



Application for Licence Amendment

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

Licence Number	L5646/1994/10
Licence Holder	Iluka Resources Limited
ACN	008 675 018
File Number	DER2016/000799
Premises	Eneabba Mineral Sands Mine Brand Highway ENEABBA WA 6518 Legal description – Being parts of mining tenements AM70/2667 and M70/879 and Vacant Crown Land 12562
Date of Report	3 September 2020
Decision	Revised licence granted

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A/MANAGER RESOURCE INDUSTRIES

An officer delegated by the CEO under section 20 of the EP Act

1. Decision summary

Licence L5646/1994/10 is held by Iluka Resources Limited (licence holder) for the Eneabba Mineral Sands Mine, located within parts of tenements AM70/2667, M70/879 and Vacant Crown Land 12562, located in Eneabba, WA (approximately 300 km north of Perth).

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 operation of the premises.

The additional infrastructure consisting of a mineral sands recovery plant (consisting of a conveyor, a mobile screening unit and de-sliming cyclones), which was constructed under W6251/2019/1, has been added to the Revised Licence. As a result of this assessment, Revised Licence L5646/1994/10 has been granted.

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

2. Scope of assessment

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>.

Amendment summary

On 13 May 2020, the licence holder submitted an application to the department to amend Licence L5646/1994/10 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act), to operate Phase 1 of the Eneabba Mineral Sands (Monazite) Recovery Project (EMRP). As part of this amendment application, the licence holder also submitted compliance construction documentation submitted for the infrastructure constructed under W6251/2019/1. Time limited operations for 90 days was permitted under the works approval.

W6251/2019/1 was issued to the licence holder on 1 August 2019, for the construction of a mineral sands recovery plant (consisting of a conveyor, a mobile screening unit and de-sliming cyclones) for the purpose of producing a mineral sands concentrate suitable for export. The infrastructure has been designed to enable the re-processing of tailings material stored within the Eneabba Monazite Pit (EMP), a large open pit on the premises where tailings from the Narngulu Mineral Separation Plant (MSP) (L5425/1989/11) and historical operations at Eneabba have been deposited.

The EMP contains approximately 827 kt of material at an average grade of 21.5% monazite, 23% zircon, 32% ilmenite and 1% rutile. All mineral sands products and by-products contain naturally occurring radioactive material (NORM).

The licence amendment application will allow for up to 18,600,000 tonnes per annual (no change in authorised licensed throughput) of by-product material (tailings) be mined from the EMP and re-processed using a mobile screening unit located in the pit. Screened material will then be transported by haul trucks to the processing plant, located adjacent to the pit.

The ore processing involves the use of water, a mobile screening unit and de-sliming cyclones to recover about 95% of the tailings, processed as saleable mineral sands concentrate 'MSC', and separate it from unwanted oversize rocks and fine clay particles.

The process consists of:

- tailings within the EMP re-mined using front end loaders that will feed an in-pit mobile screening unit;
- screened material transported by haul trucks to the processing plant where it will be stockpiled;
- material fed into a feed hopper and conveyor;
- material processed through a wet vibrating screen to remove oversize;
- material processed through two de-sliming cyclones to remove clay fines;
- final product stockpiled in a bunker prior to loading into Rotabox containers; and
- final product transported by road in the Rotabox containers to the Narngulu MSP site and ultimate export through the Port of Geraldton.

The (EMRP) processing plant, which has been constructed adjacent to the EMP, has a maximum design capacity of 350,000 tonnes per annum, although actual annual throughputs are estimated to be only around 105,000 tonnes. About 95% of the tailings material processed will be removed from the premises as an MSC saleable product. The remaining 5% (approximately 5,000 tonnes per year) of sand tailings (oversize) and clay fines are returned to existing mine voids for disposal.

Clay fines removed by the process (containing approx. 0.1 % monazite) will be pumped as a slurry for disposal to an existing open void located directly west of the EMP, where the supernatant water is expected to evaporate. Sand tailings (oversize containing approx. 0.2% monazite) will be returned to the EMP by road haulage from the processing plant.

This amendment is limited only to changes to Category 8 activities from the existing licence. No changes to the aspects of the existing Licence relating to Category 63 have been requested by the licence holder.

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 *Guidance Statement: Risk Assessments* (DER 2017).

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 Sources, pathways, receptors and controls

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this Amendment Report are detailed Table 1 below. Table 1 also details the proposed control measures the licence holder has proposed to assist in controlling these emissions, where necessary.

Table 1: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Dust	<p>Screening of material</p> <p>Material handling</p> <p>Heavy and light vehicle movements</p> <p>Dust leaving the premises</p> <p>Lift-off from stockpiles and stored product</p> <p>Dust lift-off from dried clay in mine void</p>	Air/windborne pathway, predominately in a west south westerly direction	<ul style="list-style-type: none"> - Sprinkler system for watering the monazite feed and all other stockpile areas. - Stockpiles contained in containment area (40 x 45 m) earthen bunker - Vehicle washdown bay – removal of fugitive dust material from trucks before leaving site. - Use of water carts for dust suppression in the mining area, roadways and process plant area.
Noise	Machinery and vehicles	Air/windborne pathway, predominately in a west south westerly direction	None specified
Contaminated or potentially contaminated surface water run-off (and sediment)	<p>Stockpiling of product (Seepage of water contained within product stockpile)</p> <p>Surface water run-off</p>	<p>Seepage of water contained within product stockpile causing overland runoff and infiltration through soil, which is defined as being sandy clay and clayey sand</p> <p>Infiltration through base of unlined storage area.</p>	<ul style="list-style-type: none"> - Must be equipped with a sub-surface drainage system comprising drainage pipework, aggregate, geofabric and clean fill sand; - Perimeter windrow around infrastructure area to contain stormwater run-off; - Be contained within the process water dam - Regular visual inspections of the plant area to occur following rainfall events to ensure no uncontrolled run-off occurs to surrounding areas of vegetation.
	Operation of processing plant		Must be equipped to contain all surface water runoff from the process plant area to within the operational footprint, for return to the process water dam

Emission	Sources	Potential pathways	Proposed controls
Waste (Tailings - clay fines (slimes))	Disposal of clay slimes to existing mine void	Seepage of water contained in the clay slimes causing overland runoff and infiltration through soil, which is defined as being sandy clay and clayey sand. Infiltration through base of mine void.	<ul style="list-style-type: none"> - Disposed of within an existing open void located west of the EMP. - Undertaking visual inspections daily whilst operating to assess integrity and check for leaks. - Providing automated controls via density/flow measurements on the clay fines disposal pipeline to ensure any leaks are quickly detected and controlled. - The clay fines disposal rate is such that any spill is expected to be minor, and will be contained on the road infrastructure with earthen windrows to prevent impact to adjacent vegetation. - Ensuring water levels are maintained at least 500 mm below the top of the wall on mine void disposal area. - Decant overflow water is returned to the process water dam for reuse.
	Rupture of pipeline causing clay slimes	Direct discharge to land	
	Overtopping/ breach of containment	Direct discharge to land	
Waste (Tailings – sand oversized)	Disposal of sand tailings to EMP	Seepage of water contained in the tailings infiltrating through soil, which is defined as being sandy clay and clayey sand Infiltration through base of EMP.	Returned to the EMP from the plant.
	Breach of sand fines (waste) pipelines	Overflow/overtopping resulting in run-off over land and/or seepage through soil, which is defined as being sandy clay and clayey sand.	

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the licence holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 2 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 (*Guidance Statement: Environmental Siting* (DER 2016)).

Table 2: Sensitive human and environmental receptors and distance from prescribed activities

Human receptors	Distance from prescribed activity	Pathway Assessment
Town of Eneabba (Approximately 150 residential premises)	The proposed activity is approximately 8km away from the town in a north-west direction Receptors are depicted in Figure 1 below	The Delegated Officer considers it unlikely a Risk Event for dust or noise emissions will occur as a source pathway receptor linkage does not exist based on the distance from proposed activities. Given this fact, the Town of Eneabba and the users of the Brand Hwy have not been included in the risk table below.
Users of Brand Hwy	The proposed activity is approximately 8km away from the highway (runs parallel) Receptors are depicted in Figure 1 below	
Environmental receptors	Distance from prescribed activity	Pathway Assessment
Remnant vegetation within South Eneabba Nature Reserve (which is within the State Agreement Lease and contains an area which was previously mined).	The proposed activity is approximately 1km away from the nature reserve, in a south-east direction.	Air/windborne pathway - dust deposition on native vegetation species can potentially lead to poor vegetation health and soil contamination.
Groundwater Information contained within the decision report for works approval W6251/2019/1, details that beneath the mine, groundwater occurs only in the Yarragadee Formation in multi-layered water-bearing zones that are unconfined to confined. On a regional level, groundwater is recharged	Groundwater levels around the EMP are typically 30 – 35 m below natural ground level.	Migration through soil with a medium permeability (which is defined as being sandy clay and clayey sand).

<p>to the Yarragadee Formation via rainfall and surface runoff infiltration through the overlying unsaturated superficial formations.</p> <p>Ambient groundwater is sodium chloride-type, but typically has higher proportions of calcium/magnesium where, coupled with relatively higher total dissolved solids concentrations of around 1,000 mg/L, the groundwater has been impacted by past seepage from tailings facilities and process water dams used as part of the historical Zircon Upgrade Plant operations.</p> <p>Based on the dissolved solids value, the groundwater quality is considered to be marginal, with beneficial uses for stock and pastoral.</p>		
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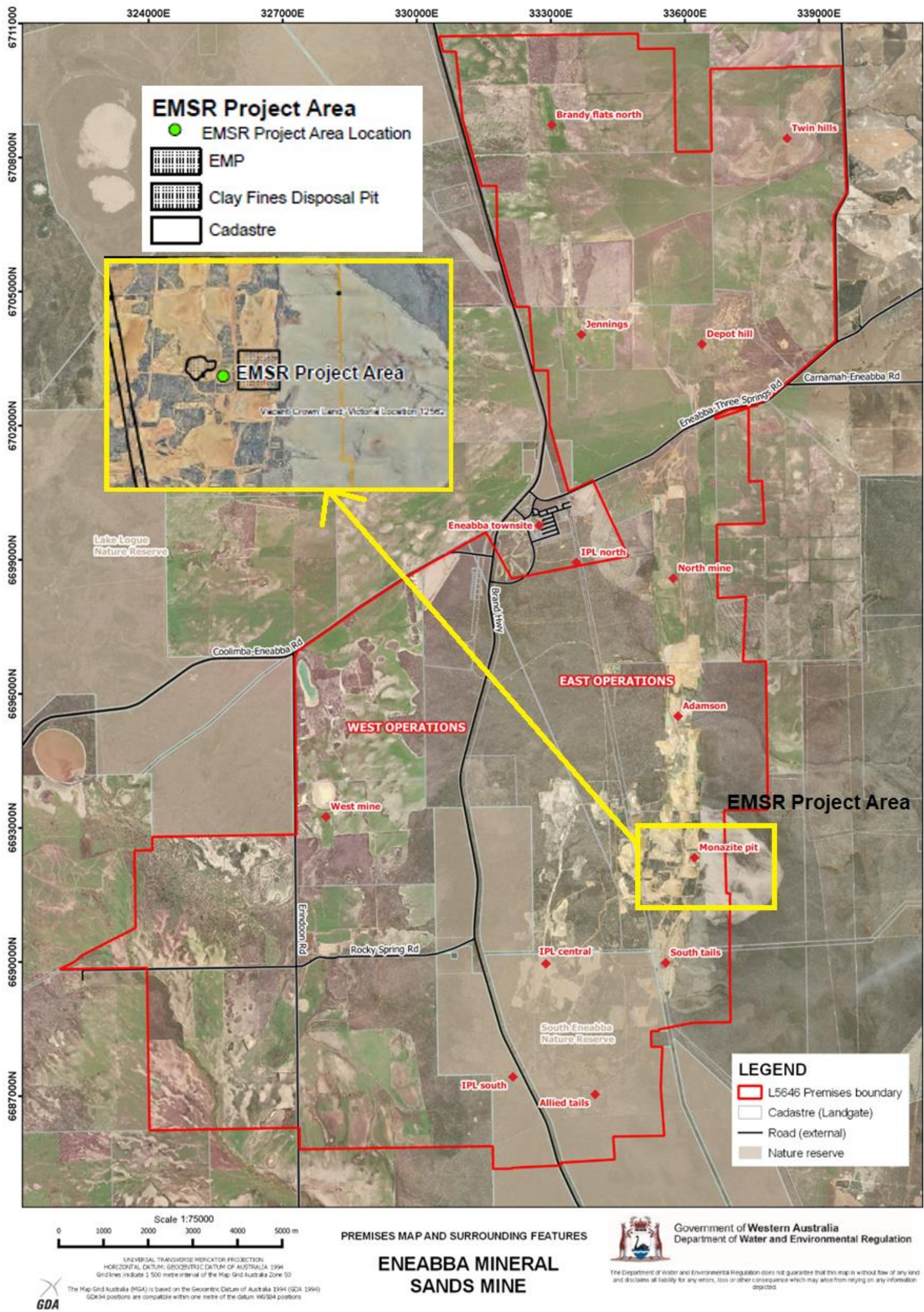


Figure 1: Sensitive receptors

3.2 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 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the licence 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 licence holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the licence holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table .

The Revised Licence that accompanies this Amendment Report authorises emissions associated with the operation of the premises i.e. for the operation of the Eneabba Mineral Sands (Monazite) Recovery Project.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 3. Risk assessment of potential emissions and discharges from the premises during operation

Risk Event					Risk rating ¹ C = consequence L = likelihood		
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls		Conditions ² of licence	Justification for additional regulatory controls
Screening of material Heavy and light vehicle movements Lift-off from feed stockpiles	Dust	Air/windborne pathway - dust deposition on native vegetation species can potentially lead to poor vegetation health and soil contamination	Remnant vegetation within South Eneabba Nature Reserve	Refer to section 3.1	MEDIUM C = Moderate L = Possible	<u>Condition 9 – Dust controls</u> Condition 10 – Dust Management Plan	There is an inherent risk of airborne dust containing NORM to be generated during mining, screening, haulage and stockpiling, where it can impact on nearby environmental values such as soil and remnant vegetation. Implementation of dust management controls as specified in the site's existing Dust Management Plan (Iluka, 2018) are expected to minimise the risk of unacceptable impacts.
Dust lift-off from dried clay in mine void							
Stockpiling of product	Potentially contaminated water	Infiltration through base of unlined storage area, as well as overland runoff causing soil and groundwater contamination from NORMs	Remnant vegetation within South Eneabba Nature Reserve and groundwater quality	Refer to section 3.1	MEDIUM C = Minor L = Unlikely	<u>Condition 4 - Infrastructure and equipment requirements</u>	The 'mineral concentrate' will be stockpiled within a earthen bunker containment area and allowed to drain to around 5% w/w. There is a risk of water runoff and infiltration contaminating surrounding areas of soil and impact remnant vegetation, if not adequately controlled and contained. Implementation of surface water controls including sub-surface drainage system comprising drainage pipework, aggregate, geofabric and clean fill sand to minimise the risk of unacceptable impacts.
Operation of processing plant	Contaminated surface water run-off (and sediment)	Runoff from processing area, causing increased load of sediment to stormwater / soil contamination / vegetation deaths	Remnant vegetation within South Eneabba Nature Reserve and groundwater quality	Refer to section 3.1	MEDIUM C = Minor L = Unlikely	<u>Condition 3 - Containment infrastructure</u> <u>Condition 4 - Infrastructure and equipment requirements</u>	There is a risk of surface water runoff from the plant area contaminating surrounding areas of soil and impact remnant vegetation, if not adequately controlled and contained. Implementation of surface water controls, including the use of bunding, cut-off drains and channels are expected to minimise the risk of unacceptable impacts.

Risk Event					Risk rating ¹ C = consequence L = likelihood		
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls		Conditions ² of licence	Justification for additional regulatory controls
Disposal of clay slimes to existing mine void	Clay slimes	Infiltration through base of mine void, leading to groundwater contamination	Remnant vegetation within South Eneabba Nature Reserve and groundwater quality	Refer to section 3.1	MEDIUM C = Minor L = Unlikely	<u>Condition 3 - Containment infrastructure</u> <u>Condition 4 - Infrastructure and equipment requirements</u>	The percentage of clay slimes within the feed material is expected to be minimal. Once deposited, clay slimes will settle and consolidate, and effectively self-seal the base of the void given the natural water retention properties (>40% clay content). The Delegated Officer reasonably foresees that some seepage will initially occur, but is not expected to be significant.
		Infiltration through base of mine void, leading to groundwater mounding			MEDIUM C = Minor L = Unlikely	N/A	Based on the distance of the receptor away from the proposed activity, the Delegated Officer does not reasonably foresee receptors being impacted. No need to impose additional regulatory controls.
		Rupture of pipeline causing clay slimes discharge to land Direct discharge, leading to soil contamination / vegetation deaths	Remnant vegetation within South Eneabba Nature Reserve adjacent to pipeline alignment	Refer to section 3.1	MEDIUM C = Minor L = Unlikely	<u>Condition 1 – Premises operation</u>	Clay slimes will be slurried with process water, therefore ruptures may impact on remnant vegetation through sedimentation or erosion impacts. Flow meters and pressure gauges on pipelines should enable early detection of spills and leaks.
		Overtopping/ breach of containment causing discharge to land Direct discharge, leading to soil contamination / vegetation deaths	Remnant vegetation within South Eneabba Nature Reserve adjacent to mine void	Refer to section 3.1	MEDIUM C = Minor L = Unlikely	<u>Condition 4 - Infrastructure and equipment requirements</u> <u>Condition 5 – Inspections of infrastructure requirements</u>	Clay slimes will be pumped to an existing below ground excavation for solar drying, which minimises the risk of overtopping or breach of containment. Operational controls for containment dams on the Revised Licence will be implemented, such as maintaining an operational freeboard and returning supernatant water to the process pond.

Risk Event					Risk rating ¹ C = consequence L = likelihood		
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls		Conditions ² of licence	Justification for additional regulatory controls
Disposal of sand tailings to EMP	Sand tailings	Seepage of water entrained in the tailings to groundwater Through base of EMP, leading to soil / groundwater contamination	Remnant vegetation within South Eneabba Nature Reserve and groundwater quality	Refer to section 3.1	LOW C = Minor L = Rare	N/A	Sand tailings (consisting principally of silica sand and other minor impurities) will have undergone physical separation only and are therefore unlikely to contain contaminants that might otherwise be present in sand tailings that have undergone secondary processing. No need to impose additional regulatory controls.
Breach of sand fines (waste) pipelines		Rupture of pipeline causing clay slimes discharge to land	Remnant vegetation within South Eneabba Nature Reserve	Refer to section 3.1			
Process water dam	Contaminated process water	Overtopping of dam casing overland runoff or infiltration through soil causing impacts to water quality and vegetation. Infiltration through base of dam causing impacts to water quality and vegetation.	Remnant vegetation within South Eneabba Nature Reserve and groundwater quality	Refer to section 3.1	MEDIUM C = Minor L = Unlikely	<u>Condition 2 – Table 1</u>	The applicant has proposed a 1mm HDPE liner which will assist in preventing seepage and infiltration within the pond, however no freeboard has been proposed which may result in overtopping. A freeboard requirement has been added to address this risk.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Guidance Statement: Risk Assessments (DER 2017).

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

4. Consultation

As the proposed activity was previously advertised under W6251/2019/1 this licence amendment was not formally advertised.

On 20 July 2020, the department consulted with the following identified direct interest stakeholders:

- Department of Mines, Industry Regulation and Safety (DMIRS) Mines Safety Directorate;
- Department of Mines, Industry Regulation and Safety (DMIRS) Resource and Environmental Compliance Division; and
- Shire of Carnamah.

DMIRS Mines Safety Division advised that the licence holder's Radiation Management Plan was approved for the proposed activity on 28 May 2020 and has confirmed that the requirements as outlined in the approved Radiation Management Plan have been complied with.

DMIRS Resource and Environmental Compliance Division advised that AM70/2667 is regulated under a State Agreement Act (*Mineral Sands (Eneabba) State Agreement Act 1975*) and has no comment in regards to the proposed modifications outlined within the Part V licence amendment application.

No comments were received from the Shire of Carnamah.

5. Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Amendment Report (summarised in Appendix 2).

Based on this assessment, it has been determined that the Issued Licence will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

DWER notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the approval under the EP Act.

5.1 Summary of amendments

Table 4 below provides a summary of the proposed amendments and will act as a record of implemented changes. All proposed changes have been incorporated into the revised licence as part of the amendment process.

Table 4: Proposed amendments

Condition no.	Proposed amendments
Introduction - Licence and works approval history	Updated to include the licences and works approval instruments issued for the premises under Division 3, Part V of the Act since 2007
Updated licence condition numbering	Licence conditions 4 to 21 have been updated to reflect new condition numbering

Updated table numbering	The numbering for Tables 3 to 8 have been updated to reflect new table numbering
1	Updated to include the clay slimes disposal and vehicle washdown into the premises operation
2 – Table 1	Updated to include the slimes disposal dam, EMP Resource Pit, Process water dam and vehicle washdown into the containment infrastructure table, with infrastructure requirements for each new infrastructure element.
3	Condition 3 added to specify the ongoing maintenance for the infrastructure within Table 1.
4 – Table 2	Condition 4 and Table 2 added to include the infrastructure and equipment constructed in the works approval W6251, along with their operating requirements and corresponding infrastructure locations
5 – Table 3	Updated to include the inspections of the clay slimes disposal, vehicle washdown, EMP Resource Pit, Slimes Disposal Dam and Process water dam in Table 3.
9 – Table 7	Condition 9 and Table 7 added to include the updated dust controls in relation to the EMRP
15 – Table 9	Updated to include the amount of ore processed through the mineral recovery plant, the amount of mineral concentrate produced and the amount and location of sand tailings and clay slimes disposed on the Premises
Definitions	Definitions added: 'ACN', 'Books', 'Department Request', 'DWER', 'EMP', 'EMRP', 'Environmental Harm', 'HDPE', 'MSP', 'MSRP', and 'tph'.
Schedule 1: Maps	Map of the EMRP in relation to the rest of the prescribed premises have been added to Schedule 1: Maps
	Map of the main features relating to the EMRP have been added to Schedule 1: Maps
	Map of the EMRP plant site layout and features have been added to Schedule 1: Maps

Appendix 2: Key documents

Document title	Availability
Iluka Resources Ltd – Licence (L5646/1994/10) Amendment application form and supporting documentation for Eneabba Mineral Sands Recovery Project (May 2020)	DWER records (A1914744)
Iluka Resources Ltd – Eneabba Mineral Sands Recovery Project - Works approval (W6251/2019/1) – Construction compliance documentation (May 2020)	DWER records (A1909363)
Iluka Resources Ltd – Eneabba Mineral Sands Recovery Project Phase 1 – Works Approval Application form and supporting documentation (May, 2019)	DWER records (A1792800)
Iluka Resources Ltd - Dust Management Plan – Eneabba Operations (2018)	DWER records (A1794986)
Granted Works Approval (W6251/2019/1) for Eneabba Mineral Sands Recovery Project (August 2019)	accessed at www.dwer.wa.gov.au
DER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Environment Regulation, Perth.	
DER, October 2015. <i>Guidance Statement: Setting conditions</i> . Department of Environment Regulation, Perth.	
DER, August 2016. <i>Guidance Statement: Licence duration</i> . Department of Environment Regulation, Perth.	
DER, February 2017 <i>Guidance Statement: Risk Assessments</i> . Department of Environment Regulation, Perth.	
DWER, June 2019 <i>Guideline: Decision Making</i> Department of Water and Environmental Regulation	
<i>Mineral Sands (Eneabba) State Agreement Act 1975</i>	accessed at: www.legislation.wa.gov.au