



Application for Works Approval Amendment

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

Works Approval Number	W6051/2017/1
Works Approval Holder	Pilgangoora Operations Pty Ltd
ACN	616 560 395
File Number	DER2017/000317
Premises	Pilgangoora Lithium-Tantalum Project Mining Tenement M45/1256 and L45/417 MARBLE BAR WA 6760 As defined by the Premises maps attached to the Revised Works Approval
Date of Report	27 November 2023
Decision	Revised works approval granted

A/MANAGER, RESOURCE INDUSTRIES

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

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1. Decision summary

Works Approval W6051/2017/1 is held by Pilgangoora Operations Pty Ltd (Works Approval Holder) for the Pilgangoora Lithium-Tantalum Project (the Premises), located at Mining Tenement M45/1256 and L45/147, MARBLE BAR WA 6760.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the construction and operation of the Premises. As a result of this assessment, Revised Works Approval W6051/2017/1 has been granted.

The Revised Works Approval issued as a result of this amendment consolidates and supersedes the existing Works Approval previously granted in relation to the Premises. The Revised Works Approval has been granted in a new format with existing conditions being transferred, but not reassessed, to the new format.

2. Scope of assessment

2.1 Regulatory framework

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

2.2 Application summary

On 12 May 2023, the Works Approval Holder submitted an application to the department to amend Works Approval W6051/2017/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought as part of the Pilgan P1000 expansion project and Mid-Stream Demonstration Research and Development (R&D) Plant:

- Addition of high-intensity magnetic separation circuit;
- Relocation of approved (yet to be constructed) stage 2 tailings thickener;
- Addition of 5 ML process water pond;
- Relocation and expansion of approved (yet to be constructed) stage 2 reagent storage yard;
- Expansion of the existing west sediment trap;
- Expansion of the existing spodumene handling pad and relocation / expansion of the existing associated sediment traps;
- Expansion of the onsite Power Station generation capacity;
- Addition of a trucked Liquefied Natural Gas (LNG) storage facility; and
- Addition of the Mid-Stream Demonstration Plant.

This amendment is limited only to the addition of Category 31 and changes to Category 5, 52 and 73 activities from the Existing Works Approval. No changes to the aspects of the existing Works Approval relating to Categories 54, 64 and 70 have been requested by the Works Approval Holder.

Table 1 below outlines the proposed changes to the existing Works Approval.

Table 1: Proposed design or throughput capacity changes

Category	Current design throughput capacity	Proposed design throughput capacity	Description of proposed amendment
5	5,000,000 tonnes per annum	5,000,000 tonnes per annum	<p>Stage 2 Processing Plant:</p> <ul style="list-style-type: none"> • High-intensity magnetic separation circuit; • Tailings thickener relocation; • Additional 5 ML Process Water Pond; • Reagent Storage relocation and expansion; • Sediment pond expansion; • Concentrate handling pad expansion; • Power Station Expansion / LNG unload and storage; and • Midstream Demonstration Plant.
31	N/A	5,000 tonnes per annum	Mid-Stream Demonstration Plant to produce up to 5,000 tpa of Lithium Phosphate (Li ₃ PO ₄).
52	32.5 MWe	36 MWe	Increase of 3.5 MWe (3 generators)
54	275 m ³ /day	275 m ³ /day	N/A
64	20,000 tonnes per annum	20,000 tonnes per annum	N/A
70	1,000,000 tonnes per annum	1,000,000 tonnes per annum	N/A
73	<p>1,476 kL (diesel fuel)</p> <p>560m³ (trailer mounted CNG)</p> <p>60 kL (chemical storage)</p>	<p>1,476 kL (diesel fuel)</p> <p>560m³ (trailer mounted CNG)</p> <p>560 kL (chemical storage)</p> <p>1,572 kL (fixed LNG)</p>	<p>A new reagents delivery and storage facility will be constructed external to the original plant footprint, to the north of the existing power station. This facility will encompass 560 kL of total chemical storage capacity (an increase of 500 kL on the previous capacity).</p> <p>To reduce emissions from stationary power generation, the Works Approval Holder proposes to transition the</p>

Category	Current design throughput capacity	Proposed design throughput capacity	Description of proposed amendment
			majority of the existing Pilgan power station generators from diesel to natural gas as a primary fuel source. The Works Approval Holder proposes to construct a permanent LNG unload and storage facility to accommodate trucked liquid natural gas supply to the site. The facility storage capacity will be 4 x 368 kL cryogenic storage vessels, with a further 100 kL allowance made for a road-train delivery to be alongside the station.

2.2.1 Pilgan P1000 expansion project

The Pilgan P1000 expansion project is within the existing approved works approval footprint. The main improvements proposed as part of this project include:

- Improvements to engineering design criteria for site surface water management;
- Improvements to the site process water management capabilities;
- Relocation of key infrastructure including reagents to improve operator safety and in-plant traffic management;
- Implementation of a larger scale natural gas fuel transition to decrease carbon intensity from onsite power generation; and
- Incorporation of the Mid-Stream demonstration plant footprint.

Refer to Figure 1 for P1000 Process Plant Flow Chart.

Refer to Figure 2 for the Proposed P1000 Concentrator Expansion.

High-Intensity Magnetic Separation Circuit

The new larger High-Intensity Magnetic Separation Circuit will be installed between the grinding circuit and the flotation circuit. It functions to remove magnetic and paramagnetic material prior to flotation.

Magnetic material removed from the circuit will be spiraled in the existing gravity circuit to provide a Tantalite concentrate, with waste to the tailings stream.

Relocated Tailings Thickener and New Process Water Pond

The approved Tailings Thickener will be constructed in an altered location for spatial efficiency and will receive the flotation deslime cyclone overflow and the multiple magnetics streams in the gravity / grinding circuits.

Thickener overflow will be collected in a new Process Water Pond with underflow pumped to the tailings stream.

Refer to Figure 3 for the Layout of Tailings Thickener and Process Water Dam.

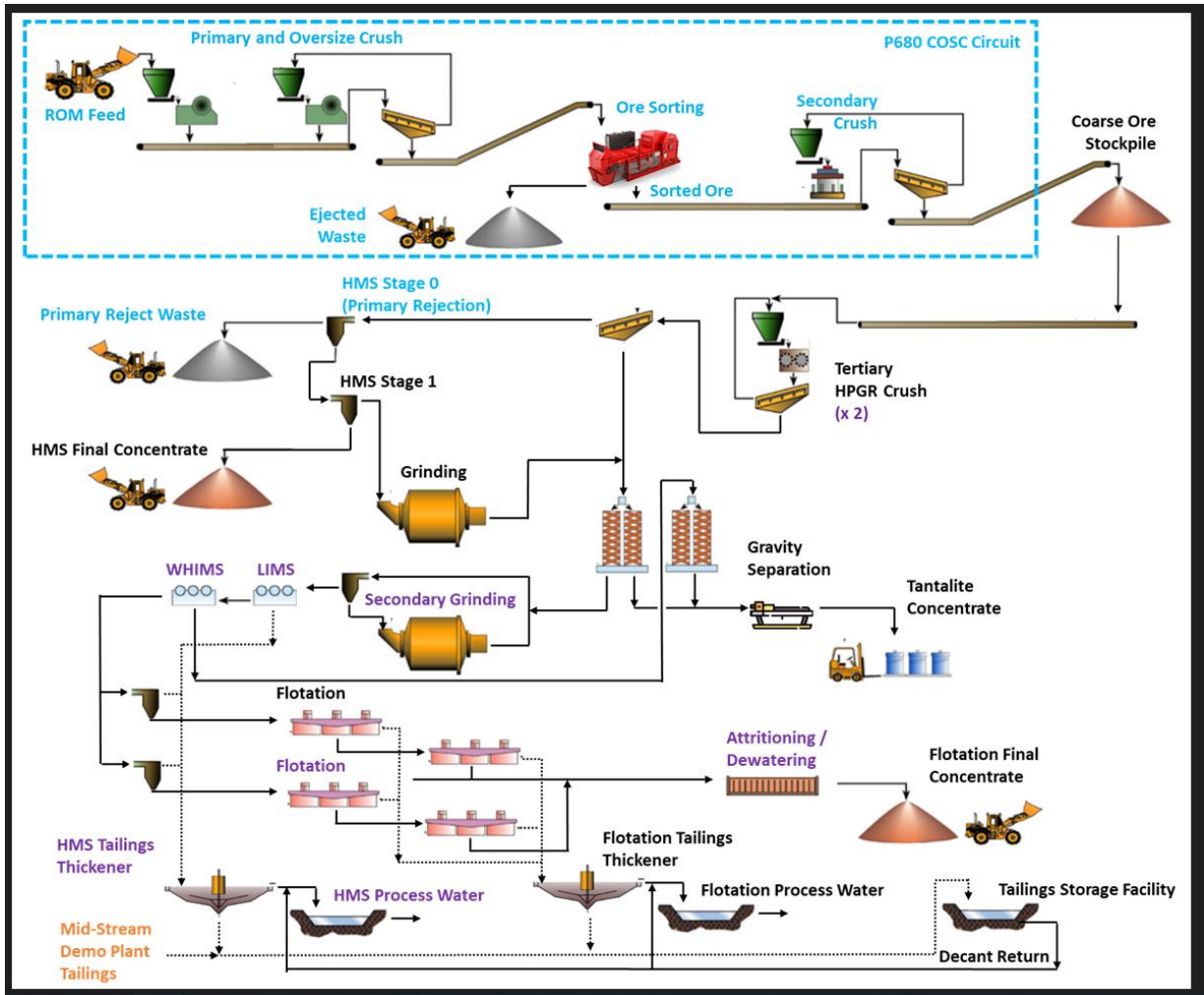


Figure 1: P1000 Process Plant Flow Chart (blue indicates P680, Purple indicates P1000)

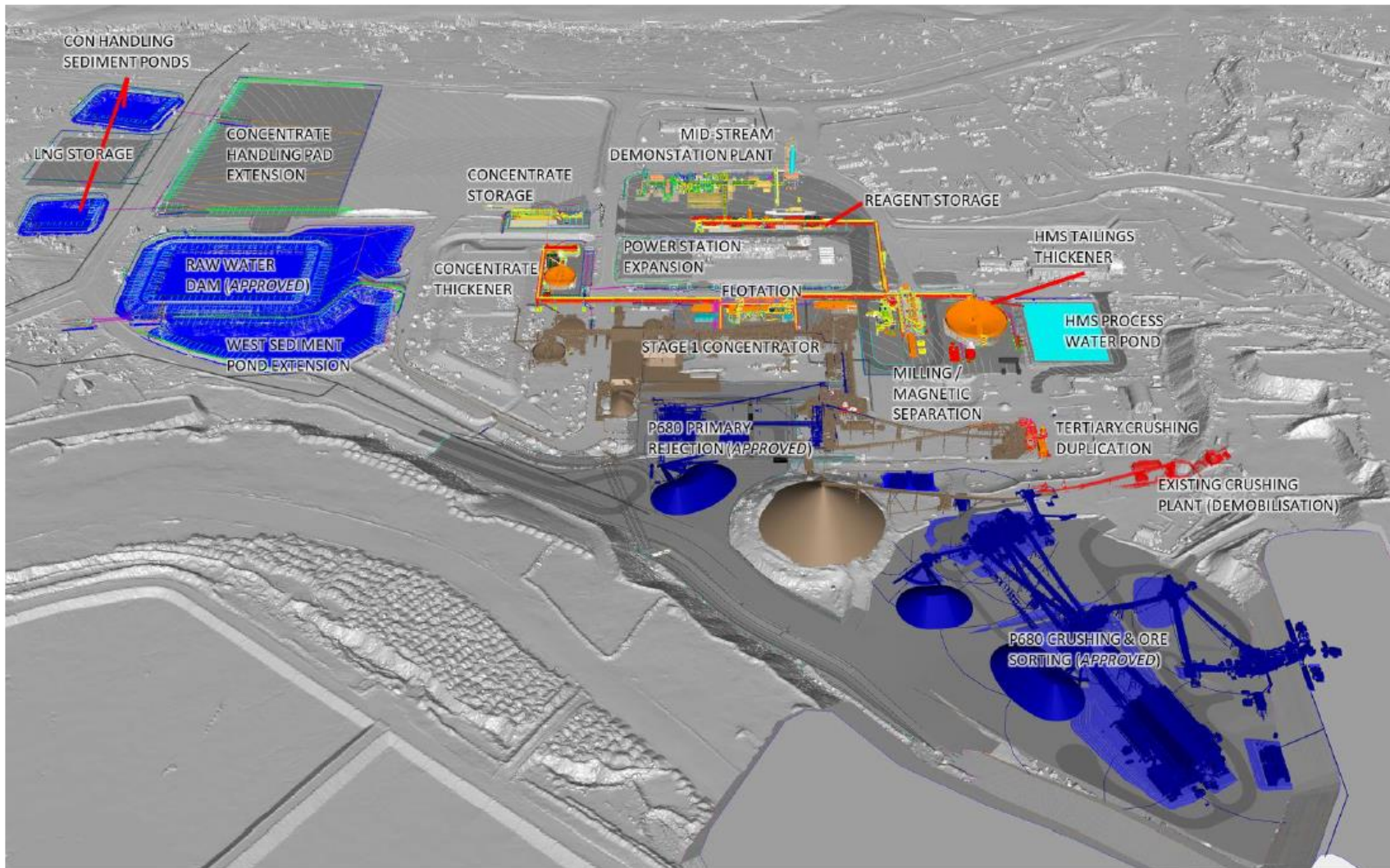


Figure 2: Proposed P1000 Concentrator Expansion.

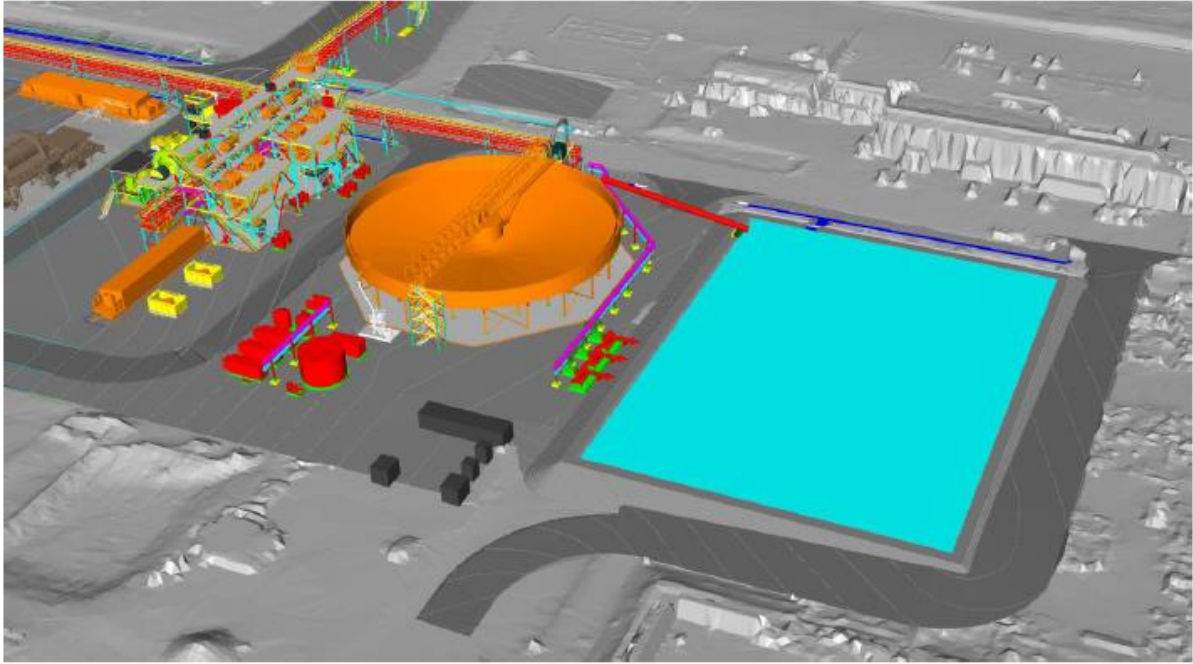


Figure 3: Layout of Tailings Thickener and Process Water Dam

Reagent Storage

A new Reagents Delivery and Storage Facility, with 560 kL total chemical storage capacity (increase of 500 kL) will be constructed external to the original plant footprint, north of the existing Power Station. It includes the following:

- Flotation collector facility with road tanker offload, bulk storage tanks, heated circulation tank and ring main distribution;
- Soda ash facility with road train vacuum system offload, bulk storage silo, automated mixing tank, storage tank and ring main distribution;
- Sulphuric acid facility with road tanker offload, including storage tanks and dosing pumps;
- Flocculant facility with road train vacuum system offload, bulk storage silo, automated batch missing plant and dosing pumps;
- Coagulant facility with road tanker offload, including storage tanks and dosing pumps;
- Sodium hydroxide facility with road tanker offload, including storage tanks and dosing pumps; and
- Hydrochloric acid facility with road tanker offload, including storage tanks and dosing pumps.

Relocation of the facility will assist in occupational health and safety risk reduction as truck / pedestrian interaction will be minimised as reagent deliveries will no longer be occurring in the main operating plant footprint.

Large volume reagents will now be via bulk tanker deliveries, which reduces manual handling.

Refer to Figure 4 Bulk Reagent Delivery Project.

Refer to Table 2 for storage and consumption rates.

Table 2: Primary Processing Regents Storage and Consumption

Reagent	Storage quantity	Storage Method	Usage
Sulphuric acid	120 m ³ (2 x 60 m ³)	Tanks	27.5 m ³ per day
Flocculent	37.5 t	Bulk Dry Silo	280 kg per day
Soda Ash	100 t	Bulk Dry Silo	5.9 t per day
Coagulant	50 m ³	Tanks	3.5 m ³ per day
Flotation Collector (Oleic Acid)	320 m ³ (2 x 150 m ³ and 1 x 20 m ³)	Tanks	23 m ³ per day
Sodium Hydroxide (Caustic Soda) – 50% solution	30 m ³	Liquid	2 m ³ per day
Hydrochloric acid – 32% solution	30 m ³	Tank	0.8 m ³ per day

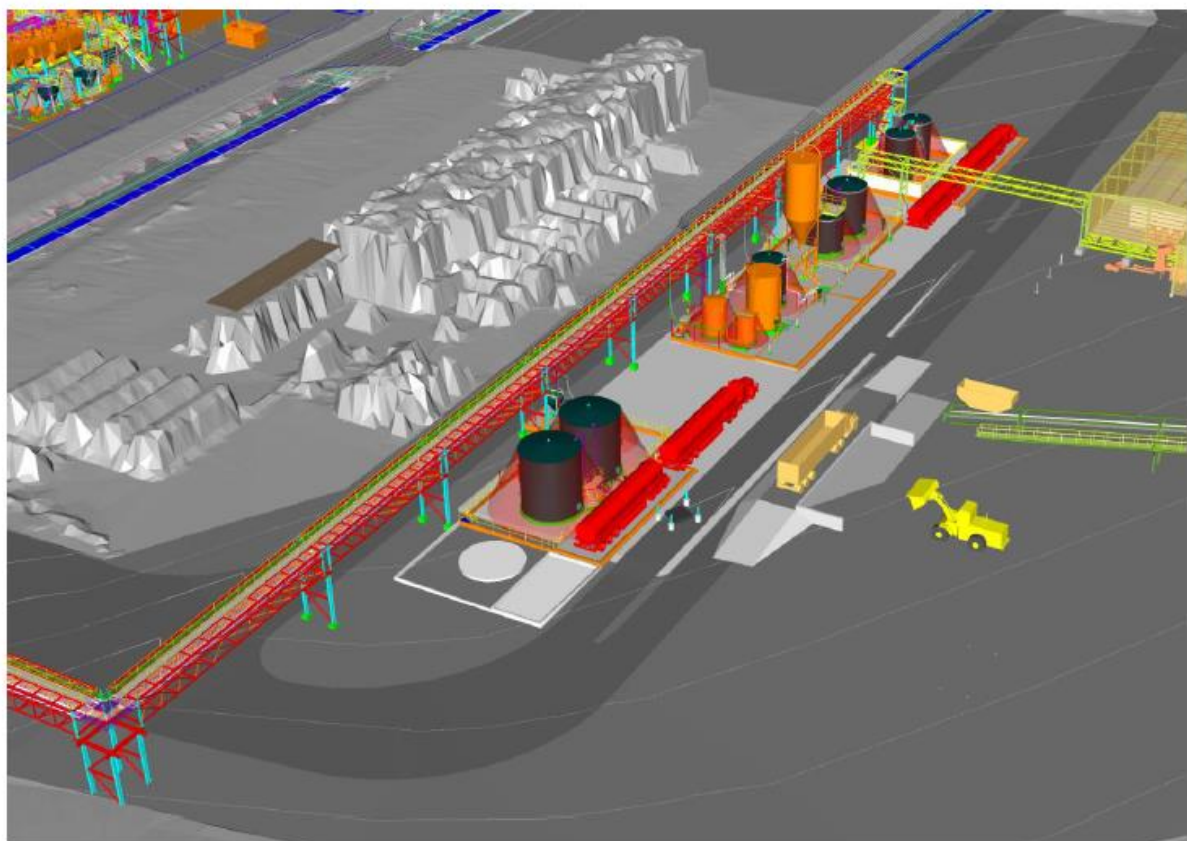


Figure 4: Bulk Reagent Delivery Project

Sediment Pond Expansion and Site Drainage Improvements

Site drainage has been reassessed with the expansion of the processing footprint. Site earthworks, drainage and culverts works program to be implemented to direct surface water from the catchment area to the expanded Sediment Pond.

Concentrate Handling Pad

Concentrate Handling Pad is to be expanded by 3.4 ha, up to 8.7 ha, to provide additional space for increased concentrate handling and loadout for the P1000 Project.

Sediment traps will be relocated west and have increased capacity.

Power Station Expansion

Due to the increased process infrastructure requirements, the Works Approval Holder, is proposing to expand the Power Station by expanding it from 14 up to 18 generators, increasing the generation capacity from 32.5 MWe up to 36 MWe.

The location of the power station expansion is directly to the west of the existing power station facility. All generators will be located on a concrete pad, within an enclosed engine hall that acoustically isolates the generators from workers at the processing plant. Exhaust stacks will be installed to the same specification of the existing power station exhaust stacks.

The Works Approval Holder plans to transition the Power Station from diesel to natural gas by constructing a permanent LNG unload and storage facility to accommodate trucked LNG supply to the site.

The diesel storage capacity will be retained for the remaining diesel generators and black-start capacity.

The power station expansion is also intended to incorporate a Battery Energy Storage System (BESS) which is being installed to allow a future large solar PV array to be supported.

The emissions from the exhaust stacks are expected to be the same as previously assessed and as shown in Table 3.

Table 3: Expected air quality concentrations emitted from stacks

Gas emissions	Concentrations	Standard of Concentration (Group 6)¹
NO _x	< 189 ppm	N.A. (system capacity less than 30 MW)
CO	< 623 ppm	N.A. (not listed) ²
Particulates	N/A	Less than 50 mg/m ³
SO ₂	< 565 ppm	N.A. (not listed) ²
Non-Methane Hydrocarbons (NMHC)	< 141.88 g/min	N.A. (not listed) ²
Volatile Organic Compounds	Less than 6.48 g/min	N.A. (using standard fuel) ²
Diesel emissions	Concentrations	Standard of Concentration (Group 6)¹
NO _x	< 2880 ppm	N.A. (system capacity less than 30 MW)
CO	< 1060 ppm	N.A. (not listed) ²
Particulates	< 55 ppm	Less than 50 mg/m ³
SO ₂	< 28 ppm	N.A. (not listed) ²

NMHC	< 110 ppm	N.A. (using standard fuel) ²
Volatile Organic Compounds	< 6.48 g/min	N.A. (using standard fuel) ²

Note 1: Based on NSW Protection of the Environment Operations (Clean Air) Regulation 2010 (Division 2, Clause 32)

Note 2: Based on NSW Protection of the Environment Operations (Clean Air) Regulation 2010 (Schedule 3, Electricity Generation)

New natural gas generation is proposed to be latest generation Cummins HSK78 or Cat 3520H engines, which comparative to equivalent diesel generation provides an >80% NOx reduction from the improved fuel source and efficiency.

The location of the power station expansion is directly to the west of the existing power station facility. All generators will be located on a concrete pad, within an enclosed engine hall that acoustically isolates the generators from workers at the processing plant.

LNG Unload and Storage

Construction of the LNG upload and storage facility will require the clearing and levelling of an approximate 70 x 60 m pad.

Four 368 kL cryogenic LNG storage tanks with a further 100 kL allowance for road train delivery and the gasification plant will be installed to AS 3961/2017 *The storage and handling of liquefied natural gas* by third party with an existing install base of equivalent design.

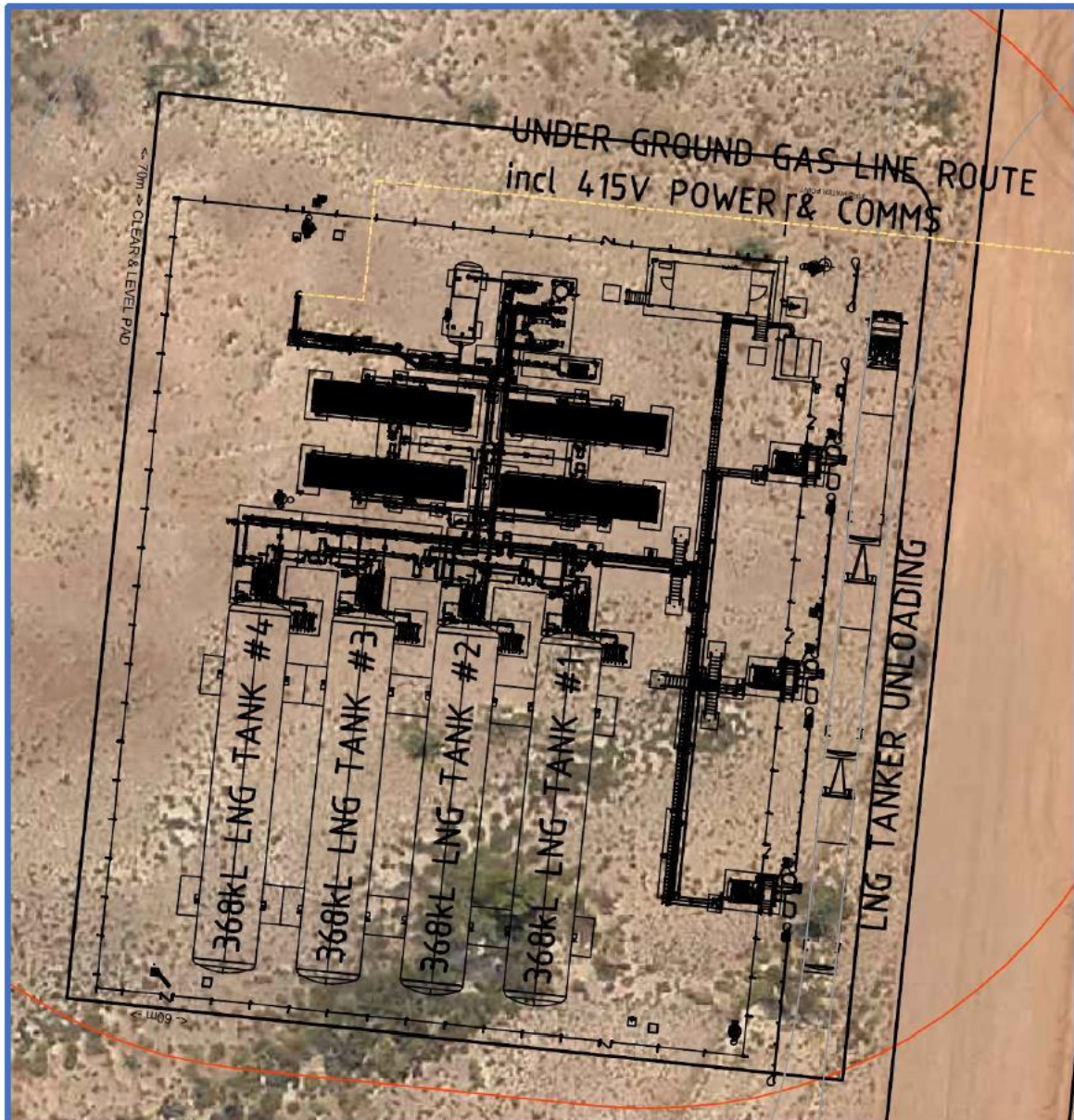


Figure 5: Indicative Layout of LNG Upload and Storage Facility

2.2.2 Mid-Stream Demonstration Plant

This plant will occupy an area of approximately 3 ha located adjacent to the reagent precinct. The plant is a proposed R&D facility to be constructed by the Works Approval Holder with Federal Government funding assistance through the Modern Manufacturing Initiative. It is intended to enable the development of novel electrification technologies and onsite production of high-value interim lithium products with this plant producing up to 5,000 tpa of Lithium Phosphate (Li_3PO_4).

Refer to Figure 6 for the Mid-Stream Demonstration Plant Flowchart.

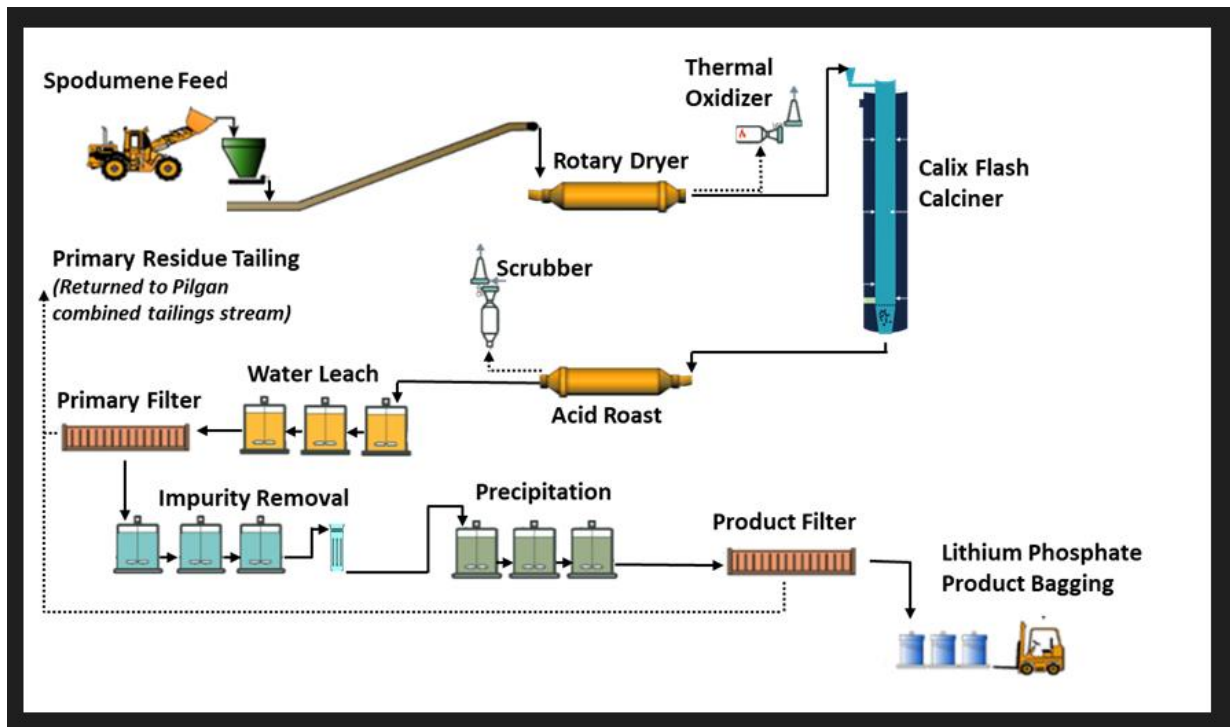


Figure 6: Mid-Stream Demonstration Plant Flowchart

The following processing plant makes up the Mid-Stream Demonstration Plant:

Pyrometallurgical Processing

Spodumene concentrate is received from the adjacent concentrator by side-tipper truck onto a concrete pad. It is then transferred to the plant by a small loader. It is then transferred into a covered conveyor through to an electrically heated rotary dryer, which reduces the moisture content of the spodumene concentrate from ~15% by weight to 0% moisture content. The moisture is evolved from the spodumene feed, and any organic material present on the spodumene is volatilised. Some spodumene dust may also be carried over with the dryer gaseous stream. As the Spodumene Dryer is electrically heated, no combustion exhaust gases are generated by the heating source.

A dust separation cyclone will be installed on the gas discharge from the Spodumene Dryer to remove a portion of the dust, and to return this to the process. The cyclone overflow, containing reduced dust levels, is then fed into a gas-fired Thermal Oxidiser to combust volatilised organic materials present in the gas discharge from the dryer. The Thermal Oxidiser discharge is cooled with quenching atmospheric air, before being passed through a baghouse to trap particulate matter. The gas stream from the baghouse is discharged through the Thermal Oxidiser stack.

The oxidiser will release a CO₂ gas stream and water vapour from a 15 m high stack with sampling ports. The flow rate through the Thermal Oxidiser Stack is expected to be 10,330 Nm³/hr at ~240°C and the emissions are expected to be lower than the limits listed in Table 4.

Table 4: Point source air emissions from the Thermal Oxidiser

Discharge Point	Emissions	Discharge point height (metres above ground level)	Limit	Guideline values
Thermal Oxidiser Stack	NO _x	20	<350 mg/Nm ³	350 mg/m ³ ¹
	SO ₂		SO ₂ is not expected to be generated in the Spodumene Dryer or Thermal Oxidiser	N/A
	SO ₃		SO ₃ is not expected to be generated in the Spodumene Dryer or Thermal Oxidiser	N/A
	CO		The generation of CO is only likely to occur on incomplete (oxygen-starved) combustion of volatiles or natural gas – the design of the Thermal Oxidiser is such that excess oxygen will be present to allow complete combustion, minimising CO production	N/A
	H ₂ SO ₄		No sulphuric acid has been added to the process at this point and hence cannot be evolved in the Spodumene Dryer or Thermal Oxidiser	N/A
	Hydrogen fluoride (HF)		The Works Approval Holder's operational analysis of the spodumene concentrate feedstock to the process has not identified the presence of fluoride-bearing minerals which could evolve HF in the Spodumene Dryer or Thermal Oxidiser	N/A
	Hydrogen chloride (HCl)		The Works Approval Holder's operational analysis of the spodumene concentrate feedstock to the process has not identified the presence of chloride-bearing minerals which could evolve HCl in the spodumene dryer, and no hydrochloric acid is added to the process at this point and therefore no HCl is expected to be evolved in the Spodumene Dryer or Thermal Oxidiser	N/A

Discharge Point	Emissions	Discharge point height (metres above ground level)	Limit	Guideline values
	Cl		The Works Approval Holder's operational analysis of the spodumene concentrate feedstock to the process has not identified the presence of chloride-bearing minerals which could evolve HCl in the spodumene dryer, and no hydrochloric acid is added to the process at this point and therefore no chlorides are expected to be evolved in the Spodumene Dryer or Thermal Oxidiser	N/A
	TSP		<50 mg/m ³	50 mg/m ³ ¹
	PM ₁₀		<50mg/Nm ³ (point source)	50µg/m ³ (ambient) ²

Note 1: Based on NSW Protection of the Environment Operations (Clean Air) Regulation 2010

Note 2: Based on National Environment Protection (Ambient Air Quality) Measure

Dried spodumene is then calcined in a novel electric powered vertical calciner, which alters the spodumene ore from its native α -spodumene form (immune to acid digestion) into a β -spodumene form (susceptible to acid digestion).

Cooled calcined β -spodumene at <100°C is mixed with concentrated H₂SO₄ and fed into an electrically-heated rotary kiln (Acid Roaster) where the mixture is heated to 250°C. As the Acid Roaster is electrically heated, no combustion exhaust gases are generated by the heating source.

Sulphuric acid is consumed in the process, however, some acid may volatilise during the reaction. A flow of sweep air is induced in the Acid Roaster in order to direct all evolved acid vapours to a dedicated Acid Roast Scrubber. It is anticipated that some dust may be entrained in the sweep air.

The Acid Roast Scrubber comprises a venturi eductor that quenches the hot gas stream, dissolving acid vapour in water and trapping most of the particulate matter. The liquid stream from the venturi eductor is returned to the process, and the gas stream is then passed through a wet electrostatic precipitator (WESP) to further remove acid mist and very fine particulate matter. The gas discharge from the WESP is then discharged through the Acid Roast Scrubber Stack.

The flow rate through the Acid Roast Scrubber Stack is expected to be 2,774 Nm³/hr at 50°C – 70°C and the emissions are expected to be lower than the limits listed in Table 5.

Table 5: Point source air emissions from the Acid Roast Scrubber

Discharge Point	Emissions	Discharge point height (metres above ground level)	Limit	Guideline values
Acid Roast Scrubber Stack	NO _x	20	No combustion occurs in the Acid Roaster or Acid Roast Scrubber unit processes. There is therefore no source of NO _x generation in this area.	N/A
	SO ₂		The Acid Roaster is specified and designed to heat the contents to a temperature of 250°C. At this temperature, a small portion of the sulphuric acid will decompose into SO ₃ and H ₂ O. Evolution of SO ₂ only commences at temperatures > ~400°C – much higher than the design and operating temperature of the Acid Roaster. It is therefore not anticipated that SO ₂ will be generated in the Mid-Stream Demonstration Plant's Acid Roaster or Acid Roast Scrubber.	N/A
	SO ₃		<100 mg/Nm ³	100 mg/m ³ ¹
	CO		No sources of carbonaceous material are present in the Acid Roast Scrubber, nor are hydrocarbons present or being combusted. There is therefore no source of CO generation in the Acid Roaster or Acid Roast Scrubber	N/A
	H ₂ SO ₄		<100 mg/Nm ³	100 mg/m ³
	HF		The Works Approval Holder's operational analysis of the β-spodumene	N/A

Discharge Point	Emissions	Discharge point height (metres above ground level)	Limit	Guideline values
			concentrate feedstock to the process has not identified the presence of fluoride-bearing minerals which could evolve HF in the Acid Roaster or Acid Roast Scrubber	
	HCl		The Works Approval Holder's operational analysis of the β -spodumene feedstock to the Acid Roaster has not identified the presence of chloride-bearing minerals which could evolve HCl in the Acid Roaster, and no hydrochloric acid is added to the process at this point and therefore no HCl is expected to be evolved in the Acid Roaster or Acid Roast Scrubber	N/A
	Cl		The Works Approval Holder's operational analysis of the β -spodumene feedstock to the process has not identified the presence of chloride-bearing minerals which could evolve chlorides in the Acid Roaster, and no hydrochloric acid is added to the process at this point and therefore no chlorides are expected to be evolved in the Acid Roaster or Acid Roast Scrubber	N/A
	TSP		<50 mg/m ³	50 mg/m ³ ¹
	PM ₁₀		<50mg/Nm ³ (point source)	50 μ g/m ³ (ambient) ²

Note 1: Based on NSW Protection of the Environment Operations (Clean Air) Regulation 2010

Note 2: Based on National Environment Protection (Ambient Air Quality) Measure

Hydrometallurgical Processing

Lithium is extracted from the acid-roasted spodumene concentrate through a water leach, in sealed agitated tanks. The subsequent solids stream is filtered from the slurry to produce a primary residue tailings stream that is collected in a local hopper and pumped through to the final tailings pump box to the Tailings Management Facility (TMF).

Leached liquid is purified with pH adjustment in sealed tanks and ion exchange in closed vessels. Sodium phosphate reagents are then used in a series of closed agitated tanks to produce a slurry with solid lithium phosphate produced. Filtration separates the solid lithium phosphate and the low volume of lithium solution is recycled back into the process.

The final tailings stream from this circuit contains soluble lithium in the range of 60-80 mg/L, however the tailings are approximately <2% by volume of the total tailings stream going to the TMF.

Product Drying and Packaging

Lithium phosphate is reduced to 0% moisture content using an electrical indirect dryer and is then transferred to the packaging circuit to be loaded into sealed bulk bags for offsite transport. The packing circuit will be located inside a closed storage shed. Refer to Section 2.2.3.

Reagent and Water Services

Some local dry reagents will be located in the final product storage shed. Refer to Table 6 for Mid-Stream Local Dry Reagents.

Table 6: Mid-Stream Local Dry Reagents

Reagent	Stored quantity	Storage method	Annual usage
Sodium Carbonate (Soda Ash)	20 tonnes	Bags	124 tonnes per annum
Tri-sodium phosphate	250 tonnes	Bags	5,794 tonnes per annum
Cellulose	1 tonnes	Bags	313 tonnes per annum

Refer to Figure 7 for a site layout of the Mid-Stream Demonstration Plant.



Figure 7: Mid-Stream Demonstration Plant

2.2.3 Lithium Phosphate Bagging and Storage

The Mid-Stream R&D Demonstration Plant produces a technical grade lithium phosphate (Li_3PO_4) final product, which is a sparingly water-soluble lithium salt with largely inert properties, being classified hazardous (attracting hazard statements H302 “Harmful if swallowed” and H319 “Causes serious eye irritation”), but not a dangerous good. Handling precautions include use of general PPE only, and due to the very low solubility of lithium phosphate, accidental release measures involve recovery by mechanical means. One of the key reasons this product was chosen is due to the low risk profile in comparison to conventional lithium hydroxide monohydrate.

The facility is divided into two sections, the product bagging area and the product storage area, with the areas walled from one another and accessible by a rapid-internal PVC roller door. External roller door access is as annotated by the red-arrows, and personnel doors by blue arrows. Refer to Figure 8 for the Final Product Bagging and Storage Facility Plan View.

The facility is intended to be operated as a dry bagging circuit, with north and south-side awnings preventing water ingress during out-loading activities and no internal bunding or floor sump arrangements. Final product is packaged into waterproof 1t bulk storage bags that are placed on pallets and plastic-wrapped, further minimising the opportunity for product release through the bagging material.

The facility is fully enclosed with roller doors and personnel access doors. The product storage area will be fitted with a ridge line vent or similar as means of thermal heat load ventilation. The product bagging area will be positively pressurised and ventilated with filtered external air – keeping outdoor particulates out of the bagging area. This pressurised air will spill to the product storage area through filtered louver panels and will be regularly inspected, cleaned and replaced. Given the design of the semi-automated bagging plant, very limited lithium phosphate

product is expected to be released as dust, and operators will utilise suitable PPE to complete the required bagging tasks.

Final product is held in a sealed vertical product storage hopper directly adjacent to the facility and is transferred into the bagging area via sealed rotary screw conveyor directly to the semi-automated bagging plant. The bagging plant is an operator attended short batch process run 1-2 times daily, consisting of manual bag attachment, automated pallet dispensing, automated bag filling, manual bag tie-off and automated bag-and-pallet wrapping. During operation of the bagging plant, all doors to the product bagging area will be closed.

Following completion of bagging, the palletised filled bulk bags are transferred to product storage area by electric forklift, with the sensor driven high-speed PVC roller door ensuring minimal open time between the two areas. All external product storage area doors will be closed during this process.

Product load-out will occur semi-regularly (2-3 times / week) and involves forklift transfer of the palletised filled bulk bags onto an adjacent truck and closed trailers. No bagging operations will occur during this process.

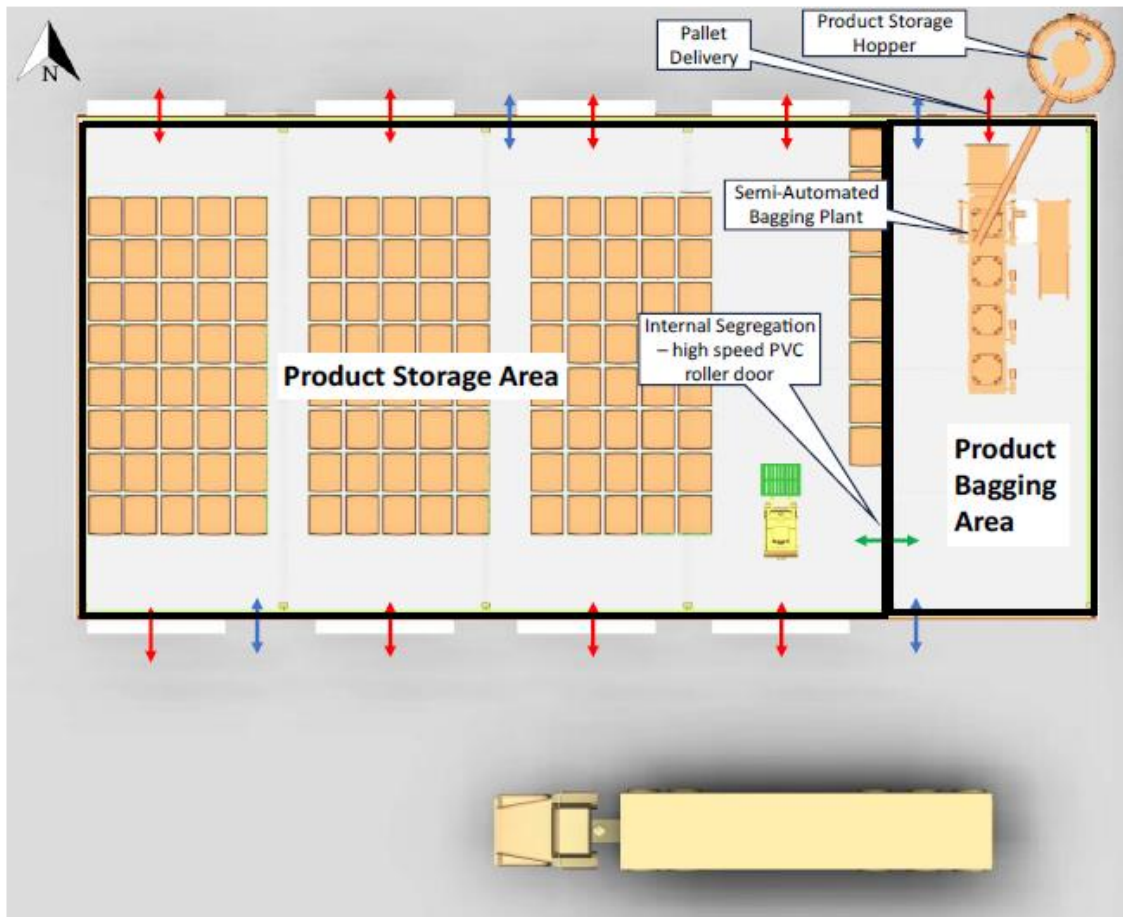


Figure 8: Final Product Bagging and Storage Facility Plan View

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 which have been considered in this Amendment Report are detailed in Table 7 below. Table 7 also details the proposed control measures the Works Approval Holder has proposed to assist in controlling these emissions, where necessary.

Table 7: Works Approval Holder controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Land clearing, construction and vehicle movements	Air/windborne pathway	<ul style="list-style-type: none"> • Clearing of vegetation kept to minimum required and in line with permit; • During high winds, top soil stripping and spreading activities restricted if dust cannot be adequately controlled; • Vehicle movements confirmed to defined haul roads and access roads with a maximum speed limit of 60 km/hr; • Visual inspections conducted to determine need for dust suppression; and • Dust suppressed by water carts on roads, water sprays at ore loading, crushing areas and dust suppressing agents.
Noise	Construction activities	Air/windborne pathway	EMISSION SCREENED OUT DUE TO DISTANCE TO SENSITIVE RECEPTORS
Hydrocarbons / chemicals	Construction activities	Direct discharges via leaks / spills	EMISSION SCREENED OUT AS WORKS APPROVAL HOLDER HAS ADVISED THAT THERE WILL BE NO CHANGES TO HYDROCARBON MANAGEMENT. CHEMICAL REAGENTS ARE ADDRESSED IN THE REAGENT STORAGE.

Emission	Sources	Potential pathways	Proposed controls
Commissioning, Time Limited Operations and Operations			
<i>Pilgan P1000 expansion project</i>			
Dust	High-Intensity Magnetic Separation Circuit	Air/windborne pathway	EMISSION SCREENED OUT AS WET PROCESS SO NO DUST EMISSIONS.
Tantalite concentrate and tailings stream		Direct discharges	
Tailings is enriched in lithium, thallium, bismuth and tantalum	Tailings Thickener new location	Direct discharges	<ul style="list-style-type: none"> • Situated within a catchment bund sized to 110% capacity of the thickener with sump pumps for material recovery back to the process plant, in the event of spillage.
Water enriched in lithium, thallium, bismuth and tantalum	Process Water Pond	Direct discharges by overtopping	<ul style="list-style-type: none"> • Level monitoring to the control system; • Engineered overflow spillway to site catchment drainage; and • Bunding of the discharge process water pumps.
		Infiltration via seepage through the base and embankments	<ul style="list-style-type: none"> • High density polyethylene (HDPE) liner.
		Fauna ingress to the area	<ul style="list-style-type: none"> • Fencing.
Reagents Refer to reagents in Section 2.2.1	Bulk Reagent Delivery Precinct	Direct discharges from leaks / spills	<ul style="list-style-type: none"> • Continuous concrete tanker unloading slab, segregating each reagent type by roll-over bunding; • Each reagent storage facility is contained within individual bunded areas sized to 110% of the largest held capacity with local sump pumps to manage rainfall and removal of spillage; and • All strong acid and base storage areas include pH monitoring of sumps to alert operators to reagent spillages.
Sediment laden water	Sediment Pond and Site Drainage Improvements	Direct discharges	<ul style="list-style-type: none"> • 10% AEP, 24 hour storm event has been adopted as a practicable engineering sizing criterion for run-off catchment capacity of processing area

Emission	Sources	Potential pathways	Proposed controls
			sediment structures; and <ul style="list-style-type: none"> Effective 4.5 hour retention time for the structure in a 1% AEP event.
Dust	Concentrate Handling Pad Expansion	Air/windborne pathway	<ul style="list-style-type: none"> Existing dust controls including windrows and regular removal of loose material from the engineered surface (cement stabilized pads) to be retained and extended across the new footprint.
Contaminated stormwater	Power Station Expansion	Direct discharges	<ul style="list-style-type: none"> Sediment ponds are located at a topographic low points within the processing and support infrastructure area to capture all stormwater and plant-runoff; and Facility contained so no contaminated runoff to be discharged into any drainage line or watercourse.
Hydrocarbons / chemicals		Direct discharges	<ul style="list-style-type: none"> Spill kits are located at various locations including diesel store, reagents store and plant maintenance areas to enable quick response to leaks and minor spills of hydrocarbons and chemicals; Drainage at the power station units be graded such that spills and surface water flow enters a triple oil/water interceptor; Oily water separator, with oil from the separation process stored in a 1,000 L tank prior to disposal offsite; Licence requires treatment to TRH <15 mg/L; Waste oil tanks self-contained double skin design within concrete aprons; and Fully enclosed metal storage bin for used oil contaminated parts which are collected for disposal offsite.
Air emissions		Air/windborne pathway	<ul style="list-style-type: none"> The power station engine hall to have gas detectors installed as necessary to detect leakage and alarm / shut-down the facility; and Reduction in overall CO_{2e} emission intensity due to change of fuel source.
Noise		Air/windborne pathway	<ul style="list-style-type: none"> Engine hall contains the proposed power station expansion, acoustically isolating the power generation noise from personnel.

Emission	Sources	Potential pathways	Proposed controls
Contaminated stormwater	LNG Unload and Storage	Direct discharges	<ul style="list-style-type: none"> Sediment ponds are located at a topographic low points within the processing and support infrastructure area to capture all stormwater and plant-runoff; and Facility contained so no contaminated runoff to be discharged into any drainage line or watercourse.
Hydrocarbons / chemicals		Direct discharges	<ul style="list-style-type: none"> Spill kits are located at various locations including diesel store, reagents store and plant maintenance areas to enable quick response to leaks and minor spills of hydrocarbons and chemicals
Air emissions		Direct discharges	<ul style="list-style-type: none"> No anticipated emissions during unloading or vaporisation operation; LNG venting from tank overpressure is anticipated to be extremely rare due to a regular delivery schedule which is significantly less than tank rated "hold-time" and is installed for tank protective purposes only; and The LNG storage facility to have gas detectors installed as necessary to detect leakage and alarm / shut-down the facility.

Midstream Demonstration Plant

Air emissions Particulate Matter, CO ₂ , SO ₃	Pyrometallurgical Processing	Air/windborne pathway	<ul style="list-style-type: none"> Latent moisture in the spodumene concentrate (~15% by weight) mitigates generation of excessive dust in the operation when it is transferred by the side-tipper truck onto the concrete pad; Covered conveyor between concrete pad and Rotary Dryer; 20 m above ground level stack with suitable sample ports for gas analysis and emissions reporting at Thermal Oxidizer; Calix Flash Calciner is zero emissions unit; Transfer of material to and from the calciner is via sealed pneumatic conveying with high-temperature dust collectors preventing any fugitive dust emissions from the process; Acid roast kiln has a system for scrubbing acid vapour process off-gas from the acid roast kiln – Venturi
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Emission	Sources	Potential pathways	Proposed controls
			<p>scrubber, Entrainment separator and Wet electrostatic precipitator;</p> <ul style="list-style-type: none"> • Acid vapor generation within the roast unit is captured by an integrated scrubber unit, outputting a water vapor stream only; and • Emissions from the Thermal Oxidiser and Acid Roaster Scrubber meet the limits in Table 4 and Table 5.
Sulphuric Acid	Pyrometallurgical Processing small-scale acid-roast	Direct discharges	<ul style="list-style-type: none"> • Acid Roast is contained within a suitable acid protected bund with appropriate dilution and sump arrangement to removal spillage to the plant tailings discharge.
Dust	Hydrometallurgical Processing	Air/windborne pathway	<ul style="list-style-type: none"> • Wet circuit, no fugitive dust emissions are expected.
Leach liquor, lithium phosphate, sodium phosphate		Direct discharges	<ul style="list-style-type: none"> • Process occurs entirely within concrete banded areas sized at 110% of the largest held tank in each subsection of the circuit; • Within Water Leach, all processing occurs in sealed agitated tanks; • pH adjustment occurs in sealed tanks; and • Ion exchange in closed vessels.
Lithium Phosphate dust	Product drying and packaging Lithium Phosphate Bagging and Storage	Air/windborne pathway	<ul style="list-style-type: none"> • Packing circuit located inside a closed storage shed to eliminate windborne dust generation and product contamination; • Bulk storage bags are placed on pallets and plastic-wrapped, further minimising the opportunity for product release through the bagging material; • Fully enclosed with roller doors and personnel access doors; • Product storage area fitted with a ridge line vent or similar as means of thermal heat load ventilation; • The product bagging area is positively pressurised and ventilated with filtered external air – keeping outdoor particulates out of the bagging area. This pressurised air spills to the product storage area through filtered louver panels and is regularly inspected, cleaned and replaced; and

Emission	Sources	Potential pathways	Proposed controls
			<ul style="list-style-type: none"> Given the design of the semi-automated bagging plant, very limited lithium phosphate product is expected to be released as dust, and operators utilise suitable PPE to complete the required bagging tasks.
Contaminated stormwater		Direct discharges	<ul style="list-style-type: none"> The location of the facility (and entire Mid-Stream R&D Demonstration Facility) lies within the overall Pilgan processing facility site catchment and surface water management design, reporting to an engineered sediment catchment structure; and Run-off from the facility roof catchment directed to a nearby drain arrangement to the south of the facility.
Spills of lithium phosphate		Direct discharges	<ul style="list-style-type: none"> Mechanical dry re-collection of any spilled material (a significant advantage due to the very low water solubility of the final product); Minor levels of contamination are tolerable and for internal spills within the facility, the re-collected product can simply be manually collected and re-bagged by an operator with suitable PPE; Should external spillage occur during the loading operation, similarly a dry clean-up strategy is employed, with the re-collected material transferred via bobcat back to the plant for re-processing; and No facility wet cleaning station is thus required for operation of the facility.

3.1.2 Receptors

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

Table 8 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 8: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Wallareenya Homestead	More than 30 km north of the Premises
Indee Station	More than 30 km northwest of the Premises.
South Hedland	More than 75 km north of the Premises
Tambrah Accommodation Camp	More than 20 km from the Premises.
Wodgina Mine Camp	More than 30 km southwest of the Premises.
Industrial receptors	<p>Ngungaju Project adjacent tenements (M45/1230 and M45/1231) approximately 3 km southwest of the Premises.</p> <p>Munjuda and Carlindi onsite accommodation camps approximately 2.1 km to 2.5 km north-east of the Premises.</p> <p>Wodgina Mine 60 km southwest of the Premises.</p>
Environmental receptors	Distance from prescribed activity
Threatened/Priority Flora	<p><i>No threatened or priority flora has been identified using publicly available GIS datasets. A study conducted by MMWC Environmental has identified the presence of “one species listed as Threatened Flora under the Wildlife Conservation Act 1050 (WA) is considered as Possible to occur in the survey area: Pityrodia sp. Marble Bar” (MMWC Environmental, July 2016).</i></p> <p>There are no Declared Rare Flora within the Premises.</p> <p>The Works Approval Holder’s database search indicated 16 species of Threatened and Priority listed flora occur within the vicinity of the project.</p> <p>Priority species <i>Heliotropium muticum</i> was recorded during the July 2016 survey conducted by the Works Approval Holder.</p>
Threatened/Priority Fauna	<p>Conservation significant species have been recorded in the survey area. These include the Rainbow Bee-eater listed under the EPBC Act, the Pilbara Leaf-nosed bat listed under the EPBC Act and the Western Pebble-mouse listed under the <i>Wildlife Conservation Act 1950 (WA)</i> (360 Environmental, July 2016).</p> <p>Threatened species <i>Pityrodia sp. Marble Bar</i> (G. Woodman & D. Coultas GWDC Opp 4) is considered possible to occur in the survey area.</p>
Threatened Ecological Communities and Priority Ecological Communities	There are no Threatened Ecological Communities or Priority Ecological Communities within or in a 30 km radius of the Premises
Groundwater Dependent Ecosystems (GDE)	The nearest significant GDE (i.e. a GDE with moderate

	or higher potential for interaction with subsurface groundwater) to the Pilgangoora project, as identified in the GDE Atlas, is the Chinnamon Creek system (GRM, 2017). The Chinnamon Creek system is classified as having moderate potential for interaction. This ecosystem is located approximately 2 km south of project (and 3 km south of any dewatering activities).
Department of Biodiversity, Conservation and Attractions - Managed Lands and Waters	Mungaroo Range Nature Reserve boundary is located approximately 82 km south-west of the Premises
Public Drinking Water Sources Area (PDWSA)	There are no PDWSA within the Premises.
RAMSAR wetland	No RAMSAR wetlands within 30 km radius of the Premises.

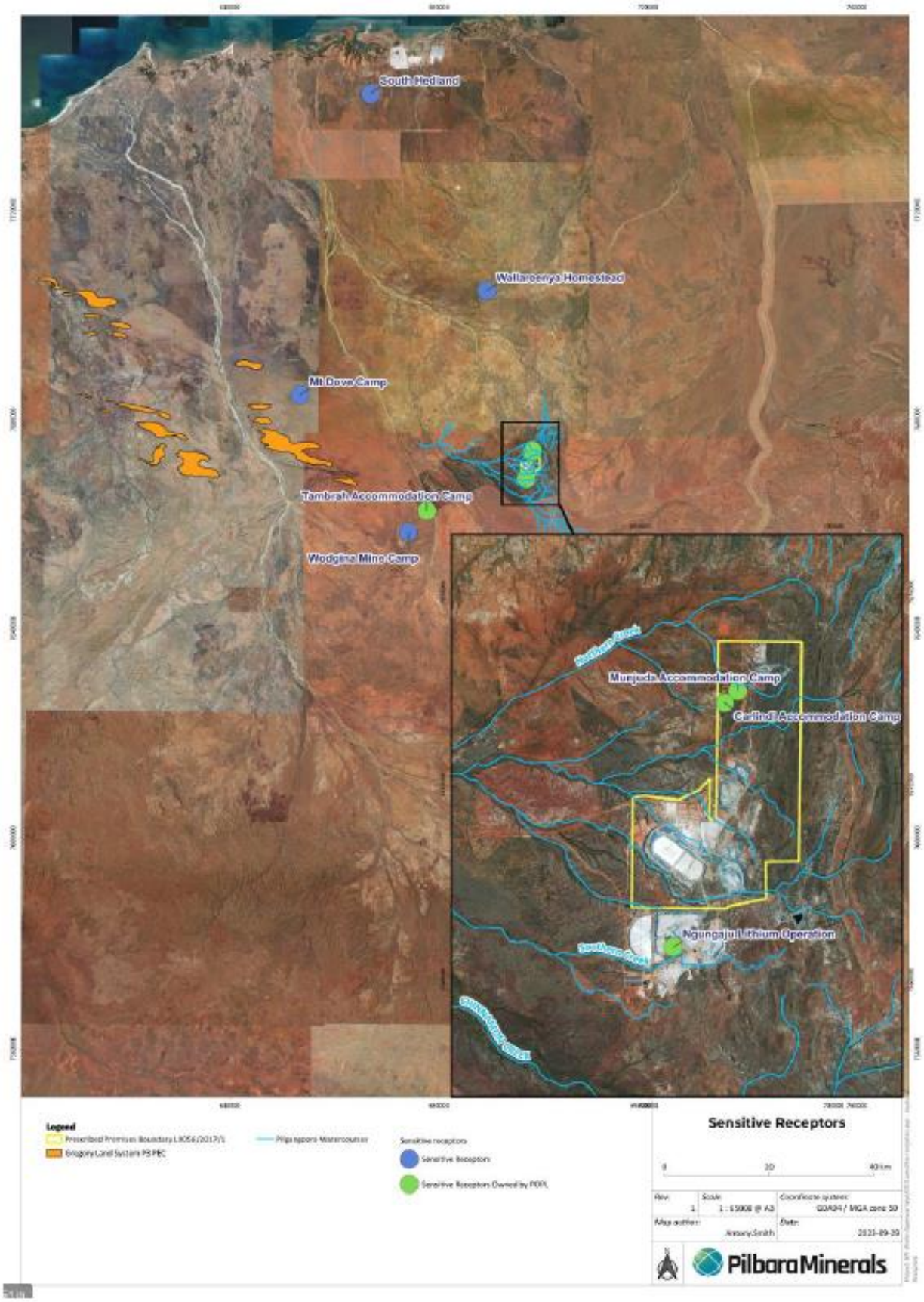


Figure 9: Distance to sensitive receptors

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the Works Approval Holder 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 Works Approval Holder'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 Works Approval Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 9.

The Revised Works Approval W6051/2017/1 that accompanies this Amendment Report authorises construction, commissioning and time-limited operations. The conditions in the Revised Works Approval have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

An amendment to existing licence L9056/2017/1 is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the Premises i.e. Category 5, 31, 52 and 73 activities. A risk assessment for the operational phase has been included in this Amendment Report, however licence conditions will not be finalised until the department assesses the licence application.

Table 9. Risk assessment of potential emissions and discharges from the Premises during construction, commissioning and operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
Construction								
Placement of new/replaced equipment, vehicle movements and ground disturbance, excavations	Dust	Air/windborne pathway causing impacts to health and amenity	Surrounding Vegetation	Refer to Section 3.1	C = Minor L = Possible Medium Risk	Y	N/A	N/A
Commissioning, Time Limited Operations and Operations								
<i>Pilgan 1000 Expansion Project</i>								
High-Intensity Magnetic Separation Circuit	Tantalite concentrate and tailings stream	Direct discharges	Soils Surrounding Vegetation	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
Tailings Thickener new location	Tailings enriched in lithium, thallium, bismuth and tantalum	Direct discharges	Soils Surrounding Vegetation	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations	N/A

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Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
							Operational requirements for infrastructure including maintenance	
Process Water Pond	Water enriched in lithium, thallium, bismuth and tantalum	Direct discharges by overtopping	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Moderate L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
		Infiltration via seepage through the base and embankments	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Moderate L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
		Fauna ingress to the area	Fauna impacts	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations	N/A

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Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
							Operational requirements for infrastructure including maintenance	
Bulk Reagent Delivery Precinct	Reagents	Direct discharges from leaks / spills	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
Sediment Pond and Site Drainage Improvements	Sediment laden water	Direct discharges	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
Concentrate Handling Pad Expansion	Dust	Air/windborne pathway	Surrounding Vegetation	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations	N/A

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Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
							Operational requirements for infrastructure including maintenance	
Power Station Expansion	Contaminated stormwater	Direct discharges	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
	Hydrocarbons / chemicals	Direct discharges	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
	Air emissions	Air/windborne pathway	Surrounding vegetation	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations	N/A

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Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
							Operational requirements for infrastructure including maintenance	
	Noise	Air/windborne pathway	Fauna	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
LNG Unload and Storage	Contaminated stormwater	Direct discharges	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
	Hydrocarbons / chemicals	Direct discharges	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations	N/A

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Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
							Operational requirements for infrastructure including maintenance	
	Air emissions	Air/windborne pathway	Surrounding Vegetation	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
	Noise	Air/windborne pathway	Fauna	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
<i>Mid-Stream Demonstration Plant</i>								
Pyrometallurgical Processing and small-scale acid-roast	Air emissions Particulate Matter, CO ₂ , SO ₃	Air/windborne pathway	Surrounding Vegetation	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	N	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3	Addition of NO _x and PM ₁₀ limits to Thermal Oxidiser as may be present within the air emissions stream

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Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
							<p>Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance</p> <p><u>Condition 13, Table 4 Emissions and discharges limits during time limited operations Sets limits for air quality parameters from stacks</u></p> <p><u>Condition 14, Table 5 Emissions and discharges monitoring during time limited operations Requires monitoring of air quality parameters from stacks</u></p>	<p>Addition of H₂SO₄ and PM₁₀ limits to Acid Roast Scrubber as may be present within the air emissions stream</p> <p>Addition of NO_x monitoring to Thermal Oxidiser as may be present within the air emissions stream</p> <p>Addition of H₂SO₄ monitoring to Acid Roast Scrubber as may be present within the air emissions stream</p>
	Sulphuric Acid	Direct discharges	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	<p>Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure</p> <p>Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance</p>	N/A
Hydrometallurgical Processing	Dust	Air/windborne pathway	Surrounding Vegetation	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure	N/A

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Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
							Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	
	Leach liquor, lithium phosphate, sodium phosphate	Direct discharges	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
Product drying and packaging Lithium Phosphate Bagging and Storage	Lithium Phosphate dust	Air/windborne pathway	Surrounding Vegetation	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A
	Contaminated stormwater	Direct discharges	Surface water Surrounding Vegetation	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure	N/A

Works Approval: W6051/2017/1

Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
			Groundwater				Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	
	Spills of Lithium Phosphate	Direct discharges	Surface water Surrounding Vegetation Groundwater	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1, Table 7 Design and construction / installation requirements Requirements for design of infrastructure Condition 12, Table 3 Infrastructure and equipment requirements during time limited operations Operational requirements for infrastructure including maintenance	N/A

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

Note 2: Proposed Works Approval Holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4. Consultation

Table 10 provides a summary of the consultation undertaken by the department.

Table 10: Consultation

Consultation method	Comments received	Department response
Local Government Authority advised of proposal (10/08/2023)	None received.	N/A.
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal (10/08/2023)	DMIRS replied on 22/08/2023 stating/advising that the description of the activities proposed within the Works amendment appear consistent with Mining Proposal (MP) Reg ID 117446 for the Pilgangoora Lithium-Tantalum Project.	Noted.
Department of Planning, Lands and Heritage (DPLH) advised of proposal (10/08/2023)	<p>DPLH replied on 31/10/2023 stating/advising that the proposed works area does not intersect with any known Aboriginal Cultural Heritage Places. However, according to records held by DPLH, it is unclear whether recent Aboriginal Cultural Heritage Surveys have been undertaken over the subject expansion area, and such information is not detailed in the document provided. Therefore, unknown Aboriginal Cultural Heritage Places could be present within the disturbance area.</p> <p>The Project area falls within the boundary of the Nyamal People #1 Native Title Determination area (represented by the Nyamal Aboriginal Corporation (NAC)). The Supporting Document references engagement with the Native Title Party on two occasions to discuss the proposed works, however, it does not detail any outcomes of such consultation or comments made by NAC. DPLH encourages ongoing consultation with the Traditional Owners to allow for best practice management of the cultural heritage present in the area, to discuss the requirement of any Aboriginal Heritage Surveys and to discuss the potential impact of the proposed works.</p>	Noted.
Nyamal Aboriginal Corporation advised of	None received.	N/A.

Consultation method	Comments received	Department response
proposal 10/08/2023		
Works Approval Holder was provided with draft amendment on 10/11/2023	Works Approval holder replied on 22/11/2023. Refer to Appendix 1.	Refer to Appendix 1.

5. Conclusion

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

5.1 Summary of amendments

Table 11 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Works Approval as part of the amendment process.

Table 11: Summary of works approval amendments

Existing condition	Condition summary	Revised licence condition	Proposed amendments
N/A	N/A	N/A	General formatting and updates to the works approval template.
Front page	Prescribed premises category description	N/A	Addition of Category 31 Chemical Manufacturing for the Mid-Stream Demonstration Plant.
1, Table 7	Construction condition	1, Table 7	Replacement of condition with updated condition.
2	Must not depart from requirements	N/A	Condition removed.
3	Compliance condition	2	Modifications to the condition so it is in line with updated condition.
4	Environmental Compliance Report	3	Modifications to the condition so it is in line with updated condition.
5, Table 3	Commissioning following Environmental Compliance Report	4	Replacement of condition with updated condition.
6, Table 3	Commissioning requirements	5, Table 1	Replacement of condition with updated condition.
7, Table 4	Emissions and discharge monitoring during environmental commissioning	6, Table 2	Updated condition number and table number.
8	Record monitoring results	7	Updated condition number.

Existing condition	Condition summary	Revised licence condition	Proposed amendments
9	Environmental Commissioning Report	8	Modifications to the condition so it is in line with updated condition.
10	Environmental Commissioning Report information	9	Updated condition number.
11	Commencement of TLO	10	Modifications to the condition so it is in line with updated condition.
12	Period of TLO	11	Replacement of condition with updated condition.
N/A	Infrastructure and equipment requirements during time limited operations	12, Table 3	New condition to regulate new infrastructure during TLO.
N/A	Emissions and discharges limits during time limited operations	13, Table 4	New condition to limit air quality emissions from the new Thermal Oxidiser stack and Acid Roast Scrubber stack.
15, Table 5	Emissions and discharges monitoring during time limited operations	14, Table 5	Addition of Mid-Stream Demonstration Plant air quality emissions monitoring.
N/A	Record monitoring results	15	New condition to ensure results recorded.
13	TLO Report	16	Modifications to the condition so it is in line with updated condition.
14	TLO Report requirements	17	Modifications to the condition so it is in line with updated condition and includes new infrastructure.
16, Table 6	Authorised Emissions Table	N/A	Removed as not standard condition.
N/A	Complaints	18	Addition of this condition as it is standard condition.
19	Books	19 and 20	Replacement of condition with updated condition.
20	Department request	N/A	Removed as not standard condition.
17	NATA accreditation	21	Updated condition number.
18	Notification of non-compliance	22	Updated condition number.
Table 2	Definitions	Table 6	Definitions updated and removed as applicable.
Schedule 1: Maps	Maps	Schedule 1: Maps	Addition of figures and maps.

Existing condition	Condition summary	Revised licence condition	Proposed amendments
Schedule 2: Site Plans	Site Plans	N/A	Heading removed and located under Schedule 1.
Schedule 3: Works	Table 7 Infrastructure and equipment requirements table Table 8 Authorised works - construction	Schedule 2: Works Table 7 Design and construction / installation requirements Table 8 Authorised works - construction	Removal of constructed infrastructure from the tables and addition of new infrastructure to the tables.

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. Pilbara Minerals, Works Approval Amendment Application W6051/2017/1 - Pilbara Minerals 12/05/2023, West Perth, Western Australia.
5. Pilbara Minerals, PILBARA MINERALS RESPONSE - APPLICATION FOR AN AMENDMENT TO WORKS APPROVAL W6051/2017/1 - REQUEST FOR FURTHER INFORMATION 24/07/2023 24/07/2023, West Perth, Western Australia.
6. Pilbara Minerals, RE: W6051 Pilgangoora Queries 15/08/2023, West Perth, Western Australia.
7. Pilbara Minerals, Pilbara Minerals Ltd Response to RFI - Works Approval 6051/2017/1 09/10/2023, West Perth, Western Australia.
8. Pilbara Minerals, RE: NOTICE REGARDING PROPOSED AMENDMENT TO WORKS APPROVAL - W6051/2017/1 21/11/2023, West Perth, Western Australia.

Appendix 1: Summary of Works Approval Holder's comments on risk assessment and draft conditions

Condition	Summary of Works Approval Holder's comment	Department's response
Works Approval		
Cover page	The Works Approval should read: Registered business address: Level 2, 146 Colin Street WEST PERTH WA 6005	Updated as requested.
Works Approval History	The Works Approval should read: Amendment 4 includes the following amendments: Please remove the text 'this amendment'. This is wording from a previous works approval amendment and will assist with administration moving forward.	Updated as requested.
	Grammatical Error: There is an extra space. It should read 275 m ³ /day. Please amend to assist with administration moving forward.	Updated as requested.
Environmental Commissioning Phase	Please remove Condition 8 and 9 of the Works Approval. Commissioning is only required for the Waste Water Treatment Plant, already specified in Conditions 4 – 7 of the Works Approval. PLS do not require commissioning of any other items of infrastructure listed in table 7. Only time limited operation is required, which is addressed in a separate section.	Conditions not removed as relevant to the WWTP, however, updated to only refer to WWTP.
Time Limited Operations Phase	As a result of removal of Condition 8 and 9, remove the sentence reference to Condition 8.	Updated to correct condition.
Works Approval Schedule 2: Works	Please reinstate this item referred to as 1,000,000 Mtpa mobile crushing and screening plant with all existing requirements (design and	Updated as requested.

Works Approval: W6051/2017/1

Condition	Summary of Works Approval Holder's comment	Department's response
Table 7: Design and construction / installation requirements. Item 21 – Mobile Crusher	<p>construction).</p> <p>It is expected that this facility will be required in the short term to assist with operations.</p>	
<p>Works Approval Schedule 2: Works</p> <p>Table 7 Design and construction / installation requirements.</p> <p>Item 14 - Power Station Expansion</p>	<p>Remove this requirement from Item 14 – Power Station Expansion. This requirement is a double up with Item 15 of Table 7.</p> <p>This requirement will only be relevant for Item 15 of Table 7 - LNG unload and storage.</p>	<p>Updated as requested.</p> <p>Noting: Item 15 is now for the Power Expansion and Item 16 is the LNG unload and storage.</p>
<p>Works Approval Schedule 2: Works</p> <p>Table 7 Design and construction / installation requirements</p> <p>Item 16 – Pyrometallurgical processing</p>	<p>Remove the construction and design requirement for the calix flash calciner to be a zero emissions unit. This is an operational requirement, and not a construction requirement.</p> <p>Remove the three points from pyrometallurgical regarding the processing occurring within water leach, pH adjustment and ion Exchange as they are only relevant for the hydrometallurgical processing in item 17 of table 7.</p> <p>They do not occur in the pyrometallurgical section and should be removed from item 16 Table 7.</p>	<p>Updated as requested.</p> <p>Noting: Item 16 referenced is now Item 17 for the Pyrometallurgical Processing.</p>
<p>Works Approval Schedule 2: Works</p> <p>Table 7 Design and construction / installation requirements</p> <p>Item 16 – Pyrometallurgical processing</p>	<p>There is a double up of this requirement for Item 16 listed on the previous page 55 (within the same table). Please remove the double up so it is only listed once.</p>	<p>Updated as requested.</p>
<p>Works Approval Schedule 2: Works</p> <p>Table 7 Design and construction / installation requirements</p> <p>Item 16 – Pyrometallurgical</p>	<p>The entire pyrometallurgical processing (dry component) is not required to be in an acid protected bund.</p> <p>The Acid Roast is the only component that will contain acid or involve the storage and containment of an acid.</p> <p>Amend wording to reflect that the Acid Roast is the only listed pyrometallurgical unit that will be acid banded, with dilution and sump</p>	<p>Updated as requested.</p>

Condition	Summary of Works Approval Holder's comment	Department's response
processing	<p>arrangements, with removal of spillage to the plant tailings discharge.</p> <p>Requirement should read:</p> <p>Acid Roast is contained within a suitable acid protected bund with appropriate dilution and sump arrangement to removal spillage to the plant tailings discharge.</p>	
<p>Works Approval Schedule 2: Works</p> <p>Table 7 Design and construction / installation requirements</p> <p>Item 16 – Pyrometallurgical processing</p>	<p>As mentioned in comment 10 above, the start of the pyrometallurgical plant (rotary dryer, thermal oxidiser, calix flash calciner) is processing dry spodumene ore and there is no wet process involved (until the acid roaster) later in the process.</p> <p>The dry process occurs in fully sealed compartments and is not required to be banded, but instead is designed to sit on concrete pads.</p> <p>Remove this design and construction requirement for the pyrometallurgical plant.</p> <p>Acid bund is already addressed for the acid roast component</p>	Updated as requested.
<p>Works Approval Schedule 2: Works</p> <p>Table 7 Design and construction / installation requirements</p>	<p>The dust collector in Acid Roast Feed Bin is now not cyclonic, but via direct impingement into a hard-faced wear plate. The word cyclonic should be removed from the requirement.</p> <p>Works Approval should read:</p> <p>Transfer of material to and from the calciner is via sealed pneumatic conveying with high-temperature dust collectors;</p>	Updated as requested.
<p>Works Approval Schedule 2: Works</p> <p>Table 7 Design and construction / installation requirements</p> <p>Item 17 – Hydrometallurgical Processing</p>	<p>Please amend to read:</p> <p>Hydrometallurgical</p>	<p>Updated as requested.</p> <p>Noting: Item 17 referenced is now Item 18 for the Hydrometallurgical Processing.</p>
<p>Works Approval Schedule 2: Works</p> <p>Table 7 Design and construction / installation</p>	<p>Please amend the wording on this sentence. Works Approval should read:</p> <p>Within Water Leach, all processing occurs in sealed agitated tanks;</p>	Updated as requested.

Condition	Summary of Works Approval Holder's comment	Department's response
requirements Item 17 – Hydrometallurgical Processing		
Works Approval Schedule 2: Works Table 7 Design and construction / installation requirements Item 19 – Reagent and Water Services	Only reagents are stored within the final product storage shed. Water services are not. Works Approval should read: Reagents are stored within the final product storage shed. Raw water is stored within 4 x 25,000 L storage tanks outside the facility. It should be noted the tanks will only contain raw water to feed the plant, and any overflows will be directed to the plant site sediment pond.	Updated as requested. Noting: Item 19 referenced is now Item 20 for Reagent and Water Services.
Amendment Report		
Works Approval IR-T15 Amendment Report Draft	Remove the word cyclonic from the pneumatic conveyor design. The design was revised however the process remains unchanged. The dust collector in Acid Roast Feed Bin is now not cyclonic, but via direct impingement into a hard-faced wear plate.	Updated as requested.
	Updated Amendment Report controls as per modifications made in the works approval also.	N/A.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY			
Application type			
Amendment to works approval	<input checked="" type="checkbox"/>	Current works approval number:	W6051/2017/1
Date application received		12 May 2023	
Applicant and Premises details			
Applicant name/s (full legal name/s)		Pilgangoora Operations Pty Ltd	
Premises name		Pilgangoora Lithium-Tantalum Project	
Premises location		Mining Tenement M45/1256 and L45/417, MARBLE BAR WA 6760	
Local Government Authority		Shire of East Pilbara	
Application documents			
HPCM file reference number:		DER2017/000317	
Key application documents (additional to application form):		<p>The amendment application documentation includes the following:</p> <ul style="list-style-type: none"> • Works Approval Amendment Cover Letter • Works Approval Amendment Application Form • Works Approval Amendment Application Form (Signature Page) • Works Approval Amendment Supporting Information • Declaration of Authority – Mr Ian Zlatnik <p>Appendix 2 – Design Documentation</p>	
Scope of application/assessment			
Summary of proposed activities or changes to existing operations.		<p>This Works Approval Amendment Application proposes the construction of supporting infrastructure changes to the Stage 2 processing plant and construction of the Mid-Stream Demonstration Facility via an amendment to the existing and current Works Approval W6051/2017/1. The new infrastructure will be located in and around the existing plant.</p> <p>The following amendments are being sought as part of the Pilgan P1000 expansion project and Mid-Stream Demonstration Research and Development (R&D) Plant:</p> <ul style="list-style-type: none"> • Addition of high-intensity magnetic separation circuit; • Relocation of approved (yet to be constructed) stage 2 tailings thickener; • Addition of 5 ML process water pond; • Relocation and expansion of approved (yet to be constructed) stage 2 reagent storage yard; • Expansion of the existing west sediment trap; • Expansion of the existing spodumene handling pad and relocation / expansion of the existing associated sediment traps; • Expansion of the onsite Power Station generation capacity; • Addition of a trucked Liquefied Natural Gas (LNG) storage facility; and • Addition of the Mid-Stream Demonstration Plant. 	

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

Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 5 – Processing or beneficiation of ore	5,000,000 tonnes per annum	No Change, however, equipment relocation, change and expansion.
Category 31 - Chemical manufacturing: premises (other than premises within category 32) on which chemical products are manufactured by a chemical process.	-	5,000 tonnes per annum
Category 52 – Electric power generation	32.5MW	36MW
Category 54 – Sewage Facility	275m ³ /day	No Change
Category 64 – Putrescible landfill	20,000 tpa	No Change
Category 70 – Screening etc. of material	1,000,000 tpa	No Change
Category 73 - Bulk storage of chemicals	1,476KL of fuel CNG 60KL of chemical storage	1,476 kL (diesel fuel) 560m ³ (trailer mounted CNG) 560 kL (chemical storage) 1,572 kL (fixed LNG)

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N.A
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N.A
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Mining Act Tenure

Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	CPS No: 8175/1
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N.A
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	GWL183354(5)
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Pilbara Proclaimed Groundwater Area/Surface Water Area
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N.A
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<i>Mining Act, Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004</i>
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N.A
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N.A
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N.A not shown in geocortex.