Application for Works Approval

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

Works Approval Number	W6707/2022/1
Applicant	Anax Metals Limited
ACN	106 304 787
File number	DER2022/000193
Premises	Whim Creek Copper Project Mining Leases M47/236, M47/237, M47/238, M47/443 North Coastal Highway WHIM CREEK WA 6718 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	17 November 2022
Decision	Works approval granted

Mariana Almeida de Moraes
Digitally signed by Mariana Almeida de Moraes
Date: 2022.11.17 08:10:29 +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 W6707/2022/1 has been granted.

2. 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 Application summary and overview of premises

On 29 April 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 copper processing at the premises. The premises is approximately 84 km east of Roebourne.

The premises is a brownfields site and is currently in Care and Maintenance. Information on the Environmental Protection Notice (EPN) issued for this site is shown in Section 3.

The Applicant proposes to further mine the Mons Cupri open pit and restart processing operations of copper bearing ore.

This works approval is for the following activities:

- Crushing, sorting and agglomeration of ore;
- Placing the agglomerated ore on the heap leach pad;
- Refurbishment of the existing crushing circuit, including agglomerator;
- Refurbishment of the existing Solvent Extraction and Electrowinning (SX-EW) circuit;
- Installation of ore sorters to produce a high-grade copper pre-concentrate;
- Construction of a new 120-room accommodation village and installation of an associated Wastewater Treatment Plant (WWTP);
- Construction of a landfill in the Whim Creek Waste Rock Landform (WRL);
- Infrastructure upgrades to the processing plant and refurbishment of support facilities; and
- Installation of a pipeline to deliver water from dewatering the Mons Cupri pit to the plant for use in processing.

Status of the infrastructure is shown in Table 1.

Table 1: Status of Infrastructure

Equipment	Status
ROM Pad	Existing
Jaw Crusher	Existing – To be refurbished

Equipment	Status
Secondary/Tertiary Cone Crusher	New
Grizzly Feeder	Existing – To be refurbished
Triple deck screen	Replaced with New
Dewatering Screens	New
Ore Sorters	New
In line pressure jigs	New
Agglomerator	Existing – To be refurbished
Bacterial Farm	New
Conveyors	Existing – To be refurbished
Raffinate Pipeline	Existing – To be refurbished
WWTP	New
Accommodation Village	New
Landfill	New
SX-EW Plant	Existing – To be refurbished
Acid Storage No.1	Decommissioned – to be demolished
Acid Storage No.2	Existing – To be refurbished
Workshop/Maintenance Area	Existing
Dewatering Pipeline	New
Water Containment	Existing Environmental Pond ungraded under EPN Pond 6 constructed under EPN
Process liquor ponds and “W” drain	Existing, ungraded under EPN
Heap leach pads	Existing

In general terms future refurbishment of assets onsite means the assets will be tested to confirm functionality and if the asset does not pass the testing requirements the assets will be removed and replaced with new like for like assets. Below is a general explanation for how the testing will occur:

- All concrete foundations (e.g. plinths) and floors will be tested/inspected for structural integrity. Bunded areas will ‘wet tested’ for permeability (i.e. fill with water and watch over time). Sections not meeting required standards for structural integrity will be replaced. Areas not meeting required containment integrity will be replaced or lined with appropriate coatings;
- All tanks onsite will be inspected and tested to confirm the integrity. Where tanks fail

testing, the tank will be changed out, new for old; and

- All pipelines and valves will be pressure tested to confirm the integrity. Where testing fails the infrastructure will be changed out, new for old.

The premises relates to the categories and assessed production / design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6707/2022/1. 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 W6707/2022/1.

2.2.1 Category 5

Ore from the Mons Cupri open cut mine will be hauled to the existing Run-Of-Mine (ROM) pad. Ore will be fed by a Front End Wheel Loader (FEL) to a ROM bin. Ore from the ROM bin will be fed to the Primary Crusher by a variable speed drive controlled Grizzly Vibrating Feeder. The crushed ore is conveyed to a triple deck classification screen.

The main change to the previously used category 5 processing infrastructure is the installation of a new smart ore sorting technology in the ore processing circuit to separate crushed ore into various process and produce streams using optical differentiation.

The stockpiled copper bearing ore is then trucked by FEL to the heap leach pads.

A process flowsheet is shown in Figure 1.

Dust controls for the Process Plant are shown in Figure 2.

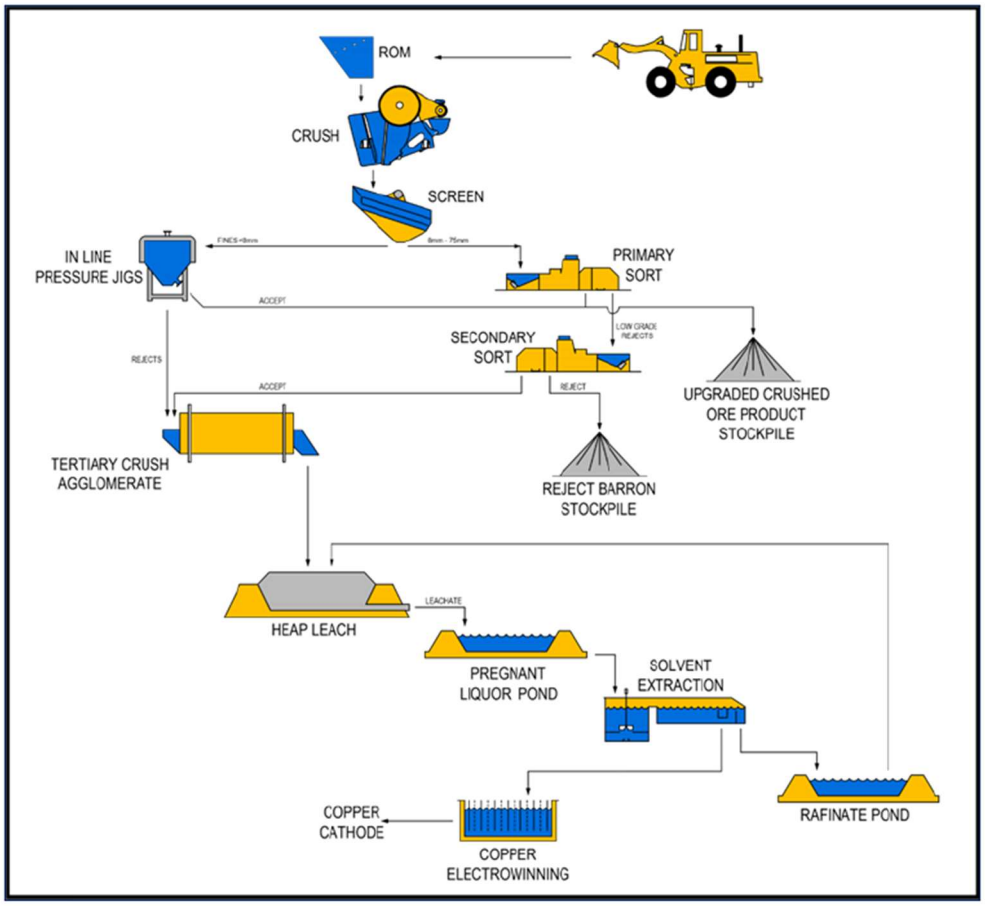

Figure 1: Process flowsheet including crushing, sorting, gravity circuit, heap leach, electrowinning and solvent extraction.

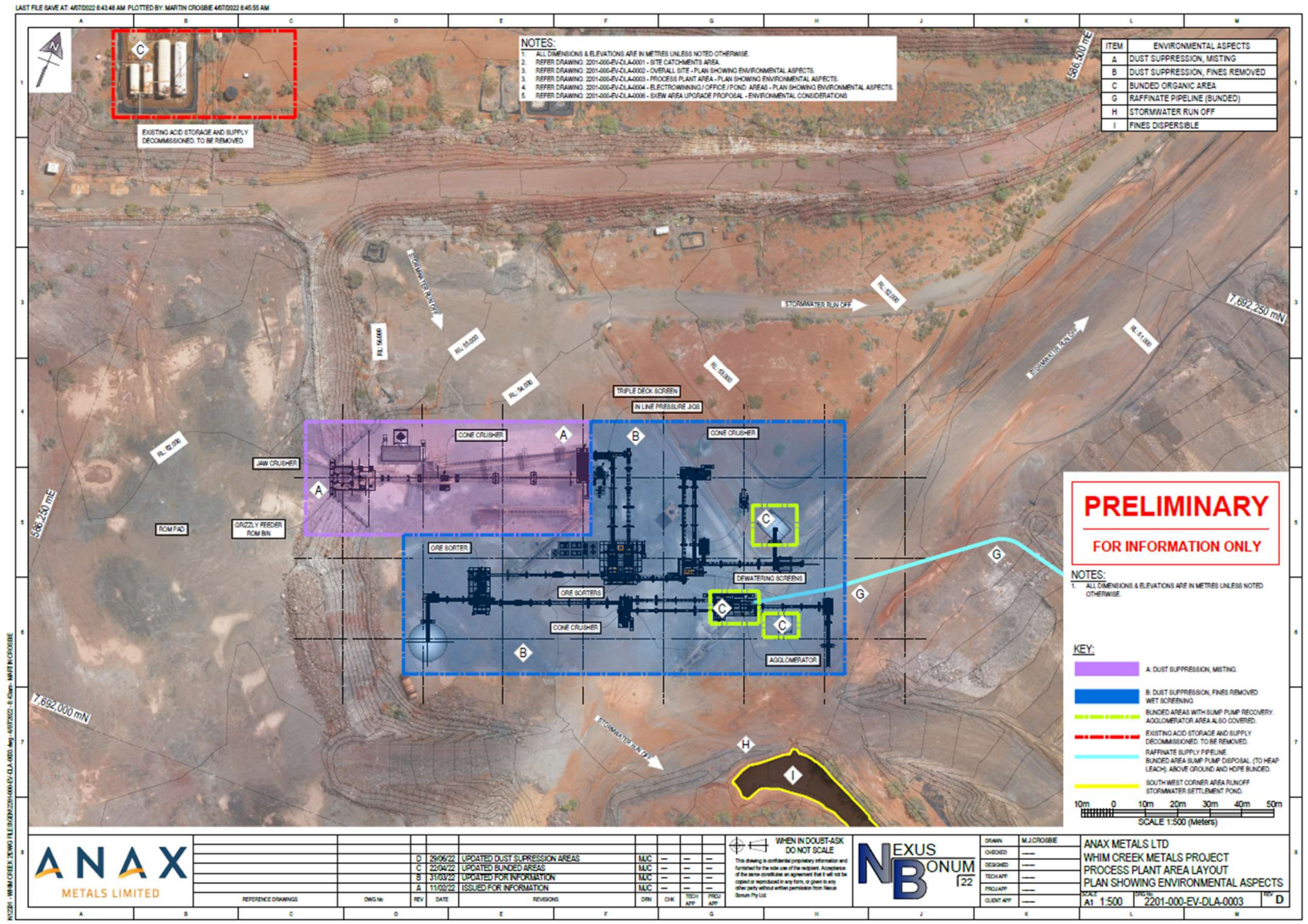

Figure 2: Process Plant Area Layout With Dust Controls

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2.2.2 Category 7

Heap Leach Pad

The Heap Leach Pad was constructed in 2005 consisting of a geotechnically prepared and compacted base overlain with High Density Polyethylene (HDPE). A sub-base, consisting of crushed low-grade ore and suitable waste stacked to a depth of up to 500 mm, was pushed out over the HDPE to protect the integrity of the liner, allowing for an ore stacker and traffic on the leach pad.

The main change to the previously used category 7 heap leaching infrastructure is the addition of a bacterial farm to assist in bioleaching of ore via the existing Heap Leach Facility. During operations the ore will be placed on the heap and copper is solubilised through irrigation with sulphuric acid and inoculated with bacteria to promote bioleaching. The solution percolates through the ore and is collected by the liner at the base of the pad. The slope of the liner directs solution into the HDPE-lined W-shaped drains which transfers the solution to the lined Process Ponds.

Process Ponds

The Process Ponds consist of five HDPE lined ponds of a turkeys nest design with a compacted sand base. As part of the refurbishment works, the HDPE liner beneath the W-Drains and Ponds 1-5 was tested for integrity. Damaged liner was repaired and re-tested to enable certification of liner integrity. This solution will be piped to the refurbished SW-EW Plant for processing.

Environmental Pond

The existing Environmental Pond was reconfigured into two ponds during 2021 as part of the EPN: Pond 6 and the Environmental Pond.

SX Plant

The process is configured into two process steps at the premises: extraction and stripping. During extraction, the pregnant leach solution is contacted in a mixer-settler with an organic phase composed of a chelating agent (extractant) in a high flash point kerosene diluent. Copper is selectively loaded onto the organic phase while the barren aqueous (raffinate) becomes enriched with acid. The loaded organic goes to the strip mixer settler and the raffinate is returned to the Heap Leach Pad.

In the stripping circuit the organic phase is depleted of copper by contacting the organic with aqueous spent electrolyte from the EW Plant. The high acid electrolyte strips copper from the organic phase and is transferred to the EW Plant for plating of copper cathode. The barren organic phase is recycled back to the extracted stages to be reloaded with copper ions.

EW Plant

The EW Plant involves the deposition of copper metal from a copper bearing solution by passage of an electric current. Filtered strong electrolyte from the SX Plant is pumped to the Electrolyte Circulation Tank and mixes with the spent electrolyte from the commercial cells to result in a stream of circulating electrolyte, which is pumped back to the commercial EW cells for plating of copper cathodes.

Refer to Figure 3 for a flowsheet of the process. Copper plates are trucked to Port Hedland Port for shipping.

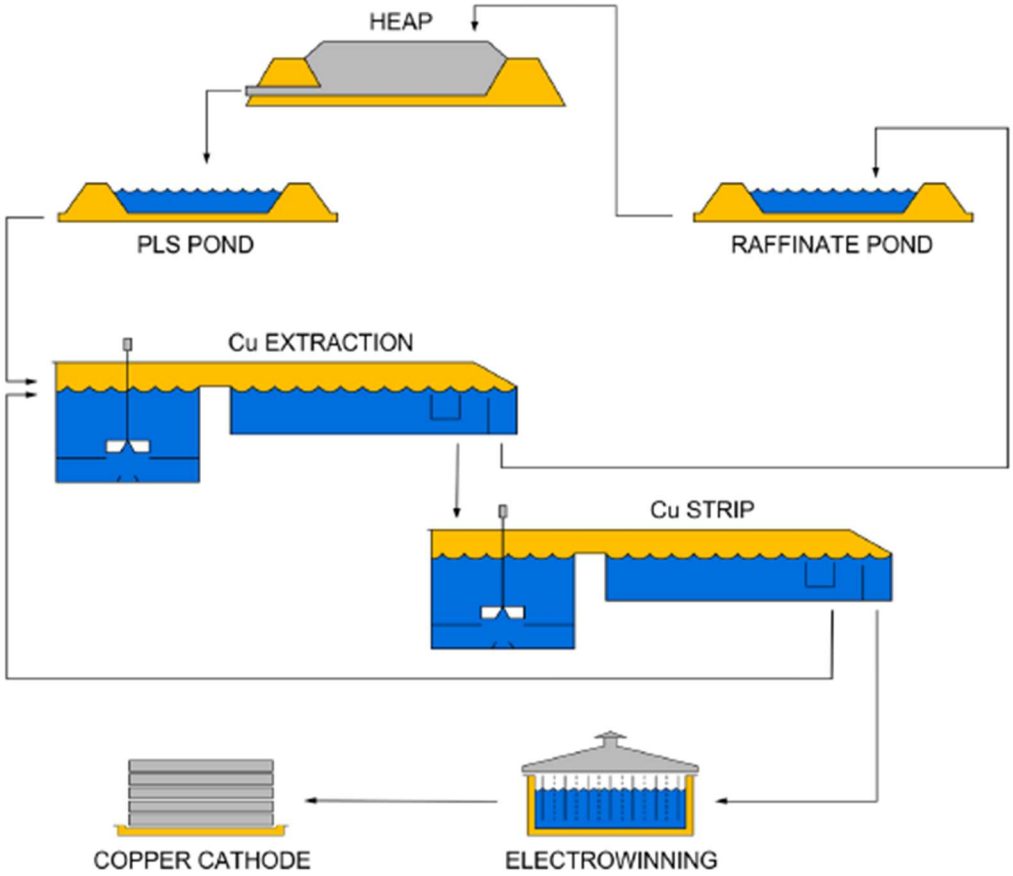

Figure 3: Heap Leach and Solvent Extraction Flowsheet

Acid Storage Tanks

Two Acid Storage Tanks will be installed / relocated as part of the refurbishment works, within the footprint of the redesigned SX-EW Plant.

Tanks sizes will consist of a combination of the following:

- 1 x 55KL; and
- 1 x 180KL.

2.2.3 Category 64 Putrescible Landfill

A new landfill facility will be established in the Whim Creek WRL. The landfill will consist of a series of trenches with one trench open at any one time. Each trench will be 30 m long, 10 m wide and 4 m deep. The Applicant will manage the landfill in accordance with the *Environmental Protection (Rural Landfill) Regulations 2002*.

Wastes disposed of will be up to 500 tonnes per annum of putrescible and non-recyclable inert wastes. Up to 100 used tyres per annum will also be disposed of if recycling or supplier return options are not available.

2.2.4 Category 85 WWTP

An Activated Sludge Bioreactor (ASBR) WWTP will be installed west of the new accommodation village, to process wastewater streams from the accommodation camp and officers. Existing offices onsite are equipped with septic tanks and leach drains. See Figure 4 for WWTP diagram.

The WWTP is designed to cater for up to 120 persons at 250 L per day per person, with a total

design capacity of 30 m^3/day. The treated effluent will be pumped to a 2 hectare, fenced irrigation area approximately 250 m from the accommodation camp.

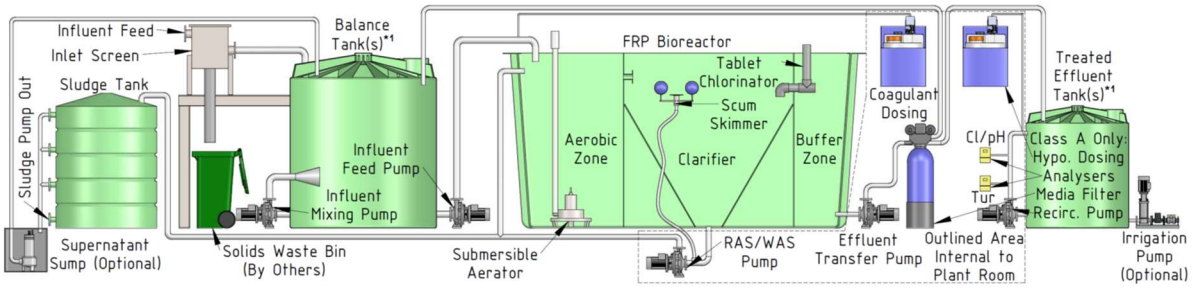

Figure 4: ASBR WWTP

Expected treated effluent from the WWTP is shown in Table 2.

Table 2: Treated water quality from the WWTP

Parameter	Measurement Unit	Effluent Quality
pH	pH units	6.5 – 8.5
Biological Oxygen Demand	mg/L	<20
Total Suspended Solids	mg/L	<30
Total Nitrogen	mg/L	<40
Total Phosphorus	mg/L	4 - 12
E.Coli	cfu/100mL	<1,000

The nitrogen and phosphorus loading rates to the irrigation area will not exceed the *Water Quality Protection Note 22: Irrigation with nutrient-rich wastewater* of 480 kg/ha/yr and 120 kg/ha/yr respectively.

3. Environmental Protection Notice

In April 2019, DWER issued an Environmental Protection Notice (EPN) Reference No: DWERDG804/19 as there was *"reason to suspect emissions of heavy metals and highly acidic process waters have caused or likely to cause pollution, being a direct alteration of the environment to its detriment".*

An EPN is a statutory notice under s.65 of the *Environmental Protection Act 1986* given where it is suspected that there is, or is likely to be, an emission that has caused, or is likely to cause, pollution or environmental harm (ongoing). The EPN may require the persons served (being the owner or occupier or both) to take necessary measures in a specific time period to investigate, prevent and control the emissions from the premises.

The EPN required the following management plans be implemented:

- Heap Leach Facility Management Plan;
- Permeability Management Plan;
- Stormwater Management Plan;
- Groundwater Monitoring Plan; and
- Vegetation Monitoring Plan.

Several actions were identified in the management plans which resulted in major infrastructure upgrades at the premises including, but not limited to:

- Completion of integrity surveys and repairs of the existing HDPE liner at the Solution Storage Ponds 1-5 and the W-Drain between the ponds and the heap leach pad;
- Construction of a new HDPE Process Water Pond (Pond 6) within the footprint of the existing Environmental Pond;
- Remediation of the compacted clay liner of the existing Environmental Pond to ensure a low permeability liner with a hydraulic conductivity of less than $1x10^{-9}$ m/s; and
- Alteration of stormwater bunding to divert clean runoff around the Environmental Pond, thereby providing greater storage for stormwater from the processing footprint.

The Heap Leach Facility Management Plan, Permeability Management Plan and Stormwater Management Plan were endorsed by DWER and improvement actions conducted.

Monitoring required by the Groundwater Monitoring Plan and Vegetation Monitoring Plan are expected to continue following the revocation of the EPN.

4. Hydrogeologist Assessment

- As the direction of groundwater flow beneath the site is indicated as being to the north and north-west, it is recommended that additional groundwater bores be considered for location to the north-west of any future operational areas with the potential to impact on groundwater quality;
- It is noted that the guideline exceedances had included vanadium surface water samples. However vanadium has not been included in the GMP analytical suite;
- The distribution of the proposed monitoring bores looks to be sound as is the proposed analytical suite. However, it is recommended that total acidity (using a field test kit) is included in the suite of field parameters measured in monitoring bores, as this is a useful proxy for elevated metal and sulfate concentrations in groundwater that are associated with mine-water contamination;
- There is still a significant information gap about whether hyporheic fauna/stygofauna will be a significant issue in Balla Balla Creek. It is suggested that the proponent commissions a survey of hyporheic fauna in saturated Balla Balla creek sediments upstream of the mine site and in the likely groundwater discharge area from the mine site. This would indicate the level of species richness in the area and the impacts that mine discharge is having on species richness. This would also identify key organisms that could be used in toxicity testing to develop site-specific water quality criteria for key toxicants;
- In the absence of a significant hyporheic fauna, there is also a risk that riparian vegetation (presumably E camaldulensis and Melaleuca species) could be affected by contaminated groundwater from the mine site. The toxicant of principal concern to this vegetation community would be magnesium sulfate. The impacts of mine-derived magnesium sulfate on riparian vegetation could be useful for setting site-specific water quality criteria for protecting riparian vegetation at the Whim Creek mine site;
- Although the ANZ guidelines allow for site-specific water quality criteria to be developed using a statistical approach, it is preferred that these are developed using toxicity testing on key organisms from sites; and
- The proposed reduced sampling frequency in the Phase 3 GMP from quarterly to annual (June) for both a number of analytes and a subset of monitoring bores are noted. Completion of data analysis, such as by Mann-Kendall analsyis, and review of

investigations by the auditor is recommended to be undertaken prior to reduction of the sampling frequency.

5. 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.

5.1 Source-pathways and receptors

5.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction / operation which have been considered in this decision report are detailed in Table 3 below. Table 3 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 3: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Vehicle and machinery activity on disturbed ground and unsealed roads Wind-driven dust lift off from disturbed areas and stockpiles	Air / windborne pathway	• Dust suppression using dedicated water carts.
Noise	Vehicle and machinery activity	Air / windborne pathway	• Standard noise suppression on machinery and applied to itemized plant where warranted to meet occupational noise standards.
Hydrocarbons / chemicals	Use of these during the construction phase	Direct discharge	• Hydrocarbon storage bunded in accord with requirements of Australian Standards AS1940; • Regular inspections of operational areas / storage facilities; • Bunded bulk fuel storage; • Above ground tanks and pipework; • Designated refueling bays / designated hydrocarbon and chemical storage areas / designated vehicle and equipment service areas; • Bunded storage; • Spill response training and adequate spill

Emission	Sources	Potential pathways	Proposed controls
			control materials available; and • Spill / incident reporting system.
Operation			
Category 5 Infrastructure			
Dust	Vehicle and machinery activity on disturbed ground and unsealed roads	Air / windborne pathway	• Water carts will be deployed for dust suppression at the ROM in times of high dust potential; • Dust suppression elsewhere using dedicated water carts; • Application of speed limits; and • Ground disturbance planning to minimise areas 'open' (progressive clearing).
	Ore crushing and screening circuit Concentrate storage and load out	Air / windborne pathway	• See Figure 2; • A sprinkler dust suppression system will be installed to prevent dust emissions during crushing; • Water sprays on the primary crusher discharge chute; • Jaw Crusher / Grizzly Feeder crusher equipped with automatic misting dust suppression; • Dust suppression activates as the material is being loaded into the crusher and mists the ore to prevent dust generation; • Secondary / Tertiary Cone Crusher covered; • Crushed ore from the Triple Deck Screen, Dewatering Screens, Ore Sorters is wet screened and fines within the ore removed. The ore discharging from the screens will have a moisture content of approximately 5-10% reducing the potential for dust generation downstream of the screens and through the sorting plant; and • In Line Pressure Jigs, Agglomerator, Conveyors - fines from the ore are slurried with water and revered using in line pressure jigs. Fines are discharged and dispatched as a moist cake reducing the potential for dust generation.
Noise	Vehicle, machinery and plant operations	Air / windborne pathway	• Standard noise suppression on machinery and warranted to meet occupational noise standards.
Contaminated	ROM and other	Direct	• A sediment sump exists at the eastern

Emission	Sources	Potential pathways	Proposed controls
Stormwater	processing infrastructure runoff	discharges	downstream end of the crushing plant area, to capture stormwater runoff from the crushing facility and reduce sediment loads in runoff from the crushing plant area. The sump has a capacity of 1,000 m^3. The sump will be equipped with an extraction pump and captured water will be added to the processing circuit; • 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; • Workshops and washdown bays to have concrete floors and sides (as appropriate) and runoff to be directed to oil water separators / clean water recovery systems; • Hydrocarbon storage to be bunded in accord with requirements of Australian Standards AS1940; and • Spill control measures in strategic positions with appropriate equipment available to contain and collect/recover hydrocarbon spills. Personnel trained in use of spill kits. ROM: • All stormwater runoff reports to a sump equipped with a submersible pump. Water from the sump is added to the process water circuit. Agglomerater: • A roof will be constructed over the agglomerator bund to ensure no stormwater is captured in the bund Machinery workshops and refueling areas: • Workshops and washdown bays to have concrete floors and sides (as appropriate) and runoff to be directed to oil water separators.
Hydrocarbons and chemicals	Leaks and spills	Direct discharge	• Hydrocarbon storage bunded in accord with requirements of Australian Standards AS1940; • Regular inspections of operational areas / storage facilities; • Bunded bulk fuel storage; • Above ground tanks and pipework; • Designated refueling bays / designated hydrocarbon and chemical storage areas /

Emission	Sources	Potential pathways	Proposed controls
			designated vehicle and equipment service areas; • Bunded storage; • Spill response training and adequate spill control materials available; and • Spill / incident reporting system. Agglomerator: • Once installed, will be sealed and contained within a concrete bund equipped with a pump to extract any potential raffinate solution spills; and • In the event of a raffinate spill, solution is contained within the bunded area and returned to the raffinate pipeline.
Category 7 Heap Leaching			
Copper rich solution	Leachate through heap leach pads lining		• Existing Heap Leach Pads to be used that have geotechnically prepared and compacted base overlaid with HDPE liner; • Groundwater Monitoring Plan; and • Vegetation Monitoring Plan.
	Pipeline leaks / spills	Direct discharges	• All pipelines carrying solution, raffinate etc. will have telemetry installed to detect leaks in the event of a spill; • All buildings, piping, valves and pumps will be designed and installed as per AS 3780-2008 and AS 4041-2006; • Groundwater Monitoring Plan; and • Vegetation Monitoring Plan.
	Overtopping of ponds	Direct discharges	• Rainfall will be retained within the lined Ponds 1-5 for events up to 1 in 5-year 72-hour rainfall event. Under greater, less frequent rainfall events local runoff will overflow from Pond 5 into Pond 6; • Pond 6 has sufficient capacity to retain runoff from the plant area for rainfall events up to a 72 hour, 1:20 year ARI event (note entire site is constructed to account for a 1:100 ARI event); • In rainfall events that exceed the 72 hour, 1:20 year ARI, the Environmental Pond will receive process water that overflows from Pond 6 (note entire site is constructed to account for a 1:100 ARI event); • Ponds designed with spillways to transfer

Emission	Sources	Potential pathways	Proposed controls
			water in ascending order; • Minimum design freeboard for Pond 6 and Environmental Pond of 0.5 m; • Clean runoff external to the infrastructure areas is directed around the Environmental Pond; • The Environmental Pond has been designed and constructed with an outlet spillway along the northern eastern wall. The spillway is approximately 35 m long, formed by lowering the embankment approximately 300 mm along this length. The spillway is designed for events larger than the design 72 hour, 1:100 year ARI event; • HDPE pipeline diversion system will be installed to redirect excess water, from high rainfall events, from the W-Drains directly to Pond 6, bypassing Ponds 1 - 5. This diversion will minimise the potential for concentrated solutions contained within Ponds 1 - 5 to wash into Pond 6 and potentially, subject to the amount of rainfall, then into the clay lined Environmental Pond; • Groundwater Monitoring Plan; and • Vegetation Monitoring Plan.
	Leachate through base and embankments of W-Drains and ponds	Seepage	• HDPE lined; • The use of bore SWP2 as a contaminant recovery bore to help mitigate the risk of the plume migrating; • Groundwater Monitoring Plan; and • Vegetation Monitoring Plan.
	Process solution leaks / spills at the SX-EW Plant	Direct discharges	• All concrete floors and foundations (e.g. plinths) will be tested/inspected for structural integrity. Bunded areas will be wet tested for permeability (i.e. fill with water and watch over time). Sections not meeting required standards for structural integrity will be replaced. Areas not meeting required containment integrity will be replaced or lined with appropriate coatings; • All tanks onsite will be inspected and tested to confirm the integrity. Where tanks fail testing, the tank will be changed out, new for old; • All pipelines and valves will be pressure tested to confirm the integrity. Where

Emission	Sources	Potential pathways	Proposed controls
			testing fails the infrastructure will be changed out, new for old; • Constructed to comply with AS 3780-2008; • Contained within bunded area; and • Spillages and stormwater that occur within this bund are captured in a sump and pumped to Pond 3 Raffinate Pond.
	Overspray from the SX-EW Plant	Air / windborne pathway	• The reticulation of process liquors around the SX/EW plant does not involve high pressure or airborne sprays; • Care is taken in periodic manual washing down the wet areas within the bunds with process water to direct runoff to the sump for return to the process circuit; and • There is potential for misting to occur at the EW Tanks due to chemical reactions associated with the electrowinning process. Small plastic balls (BB pellets) are added to the tanks to disturb the surface tension and prevent misting.
Contaminated surface water runoff	Rainfall surface water runoff at heap leach facilities	Direct discharges mixed with rainwater	• HDPE pipeline diversion system will be installed to redirect excess water, from high rainfall events, from the W-Drains directly to Pond 6
Sulphuric Acid	Pipeline leaks / spills	Direct discharges	• All pipelines and valves will be pressure tested to confirm the integrity. Where testing fails the infrastructure will be changed out, new for old; • Pipelines contained within HDPE lined bund or concrete bund; • Pipelines equipped with telemetry systems and pressure sensors along pipelines to allow detection of leaks / spills; • Pipelines, valves and pumps designed and installed as per Australian Standards AS 3780-2008 and AS 4041-2006; and • Acid delivery transfer will occur at the Acid Delivery Area. This area is constructed to allow spills to naturally report to a sump which is equipped with an extraction pump. Spills/solution are extracted from this sump via a pump and pumped to the ILS Pond (Pond 3); • Where acid is transferred via pipelines, the pipelines will be contained within HDPE lined bund or a concrete bund to ensure that in the event of a pipeline failure any spilled solution will be captured with the

Emission	Sources	Potential pathways	Proposed controls
			HDPE lined area or concrete bund; • All acid pipelines will be equipped with telemetry systems and pressure sensors to allow detection of leaks and failures; and • All piping, valves and pumps are designed and will be installed as per Australian Standards 3780:2008 and AS 4041:2006.
	Spills / leaks in the vicinity of the Sulphuric Acid tanks	Direct discharges	• The Acid Storage Tanks will be contained within a new concrete bund; • All concrete floors and foundations (e.g. plinths) will be tested/inspected for structural integrity. Bunded areas will be wet tested for permeability (i.e. fill with water and watch over time). Sections not meeting required standards for structural integrity will be replaced. Areas not meeting required containment integrity will be replaced or lined with appropriate coatings; • All tanks onsite will be inspected and tested to confirm the integrity. Where tanks fail testing, the tank will be changed out, new for old. • Storage in line with AS 3780-2008; • Storage bunds constructed with return sumps. Bund designed to capture spills with solution reporting back to the sumps; • Acid delivery transfer to occur at Acid Delivery Area with spills/leaks reporting to sumps; • Stored within tanks in appropriately bunded facilities whereby 110% of the largest vessel and 25% of the total volume is contained according to AS 1940:2017 and AS 1692:2006; • All containment / storage bunds are constructed with return sumps; • Bunds are designed to allow spills / solution to report to these sumps; • All sumps are equipped with extraction pumps; • Spills / solution that fall to ground are captured in sumps and pumped via pipelines to the ILS Pond/ Pond 3; • Captured stormwater directed to process water circuit; and • All chemical reagents will be stored within tanks in appropriately bunded facilities

Emission	Sources	Potential pathways	Proposed controls
			whereby 110% of the largest vessel and 25% of the total volume is contained according to Australian Standards 1940 and AS1692.
	Sulphuric acid corrosion of tanks resulting in containment issues	Direct discharges	• Acid storage will be undertaken as per - AS 3780:2008 *Storage and handling of corrosive substances.*
	Sulphuric acid overspray on the heap leach pads	Air / windborne pathway	• Network of sprinklers (wobblers) placed on top of the pads to ensure complete coverage.
Sediment laden / potentially contaminated stormwater	Laydown areas, pond areas etc. following rainfall events	Direct discharges	• Potentially contaminated runoff from the plant area and W-Drains reporting to Pond 6; and • Clean runoff external to the infrastructure areas directed around the Environmental Pond.
Bacterial culture	Bacterial Farm	Direct discharges	• Bioleaching of ore via the existing Heap Leach Facility; • Bacterial culture is cultivated in 1,000L tanks at the bacterial farm prior to being manually added to raffinate solution; and • Tanks will be sufficiently bunded and any spills will report to a sump equipped with an extraction pump which will pump solution directly to the heap leach pad.
Category 64 Landfill			
Odour	Putrescible wastes	Air / windborne pathway	• Regular waste coverage, at least fortnightly.
Windblown wastes	Open trenches of the landfill	Windblown causing littering and attracting fauna / livestock	• Landfill will be fenced.
Leachate	Waste within landfill trenches	Through the base of the landfill trenches from rainfall into groundwater	• The WRL landfill will be constructed on a 10m thick oxide waste layer on siting of low permeability compacted silt stones which will inhibit the flow of leachate from the landfill cells; • The landfill sits on a thick layer of oxide waste approximately 30m above groundwater level. The compacted oxide waste layer suggests that the landfill poses a low risk to groundwater resources as infiltration will be negligible; • Located within the existing Whim Creek

Emission	Sources	Potential pathways	Proposed controls
			WRL. Earthen bunds will be constructed around the WRL landfill area to contain any potentially contaminated surface water run-off and allow clean surface water to flow around the perimeter of the landfill area; • Waste is placed in a defined trench or within an area or enclosed by earthen bunds; and • When waste material is covered with sufficient quantities of inert waste, clean fill or other appropriate cover material, the area is traversed by machinery and compacted, reducing the stormwater infiltration risk at the facility and minimising the potential for leachate seepage to groundwater.
Contaminated stormwater	Waste within landfill trenches	Clean rainfall flowing into the contaminated areas of the landfill	• The landfill trenches will be built within a flat section of the WRL that has limited upgradient catchment. Soil excavated from each trench and existing oxide waste rock will be utilised to construct earthen stormwater bunds around the landfill area, diverting stormwater around the landfill and also preventing surface water from entering the trenches.
Category 85 WWTP			
Odour	WWTP tanks and irrigation area	Air / windborne pathway	• Maintain WWTP to operating standards
Raw sewage, partially treated sewage	Tank overtopping and/or pipeline leaks / spills	Direct discharge	• WWTP will be equipped with a telemetry / instrumentation control room • WWTP control system alarms when operational parameters are outside normal operating conditions. • Telemetry / instrumentation will include level sensors on the balance tank and treated effluent tanks and high level audible and visual (flashing light) alarms. • Balance tank sized to provide 24 hours buffer at 100% capacity. • 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. • WWTP provided with Vendor's Premium Instrumentation Package (for Class C / Low Risk effluent), which includes ClearAccessTM remote access with email

Emission	Sources	Potential pathways	Proposed controls
			alerts on alarm conditions. • The plant, treated effluent pipeline and sprayfield area will be inspected daily.
Nutrient rich treated effluent Irrigation area proposed to overlay historic tailings mobilizing salts and / or contaminants	Irrigation Tank	Direct discharge	• Effluent quality targeted at the values presented in Table 2; • Regular monitoring of effluent quality and monitoring for weeds; • Irrigation area will be fenced to prevent ingress of fauna and livestock; • The nitrogen and phosphorus loading rates to the irrigation area will not exceed the *Water Quality Protection Note 22: Irrigation with nutrient-rich wastewater* of 480 kg/ha/yr and 120 kg/ha/yr respectively. • The 2.0 Ha sprayfield is conservatively sized to ensure there is no excessive hydraulic loading as a result of spray irrigation. At full camp occupation (120 persons) treated effluent irrigation equates to 1.5 mm/day, compared to average daily evaporation in the order of 9 mm/day. The area within the sprayfield used for tailings storage in the 1960's was remediated in 2006, with the tailings and some underlying substrate removed and disposed on the project heap leach facility. In the fifteen years since 2007, the area has been subject to numerous cyclonic rainfall events between 50 mm and 200 mm, with the potential to saturate soils and generate runoff. Given this history and the conservative sprayfield design/hydraulic loading, the works approval holder has deemed the risk of mobilisation of any residual contaminants is considered very low; and • Managed under the DMIRS Mine Closure Plan.
Contaminated stormwater	Treated effluent in irrigation area	Clean rainfall flowing into the contaminated areas of the irrigation area	• The WWTP will be constructed on a relatively flat area of ground, on a constructed hardstand pad. An earthen bund and small diversion drain will be constructed around the perimeter of the WWTP pad to divert stormwater runoff around the facility; and • The irrigation area will be constructed with earthen bunds around the perimeter of the irrigation area to divert stormwater runoff around the irrigation area and are designed to prevent stormwater ingress into the

Emission	Sources	Potential pathways	Proposed controls
			irrigation area.
Ancillary infrastructure			
Hydrocarbons and contaminated wastewater	Heavy and Light Vehicle Workshops and Washdown Bay	Direct discharges from leaks / spills	• A multi-bay workshop on a concrete pad will be constructed for light and heavy vehicle maintenance located between the Mons Cupri and Whim Creek pits; • Associated facilities include adjacent stores, tyre changing facility, 10 kL bunded lubrication storage, air compressors and a bunded oil change area on concrete hardstand with a waste oil storage tank; • A separate tank will store waste oil prior to removal from site for recycling; • A vehicle washdown facility exists for the cleaning of mining and mobile equipment and will be refurbished as part of the works. It includes a concrete pad, drive-in sump (for solids removal) and a water management system equipped with a grease trap and oil / water separator; • All chemical reagents will be stored within tanks in appropriately bunded facilities whereby 110% of the largest vessel and 25% of the total volume is contained according to AS 1940:2017 and AS1692-2006; and • All containment / storage bunds are constructed with return sumps. Bunds are designed to allow spills / solution to report to these sumps. All sumps are equipped with extraction pumps. Spills / solution that fall to ground are captured in sumps.
Hydrocarbons	Bulk fuel storage	Direct discharges from leaks / spills	• All concrete floors, foundations (e.g. plinths) and floors will be tested/inspected for structural integrity. Bunded areas will be wet tested for permeability (i.e. fill with water and watch over time). Sections not meeting required standards for structural integrity will be replaced. Areas not meeting required containment integrity will be replaced or lined with appropriate coatings; • All tanks onsite will be inspected and tested to confirm the integrity. Where tanks fail testing, the tank will be changed out, new for old; • All pipelines and valves will be pressure tested to confirm the integrity. Where testing fails the infrastructure will be

Emission	Sources	Potential pathways	Proposed controls
			changed out, new for old; • Six 55kL bunded diesel storage tanks; • Refueling facility that includes a concrete hardstand under potential spillage/drip points and a low drive-over bunded refueling apron with runoff directed to a sump and oil water separator, exists onsite and forms part of the sites fuel farm; • Another standalone 55kL bunded diesel storage tank exists for light vehicle refueling at the rear of the SW-EX plant; • All diesel storage tanks onsite are bunded to comply with AS 1940:2017; • Gas Fired Power Station single bunded 10,000 L diesel tank complete with a dual hose bowser and piping is installed to supply black start and emergency backup generation; and • Accommodation Camp Power Station will have a diesel power station for initial power and backup supply. The camp power station will be self-contained, acoustic enclosed, diesel generators totaling 1.25 MW. The diesel generators will provide camp power prior to connection and commissioning of the process plant gas power station. Fuel supply will be a bunded 55,000 L diesel tank complete with hose bowser. The bowser facility includes concrete hardstand under potential spillage/drip points and a low drive-over bunded refueling apron with runoff directed to a sump.
Hydrocarbons	Gas Fired Power Station	Direct discharges from leaks / spills	• An existing 2 MW natural gas fired power plant, supplied from a low pressure gas spur from the Karratha / Port Hedland link PEPL (PL22) will be recommissioned to provide the majority of site power requirements. Other minor and more remote power requirements will be met by mobile diesel generators; and • A single bunded 10,000 L diesel tank complete with a dual hose bowser and piping is installed to supply black start and emergency backup generation.
Hydrocarbons	Accommodation Camp Power Station	Direct discharges from leaks / spills	• Diesel power station for initial power and backup supply to provide camp power prior to connection and commissioning of the Process Plant Gas Power Station; • Self-contained, acoustic enclosed, diesel

Emission	Sources	Potential pathways	Proposed controls
			generators totaling 1.25 MW; • Fuel supply will be a bunded 55,000 L diesel tank complete with hose bowser; and • The bowser facility includes concrete hardstand under potential spillage/drip points and a low drive-over bunded refuelling apron with runoff directed to a sump.

5.1.2 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 4 and Figure 5 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 4: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Whim Creek Hotel	2.4 km north of the premises
Mallina Homestead	20 km east of the premises **Screened out receptors due to distance from prescribed activity.**
Sherlock Homestead	20 km west of the premises **Screened out receptors due to distance from prescribed activity.**
Roebourne	84 km west of the premises **Screened out receptors due to distance from prescribed activity.**
Environmental receptors	**Distance from prescribed activity**
Threatened and/or priority fauna Northern Quoll and Ghost Bat	500 m outside the development area
Flora and Vegetation	According to Venturex Resources Limited, (2016) the Premises lie within the Abydos Plain subregion of the Fortescue Botanical District of the Eremean Botanical Province (Beard, 1975). The Premises is located in a vegetation type classified by Beard, (1975) as Mosaic: Hummock grasslands, shrub-steppe / Hummock grasslands, grass steppe. The shrub-steppe generally occurs in valleys and is dominated by Kanji Acacia pyrifolia over Soft Spinifex *Triodia epactia*, whilst the grass-steppe is dominated by Soft Spinifex

	Triodia epactia and Hard *Spinifex Triodia* wiseana. Within the general vegetation type, variations are evident, including drainage lines, southern slopes and creek lines. A flora survey was completed in September 2005 following a wet year, which interrupted several years of low rainfall. Consequently, during the survey, annual plants were abundant, and many plants were in flower or seed. No Declared Rare Flora (DRF) or Threatened Ecological Communities (TEC's) have been found within the Project area. Vegetation in established areas is generally considered to be in very good to excellent condition.
Aboriginal and other heritage sites Four registered sites are located within the Whim Creek Project area, including: • Site 160 Balla River 02 (Legacy ID P07595) – Artefacts / Scatter • Site 161 Balla River 03 (Legacy ID P07596) – Artefacts / Scatter, Mythological, Water Source • Site 109 (Legacy ID P07601) Mons Cupri Hill – Mythological Site 6141 (Legacy ID P06978) Mt Brown – Artefacts / Scatter	3 sites within prescribed premises boundary.
Rivers, lakes, oceans, and other bodies of surface water, etc. Balla Balla River Hyporheic fauna and riparian vegetation	250m from Environmental Pond Northeastern edge of Premise Boundary 20m from Balla Balla River.
Contaminated Sites Site registered as 'Possibly contaminated - investigation required	Groundwater contamination onsite from previous operations. Groundwater SWL is 3 m below ground level (bgl) to 15 mbgl.

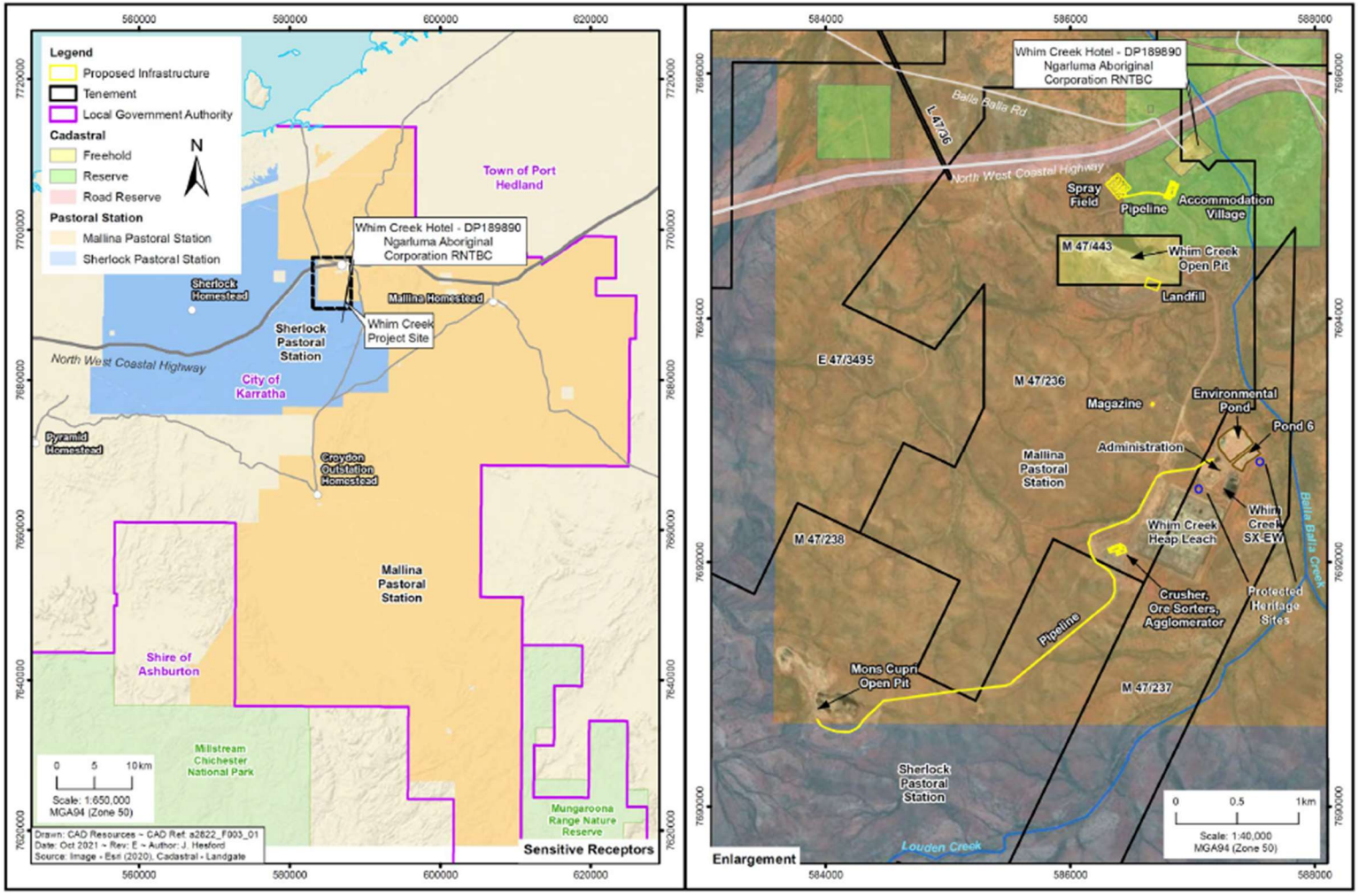

Figure 5: Distance to sensitive receptors

5.2 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 5.1. 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 5.1), 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 5.

Works approval W6707/2022/1 that accompanies this decision report authorises construction, commissioning and time-limited operations. The conditions in the issued works approval, as outlined in Table 5 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. Categories 5, 7, 64 and 85 activities. 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 5: Risk assessment of potential emissions and discharges from the premises during construction, commissioning and operation

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Vehicle and machinery activity on disturbed ground and unsealed roads Blasting and earthmoving associated with mining Wind-driven dust lift off from disturbed areas and stockpiles	Dust	Air / windborne pathway causing impacts to health and amenity	Whim Creek Hotel 2.4 km north of the premises	Refer to Section 5.1	C = Minor L = Unlikely **Medium Risk**	Y	N/A	N/A
	Noise			Refer to Section 5.1	C = Minor L = Unlikely **Medium Risk**	Y	N/A	N/A
Commissioning, Time Limited Operations and Operations								
Category 5 processing infrastructure	Dust	Air/windborne pathway causing impacts to health and amenity	Whim Creek Hotel 2.4 km north of the premises	Refer to Section 5.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for dust mitigation controls on infrastructure Condition 15, Table 4 Environmental commissioning requirements Requirements for water sprays, weather monitoring and visual monitoring Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirement for water sprays, weather monitoring and visual monitoring	N/A
	Noise	Air/windborne pathway causing impacts to health	Whim Creek Hotel 2.4 km north of the	Refer to Section 5.1	C = Slight L = Unlikely	Y	N/A	N/A

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
		and amenity	premises		**Low Risk**			
	Hydrocarbons and chemicals	Direct discharges from leaks spills contaminating	Soils, vegetation, groundwater	Refer to Section 5.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for storage and bunding in accordance with Australian Standards	N/A
	Contaminated stormwater	Direct discharges from rainfall ingress to processing areas	Soils, vegetation and Balla Balla River	Refer to Section 5.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for stormwater controls on infrastructure Condition 15, Table 4 Environmental commissioning requirements Requirements for monthly inspections Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for monthly inspections	N/A
Category 7 heap leaching infrastructure	Solutions with low pH, high levels of metals and sulphuric acid etc.	Direct discharges from ponds overtopping	Soils, vegetation, groundwater, hyporheic fauna, riparian vegetation	Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**	N	Condition 1 requires vegetation monitoring as per the Whim Creek Vegetation Monitoring Plan Condition 2 requires groundwater monitoring as per the Whim Creek Groundwater Monitoring Plan Condition 4, Table 2 Critical containment infrastructure design and construction requirements Requirements for minimum freeboard and containment in rainfall events **Condition 7 requires hyporheic fauna survey**	**Recommendation for additional groundwater monitoring network to the north and north-west** **Recommendation for Hyporheic fauna survey and Riparian vegetation criteria due to these sensitive receptors**

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
							Condition 8 requires riparian vegetation criteria Condition 15, Table 4 Environmental commissioning requirements Requirements for minimum freeboard during commissioning and cleaning / maintaining ponds Conditions 16 - 20 require monitoring and recording of emissions and reporting of results during commissioning Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for minimum freeboard during commissioning and cleaning / maintaining ponds Conditions 24 - 27 require monitoring of emissions and reporting of results during time limited operations	
		Direct discharges from pipelines leaks / spills	Soils, vegetation, groundwater, hyporheic fauna, riparian vegetation	Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**	N	Condition 1 requires vegetation monitoring as per the Whim Creek Vegetation Monitoring Plan Condition 2 requires groundwater monitoring as per the Whim Creek Groundwater Monitoring Plan Condition 3, Table 1 Design and construction / installation requirements Requirements for telemetry and Australian Standards design **Condition 7 requires hyporheic fauna survey** **Condition 8 requires riparian**	**Recommendation for additional groundwater monitoring network to the north and north-west** **Recommendation for Hyporheic fauna survey and Riparian vegetation criteria due to these sensitive receptors**

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
							vegetation criteria Condition 15, Table 4 Environmental commissioning requirements Requirements for integrity testing and daily inspections Conditions 16 - 20 require monitoring and recording of emissions and reporting of results during commissioning Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for minimum freeboard during commissioning and cleaning / maintaining ponds Conditions 24 - 27 require monitoring of emissions and reporting of results during time limited operations	
		Seepage / infiltration	Groundwater, Balla Balla River, hyporheic fauna, riparian vegetation	Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**	N	Condition 1 requires vegetation monitoring as per the Whim Creek Vegetation Monitoring Plan Condition 2 requires groundwater monitoring as per the Whim Creek Groundwater Monitoring Plan Condition 4, Table 2 Critical containment infrastructure design and construction requirements Requirements for compacted bases and HDPE lining on heap leach pads, W-Drains and water ponds, the use of bore SWP2 as a contaminant recovery bore to help mitigate the risk of the plume migrating **Condition 5 requires additional groundwater monitoring**	**Recommendation for additional groundwater monitoring network to the north and north-west** **Recommendation for Hyporheic fauna survey and Riparian vegetation criteria due to these sensitive receptors**

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
							network to the north and north-west **Condition 6 requires construction report for the additional groundwater monitoring network** **Condition 7 requires hyporheic fauna survey** **Condition 8 requires riparian vegetation criteria** Condition 15, Table 4 Environmental commissioning requirements Requirements for the use of bore SWP2 as a contaminant recovery bore to help mitigate the risk of the plume migrating Condition 17, Table 9 Monitoring of ambient concentrations during environmental commissioning and time limited operations Requires quarterly monitoring of ambient groundwater quality Conditions 18 - 20 require monitoring and recording of emissions and reporting of results during commissioning Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for the use of bore SWP2 as a contaminant recovery bore to help mitigate the risk of the plume migrating Conditions 24 - 27 require monitoring of emissions and reporting of results during time limited operations	

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
	Sulphuric Acid	Direct discharges from leaks / spills from Acid Storage Tanks	Soils, vegetation, groundwater	Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**		Condition 4, Table 2 Critical containment infrastructure design and construction requirements Requirements for concrete bunding, integrity testing, Australian Standards, sumps, telemetry Condition 15, Table 4 Environmental commissioning requirements Requirements for hydrostatic testing and integrity testing Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for inspections Conditions 24 - 27 require monitoring of emissions and reporting of results during time limited operations	
		Direct discharges from pipeline leaks / spills	Soils, vegetation, groundwater	Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for telemetry and Australian Standards design. Condition 15, Table 4 Environmental commissioning requirements Requirements for integrity testing and daily inspections Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for inspections, flow sensors	N/A

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
	Contaminated stormwater	Direct discharges from rainfall ingress to heap leaching areas	Soils, vegetation and Balla Balla River	Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for potentially contaminated runoff to report to Pond 6 and clean runoff to be directed around the Environmental Pond	N/A
Category 64 Putrescible Landfill	Dust	Air/windborne pathway causing impacts to health and amenity	Whim Creek Hotel 2.4 km north of the premises	Refer to Section 5.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	N/A
	Odour	Air/windborne pathway causing impacts to health and amenity	Whim Creek Hotel 2.4 km north of the premises	Refer to Section 5.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for the landfill design **Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations** **Requirements for general landfill management and tyre management**	**General landfill management and tyre management conditions included**
	Windblown waste	Air/windborne pathway causing impacts to health and amenity	Whim Creek Hotel 2.4 km north of the premises	Refer to Section 5.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for the landfill to be fenced **Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations** **Requirements for general landfill management and tyre management**	**General landfill management and tyre management conditions included**

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
	Contaminated stormwater	Direct discharges from rainfall ingress to landfill areas	Soils, vegetation and Balla Balla River	Refer to Section 5.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for the landfill design **Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations** **Requirements for general landfill management and tyre management**	**General landfill management and tyre management conditions included**
	Leachate	Infiltration from rainfall through the base of the landfill	Groundwater	Refer to Section 5.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for the landfill to be constructed on compacted soils **Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations** **Requirements for general landfill management and tyre management**	**General landfill management and tyre management conditions included**
Category 85 WWTP	Odour	Air/windborne pathway causing impacts to health and amenity	Whim Creek Hotel 2.4 km north of the premises	Refer to Section 5.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for enclosed tanks	N/A
	Sewage, partially treated sewage and/or nutrient rich treated effluent	Overtopping causing contamination	Soils, vegetation and groundwater	Refer to Section 5.1	C = Minor L = Rare **Low Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for level sensors on tanks with alarms, 24 hours buffer provided Condition 15, Table 4 Environmental commissioning requirements Requirements for daily	N/A

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
							inspections Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for daily inspections	
		Pipeline leaks/spills causing contamination	Soils, vegetation and groundwater	Refer to Section 5.1	C = Minor L = Rare **Low Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements pressure sensors on pipelines Condition 15, Table 4 Environmental commissioning requirements Requirements for daily inspections of pipelines Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for daily inspections of pipelines	N/A
	Nutrient rich treated effluent	Direct planned discharges to irrigation area	Soils, vegetation and groundwater	Refer to Section 5.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for treated effluent quality targets, loading rates, fenced irrigation area, stormwater diversions. Condition 15, Table 4 Environmental commissioning requirements Requirements for weekly treated effluent monitoring and storage in tanks until quality criteria met, daily inspections of irrigation area Condition 16, Table 8 Emissions	N/A

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
							and discharges monitoring during environmental commissioning and time limited operations Requirements for weekly monitoring of treated effluent during commissioning Requirements for quarterly monitoring of treated effluent during time limited operations Condition 23, Table 5 Infrastructure and equipment requirements during time limited operations Requirements for quarterly treated effluent monitoring, daily inspections of irrigation area	
	Contaminated stormwater	Direct discharges from rainfall ingress to WWTP and irrigation areas	Soils, vegetation and Balla Balla River	Refer to Section 5.1	C = Minor L = Rare **Low Risk**	Y	Condition 3, Table 1 Design and construction / installation requirements Requirements for WWTP to be constructed on flat ground with earthen bund and small diversion drain around the perimeter.	N/A

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.

6. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

Table 6: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 01/08/2022	None received	N/A
Local Government Authority advised of proposal on 29/07/2022	City of Karratha replied on 22/08/2022 advising that should the works listed within the Works Approval be approved by DMIRS to be located within the boundaries of a granted mining tenement, then under the City's Local Planning Scheme No. 8 (LPS8), the works are exempt from requiring development approval under the City's Local Planning Scheme No.8. Regarding any new proposed sewage facility, the existing office is to be connected to an approved septic system. City of Karratha has no objection to the proposal under this application.	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 29/07/2022	DMIRS replied on 31/08/2022 Refer to Appendix 1	DMIRS replied on 31/08/2022 Refer to Appendix 1
Ngarluma Aboriginal Corporation advised of proposal on 29/07/2022	None received	N/A
Applicant was provided with draft documents on 21 October 2022	Applicant responded on 04 November 2022, 07 November 2022 and 09 November 2022 Refer to Appendix 2	Applicant responded on 04 November 2022, 07 November 2022 and 09 November 2022 Refer to Appendix 2

7. 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. Anax Metals Ltd, Whim Creek Copper-Zinc Project: Works Approval Application (Rev 0) 27/04/2022, West Perth, Western Australia.
5. Anax Metals Ltd, Whim Creek Copper-Zinc Project: Supporting Documents 02/05/2022, West Perth, Western Australia.
6. Anax Metals Ltd, RE: Works Approval RFI 04/07/2022, West Perth, Western Australia.
7. Anax Metals Ltd, RE: Works Approval RFI 28/07/2022, West Perth, Western Australia.
8. Anax Metals Ltd, RE: Works Approval RFI 17/08/2022, West Perth, Western Australia.
9. Beard, J. S. (1975) Pilbara, 1:1 000,000 vegetation series: explanatory notes to sheet 5. Perth, Australia: University of Western Australia Press.
10. Anax Metals Ltd, RE: NOTIFICATION : APPLICATION FOR A WORKS APPROVAL W6707/2022/1 – DRAFT INSTRUMENT AND DECISION REPORT – Attn: Dan O'Hara 04/11/2022, West Perth, Western Australia.
11. Anax Metals Ltd, RE: NOTIFICATION : APPLICATION FOR A WORKS APPROVAL W6707/2022/1 – DRAFT INSTRUMENT AND DECISION REPORT – Attn: Dan O'Hara 07/11/2022, West Perth, Western Australia.
12. Anax Metals Ltd, RE: NOTIFICATION : APPLICATION FOR A WORKS APPROVAL W6707/2022/1 – DRAFT INSTRUMENT AND DECISION REPORT – Attn: Dan O'Hara 09/11/2022, West Perth, Western Australia.

Appendix 1: Summary of DMIRS comments on supporting documentation

Aspect	Summary of DMIRS comment	Department's response
Category 5 Processing and beneficiation of metallic or non-metallic ore	DMIRS is currently assessing a mining proposal and mine closure plan for the Whim Creek Project (Registration ID 100771), which includes refurbishment of existing processing facilities (no new disturbance) and an additional crusher / sorter / agglomerator. The processed material is proposed to be sent off site for further processing. Only a small additional disturbance is proposed for these activities and DMIRS considers the additional risks to be minimal for aspects considered under the Mining Act 1978 (Mining Act). Anax has discussed with DMIRS their future intent to process ore to a concentrate on site and dispose of tailings, however this has not yet been submitted for DMIRS assessment. It is understood this activity does not form part of this DWER works approval application. The proposed works (Attachment 3B, page 49) notes redundant acid farm infrastructure is to be removed upon closure. If the infrastructure is inactive and no longer used, DMIRS expects that Anax will decontaminate, decommission and remove this from site as soon as practicable for reuse or recycling. DMIRS will follow this up separately with Anax.	Noted.
Category 7 – Vat or in situ leach of metal	DMIRS has not received a revised proposal for recent upgrades to heap leach facility, processing ponds, and environment pond that have been carried out under DWER's Environmental Protection Notice (EPN). These facilities are proposed by Anax to be operated under existing Mining Act approvals. DMIRS has reviewed the *Heap Leach Facility Permeability Management Plan (HLFPMP) (Mworx TDK, 2021)* and *Stormwater Management Plan (SWMP) (360 Environmental, 2021)* that were required under the EPN. DMRIS has recommended that these be reviewed and improved.	These plans are a requirement under the EPN requiring improvements to the site infrastructure. These plans can be updated as part of the licence application for operations.
Category 64 – Class II or III putrescible landfill site	DMIRS notes that the proposed site mentioned in Attachment 3B (Table 3) refers to Mons Cupri waste landform, whereas the mining proposal notes the landfill expansion will occur at Whim Creek waste landform. Figure 2 in the works approval documentation confirms the location to be at Whim	Noted.

Aspect	Summary of DMIRS comment	Department's response
	Creek waste landform. It is recommended this inconsistency be queried and amended in the document. DMIRS anticipate operational management of tyre disposal will primarily be managed by DWER under Part V licensing conditions. This aspect of waste management has not been included in the current mining proposal or mine closure plan submitted to DMIRS, and will need to be risk assessed prior to implementation. Burial of tyres and landfill within a waste rock landform will require consideration of landform stability and careful planning and implementation during operations to ensure it meets the DMIRS objective for closure and rehabilitation: "Mining activities are rehabilitated and closed in a manner to make them physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/non-contaminating, and capable of sustaining an agreed post-mining land use, and without unacceptable liability to the State.". This aspect of closure will be followed up with Anax by DMIRS with respect to mine closure and final landform stability.	
Category 85 - Sewage facility	The Waste Water Treatment Plant (WWTP) Spray field is proposed to overlay historic tailings, whose materials properties (physical and chemical) are unknown. Discharging effluent in this area may result in additional mobilising of salts and / or contaminants and / or erosion and it is recommended that this risk be considered in the Part V application assessment.	Included in assessment.
Additional general comments	Closure of the facilities has been presented in the Mine Closure Plan Whim Creek Copper Zinc Project Revision 4.0 dated 31/05/2022. Review of the closure plan is ongoing and alternative options for closure of the heap leach facility are being considered by Anax Metals.	Noted.

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

Condition	Summary of applicant's comment	Department's response
3, Table 1, Point 4	Cone crushers aren't covered, however ore will still be damp from the dust control administered at the Jaw Crusher / Grizzly Feeder.	Updated as requested.
3, Table 1, Point 11	Water sprays are not located on the conveyors, however ore on the conveyors is still damp as a result of water sprayers at the Jaw crusher phase	Updated as requested.
3, Table 1, Point 14	Request this be modified to say pipelines outside of the SX-EW bunded area. Not all pipelines within the bunded areas will be equipped with telemetry.	Updated as requested.
3, Table 1, Point 15	Request this be modified to remove the term "self" so text will read "bunded" instead of "self-bunded". All diesel tanks will be bunded as per AS1980 however the self-bunded requirement requires every tank to be self bunded which adds significant costs to the project. Note AS1980 is a typographical error and should read Australian Standard AS 1940:2017 The storage and handling of flammable and combustible liquids Australian Standard AS 1940:2017 *The storage and handling of flammable and combustible liquids.*	Updated as requested.
3, Table 1, Point 16		Updated as requested.
3, Table 1, Point 17		Updated as requested.
3, Table 1, Point 18		Updated as requested.
4, Table 2, Point 4	Update capacity of Pond 6 to 60,000 m^3. Update rainfall events to 1:20 ARI.	Updated as requested with a note that entire site is constructed to account for a 1:100 ARI event.
4, Table 2, Point 5	Update capacity of Environmental Pond to 156,240 m^3. Update area to 200 m long. Update rainfall events to 1:20 ARI.	Updated as requested with a note that entire site is constructed to account for a 1:100 ARI event.
4, Table 2, Point 7	Request this be modified to say pipelines outside of the SX-EW bunded area. Not all pipelines within the bunded areas will be equipped with	Updated as requested.

Condition	Summary of applicant's comment	Department's response
	telemetry.	
15, Table 4, Point 4	Ponds 1-6 are designed to eventually spill over in an ascending order. The HDPE-lined process ponds are fitted with spillways with water sequentially spilling to the northeast as pond capacities are reached (Page 27 Heap Leach MP). Maintaining freeboard at each of the process ponds is therefore not possible as it prevents normal pond operation. However, this statement does hold true for Pond 6 and the environmental pond. Should this state "with the exception of high rainfall events?" Pond 6 was designed to received overflow in the event of a high rainfall event.	
Schedule 1: Maps, Premises map, Figure 1	Premise Boundary as per Figure 2 of the Works Approval Application (Page 27).	Updated as requested.
Schedule 1: Maps, Figure 2		Updated as requested.
Schedule 2: Premises boundary	These match Figure two and table in Works Approval Application page 66.	Noted.

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		29 April 2022			
Applicant and Premises details					
Applicant name/s (full legal name/s)		Anax Metals Limited			
Premises name		Whim Creek Copper Project			
Premises location		Mining Leases M47/236, M47/237, M47/238, M47/443 North Coastal Highway WHIM CREEK WA 6718			
Local Government Authority		City of Karratha			
Application documents					
HPCM file reference number:		DWERDT596749 and DWERDT596980			
Key application documents (additional to application form):		Application Form Supporting Documents			
Scope of application/assessment					

Summary of proposed activities or changes to existing operations.	Works approval Construction of: Crushing, sorting and agglomeration of ore; • Placing the agglomerated ore on the heap leach pad; • Refurbishment of the existing crushing circuit, including agglomerator; • Refurbishment of the existing SX-EW circuit; • Installation of ore sorters to produce a high-grade copper pre-concentrate; • Construction of a new 120-room accommodation village and installation of an associated Wastewater Treatment Plant (WWTP); • Infrastructure upgrades to the processing plant and refurbishment of support facilities; and • Installation of a pipeline to deliver water from dewatering the Mons Cupri pit to the plant for use in processing.

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	1,200,000 tonnes per annum	N/A
Category 7: Vat or in situ leach of metal	400,000 tonnes per annum	N/A
Category 64: Class II or III putrescible landfill site	500 tonnes per annum	N/A
Category 85: Sewage facility	40 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: 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: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes No	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes No	Certificate of title General lease Expiry: Mining lease / tenement Expiry: Other evidence Expiry:

Has the applicant obtained all relevant planning approvals?	Yes No N/A	Approval: Expiry date: If N/A explain why?
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes No	CPS No: CPS9355/1 A Native Vegetation Clearing Permit application was approved by DMIRS on 30 November 2021 (CPS9355/1).
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
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes No	Application reference No: Licence/permit No: GWL95745(9) GWL95745(9) allows for 900,000 kLpa.
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	N/A
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	Classification: possibly contaminated – investigation required (PC–IR) Date of classification: Managed under EPN