Mining, Exploration and Geoscience
Department of Regional NSW

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Balranald Mineral Sands Mine – Modification 1 (SSD-5285-Mod-1) – Advice on Modification Report

Dear Clay,

I refer to Department of Planning and Environment correspondence dated 24 May 2022 inviting the Department of Regional NSW – Mining, Exploration and Geoscience (MEG) to provide comments on the Balranald Mineral Sands Mine – Modification 1 (SSD-5285-Mod-1) Modification Report (the Modification) submitted by Iluka Resources Limited (the Iluka or the Proponent).

Executive summary

The Modification is to extend the trial mining period to 6 years and allow Iluka to move mined material offsite for secondary processing. The extension is necessary for Iluka to trial innovative and proprietary mining methods that would allow for further development of the Balranald mineral sands deposits.

Table 1: MEG estimate of total royalties

Resource parameter	$m (2022 dollars)
Total royalties received	22
Net Present Value (NPV) royalties (7 percent discount rate, real)	15
Annual estimated royalties (average)	3.6

MEG considers the Modification will provide an appropriate return to the NSW Government

The Modification is considered to be an efficient use of resources. If the Modification does not proceed the economic and social benefits outlined above will not be realised.

Economic Assessment

Economic benefits

The proponent has indicated that the Modification would provide the following economic benefits to the local economy over 6 years:

- $175 million in annual direct and indirect regional output or business turnover
- $89 million in annual direct and indirect regional value added
- $26 million in annual direct and indirect household income
- a peak construction workforce of 200 jobs and a peak operational workforce of 170. Average annual employment over both phases is expected to be 150 jobs
- royalties over the 6-year trial mining of $22 million in real terms, $15 million in NPV terms and an average annual of $3.6 million (real).

Risks to the benefits are that the trial of mining methods is not successful, input prices rise significantly and/or geological conditions encountered are unfavorable.

The proponent is requested to confirm that there is no double counting in the estimation of benefits. For example, is indirect household income included in indirect regional output or business turnover?

MEG notes that the Modification would allow Iluka to develop a heavy mineral sands deposit that would be in alignment with the Critical Minerals and High-Tech Metals Strategy for NSW, pending a successful trial of mining methods.

MEG also recognises that Iluka would be a significant regional employer throughout the trial and if operations proceed to commercial production. Given that the population of Balranald is 2,306, it is likely that the many employees would be attracted to the region to work for the mine.

Resource and economic context

The proposed Modification and extension to trial mining at the Balranald mineral sands deposit is likely to have a significant positive impact on the local region in terms of population, employment and household income.

The current unemployment rate of Balranald is at 5.0 per cent which is slightly above the NSW average of 4.7 per cent. Youth unemployment is 13 per cent, higher than the NSW average of 10.3 per cent. Current mining employment in the Balranald region is around447 jobs.

The development of the Balranald heavy mineral sands deposit aligns with the Critical Minerals and High-Tech Metals Strategy for NSW. Rutile and ilmenite are the preferred source for titanium in high strength and corrosion resistant high-tech alloys used in medical and aerospace applications. It is also used as pigmentation in white paints due to it's ability to retain its colour over time. Zircon is used in ceramics, foundry casting and refractory applications and has a growing role in emerging high-tech industries.

Further, the continuation of the trial mining of the Balranald deposit aligns with Direction 3 of the Far West Regional Plan 2036 to sustainably manage mineral resources.

Royalty return to the state

This royalty estimate uses the same assumptions as royalty calculations for open cut Heavy Minerals Sands (HMS) operations in the Murray Basin. Given the proposed Balranald Modification is using

proprietary mining techniques, these estimates are accurate within a wider confidence interval than other Murray Basin HMS royalty estimates.

The royalty estimate assumes a royalty rate of 2.3 percent after deductions. This is consistent with other heavy mineral sands mines.

Prices for heavy mineral sands products are based on Consensus Economics forecasts and are considered conservative in comparison to current spot prices.

Heavy mineral sand product price forecasting is inherently difficult and over the project life variations in the price of products are expected. Consensus Economics long term price forecasts are A$287 per tonne for ilmenite products, A$1751 per tonne for rutile and A$1865 per tonne for zircon.

Using these parameters, MEG has projected that the Modification would provide NSW with royalties of around A$22 million in real terms and around A$15 million in NPV terms using a 7 per cent discount rate, over the period 2024 to 2030. Average royalties payable to NSW Government from the Project would be around A$3.6 million a year in real terms.

Resource considerations

Background

Iluka has approval to develop a mineral sands mine in southwestern NSW. The approval includes construction, mining, primary processing and rehabilitation of two linear mineral sand deposits, known as the West Balranald and Nepean deposits. These deposits are potentially world class in terms of grade and overall tonnage of the contained resources.

The Balranald Project would generate approximately 14.4 Million tonnes (Mt) of heavy mineral concentrate (HMC) and ilmenite over the 15-year project life, at production rates of up to 500,000 tonnes of HMC and 600,000 tonnes of ilmenite per year. The full-scale project is expected to generate 225 jobs during construction and up to 550 jobs during operations.

Size and quality of the resource

The West Balranald strandline is about 29 kilometres in length. The width of the strand varies along the strike length from 160 metres to the very north and south extents and to a maximum of 300 metres in the centre.

Average thickness also varies along strike from about 3 metres in the north and south extents and to 6m through the centre of the strand. The ore body is hosted by the lower sequence of the Loxton Sands (informally Loxton-Parilla sands) close to basement. Nearshore wave action may have reworked and upgraded an earlier, local HM accumulation.

The resource is very rich overall, with a high ilmenite assemblage. However, it is quite deep, mostly 60 metres or so below surface.

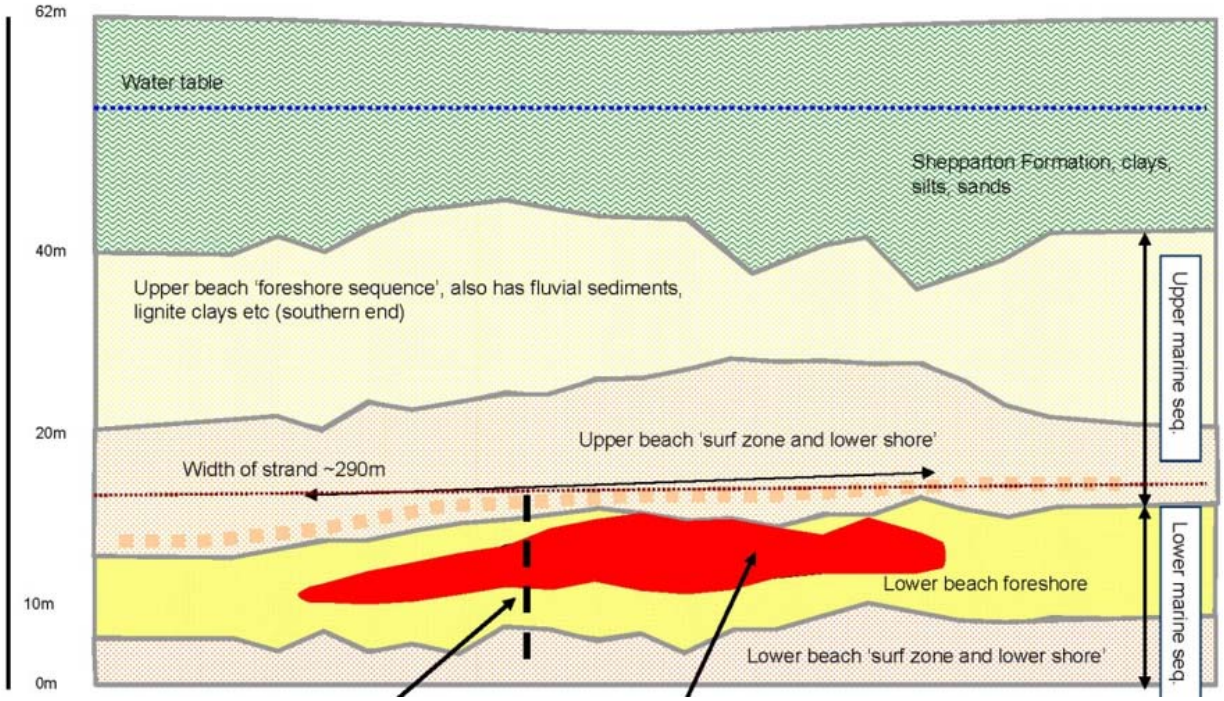

Figure 1. Typical cross section West Balranald High-grade HM in red.

A detailed, commercial in confidence resource statement which includes mineralogy, slimes, oversize, non-valuable heavy mineral content, domains and kriging was provided to MEG in 2013 which was an update on the 2011 version. The exceptional grades, good mineral assemblage and grainsize for the Murray Basin would make the ore highly economic. The main negative factors are the deposit's depth (60-80 m) which would require a high open pit strip ratio (about 22:1) and position below the water table, with high acid-forming potential.

Resource recovery

The borehole mining trial would extract only a small proportion of the overall resource. For dry mining to be undertaken as approved, major de-watering of the pit would be necessary. Given the dependency on the water table of each method, this would not be compatible in the same part of the deposit as borehole mining simultaneously. Hence borehole mining is proposed in the north of the deposit, whereas open-cut mining (if pursued in the future) would commence from the south.

The borehole mining process includes:

- sand tailings from the underground mining trial would be placed on surface directly above the mining panels ahead of mining
- topsoil and overburden would be pre-stripped from these emplacement areas to allow successful rehabilitation
- ore is extracted up the borehole
- slimes and flotation tails would be reinjected underground.

The water injection bores ahead of the extraction bore provide additional pressure for extraction of the ore via the bore while tailings are progressively reinjected.

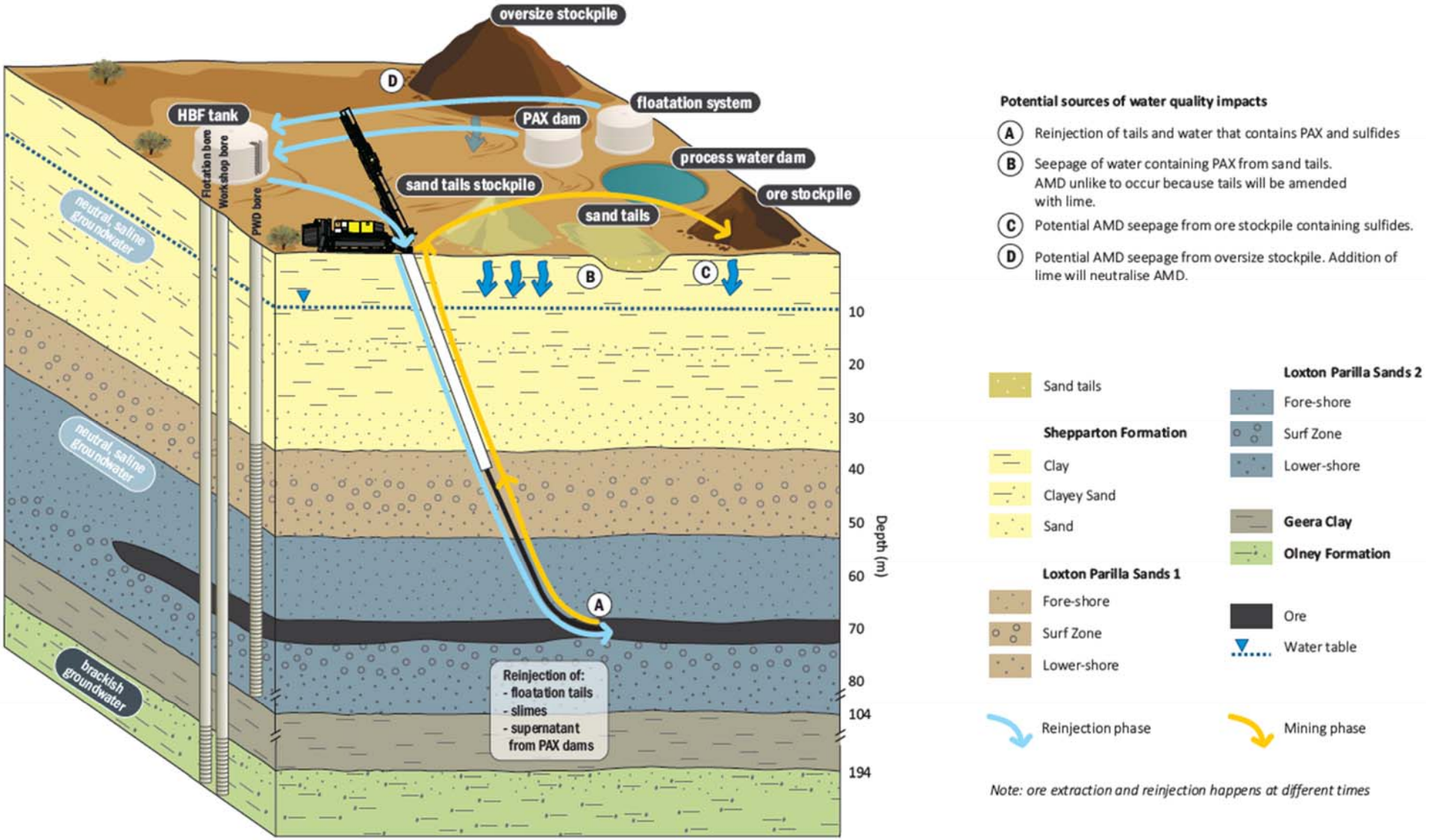

Figure 2. Schematic diagram showing basic components, layout and geochemical model for borehole (underground) mining.

Mining of panels and processing

Each stope hosts:

- ~35,000 to 40,000 tonnes
- average length ~ 500 metres
- height 3.5 metres and width 12 metres
- 1 metre longitudinal pillar between stopes

Ore production rates of up to about 34,000–38,000 tonnes per month or ~450,000 tonnes per rig, per year are anticipated, with the proposed open-cut production rate would cover two rigs operating efficiently.

Extraction of up to the currently approved 1.1 Million tonnes per annum for open-cut mining, including up to 500,000 tonnes of HMC and 600,000 tonnes of ilmenite is proposed. It is understood that each borehole rig could feasibly extract up to 400,000-450,000 tonnes per annum (Tpa) or up to 900,000 Tpa for two rigs. Up to 6.6 Million tonnes could be recovered over the proposal period.

Valuable heavy minerals will be concentrated with a flotation concentrator, including a standard magnetic separation stage on site to produce an ilmenite stream, and using a wet high-intensity magnetic separation tower, a magnetic and non-magnetic (rutile and zircon-rich) heavy mineral concentrate. Recoveries of HMS would be proportional to the (high) grade and are expected to be about 50 percent which is lower than is typical for the industry (roughly 70-90 percent of the grade which includes NSW mines). These low recoveries are due to the infancy of the technology and conservatism on the part of the proponent.

Resource sterilisation

The mining method overall should allow higher-grade ore to be extracted efficiently.

However, the process will progressively re-inject waste, and by its nature has the potential to "high-grade" and possibly sterilise to some extent. The zones mined during the trial are the shallower and probably higher-grade parts of the ore body. Diagrams showing the ore body relative to staged underground extraction have not been included in the EIS.

It should be highlighted, however, that the technique has many benefits given the nature of this deposit.

Advantages of borehole mining include:

- the depth to mineralisation also creates a very high open-cut waste/ore ratio for a mineral sands deposit of about 22:1 and would require high volume pit de-watering and construction of a substantially greater re-injection bore field with attendant sensitivities
- pit wall angles must be shallow due to soft ground conditions and high groundwater inflows
- the mining footprint of West Balranald would be large, about 20 kilometres by 1.5 kilometres.

The mining method proposed is new and significantly proprietary, but extension of the mining trial should establish the commerciality of the process which, if successful, would be globally significant. There has very good potential for future borehole mining of numerous deep HMS deposits in the Murray Basin of NSW.

JORC code considerations

The Proponent has completed resource and reserve estimations for the Modification in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC code) produced by the Australasian Joint Ore Reserves Committee. The JORC Code is an

industry-standard professional code of practice that sets minimum standards for public reporting of mineral exploration results, mineral resources and ore reserves. Reserves are the economically mineable portion of a resource. A JORC compliant reserves report assists in independently assessing the commercial viability of the Modification and the proposed mining method.

The stated resources are of sufficient confidence and grade for the proposed mining trial. The borehole mining trial would extract only a small proportion of the global resource but would validate the method for much of it, given the geology and grades. Final mineral recoveries are unknown but are most likely to be superior to finer-grained and considerably lower-grade deposits successfully mined in the Murray Basin of Victoria.

In view of the opportunities and constraints outlined in the Proponent's Modification and based on the information currently available, MEG considers that the Modification is consistent with the objects of the *Mining Act 1992*. Furthermore, in relation to clause 2.21 of the State Environmental Planning Policy (Resources and Energy) 2021, the Modification represents an efficient development and utilisation of minerals resources which will foster significant social and economic benefits.

MEG is satisfied that, should the operational outcomes be achieved, the proposed mine design and mining method submissions adequately recover resources and will provide an appropriate return to the state.

The requirement for a mining authority and royalty liability

The requirement for a mining lease

As Ilmenite, Monazite, Rutile, Staurolite and Zircon are prescribed minerals under the *Mining Act 1992*, the Proponent is required to hold appropriate mining title(s) allowing for mineral extraction, such as a mining lease, to undertake mining.

Royalty Liability

The holder of a mining lease is also liable to pay a royalty for both publicly and privately-owned minerals (refer to section 282-285 of the Act).

Application of section 65 of the *Mining Act 1992* – development consents under the *Environmental Planning and Assessment Act 1979*

A development application under the Environmental Planning and Assessment Act 1979 must be approved before a mining lease can be granted. A mining lease will only be granted for activities specified in the development consent.

Section 65 states:

> *The Minister must not grant a mining lease over land if development consent is required for activities to be carried out under the lease unless an appropriate development consent is in force in respect of the carrying out of those activities on the land.*

Biodiversity offset assessment

MEG requests that the Proponent consider potential resource sterilisation should any future biodiversity offset areas be considered. The Proponent must consult with MEG and any holders of existing mining or exploration authorities that could be potentially affected by the proposed creation of any such biodiversity offsets, prior to creation occurring. This will ensure there is no consequent reduction in access to prospective land for mineral exploration or potential for the sterilisation of mineral and extractive resources.

Summary of review

MEG considers that should the Modification be approved; efficient and optimised resource outcomes can be achieved.

MEG requests that it be provided with an opportunity to review the draft conditions of approval before finalisation and any granting of development consent.

For enquiries and further information on this matter, please contact Adam Banister, Senior Advisor Industry Advisory & Mining Concierge service within the Industry Development branch on 02 4063 6860 or mining.concierge@regional.nsw.gov.au.

Yours sincerely,

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for

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