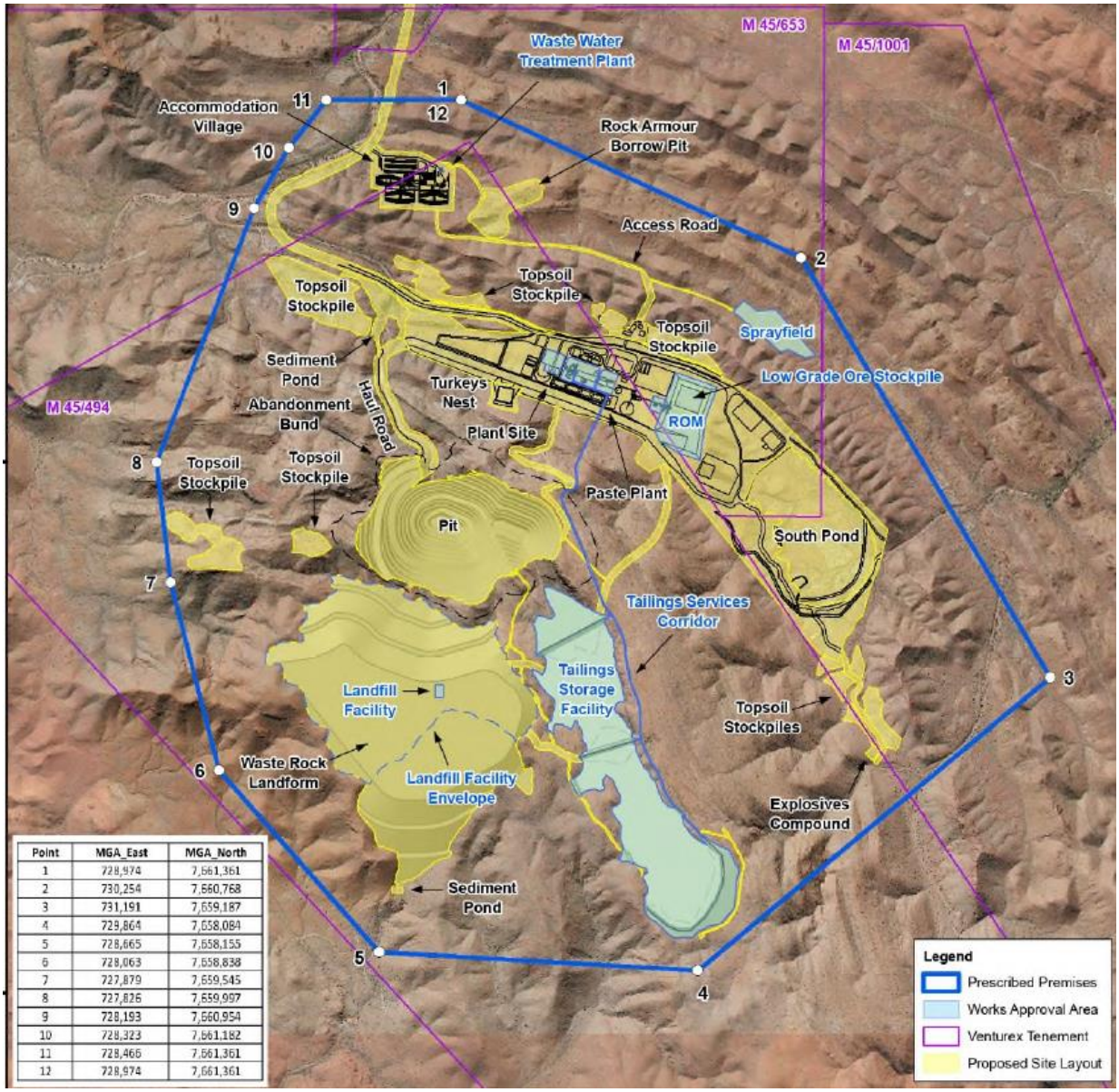

Figure 1: Proposed Layout of Sulphur Springs

2.3.1 Category 5 Ore Processing

The Processing Plant is designed to process up to 1.5 Mtpa of Run of Mine (ROM) ore to produce separate copper and zinc concentrates and up to 1.4 Mtpa dry barren tailings stream. Plant includes jaw crusher, Semi Autogenous Grinding (SAG) mill and ball mill, conditioning tanks, floatation cells, concentrate thickeners, and concentrate storage shed.

Waste management (ore processing) also includes tailings thickener, tailings and water pipelines, and Paste Fill Plant.

ROM Pad

Ore from the underground mine, and later the open pit, will be delivered to the ROM Pad. The ROM Pad will be approximately 250 m long by 150 m wide to temporarily store up to 120,000 tonnes of low grade ore and/or potentially acid forming waste rock provided in the early stages of underground mining. It will allow for an operating stockpile surface of 3.7 ha.

It will be constructed on naturally elevated ground with a base of non-acid forming waste rock.

Primary Crushing

ROM ore will be tipped directly from haul trucks or reclaimed from the ROM pad by a front-end loader and fed to the ROM bin. The primary crushing circuit is made up of a static grizzly, mobile rock breaker, vibrating grizzly, apron feeder, single toggle jaw crusher, discharge conveyer, surge bin stockpile feed conveyor and static stockpile.

Grinding

The grinding circuit comprises a Semi Autogenous Grinding (SAG) mill in open circuit followed by a ball mill in closed circuit with hydrocyclones.

Flotation

The flotation circuit is configured to sequentially float copper and zinc sulphides. In the first stage, chalcopyrite particles (copper bearing minerals) will be separated from the sphalerite, pyrite and gangue minerals. In the second stage, sphalerite (zinc bearing minerals) will be separated from the pyrite and gangue minerals.

The flotation circuit will be elevated to maximise gravity flow of slurry between cells while minimising pumping requirements. The bunded concrete floor for each flotation circuit will be sloped to either of two pump sumps to aid clean up. The pumps will direct recovered material to either the tailings thickener or copper and zinc conditioning tanks.

Concentrate Thickening, Filtering and Washing

Copper and zinc concentrate slurry from the copper and zinc recleaner circuit will be pumped, to a high-rate copper and zinc thickener (two separate units). The slurry will be mixed with flocculant before being introduced to each thickener. The thickener underflow will be pumped at 65% solids by weight to agitated copper and zinc concentrate storage tanks (separate tanks). The concentrate thickener overflow will gravitate to the circuit water tank for recycling to each flotation circuit. Surplus water not required for the flotation circuits will be returned to the process water tanks for treatment in the process water treatment plants.

Thickened copper and zinc concentrate slurry will be pumped from the copper and zinc concentrate storage tanks (separate tanks) to horizontal plate and frame pressure filters for dewatering. Each filter will separate water and solids to produce a filter cake, containing nominally 10% moisture by weight, and a filtrate solution. The filtrate solution will gravitate to the copper and zinc concentrate thickeners (separate units). The filter cakes will discharge into a concentrate bunker under the filter.

Concentrate Storage and Transport

The separate copper and zinc concentrate filters will be housed in a fully enclosed shed constructed on a concrete bunded area. Storage of concentrate for up to 24 hours will be provided under each filter. On a regular basis the concentrate will be loaded onto stockpiles, also in in the concentrate storage shed, by front end loader, to allow for blending and provide surge capacity. The stockpiles will contain up to 7 days inventory.

Loading of trucks will occur inside the concentrate shed. The shed entry and exits points will be sealed by roller doors which will remain closed except for truck access and egress. A weighbridge will be placed within the shed.

A drive through wheel wash facility will be constructed outside of the shed exit point. The facility will include a sump pump, which will discharge to either the copper thickener feed hopper, zinc thickener feed or the flotation feed conditioning tank. Concentrate will be loaded by front end loaders into closed, half-height containers fitted with lids or fully enclosed and sealed side tipper trailers for transport to a holding facility in Port Hedland.

Tailings Thickener

Tailings from the flotation plant will be pumped to a tailings thickener and may be mixed with flocculant and coagulant to increase settling rate and underflow density. The thickener underflow will be pumped at 60 – 65% solids by weight to the TSF or Paste Fill Plant.

Thickener overflow will report to the process water tank.

Paste Fill Plant

The Paste Fill Plant will condition a proportion of the tailings for use as backfill in the underground mine. The moisture content of the tailings will be reduced through a paste thickener and filtration and a binder (such as cement) added to improve structural strength before the paste is delivered to mined out stopes. Backfilling the void is not required until the underground mine is sufficiently advanced (generally 12 – 18 months of mining) so construction and commissioning of the Paste Fill Plant will lag that of the Processing Plant and other infrastructure.

Reagents and Services

A number of reagents will be consumed in the Processing Plant as shown in Table 1.

Table 1: Reagents used in the Processing Plant

Reagents	Description
Hydrated Lime	Supplied in bulk tankers and transferred pneumatically into a 250 tonne capacity silo. This will be mixed to 15% slurry and pumped via a ring main for distribution to the plant.
Sodium Metabisulphite	Supplied in 1 tonne bulk bags. This will be mixed with raw water to a 15% solution and transferred from the mixing tank to a storage and distribution tank for distribution to the processing circuit by a controlled dosing system.
A3894 copper collector	Received in 1 m^3 Intermediate Bulk Containers (IBCs) and distributed by a controlled dosing system to the copper flotation circuit.
Methyl Isobutyl Carbinol	Methyl Iso Butyl Carbinol will be supplied in 1 m^3 IBCs as a 100% concentrated solution. This will be distributed by a dosing system to the copper and zinc flotation circuits.
Sodium Iso Butyl Xanthate (Zinc Collector)	Supplied in 900 kg bulk bags. This will be mixed to a 15% solution and transferred from the mixing tank to a storage tank and then distributed by a controlled dosing system.
Copper Sulphate (Activator)	Supplied in 1,200 kg bulk bags in crystal form. This will be mixed to a 15% solution and transferred from the mixing tank to a storage and distribution tank for controlled distribution to the processing circuit.
Flocculant	Supplied in powder form in 25 kg bags. The flocculant mixing system will be a packaged plant consisting of a dry flocculant hopper feed and wetting system, mixing tank, transfer pump and storage tank. Flocculant will be mixed with raw water on a batch basis and distributed to the thickeners.
Caustic (sodium hydroxide)	Supplied in 1 tonne bulk bags, mixed to a 50% solution and pumped to the process water treatment plant.

Reagents	Description
Sulphuric acid	If required for water treatment will be supplied in 1 m^3 IBCs.

A process flow diagram is shown in Figure 2.

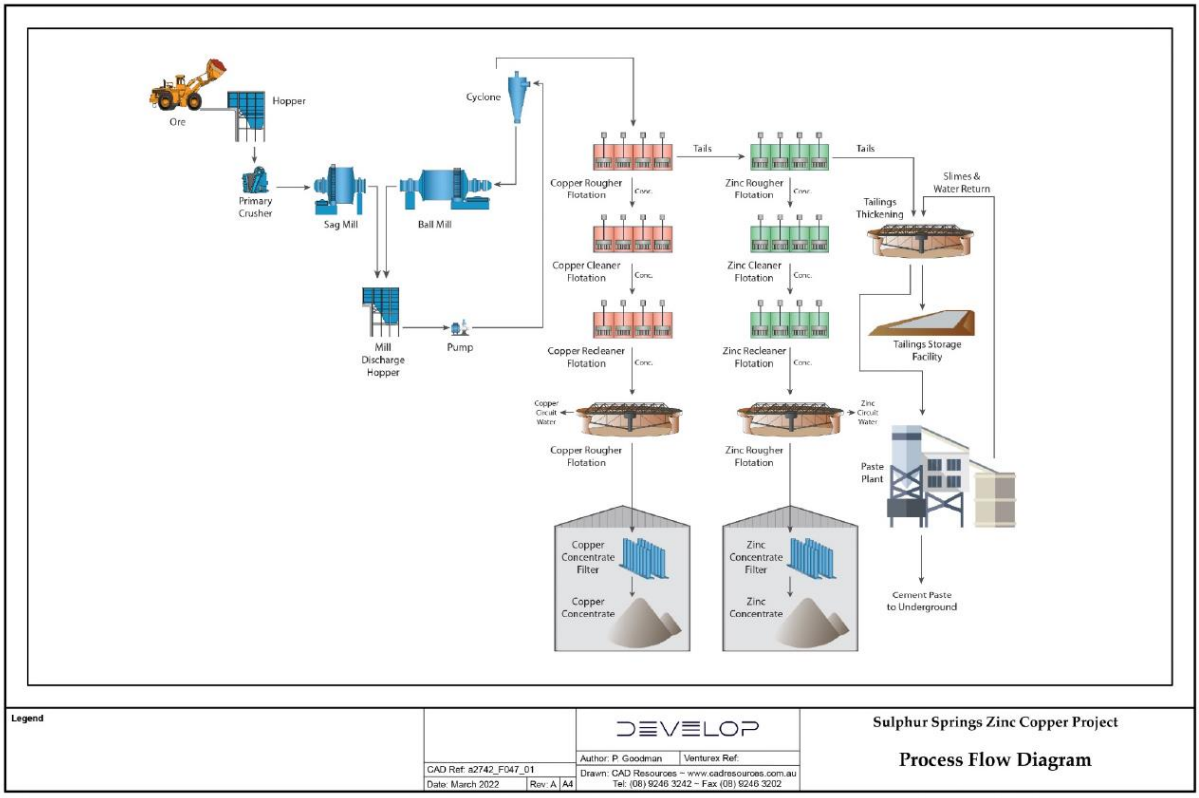

Figure 2: Process Flow Diagram

Raw Water Pond

Good quality groundwater will be sourced from outside the mineralized area and stored in the Raw Water Pond for use in the process water circuit.

Process Water Pond

The Process Water Pond will receive water from the tailings thickener overflow, tailings decant return, and surplus water from the zinc and copper process water circuits. Process water will be supplemented with raw water where required and used for process dilution and plant cleaning duties in the grinding and tailings areas, including tailings line flushing.

South Pond

The South Pond will be constructed to store excess water which will be drawn back into process as required. Water surplus to immediate processing requirements will be stored in the pond, including excess groundwater produced in mine dewatering.

Localised runoff from the hillslopes upgradient of the pond will be diverted around the pond embankments, with provision made to intercept and capture this runoff to supplement the operational water supply if required. The pond design has the ability to reclaim water by floating pontoons pumps for use in the process circuit as required

Plant Site Runoff Pond

Stormwater from the plant area will be retained in the Site Runoff Pond. Captured water will be used in the Processing Plant.

Sedimentation Pond

A sediment pond will be constructed at the northern, downstream end of the mine haul road, outside of plant area, to reduce sediment loads in runoff from the mine haul road. The sediment pond will be established by positioning and controlling the flow through culverts in a constructed crossing for the mine access road.

2.3.2 Category 5 Tailings Storage Facility

The TSF will utilise an incised linear gully between two parallel, competent rock formations. The underlying rock lithologies are of low permeability.

The design is a 42 ha conventional valley-fill TSF, located south-east (upstream) of the proposed open pit. Staged build of two cells of approximately equal storage volumes to provide a tailings storage capacity of 8.8 Mt:

- Cell 1 (northern cell): 2.2 Mm^3 (4.4Mt) - Underground Operations; and
- Cell 2 (southern cell): 2.2 Mm^3 (4.4Mt) - Open Pit Operations.

The valley-fill TSF will be constructed at the head of the catchment of a tributary to Sulphur Springs Creek, upgradient of the mine. This site is within the long-term hydraulic capture zone of the open pit. Seepage from the TSF during the operational phase will be intercepted between the TSF and the mine and returned to the process water circuit. After closure and the cessation of seepage recovery (which may continue during and after the closure phase) seepage will report to the open pit which is expected to remain a perpetual groundwater sink.

Embankments

Three embankments will be constructed:

- Main embankment – constructed at the northern end of the valley with the centreline of the embankment 300 m upstream of the crest of the open pit. The main embankment is the downstream embankment of Cell 1. The embankment crest at 358 mRL will be 57 m above the lowest point in the valley at completion;
- Mid-valley embankment – constructed approximately 400 m upstream (south) of the Main embankment. This embankment is the downstream embankment for Cell 2; and
- Southern embankment – upstream embankment constructed on the Sulphur Springs Creek catchment boundary that completes Cell 2.

Pipelines and Spigots

After thickening, the tailings will be pumped via the pipeline to the TSF. Deposition will be primarily from the main or southern embankments depending on which cell is operational.

Deposition from the eastern perimeter of the TSF will to help with surface profiling (achieving a gradient in the tails surface from east to west in accord with closure objectives). The tailings distribution pipeline will be raised with each staged raising of the embankments. Sub-aerial deposition will occur from multiple spigots inserted along the tailings distribution line (nominally 3 to 5 at a time). The deposition locations will be moved progressively along the distribution line as required to optimize tailings drainage and collection in the supernatant pond and ensure the tailings surface is re-wet at a maximum of 14 days intervals to maintain saturation levels.

Decant

Decant water will be removed from the Decant Pond within the TSF by pontoon mounted pumps and pumped to the Processing Plant.

Seepage

An underdrainage system along the natural gradient and comprising a central drain positioned along the TSF valley will be installed to promote tailings drainage and consolidation. Drains installed along the upstream toe of the embankments will connect to the central drain. Water collected in the underdrainage system will be delivered to a sump on the downstream side of the downstream embankment. Drainage collected in the sumps will be pumped to the decant pond from where it is returned to the processing plant.

2.3.3 Category 64 Inert and Putrescible Landfill

Putrescible and non-recyclable inert waste will be disposed to the landfill located within the footprint of the Waste Rock Landform (WRL) and then within the overburden deposited on the WRL. The landfill will comprise a series of trenches (~30 m x 10 m x 4 m deep). The estimated maximum quantity of waste to be disposed is 700 tonnes per annum.

Up to 100 used tyres per annum may also be disposed of at the landfill.

2.3.4 Category 85 Wastewater Treatment Plant

A Wastewater Treatment Plant (WWTP) with maximum design capacity of 75 m^3/day (300 persons @ 250 L/day) is planned to be installed to service the accommodation camp and processing plant, with treated water being irrigated over 2.5 ha irrigation area.

The WWTP will utilize conventional activated sludge technology, with the following processing steps:

- Influent screening and balance tank;
- Anaerobic and aerobic treatment;
- Clarification;
- Effluent sterilization (chlorination);
- Bag filtration (100 micron);
- Sludge settling tank and
- Irrigation / treated effluent tank.

The treated effluent quality to be discharged to the irrigation area is shown in Table 2. This meets the criteria of the *Category C Secondary Treatment as per the National Water Quality Management Strategy, Australian Guidelines for Sewerage Systems, Effluent Management, 1997.*

Table 2: WWTP Treated Effluent Criteria

Parameter	Expected Quality	Criteria
pH	6.5 – 8.5	-
Biochemical Oxygen Demand	<20 mg/L	20 – 30 mg/L
Total Suspended Solids	<30 mg/L	25 - 40 mg/L

Parameter	Expected Quality	Criteria
Total Nitrogen	<40 mg/L	20 – 50 mg/L
Total Phosphorus	<10 mg/L	6 – 12 mg/L
Total Chlorine	0.2 – 2.0 mg/L	-
E.coli	<1,000 cfu/100 mL	10^5 - 10^6

The loading rates for Total Nitrogen and Total Phosphorus over the 2.5 ha irrigation area are shown in Table 3. This meets the criteria of *DWER's Water Quality Protection Note 22, Irrigation with nutrient-rich wastewater.*

Table 3: Loading Rates for Total Nitrogen and Total Phosphorus

Parameter	Expected Quality	Criteria
Total Nitrogen	438 kg/ha/yr	480 kg/ha/yr
Total Phosphorus	109.5 kg/ha/yr	120 kg/ha/yr

A second WWTP with a 15 m^3/day capacity will also be installed to service the plant site and offices. The treated effluent will make up 0.2% of the water discharged to the TSF in the tailings slurry.

2.3.5 Other supporting infrastructure

Process water treatment plant, water storage pond (south pond), raw water pond, process water pond, plant area runoff pond, ROM Ore Pad and ore stockpile, Bulk Fuel Storage and refuelling area, reagent storage, Vehicle Workshop and washdown bay (Oily water separator), Gas fired power station (max 10 MW), and Core Shed.

2.3.6 Construction, commissioning, and time limited operations

Construction is scheduled to commence in Quarter 2 2023.

Commissioning of the specified plant will be undertaken in two stages:

- Stage 1 – The Accommodation Village WWTP and sprayfield will be commissioned in Quarter 3 2023.

  Associated with the wastewater treatment plant commissioning will be the operation of a potable water treatment plant. As an interim measure until the processing plant is commissioned (approximately 15 months) reject water from the potable plant will be blended with the treated wastewater and disposed at the irrigation sprayfield.

  Although no specific commissioning is required for the landfill facility, it is planned it will become operational in the same timeframe as the WWTP.

- Stage 2 – The Process Plant, TSF, and associated ore processing and product handling infrastructure is planned to be commissioned in Quarter 4 2024.

  The Paste Fill Plant, which is not required for approximately one year after the commencement of productive mining, is likely to be commissioned in Quarter 4 2025.

  Non ore processing equipment within the plant area such as the process water treatment plant and HDPE lined raw water pond and process water pond will be commissioned in

Quarter 4 2023 to facilitate the planned commencement of mine dewatering in advance of mining.

Treated water will be utilised for dust suppression and construction and sludge from the water treatment process temporarily placed in the HDPE lined pond before transfer to the TSF once production is commenced.

Commissioning of the ore processing facilities will be in five stages. Stages 4 and 5 present the risk of emissions and discharges to the environment:

- Stage 1 – Construction verification – verification that infrastructure/plant/equipment is mechanically and electrically complete and constructed to specification.
- Stage 2 – Functional testing (Dry Testing) - introduction of energy (electrical, hydraulic, pneumatic or potential) to test motors and pressure test vessels and piping where possible.
- Stage 3 – No Load Commissioning (Wet Commissioning) – involves operating plant with load (ore/material) or where appropriate with water to verify operation of control systems, and integration of plant subsystems where practicable.
- Stage 4 – Load Commissioning (Ore Commissioning) – ore, or other process medium, is progressively introduced to the plant and system settings are monitored and adjusted and plant performance data obtained from the control systems. Loadings are progressively increased with the plant functioning carefully monitored. Emergency shutdown and plant start-up are tested.
- Stage 5 – Performance Verification – plant is operated under normal conditions for longer periods, at variable rates and steady state conditions to evaluate reliability and performance against design criteria.

Time limited operation for the WWTP is scheduled to commence Quarter 3 2023, and the process plant and TSF is scheduled to commence Quarter 4 2024.

2.3.7 Groundwater Characteristics

Groundwater characteristics at each infrastructure area are shown in Table 4.

Table 4: Groundwater characteristics at each infrastructure area

Infrastructure Area	Representative Bores	Depth to Groundwater (mbgl)[1]	Groundwater Quality Description[2]	pH[1]	TDS[1] (mg/L)
Processing Plant Area	Kim Bore SSWB03 SSWB06 SSWB09	11 – 16	• Circumneutral pH • Fresh to brackish salinity • High alkalinity • Very hard – extremely hard	6.3 – 7.5	560 - 940
Landfill Facility	SSWB65 SSWB66 SSWB67	12 – 16	• Circumneutral pH • Fresh salinity	6.7 – 8.0	175 - 430

Infrastructure Area	Representative Bores	Depth to Groundwater (mbgl)[1]	Groundwater Quality Description[2]	pH[1]	TDS[1] (mg/L)
	SSWB68		• Moderate – high alkalinity • Moderately hard – very hard		
Wastewater Treatment Plant	SSWB33 (level) SSWB26 (quality)	>12		7.1 – 7.5	790 - 940
Sprayfield	SSWB26	17		7.1 – 7.5	790 - 940
Tailings Storage Facility	TSF1 – 8 (levels) TSF 1, 2 (quality)	30 – 40 (ridgelines) 6-15 (valley invert)	• Circumneutral pH • Fresh salinity • High alkalinity (200 – 440 mg/L • Very hard (370 – 400 mg/L)	7.2 – 7.7	610 - 880

Note 1: Based on latest monitoring data Nov 2021 – Jul 2022

Note 2: Sulphur Springs Project Groundwater Assessment (Aecom 2020), except for the TSF which is based on June 2022 data)

Provisional triggers have been developed from the baseline monitoring data. Refer to Table 5. The purpose of these triggers is to identify whether changes to surface water or groundwater are significantly outside the normal range, thus necessitating a series of actions to investigate the cause to prevent an adverse environmental impact. In addition, reportable triggers have been identified based on guideline values from the Australian Water Quality Guidelines (ANZECC & ARMCANZ, 2000).

The baseline triggers have been selected based on a margin that is 20% beyond the baseline range. Given the low concentrations of some parameters, the triggers have been increased to a reliably detectable value compared to the corresponding limit of reporting. As the provisional triggers are drawn from baseline data, they will be reviewed regularly to ensure they remain relevant as more monitoring data become available.

Table 5: Provisional Water Triggers

Surface Water / Groundwater	Location	Parameter	Units	Baseline Range[5]	Baseline Trigger	Guideline Trigger
Surface Water	Sulphur Springs & Six Mile Creeks SSC14 SSC20 SMC1	pH	pH units	7.3 – 8.4	7.0 – 8.8	-
		DO	mg/L	2.4 – 7.0	2.0	-
		TDS	mg/L	260 – 1,500	1,800	4,000[1]
		Arsenic	mg/L	<0.001 – 0.004	0.005	0.013[2]

Surface Water / Groundwater	Location	Parameter	Units	Baseline Range[5]	Baseline Trigger	Guideline Trigger
		Cadmium	mg/L	<0.0001 – 0.012	0.0015	0.0020[2]
		Copper	mg/L	<0.004	0.005	0.007 – 0.013[2]
		Nickel	mg/L	<0.002	0.003	0.057 – 0.100[2]
		Selenium	mg/L	<0.012	0.015	0.011[2]
		Zinc	mg/L	<0.017	0.020	0.042 – 0.072[2]
	Minnieritchie Creek MRC2 MRC4	pH	pH units	7.1 – 8.4	7.0 – 8.5	-
		DO	mg/L	4.0 – 10.8	3.2	-
		TDS	mg/L	500 – 1,080	1,300	4,000[1]
		Arsenic	mg/L	<0.001	0.002	0.013[2]
		Cadmium	mg/L	<0.0001	0.0002	0.0020[2]
		Copper	mg/L	<0.001	0.002	0.007 – 0.013[2]
		Nickel	mg/L	<0.004	0.005	0.057 – 0.100[2]
		Selenium	mg/L	<0.01	0.01	0.011[2]
		Zinc	mg/L	<0.005	0.006	0.042 – 0.072[2]
Groundwater	TSF Area TSF1 TSF2 TSF3 TSF4 TSF5 TSF6	pH	pH units	7.1 – 7.2	7.0 – 7.3	-
		TDS	mg/L	480 - 580	640	4,000[1]
		Arsenic	mg/L	<0.001	0.002	0.5[1]
		Cadmium	mg/L	<0.0002	0.0003	0.01[1]
		Copper	mg/L	<0.001	0.002	1.0[1]
		Nickel	mg/L	<0.001	0.002	1.0[1]
		Selenium	mg/L	<0.01	0.01	0.02[1]
		Zinc	mg/L	<0.005	0.006	20[1]

Surface Water / Groundwater	Location	Parameter	Units	Baseline Range[5]	Baseline Trigger	Guideline Trigger
		SWL	mbgl	-	+/-20%[4]	-
	Process Area Kim Bore PPS1[3]	pH	pH units	7.1 -7.4	7.0 -7.5	-
		TDS	mg/L	680 - 800	800	4,000[1]
		Arsenic	mg/L	<0.001	0.002	0.5[1]
		Cadmium	mg/L	<0.0002	0.0003	0.01[1]
		Copper	mg/L	<0.008	0.009	1.0[1]
		Nickel	mg/L	<0.002	0.003	1.0[1]
		Selenium	mg/L	<0.01	0.01	0.02[1]
		Zinc	mg/L	<0.031	0.034	20[1]
		SWL	mbgl	-	+/-20%[4]	-
	Six Mile Creek SSWB21 SSWB25	pH	pH units	7.0	6.9 – 7.1	-
		TDS	mg/L	400 – 1,120	1,240	4,000[1]
		Arsenic	mg/L	<0.004	0.005	0.5[1]
		Cadmium	mg/L	<0.0001	0.0002	0.01[1]
		Copper	mg/L	<0.006	0.007	1.0[1]
		Nickel	mg/L	0.010 – 0.023	0.025	1.0[1]
		Selenium	mg/L	N.D.	0.01	0.02[1]
		Zinc	mg/L	0.019 – 0.025	0.028	20[1]
		SWL	mbgl	-	+/-20%[4]	-

Note: A trigger will be exceeded if the result is outside of the specified pH and SWL ranges, below the DO value or above the specified values for other parameters.

1 – Stock drinking water limits (ANZECC & ARMCANZ, 2000).

2 – 95% protection, HMTV adjusted (ANZECC & ARMCANZ, 2000).

3 – based on water quality results from other bores in the catchment (AECOM, 2018a).

4 – +/-20% from the baseline seasonal range.

5 – Excludes baseline data from bore SSDW001.

A trigger will be exceeded if two successive routine readings are above the baseline trigger or range.

If this occurs, the following action plan will be implemented:

Level 1 Response (confirmation and background data review)

- If a baseline trigger is exceeded, re-sample within seven days from receipt of the results to confirm the exceedance;
- Review results against the site's data trends to identify whether it is part of a short-term or longterm change;
- Review background monitoring data to identify whether the change is due to a regional trend i.e. climate-based rather than site-based event;
- If the change is in line with background changes, continue to monitor the change to determine whether a guideline trigger is breached, otherwise, initiate a Level 2 response; and
- Report the event in the next annual monitoring report.

Level 2 Response – (impact identification and mitigation)

- If the baseline trigger is reached due to a site-based event, review contributing factors to identify the cause(s);
- Review or establish predictive results to identify impact risks;
- If the change is not expected to result in an impact, continue monitoring and report in the next annual monitoring report;
- If the guideline trigger is breached, re-sample the site within seven days (if this hasn't occurred as part of a Level 1 response) from receipt of the results, review local and background monitoring data, and investigate for evidence of an impact;
- If the change has, or is likely to result in an adverse impact, develop a mitigation plan and seek approval from DWER within six months of becoming aware of the change; and
- Implement the approved mitigation plan and continue to monitor to determine effectiveness of the change.

Potential Level 2 response contingency actions include

- Operation of existing or additional recovery bores if cross-catchment seepage is occurring;
- Alkaline pH adjustment of full decant water stream instead of only the volume required for processing;
- Alkaline pH adjustment of tailings via lime addition at the final tailings hopper prior to deposition into TSF; and
- Alkaline pH adjustment of tailings via calcined magnesia at the final tailings hopper prior to deposition into TSF.

Level 3 Response – (unplanned leaks, spills and emergency response)

An unplanned event such as a leak or spill will be managed according to the ERP. The ERP will contain details on the type of response, level and timing of internal and external reporting.

An unplanned event is one that involves the release of potentially contaminating substances, either following a sudden occurrence, or slow but undetected release. Control and containment of substances such as hydrocarbons and processing chemicals are governed by various

regulations outside the scope of this plan. Identification and reporting of a contamination event are defined in the Contamination Sites Guidelines (DER, 2017).

2.4 Hydrogeologist Assessment

Once mining is completed, the mine void will slowly fill with groundwater, TSF seepage and runoff from rainfall entering the pit footprint. The rate of flooding will slow once the water level reaches the pit floor where the void volume per metre rise will increase significantly, and evaporation from the pit lake will begin to take effect.

It is likely that a simplified algae-aquatic insect ecosystem will develop in the pit lake after closure. Recent literature suggests that emergent insects from such water bodies (mostly mosquitos and midgies) are a potential transport pathway for metals from contaminated water to insect eating birds (such as swallows and swifts) and bats. Emissions from the TSF via surface runoff and groundwater flow should be controlled to minimise this environmental risk.

The metals of most concern for this process appear to be mercury, selenium, cadmium and copper. Trigger values for initiating a management response are recommended.

2.5 Department of Mines, Industry Regulation and Safety

A Mining Proposal (MP), which includes a Mine Closure Plan (MCP), was lodged with the Department of Mines, Industry Regulation and Safety (DMIRS) in March 2022 to allow approval of the above-proposed works under the *Mining Act 1978*, as well as other associated mining activities.

DMIRS has raised the following as part of the referral of the works approval supporting documentation:

- The % solids at 60% seems overly optimistic and is not in line with the tailings properties described. A worst case scenario in relation to % solids and density should be provided to better understand the implications for the management of the TSF;
- The input parameters for the permeability of the TSF base do not reflect the trial pit findings. The value used is 10 times less permeable than what was tested on site and described in the text. The seepage analysis may underestimate the amount of seepage and it will impact the design of the recovery system;
- The seepage modelling is 2D and not 3D; and
- This version of the Mining proposal has excluded the North pond water storage facility (shown in water balance documentation but deleted from MP figures). It appears that the water balance has not been updated to reflect that change.

These issues were resolved and DMIRS approved the Mining Proposal and Mine Closure Plan on 15 August 2022.

2.6 Part IV of the EP Act

The Suphur Springs Zinc Copper Project proposal was assessed by the Environmental Protection Authority (EPA) under Section 38 Part IV of the EP Act and approved under Ministerial Statement (MS) 1134 on 20 May 2020 (EPA Report No. 1671).

Conditions of MS 1134 relevant to this assessment include:

"6-1 The proponent shall manage the implementation of the proposal to meet the following environmental outcome:

(1) The proponent shall ensure that there are no impacts, as a result of the proposal, to Pityrodia sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) as delineated in Figure 3 and by the coordinates in Schedule 2."

Requirements of MS 1134, such as native vegetation clearing (i.e. clearing of no more than 313.6 ha within the 889.2 ha development envelope), are not re-assessed in this decision report and are not duplicated as conditions in works approval W6665/2022/1.

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 *Guideline: Risk Assessments* (DWER 2020).

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 (including commissioning and Time Limited Operation) which have been considered in this decision report are detailed in Table 6 below. Table 6 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 6: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Vehicle and machinery activity on disturbed ground and unsealed roads Unsealed roads Ground disturbing activities	Air / windborne	• Dust suppression using dedicated water carts; • Application of speed limits; • Ground disturbance planning to minimise areas 'open' (progressive clearing); and • *Quoya zonalis* (MS 1134) condition monitoring.
Gaseous (diesel combustion)	Vehicle, machinery, and diesel generator activity	Airborne	• Maintenance according to schedule; and • Mine design (minimise fuel cost and therefore emissions).
Noise	Vehicle, machinery, and diesel generator activity	Airborne	• Standard noise suppression on machinery and plant. Additional attenuation, where warranted, to meet occupational noise standards. EMISSION SCREENED OUT DUE TO DISTANCE TO SENSITIVE RECEPTORS
Hydrocarbons	Hydrocarbon spills	Infiltration	• All hydrocarbon storage areas will be designed and constructed in accordance with Australian Standards AS 1940-2004 *The Storage and Handling of Flammable and Combustible Liquids - Western Australia* (AS 1940-2004) and AS 1692-

Emission	Sources	Potential pathways	Proposed controls
			2006 (AS 1692-2006) *Steel tanks for flammable and combustible liquids*; • The bunded areas will incorporate a collection sump to recover spillage; • Fuel bowsers and fuel delivery inlets will be located on concrete or HDPE-lined pads to contain any drips and spills; • Refueling aprons graded to collect sump and clean water recovery system; • Spill kits in strategic positions with materials and equipment to contain and collect/recover hydrocarbon spills; • Personnel trained in use of spill kits; and • Contaminated soils will be remediated or removed from site by a licensed third party.
Stormwater potentially containing sediments, hydrocarbons, reagent/product	Plant area	Overland runoff/flow	• Plant site drainage directed to HDPE lined stormwater pond (Site Runoff Pond) with capacity for 1 in 100 year, 72 hour event; • Storage of liquid chemical in bunded facilities sized to retain 110% of the largest vessel and 25% of the total stored reagent volume as per AS 1940-2004 and AS 1692-2006; • Stocks of solid reagents stored in a designated reagent shed; • Wet processing areas (e.g. flotation cells and thickeners) concrete bunded and graded to sumps where liquids are returned to process; • Separation through bunding, drainage diversion and infrastructure, of plant area drainage and surrounding, uncompromised runoff; • All concentrate thickeners will be individually bunded and provided with sump pumps to aid area clean up. Clean up will be directed back to the thickener feed or optionally to the appropriate filter feed tank; • Captured stormwater directed to water treatment plant; • Workshops and washdown bays to have concrete floors and sides (as appropriate) and runoff to be directed to oily water separators / clean water
	Machinery workshops and refueling areas	Overland runoff/flow	
	Contaminated /sediment laden stormwater	Overland runoff/flow	
		Infiltration	

Emission	Sources	Potential pathways	Proposed controls
			recovery systems; • All hydrocarbon storage areas will be designed and constructed in accordance with AS 1940-2004 and AS 1692-2006; • All liquid chemical reagents will be stored within tanks in appropriately bunded facilities whereby 110% of the largest vessel is contained and 25% of the total volume is contained according to AS 1940-2004 and AS 1692-2006. Stocks of reagents in solid form will be stored in a designated reagent shed; • Spill control measures in strategic positions with appropriate equipment available to contain and collect/recover hydrocarbon spills; and • Personnel trained in use of spill kits.
Commissioning, Time Limited Operations, Operations			
Processing Plant			
Dust	Vehicle and machinery activity on disturbed ground and unsealed roads	Air / windborne	• Dust suppression using dedicated water carts; • Application of speed limits; • Ground disturbance planning to minimise areas 'open' (progressive clearing); • Sprinkler infrastructure on ROM pad stockpiles and surge stockpiles; and • Quoya zonalis (MS 1134) condition monitoring.
	Unsealed roads		
	Ore/waste mining and transfer		
	Disturbed areas, stockpiles, and WRL.		
	Ore crushing and screening circuit		• Dust extraction system at ore transfer points at the ROM bin apron feeder, vibrating grizzly apron feeder and at the primary crusher discharge chute; • Concentrate storage and loading undertaken in enclosed shed; • The crushing circuit will include a dust extraction system that will draw dust from the ore transfer points at the primary crusher discharge. Dust suppression sprays will also be installed at the primary crusher ROM bin; and • Water sprays on the primary crusher discharge chute and ore conveyors.
	Concentrate storage and load out		

Emission	Sources	Potential pathways	Proposed controls
Gaseous (diesel combustion)	Vehicle fleet, machinery, plant operations, and stationary sources	Airborne	• Maintenance according to schedule; and • Mine design (minimise fuel cost and therefore emissions).
Noise			• Standard noise suppression on machinery and plant; and • Additional attenuation, where warranted, to meet occupational noise standards. EMISSION SCREENED OUT DUE TO DISTANCE TO SENSITIVE RECEPTORS
Stormwater potentially containing sediments, hydrocarbons, reagent/product	Plant area	Overland runoff/flow	• The ROM pad will include an HDPE lined base graded to report to sumps for the containment of any seepage originating from water percolating through stockpiled material. The captured water will be transferred to the processing plant water circuit or the water treatment plant; • Plant site drainage directed to HDPE lined stormwater pond (Site Runoff Pond) with capacity for 1 in 100 year, 72 hour event; • Captured stormwater directed to water treatment plant; • Wet processing areas (e.g. flotation cells and thickeners) concrete bunded and graded to sumps where liquids are returned to process; • Separation through bunding, drainage diversion and infrastructure, of plant area drainage and surrounding, uncompromised runoff; • Fuel bowsers and fuel delivery inlets will be located on concrete or HDPE-lined pads to contain any drips and spills; • Refueling aprons graded to collect sump and clean water recovery system; • All hydrocarbon storage areas will be designed and constructed in accordance with AS 1940-2004 and AS 1692-2006; • Storage of liquid chemical in bunded facilities sized to retain 110% of the largest vessel and 25% of the total stored reagent volume as per AS 1940-2004 and AS 1692-2006; • The bunded areas will incorporate a collection sump to recover spillage; • Stocks of solid reagents stored in a
	Plant area	Overland runoff/flow	
	Machinery workshops and refueling areas	Overland runoff/flow	
	Contaminated /sediment laden stormwater	Overland runoff/flow	
		Infiltration	

Emission	Sources	Potential pathways	Proposed controls
			designated reagent shed; • Workshops and washdown bays to have concrete floors and sides (as appropriate) and runoff to be directed to oily water separators / clean water recovery systems; • Spill control measures in strategic positions with appropriate equipment/materials available to contain and collect/recover hydrocarbon spills; • Personnel trained in use of spill kits; and • Contaminated soils will be remediated or removed from site by a licensed third party.
Process water	Process Water Pond	Overtopping, leaks/spills	• 1.5mm HDPE lined; and • Minimum design freeboard of 0.5 m.
TSF			
Tailings / water potentially containing elements of environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn.)	Tailings pump breakdown (at plant)	Unplanned direct discharge / overland flow	• Bunding of Pumps; • Use of standby pump; • Use of automated systems for failure notification; • Regular inspections and maintenance of pump and pipeline; • Minimum daily inspections; • Construction of bunded pipeline corridor. • Use of leakage detection system; • Pipeline alignment to utilise topography for spillage containment; • The tailings pipeline will be a combination of lined steel pipe and HDPE. The pipeline will have a form of secondary containment such as an earthen bund to contain and recover material from pipeline leaks or ruptures; • Pipeline operating characteristics will be monitored electronically via the plant control system for leak detection; • Pressures sensors along pipeline(s) and auto pump shut-off in event of significant pressure drop; and • The pipeline to have a form of secondary containment such as an earthen bund to contain and recover material from pipeline leaks or ruptures.
		Unplanned direct discharge / infiltration	
	Tailings / water pipelines (leaks of rupture)	Unplanned direct discharge / overland flow	
		Unplanned direct discharge / infiltration	

Emission	Sources	Potential pathways	Proposed controls
	TSF (Cells 1 and 2)	Seepage / Infiltration of supernatant water through basin and pit walls	• TSF siting in confining stable geological structures, upstream of mine pit. Appropriate siting (geological/topographical setting – upgradient of natural acid mine drainage); • Minimise decant pond on TSF at all times; • Installation/utilization of monitoring bores to measure groundwater levels and quality; • Recovery of seepage water back to TSF/directly to the plant; • Minimise volume of tailings stored above ground (optimise underground tailings storage); • Seepage within the catchment of the mine pit (unintercepted seepage caught in dewatering (operations) and pit lake perpetual sink (post closure); • Underdrainage capture. Along valley invert and at the toe of embankments (except middle embankment); • Cut off trenches at base of upstream embankments; • Vibrating Wire Piezometers will be installed in the main and southern embankments to monitor trends in pore pressure which can reflect seepage through the embankment; • Seepage detection, monitoring and contingency seepage recovery; • The volumes and quality of seepage intercepted downstream of the TSF will be monitored monthly; • Location and size of the decant pond will be visually monitored and maintained by changing the active spigots; • Bituminous geomembrane (BGM) upstream embankment lining (Northern, middle and Southern embankments); • Perimeter groundwater and surface water monitoring; • Groundwater monitoring bores will be converted to recovery bores, or further recovery bores installed, should monitoring results indicate material

Emission	Sources	Potential pathways	Proposed controls
			tailings seepage; and • Further afield, sites where groundwater expresses at the surface seasonally and which may be expected to reflect any significant seepage from the tailings over time will be monitored and sampled (subject to water availability) on a six-monthly basis.
		Ingestion (from surface of TSF)	• Minimise decant pond on TSF at all times; and • Undertake regular checks of decant pond and pumps to assess size and depth.
		Seepage daylighting / surface expression	• Locations where groundwater expresses at the surface (i.e. seasonally) will be monitored and sampled (subject to water availability) on a six-monthly basis.
	TSF (Cells 1 and 2) embankment failure	Overland flow / infiltration	• Engineered embankments to ensure structural integrity; • TSF design to meet or exceed criteria applicable to High C consequence category facility under ANCOLD risk rating (ANCOLD 2019); • Quality control on TSF construction and inspected and signed off by accredited engineer; • Comprehensive inspection of the TSF by Dams Engineer and Specialist (where relevant) after first year of operation, then every two years; • Intermediate inspection of the TSF by Dams Engineer annually; • Continuous embankment stability monitoring; • Daily inspections; • Adherence to operating manual – maintenance of design freeboard, deposition management; • Decant water pond is kept to a minimum; • Checks for signs of erosion after rainfall events; • Crest sloped inwards to shed water into the TSF; and • Embankment downstream slope covered with rock armour to protect from erosion

Emission	Sources	Potential pathways	Proposed controls
			if required. MANAGED BY DMIRS
	TSF (Cells 1 and 2) overtopping due to insufficient freeboard capacity	Uncontrolled release / overland flow / infiltration	• The TSF has been designed, and progressive construction of the embankments will be managed, to ensure rainfall from a 1 in 100 year, 72 hour event will be contained within the structure during the operational phase. • Operational freeboard is kept to 300 mm (minimum); and • Daily inspections.
Dry tailings (particulates) on exposed beaches potentially containing concentrations of elements with environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn).	TSF (Cells 1 and 2)	Air / windborne deposition	• TSF siting in steep sided valley; • Multi-cell TSF design (limits tailings surface area); • Cycling tailings discharge to maintain wet tailings surface as per TSF Operating Manual; • Rotate slurry spigots around TSF perimeter embankments; • Rehabilitate when decommissioned; • Allow salt crusting on surface of the TSF; • Tailings beaches to be kept damp during operations; and • If dust generation becomes an issue (i.e. in periods the TSF may be inactive), the tailings beaches are to be irrigated (i.e. with sprinklers or similar) or mulching of the surface.
Potentially contaminated stormwater	Stormwater potentially containing reagent / product (within plant area only, sediments, hydrocarbons (machinery workshops and refueling areas)	Overland runoff/flow Infiltration	• Plant site drainage directed to HDPE lined stormwater pond with capacity for 1 in 100-year, 72-hour event; • Captured stormwater directed to process water circuit/treatment plant; • Storage of liquid chemical in bunded facilities sized to retain 110% of the largest vessel and 25% of the total stored reagent volume as per AS 1940-2004 and AS 1692-2006; • Stocks of solid reagents stored in a designated reagent shed; • Wet processing areas (e.g., flotation cells and thickeners) concrete bunded and graded to sumps where liquids are returned to process; and • Separation through bunding, drainage

Emission	Sources	Potential pathways	Proposed controls
			diversion and infrastructure, of plant area drainage and surrounding, uncompromised runoff.
Leachate	ROM pad and Low Grade Stockpile	Seepage / infiltration	• ROM Pad and Low-Grade Stockpile bases to be HDPE lined, with leachate reporting to a sump then directed to the Process Water Treatment Plant; • Groundwater monitoring downgradient of ROM pad and Low-Grade Stockpile (monitoring as per Water Management Plan); and • Contingency measures – groundwater recovery.
Leachate containing PAF	PAF Waste Rock Landform	Seepage / infiltration	• PAF is to be encapsulated in dedicated, managed cells within NAF rock in the WRL, within the catchment of the mine pit; • Altered groundwater captured by dewatering system (operations); and • Altered groundwater reports to pit lake (perpetual sink) post closure.
WWTP			
Odour	Wastewater treatment plant	Air / windborne	• Most tanks are enclosed; and • Regular monitoring and maintenance of WWTP. EMISSION SCREENED OUT DUE TO DISTANCE TO SENSITIVE RECEPTORS
Sewage, partially treated sewage and/or treatment effluent	WWTP tanks and pipelines from overtopping or malfunctions	Direct discharges	• Contingency tank storage equivalent to 24 hours (i.e. 2 shift changes) of wastewater throughput will be maintained at the WWTP. This equates to 75m^3 when the accommodation camp is at full capacity (during the construction phase). The screening/balance tank (capacity of 70m^3 capacity), and treated effluent tank (minimum 40m^3) also provide contingency storage in the event of component malfunction. In the unlikely event the plant experiences extended downtime, liquid effluent may be removed off site or temporarily stored in tankers mobilised from licenced operators in Port Hedland; and • A weather proof control room is part of the WWTP. The WWTP, treated effluent pipeline and sprayfield area will be inspected daily. Instrumentation will

Emission	Sources	Potential pathways	Proposed controls
			include level sensors on the balance tank and treated effluent tanks and high level audible and visual (flashing light) alarms. Other sensors will alarm in the event of a transfer pump or blower malfunction. Pressure sensors on the treated effluent pipeline will alarm in the event pressure varies outside expected operating parameters indicative of a possible leak, or less likely, blockage.
Treated effluent	Planned discharges to the irrigation area	Direct discharges	• Management and monitoring to ensure required treatment performance and discharge quality; • WWTP control system alarms when operational parameters are outside normal operating conditions; • Weed monitoring and control as warranted; and • Irrigation area fenced to prevent fauna and livestock ingress.
Contaminated stormwater	Stormwater ingress into contaminated landfilling areas	Direct discharges	• The WWTP will be installed on a constructed hardstand pad of approximately 0.09 ha mostly proud of the surrounding natural ground. An earthen bund and shallow diversion drain will be constructed at the interface with the natural surface on the upgradient edge of the pad to direct any sheet runoff from above the pad around the facility; and • Similarly, an earthen bund and shallow drain will be excavated on the upgradient boundary of the sprayfield area, directing any runoff from upstream either around the sprayfield area, or to a minor ephemeral drainage line that traverses the sprayfield area (a 10 metre buffer over this drainage line will be quarantined from the irrigation area through the design of the sprinkler configuration).
Putrescible Landfill			
Dust	Movement of vehicles and disposal of waste to trenches	Air / windborne	• Dust emissions from the landfill facility will be minimised by limiting the area of disturbed ground to that required to accommodate and operate the active trench. Dust suppression using watercarts will be deployed as required. As the waste rock landform (WRL) is progressively developed in the latter half of the project life the landfill site will

Emission	Sources	Potential pathways	Proposed controls
			constitute an insignificant proportion of the footprint of the WRL with a commensurate, minimal, contribution to dust emissions. • EMISSION SCREENED OUT DUE TO DISTANCE TO SENSITIVE RECEPTORS
Odour	Putrescible waste within the trenches	Air / windborne	• Regular covering of waste, at least fortnightly. EMISSION SCREENED OUT DUE TO DISTANCE TO SENSITIVE RECEPTORS
Windblown waste	Uncovered waste blown by wind resulting in littering and potential attraction of fauna / livestock	Air / windborne	• Temporary mesh fencing 2 metres in height will be deployed around the landfill facility to exclude fauna and contain windblown litter; and • Waste in the active trench will be covered by earth and waste rock at fortnightly intervals.
Contaminated stormwater	Stormwater ingress into contaminated landfilling areas	Direct discharges	• The initial landfill trenches will be positioned on a natural rise with no upgradient catchment; • Spoil from the excavation of each trench will be positioned on the 'high' side of the trench to divert any immediate, localised runoff around the trench; and • As the WRL is developed the landfill trenches will be constructed in the finished, flat surface of an overburden lift. Waste rock bunds (windrows) will be constructed around the excavated trenches to contain incident rainfall and prevent any surface runoff entering the trenches.
Leachate	Class II putrescible landfill	Infiltration	• The landfill facility is positioned within the footprint of the WRL upstream of the orebody and within the catchment of the open pit; • Infiltration of rainfall through the completed waste trenches will be minimised by capping the trench with compacted, slightly mounded fill. Any seepage through the trenches will migrate vertically to the water table and mix with local groundwater. During operations the groundwater will be within the capture zone of orebody dewatering. Abstracted groundwater will be passed through a water treatment plant for use in mineral processing. The contribution of

Emission	Sources	Potential pathways	Proposed controls
			any seepage through the landfill trenches to the dewatering volumes will be negligible; and • Post mine closure, seepage through the waste rock landform hosting the landfill trenches will mix with groundwater and flow downgradient to the pit lake which will be a terminal groundwater sink.
Other infrastructure			
Tailings / water potentially containing elements of environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn).	Paste Fill Plant	Direct discharges	The following construction requirements are proposed: • Paste Plant Tailings Storage Tank positioned within concrete bunded area and fitted high level alarm; • Paste thickener and filtration area in bunded concrete area graded to a sump equipped with a pump to return tailings to the thickener. Filtration unit constructed in covered area; • Temporary filter cake storage in covered concrete bunker with front end loader access; • Binder storage silo on concrete foundation equipped with dosing system and pneumatic transfer for re-filling; and • Paste mixing feed conveyor is covered, equipped with belt scrapers and constructed over hardstand that facilitates mechanical clean-up and return to filter or paste mixing sumps. The following commissioning requirements are proposed: • Record volumes of tailings processed and volume of paste fill delivered to underground mine void; • Monitor volumes of filtercake spillage within paste plant compound and efficacy of solids recovery; • Visual monitoring of airborne dust levels during filling of Binder Silo; and • Inspection of paste delivery pipeline every shift during paste fill operations. Include the following time limited operations

Emission	Sources	Potential pathways	Proposed controls
			operational requirements: • Record volumes of tailings processed and volume of paste fill delivered to underground mine void; • Clean up/recovery of spilled filtercake as necessary to ensure no accumulations of process solids within paste fill plant compound; and • Inspection of paste delivery pipeline every shift during paste fill operations.
Hydrocarbons	Bulk Fuel Storage and Refuelling Facility	Direct discharges	• Plant site drainage directed to HDPE lined stormwater pond (Pond Site Runoff Pond) with capacity for 1 in 100 year, 72 hour event. Captured stormwater directed to water treatment plant; • Workshops and washdown bays to have concrete floors and sides (as appropriate) and runoff to be directed to oily water separators / clean water recovery systems; • Fuel storage tanks designed, constructed and tested according to AS 1940-2004; • Fuel storage tanks above ground, self bunded or within bunded area/secondarily contained to ensure any spills are contained; • Hydrocarbon storage to be bunded in accord with requirements of AS1940-2004; and • Concrete hardstand installed under proposed fuel storage and facilities where there is potential for hydrocarbon spills.
Contaminated wastewater	Workshops and wash down bays	Direct discharges	• Plant site drainage directed to HDPE lined stormwater pond (Pond Site Runoff Pond) with capacity for 1 in 100 year, 72 hour event. Captured stormwater directed to water treatment plant; • Workshops and washdown bays to have concrete floors and sides (as appropriate) and runoff to be directed to oily water separators / clean water recovery systems; • Fuel storage tanks designed, constructed and tested according to AS 1940-2004; • Fuel storage tanks above ground, self bunded or within bunded area/secondarily contained to ensure any

Emission	Sources	Potential pathways	Proposed controls
			spills are contained; • Hydrocarbon storage to be bunded in accord with requirements of AS1940-2004; and • Concrete hardstand installed under proposed fuel storage and facilities where there is potential for hydrocarbon spills.
Gaseous emissions	Power Stations (gas and diesel)	Airborne	• Maintenance according to schedule; • Mine design (minimise fuel cost and therefore emissions); and • Visual exhaust monitoring.
Leachate containing PAF	PAF Waste Rock Landform	Seepage / infiltration	• PAF is to be encapsulated in dedicated, managed cells within NAF rock in the WRL, within the catchment of the mine pit; • Altered groundwater captured by dewatering system (operations); and • Altered groundwater reports to pit lake (perpetual sink) post closure.

3.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 7 and Figure 3 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 *(Guideline: Environmental Siting* (DWER 2020)).

Table 7: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Town of Marble Bar	Approximately 57 km east of the Premises. RECEPTOR SCREENED OUT DUE TO DISTANCE FROM PREMISES
Environmental receptors	**Distance from prescribed activity**
Native vegetation, including Threatened and Priority flora (P4)	Threatened *Quoya zonalis* (T) and several priority (including *Ptilotus mollis* (P4)) species within and/or around Premises boundary. Riparian vegetation monitoring is proposed by the Applicant to assess impacts from groundwater abstraction.

Threatened and/or priority fauna	Marginal habitat within and adjacent to premises Considered in Part IV assessment.
Groundwater	Refer to Table 4.
Surface water	Major nonperennial waterbody - Shaw River ~10 km east of premises. RECEPTOR SCREENED OUT DUE TO DISTANCE FROM PREMISES
Land/soils	Beneath, and immediate proximity to the proposed activities.
Heritage Sites	Three sites, 100-300 m north and south of the Premises Boundary. One site on the eastern boundary of the TSF / tailings services corridor.
Acid sulfate soils	Present along margins of Shaw River 10 km east of premises RECEPTOR SCREENED OUT DUE TO DISTANCE FROM PREMISES

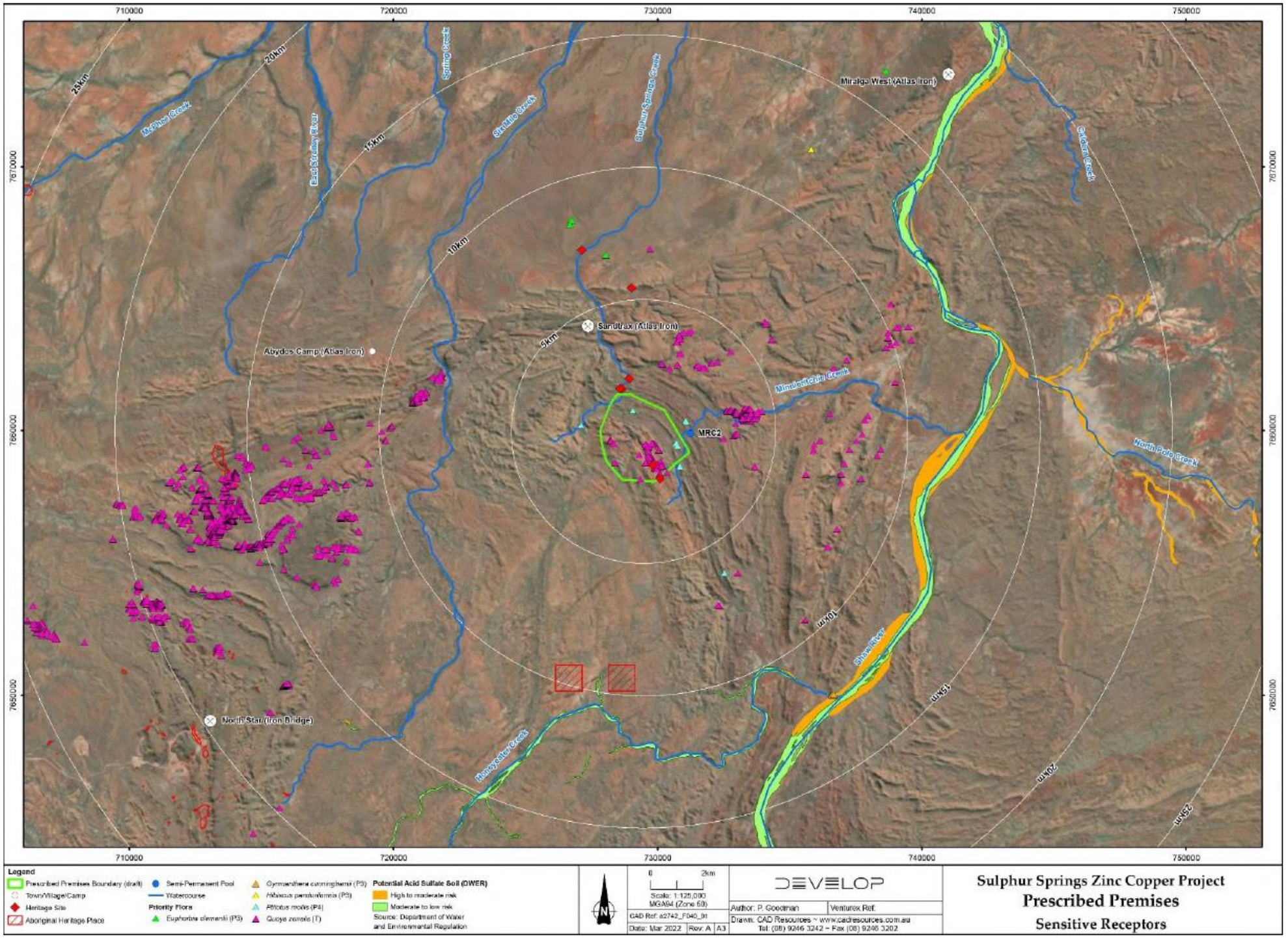

Figure 3: Sensitive receptors (20 km Radius)

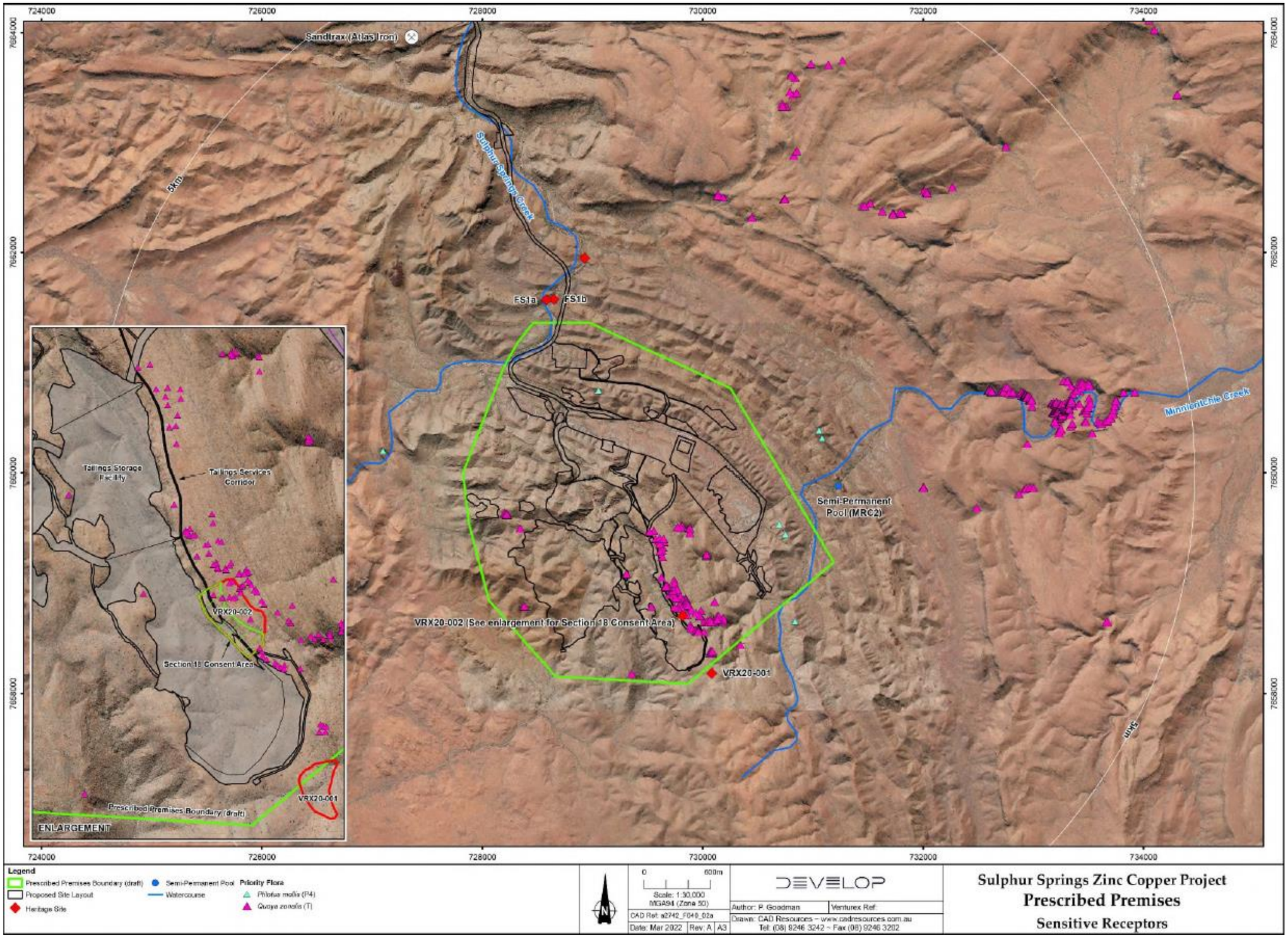

Figure 4: Sensitive receptors (5 km Radius)

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) 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 8.

Works approval W6665 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 8 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence 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. operation of the ore processing plant, TSF, Class II landfill, and WWTP. 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 8: 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 emissions**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Vehicle and machinery activity on disturbed ground and unsealed roads Unsealed roads Ground disturbing activities	Dust	Air/windborne deposition	Surrounding native vegetation, in particular *Quoya zonalis* <50m of source	Refer to Section 3.1	C = Minor L = Possible **Medium Risk**	Y	N/A	Dust impacts on flora and vegetation were assessed by the EPA under Part IV of the EP Act. MS 1134 condition for *Quoya zonalis* monitoring.
Vehicle, machinery, and diesel generator activity	Gaseous (diesel combustion)	Airborne	Native vegetation Air quality	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	N/A
Hydrocarbon spills	Hydrocarbons	Direct discharges	Land and soils Groundwater	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements Requirements for storage to meet Australian Standards Condition 11, Table 4 Environmental commissioning requirements Requirements for monthly inspections of storage and refuelling areas Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Reequipments for monthly inspections of storage and refuelling areas	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 emissions**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Stormwater potentially containing sediments	Sediment laden stormwater	Overland runoff/flow	Surface water	Refer to Section 3.1	C = Slight L = Possible **Low Risk**	Y	Condition 1, Table 1 Infrastructure Design and construction / installation requirements Requirements for plant site drainage to be directed to HDPE lined Plant Site Runoff Pond, bunding and sumps	N/A.
		Infiltration	Groundwater	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 1, Table 1 Infrastructure Design and construction / installation requirements Requirements for plant site drainage to be directed to HDPE lined Plant Site Runoff Pond, bunding and sumps	N/A
Commissioning, Time Limited Operation, and Operation								
Processing Plant								
Vehicle and machinery activity on disturbed ground and unsealed roads Unsealed roads Ore/waste mining & transfer Disturbed areas, stockpiles, and WRL. Ore crushing and screening circuit Concentrate storage and load out	Dust	Airborne / windborne	Native vegetation, in particular *Quoya zonalis* <50m of source	Refer to Section 3.1	C = Minor L = Possible **Medium Risk**	Y	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements Requirements for dust control on processing infrastructure Condition 11, Table 4 Environmental commissioning requirements Requirements for visual monitoring of dust levels Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Requirements for visual monitoring of dust levels	N/A
Earthmoving and vehicle fleet and stationary source	Gaseous (diesel combustion)	Airborne	Surrounding native vegetation Air quality	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	No conditions required.	N/A
ROM pad and Low Grade Stockpile	Leachate	Seepage / infiltration	Groundwater Land and soils	Refer to Section 3.1	C = Slight L = Possible **Low Risk**	Y	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements Requirements to have HDPE lining, bunding and sumps	N/A
Hydrocarbon spills	Hydrocarbons	Infiltration	Land and soils Groundwater	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements Requirements for storage to meet Australian Standards	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 emissions**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
							Condition 11, Table 4 Environmental commissioning requirements Requirements for monthly inspections of storage and refuelling areas Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Reequipments for monthly inspections of storage and refuelling areas	
Stormwater potentially containing reagent / product (within plant area only), sediments, hydrocarbons (machinery workshops and refueling areas)	Potentially contaminated stormwater	Overland runoff / flow	Surface water	Refer to Section 3.1	C = Slight L = Possible **Low Risk**	Y	Condition 1, Table 1 Infrastructure Design and construction / installation requirements Requirements for plant site drainage to be directed to HDPE lined Plant Site Runoff Pond, bunding and sumps	N/A
		Infiltration	Groundwater	Refer to Section 3.1	C = Slight L = Possible **Low Risk**	Y	Condition 1, Table 1 Infrastructure Design and construction / installation requirements Requirements for plant site drainage to be directed to HDPE lined Plant Site Runoff Pond, bunding and sumps	N/A
TSF								
Tailings / water pipelines (leaks or rupture)	Tailings / water potentially containing elements of environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn)	Unplanned direct discharge / overland flow	Surface water	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 1, Table 1 Infrastructure Design and construction / installation requirements Requirements for materials used, secondary containment and electronic control system. Condition 11, Table 4 Environmental commissioning requirements Requirements for daily inspections to check integrity. Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Requirements for daily inspections to check integrity.	N/A
		Unplanned direct discharge / infiltration	Groundwater Land and soils Native vegetation	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 2, Table 2 – CCI design and construction / installation requirements Requires overland pipelines with suitable construction materials, secondary containment and electronic control system.	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 emissions**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
		Seepage	Groundwater Land and soils	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	Condition 2, Table 2 – CCI design and construction / installation requirements Requires VWPs, underdrainage system, cut-off trenches, BGM Conditions 3 and 4, Table 3 Infrastructure requirements – groundwater monitoring wells Requires 12 new TSF groundwater monitoring wells Condition 11, Table 4 Environmental commissioning requirements Requirements for daily inspections of decant pond, TSF embankment condition and seepage detection, VWPs, recovery systems. Condition 14 and 15, Table 11 Monitoring of ambient concentrations during environmental commissioning and time limited operations Requires groundwater and surface water monitoring Condition 17 requires Environmental Commissioning Report and comparison of groundwater and surface water monitoring data to trigger values and actions taken. Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Requirements for minimizing decant pond, tailings spigot set up, daily inspections of decant pond, TSF embankment condition and seepage detection, VWPs, recovery systems. Condition 23 requires water balance. Condition 25, Table 11 Monitoring of ambient concentrations during environmental commissioning and time limited operations Requires groundwater and surface water monitoring Condition 28 TLO Report and comparison of groundwater and surface water monitoring data to trigger values and actions taken.	N/A
Authorised direct discharge to TSF (Cells 1 and 2)	Seepage water potentially containing elements of environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn)	Seepage ‘daylighting’ (surface expression)	Surface water	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y		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 emissions**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Surface of TSF (Cells 1 and 2)	Dry tailings (particulates) on exposed beaches potentially containing concentrations of elements with environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn)	Airborne / windblown / deposition	Native vegetation	Refer to Section 3.1	C = Minor L = Possible **Medium Risk**	Y	Condition 11, Table 4 Environmental commissioning requirements Requirements for daily inspections of dust generation Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Requirements for daily inspections of dust generation	Dust impacts on flora and vegetation were assessed by the EPA under Part IV of the EP Act. MS 1134 condition for Quoya zonalis monitoring.
TSF (Cells 1 and 2) embankment failure	Tailings / water potentially containing elements of environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn)	Overland flow / infiltration	Land and soils Groundwater	Refer to Section 3.1	N/A	N/A	Managed via DMIRS	Managed via DMIRS
TSF (Cells 1 and 2) overtopping due to insufficient freeboard capacity	Tailings / water potentially containing elements of environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn)	Uncontrolled release / overland flow / infiltration	Land and soils Groundwater Surface water Native vegetation	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 2, Table 2 – CCI design and construction / installation requirements Requirements for freeboard to be maintained. Condition 11, Table 4 Environmental commissioning requirements Requirements for freeboard to be maintained Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Recruitments for freeboard to be maintained.	N/A
WWTP								
WWTP tanks and treated effluent discharge to irrigation area	Raw sewage / partially treated sewage	Spills / leaks from tanks	Soils and vegetation	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	Condition 1, Table 1 Design and construction / installation requirements Requirements for level sensors, alarms and contingency tank. Condition 11, Table 4 Environmental commissioning requirements Requirements for daily inspections Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Requirements for daily inspections	N/A
		Pipeline spills / leaks	Soils and vegetation	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	Condition 1, Table 1 Design and construction / installation requirements Requirements for sensors and	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 emissions**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
							alarms Condition 11, Table 6 Environmental commissioning requirements Requirements for daily pipeline inspections Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Requirements for daily pipeline inspections	
	Treated effluent	Authorised direct discharge / infiltration, inundation of vegetation, weed growth	Soils, vegetation and groundwater (depth to groundwater in the vicinity of the irrigation area is 15 mbgl)	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements Requirements for design effluent quality, loading rates, size of irrigation area, fencing. Condition 11, Table 4 Environmental commissioning requirements Requirements for treated effluent to be recirculated until sampling shows target quality met, daily inspections of irrigation area Condition 13, Table 10 Emissions and discharges monitoring during environmental commissioning and time limited operations Requirements for weekly monitoring of treated effluent during commissioning period Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Requirements for daily inspections of irrigation area Condition 24, Table 10 Emissions and discharges monitoring during environmental commissioning and time limited operations Requirements for quarterly monitoring of treated effluent during time limited operations	N/A.
	Contaminated stormwater that has come in contact with the WWTP area and irrigation area	Direct discharge	Soils and vegetation	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements Requirements for hardstand proud of natural ground with earthen bund and diversion drain.	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 emissions**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Landfill								
Class II putrescible landfill	Leachate	Infiltration	Land and soils Groundwater	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements Requirements for infiltration of rainfall through the completed waste trenches to be minimised by capping the trench with compacted, slightly mounded fill	The landfill is proposed to be located within the footprint of the WRL. The WRL is to be managed in accordance with a Mining Proposal administered by DMIRS
	Windblown waste	Airborne / windblown / deposition	Uncovered waste blown by wind resulting in littering and potential attraction of fauna / livestock	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	Condition 1, Table 1 Design and construction / installation requirements Requirements for temporary mesh fencing to be deployed around the landfill facility to exclude fauna and contain windblown litter Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Requirements for temporary mesh fencing to be deployed around the landfill facility and regular waste covering	N/A
	Contaminated stormwater	Direct discharge	Soils, vegetation and surface water	Refer to Section 3.1	C = Minor L = Unlikely **Low Risk**	Y	Condition 1, Table 1 Design and construction / installation requirements Requirements for Waste rock bunds (windrows) to be constructed around the excavated trenches to contain incident rainfall and prevent any surface runoff entering the trenches	N/A
Other infrastructure								
Paste Fill Plant	Tailings / water potentially containing elements of environmental significance (As, Bi, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se & Zn)	Direct discharges	Land and soils Groundwater	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 1, Table 1 Design and construction / installation requirements Requirements for concrete bund areas, sump, conveyor covers with belt scrapers	N/A
Bulk Fuel Storage and Refuelling Facility	Hydrocarbons	Direct discharges	Land and soils Groundwater	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements Requirements for storage to meet Australian Standards Condition 11, Table 4 Environmental commissioning requirements Requirements for monthly inspections of storage and	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 emissions**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
							refuelling areas Condition 21, Table 6 Infrastructure and equipment requirements during time limited operations Reequipments for monthly inspections of storage and refuelling areas	
Workshops and wash down bays	Contaminated wastewater	Direct discharges	Land and soils Groundwater	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 1, Table 1 Design and construction / installation requirements Requirements for concrete floors and sides with runoff directed to oily water separators	N/A
Power Stations (gas and diesel)	Gaseous emissions	Airborne	Native vegetation Air quality	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	N/A
PAF Waste Rock Landform	Leachate containing PAF	Seepage / infiltration	Groundwater	Refer to Section 3.1	C = Slight L = Possible **Low Risk**	N/A	Condition 1, Table 1 - Infrastructure Design and construction / installation requirements	The PAF WRL to be managed in accordance with a Mining Proposal and Mine Closure Plan administered by DMIRS.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).

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

4. Consultation

Table 9 provides a summary of the consultation undertaken by the department.

Table 9: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 25 April 2022	No comments received	N/A
Local Government Authority (Shire of East Pilbara) advised of proposal on 22 April 2022	No comments received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 22 April 2022	DMIRS replied on 13 May 2022 Refer to Section 2.5	DWER emailed DMIRS 16 August 2022 and DMIRS confirmed that the issues were resolved and the Mining Proposal and Mine Closure Plan have been approved.
Applicant was provided with draft documents on 29 August 2022	Comments received 02 September 2022 Refer to Appendix 1	Comments received 02 September 2022 Refer to Appendix 1

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) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. Develop Global Limited, Sulphur Springs 18/03/2022, West Perth, Western Australia.
5. Develop Global Limited, RE: NOTIFICATION :APPLICATION FOR A WORKS APPROVAL (W6665/2022/1) - REQUEST FOR FURTHER INFORMATION 06/07/2022, West Perth, Western Australia.
6. Develop Global Limited, RE: NOTIFICATION: APPLICATION FOR A WORKS APPROVAL UNDER THE ENVIRONMENTAL PROTECTION ACT 1986 – DRAFT INSTRUMENT AND DECISION REPORT 02/09/2022, West Leederville, Western Australia x 2

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

Condition	Summary of applicant's comment	Department's response
Registered Business Address	Please change registered business address to: 234 Railway Parade West Leederville WA 6007 (effective from 23 August 2022)	Updated as requested.
Duration	To provide some flexibility for the project development timeline, please set the duration of the Works Approval to 4 years.	Updated as requested.
1, Table 1	Suggest re-format condition to read: The works approval holder must construct and/or install the infrastructure and/or equipment: (a) in accordance with the corresponding design and construction / installation requirements; (b) at the corresponding infrastructure location; and (c) within the corresponding timeframe, as set out in Table 1.	Standard condition.
	ROM Design and Construction / Installation requirements • Remove 'and' from second last dot point • Delete last dot point 'Groundwater recovery' (not relevant to ROM pad)	Updated as requested.
	Flotation (Copper and Zinc) • Correct minor typo in first dot point to 'flotation'	Updated as requested.
	Concentrate • Suggest insert words as per below **(in bold)** to improve clarity:	Updated as requested.

Condition	Summary of applicant's comment	Department's response
	The **wheel wash** facility to include a sump pump to discharge to either the copper thickener feed hopper, zinc thickener feed or the flotation feed conditioning tank.	
	Workshops, hydrocarbon/fuel storage and refuelling facilities • Suggest delete first dot point – 'Plant site drainage …..' since this requirement is duplicated under the Site Runoff Pond (where it is more appropriately listed). • Suggest delete 'proposed' from last dot point	Updated as requested.
	Paste Fill Plant • The following design and construction / installation requirements are proposed: ➢ Paste Plant Tailings Storage Tank positioned within concrete bunded area and fitted high level alarm; ➢ Paste thickener and filtration area in bunded concrete area graded to a sump equipped with a pump to return tailings to the thickener. Filtration unit constructed in covered area; ➢ Temporary filter cake storage in covered concrete bunker with front end loader access; ➢ Binder storage silo on concrete foundation equipped with dosing system and pneumatic transfer for re-filling; and ➢ Paste mixing feed conveyor is covered, equipped with belt scrapers and constructed over hardstand that facilitates mechanical clean-up and return to filter or paste mixing sumps.	Updated as requested.
	Process Water Pond • Map detailing the location of the Process Water Pond presented at Figure 1	Updated as requested.
	Raw Water Pond • Map detailing the location of the Raw Water Pond presented at Figure 1	Updated as requested.

Condition	Summary of applicant's comment	Department's response
	Site Runoff Pond • Map detailing the location of the Site Runoff Pond presented at Figure 1	Updated as requested.
	Mine Water Settling Ponds (to be added) • Suggest adding additional row to Table 1 to include: Mine Water Settling Pond(s) ➢ Capacity 4,000 m3 ➢ Minimum Design freeboard 0.5 m ➢ Lined with 1.5 mm HDPE ➢ Provision for two ponds, one built on initial plant construction and the second pond during operational phase if required.	Updated as requested.
	Sedimentation Pond • Map detailing the location of the Site Runoff Pond presented at Figure 1	Updated as requested.
	Wastewater Treatment Plant (WWTP) • Stormwater management controls to be listed under design and construction / installation requirements are (as per RFI response 6 July 2022): ➢ The WWTP to be installed on a constructed hardstand pad of approximately 0.09 ha mostly proud of the surrounding natural ground. ➢ An earthen bund and shallow diversion drain will be constructed at the interface with the natural surface on the upgradient edge of the pad to direct any sheet runoff from above the pad around the facility.	Updated as requested.
	Irrigation Sprayfield • Map detailing the location of the Site Runoff Pond presented at Figure 1, attached.	Updated as requested.

Condition	Summary of applicant's comment	Department's response
	• Stormwater management controls to be listed under design and construction / installation requirements are (as per RFI response 6 July 2022): ➢ An earthen bund and shallow drain will be excavated on the upgradient boundary of the sprayfield area, directing any runoff from upstream either around the sprayfield area, or to a minor ephemeral drainage line that traverses the sprayfield area. ➢ A 10 metre buffer over a minor ephemeral drainage line will be quarantined from the irrigation area through the design of the sprinkler configuration.	
	Tailings delivery and water pipelines Suggest amend second dot point to read: • Secondary containment such as an earthen bund where practicable and catchment sumps at low elevation points to provide containment capacity and recover material from pipeline leaks or ruptures; and Amendment is suggested to (i) reflect steep topography and outcropping rock (renders earthen bunds impracticable and ineffective in sections of pipeline alignment); and (ii) align with controls listed under the Mining Proposal.	Updated as requested.
2, Table 2	Critical Containment Infrastructure Suggest re-format condition to read: The works approval holder must construct the critical containment infrastructure: (a) in accordance with the corresponding design and construction / installation requirements; (b) at the corresponding infrastructure location; and (c) within the corresponding timeframe, as set out in Table 2.	Standard condition.
	Tailings Storage Facility (TSF) Cells 1 and 2) • Insert 'predominantly' under third dot point:	Updated as requested.

Condition	Summary of applicant's comment	Department's response
	• TSF Cells 1 and 2 to have approximately equal storage capacity: ➢ Cell 1 (north): 2.2 Mm3 / 4.4 Mt (tailings predominantly from underground operations); and ➢ Cell 2 (south): 2.2 Mm3 / 4.4 Mt (tailings predominantly from open pit operations); • Insert words under fourth dot point as highlighted in bold below: • Staged construction (lifts) of three embankments as specified on Figure 4, Figure 5, and Figure 6: ➢ Main embankment (initial site construction); ➢ Mid-valley embankment (dividing wall) (initial site construction); and ➢ Southern embankment (nominally year 4 of operations, prior to commissioning Cell 2); • Two corrections to fifth dot point: • Sub-areal deposition via tailings spigot points at 24 m to 40 m intervals along the northern main embankment (Cell 1) and southern embankment (Cell 2), as shown on Figure 7 and Figure 8; • Insert words for clarification on timing under 7th dot point as highlighted in bold below: • Construction of four minor, secondary saddle dams late in the operational life of each cell along the eastern and western perimeter of the cells as specified in Figure 5; • Insert words for clarification under 12th (final) dot point as highlighted in bold below: • A bituminous geomembrane (BGM) liner to be installed on the upstream batter of the main and southern TSF embankments and both faces of the middle (dividing) embankment as specified in Figure 6. • Under the Timeframe column change, (i) the reference to 'Environmental Compliance Report' to 'Critical Containment Infrastructure Report'; and (ii) the reference to 'condition 5' to 'condition 7'	

Condition	Summary of applicant's comment	Department's response
	(condition 7 requires a Critical Containment Infrastructure Report as is relevant to the TSF).	
	Stormwater capacity (containment) • For clarification, suggest add 'TSF' to the Infrastructure descriptor such that it reads: TSF stormwater capacity (containment) • Under the Timeframe column, change (i) the reference to 'Environmental Compliance Report' to 'Critical Containment Infrastructure Report'; and (ii) the reference to 'condition 5' to 'condition 7' (condition 7 requires a Critical Containment Infrastructure Report as is relevant to the TSF).	Updated as requested.
	Spillway capacity (operation and closure) • For clarification, suggest add 'TSF' to the Infrastructure descriptor such that it reads: TSF spillway capacity (operation and closure)	Updated as requested.
3, Table 3	• Amend '12' to '5' such that Condition 3 reads: The works approval holder must design, construct, and install 5 new groundwater monitoring wells in accordance with the requirements specified in Table 3. (Bores TSF1, TSF2, TSF3, TSF4, TSF5 & TSF6 were constructed in June – August 2021). Two other bores, TSF7 & TSF8, were also installed in this period. Bore NEP1 was originally recommended to monitor seepage from a proposed North Pond (water storage). North Pond was removed from the project design and will not be constructed)	Updated as requested.
	Infrastructure requirements – groundwater monitoring wells	Updated as requested.
	• Remove bores TSF1, TSF2, TSF3, TSF4, TSF5 & TSF6 from Infrastructure column (bores are constructed). • Delete Bore NEP1 from Infrastructure column (Bore NEP1 was recommended to monitor seepage from a proposed North Pond (water	

Condition	Summary of applicant's comment	Department's response
	storage). North Pond was removed from the project design and will not be constructed). • Replace bore name GDE01MB in infrastructure column with SWB70 (proposed bore has been renamed to better fit purpose and site naming conventions)	
	Monitoring Well Locations • Map detailing the location of all water monitoring locations, including groundwater monitoring wells (existing and to be constructed), is presented at Figure 2. (replaces Figure 10 of draft Works Approval) • Suggest replacing Figure 11 of the draft Works Approval with Figure 4 attached. (Figure 4 includes the TSF seepage monitoring locations not shown in the existing Figure 11).	Updated as requested.
5	• Delete reference to condition 2 such that Condition 5 reads: The works approval holder must within 60 calendar days of an item of infrastructure or equipment required by condition 1 being constructed and/or installed: (a) undertake an audit of their compliance with the requirements of condition 1; and (b) prepare and submit to the CEO an Environmental Compliance Report on that compliance. (condition 2 refers to Critical Containment Infrastructure which is addressed in condition 7 & 8)	Updated as requested.
11, Table 4	TSF • Amend 3rd dot point to read: Sub-areal deposition via tailings spigot points at 24 m to 40 m intervals along the northern main embankment (Cell 1) and southern embankment (Cell 2), as shown on Figure 7 and Figure 8;	Updated as requested.
	Paste Fill Plant • The following commissioning requirements are proposed: ➢ Record volumes of tailings processed and volume of paste fill	Updated as requested.

Condition	Summary of applicant's comment	Department's response
	delivered to underground mine void. ➢ Monitor volumes of filtercake spillage within paste plant compound and efficacy of solids recovery. ➢ Visual monitoring of airborne dust levels during filling of Binder Silo. ➢ Inspection of paste delivery pipeline every shift during paste fill operations. (Commissioning the Paste Fill Plant will occur approximately 12 months after processing plant commissioning.) • Suggest the authorised commissioning duration for the Paste Fill Plant be: For a period not exceeding 6 months	
	Authorised discharges and discharge locations • Suggest removal of 2nd row from Table 5: Decant Water to Process Water Pond at the Processing Plant. (Decant water is not a waste, and return of decant water to the processing plant does not constitute an emission or discharge to land, air or water). • Discharge point locations at the TSF and Sprayfield Irrigation Area are detailed in Figure 3 attached.	Updated as requested.
21, Table 6	Process Water Pond • Map of process water ponds presented at Figure 1	Updated as requested.
	TSF • Amend 3rd dot point to read: ➢ Sub-areal deposition via tailings spigot points at 24 m to 40 m intervals along the northern main embankment (Cell 1) and southern embankment (Cell 2), as shown on Figure 7 and Figure 8;	Updated as requested.
	Paste Fill Plant	Updated as requested.

Condition	Summary of applicant's comment	Department's response
	• Include the following time limited operations operational requirements: ➢ Record volumes of tailings processed and volume of paste fill delivered to underground mine void. ➢ Clean up/recovery of spilled filtercake as necessary to ensure no accumulations of process solids within paste fill plant compound. ➢ Inspection of paste delivery pipeline every shift during paste fill operations.	
	WWTP irrigation spray field • Location of sprayfield and irrigation area detailed in Figure 1 attached	Updated as requested.
22, Table 7	Authorised Discharge Points • Suggest removal of 2nd row from Table 5: Decant Water to Process Water Pond at the Processing Plant. (Decant water is not a waste, and return of decant water to the processing plant does not constitute an emission or discharge to land, air or water). • Location of discharge points detailed in Figure 3 attached.	Updated as requested.
28	• Correct minor typo in sub condition (c) (ii) – 'zince'	Updated as requested.
Definitions, Table 8	Term 'm' - amend 'meters' to metres	Updated as requested.
Schedule 3 Table 11	Monitoring during environmental commissioning and time limited operations – Suggest replace 'çoncentrations' in table title with 'çonditions' • Add bores TSF7 and TSF8 to the list of existing TSF bores in the Monitoring Location column. • Delete Bore NEP1 from the Monitoring Location column (no longer relevant - bore is not constructed and was proposed to monitor seepage from the North Pond (water storage). The North Pond is no longer part of the project design). • Change Bore GDE01MB to SWB70 (proposed bore has been renamed to fit site naming conventions)	Updated as requested.

Condition	Summary of applicant's comment	Department's response
	• Amend frequency of monitoring at groundwater sites from monthly to the schedule as indicated below: ➢ All groundwater monitoring locations: monthly – SWL ➢ TSF bores (TSF 1-8) and Processing Plant (Kim Bore, PPS1, SSWB03): quarterly – all parameters (except SWL). ➢ Mine (SSWB 66-69); unknown, CF1-3); Regional (SSWB18, 21, 22, 23, 25): annually – all parameters (except SWL) (i.e. at least once during commissioning and time limited operations periods) (adjusted monitoring frequencies align better with existing baseline monitoring and expected groundwater response times to any effects of processing plant and TSF commissioning and operations)	

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY					
Application type					
Works approval	☒				
Licence	☐	Relevant works approval number:		None	☐
		Has the works approval been complied with?		Yes ☐ No ☐	
		Has time limited operations under the works approval demonstrated acceptable operations?		Yes ☐ No ☐ N/A ☐	
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?		Yes ☐ No ☐	
		Date Report received:			
Renewal	☐	Current licence number:			
Amendment to works approval	☐	Current works approval number:			
Amendment to licence	☐	Current licence number:			
		Relevant works approval number:		N/A	☐
Registration	☐	Current works approval number:		None	☐
Date application received		18 March 2022			
Applicant and Premises details					
Applicant name/s (full legal name/s)		Venturex Sulphur Springs Pty Ltd			
Premises name		Suphur Springs Zinc Copper Project			
Premises location		M45/494, M45/653, M45/1001			
Local Government Authority		Shire of East Pilbara			
Application documents					
HPCM file reference number:		DWERDT579009, A2090542			

Key application documents (additional to application form):		Supporting document containing the following additional attachments:
		• Environmental Commissioning Plan
		• TSF Design Report, includes:
		  ○ Tailings Storage Data Sheets
		  ○ Geotechnical Investigation Report
		  ○ Drawings
		  ○ Scope of Works and Technical Specification Document
		  ○ Seepage Analyses
		  ○ Stability Analyses
		  ○ Deformation Estimate
		  ○ Water Balance Analyses			

	○ Dam Break Assessment ○ Operations Manual • Tailings Geochemistry Review • Project Tails Physical Test • Waste Rock Geochemistry • TSF Groundwater Investigation Factual Report • Water Management Plan • Groundwater Licence • Water Balance • Surface Water Assessment • Groundwater Assessment.
Scope of application/assessment	
Summary of proposed activities or changes to existing operations.	Construction of: • **Ore Processing Plant** (Category 5). Designed to process up to 1.5 Mtpa of ROM ore to produce separate copper and zinc concentrates and up to 1.4 Mtpa dry barren tailings stream. Plant includes jaw crusher, SAG mill and ball mill, conditioning tanks, floatation cells, concentrate thickeners, and concentrate storage shed. • **TSF** (Category 5). 'Valley fill' TSF - Staged build of two cells of approximately equal storage volumes to provide a tailings storage capacity of 8.8 Mt: ○ Cell 1 (northern cell): 2.2 Mm^3 (4.4Mt) - Underground Operations ○ Cell 2 (southern cell): 2.2 Mm^3 (4.4Mt) - Open Pit Operations Waste management (ore processing) also includes tailings thickener, tailings and water pipelines, and Paste Fill Plant. • **Class II landfill** (Category 64). Located within the footprint of the WRL. The facility will comprise a series of trenches (~30 m x 10 m x 4 m deep). The estimated maximum quantity of waste to be disposed is 700 tpa. • **WWTP** (Category 85). Maximum design capacity of 75 m^3/day (300 persons @ 250L/day), with treated water being irrigated over 2.5 ha. • **Other support infrastructure -** Process water treatment plant, water storage pond (south pond), raw water pond, process water pond, plant area runoff pond, ROM Ore Pad and ore stockpile, Bulk Fuel Storage and refuelling area, reagent storage, Vehicle Workshop and washdown bay (Oily water separator), Gas fired power station (max 10 MW), and Core Shed.

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: Processing or beneficiation of metallic or non-metallic ore: premises on which — (a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; or (b) tailings from metallic or non-metallic ore are reprocessed; or (c) tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	1,500,000 tpa.	N/A
Category 64: Class II or III putrescible landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	700 tpa.	N/A
Category 85: Sewage facility: premises: a) on which sewage is treated (excluding septic tanks); or b) from which treated sewage is discharged onto land or into waters.	75 m^3/day.	N/A

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 ☒ No ☐	Referral decision No: CMS 16058 Managed under Part V ☐ Assessed under Part IV ☒
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☒ No ☐	Ministerial statement No: MS 1134 EPA Report No: 1671
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☐ No ☒	Reference No: N/A

Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Certificate of title ☐ N/A General lease ☐ Expiry: N/A Mining lease / tenement ☒ Expiry: • M45/494 – 21/10/2032 • M45/653 – 28/09/2037 • M45/1001 – 21/01/2029 Other evidence ☐ Expiry: N/A
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☐ N/A ☒	Approval: N/A Expiry date: N/A If N/A explain why? No planning approvals required under the Shire of East Pilbara Town Planning Scheme No 4 - Project managed under Mining Act and EP Act (Part IV and V) approvals.
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☐ No ☒	CPS No: N/A Up to 313.6 ha (within the 889.2 ha development envelope) of proposed clearing was assessed and approved under Part IV of the EP Act (MS 1134).
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☒	Application reference No: N/A Licence/permit No: N/A Licence not required.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☒ No ☐	Application reference No: 047195 - Section 17 RIWI Act permit application for diversion of watercourses (Form 3P). Licence/permit No: GWL 165207 allows for 940,000 kLpa; GWL 176408 allows for 1,198,368 kLpa (Atlas Iron, access by agreement).
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☐ No ☒	Name: N/A Type: N/A Has Regulatory Services (Water) been consulted? Yes ☐ No ☐ N/A ☒ Regional office: N/A

Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☐ No ☒	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes ☐ No ☐ N/A ☒

Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*)	Yes ☒ No ☐	• *Mining Act 1978* approvals:
		  ○ (Outstanding approvals - Mining Proposal and Mine Closure Plan expected approval July 2022).
		• Department of Health approvals:
		  ○ *Health (Miscellaneous Provisions) Act 1911*
		  ○ Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 (Shire of East Pilbara)
		• *Dangerous Goods Safety Act 2004*
		• *Mining Rehabilitation Fund Act 2012*
		• *Biodiversity Conservation Act 2016*
		• *Aboriginal Heritage Act 1972 / Aboriginal Cultural Heritage Act 2021* (Section 18 approval(s) (if required).

Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	N/A
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	N/A
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☐ No ☒	N/A Classification: N/A Date of classification: N/A