



Appendix Q

Rehabilitation assessment

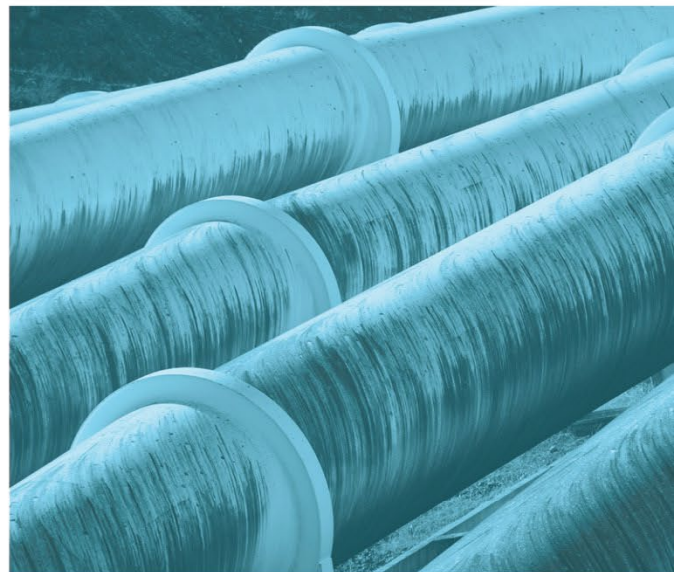




Balranald Mineral Sands Project - Modification of Consent (SSD-5285)

Rehabilitation and closure assessment

Prepared for Iluka Resources Limited
May 2022





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Rehabilitation and closure assessment

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1 Rehabilitation

EMM Consulting Pty Limited (EMM) was commissioned by Iluka Resources Limited (Iluka) to undertake a rehabilitation and closure assessment (RCA) for the proposed modification (MOD1) to the approved Balranald Mineral Sands Project (the Balranald Project) in south-western New South Wales (NSW).

The purpose of this RCA is to assess the rehabilitation and closure impacts related to the proposed modification against the predicted impacts of the approved project. The RCA provides:

- a description of the proposed modification;
- a summary of the original 2015 rehabilitation and closure strategy (RCS) prepared by EMM Consulting for the Balranald Project (EMM, 2015); and
- assess of rehabilitation and closure objectives between the existing project and the proposed modification.

1.1 Project background

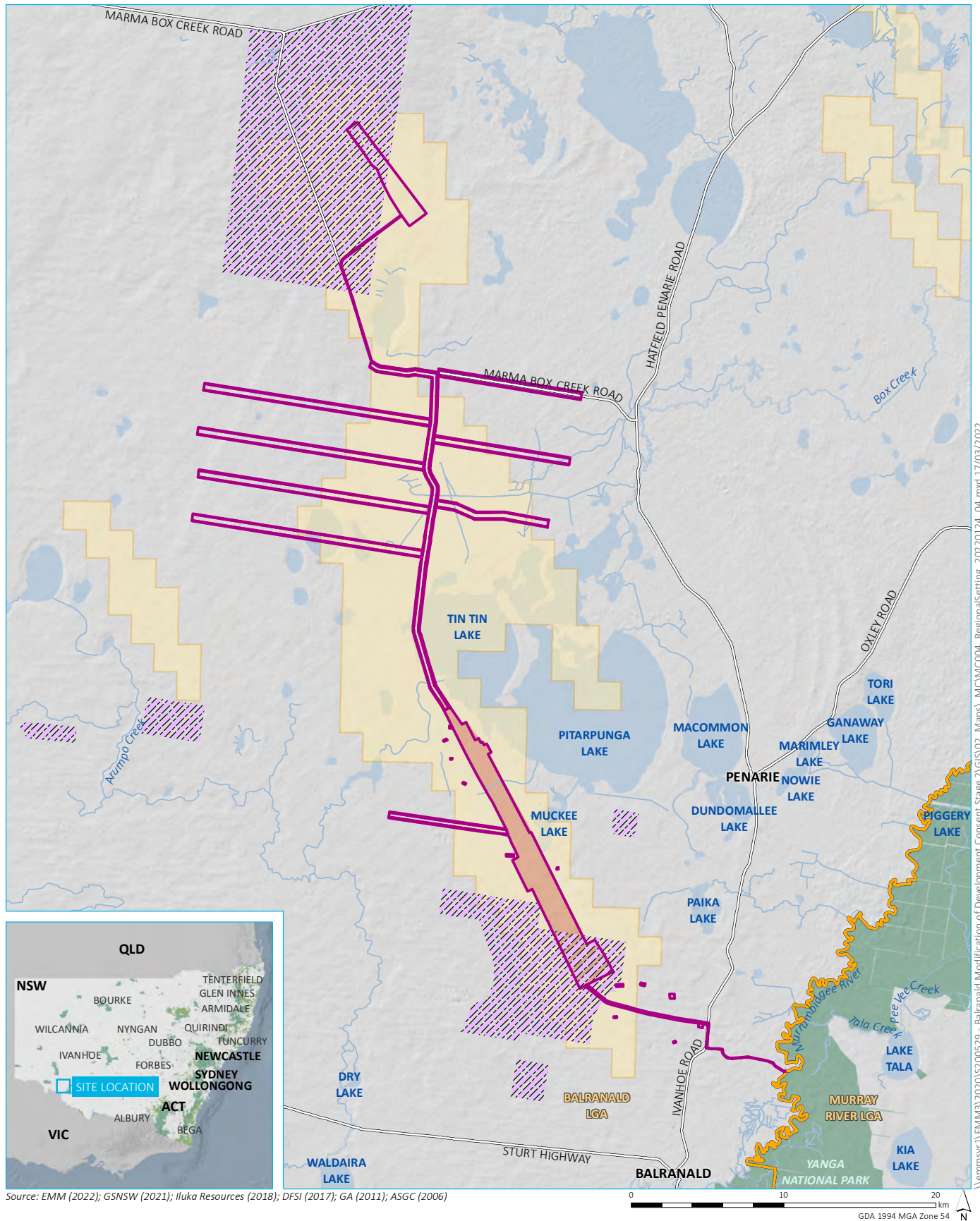
Iluka have approval develop a mineral sand mine in south-western (NSW), known as the Balranald Project. It includes construction, mining, primary processing, and rehabilitation of two linear mineral sand deposits, known as the West Balranald and Nepean deposits, located approximately 12 kilometres (km) and 66 km north-west of the town of Balranald (Balranald town), respectively.

An environmental impact statement (EIS) was prepared and submitted in 2015 to accompany a State significant development (SSD-5285) application under Part 4 of the EP&A Act for an open cut, truck and shovel mining method. Development consent was granted by DPIE under Part 4 of the EP&A Act on 5 April 2016. The Balranald Project also included undertaking a bulk sampling activity at the West Balranald mine to test the removal of ore using underground mining methods.

The regional setting and approved EIS project area are shown on Figure 1.1.

Since development consent was granted in April 2016, Iluka has undertaken the approved bulk sampling activity involving the extraction of mineralised material or ore, from depth within the approved disturbance area of the West Balranald mine.

The outcome of the bulk sampling activities confirmed the effectiveness of the underground mining method, validated key elements of the mining unit design and have been used to help guide the proposed modification to inform the potential suitability (ie commerciality and reduced environmental impacts) of underground mining as an alternative method for resource extraction for the Balranald Project.



KEY

- EIS Approved Balranald Project Area (SSD-5285)
- Exploration Licence (EL7450)
- Mining Lease (ML1736)
- Southern Mallee Conservation Area (2015)
- Major road
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Local government area

INSET KEY

- NPWS reserve
- State forest

Regional setting and EIS approved Balranald project area (SSD-5285)

Balranald Mineral Sands Project
Rehabilitation and closure assessment
Figure 1.1

1.2 Description of modification

The proposed MOD1 would involve:

- continuing underground mining within a portion of the approved disturbance footprint of the West Balranald deposit pursuant to the consent (ie mining area); and
- development of approved mineral processing infrastructure within a proposed new area of disturbance (ie surface infrastructure).

The construction of infrastructure approved under the development consent would be undertaken to support the construction and operation for proposed underground mining, including mineral processing infrastructure, access roads, upgrade of external roads and intersections, gravel extraction, monitoring infrastructure, accommodation facility, road transport of ore offsite for downstream processing and other infrastructure as required.

The majority of this infrastructure would be required regardless of the mining method (ie open cut as approved under the development consent, or underground). For all other land located outside of the proposed modification area, ie other areas of the West Balranald mine and the Nepean mine, Iluka proposes no change to the currently approved open cut mining method at this stage.

The underground mining process would involve:

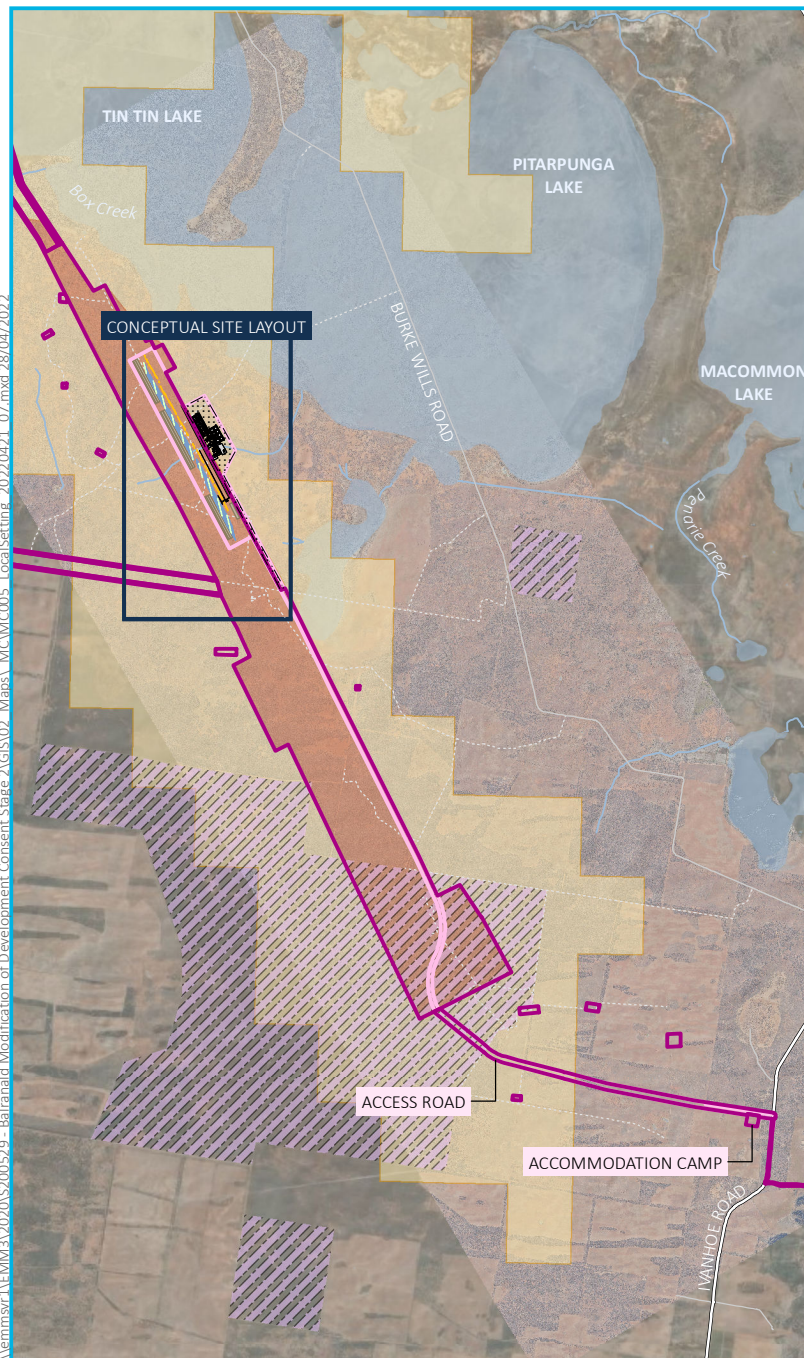
- clearing the footprint directly above the mining area – the area will be stripped of topsoil, subsoil and non-saline overburden to a nominal depth of 2 metres (m);
- surface placement of treated sand tails and overburden/subsoil ahead of mining into the space created by the above stripping;
- underground mining of the ore;
- processing of the mined ore to separate the heavy mineral concentrate (HMC) from sand tails, sand fines and oversize;
- stockpiling of the HMC;
- backfilling of sand fines underground;
- replacement of subsoil and topsoil for rehabilitation and final landform; and
- environmental monitoring activities (including groundwater, geochemistry, subsidence, air quality and noise).

Ore is expected to be produced and processed at a rate no greater than approved under the development consent. The processing plant on site will produce a HMC to generate two primary product streams: magnetic HMC and non-magnetic HMC.

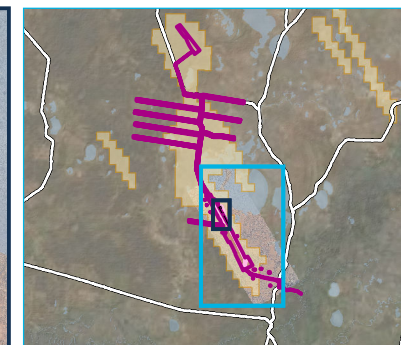
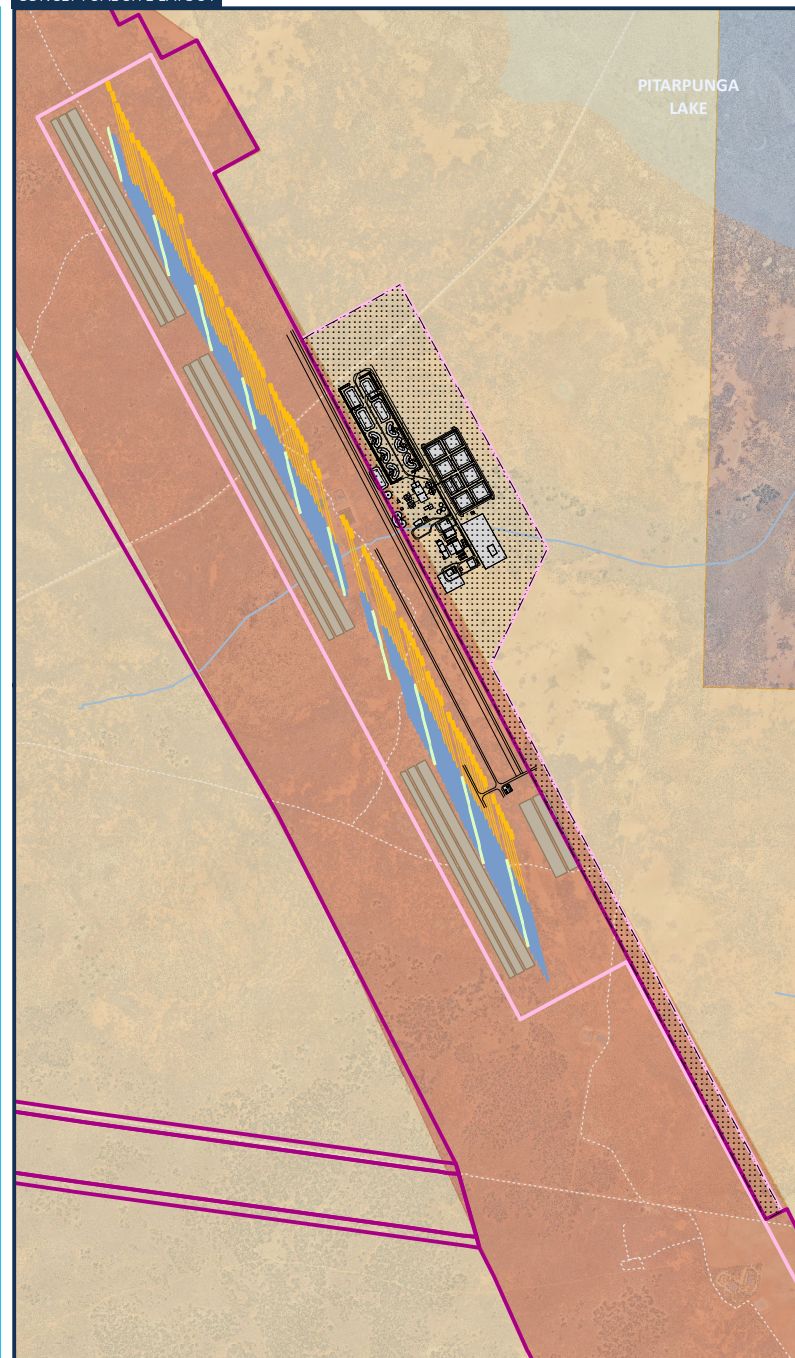
The product would be stockpiled and transported off-site for downstream processing with underground mining operations to be undertaken for a period of up to 6 years.

The proposed modification and conceptual layout are shown in Figure 1.2.

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CONCEPTUAL SITE LAYOUT



KEY

- EIS Approved Balranald Project Area (SSD-5285)
- Proposed modification study area
- Proposed modification extension to Balranald Project Area boundary
- Processing area infrastructure
- Subsoil stockpile
- Drill pad and string to underground stope
- Underground stope
- Underground pillar
- Major road
- Minor road
- Existing track
- Watercourse/drainage line
- Waterbody
- Southern Mallee Conservation Area (2015)
- Exploration Licence (EL7450)
- Mining Lease (ML1736)

Proposed modification study area and conceptual site layout

Balranald Mineral Sands Project
Rehabilitation and closure assessment
Figure 1.2

2 Summary of the 2015 rehabilitation and closure strategy

The approved *2015 Rehabilitation and Closure Strategy* (RCS) (EMM 2015a) outlines Iluka's objectives for rehabilitation of the approved Balranald Project (SSD-5285) as summarised below.

2.1 Rehabilitation and closure strategy

The 2015 RCS:

- described the means by which acceptable post-mining land use suitability would be achieved;
- presented the proposed stable post-mining landforms; and
- described methods to preserve downstream water quality.

To achieve these objectives, the 2015 RCS presented:

- rehabilitation strategies for areas that would be disturbed;
- objectives for the rehabilitation;
- a revegetation program;
- a monitoring program to assess performance of rehabilitated areas; and
- objectives and preliminary rehabilitation criteria for mine closure.

2.1.1 Rehabilitation objectives

The overarching primary rehabilitation and closure objectives of the Balranald Project were:

- the creation of safe, stable and non-polluting landforms;
- restoring self-sustaining ecosystems suitable for a final use determined in consultation with landholders and relevant government agencies; and
- progressive rehabilitation of the mine path scheduled to make best use of favourable climatic and intrinsic conditions.

2.2 Relevant legislation, guidelines, and standards

2.2.1 Mining Act 1992

The NSW *Mining Act 1992* (Mining Act) regulates environmental protection, closure and rehabilitation conditions included in all mining leases. Relevant provisions of the Mining Act were considered during the preparation of the 2015 RCS, including addressing Section 239 - Rehabilitation of area damaged by mining:

“(1) The conditions subject to which an authority or mineral claim is granted or renewed may include such conditions relating to:

(a) the rehabilitation, levelling, re-grassing, reforestation or contouring of such part of the land over which the authority or claim has effect as may have been damaged or adversely affected by prospecting operations or mining operations, and

(b) the filling in, sealing or fencing off of excavations, shafts and tunnels...”

Iluka currently holds a Mining Lease (ML) 1736 issued under the Mining Act over the Balranald Project with bulk sampling activities undertaken in accordance with a MOP approved by the NSW Resources Regulator.

2.2.2 Protection of the Environment Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) establishes the State’s environmental regulatory framework and includes licensing requirements for certain activities. The objectives of the POEO Act that relate to decommissioning and rehabilitation that were considered in the preparation of the 2015 RCS include ‘...to protect, restore and enhance the environment, to reduce risks to human health and prevent degradation of the environment’.

Iluka currently holds an Environmental Protection Licence (EPL 20795) issued under the POEO Act over the Balranald Project with bulk sampling activities undertaken in accordance with an Environmental Management Plan (EMP) approved by the NSW Environment Protection Authority (EPA).

2.2.3 Guidelines

The following guidelines provide a strategic overview for rehabilitation and, where relevant, principles of each were adopted in the preparation of the 2015 RCS:

- *ESG3 – MOP Guidelines* (NSW Department of Trade and Investment – Division of Resources and Energy 2013);
- *Guidelines to the Mining, Rehabilitation & Environmental Management Process* (NSW Department of Trade and Investment 2012);
- *The Strategic Framework for Mine Closure* (ANZMEC and MCA 2000);
- *Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry* (Commonwealth of Australia); and
- *Mine Closure and Completion - Leading Practice Sustainable Development Program for the Mining Industry* (Commonwealth of Australia).

The relevance of each of the guidelines is discussed briefly below.

i Mining Operations Plan Guidelines

The *MOP Guidelines* provide an overview of the approval process for mining developments in NSW and provides content and formatting requirements for MOPs and Annual Reviews. The purpose of the document is to “ensure that all mining operations are safe, the resources are efficiently extracted, the environment is protected and rehabilitation achieves a stable and satisfactory outcome”.

ii Guidelines to the Mining, Rehabilitation & Environmental Management Process

The Balranald Project was broken up into seven domains as defined in the *Guidelines to the Mining, Rehabilitation & Environmental Management Process* (NSW Department of Trade and Investment 2012) with domains defined as land management units with similar geophysical characteristics (refer Section 2.4).

iii Strategic Framework for Mine Closure

The *Strategic Framework for Mine Closure* (SFMC) was developed to promote nationally consistent mine closure management. The SFMC provides guidelines for the development of a mine closure plan to ensure that all stages of mine closure are conducted appropriately, including stakeholder engagement, development of mine closure methodology, financial planning, and implementation of mine closure. The SFMC also describes the expected standards for mine closure and relinquishment of the mine to a responsible authority. Whilst the objectives generally relate to mine closure, there are key elements that were relevant to Balranald Project rehabilitation, in particular the allocation of appropriate resources and the establishment of key rehabilitation criteria which were included in the 2015 RCS.

iv Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry

The aim of *Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry* (MR Handbook) is to provide guidelines to promote ‘leading practice’ sustainable mine plan and rehabilitation design, considering environmental, economic, and social aspects to support on-going sustainability of a mining development.

The MR Handbook recommends procedures and mitigation measures that should be considered during mine plan and rehabilitation design, including stakeholder consultation, material and handling, water balance, final landform design, topsoil management, vegetation and fauna habitat re-establishment and rehabilitation, and agriculture/commercial forestry suitability. The MR Handbook also provides relevant mine development case studies supporting the recommended procedures and mitigation measures.

Where relevant to the Balranald Project, the above principals were addressed in the 2015 RCS.

v Mine Closure and Completion - Leading Practice Sustainable Development Program for the Mining Industry

The aim of *Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry* (MCC Handbook) is to provide guidelines to promote ‘leading practice’ sustainable mine closure and completion, minimising any long-term environmental, economic, and social impacts and resulting in a suitable final landform for an agreed land use. Specifically, the MCC Handbook provides that a progressive rehabilitation plan, which was a key principle of the 2015 RCS, should be developed for mine closure.

Iluka has its own internal standards that would apply to closure and rehabilitation. These include:

- STD4443 – *Environmental Management Standard*;
- STD6925 – EHS Standard – *Rehabilitation and Closure*;
- STD6922 – EHS Group Standard – *Stakeholder Relations*;
- PRC3077 – Major Risk Procedure – *Tailings*; and
- Iluka Environment, *Health and Safety Policy, 2012*.

2.3 Operational rehabilitation

The main rehabilitation and closure activities assessed as part of the 2015 RCS included soil stripping and handling, overburden handling, open-cut ore mining and handling, access road, injection borefield, gravel extraction and wind erosion from exposed areas.

2.3.1 General strategies and methods

The following general strategies and methods were proposed to be implemented prior to and during operations for the Balranald Project in order to facilitate an effective rehabilitation program:

- Seed collection from the disturbance area prior to ground disturbing activities, where possible.
- Clearing of vegetation ahead of the mining activities, comprising for low open shrubland areas clearing the understorey with the topsoil layer, while for portions of the access road mulching and stockpiling the majority of overstorey timber, while retaining some for habitat enhancement purposes.
- Surface soil stripping, stockpiling, and management, comprising topsoil and vegetation stockpiling, subsoil and overburden would be maintained in separate stockpile categories (including recording soil type, quality, location, vegetation community, weeds present (if any), removal date, storage location and dust suppression treatment (if any)).
- Disturbance areas would be stripped progressively (ie only as required).
- Rehabilitation of disturbed areas would be undertaken as soon as practicable after the areas are no longer required.
- Stockpiles would be located so that they would not be further disturbed by mining activities and positioned to avoid surface water flow.
- Erosion and sediment controls would be installed around stockpile areas and regularly maintained.
- Topsoil stockpiles would be retained at a height of no more than 2 m, while subsoil would be stockpiled to a maximum of 10 m dependent on soil properties.
- Weed management will be applied to stockpiles to minimise the accumulation of weed seed in the soil.

Topsoil, subsoil, and overburden was proposed to be removed using earthmoving equipment such as scrapers, excavators, shovel and trucks. Saline groundwater was not proposed to be used to control dust during topsoil, sub soil or overburden stripping unless it was shown that groundwater quality would not affect rehabilitation outcomes.

2.4 Post mining land use

Establishment of native vegetation communities suitable for intermittent and low intensity grazing uses was the proposed final vegetation option for the approved Balranald Project (SSD-5285).

As previously stated, the Balranald Project was broken up into seven domains as defined in the *Guidelines to the Mining, Rehabilitation & Environmental Management Process* (NSW Department of Trade and Investment 2012) with domains defined as land management units with similar geophysical characteristics.

The following primary and secondary domains and their respective revegetation areas relevant to MOD1 can be summarised as follows:

- Mine path (including an estimated 52 hectares (ha) associated with the proposed final void): selected native revegetation species, comprising chenopod shrubland, belah woodland, dune Mallee and Sandplain Mallee.
- Processing area: regraded to the original ground level, top soiled and then reseeded with selected native revegetation species, being primarily chenopod shrubland.
- Access roads, accommodation facility, borrow pits: reseeded selected native revegetation species.

The most significant variation in the post-mining landform compared to pre-mining conditions was the rehabilitated open cut mine pit, including the final void at West Balranald, and areas where non saline overburden stockpiles would remain in situ. These landforms were intended to be rehabilitated in order to be compatible with the surrounding environment.

3 MOD1 assessment

The following sections assesses the rehabilitation and closure impacts related to the proposed MOD1 against the approved Balranald Project.

This closure and rehabilitation assessment includes a commitment to progressive rehabilitation which is a key part of the closure planning process.

3.1 MOD1 areas of disturbance

For the purpose of this assessment, the MOD1 disturbance area for each project domain has been assessed against those proposed in the 2015 RCS as outlined in Table 3.1 and summarised in the following sections.

Table 3.1 MOD1 disturbance area

Primary domain element	EIS approved disturbance area (ha)	Proposed MOD1 additional disturbance area (ha)	Purpose
West Balranald mine (domain 1)	2,987	As approved	Underground mining using horizontal directional drilling (HDD), mine stopes, majority of access roads, infrastructure corridors, maintenance, topsoil and other material stockpiles, internal road network and ancillary infrastructure.
Nepean mine (domain 2)	804	As approved	Not applicable to MOD1.
West Balranald processing/infrastructure area (domain 3)	71	95.2	Processing plant, portion of access roads, stockpiles, maintenance areas/ workshops, water storage dams, ore stockpiles and truck load-out area, administration offices and amenities, internal road network and ancillary infrastructure.
Nepean infrastructure area (domain 4)	0.62	As approved	Not applicable to MOD1.
West Balranald access road (domain 5)	72	24	Greenfield access road.
Nepean access road (domain 6)	15	As approved	Not applicable to MOD1.
Injection borefield (domain 7)	1,348	As approved	Not applicable to MOD1.
Gravel extraction (domain 8)	42	As approved	Borrow material for construction and operation.
Water supply pipeline (domain 9)	11	As approved	Not applicable to MOD1.
Accommodation facility (domain 10)	7.1	As approved	Accommodation for workforce.
Total	5,357.1	119.2	

Figure 1.1 presents the existing pre-mining environment conditions for the Balranald Project while Figure 1.2 presents the project elements for MOD1.

3.1.1 West Balranald mine (approved domain 1)

MOD1 proposes development of the following within the approved West Balranald mine disturbance footprint:

- underground mining;
- soil and overburden stockpiles;
- groundwater management infrastructure, including access holes, injection wells, monitoring bores and associated pumps and pipelines;
- surface water management infrastructure;
- services and utilities infrastructure (eg electricity infrastructure);
- majority of the access roads for heavy machinery and service roads for light vehicles; and
- other ancillary equipment and infrastructure.

3.1.2 MOD1 processing and ancillary infrastructure (proposed additional domain 3)

MOD1 proposes development of the following within new area of disturbance:

- a processing area, including a mineral processing plant (has a number of components including the screening plant, Wet Concentrator Plant (WCP), flotation plant and Wet High Intensity Magnetic Separation (WHIMS) plant, maintenance areas and workshops, product stockpiles, truck load-out area, administration offices and amenities;
- groundwater management infrastructure, including production bores, monitoring bores and associated pumps and pipelines;
- surface water management infrastructure;
- services and utilities infrastructure (eg electricity infrastructure);
- portion of the access road for heavy machinery and service roads for light vehicles; and
- other ancillary equipment and infrastructure.

3.1.3 Access roads (approved domain 5)

The primary access road within the project area would be the proposed establishment of the West Balranald access road, being a private access road to be constructed from the Balranald Ivanhoe Road to the MOD1 processing plant infrastructure.

The West Balranald access road would be used by heavy vehicles transporting HMC during operation. During the initial construction phase, existing access tracks through the project area from the local road network (eg Burke and Wills Road) may also be used temporarily until the West Balranald access road is established.

3.1.4 Accommodation facility (approved domain 8)

An accommodation facility would be constructed for the Balranald Project workforce with a location adjacent the West Balranald access road and Balranald Ivanhoe Road as approved under SSD-5285.

3.1.5 Gravel extraction (approved domain 10)

Gravel would be required during the construction and operational phases of MOD1. Local sources of gravel (borrow pits) were approved under SSD-5285 and would be used to provide gravel during the construction phase for the West Balranald access road, internal haul roads and service roads, and hardstand areas for infrastructure. Processing operations, such as crushing and screening activities (if required) would also be undertaken at the borrow pits.

3.2 Material handling

Underground mining will produce the following overburden types, ore, and mining by-products (MBP):

- Topsoil (of variable depth for use in the rehabilitation program – refer Section 3.4.1(2)(a)).
- Subsoil (up to 0.4 m depth of excavation).
- Non-Saline Overburden (NSOB, up to 1.5 m depth of excavation) – defined as material below the topsoil/subsoil but above the groundwater table. Consists of Shepparton Formation sands, clayey sands, and clays.
- Ore (up to 3 – 5m thick) – defined as the mineralised strand within the Loxton Parilla Sands Lower Marine Sequence.
- Surface placement of treated sand tails (nominally up to 2 m depth of fill material) and overburden/subsoil ahead of mining.

3.2.1 Mining induced subsidence

The MOD1 underground mining method is predicted to result in a subsidence trough from the northwest to the southeast of the mining area.

The maximum subsidence trough depth is predicted to range between 3.8 m and 5.7 m in depth if the full ore body thickness is extracted and is likely to be undulating as a result of the potential variations in extraction quantities, stope dimensions and extent of any remnant pillars left behind during the course of operations (Mine Advice, 2021).

The landform design will be modified compared to the pre-mining surface but is intended to be compatible with the surrounding environment with the material handling volumes and surface sand tails emplacement aiding the final landform to replicate the original landform as much as possible.

3.3 Rehabilitation strategy

3.3.1 Rehabilitation strategies and methods

The following identifies the general strategies and methods that will be progressively implemented prior to and during operations as summarised below from the 2015 RCS (EMM 2015b).

i Seed collection

Where possible, seed will be collected from within the MOD1 disturbance area prior to ground disturbing activities.

ii Vegetation clearing

Clearing of native vegetation will be performed in compliance with Iluka policies and procedures. Vegetation clearing will be minimised as far as practicable to areas for mining operations and support activities.

Cleared overstorey timber will be retained and stockpiled for habitat enhancement purposes (brushing, habitat creation). Clearing of overstorey species will be via chaining or pushing with a dozer, excavator or loader.

For low open shrubland areas where it is not practical due to vegetation height, health or density, it may be appropriate to clear the understorey with the top soil layer. In other areas, the understorey may be cleared separately to the top soil. A loader, dozer or grader will use their blade to cut off the shrubs close to ground level and push them into a windrow. The windrows will then be carted away for placement in stockpiles for later use. An alternate approach may be to mulch the chenopod shrubs, leaving a litter layer on the ground that can be stripped with the top soil. Alternatives will be considered for trialling during operations.

a Management of soils and topsoil

All areas to be disturbed as a result of construction and operations would require soil stripping for reuse in rehabilitation as summarised below from the 2015 *Soil Resource Assessment* (EMM 2015b).

The expected volumes of topsoil and sub soil reserves to be stripped for proposed MOD1 is 3.9 million cubic metres (Mm³).

iii Decommissioning

If required, decommissioning of MOD1 would involve the following activities:

- decommissioning of processing plant areas following removal of plant;
- decommissioning of mine services and infrastructure;
- removal of mining infrastructure, materials and rubbish;
- topsoil and sub soil testing of all potentially contaminated areas;
- removal of any contaminated topsoil and sub soils to the pit with provision for at least 1 m of cover following treatment (as may be required);
- topsoil and sub soil testing to validate potentially contaminated sites to ensure benign material is present before rehabilitation programs commence and potentially contaminated soil is removed or treated;

- contouring earthworks to rip up compacted areas and blend disturbed mining surfaces into surrounding topography; and
- application of topsoil and subsoil and/or collected seeds to promote establishment of endemic vegetation suitable for intermittent and low intensity grazing.

iv Borrow pits

Borrow pits would be closed and rehabilitated earlier if the resource is exhausted prior to MOD1 closure. Rehabilitation of borrow pits will typically include:

- removal of all infrastructure from site;
- deep ripping of compacted areas;
- placement of any material that was not suitable for construction purposes back into the excavation;
- pit walls will be battered to an appropriate angle to ensure they are safe, stable and suitable for the surrounding land use;
- previously stockpiled topsoil will be spread over the final landform and disturbed areas; and
- revegetation, seeding and/or planting (depending on the final land use).

4 Post mining land use

Iluka propose to maintain the 2015 RCS final land use option for proposed MOD1 to establish native vegetation communities suitable for intermittent and low intensity grazing uses.

4.1 Rehabilitation objectives

As previously stated in the 2015 RCS, the overarching primary objectives of the MOD1 rehabilitation strategy are:

- the creation of safe, stable and non-polluting landforms;
- restoring self-sustaining ecosystems suitable for a final use determined in consultation with landholders and relevant government agencies; and
- progressive rehabilitation of the mine path scheduled to make best use of favourable climatic and intrinsic conditions.

4.2 Final landform design

MOD1 proposes to replicate the original landform as much as possible. The landform design will be modified compared to the pre-mining surface but is intended to be generally compatible with the surrounding environment. Areas disturbed for the construction of other infrastructure including access roads and accommodation facility will generally be the subject of minor surface disturbance. Consequently, the objective for these areas will be to reinstate the pre-mining contours and drainage.

4.2.1 Domain selection

As defined in ESG3, a domain is defined as a land management unit within the proposed MOD1, usually with similar geophysical characteristics.

In accordance with ESG3, the process of identifying domains has been broken into three steps:

1. Identification of mining domains according to the way an area of land is managed in a mining context.
2. Identification of primary (operational) mining domains. These are management units within the MOD1 with a unique operational and functional purpose.
3. Identification of secondary (post mining land use) domains. These are land management units characterised by a similar post mining land use objective.

The four proposed primary domains and secondary domains and their respective areas in terms of operational impact as described in Section 3.1 and proposed final landform areas are listed in Table 4.1.

Table 4.1 Primary and secondary domains and final land use

Domain no.	Domain (primary)	Description of uses	Secondary domain	Secondary domain description	Pre-mining land use	Final land use
1	MOD1 mine path	Underground mine path	1a: Mine path – surface sand tails emplacement backfilled	Backfilled mine path- subject to ongoing consolidation –residual depression	Grazing on pasture and shrublands	Chenopod shrublands- not grazed (fenced) until stable
		Internal access roads, soil stockpiles and groundwater monitoring infrastructure	1b: Ancillary infrastructure	Internal access roads, stockpiles, and groundwater monitoring infrastructure	Grazing on pasture and shrublands	Grazing on chenopod shrublands
3	MOD1 processing area	Processing plant, maintenance areas/workshops, final product stockpiles and truck load-out area, administration offices and amenities, internal road network and ancillary infrastructure	3b: Other infrastructure	Concentrator and all other infrastructure	Grazing on pasture and shrublands	Grazing on chenopod shrublands
5 & 8	West Balranald access road and accommodation facility	Access road and accommodation facility	n/a	n/a	Grazing on pasture and shrublands or access road left in place	Grazing on chenopod shrublands
10	Borrow pits	Borrow pits	n/a	n/a	Grazing on pasture and shrublands	Grazing on chenopod shrublands

4.3 Rehabilitation methods for closure

In accordance with the approved Balranald Project, Iluka is committed to adopting a progressive approach to the rehabilitation of disturbed areas within the domains.

4.3.1 Topsoil and sub soil reinstatement, compaction, and remediation

Upon decommissioning of infrastructure and hardstand areas at closure, compacted topsoil and sub soil would be ripped under dry conditions to break up hard layers and provide a favourable root zone. These areas would be seeded with species appropriate to the identified post-mining land use. To alleviate any compaction that may have been caused by the movement of heavy machinery, all mined areas may be ripped to aid in reducing compaction of earth.

Topsoil and sub soil would be applied to landforms once they are re-contoured and drainage works are complete. Contour or diversion banks with stable discharge points would be constructed to limit slope lengths and control runoff. Collection drains and sedimentation dams would be installed to collect runoff and remove suspended sediment.

4.3.2 Drainage and erosion control

Restored surfaces would be stabilised as soon as practicable to reduce potential wind erosion and subsequent dust.

All rehabilitation areas and stockpiles would require stabilisation to protect them against the risk of erosion from wind or water. The most effective strategy for stabilisation would be trialled during the early stages of mining.

Drainage zones would not receive special erosion control treatments due to the infrequency of rainfall and subsequent flow events. If excessive sediment movement occurs, then supplementary earthworks would be undertaken to return the drainage channels to design levels.

4.3.3 Control of surface water inflow to void

Surface water inflow would be directed away from the mined area through the construction of interceptor channel drains around the perimeter. Uncontrolled surface water has the potential to cause slope deterioration and ultimate failure.

4.3.4 Revegetation

Disturbed areas would be revegetated predominantly from the topsoil seed store.

Direct seedling, planted seedlings, and transplanting of seedlings may be introduced into the revegetation program if considered necessary, after assessment of rehabilitation germination success.

Species would be selected in order to encourage the re-establishment of the pre-agricultural vegetation communities in those areas defined for woody vegetation establishment. Areas identified for shrublands and chenopod re-establishment would have stock excluded until it can be demonstrated that the vegetation is stable and self-sustaining, and that grazing would not impact upon its establishment.

4.3.5 Brush/timber spreading

Revegetation would include the spreading of brush and timber across the rehabilitated land, focussing on those areas where woody native vegetation is to be established. Subject to availability of material, the timber and or mulch would be spread thick enough to provide the desired benefits, but not so thick as to inhibit germination of seed.

Mulch would be spread following topsoil replacement with larger stockpiled timber may also be utilised to develop fauna habitat piles.

4.3.6 Rehabilitation maintenance

Rehabilitation maintenance for MOD1 will be in accordance with the approved RCS for weed management, feral species management, fire control, access, and public safety.

4.3.7 Rehabilitation schedule

The progressive formation of the post-mining landform and the establishment of a vegetative cover would vary throughout the life of MOD1.

If the proposed MOD1 underground mining is successful, Iluka would seek a LOM approval for underground mining with associated final land form and closure deferred until after the LOM. Should the MOD1 underground mining provide unsuccessful, Iluka would retain the right to open cut mine the West Balranald and Nepean mines in accordance with the approved EIS.

Further detail on specific rehabilitation will be provided in the Rehabilitation Reform process.

4.4 Rehabilitation criteria

In accordance with 2015 RSC rehabilitation criteria would be used as the basis for assessing when rehabilitation of the Balranald Project is complete.

The rehabilitation criteria need to demonstrate that the rehabilitation objective has been achieved to address the following outcomes:

- Restoration of a safe and stable landform.
- Reinstatement of topsoil and subsoil profile and function and ensure that landforms are generally compatible with surrounding topography.
- The post mining ecosystem and landscape function is resilient, self-sustaining and indicating that the pre-mining ecosystem and landscape function will ultimately be achieved. Due to the semi-arid environment, development of vegetation may take many years. Consequently, the proposed rehabilitation criteria, when considered in conjunction with criteria for topsoil and sub soil and landform, are intended to indicate a trend where the revegetation will ultimately reach a level that is compatible with the surrounding environment.
- The restored landform permits land uses of grazing and/or conservation with no significant adverse impacts on native fauna.

The rehabilitation criteria would be subject to periodic formal review through the Rehabilitation Reform process requirements in consultation with relevant stakeholders.

Amendments to the rehabilitation criteria would be included as part of the Rehab Reform and AEMR process or future MODs as required.

Reporting on rehabilitation activities, monitoring, and progress towards achieving agreed rehabilitation criteria will occur via an annual review.

Throughout the life of MOD1, the rehabilitation criteria may be refined based on the results of ongoing rehabilitation monitoring.

Further detail on specific rehabilitation criteria will be provided in the Rehabilitation Reform process.

4.4.1 Rehabilitation monitoring

Regular monitoring of the rehabilitated areas would be required during the initial vegetation establishment period and beyond to demonstrate whether the objectives of the rehabilitation and closure are being achieved and whether a sustainable and stable landform has been provided.

5 Conclusion

The RCA for MOD1 seeks to establish clear and achievable objectives for the rehabilitation of land that will be disturbed.

A key objective is that rehabilitation will aim to create a stable landform with the maximum possible post-mining land use capability and/or suitability. This is proposed to be achieved by setting rehabilitation success criteria and outlining the monitoring requirements to assess whether or not these criteria are being accomplished.

The MOD1 will be progressively rehabilitated with monitoring of the rehabilitated areas to be undertaken to demonstrate whether the objectives of rehabilitation and closure are being achieved and whether a sustainable and stable landform has been achieved. The rehabilitation program will also be assessed against success criteria.

Further detail on specific rehabilitation will be provided in the as part of the Rehabilitation Reforms.



