Amendment Report

Application for Works Approval Amendment

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

Works Approval Number	W6209/2019/1
Works Approval Holder	Hastings Technology Metals Limited
ACN	122 911 399
File Number	DER2019/000040
Premises	Yangibana Rare Earths Project Legal description - Mining Tenements G09/14, M09/158, M09/157, G09/18, G09/17, G09/20 and M09/161 WEST LYONS RIVER WA 6705 As defined by the Premises map attached to the Revised Works Approval
Date of Report	10 June 2022
Decision	Revised works approval granted

A/SENIOR 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

Works Approval W6209/2019/1 is held by Hastings Technology Metals Limited (Works Approval Holder) for the Yangibana Rare Earths Project (the Premises), located on mining tenements on Wanna Station and Gifford Station, approximately 150 km northeast of Gascoyne Junction in the Shire of Upper Gascoyne, Western Australia.

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 W6209/2019/1 has been granted.

The Revised Works Approval issued as a result of this amendment supersedes the existing works approval previously granted in relation to the Premises.

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 17 September 2021, the Works Approval Holder submitted an application to the department to amend Works Approval W6209/2019/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments were being sought:

- Relocation of the ore processing plant approximately 750 m to the east of the approved location;
- Removal of the hydrometallurgical circuit from within the ore processing plant and the addition of ore sorting infrastructure to the beneficiation circuit;
- Relocation of the wastewater treatment plant (WWTP) and spray-field (which will service the process plant and mine support buildings) to the new ore processing plant location (movement of around 500 m to 750 m east of current approved location); and
- Removal of Category 52: Electrical power generation and Category 73: Bulk storage of chemicals from the works approval due to reduced throughput and design capacity.

Other prescribed premises Categories on the works approval to remain unchanged (Category 6: Mine dewatering and Category 64: Landfill).

This amendment is limited only to changes to Category 5, 52, 73 and 85 activities from the existing Works Approval. No changes to the aspects of the existing Works Approval relating to Categories 6 and 64 have been requested by the Works Approval Holder. Table 1 below outlines the proposed changes to the existing Works Approval.

The proposed changes were a result of a review undertaken by the Works Approval Holder to further optimise the premises activities and to reduce cost.

In addition, general purpose lease G09/16 on the works approval has expired and is now a dead tenement. It has been replaced by general purpose lease G09/20, which will be added to the revised works approval.

Table 1: Proposed changes to prescribed activities

Category	Current throughput / design capacity	Proposed throughput / design capacity	Description of proposed amendment
5 – Processing or beneficiation of ore	1100,000 tonnes per annual period	No change.	• Relocation of ore processing plant 750m east of currently approved location. • Addition of ore sorting process to the beneficiation circuit. • Removal of hydrometallurgical circuit.
6 – Mine dewatering	60,000 tonnes per annual period	No change.	N/A
52 – Electrical power generation	20.16 MW per annual period	8.4 MW per annual period. Category removed.	• Change in design capacity means that this activity no longer triggers Category 52 and so this category will be removed from the works approval.
64 – Class II or III putrescible landfill site	3,487 tonnes per annual period	No change.	N/A
73 – Bulk storage of chemicals etc.	1,255 m^3 in aggregate	240 m^3 in aggregate. Category removed.	• Change in design capacity means that this activity no longer triggers Category 73 and so this category will be removed from the works approval.
85 – Sewage facility	34 m^3/day	No change.	• Location of WWTP and spray-field moved to new process plant location (500-750m to the east).

2.2.1 Changes to Category 5 activities

The current approved design of the ore processing plant comprises two sequential process circuits: the beneficiation process, followed by the hydrometallurgical process. Through this amendment, the Works Approval Holder is seeking to change the process, layout, and location of the ore processing plant. Changes to the ore processing plant location are outlined in Figure 1 and changes to the process and layout are outlined in Figure 2.

Location of process plant

The location of the process plant is proposed to be shifted to approximately 750 m to the east of its approved location (Figure 1). The change in location was to more favourable ground conditions for construction activities and to reduce distance to transport ore from the mining operations to the process plant, which represented a significant reduction in operating expenditure.

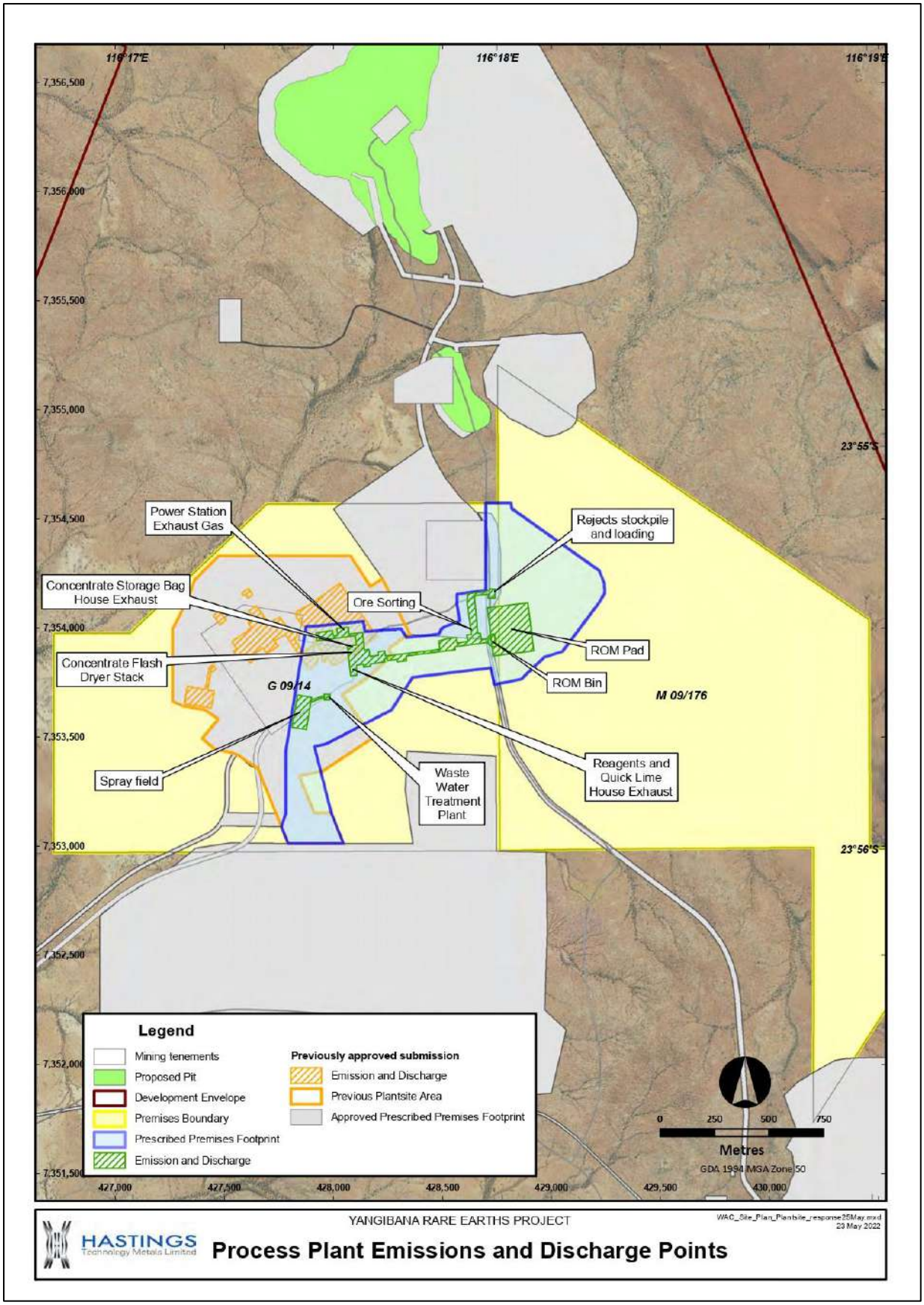

Figure 1: Updated location of process plant

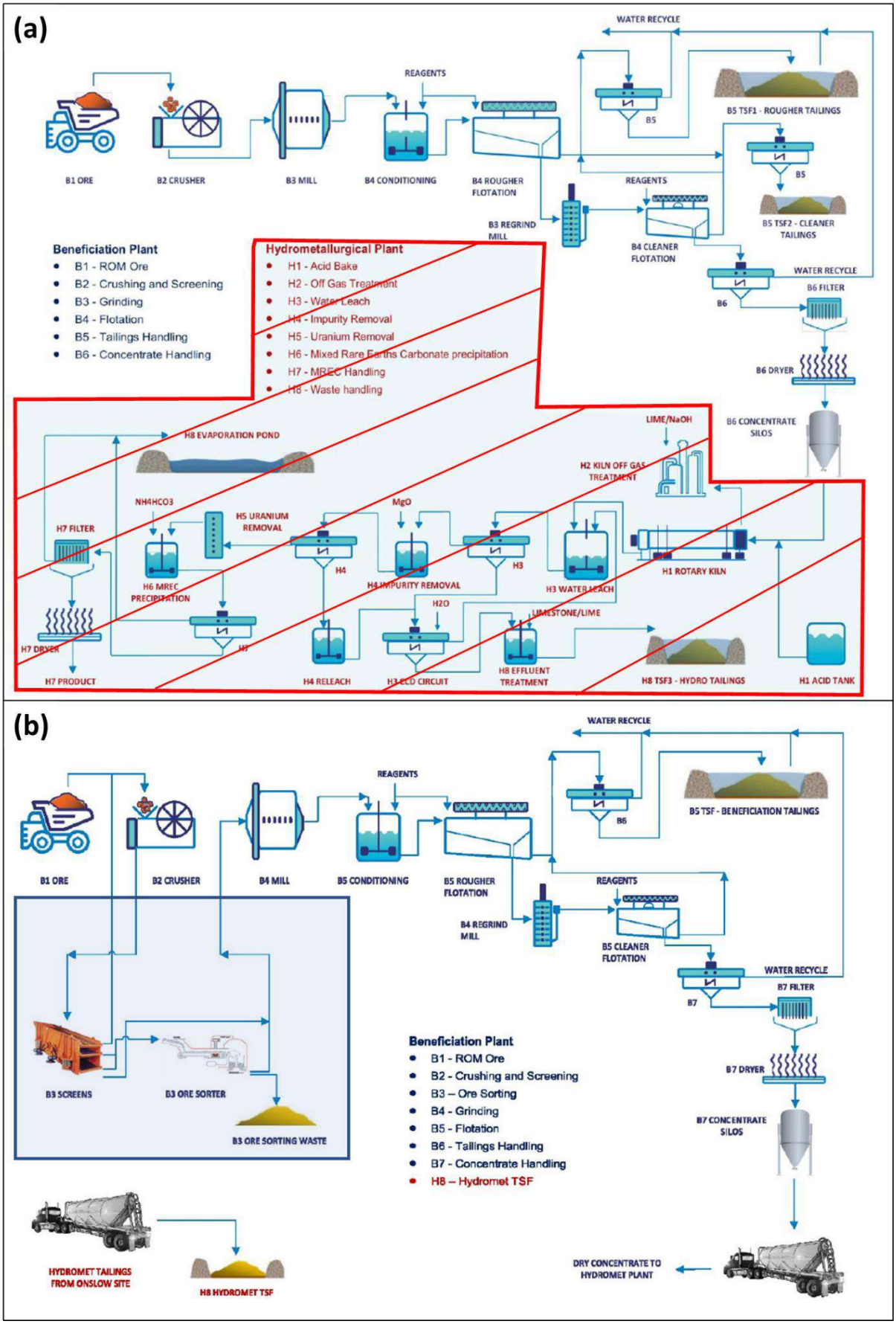

Figure 2: Summary of the proposed change in process for the ore processing plant

Hydrometallurgical plant and tailings storage facility

The process of the ore processing plant is proposed to be simplified to a beneficiation plant through the removal of the hydrometallurgical plant. The Works Approval Holder intends to construct the hydrometallurgical plant on a separate premises at the Ashburton North Strategic Industrial Estate in Onslow and will be assessed under a separate works approval. Therefore, the hydrometallurgical plant will no longer fall within the scope of works approval W6209/2019/1. Ore concentrate produced from the beneficiation process is intended to be transported offsite to undergo the hydrometallurgical process.

Based on correspondence with the Works Approval Holder during the assessment of this amendment, the department understands that the Works Approval Holder intends to retain the Hydromet tailings storage facility (TSF) at the premises. The Hydromet TSF was designed to abut the north-eastern portion of the larger Beneficiation TSF (Figure 3) and would receive tailings from the hydrometallurgical plant and barren liquor (wastewater from the hydrometallurgical process and reverse osmosis effluent from the wastewater treatment plant). The Works Approval Holder has proposed to transport tailings from the offsite hydrometallurgical plant and deposit them into the Hydromet TSF.

Due to potential changes to either tailings characteristics or deposition method, an updated assessment is required to assess and manage the risk of emissions and discharges at the Hydromet TSF. At the time of this amendment, the Works Approval Holder is still in the process of updating their TSF design and operational strategy. As such, the Delegated Officer has decided to remove the authorisation for time-limited operation of both the Beneficiation TSF and Hydromet TSF from the works approval. Time-limited operation authorisation for the Beneficiation TSF was also removed as it shares an embankment with the Hydromet TSF and will likely be affected by the updated TSF design.

Under the amended works approval, the Works Approval Holder is still allowed to construct the TSFs in accordance with the approved design. However, the department notes that the approved design may not necessarily be fit-for-purpose due to potential changes to TSF design, tailings characteristics or deposition method. The department understands, through verbal communication with the Works Approval Holder, that construction of either TSFs will not commence until the updated TSF design has been finalised and its construction and time-limited operation have been assessed by the department under a separate, future amendment to works approval W6209/2019/1.

Ore sorting

Furthermore, the Works Approval Holder also proposes to implement ore sorting as an additional process in the beneficiation process. After primary crushing, the crushed product will be conveyed through a transfer chute to either the secondary crushing and ore sorting or directly to the crushed ore bin.

During the ore sorting process, primary crushed ore will be conveyed to a primary vibrating screen, which will size the material at 60 mm and 10 mm. The >60 mm screen oversize will report to the secondary cone crushing, which will be fed via a bin and feeder arrangement and discharged back onto the primary screen feed conveyor. The 10-60 mm primary screen mid-size fraction will report to ore sorting and the <10 mm screen undersize will bypass ore sorting and report directly to the crushed ore bin.

To further segregate the mid-size fraction, a coarse and fine ore sorter will separate the 25-60 mm and 10-25 mm size fraction, respectively. A vibrating screen will be positioned above the ore sorters to achieve this size separation. The screen size fractions will drop into a surge bin prior to being fed into the ore sorter units.

The ore will be sorted based on density using X-ray transmission (XRT), where higher density product will be separated from low density waste via high pressure air to blow product onto the acceptance conveyor, where it will be collected and conveyed with the primary screen undersize

to the crushed ore bin.

Reject material will fall onto the rejects conveyor and will be trucked to the mine waste rock landform via a surge bin and truck loading stacker arrangement.

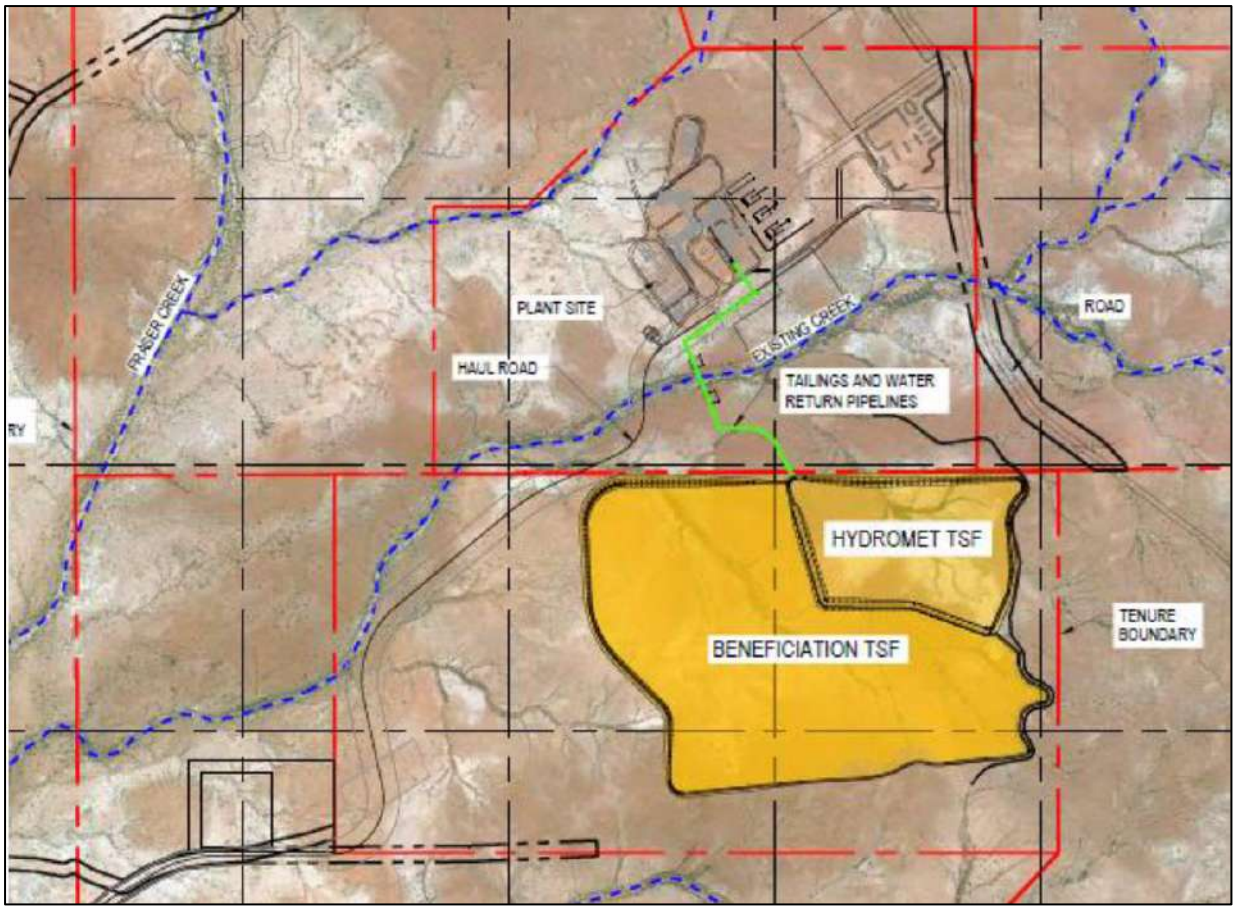

Figure 3: Current layout plan for Beneficiation TSF and Hydromet TSF

2.2.2 Changes to Category 52 activities

The design of the power station authorised under works approval W6209/2019/1 consisted of six 3.36 MW gas reciprocating generator sets and one 800 kW diesel black start generator, with an installed generation capacity of 20.16 MW.

Due to changes to infrastructure and required power consumption, the maximum demand will be approximately 8.4 MW. Consequently, the Works Approval Holder is proposing to replace the approved design with a Build-Own-Operation (BOO) using liquified natural gas (LNG), which will be delivered to site via tanker. An offloading and storage facility will be installed to store the LNG prior to evaporation and delivery to the power station, dryer and water heater.

As a result of these changes, the premises no longer meets the design capacity of a Category 52 prescribed activity.

2.2.3 Changes to Category 73 activities

Under the existing works approval, the Works Approval Holder was authorised to store up to 1,225 m^3 of chemicals (in aggregates) at the premises. The majority of the chemicals were used for the hydrometallurgical process, which will no longer be required due to the removal of the hydrometallurgical circuit from the ore processing plant (refer to Section 2.2.1).

Furthermore, the total capacity of these beneficiation chemicals will be reduced by 50%, with a required maximum storage of less than 240 m^3. The remaining chemicals stored at the premises are used for the floatation component of the beneficiation process, including:

- **Sodium hydroxide** – for pH alteration and control of the flotation stages.
- **Sodium silicate** – to disperse the gangue mineral particles in the slurry, to allow better separation in the flotation stages.
- **Collector (RE60)** – to float monazite selectively.
- **Flocculant** – to enhance the settling characteristics of the solids in thickeners.
- **Lime** – to assist with settling of flotation tailings and concentrate streams.

As a result of these changes, the premises no longer meets the design capacity of a Category 73 prescribed activity.

The Works Approval Holder has stated that all chemicals classed as dangerous goods will be stored in accordance with the requirements of the *Dangerous Goods Safety Act 2004* and the *Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007*.

2.2.4 Changes to Category 85 activities

The construction of a WWTP and associated sprayfield was authorised under works approval W6209/2019/1 to treat sewage from the ore processing plant and mine support buildings. Due to the shift in location for the ore processing plant (refer to Section 2.2.1), the location of the WWTP and sprayfield will also need to be relocated (Figure 4).

There are no proposed changes to the technical specification and capacity of the WWTP and sprayfield. The system will still comprise of a five-stage Bardenpho-activated sludge treatment plant designed treat effluent to Western Australian Class C standards.

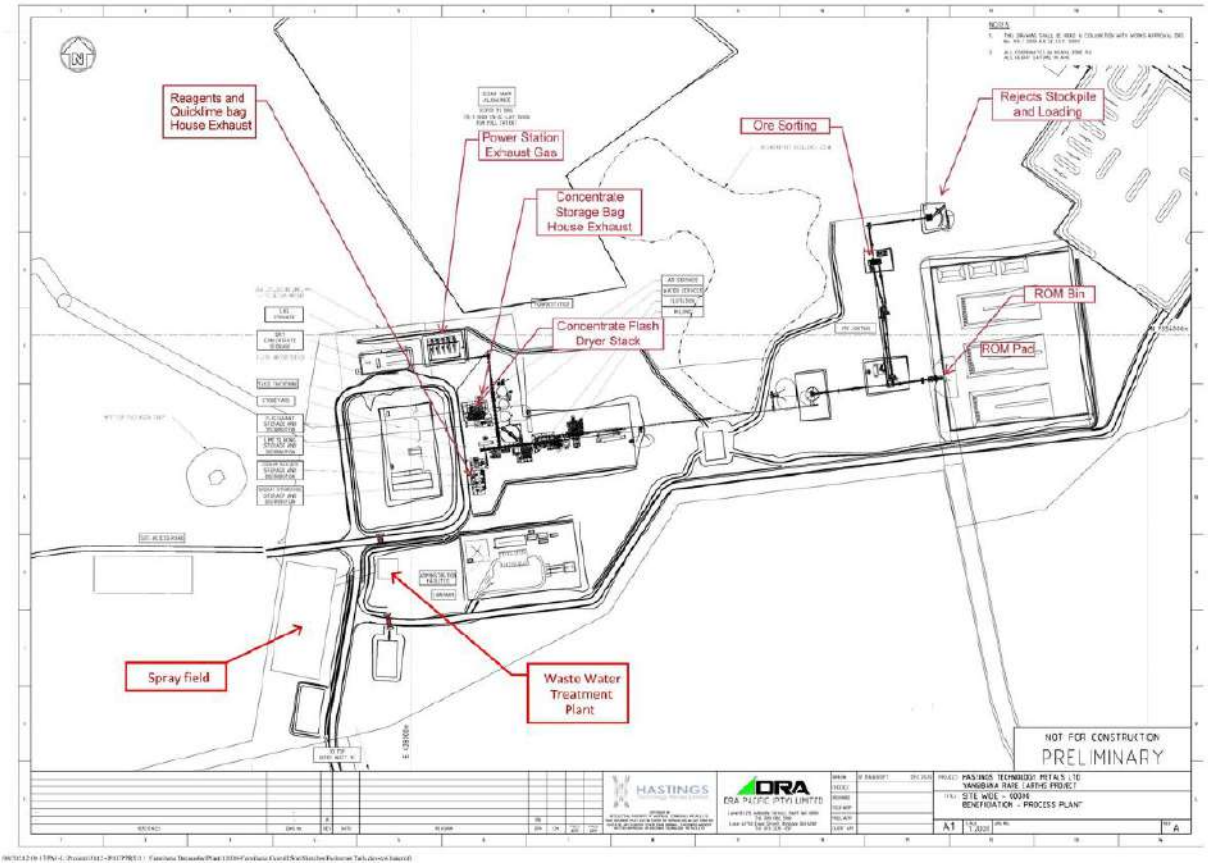

Figure 4: Proposed location for wastewater treatment plant and sprayfield in relation to relocated process plant

2.3 CEO-initiated amendment

Works approval W6209/2019/1 requires the installation of six groundwater monitoring bores that were intended to monitor groundwater level and quality around the proposed TSFs.

As a result of delays and proposal revisions considered by the Works Approval Holder, the construction and operation of the TSFs at the premises are delayed and may be subject to change (refer to Section 2.2.1). As such, the installation of groundwater monitoring bores at the TSFs have not been undertaken.

The Delegated Officer has decided to amend the condition of the works approval such to provide flexibility for the timing of implementation, while still achieving the desired outcomes in terms of obtaining a sufficiently robust baseline groundwater monitoring dataset.

These amendments will be considered alongside amendments proposed by the Works Approval Holder, specifically the removal of time limited operation for TSFs.

2.4 Part IV of the EP Act

The Works Approval Holder referred the Yangibana Rare Earths Project to the Environmental Protection Agency (EPA) under section 38 of the EP Act in January 2017. The level of assessment was set at Public Environmental Review (PER) in February 2017. The proposal scope of assessment for the EPA included five open mine pits, tailings facilities and ancillary infrastructure to support the mining operation.

The EPA concluded, in EPA Report 1642, that the proposal is environmentally acceptable and recommended the proposal be implemented subject to recommended conditions in Appendix 4 of the report. The EPA recommended conditions relating to the protection of flora and vegetation and subterranean fauna.

2.4.1 Ministerial Statement 1110

The Minister for Environment granted Ministerial Statement (MS) 1110 for the Yangibana Rare Earths Project under Part IV of the EP Act on 19 August 2019. The conditions imposed related to protection of flora and vegetation, and subterranean fauna.

Flora and vegetation conditions related to:

- Avoiding where possible, and minimising direct and indirect impacts to specified vegetation units, listed priority flora and vegetation communities associated with claypans/depressions, drainage lines, creeks and riparian vegetation;
- Targeted vegetation surveys within and outside the development envelope prior to ground disturbing activities;
- Modelling to determine indirect impacts from altered surface water regimes on vegetation communities (as above) prior to ground disturbing activities;
- Prepare and submit a condition environmental management plan for the avoidance and minimisation of direct and indirect flora and vegetation impacts, including monitoring management actions targets and reporting; Subterranean fauna conditions related to:
- Protection of stygofauna from mine groundwater drawdown during construction and operational phases; and
- Prepare and submit a condition environmental management plant for the protection of stygofauna from mining groundwater drawdown, including specification of environmental outcomes, trigger criteria, thresholds, monitoring, actions, contingencies and reporting.

Subterranean fauna conditions related to:

- Protection of stygofauna from mine groundwater drawdown during construction and

operational phases; and

- Prepare and submit a condition environmental management plant for the protection of stygofauna from mining groundwater drawdown, including specification of environmental outcomes, trigger criteria, thresholds, monitoring, actions, contingencies and reporting.

Condition 1-1 specified the authorised extent of the proposal. This specifies that a maximum of 10 mega tonnes (Mt) of tailings are to be disposed into the Beneficiation TSF and no more than 777,000 tonnes into the Hydromet TSF.

2.4.2 Changes to proposal under section 45C of EP Act

A section 45C application was approved by the EPA in November 2021 to allow for changes to the location of the accommodation village, access road, process plant and aerodrome, a reduction of the development envelop by 1,323 ha and an increase in the area to be cleared by 80 ha.

The s45C request did not address changes to the ore processing plant relating to the removal of the hydrometallurgical circuit or proposed plans to dispose of tailings from an offsite hydrometallurgical plant into the Hydromet TSF.

In liaising with the EPA, the Delegated Officer notes that the removal of the hydrometallurgical circuit from the ore processing plant from the works approval does not contradict their continued inclusion in MS1110.

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 2020b).

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 time limited operation which have been considered in this Amendment Report are detailed in Table 2 below. Emissions are only considered where relevant to the changes proposed in this amendment and do not include the emissions and discharges for the entire premises, which has already been assessed in the Decision Report for works approval W6209/2019/1.

Table 2 also details the proposed control measures the Works Approval Holder has proposed to assist in controlling these emissions, where necessary.

Table 2: Works Approval Holder controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Earthworks, construction of new buildings, plant infrastructure	Air/ windborne pathway	No additional controls proposed in this amendment. Refer to Decision Report for works approval W6209/2019/1 for proposed control.
Noise			

Emission	Sources	Potential pathways	Proposed controls
	and vehicle movements		
Time Limited Operation (Category 5)			
Fugitive dust	Beneficiation process at ore processing plant, including ore sorting and transport of ore concentrate	Air/ windborne pathway	In addition to the controls proposed in the Decision Report for works approval W6209/2019/1, the Works Approval Holder has proposed the following in the amendment: • Dust suppression water fogging or sprays at the crusher feed bin tip point; • Dust extraction on the ore sorted discharge; • Dust suppression sprays in the screening and conveying areas; and • Crushed ore storage in a bit, rather than open stockpile.
Noise			In addition to the controls proposed in the Decision Report for works approval W6209/2019/1, the Works Approval Holder has proposed the following in the amendment: • Require all plant equipment to comply with peak and eight-hour equivalent continuous noise level limits of 140 dB and 85 dB, respectively.
Sediment laden stormwater		Overland flow, during rainfall event	In addition to the controls proposed in the Decision Report for works approval W6209/2019/1, the Works Approval Holder has proposed the following in the amendment: • Pad slopes will be designed to have a minimum of 1-2% fall to ensure they are free-draining and directing stormwater away from infrastructure; • Broader plant site drainage infrastructure will be designed to convey stormwater to pipe/channel network and pit during minor storm events (up to 10% AEP) and to be stable in relation to flow velocities and identifying overland flow routes for major storm events (up to 2% AEP); and • Channel erosion control protection (e.g. drop structure, rock check dams, rock-lined channels, concrete-lined channels) will be constructed where scour velocities for unlined channels are reached.
Process chemical	Storage and use of chemical reagents for floatation	Loss of containment (pipeline failure, spills and storage	While the premises no longer meets the design capacity of a Category 73 prescribed activity, the Works Approval Holder has committed to implementing the following controls:

Emission	Sources	Potential pathways	Proposed controls
	component of beneficiation process	overflow)	• Storage of all chemicals classified as dangerous goods in accordance with requirements of the *Dangerous Goods Safety Act 2004* and the *Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007*; • Storage of chemicals within the process plant area, where any containment and spill control of reagents will be contained. Bunding of the entire process plant area with waste rock and will include drainage to a collection sump; • Storage of all chemicals in tanks, IBCs or silos, with appropriate bunding; • Storage of hydrocarbons in self-bunded tanks; • Spill kits will be available in chemical storage areas; • Waste oil will be stored in bunded storage tank and disposed of by a licensed waste contractor; and • Pipeline carrying chemicals from storage areas to process plant that are outside of bunded area will have spill management bunds and sumps controls.
Time Limited Operation (Category 85)			
Wastewater effluent	Operation of WWTP and sprayfield	Loss of containment (pipeline failure, spills and storage overflow)	No additional controls proposed in this amendment. Refer to Decision Report for works approval W6209/2019/1 for proposed control.
Treated wastewater		Direct irrigation to sprayfield	

While electric power generation and bulk storage of chemicals are no longer regulated and managed under this works approval, the Works Approval Holder has committed to implementing controls to manage the risk of unauthorised emissions and discharges to the environment.

3.1.2 Receptors

The Works Approval Holder has a worker accommodation village located within the premises boundary, approximately 9 km south-west of the ore processing plant and approximately 7 km south-west of the TSFs. In accordance with the *Guideline: Risk assessments* (DWER 2020b), 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 regulated under other state legislation.

Table 3 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed

premises (*Guideline: Environmental siting* (DWER 2020a)).

Table 3: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	**Distance from prescribed activity**
None	N/A
Environmental receptors	**Distance from prescribed activity**
Native vegetation	The premises is surrounded by low woodland comprising mulga and snakewood.
Conservation significant flora	Eleven priority flora species (including six significant range extensions) are located within and surrounding the premises, according to EPA Report 1642. The EPA Report also noted that the vegetation surveys undertaken to date do not necessarily meet its guidance and standards, such that more targeted and detailed surveys are conditioned in MS1110. The nearest and most abundant priority flora species is *Acacia curryana* (Priority 1), surrounding the ore processing facility (Figure 5). *Sporobolus blakei* (Priority 3) were also observed along the south of the facility (within 300 m), along a tributary of Frasers Creek.
Priority Ecological Community (PEC)	The entire premises is located within a Priority 1 (P1) PEC: the Gifford Creek, Mangaroon, Wanna calcrete groundwater assemblage type one Lyons paleodrainage on Gifford Creek, Lyons and Wanna Stations. The PEC comprises a diverse community of stygofauna within the Lyons paleodrainage channel, some of which are restricted to the calcrete PEC in their distribution.
Surface water body	Frasers Creek is located approximately 1.8 km east of the ore processing facility (including the wastewater treatment plant and sprayfield). A creek or tributary of Frasers Creek transects the southern perimeter of the ore processing facility, with the closest distance being 75 m apart (Figure 6). Another tributary of Frasers Creek is 500 m north-west of the ore processing facility. Lyons River is located approximately 9.5 km south-west of the ore processing facility.

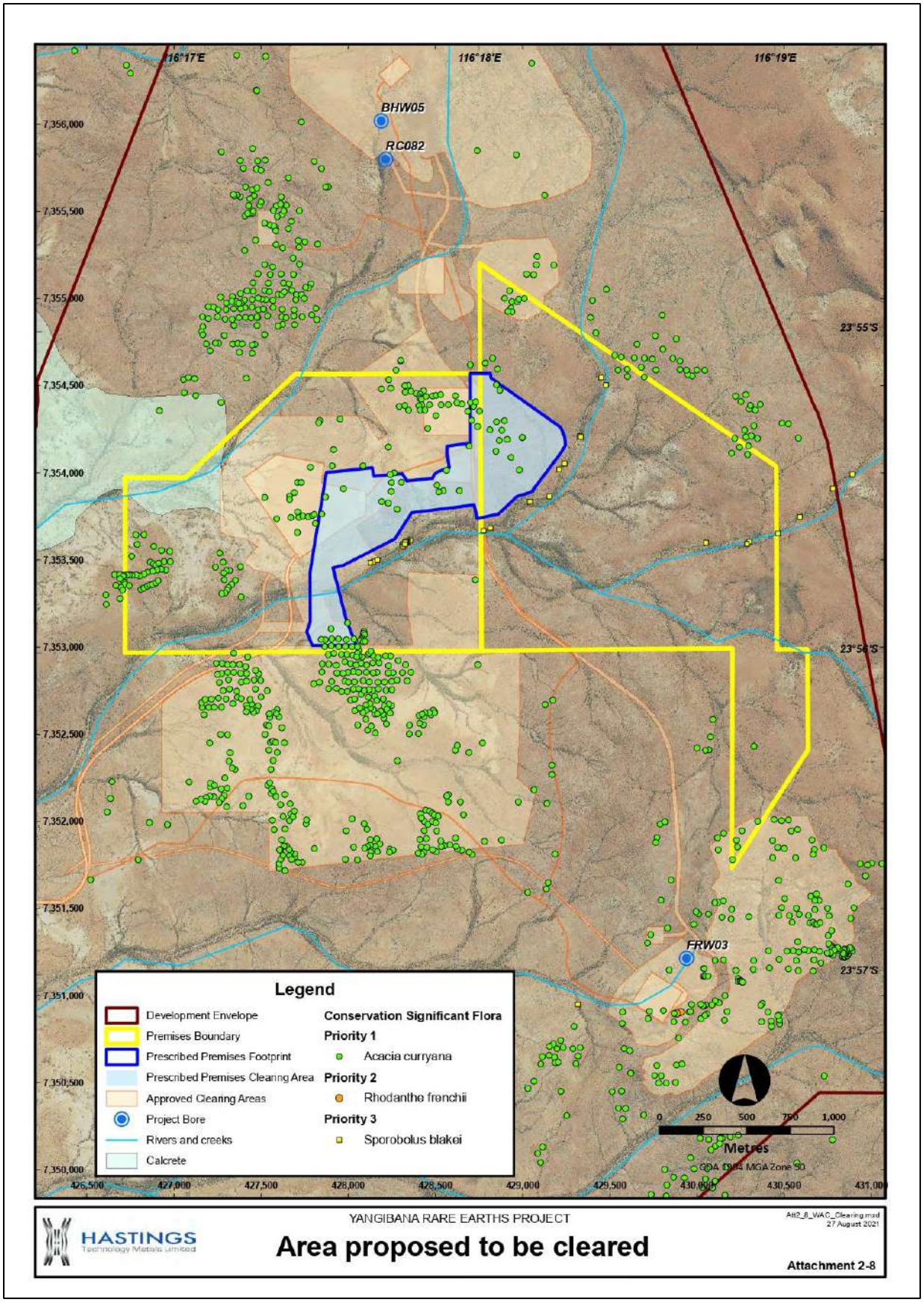

Figure 5: Location of conservation significant flora in relation to prescribed premises

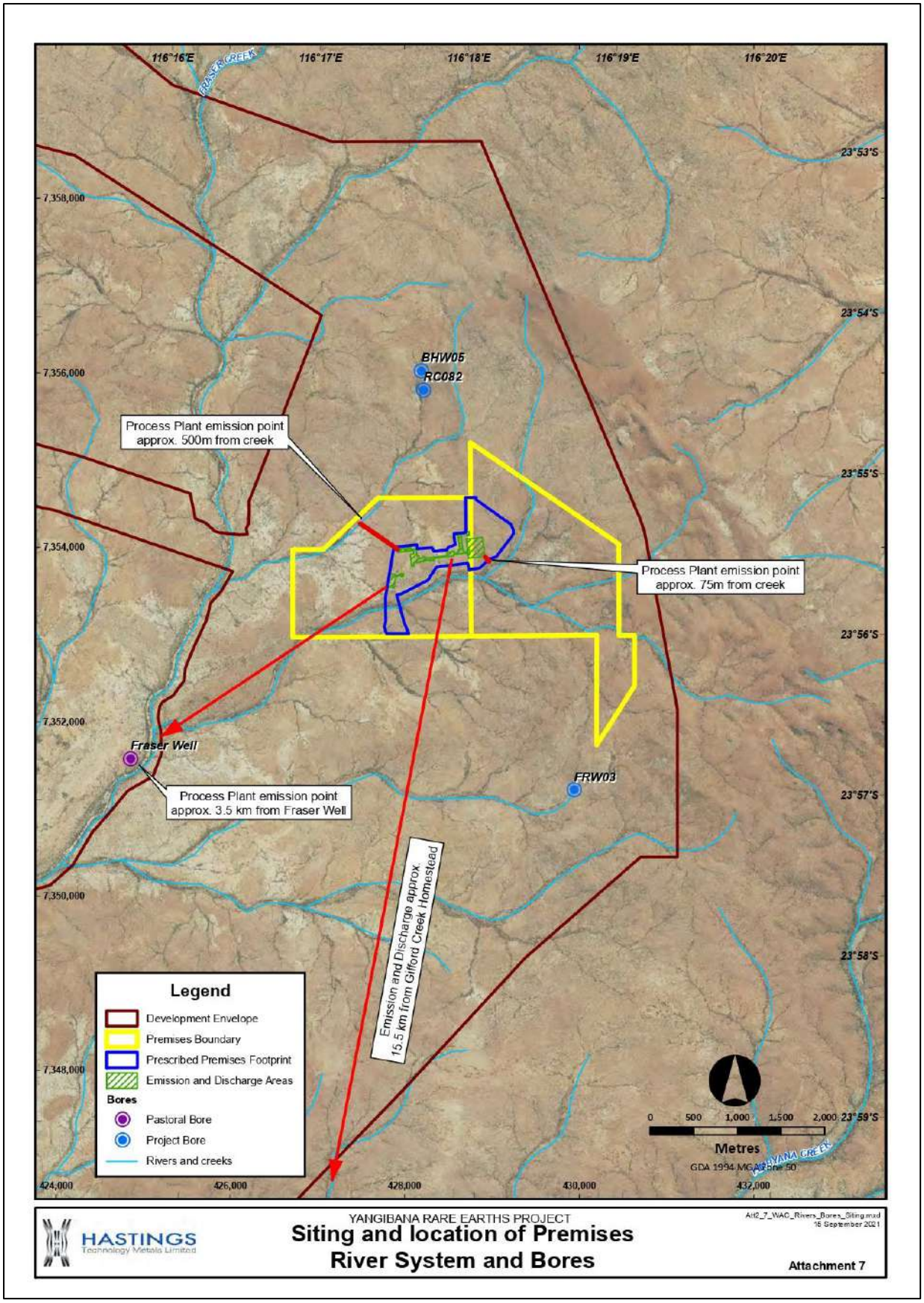

Figure 6: Distance of prescribed premises from local creek lines

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020b) 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 in-complete 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 4.

The Revised Works Approval W6209/2019/1 that accompanies this Amendment Report authorises construction and time-limited operations. The conditions in the Revised Works Approval 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. 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 4. Risk assessment of potential emissions and discharges from the Premises during construction and time-limited 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								
Construction of ore processing plant, including ore sorting circuit Construction of wastewater treatment plant and sprayfield Light and heavy vehicle movements	Fugitive dust	***Pathway:*** Air/ windborne pathway ***Impact:*** Impacts to ecological health	Native vegetation, including priority flora	Refer to Section 3.1	C = Slight L = Unlikely **Low risk**	Yes	Condition 1	The Delegated Officer considers the controls proposed by the Works Approval Holder to be sufficient to manage dust emissions and its impacts to nearby environmental receptors. Current condition in the works approval is considered sufficient as these sources/activities are short-term. Additional regulatory controls are not required.
Time Limited Operation								
Operation of ore processing (beneficiation) plant, including ore sorting circuit	Fugitive dust (including radionuclides)	***Pathway:*** Air/ windborne pathway ***Impact:*** Impacts to ecological health	Native vegetation, including priority flora Surface water bodies	Refer to Section 3.1	C = Minor L = Unlikely **Medium risk**	Yes	Condition 1 Condition 2 Condition 17	Refer to Section 3.3.
	Sediment laden stormwater	***Pathway:*** Overland runoff during rainfall events ***Impact:*** Discharge to land, resulting in impacts to		Refer to Section 3.1	C = Slight L = Unlikely **Low risk**	Yes	Condition 1 Condition 17	The Delegated Officer considers the controls proposed by the Works Approval Holder to be sufficient to manage sediment laden stormwater emissions and its impacts to nearby environmental

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**				
		ecological health						receptors. Additional regulatory controls are not required.
	Loss of containment of beneficiation reagents	***Pathway:*** Pipeline failure, spills and storage overflow ***Impact:*** Discharge to land, resulting in impacts to ecological health		Refer to Section 3.1	C = Minor L = Unlikely **Medium risk**	Yes	Condition 1	The Delegated Officer considers the controls proposed by the Works Approval Holder to be sufficient to manage uncontrolled release of chemicals due to loss of containment and its impacts to nearby environmental receptors. Although the design capacity of the premises no longer meets the requirements of Category 73 activity, the relevant construction requirements for chemical storage in condition 1 has been retained as it is utilised as and considered an activity associated with Category 5 (i.e., chemicals used for the floatation component of the beneficiation process). Additional regulatory controls are not required.
Operation of wastewater treatment plant and sprayfield	Loss of containment of wastewater	***Pathway:*** Pipeline failure, spills and storage overflow ***Impact:*** Discharge to land, resulting in impacts to ecological health	Native vegetation, including priority flora Surface water bodies	Refer to Section 3.1	C = Minor L = Unlikely **Medium risk**	Yes	Condition 1	The Delegated Officer considers the controls proposed by the Works Approval Holder to be sufficient to manage sediment laden stormwater emissions and its impacts to nearby environmental

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				
								receptors. Additional regulatory controls are not required.
	Treated wastewater	***Pathway:*** Irrigation at sprayfield ***Impact:*** Discharge to land, resulting in impacts to soil and subsurface environment	Surface water bodies	Refer to Section 3.1	C = Slight L = Unlikely **Low risk**	Yes	Condition 1 Condition 10 Condition 15 Condition 16	The Delegated Officer considers the controls proposed by the Works Approval Holder to be sufficient to manage treated wastewater discharges and its impacts to nearby environmental receptors. Additional regulatory controls are not required.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk assessments* (DWER 2020b).
Note 2: Proposed Works Approval Holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

3.3 Revised risk assessment of dust emission from Category 5 activity

3.3.1 Previous risk assessment

Fugitive dust emissions from Category 5 activities (e.g., ore processing plant, Beneficiation TSF, Hydromet TSF) at the premises were previously assessed in the Decision Report for works approval W6209/2019/1. In the previous risk assessment, the risk of fugitive dust (including radionuclides) from the operation of Category 5 activities (the source) to flora, fauna soil and surface water (the receptors) through an air/windborne pathway (the pathway) was considered. After considering controls proposed by the Works Approval Holder, the consequence of the risk event was **moderate** and the likelihood was **unlikely**, which resulted in a **medium** risk rating.

3.3.2 Relevant changes proposed

In this amendment, the hydrometallurgical circuit was removed from the ore processing plant. Furthermore, the Delegated Officer has decided to remove time-limited operation for both TSFs due to uncertainty with how tailings will be handled at the premises. As such, the only source of fugitive dust emissions from Category 5 operations is the ore processing plant (which only contains a beneficiation circuit).

In addition to changes in source of dust emissions, the risk of radionuclide exposure has also changed and is considered in this revised risk assessment.

3.3.3 Revised risk assessment for environmental receptors

Due to the changes detailed in Section 3.3.2, the radioactive component of the previous risk assessment has been largely downgraded. While naturally occurring radioactive material (NORM) are present in the orebody – containing low levels of thorium, uranium and their decay progenies – EPA Report 1642 indicated that radioactive fractions concentrated in the solid waste stream and were found primarily in the hydrometallurgical circuit and its resultant tailings.

The average radionuclide concentration in tailings produced from the beneficiation process was only approximately 0.8 Bq/g, comprising 0.3 Bq/g for uranium and 0.5 Bq/g for thorium. As such, fugitive dust emissions generated from the beneficiation circuit contains only low levels of radionuclide and unlikely to be considered radioactive (i.e., <1.0 Bq/g). This is supported by the relatively lower radionuclide concentrations (Table 5) and radon and thoron emissions rates (Table 6) estimated in beneficiation activities, compared to the now-removed hydrometallurgical activities, as detailed in an updated radiation impact assessment (JRHC 2021).

The radiation impact assessment also concluded that the changes proposed do not significantly alter the outcome of an ERICA assessment undertaken, where it was found that impacts to non-human biota at residential receptor locations (i.e., homesteads) are negligible (JRHC 2021).

In addition, the overall extent of dust emission and its sources at the premises have changed, with the removal of the hydrometallurgical circuit and TSFs, as well as the inclusion of ore sorting to the beneficiation circuit at the ore processing plant. Given the controls proposed to manage fugitive dust during ore sorting, the addition of this process is unlikely to contribute significantly to the overall risk profile of the ore processing plant.

In considering the changes in infrastructure, reduced radioactive risk and the sensitivity of nearby environmental receptors (e.g., native vegetation, priority flora, surface water bodies), the updated consequence of this risk event is **minor**.

In considering the additional controls proposed by the Works Approval Holder and distances between the source and environmental receptors, the updated likelihood of this risk event is **unlikely**.

In considering both the consequence and likelihood of this risk event, the updated rating for this risk event is **medium risk**. The Delegated Officer considers the controls proposed by the Works Approval Holder to be sufficient to manage dust emissions and its impacts to nearby environmental receptors. No additional regulatory controls are required.

Table 5: Radionuclide concentrations in various waste streams

Radionuclide	Radionuclide concentration on streams (Bq/g)				
	Ore	Beneficiation Tailings	Total Rare Earth Oxides	Refloat Tailings	Return Residue
U-238	0.3	0.3	2.1	0.52	1.36
Th-230	0.3	0.22	2.1	0.98	2.0
Ra-226	0.3	0.27	2.1	0.5	2.0
Pb-210	0.3	0.31	2.1	0.54	1.9
Po-210	0.3	0.23	2.1	0.46	1.2
Th-232	2.0	0.45	38.7	3.5	31
Ra-228	2.0	0.33	38.7	3.9	30
Th-228	2.0	0.34	38.7	3.7	30
Ra-224	2.0	0.32	38.7	3.7	30
Total	9.5	2.77	17.8	165.3	129.46

Note: Data sourced from JRHC (2021), based on a review of radionuclide analysis of process materials by the Australian Nuclear Science and Technology Organisation.

Table 6: Estimated radon and thoron emission rates

Source	Radon (MBq/s)	Thoron (MBq/s)
Mine	0.13[1]	8
Beneficiation Plant	0.02	0.02
Beneficiation Tailings	0.02	5
Hydrometallurgical Plant[2]	0.02	35
Hydrometallurgical Residue Dry Stack Cell[2]	Minor	Minor
Storage stockpiles	0.15	12
Total	0.33	60.02

Note 1: As noted in JRHC (2021), the modelled mine emission rate is high by a factor of 10.

Note 2: Hydrometallurgical plant and hydrometallurgical residue values were conservatively included in radiation assessment (JRHC 2021).

3.3.4 Considerations for risks to human receptors

Human receptors are not considered in the scope of this risk assessment as it has already been assessed under Part IV of the EP Act. EPA Report 1642 noted that the potential impacts to human health will be monitored under the Radiation Management Plan (RMP) to ensure that human exposure to radiation is reduced to 'as low as reasonably achievable'. The RMP is required and regulated by the Radiological Council under the *Radiation Safety Act 1975* and by the Department of Mines, Industry Regulation and Safety (DMIRS) under the *Mines Safety and Inspection Act 1994* (and its associated regulations). The report also stated that waste management of radioactive material had been addressed by the Radiation Waste Management Plan (RWMP). Finally, the EPA concluded that the risks associated with radiation can be adequately monitored and managed under the RMP, as advised by the Radiological Council.

Given the distance between the prescribed activity and the sensitive human receptors, it is unlikely that fugitive dust emissions would present an unacceptable risk to human health due to the lack of a viable exposure pathway. Hence, a risk assessment is not required as there is no complete source-pathway-receptor linkage.

4. Consultation

Table 7 provides a summary of the consultation undertaken by the department.

Table 7: Consultation

Consultation method	Comments received	Department response
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 8/12/2021	No comments received.	N/A.
Department of Jobs, Tourism, Science and Innovation (JTSI) advised of proposal on 8/12/2021.	Responded on 13/12/2021 advising that they had no comments on the proposed amendment.	Noted.
Works Approval Holder was provided with draft amendment on 9 June 2022	Responded with no comments. Clarified outstanding matters as highlighted by the department.	Noted.

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 8 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 8: Summary of works approval amendments

Condition no.	Proposed amendments
Cover page	Added *Date of Amendment*. Updated *Prescribed details* to include G09/20 and remove G09/16. Updated *Prescribed premises category description* to remove Category 52 and 73

Condition no.	Proposed amendments
	and to update design capacity units.
Works approval history	Updated *Works approval history* table to include changes made under this amendment.
Condition 1	Updated Table 1 to: • Under *Ore processing facility*, added 'chemical storage area' and removed 'hydrometallurgical circuit'. The Design and construction/installation requirements was updated to remove mention of hydrometallurgical circuit and add requirements for storage of chemicals and chemical-moving pipelines; • Removed *Ore processing facility: acid bake kiln normal scrubbing system and normal discharge stack; Ore processing facility: acid bake kiln emergency scrubbing system and emergency discharge stack; power station; bulk storage of chemicals* • Under *Groundwater monitoring bores*, updated timeframe requirements for the construction of the bores.
Condition 11	Update header name in accordance with standard naming convention.
Condition 14	Removed condition to remove authorisation of time limited operation for critical containment infrastructure.
Condition 15	Removed references to Conditions 2 and 14 to remove authorisation of time limited operation for critical containment infrastructure. Updated Condition 15(b) in accordance with standard condition.
Condition 16	Removed Condition 16 and Table 4 as this infrastructure has been removed from the works approval.
Condition 17	Removed emissions for particulate matter, nitrogen oxides, sulfur dioxide, sulfuric acid mist, sulfur trioxide, hydrogen fluoride and carbon monoxide from the acid bake kiln, gas-fired generator stack and diesel black start generator stack as this infrastructure have been removed from the works approval.
Condition 18	Removed Condition 18 and Table 6 as this infrastructure (and its associated emissions) have been removed from the works approval.
Condition 19	Removed Condition 19 and Table 7 as this infrastructure (and its associated emissions) has been removed from the works approval.
Condition 21	Removed Condition 21 as authorisation for time limited operation of TSFs have been removed from the works approval. This condition is no longer applicable/achievable.
Condition 22	Removed Condition 22 as authorisation for time limited operation of TSFs have been removed from the works approval. This condition is no longer applicable/achievable.
Condition 24	Removed Condition 24 as authorisation for time limited operation of TSFs have been removed from the works approval. This condition is no longer applicable/achievable.
Condition 25	Removed Condition 25 as authorisation for time limited operation of TSFs have been removed from the works approval. This condition is no longer applicable/achievable.
Condition 26	Removed Condition 26 as authorisation for time limited operation of TSFs have been removed from the works approval. This condition is no longer

Condition no.	Proposed amendments
	applicable/achievable.
Condition 27	Removed Condition 27 as authorisation for time limited operation of TSFs have been removed from the works approval. This condition is no longer applicable/achievable.
Condition 28	Removed Condition 28 as authorisation for time limited operation of TSFs have been removed from the works approval. This condition is no longer applicable/achievable.
Condition 30	Updated Condition 30 to remove reporting requirements for conditions 19, 24, 25, 26, 27 and 28 due to the removal of these conditions from the works approval.
Definitions	Updated Table 8 to include definition of IBC.
Schedule 1: Maps	Updated *Processing Plant Site Layout* and *Ore Processing Plant Stormwater Drainage Infrastructure Map* (and added an additional figure) to reflect new site location and layout. Removed *Acid Bake Kiln normal and emergency scrubbing systems Process Flow Diagram* as this infrastructure has been removed from the works approval.
Schedule 2: Works	Updated Table 9 to include latest information, including ore sorting, removal of time limited operation for TSFs, removal of hydrometallurgical plant, removal of Category 52 and 73 activities.
Schedule 3: Monitoring	Updated Table 10 to specify quarterly monitoring during time limited operation. Updated Table 11 to remove radionuclides from monitoring parameters and to remove monitoring frequency during time limited operation. Updated Table 12 to remove radionuclides from monitoring parameters.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020b, *Guideline: Risk Assessments*, Perth, Western Australia.
4. JRHC Enterprises Pty Ltd (JRHC) 2021, *Yangibana Rare Earths Project Revised Site Layout Radiation Impact Assessment*, Stirling, South Australia.

Appendix 1: Application validation summary

SECTION 1: APPLICATION SUMMARY			
Application type			
Amendment to works approval	☒	Current works approval number:	W6209/2019/1
Date application received	17/9/21		
Applicant and Premises details			
Applicant name/s (full legal name/s)	Hastings Technology Metals Ltd		
Premises name			
Premises location	Mining Tenements G09/14, M09/158, M09/157, G09/16, G09/18, G09/17 and M09/161		
Local Government Authority	Shire of Upper Gascoyne		
Application documents			
HPCM file reference number:	NA		
Key application documents (additional to application form):	Attachment 2 – maps (and GIS files for premises boundary) Attachment 3b – details of power generation Attachment 3c – map of area to be cleared, and Priority flora Attachment 5 – stakeholder engagement register Attachment 7 – Premises boundary map, showing waterways and bores **Attachment 8 – Supporting documents; description of changes – key document** Attachment 8 appendix – Air quality assessment for revised layout		
Scope of application/assessment			
Summary of proposed activities or changes to existing operations.	**Works approval amendment** The processing plant is simplified from a beneficiation plant and hydrometallurgical plant, to only a beneficiation processing plant. Ore sorting and transport of ore concentrate to the hydrometallurgical plant (offsite) is added. The plant location has moved approximately 750m. Category 52 and 73 are to be removed, as downsized designs do not meet category thresholds. The location of the WWTP and sprayfield has changed.		

Category number/s (activities that cause the premises to become prescribed premises)
Note: No changes to categories 6 (dewatering) or 64 (landfill)
Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity
Category 5: Processing of metallic or non-metallic ore	1.1 Mtpa	No change to throughput - 1.1 Mtpa Emission point locations have changed with the new layout. LO will need to review the existing risk assessment and determine whether this changes to risk to receptors. Addition of ore sorting, and transport of ore

		concentrate to Hydromet plant in Onslow and return of Hydromet tailings to the premises.
Category 52: Electric power generation	20.16 MW pa	To be removed. Proposed 8.4WW plant is below the category threshold.
Category 73: Bulk Storage of chemicals etc	1225 m^3 in aggregate	To be removed. Proposed storage of up to 240m^3 is below the category threshold.
Category 85: Sewage facility	34m^3 /d	No change to throughput. Location changed. LO to review risk assessment.

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 ☐	Assessed. See row below
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☒ No ☐	Ministerial statement No: MS1110 EPA Report No: 1642 S45C approved Nov 2021
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☒ No ☐	Reference No: 2016/7845; approval received
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☐ No ☒	No change in premises boundary since this issue of W6209/2019/1.
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☐ N/A ☒	If N/A explain why? mining tenure
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☐ No ☒	Clearing of native vegetation is authorised through MS 1110 granted under Part IV of the EP Act and therefore not considered in this assessment.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☐	Clearing of native vegetation is authorised through MS 1110 granted under Part IV of the EP Act.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☒ No ☐	GWL183285(2), PMB201193(1)
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☐ No ☒	
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☐ No ☒	

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 ☐	Yes, as tabulated in Table 7 of the Decision Report for W6209/2019/1
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☐ No ☒	