Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Application for Works Approval Amendment

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

Works Approval Number	W6641/2022/1
Works Approval Holder	Iluka Rare Earths Pty Ltd
ACN	654 487 662
File Number	INS-0002523 | APP-0027709
Premises	Eneabba Rare Earths Refinery Part of Mining Lease M267SA ENEABBA WA 6518 As defined by the Premises maps attached to the Revised Works Approval
Date of Report	10 September 2025
Decision	Revised works approval granted

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1. Decision summary

Works Approval W6641/2022/1 is held by Iluka Rare Earths Pty Ltd (Works Approval Holder) for the Eneabba Rare Earth Refinery (ERER) at the Eneabba Mineral Sands Mine (the Premises), located approximately 8km south of the Eneabba township.

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 W6641/2021/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Background

The ERER is being constructed as part of a project to facilitate the secondary processing of rare earth concentrate that has been historically stored within the Eneabba Mozanite Pit (EMP) at the Eneabba Mineral Sands Mine.

Phase 1 of the project included the construction of a Wet Separation Plant (WSP) for the initial recovery and processing of the stored rare earth minerals through a small-scale physical separation plant to produce Mineral Sands Concentrate (MSC). The WSP was constructed under Works Approval W6251/2019/1 and is currently operational under Licence L9369/2023/1.

The MSC generated by the WSP serves as feedstock for Concentrator Plant which constitutes Phase 2 of the project. Constructed under Works Approval W6458/2020/1, the Concentrator Plant is designed to produce both a 90% monazite product and a Heavy Mineral Concentrate (HMC). The HMC from the Concentrator Plant is stored onsite prior to being transferred to an offsite mineral separation plant for further processing. Monazite from the Concentrator Plant will be subject to further processing through the ERER to produce various rare earth oxides and carbonates.

Construction, commissioning and time limited operation of the ERER was authorised by this Works Approval (W6641/2021/1) granted in June 2022.

2.3 Application summary

On 28 February 2025, the Works Approval Holder submitted an application to the department to amend Works Approval W6641/2021/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following sections outline the amendments that are being sought. No changes to the overall design capacity or throughput are proposed relating to any of the prescribed premises categories.

2.3.1 Premises layout changes

The Works Approval Holder proposes to relocate the Brine Bleed Evaporation Pond, Stormwater Dam and Sulfate Dam from north of the refinery to the east and south of the refinery area. Pipeline routes to the Brine Bleed Evaporation Pond, tailings storage facility (TSF) and the Concentrator Plant Feed pipeline are also planned to be relocated.

No changes to the design or controls associated with the ponds, dams or pipelines are proposed

by the Works Approval Holder and therefore the changes are not expected to alter the risk profile of these facilities. As such, risks associated with the process water storage ponds and associated transfer pipelines has not been reassessed.

The revised layout of the premises showing the new location of the ponds and pipelines is shown in Figure 1.

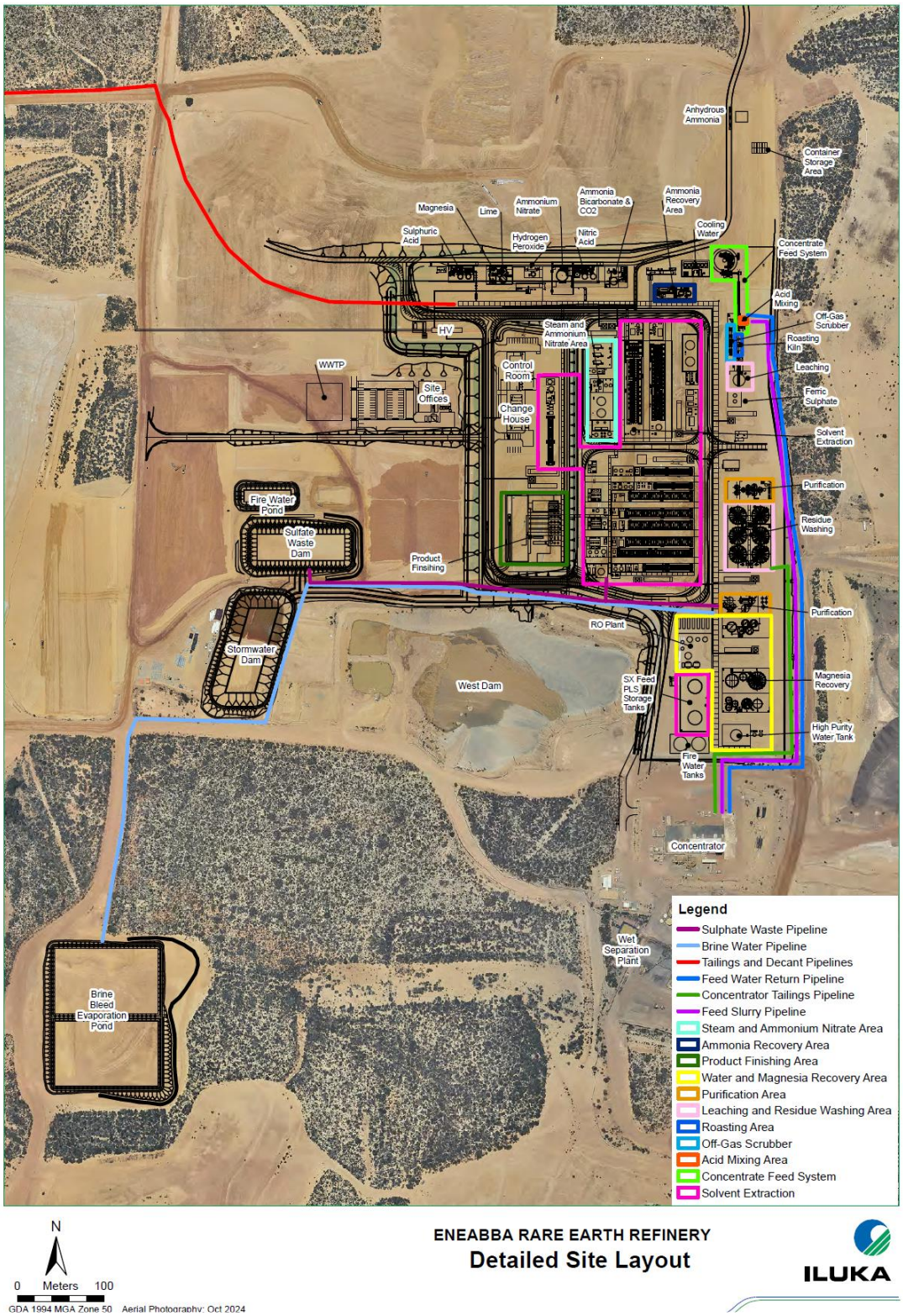

Figure 1: Revised layout of the premises showing the new location of the Brine Bleed Evaporation Pond, Stormwater Dam and Sulfate Dam and associated pipelines.

2.3.2 Air emission points

The Works Approval Holder proposes the following changes to the design of REPF impacting the current authorised air emission points as follows:

- Exhaust from the kiln is separated into five discharge points. Four stacks will discharge burner combustion/exhaust emissions and one stack will discharge process waste gas.

  The kiln will be indirectly heated by burners rather than direct heated within the kiln. As a result, combustion gas emissions from the kiln will be redirected to four separate stacks from the burner (stacks A – D). Emissions from the burners are separate to the kiln off gas which is discharged via another individual stack and treated via the waste gas treatment system. The kiln burners will be fitted with Low NOx burners for minimising NOx emissions.

- Exhausts from the boilers will no longer be combined into a single stack. Each boiler will have individual stacks (Boiler Stacks 1 – 3).

- A dust extraction bag house with secondary filter has been added to the feed system. This is included to meet the requirement of the works approval which states that the RE concentrate delivery design includes 'Dust extraction at the feed hopper and conveyors must be constructed to extract air to the Off Gas Treatment System'. To address the distance between the feed system and Off Gas Treatment System, and to ensure that dust emissions associated with feed delivery are adequately treated prior to discharge, the Works Approval Holder has elected to install a bag house at the source.

  With the secondary filter, treated air from the delivery system baghouse is expected to have a dust concentration of 0.5mg/m^3. Additional filtration is being implemented to improve environmental, health and safety (HSE) outcomes. As a result of the reduced emissions, the stack height has been reduced and emissions will be discharged at ground level (approximate 2-3m).

- A second ammonia scrubber stack has been added to the magnesia circuit.

- A carbon dioxide absorber exhaust has been added.

- Similar to the kiln, the dryer and calciner stacks have been split to separate the burner combustion exhaust and an off-gas.

- The La_2O_3 Calciner has been removed as an emission point at Lanthanum is no longer being processed to oxide form.

- Two additional calciners have been included in the design for processing of dysprosium oxide and terbium oxide. Each calciner is designed with designated exhaust and off-gas stacks. Both products were considered previously as part of the overall product suite.

- An additional dryer (HREY Dryer) is included as an emission point which is associated with the production of a mixed heavy earth elements (HRE) and yttrium (Y). These elements were previously processed through the combined SEGHY Dryer however this unit (SEG Dryer) is now focused on production of samarium (Sm), europium (Eu), and gadolinium (Gd) (SEG).

The Works Approval Holder has confirmed that all burners associated with the REPF will be fitted with Low NOx burners and all calciners and dryers fitted with baghouses for capturing particulate emissions.

In addition to the above changes, the Works Approval Holder has also identified that there is potential for ammonia emissions from the off-gas treatment system scrubber as ammonia is present in the reagent used to neutralise the Off Gas Treatment System. Revised modelling was completed to assess the above design changes and additional source of ammonia (refer to section 3.1.1).

2.3.3 Additional tailings stream

Sand and clay slimes from the Concentrator Plant are currently densified and co-disposed with the thickener underflow clay from the WSP as a slurry. This material was being deposited into the East Tailings Dam mine void, however, this facility has since reached capacity and the tailings are now directed to the West Dam; an unlined mine void. Disposal of tailings to the West Dam is undertaken in accordance with Licence L9369/2023/1.

Once the ERER is operational, the Works Approval Holder intends to direct the combined sand/clay tailings from the Concentrator Plant and thickener underflow from the WSP to the ERER for co-disposal within the Yellow Dam TSF. It is expected that the nominal rate of sand/clay tailings deposition will be 50,000 tonnes per annum (tpa) however, up to 250,000tpa may be deposited during years when low grade concentrates are being processed.

The works approval initially considered risks associated with the construction and operation of the Yellow Dam TSF based on conceptual information provided by the Works Approval Holder at the time of assessment. The Works Approval Holder has advised that detailed design of the Yellow Dam TSF is now complete and submitted a Detailed Design Report for the facility. The detailed design incorporates the co-disposal of wastes from the Concentrator Plant and WSP within the Yellow Dam TSF.

2.3.4 Refinery area – East Diversion Dam

Original design of the ERER included the East Diversion Drain; a stormwater diversion drain intended to redirect stormwater flows from external catchments upstream of the eastern site boundary away from site infrastructure. The original works approval conditions required that a 1km-long drain is installed to the east of the ERER facility to convey runoff to the south and into the South Depression. The drain was to be constructed with the following dimensions:

- Bottom width of at least 1.0 m;
- Top width of at least 5.0 m;
- Depth of at least 0.5 m; and
- Batters shaped to a ratio of approximately 1V:4H.

The Works Approval Holder has advised that the 1km drain is no longer proposed, and instead, existing surface water diversion bunds will be utilised to divert runoff towards the South Depression. In addition to existing diversion bunds, extra bunding has been installed to support the surface water diversion design (refer to Figure 2 below).

Given that the initial design is no longer quired, the Works Approval Holder is requesting that the relevant conditions regarding stormwater infrastructure be removed from the works approval.

In support of this amendment, the Works Approval Holder submitted updated hydraulic modelling (Water Technology 2024) which reviewed the revised stormwater diversion design. Modelling results suggest that the existing diversion structures will successfully divert flows away from the North Mozanite Pit into a small water dam to the south, and that all southern water flows will be diverted towards the South Depression.

The delegated officer considers that the revised design of the stormwater diversion infrastructure meets the intent of the original design and therefore does not alter the risk profile of the premises. As such, risks associated with stormwater have not been reassessed and conditions updated accordingly.

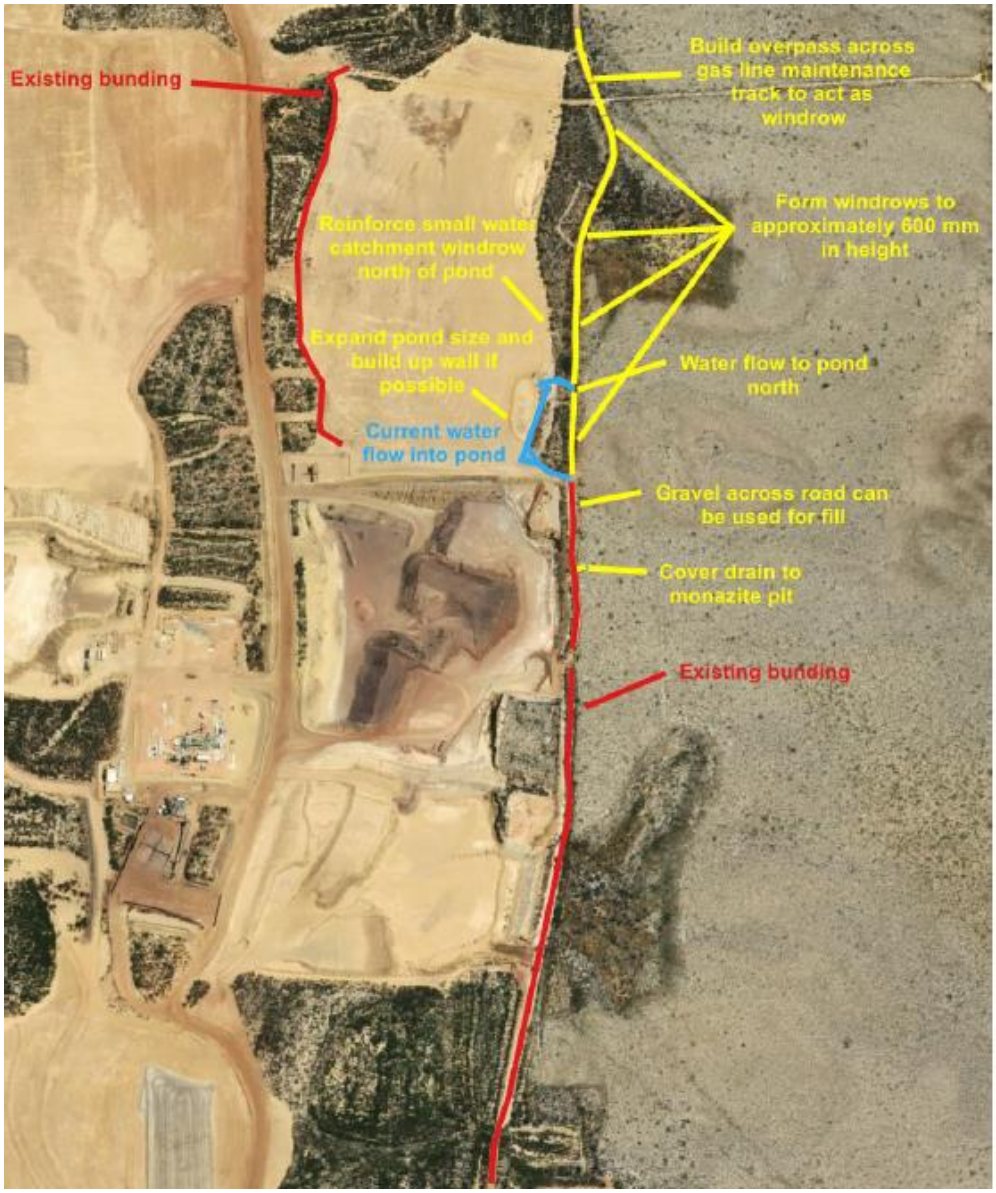

Figure 2: Alternative design of surface water diversion structures.

2.3.5 Surface water management - Yellow Dam TSF

Stormwater protections are also proposed around the Yellow Dam TSF to protect the integrity of the storage facility. The Works Approval Holder commissioned a surface water assessment of the impact of a 1% Annual Exceedance Probability (AEP) and Probably Maximum Flood event on the Yellow Dam TSF. This involved hydraulic modelling (Water Technology 2022) of the TSF and surrounding area to inform the design of bunding around the facility to prevent stormwater ingress. The assessment concluded that construction of diversion bunds around the Yellow Dam TSF are required to prevent stormwater entering the facility and recommended a diversion bund on the eastern side of the TSF (Figure 3). A spillway was also proposed to allow drainage of surface flows to the south. As a result, the existing works approval requires that earthen bund wall/s must be constructed around the Yellow Dam TSF to keep stormwater from contacting embankment walls in the event of a 1% AEP flood level.

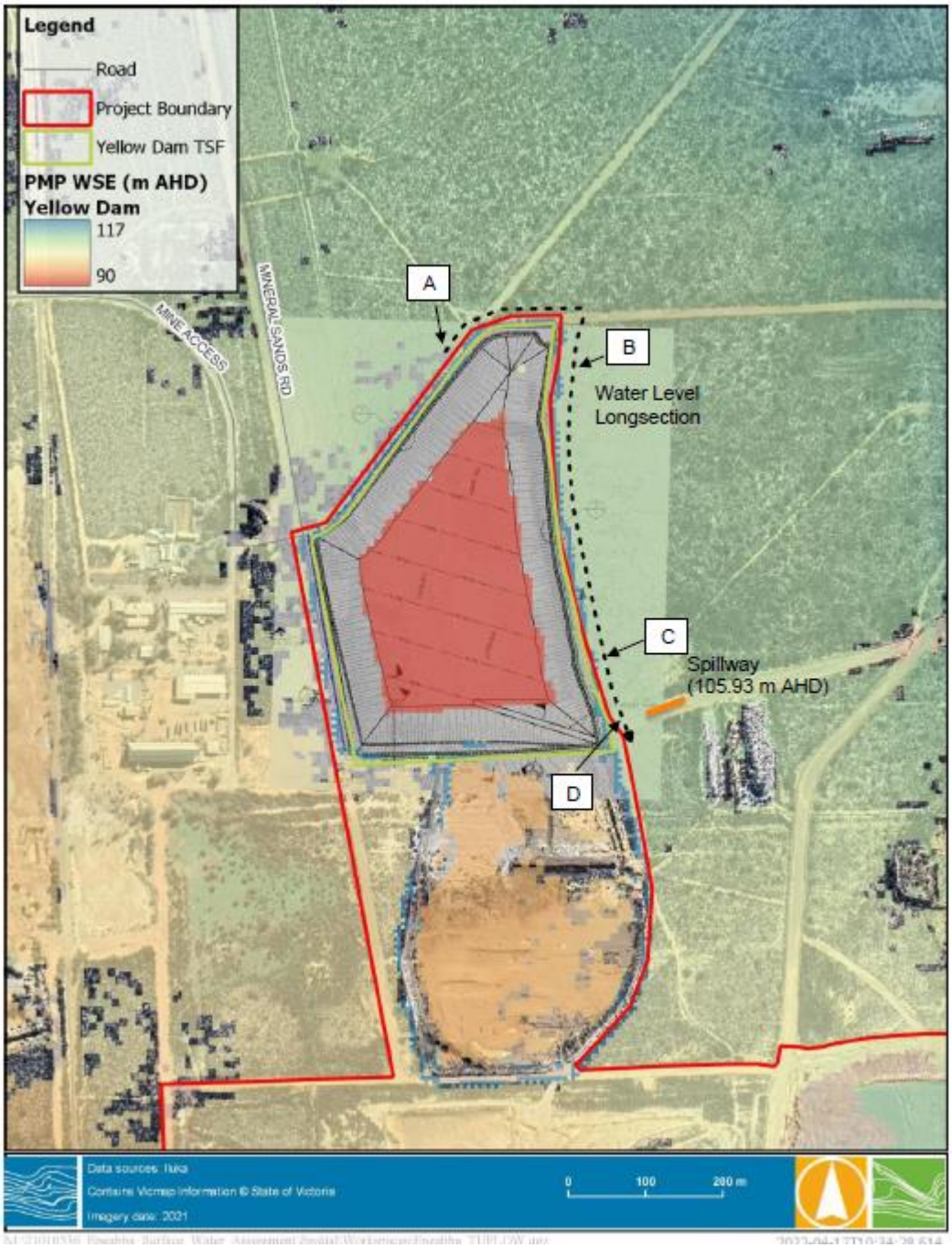

Figure 3: Initial stormwater diversion bund design (Water Technology 2022).

The stormwater diversion design has since been revised and further hydraulic modelling undertaken to confirm that the intent of the works approval condition will be achieved (Water Technology 2024a). The revised design includes two diversion bunds upstream of the TSF; north-south and east-west bunds located along existing roads (Figure 4). The updated hydraulic modelling indicates that the proposed diversion bunds will sufficiently prevent external runoff entering the TSF under the modelled 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1,000 year) events.

Given that diversion bunds are located upstream of the TSF, modelling indicated potential for water from the small catchment between the downstream side of the flow protection bunds and upstream of the TSF to accumulate along the eastern embankment, particularly during a 0.1% AEP (1 in 1.000 year) event. To address this, flow will be diverted away from the TSF via an engineering road-spillway located to the south.

Following consideration of a number of options, the Works Approval Holder has also elected to install an additional measure to manage ponded water on the eastern side of the TSF. The haul road will be lowered and a small swale inserted to drain water to the south-east. The Works Approval Holder also proposes install a rip-rap layer along the downstream side of the TSF eastern embankment as a flood erosion protection measure.

Modelling indicates that significant pooling within the area east of the TSF will only occur in large events greater than a 20% AEP and that most smaller events are expected to generate minor flow volumes which are likely to infiltrate or evaporate without intervention.

Figure 4: Proposed diversion infrastructure.

2.4 Department of Mines, Petroleum and Energy

The proposal exists within a State Agreement area and as such is not subject to a Mining Proposal under the *Mines Safety Act 1994*. The application was referred to the Department of Mines, Petroleum and Energy (DMPE) seeking geotechnical advice on the proposed changes, in particular, relating to the design and use of the Yellow Dam TSF.

Initial advice provided by DMPE noted the potential for significant flooding on the eastern embankment of the TSF as outlined in the hydraulic modelling undertaken by Water Technology (2024) and further protection against erosion and potential instability was recommended. DMPE also requested that embankment stability assessments on selected critical sections would need to take into account potential toe flooding and seismic loading, recommending that the Factor of Safety be reassessed.

The Works Approval Holder submitted a revised Tailing Storage Facility Design Report (Tetra Tech Coffey 2025) which DMPE reviewed and confirmed addressed concerns raised.

DMPE provided a number of recommendations regarding conditions associated with geotechnical stability:

- specifying separation distances between final tailings surface and groundwater;
- regular checks to ensure the appropriate dewatering of the facility is occurring and that the facility is functioning per the design intent;
- pit wall stability monitoring in accordance with a trigger-action response plan (TARP);

- annual review of the TSF by an engineering or geotechnical specialist;
- construction to be supervised by an engineering or geotechnical specialise and documented; and
- reporting on decommissioning.

The majority of the recommendations from DMPE are addressed through existing works approval conditions or will be addressed through the assessment of a licence application.

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 Receptors

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

Table 1 and Figure 6 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 1: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	**Distance from prescribed activity**
Nearest residential premises (Eneabba townsite)	Approximately 6.3 km north of the Yellow Dam TSF (nearest prescribed activity associated with this assessment). Approximately 5.0 km north of the premises boundary
Golf course (recreational receptor)	Approximately 5.7 km north of the Yellow Dam TSF
Brand Highway	Approximately 3.7 km west of application activities
Environmental receptors	**Distance from prescribed activity**
Groundwater	Refer to section 3.1.1.
Groundwater: Public Drinking Water Source Areas	P1 – 4.9 km north of the Yellow Dam TSF P2 – 2.6 km north of the Yellow Dam TSF Eneabba Town Drinking Water Bore located approximately 5.5 km north of the Yellow Dam TSF
Surface water	Surface water feature (Wetland ID 510) that can be described as a creek line subject to inundation during heavy rainfall periods. The feature is associated with a superficial aquifer although native vegetation is not

	groundwater dependent, possibly surface water dependent. Approximately 850 m southwest of the Yellow Dam TSF. There are several ephemeral unnamed watercourses in the vicinity of the project area. These temporary features are depicted in Figure 6 and also represent locations of potential surface water-dependent vegetation.
Groundwater dependent ecosystem	Nearest groundwater dependent ecosystem (Warradarge Fault Zone) located approximately 3 km west of the Yellow Dam TSF.
Threatened and/or Priority fauna	Carnaby's Cockatoo (Calyptorhynchus latirostris) present within the ERER project area and close proximity to the proposed Yellow Dam TSF location. There is evidence of cockatoos foraging in the area and roosting at the administrative building, approximately 300m west of the Yellow Dam TSF. There are no permanent surface water features in the vicinity.
Surrounding vegetation Threatened and/or priority flora	The ERER and associated infrastructure is surrounded by vast areas of cleared and partially rehabilitated land with vegetation communities typically in degraded condition. Vegetation in the area is described typically low woodland, shrubland and heaths growing on grey-brown sands. This vegetation is unlikely to intercept or rely upon groundwater. There are a number of Threatened and Priority flora species within the Eneabba Mineral Sands Mine study area although very few have been identified in the ERER development envelope. This is despite intensive flora surveys being conducted in the area. There exists high numbers of Priority 4 vegetation (two significant flora species (*Eucalyptus macrocarpa ssp. elachantha* and *Verticordia aurea*) although these species are well represented beyond the proposed ERER and associated infrastructure.

3.1.1 Groundwater

The primary geological units in the area around the ERER proposal area are the Quaternary aged Superficial formations, and the underlying Yarragadee Formation (a high yielding aquifer).

Long term groundwater monitoring has been undertaken at background locations and areas impacted by previous mineral sands mining operations. There has been an observed increase in groundwater levels at a number of groundwater monitoring bores, although this is a result of mine dewatering activities ceasing and groundwater levels recovering to pre-mining levels. Standing water levels at bores EM62, WTE16, WTE17 and WTE01 typically ranged between 30 and 44 metres below ground level following the cessation of groundwater abstraction.

Local groundwater is typically neutral to mildly acidic at depth. However, in the perched system, groundwater pH appears to be more acidic, with pH ranging between 4.5 and 5.5. It is possible that the lower pH values in this area may relate to historical mining activities.

Groundwater is fresh to marginally brackish (up to 1,000 mg/L TDS). Although not suitable for human consumption, groundwater has a potential use for agricultural purposes. The presence of nitrogen as nitrate, and ammonia concentrations below detection locally, groundwater is generally considered oxidising (Jacobs, 2021).

Local background sulfate concentrations range between approximately 30 and 85mg/L, significantly lower than estimated concentrations in the seepage model for the Yellow Dam TSF (refer to section 3.1.2). An acid sulfate soils (ASS) survey over the Eneabba Operations was conducted in 2008 to identify whether there are any potentially acid sulfate soils (PASS). The assessment determined that no PASS soils are likely to occur within the Eneabba mine site.

Of the contaminants present in the tailings waste stream, lead, cadmium, aluminium and uranium were measured as being below limits of reporting for the groundwater analysis undertaken at the monitoring locations identified in Figure 5.

Investigations informing the seepage modelling identified that groundwater flows in a west to north-west direction, away from the Eneabba Water Reserve.

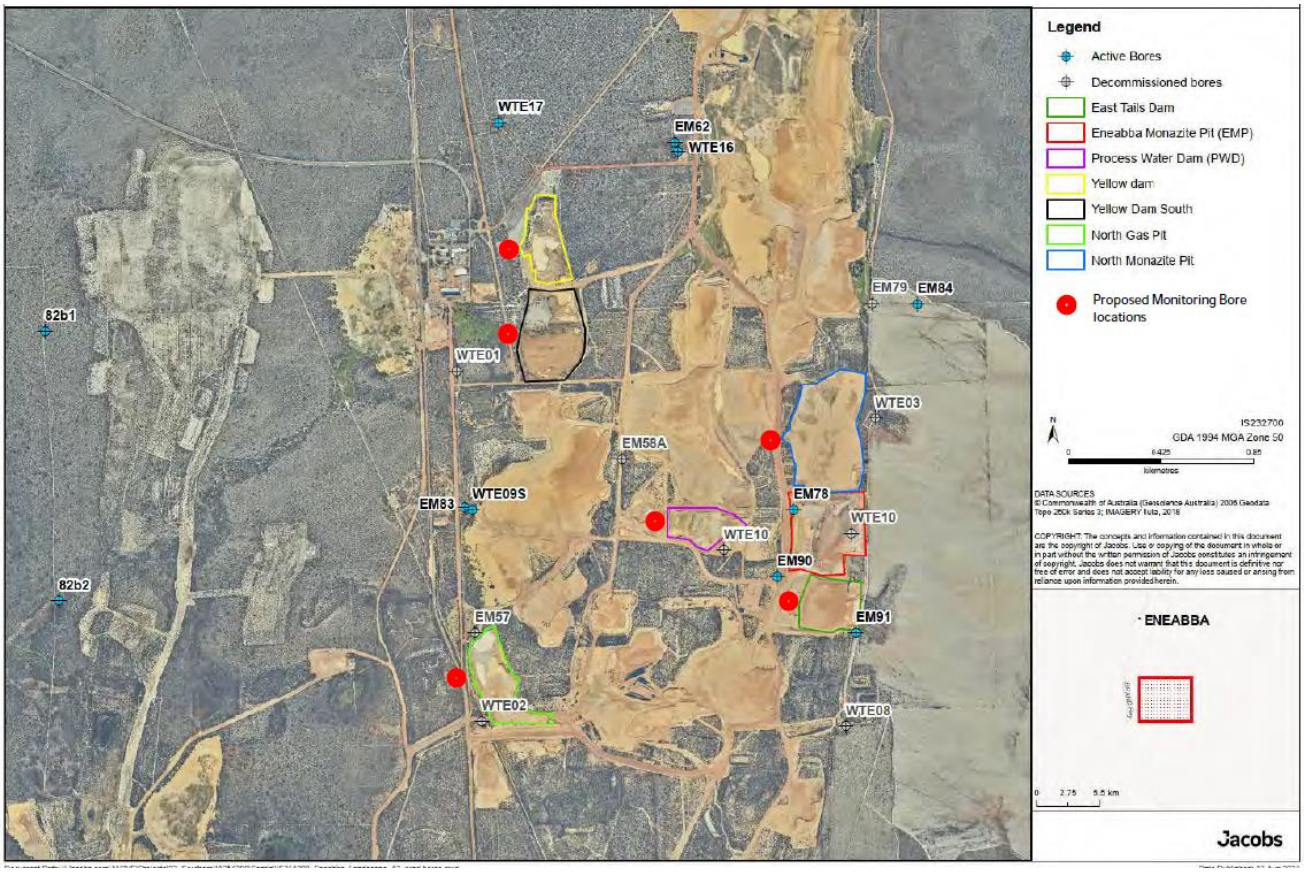

Figure 5: Groundwater monitoring bore locations

3.2 Air quality modelling

The Applicant submitted revised air quality modelling (ETA 2025) for the changes to air emissions outlined in section 2.3.2. Emissions sources considered in the modelling are provided in Table 2.

Air emissions from the ERER were previously assessed as low risk with earlier modelling predicting ground level concentrations (GLC) for the majority of key pollutants to be less than 10% of the assessment criteria. The exception to this was the maximum 1-hour NOx result which was estimated to be about 30% of the assessment criteria at the nearest receptor.

Results of the revised air dispersion modelling indicate that the proposed changes outlined in section 2.3.2 do not significantly alter the predicted ground level concentrations for NOx, SO_2, sulfuric acid (SO_3 / H_2SO_4) and particulates.

Despite the additional sources of ammonia, the maximum predicted GLC concentrations of ammonia are expected to be well below the assessment criteria at sensitive receptors (<16%). However, ammonia concentrations are predicted to exceed the guideline value for human health provided in the *Draft Guideline: Air Emissions* (DWER 2019) in areas directly east of the premises (Figure 6). While it is acknowledged that the assessment criteria applies to all areas outside of the premises (unlike the assessment criteria for NOx, SO_2 and particulates which only apply to sensitive receptors locations), the delegated officer notes that there are no receptors

present in this area. Considering the low spatial extent of the exceedance and lack of receptors, the risk of elevated ammonia emissions impacting on receptors is considered to be low.

A technical review of the modelling identified some inconsistencies with the *Air Quality Modelling Guidance Notes* (DoE 2006), however, since the predicted GLCs for pollutants are well below the relevant guideline values, it was determined that these discrepancies are unlikely to significantly affect the overall outcome of the assessment.

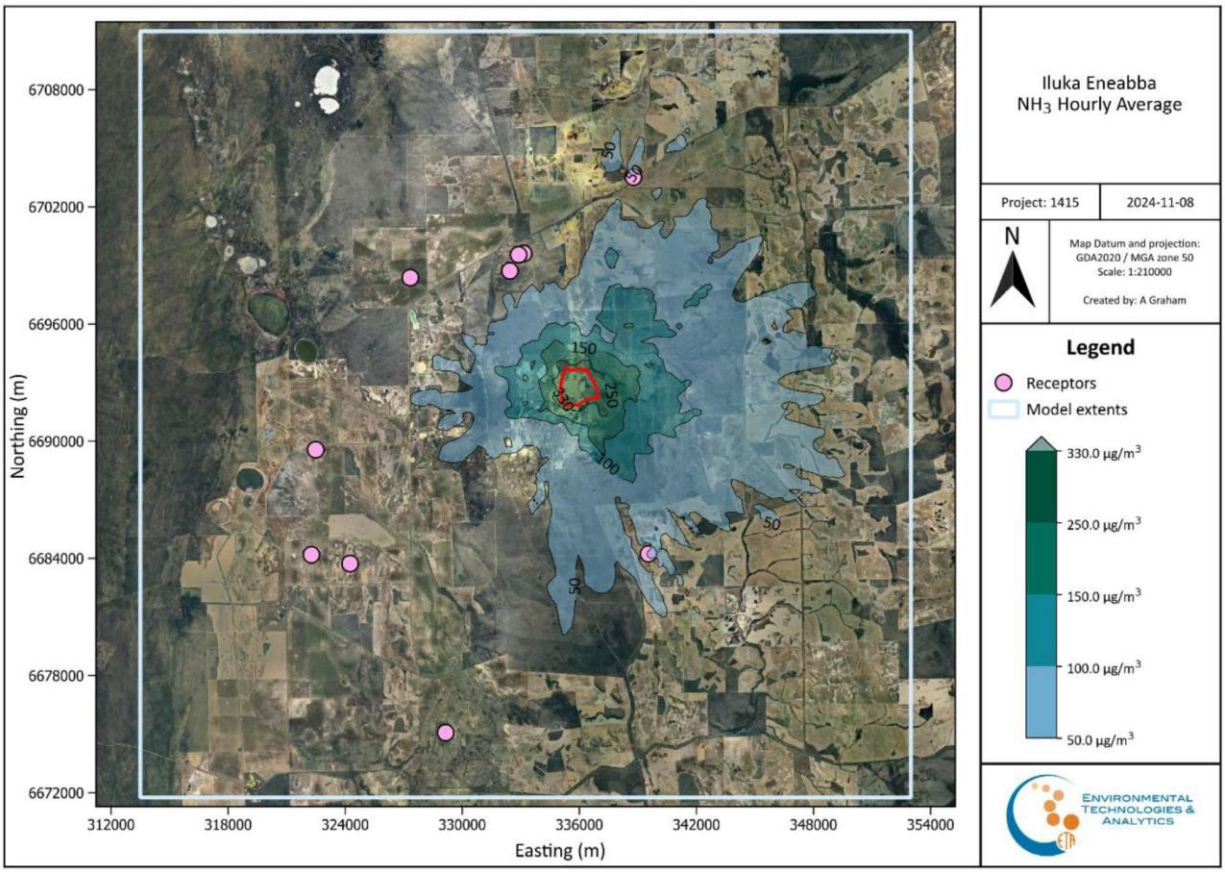

Figure 6: Predicted maximum 1-hour NH3 concentration (µg/m^3)

Table 2: Emission sources input into the revised modelling (ETA 2025)

Parameter	Source									
	Kiln Off-Gas	**Kiln Muffler Exhaust**	**Boiler Stacks 1 – 3[a]**	**CO^2 Absorber**	**Ammonia Scrubber 1**	**Ammonia Scrubber 2**	**HREY Dryer Muffler Exhaust**	**HREY Dryer Off-gas**	**Dy Calciner Muffler exhaust**	**Dy Calciner Off-gas**
Stack Height (magl)	50	15	15	5	5	5	15	15	15	15
Stack Diameter (m)	0.75	0.8	0.646	0.5	0.5	0.2	0.4	0.3	0.3	0.2
Temperature (°C)	80	320	135	40	40	40	450	120	710	160
Volumetric Flow (Nm^3/h)	14,639	10,901	11,527	10,000	11,300	1,200	3,266	4,307	1500	1,891
Exit velocity (m/s)	11.9	12.6	14.6	16.2	18.3	12.2	19.1	24.4	21.2	26.5
Emission rate (g/s)										
NO_x	-	1.55	1.64	1.81	2.04	-	0.47	0.12	1.28	0.05
SO_2	0.81	-	-	-	-	-	-	-	-	-
SO_3	0.41	-	-	-	-	-	-	-	-	-
H_2SO_4	0.41	-	-	-	-	-	-	-	-	-
Particulates	0.20	-	-	-	-	-	-	0.06	-	0.026
Ammonia	26	-	-	0.028	0.031	0.003	-	-	-	-

(Table 2 continued)

Parameter	Source										
	Tb Calciner Muffler Exhaust	Tb Calciner Off-gas	SEG Calciner Muffler Exhaust	SEG Calciner Off-gas	NdPr Calciner Muffler Exhaust	NdPr Calciner Off-gas	Nd Calciner Muffler Exhaust	Nd Calciner Off-gas	Pr Calciner Muffler Exhaust	Pr Calciner Off-gas	External Concentrate Dust Collector
Stack Height (magl)	15	15	15	15	15	15	15	15	15	15	25 [b]
Stack Diameter (m)	0.2	0.1	0.2	0.2	0.5	0.4	0.5	0.3	0.3	0.2	0.577
Temperature (°C)	750	160	325	120	700	160	770	160	730	160	Ambient
Volumetric Flow (Nm^3/h)	440	394	982	764	3,956	5,233	3,246	4,098	925	946	-
Exit velocity (m/s)	14.6	22.1	19	9.7	19.9	18.3	17.5	25.5	13.4	13.3	8
Emission rate (g/s)											
NO_x	0.38	0.01	0.14	0.02	3.38	0.15	2.78	0.11	0.79	0.03	-
-SO_2	-	-	-	-	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-	-	-	-	-
H_2SO_4	-	-	-	-	-	-	-	-	-	-	-
Particulates	-	0.005	-	0.011	-	0.073	-	0.057	-	0.013	0.038 [c]
Ammonia	-	-	-	-	-	-	-	-	-	-	-

Notes:

a. Each boiler stack is an individual emission point, i.e. there are three stacks in total.

b. The modelling report noted that Iluka advised that a secondary filter has been added since previous modelling was undertaken and that the release height will be approximately 2-3m.

c. The modelling report noted that the addition of a secondary filter on the concentrate feed collector will result in emissions lower than what has been modelled.

3.3 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3. 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 2.3), 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 3.

The Revised Works Approval W6641/2022/1 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 3: Risk assessment of potential emissions and discharges from the premises during commissioning and operation

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Reasoning
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**			
Commissioning and operation of the process plant and associated infrastructure	Dust emissions associated with RE concentrate delivery and transfer	Air/windborne pathway impacting health and amenity Air/windborne pathway impacting vegetation health	Nearest residential receptors 5km north Brand Hwy 3.7km west of activities Surrounding vegetation	Baghouse with secondary filter installed at the feed system for direct treatment of dust at source rather than directing to Off Gas Treatment System.	C = Minor L= Unlikely **Low Risk**	Y	Previously emissions were treated via the kiln waste gas treatment unit however are now proposed to be treated via a dedicated baghouse. Implementation of a separate baghouse is not considered to change the overall risk of emissions. Conditions have been updated to reflect the design change.
	Stack emissions from kiln, calciners, scrubbers, etc.	Air/windborne pathway impacting health and amenity	Nearest residential receptors 5km north Brand Hwy 3.7km west of activities	Off-gas from the kiln will continue to be treated via the Off Gas Treatment System. Kiln burner exhaust fitted with Low NOx burner. Additional ammonia scrubber installed at Magnesia Circuit for treatment of ammonia emissions. Off-gas from calciners and dryer will be directed through a baghouse for treatment of particulates.	C = Slight L = Unlikely **Low risk**	Y	Revised air quality modelling indicates that the proposed changes to air emission sources does not significantly alter the predicted ground level concentrations for most pollutants at receptors and therefore are not expected to change the emissions risk profile. Conditions have been updated to reflect changes to the design and implementation of pollution controls. As discussed in section 3.1.1, although ammonia is predicted to exceed the nominated health guideline outside the premises boundary, the delegated officer considers the overall risk of this to be low noting the limited extent of the exceedance and lack of human receptors present in the area.
Containment of tailings waste	Loss of containment of tailings	Seepage/infiltration causing groundwater contamination and impacts to groundwater dependent ecosystems.	Groundwater >20mbgl at the Yellow Dam TSF, Brine Bleed Evaporation Pond and Process Water Dam. Groundwater dependent ecosystems located approximately 3 km west of the Yellow Dam TSF. Surface water/perched aquifer dependent ecosystems located approximately 850 m west.	No change to TSF design which includes dual liners with underdrainage system installed and leak detection. Decant system for water recovery. Groundwater monitoring.	C = Major L = Unlikely **Medium Risk**	Y	The delegated officer considers that the additional tailings stream can be managed through existing works approval controls. Noted that the tailings stream is inert, the acceptance of this waste is not expected to alter the risk profile of the TSF. As outlined in section 2.3.5, the delegated officer considers that the revised stormwater diversion system provides adequate protection consistent with the initial design intent. As a result, environmental risks associated with the Yellow Dam TSF remain unchanged. Conditions have been amended to reflect the updated design commitments. An updated version of the Yellow Dam TSF Operations
		Overtopping or containment failure causing adverse		Sufficient freeboard included in TSF design which will be maintained	C = Major L = Unlikely	Y	

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Reasoning
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**			
		impacts to downgradient vegetation.	Adjacent priority vegetation.	and managed using decant system. Tailings beach and decant pond size to be managed through rotation of the spigot discharge pipeline. Surface water flows diverted around the TSF using bunding to prevent ingress of uncontaminated stormwater.	**Medium Risk**		Manual is required to be submitted prior to the commencement of commissioning that captures the current TSF design (e.g. use of single spigot deposition). Per recommendations of DMPE, TARPS addressing TSF wall stability is also required to ensure that these plans are in place prior to tailings deposition occurring.

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

4. Consultation

Table 4 provides a summary of the consultation undertaken by the department.

Table 4: Consultation

Consultation method	Comments received	Department response
Applicant was provided with draft documents on 11 August 2025	Comments were received by the Applicant on 1 September 2025 and are summarised in Appendix 1	
Department of Mines, Petroleum and Energy	Refer to section 2.4	

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.

As outlined in the above risk assessment, the delegated officer has determined that the risk profile of the premises has not changed as a result of the proposed amendments and has updated conditions accordingly (refer to section 5.1 below).

5.1 Summary of amendments

Table 5 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 5: Summary of works approval amendments

Condition no.	Proposed amendments
Condition 1 – Table 1 Off-Gas Treatment System	Condition updated to reflect design change and separation of kiln exhaust and off-gas stacks. Some wording has been updated to provide additional clarity and certainty regarding intent.
Condition 1 – Table 1 Kiln burner	Section added reflecting separation of exhaust and off-gas stacks as per above. Condition includes specifications for stack heights and low NOx burners which is consistent with commitments of the Works Approval Holder. A condition requiring the installation of sampling ports to allow stack testing has been carried over.
Condition 1 – Table 1 RE concentrate delivery	Condition update to reflect installation of separate dust collection system at the RE concentrate delivery area per the application request. Requirements for broken bag detection system amended noting alternative design options (refer to Appendix 1).
Condition 1 – Table 1 ERER Processing infrastructure	Conditions update to include the additional ammonia scrubber unit per the application request. Emission concentration specifications are consistent with the application commitments.
Condition 1 – Table 1	Conditions have been updated to reflect the design change which separates the exhaust and off-gas stacks associated with calciners and dryers. Commitments

Product Finishing	regarding low-NOx burners and stack heights are derived from the application. Existing conditions regarding installation of baghouses have been amended to specify installation of baghouse on off-gas stacks.
Condition 1 – Table 1 Bulk fuel storage (diesel)	Removed – Applicant has indicated this is no longer proposed (refer to Appendix 1).
Condition 1 – Table 1 Bunding, stormwater diversion and hardstands	Requirements for the eastern diversion bund have been removed. Conditions regarding stormwater diversion around the Yellow Dam TSF updated to reflect revised design.
Condition 2 – Table 2 Yellow Dam TSF	Minor modifications regarding liner installation specifications per Works Approval Holder request. The delegated officer determine that these changes to not alter the intent of the conditions. Included requirement for installation of rip-rap layer on eastern embankment as per commitments for managing surface water.
Condition 10	An updated Operations Manual for the TSF and TARP are required to be submitted prior to the commencement of commissioning.
Condition 14 – Table 4 Monitoring of air emissions	Table updated to reflect above changes regarding separation of off-gas and exhaust gas into multiple stacks. Reference conditions for air emissions monitor have been specified for quality control purposes. US EPA Method 7E specified for sampling of NOx.
Condition 18 – Table 5 Infrastructure requirements (operations)	Table updated to reflect above changes regarding separation of off-gas and exhaust gas into multiple stacks. Reference to bulk fuel storage removed noting that this is no longer proposed. Removed requirement for broken bag detection system on the baghouse associated with the pneumatic transfer system (refer to Appendix 1). Altered conditions regarding tailings deposition to align with modified approach of using a single spigot versus the previously proposed multi-spigot discharge.
Condition 19 – Table 6 Authorised emissions to air	Table updated to reflect above changes regarding separation of off-gas and exhaust gas into multiple stacks.
Definitions	Definitions which were previously omitted have been included (i.e. AS 1726, ASTM D5321, ASTM D5092/D5092M-16, STP and definitions for US EPA test methods). In relation to condition 10, a definition of “TSF Operations Manual” has been included for clarity.
Other	Figures and condition numbering have been updated where required.

References

1. Department of Environment (DoE) 2006, *Air Quality Modelling Guidance Notes*, Perth Western Australia
2. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
3. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
4. DWER 2019, *Guideline: Air Emissions (Draft for external consultation)*, Perth, Western Australia.
5. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
6. Environmental Technologies & Analytics (ETA) 2025, *Eneabba Rare Earth Refinery Revised Air Quality Assessment, Final (Version 5).*
7. Jacobs 2021, *Eneabba Project Phase 3 Hydrogeological Impact Assessment – Jacobs 2021*. DWER record DWERDT533077.
8. Tetra Tech Coffey 2025, *Eneabba Yellow Dam (North) TSF Design, Detailed Design Report, Iluka Rare Earths Pty Ltd* (Reference: 754-PERGE308154-R03 Eneabba TSF DR_Rev2)
9. Water Technology 2022, *ERER Project - DWER Request for Information – TSF Surface Water Diversion*, Technical Memorandum date 13 April 2022 (Reference: 21010536_Eneabbe_M02V02a).
10. Water Technology 2024, *ERER East Diversion Bund*, Technical Memorandum dated 28 May 2024 (Reference: 23010193_M04_V05_EDD)
11. Water Technology 2024a, *ERER Project – TSF Flow Protection*, Technical Memorandum dated 23 September 2024 (Reference 23010193_M07_V08).

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

Condition	Summary of applicant's comment	Department's response
Condition 1 (Table 1) Kiln burners	The Applicant indicated that detailed design has replaced the Venturi Scrubber with a Reverse Spray Jet Scrubber. The Applicant cited improved gas absorption, ability to handle variable flow associated with fluctuating kiln loads and lower water requirements as justification to support the design change. It was also stated that the new system will have the same or lower emissions.	The delegated officer considers the proposed change to be acceptable and considers that Condition 1 will ensure that the new system can achieve the same air emission design criteria. Stack testing required by condition 14 will verify system performance.
	The Applicant requested the removal of reference to low NOx burners noting that the modelled NOx emissions in the air quality assessment have not changed and therefore, the assessed risk profile is also the same. However, given the term "Low NOx burner" is not formally defined (i.e. no specific regulatory definition or threshold for what constitutes a "low NOx burner"), the Applicant requested the term be removed to avoid any confusion.	Installation of low NOx burners was a commitment of the Works Approval Holder. The term "low NOx burner" is common wording for this type of equipment and the delegated officer considers the current wording of the condition appropriate for achieving the intended outcome, which is the reduction of NOx in burner emissions.
Condition 1 (Table 1) RE concentrate delivery	Adjust wording from "belt filter and mill" to "mill and belt filter" to reflect stages of process.	Accepted. The delegated officer considers this a minor amendment that does not alter the intent of the condition.
	The Applicant requested the replaced of reference to "broken bag alarm" with "broken bag detection and alert system" to allow for inclusion of alternative methods for achieving the same outcome. Alternative methods identified by the Applicant include, but are not limited to: • Differential pressure monitoring • Opacity meters; or • Broken bag detection alarm (filter leak detectors). In addition to the above, the Applicant advised that regular physical inspections will be undertaken on the filters elements.	The delegated officer considers that the requested change is appropriate noting that it does not alter the outcome of the condition, which is that the baghouses are equipped with a system for monitoring performance to allow enable timely detection and rectification of performance issues such as broken bag filters.
Condition 1 (Table 1) Product finishing	Amend reference to "broken bag alarm" and remove reference to low Nox burners as above.	Refer to above.

Condition	Summary of applicant's comment	Department's response
Condition 1 (Table 1) Bulk fuel storage	The Applicant requested removal of reference to bulk fuel storage as this infrastructure is no longer being installed.	Removed as requested.
Condition 2 (Table 1) Decant infrastructure	Remove reference to the Return Water Tank noting that this is no longer proposed and that decant water will be pumped directly back into the processing plant. No change to the date of the decant water which was always intended to be returned to the processing plant.	Updates made as requested noting that this does not alter the assessed risks.
Condition 14 (Table 4) Air emissions monitoring	Requests that EPA method 7E replace existing referenced test methods.	The delegated officer considers Method 7E an acceptable test method that is commonly used for measuring NOx.
Condition 18 (Table 5) RE concentrate delivery	Adjust wording from "belt filter and mill" to "mill and belt filter" as above	Accepted as above.
Condition 18 (Table 5) Products	Amend reference to broken bag alarm to align with changes made to Condition 1 (Table 1)	Accepted for consistency.
Condition 18 (Table 5) Reagents and bulk fuel storage	The Applicant has requested the requirement regarding broken bag alarm for the pneumatic transfer system baghouse. Noting that the pneumatic transfer system only handles lime, broken bag alarms are not proposed. The Applicant indicated that regular inspections and administrative processes will be utilised to identify bag filter failure.	Noting that the referenced bag house is associated with handling of lime, the delegated officer has accepted the proposed change on the basis that it will not significantly alter the risk profile of the premises. The delegated officer also notes that procedures will be in place to ensure effective operation of the baghouse.