

Part C

Commitments and justification and conclusion



18 Management and mitigation measures

18.1 Introduction

This chapter has been prepared to address the EIS Guidelines which state:

The EIS must provide information on proposed avoidance, mitigation and offset measures to deal with the relevant impacts of the action. Specific and detailed descriptions of proposed measures must be provided and substantiated, based on best available practices and must include the following elements:

- (a) a description of how the action has been designed to avoid impacts to migratory species, threatened species and ecological communities, World Heritage values and National Heritage values;
- (b) a consolidated list of mitigation measures proposed to be undertaken to prevent or minimise the relevant impacts of the action, before, during and after construction, during operation, decommissioning and rehabilitation;
- (c) the cost of the proposed mitigation measures;
- (d) for proposed avoidance and mitigation measures relevant to Indigenous heritage values, evidence of consultation with relevant Indigenous people with rights or interest;
- (e) a description and an assessment of the expected or predicted effectiveness of the mitigation measures, including a justification of the location and design of mitigation measures to be implemented to ensure their effectiveness. This analysis should be based on best available knowledge and baseline data for the relevant areas;
- (f) a detailed outline of an Environmental Management Plan (EMP) that sets out the framework for management, mitigation and monitoring of relevant impacts of all stages of the action, including any provisions for independent environmental auditing. The EMP must state the environmental objectives, performance criteria, monitoring, reporting, corrective action, responsibility and timing for each environmental issue. The EMP should also describe contingencies for events such as failure of sewerage systems, heavy or prolonged rainfall, or saltwater intrusion into ground water;
- (g) any statutory or policy basis for the mitigation measures;
- (h) the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program; and
- (i) in the event that impacts cannot be avoided or mitigated, a description of any offsets to compensate for any predicted or potential residual impacts on matters of NES. This should be in accordance with the EPBC Act Environmental Offsets Policy and include:
 - a. an assessment of how any proposed offset compensates for the residual impacts on matters of NES likely to remain following avoidance and mitigation measures to be implemented;
 - b. the location of any proposed offset;
 - c. the timing of the delivery of any offset; and
 - d. how the offset will be secured and managed in perpetuity.

18.2 Avoidance

Avoidance measures, including measures to avoid impacts to migratory species, threatened species and ecological communities, World Heritage values and National Heritage values have been described through this EIS, including in Chapter 4 (consideration of alternatives), Chapter 9 (biodiversity) and Chapter 10 (Aboriginal cultural heritage).

In particular, key avoidance measures to reduce clearing of habitat for the Malleefowl, as discussed in Chapter 9, are as follows:

- A reduction in overall clearing (compared with the initial project area) has reduced possible clearing of Malleefowl habitat by approximately 3,000 ha and potential Corben's Long-eared Bat habitat by approximately 2,000 ha. The reduced area of clearing will also mean a larger area of high and very high potential Malleefowl habitat is retained east of the West Balranald mine totalling approximately 1,000 ha, which will assist the ability of Malleefowl to continue to inhabit this area.
- A reduction in the southern extent of clearing for the West Balranald mine area by approximately 1,900 m has resulted in the potential to include a 600 m wide corridor area within the Mallee vegetation at the southern end of the mine, which is very high potential habitat for Malleefowl. This will serve to allow continued connectivity between east and west parts of known Malleefowl habitat which will be fragmented by the West Balranald mine. It is noted that the West Balranald access road will interrupt the proposed corridor, however this interruption is unlikely to represent a barrier to occasional movement of Malleefowl between the eastern and western side of the mine.

Avoidance measures will also benefit other threatened species, including the Regent Parrot and Plains Wanderer as follows:

- Reductions in overall clearing and retention of a significant 600 m wide corridor of Mallee woodland at the southern end of the West Balranald mine would aid in the retention of marginal foraging habitat for the Regent Parrot (however it is noted that the species was not recorded further north than the Sturt Highway despite extensive survey).
- Reductions in the extent of clearing for the project area and reduction in its eastern extent around Burke and Wills Road has resulted in a larger buffer between the disturbance area and potential Plains Wanderer habitat within Pitarpunga Lake. The project area has increased the buffer area between proposed disturbance and potential habitat areas by 500 m to 1,000 m.

18.3 Consolidated list of mitigation measures

This section provides a consolidated summary of the management and measures that would be implemented during the construction, operation, decommissioning and rehabilitation of the Balranald Project to manage, mitigate and/or monitor potential impacts identified within the technical studies prepared for the project. These technical studies include studies prepared and included in the NSW EIS.

Proposed environmental management and mitigation measures are summarised in Table 17.1.

Table 18.1 Summary of management and mitigation measures

Commitment

Noise

A noise management plan would detail management and mitigation measures to minimise noise impacts during construction and operation of the Balranald Project, as summarised below.

Operations

- identify noise affected properties consistent with the environmental assessment and any subsequent assessments;
- outline mitigation measures to achieve the noise limits established;
- outline measures to reduce the impact of intermittent, low frequency and tonal noise (including truck reversing alarms using broadband quakers);
- specify measures to document any higher level of impacts or patterns of temperature inversions, and detail actions to quantify and ameliorate enhanced impacts if they occur;
- schedule heavy vehicle movements during least sensitive times of day (7:00 am to 10:00 pm);
- minimise heavy vehicle engine brake noise when passing residential areas, especially areas that are relatively highly populated (eg Balranald Town);
- specify protocols for routine, attended and unattended noise monitoring of the Balranald Project, including provision for low frequency noise monitoring;
- outline the procedure to notify property owners and occupiers that could be affected by noise from the mine;
- establish a protocol to handle noise complaints that includes recording, reporting and acting on complaints;
- specify procedures for undertaking independent noise investigations; and
- describe proactive and predictive modelling, and management protocols for managing noise during adverse meteorological conditions.

Construction

- measure construction noise levels at early stages of the West Balranald to Nepean haul road construction to validate the predicted construction noise levels;
- re-evaluate the predicted construction noise levels at assessment locations near the West Balranald to Nepean haul road, and where required review noise management and mitigation measures to reduce levels below the NMLs. This may include but is not limited to:
 - limiting West Balranald to Nepean haul road construction within a certain distance of assessment locations during the evening and night time period;
 - selecting quieter equipment or reduced equipment fleet during the evening and night period; or
 - measuring construction noise levels at assessment locations during the evening and night-time period and implementing real-time noise management and mitigation measures where exceedance of NMLs is identified; and
- affected property owners would be consulted prior to and during construction where exceedance of NMLs has been predicted, and would be notified of proposed mitigation measures that would be used to manage construction noise levels to below ICNG NMLs.

Air quality

An air quality management plan would detail management measures to minimise the emission of particulates and gaseous pollutants during construction and operation of the Balranald Project, as summarised below.

Operation

- minimise the drop height of excavators loading material to trucks;
- minimise the drop height of front end loaders loading ROM ore to dump hoppers;
- maintain average vehicle speed on unpaved roads (site access and on-site) to less than 40 km/hr;
- all unsealed roads and other trafficked areas would be watered regularly to minimise dust emissions;
- consider application of chemical suppression where practical to minimise dust generation;

Table 18.1 Summary of management and mitigation measures

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<ul style="list-style-type: none"> • emissions from the processing plant area would be exhaust filtered through a baghouse before being emitted;
<ul style="list-style-type: none"> • cease or relocate operations to more sheltered areas during periods of dry, windy conditions where watering is not providing required mitigation;
<ul style="list-style-type: none"> • maximise direct in-pit placement of overburden, minimising the potential for wind erosion;
<ul style="list-style-type: none"> • minimise double handling of material, wherever practicable;
<ul style="list-style-type: none"> • progressive rehabilitation of disturbed areas as soon as practical;
<ul style="list-style-type: none"> • temporary rehabilitation of long-term topsoil stockpiles; and
<ul style="list-style-type: none"> • a network of dust deposition gauges would be used for monitoring during operations at the Balranald Project.
Construction
<ul style="list-style-type: none"> • minimise the extent of exposed areas as far as practical throughout the construction phase;
<ul style="list-style-type: none"> • stabilise exposed areas (eg vegetation, chemical stabilisation) as soon as practical;
<ul style="list-style-type: none"> • all unsealed roads and other trafficked areas would be watered regularly to minimise dust emissions;
<ul style="list-style-type: none"> • consider the application of water extenders to improve the control effectiveness of watering;
<ul style="list-style-type: none"> • consider the prevailing wind direction and speed in short term planning of construction operations, particularly when activities are close to assessment locations;
<ul style="list-style-type: none"> • cease or modify operations under adverse meteorological conditions (dry, windy conditions) when assessment locations are located downwind of the construction activities;
<ul style="list-style-type: none"> • minimise double handling of material; and
<ul style="list-style-type: none"> • locate stockpiles in sheltered areas where possible.
Greenhouse gas
<p>The air quality management plan would detail management measures to minimise GHG emissions from the Balranald Project, as summarised below.</p>
<ul style="list-style-type: none"> • Scope 1 emissions: <ul style="list-style-type: none"> - use mining equipment which is regularly maintained and serviced to maximise efficiency; - use of fuel efficient plant and equipment; - proper maintenance of the ISP for maximising efficiency; - use of lower emission fuels (biodiesel, natural gas) where practical; - reduce fuel consumption by minimising the vehicle kilometres travelled on site where possible; and - plan operations well in advance in order to minimise resource non-utilisation and wastage.
<ul style="list-style-type: none"> • Scope 2 and Scope 3 emissions: <ul style="list-style-type: none"> - adopt the use of energy efficient lighting technologies and hot water and air conditioning systems wherever practical; - use of alternative energy sources where practical such as solar power and green power; - progressively review and implement energy efficiency measures throughout the life of the Balranald Project; - undertaking awareness and training programs on energy efficiency measures for site personnel; - investigating alternative haulage systems (eg trucks with larger payload capacity) for reducing the number of trips taken for material/product transportation; thereby reducing the vehicle kilometres travelled; - conduct periodic audits and reviews on the amounts of materials used, amount of mine waste and non-mine waste generated and disposed; and - source materials locally where feasible to minimise emissions generated from upstream activities.

Table 18.1 Summary of management and mitigation measures

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Ecology

A BMP would detail management measures to avoid, minimise and offset impacts during construction and operation of the Balranald Project, including the commitments described in this EIS and specific information for the Malleefowl, as summarised below.

- land clearance:
 - pre clearance surveys or remote sensing in very high - moderate potential habitat to detect active mounds;
 - 200 m buffer established around active mounds until hatching occurs which will be determined through monitoring protocol;
- fragmentation:
 - maintenance of corridor at southern end of West Balranald mine area;
 - identified corridors to be specifically targeted in predator control programs;
 - management of vegetation and development of BMP and fire management plans for impact and offset areas to reduce the risk of high intensity/frequency fire;
 - consolidation of vegetation and removal of tracks where appropriate within offset areas as per offset management plans to be established;
- predation (foxes and cats):
 - develop and implement BMP focussing on feral management. Inclusion of predator control programs within the Balranald project area including fox and cat baiting;
 - trapping, shooting or poisoning programs depending on the most effective identified methods or combination of methods;
- competition and land degradation by rabbits and goats:
 - develop and implement BMP focussing on feral management;
 - rabbit control including burrow ripping within offset areas and Iluka managed areas;
 - removal of watering points, fencing and collecting of goats (eg via one way gate systems) will be features of offset management plans;
 - ongoing monitoring of response of vegetation to goat exclusion in offset areas;
- road strike:
 - communications protocols to inform staff and contractors of the presence and importance of Malleefowl and controls in place for impact minimisation;
 - planning to minimise road-strike for Malleefowl by limiting truck speeds and provision of appropriately sized signage along access roads, particularly areas close to active or recently active mounds, or where Malleefowl prints are observed;
 - development of methods and communication tools to monitor road-strike and mortality of Malleefowl and disseminate such information to the public and appropriate state and local authorities/interest groups;
- edge effects - management protocols for the identification of noxious or important environmental weeds within areas to be cleared (in order to avoid transporting the weeds to the rehabilitation area) and also within the rehabilitation area;
- weeds - management protocols for the identification of noxious or important environmental weeds within areas to be cleared (in order to avoid transporting the weeds to the rehabilitation area) and also within the rehabilitation are;

Table 18.1 Summary of management and mitigation measures

Commitment

- dust and noise:
 - establishment of dust control procedures and monitoring;
 - special measures to be taken (eg increased frequency of road wetting) where active mounds occur within 200 m of roads or other dust sources and outside of clearing areas;
 - once the position of active Malleefowl mounds is established measures can be investigated to lower machinery and vehicle noise in areas adjacent to Malleefowl nesting;
- fire - establishment of fire management planning and exclusion measures within construction and offset areas;
- light - special measures to be taken (eg blocking or diminishing of night light) where mounds occur within 200 m of roads or other dust sources and outside of clearing areas.
- monitoring - use of a combination of LiDAR survey, drone survey, real time monitoring cameras, walked transects, site visits, and opportunistic observations depending on what methods are established as being the most effective and efficient throughout the process of BMP formulation.
- Other key mitigation and management measures that would be included in the BMP are:
 - protocols for clearing restrictions, informed by important lifecycle events of the threatened species known or likely to occur within the project area which are likely to be significantly impacted by the Balranald Project;
 - clearing protocols in line with the Rehabilitation and Closure Strategy (EMM 2015);
 - protocols for cleared vegetation to be used immediately elsewhere in Balranald Project for progressive rehabilitation; and
 - the use of trittering or mulching for temporary access during construction where possible.

Biodiversity offset strategy

- a BOP forms part of the Balranald Project. The package, when finalised, would compensate for impacts on threatened species listed under the TSC Act and EPBC Act by meeting the requirements of the *Draft NSW Biodiversity Offset Policy for Major Projects* and the *Environmental Offsets Policy*.

Aboriginal cultural heritage

An Aboriginal cultural heritage management plan would be prepared in consultation with RAPs and would detail management of Aboriginal heritage values during construction and operation of the Balranald Project, including the commitments described in this EIS, as summarised below.

- avoidance of known sites/high risk areas during mine plan development (to be ongoing during further detailed design);
- for unavoidable impacts, undertake mitigation via:
 - salvage excavation and landscape characterisation of areas of research interest;
 - salvage surface collection in high and moderate risk layers; and
 - unmitigated harm in low risk layer.
- for high and moderate risk areas, the following management measures would be implemented:
 - avoidance where possible;
 - where not possible, archaeological surface collection of Aboriginal objects in accordance with the ACHMP, which would include:
 - collection undertaken by appropriately qualified and experienced archaeologists and representatives of the Registered Aboriginal Parties, where available;
 - collection undertaken prior to any activities or impact occurring in that area;
 - defined collection areas based on the ACHMP, depending on whether or not the areas has been previously surveyed;
 - systematic collection of a representative sample of surface Aboriginal heritage evidence with respect to the nature and extent of heritage evidence and that delineates collection areas, takes site and site feature photographs and records the provenance of each Aboriginal object or site feature;

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Commitment

- recovered archaeological material stored in accordance with the Temporary Storage Protocol; and a representative sample of Aboriginal objects may be selected for further lithics analysis and attribute recording.

- for low risk unsurveyed areas, no management and mitigation measures.
- for low risk known sites, avoidance where possible, where not possible, no management and mitigation measures.

Water resources

A water management plan would detail management measures to manage and mitigate impacts to water resources during construction and operation of the Balranald Project, including the commitments described in this EIS, as summarised below.

Water management system

- segregate different water sources and different water qualities (ie mine affected water, and raw water from the Murrumbidgee River, sediment-laden water);
- capture and contain mine affected water and prevent discharge to receiving water environments;
- ensure unused abstracted, saline groundwater is contained and injected;
- capture and segregate runoff from the following locations:
 - MUP area, processing area, and the saline overburden stockpiles;
 - the non-saline overburden, topsoil and subsoil stockpiles;
 - other disturbed areas;
- divert clean runoff away from areas disturbed by mining activities to minimise the volume of mine affected water;
- management of sediment laden water in accordance with an erosion and sediment control plan that would be part of the water management plan, which would include the capture and treatment of sediment laden water in sediment dams;
- reuse and recycle water in mining operations; and
- include contingency measures to accommodate either a surplus or deficit of site water.

Surface water

- surface water quality sampling from key storages within the mine affect water management system would be completed, with monitoring parameters based on the expected water quality, and frequency of monitoring based on climatic conditions;
- regular inspection of surface drainage and dam infrastructure; and
- metering and quality monitoring of all water volumes pumped from in pit sumps.

Groundwater

- ongoing monitoring during construction and operation to assess groundwater level and quality trends;
- water quality monitoring of the dewatered groundwater prior to reinjection would occur on a daily basis;
- real time metering of all dewatering and reinjection volumes would be recorded using telemetry systems; and
- establishment of groundwater infrastructure levels and quality triggers, actions and contingencies that would be implemented in the event that monitoring indicates an impact.

Table 18.1 Summary of management and mitigation measures

Commitment

Land management

A land management plan would detail mitigation and management measures to manage and mitigate impacts to soil resources during construction and operation of the Balranald Project, as summarised below.

- installing appropriate ESC measures prior to disturbance on site;
- identifying and quantifying the soil requirements for rehabilitation works over the project life based on mine progression, the nature of disturbance and rehabilitation objectives;
- identifying and mapping soil resources (including topsoil and soil with specific management requirements) and locations of stockpiles across the site and managing this information via appropriate systems and databases;
- optimising the recovery of topsoil and useable subsoil during stripping operations;
- stockpiling soil appropriately and managing stockpiled soil to minimise resource degradation (including installation of ESC measures and application of amelioration measures where required); and
- carrying out rehabilitation works in appropriate conditions to minimise deterioration of the soil resource and to maximise rehabilitation success.

The land management plan for the Balranald Project would include measures to minimise impacts to surrounding land uses during construction and operation of the Balranald Project, as summarised below.

- minimising disturbance to agricultural land, where practicable;
- management of soil resources within the project area including:
 - identification and quantification of potential soil resources for rehabilitation;
 - optimisation and recovery of useable topsoil and subsoil during stripping operations;
 - management of soil reserves in stockpiles so as not to degrade the resource;
 - establishment of effective soil amelioration procedures to maximise the availability of soil reserve for future rehabilitation works and provide benefit during final rehabilitation;
 - use of appropriate soil ameliorants (eg gypsum) to improve structure of sodic soils during rehabilitation, and as such improve future agricultural potential; and
 - inclusion of agricultural lands in the RCS.

Rehabilitation

Iluka would develop a rehabilitation management plan in accordance with the RCS. The primary objectives of rehabilitation of the project area are to:

- create safe, stable and non-polluting landforms;
- restore self-sustaining ecosystems suitable for a final use determined in consultation with landholders and relevant government agencies; and
- progressively rehabilitate disturbed areas to make best use of favourable climatic and intrinsic conditions.

Traffic

A traffic management plan would detail measures to manage and mitigate impacts to traffic during construction and operation of the Balranald Project, as summarised below.

Construction

- Burke and Wills Road:
 - a minimum 8 m wide two lane unsealed road would be provided on all sections required for Balranald Project construction access with sections regraded if required.
- Balranald-Ivanhoe Road:
 - route signage, line marking and guide post deficiencies identified in the RSA would be rectified by Iluka during the construction phase; and
 - existing localised road pavement defects identified in the Road Pavement Strength Review would be addressed by Iluka through road maintenance contributions to BSC in the Balranald Project construction phase.

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Commitment

- Balranald- Ivanhoe Road and West Balranald access road intersection:
 - a new Balranald-Ivanhoe Road/West Balranald access road intersection, designed in accordance with the Austroads intersection design standard, would be constructed by Iluka. It would incorporate a left turn deceleration lane to facilitate heavy vehicle movements (primarily to and from the south) at the intersection;
 - the intersection sight distance would be a minimum of 450 m in both directions along Balranald-Ivanhoe Road; and
 - advance and position intersection signs would be provided for the approaching traffic on Balranald-Ivanhoe Road in both directions.
- Intersections of Balranald-Ivanhoe Road and Moa Street, Moa Street and O’Connor Street, Sturt Highway and Piper Street and Sturt Highway and Murray Valley Highway intersection near Euston/ Robinvale:
 - Traffic management and additional intersection earthworks (eg fill) would be provided by Iluka to accommodate the turning ‘swept paths’ for these vehicles.
- Balranald-Ivanhoe Road and McCabe Street intersection:
 - Iluka would formalise the existing left turn deceleration lane, designed in accordance with the Austroads intersection design standard, by providing line marking for the lane prior to the start of the Balranald Project operational phase; and
 - visual barriers and/or landscaping would be provided by Iluka prior to the start of the Balranald Project operational phase.

Operations

- Burke and Wills Road:
 - 12 km of the northern section of Burke and Wills Road would be improved prior to the start of Nepean mine operations to a minimum width of 11 m, but would remain unsealed;
 - Iluka would install signage east of the Nepean access road intersection with Burke and Wills Road (34 km north west of Balranald-Ivanhoe Road) and south of Arumpo Road at the Burke and Wills Road intersection alerting road users to the presence of product haulage; and
 - Burke and Wills Road would be regraded during the Balranald Project operational phase to minimise corrugations, potholes and other surface defects.
- Arumpo Road:
 - Arumpo Road would be improved by Iluka prior to the start of Nepean mine operations to be a minimum of 11 m wide but would remain unsealed;
 - Iluka would install signage west of the actual Nepean mine access intersection (10 km north west of Burke and Wills Road) and east of the Burke and Wills Road intersection alerting road users to the presence of product haulage trucks;
 - Arumpo Road would be regraded during the Balranald Project operational phase to minimise corrugations, potholes and other surface defects; and
 - advance and intersection direction signage would be provided by Iluka at the Arumpo Road/Burke and Wills Road intersection for traffic approaching from the west (ie from the Lake Mungo direction). This would advise tourist traffic travelling towards Balranald to travel via Arumpo Road rather than Burke and Wills Road. It would indicate that, if travelling to Balranald, there is 10 km of unsealed road on Arumpo Road and 46 km of unsealed road on Burke and Wills Road.
- Balranald- Ivanhoe Road:
 - a road maintenance contribution to BSC (based on tonnes of product transported) would be negotiated prior to the Balranald Project construction phase.
- McCabe Street:
 - existing requirement to resurface asphalt layer identified in the Road Pavement Strength Review would be addressed by Iluka directly or through road maintenance contributions to BSC in the Balranald Project operations phase. Undertaking asphalt upgrade would reduce ongoing pavement maintenance contribution to BSC (based on tonnes of product transported) along McCabe Street.

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- McCabe Street and Sturt Highway intersection:
 - Iluka, in consultation with RMS, would rectify sight lines of approaching traffic on the Sturt Highway at the McCabe Street and Sturt Highway intersection by vegetation removal and adjustments to the height of signage, to provide clear sight lines for car and truck drivers who are travelling on the McCabe Street (north) and Sturt Highway (south) approaches to the intersection.
- Arumpo Road and Burke and Wills Road intersection:
 - Iluka would seal the three intersection approaches, for at least 100 m on the two Arumpo Road approaches and at least 50 m on the Burke and Wills Road approach.
- The traffic management plan would also describe measures to:
 - maximise safety for all light and heavy vehicle operations related to the Balranald Project;
 - ensure compliance with the state and Commonwealth road transport legislative and regulatory requirements;
 - manage driver fatigue; and
 - respond to any product haulage incident or emergency.

Social

Measures to manage and mitigate social impacts during construction and operation of the Balranald Project, including the commitments described in this EIS, as summarised below.

Workforce issues

- provide advance information about its approach to workforce sourcing, recruitment policies of local people, and work arrangements in relation to matters such as shifts and transport and work, health and safety obligations;
- work with recruitment, education and training providers in Balranald, Swan Hill and Mildura to encourage the provision (in advance of project commencement) of future employment and training opportunities for skills that would be directly and indirectly generated by mining projects;
- continue liaison with relevant agencies to ensure that any wider community issues about training and labour availability for 'vacated' local jobs;
- participate, as appropriate, in business groups, events or programs as part of a Balranald Business Association and/or provide training programs directly relevant to project needs or broader industry skills;
- participate in the local mining liaison committee that has been established by BSC so that relevant project information can be provided and community feedback received; and
- Iluka's to development local employment and business policy.

Housing and accommodation

- rental and housing and land development markets:
 - maintain dialogue with stakeholders who regularly monitor the local housing market relative to any direct Iluka requirements;
 - continue engagement with BSC, other mining companies in the LGA and accommodation suppliers, to monitor general short-term accommodation usage by Iluka and any impacts on other accommodation sectors;
 - consult with Cristal to ensure that potential adverse social impacts result from any concurrent stages of project construction and operation are minimised; and
 - augment the accommodation facility with additional temporary accommodation if required.

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Community services

- consult with health and emergency services (ambulance and rescue services) prior to commencement of construction, to ensure that there would be appropriate interface arrangements for operational matters;
- provide advance briefings about corporate purchasing policies and assistance to local businesses to become approved suppliers or pre-qualified tenders to assist them to participate in supply to Iluka during the construction and operational periods; and
- provide a conduit between local businesses and major Iluka contractors.

Social amenity

- build on the existing base of community goodwill in the Balranald community by ensuring, through the nominated mitigation and management measures presented in this social assessment as well as a regular stakeholder communications program, to ensure that the benefits to the community as a result of the Balranald Project are realised; and
- emphasise acceptable behaviours in the Balranald community as part of its induction program for the incoming workforce.

Rehabilitation and decommissioning

- Iluka would work with relevant stakeholders to provide information about the timing of the final stages of the Balranald Project and appropriate support to employees, suppliers and the community would be made available as required.

Economics

The Balranald Project would provide substantial economic benefit to the regional and NSW economies. Accordingly, no mitigation measures are considered necessary.

Geochemistry

Key components of the proposed management and mitigation strategy for AMD includes:

- routine monitoring and segregation of OOB during mining;
- installation of a low permeability/limestone liner beneath OOB stockpiles during excavation of the initial boxcut and stockpiled ore;
- incorporate sufficient quantity of limestone in OOB stockpile liner during excavation of the initial boxcut and stockpiled ore;
- surface water drainage control around the OOB stockpiles during excavation of the initial boxcut and stockpiled ore;
- minimise the amount and surface area of stockpiled OOB (ie relocate to pit as soon as possible) and ore;
- incorporate AMD considerations into MUP dam design, operation and emergency response procedures;
- return OOB directly (via the in-pit haulage routes) to its final storage location as low as possible in the backfill profile below the final (natural) groundwater level in the West Balranald mine;
- incorporate sufficient quantity of limestone into backfilled OOB and mining by-products, allowing for three times the theoretical neutralisation requirement to address AMD from both backfilled and in situ sources, during the operations phase;
- transport compact backfilled limestone-blended overburden and cover as soon as practicable;
- backfill oversize material directly to the West Balranald mine void;
- routine monitoring and characterisation of mining by-products to inform neutralisation requirements;
- no disposal of mining by-products at the Nepean mine;
- co-dispose thickener underflow and sand tails as ModCod to facilitate handling and trafficability of backfilled material;

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- return mining by-products from Hamilton MSP directly if possible to their final placement location in the West Balranald mine backfill profile however if this is not possible:
 - stockpile by-products on low permeability pads comprising a limestone liner with surface water drainage control at the MUP site, or;
 - alternatively, consider temporary stockpiling of by-products below ground level so that drainage reports to the pit sump;
- transport compacted backfilled limestone-blended mining by-products and cover as soon as practicable;
- regular surface and groundwater monitoring at the pit sump, MUP dam, OOB and ore stockpiles;
- where overburden is exposed in benches in the pit, maintain a layer of in situ SOB as long as possible (eg minimum 5 m) before disturbing OOB; and
- collect, treat and/or reuse any acidic runoff or seepage from OOB stockpiles and stockpiled ore, backfilled OOB, backfilled mining by-products and pit walls/benches/floor.

Radiation

Key components of the proposed detailed over-arching radiation management plan (RMP) that would be prepared in accordance with the ode (ARPANSA 2005) management and mitigation strategy includes:

- handling and stockpiling of HMC, mineral concentrates and by-products at Balranald Mine:
 - radiation monitoring program;
 - stockpile management standard;
 - radiation management standard;
 - dust suppression measures;
 - emergency response plan;
 - emergency response procedures;
 - radioactive waste management plan;
 - transport management plan;
- transport of HMC, mineral concentrates and by-products:
 - covering of truck tubs;
 - haul truck operator training;
 - contractor management standard;
 - radiation monitoring program;
 - emergency response procedures;
 - emergency response plan;
 - radioactive waste management plan;
 - transport management plan;
- environment;
 - all measures described above.

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Commitment

Dangerous goods

The EMS would detail measures to manage and mitigate hazards and risk during construction and operation of the Balranald Project, including:

- Dangerous goods would be sited and stored in accordance with the following measures:
 - petrol and oil storages would be sited to comply with the setback requirements specified in Applying SEPP;
 - all hydrocarbons, including diesel, petrol and oils would be stored and handled on site in accordance with AS 1940:2004; and
 - LPG or LNG would be stored in accordance with AS/NZS 1596:2008.
 - Leading up to closure of the Balranald Project, a preliminary sampling and analysis program would be implemented to determine whether a contamination assessment is required for the dangerous goods storage areas.
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Bushfire

A bushfire management plan would detail measures to manage and mitigate bushfire risks and prevent ignition and spread of fire during construction and operation of the Balranald Project, as summarised below. The bushfire management plan would be prepared in consultation with the RFS.

Hazard reduction

- the bushfire management plan would contain a strategy for hazard reduction, including hazard reduction in undeveloped areas where vegetation may regenerate.
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Water

- the site water management system would provide water for fire fighting; including from a fire water storage tank at the processing area and the other water sources;
 - water carts are to be fitted with water cannons to help with fire fighting; and
 - fire hydrants at buildings would be spaced, sized and pressured in accordance with Australian Standard 2419.1 - 2005 Fire Hydrant Installations – System Design, Installation and Commissioning.
-

Electricity and gas

- where operationally practical, electrical transmission lines would preferably be placed underground. However, where overhead electrical transmission lines are used, they would be installed and managed in accordance with Essential Energy (2012) CEOP8008 Vegetation Management Plan;
 - AS/NZ1596 - 2008 The Storage and Handling of LP Gas would be followed for bottled gas installation and maintenance; metal piping would be used;
 - there would be at least 10 m between fixed gas cylinders and flammable materials;
 - shielding would be placed on the side of the cylinders which face potential fires; and
 - release valves on gas cylinders that are close to buildings would be directed away from the building and at least 2 m from combustible material; metal connections would be used.
-

Access

- internal roads would be designed in accordance with the following PBP guidelines:
 - there would be a minimum vertical clearance of 4 m to any overhead obstructions including branches;
 - there would be a minimum carriageway of 4 m with 1 m clearance on each side;
 - there would be a maximum grade of 15° if sealed and less than 10° if unsealed;
 - crossfall would not be more than 10°; and
 - dead end roads are not recommended by the PBP guidelines; however, when they are unavoidable, turning circles would be provided with a minimum 12 m outer radius at the end of these roads.
-

Table 18.1 Summary of management and mitigation measures

Commitment

Bushfire construction levels

- all buildings would be designed in accordance with the general bushfire construction levels in *Australian Standard 3959 - 2009 Construction of Buildings in Bushfire Prone Areas (AS 3959 - 2009)*.

Reducing risk of fire or explosion

- the following measures would reduce the risk of a fire or explosion in the mining and infrastructure areas igniting a bushfire:
 - refuelling would take place away from vegetation;
 - fire extinguishers would be maintained in buildings, vehicles and refuelling areas;
 - there would be no smoking in, or next to, vegetated areas;
 - water carts would be made available to help with fire fighting when required; and
 - spill response kits would be available should there be a spill of flammable substances.
- the following measures would be taken to reduce the likelihood of a bushfire or the consequences of a bushfire should one occur:
 - a UHF/VHF communication system would enable rapid response to emergencies; and
 - the RFS would be contacted if there is a fire.

Bushfire management procedures

- bushfire management procedures would be documented within an emergency response plan prepared prior to construction for the Balranald Project. Bushfire management procedures would include:
 - contact person/details for emergency management;
 - communication strategy for coordinated response to bushfires with the RFS;
 - availability of suppression equipment;
 - fire fighting water supplies;
 - storage of fuels and other flammable materials; and
 - evacuation procedures for staff in case of bushfire emergency in accordance with the RFS *Guidelines for the Preparation of Emergency/Evacuation Plan*.

Historic heritage

The EMS would detail measures to manage and mitigate non-Indigenous impacts during construction and operation of the Balranald Project, including:

- if historic heritage object(s) are uncovered during the construction and operational phases, all works would halt in the immediate area to prevent any further impact. A suitably qualified archaeologist would be contacted to determine the significance of the object(s); and
- any new object(s) would be registered with OEH and BSC including details of their proposed management.

Visual

The EMS would detail measures to manage and mitigate visual impacts during construction and operation of the Balranald Project, as summarised below.

- install directional light fittings in the processing area to minimise light spill;
- use of low wattage lighting;
- limit placement of lighting at the top of overburden stockpiles (at night), where safe and practical, to provide screening and limit light spill on top of overburden stockpiles; and
- progressive rehabilitation of disturbed areas to minimise the extent of, and views to, the most visually obtrusive elements in the project area.

18.4 Cost of mitigation measures

As previously stated, the cost of all proposed management and mitigation measures described in Table 16.1 have been incorporated into the economic assessment of the Balranald Project discussed in Chapter 16 and contained in Appendix N. In particular, Section 3.4.2 of the economic assessment describes the costs of these mitigation measures.

18.5 Avoidance and mitigation measures relevant to Indigenous heritage

All avoidance and proposed management and mitigation measures relevant to Aboriginal cultural heritage have been described in the Aboriginal cultural heritage assessment discussed in Chapter 10 and contained in Appendix E. Both describe the consultation undertaken with RAPs, including consultation on the proposed avoidance and mitigation measures.

18.6 Effectiveness of mitigation measures

All proposed management and mitigation measures described in Table 16.1 have been developed by the technical specialists through the preparation of their respective technical assessments, which included an assessment of the potential impacts of the Balranald Project using comprehensive baseline data. All measures have been designed to either avoid or minimise environmental impacts to acceptable levels. For example, with the implementation of proposed air quality management measures described in Table 16.1, no air quality impacts are predicted above air quality goals and criteria.

With the exception of some measures designed to minimise or manage potential traffic and social impacts, all of the proposed management and mitigation measures would be undertaken at site within the project area.

As described below, all of the proposed management and mitigation measures would be detailed in a suite of environmental management plans which would be contained within an EMS. These management plans would describe a monitoring, review and reporting process which detail how the proposed management and mitigation measures would be monitored, reviewed and reported.

18.7 Environmental management strategy

Environmental management during the Balranald Project would be in accordance with an EMS. The EMS would contain a suite of environmental management plans (EMPs) which detail the site-specific management measures and procedures to be implemented during construction and operation of the Balranald Project, as specified in this EIS and the NSW EIS, for managing and mitigating impacts including noise, air quality, GHG emissions, biodiversity, heritage, water resources, land resources, traffic, social, geochemical, hazards and risks, bushfire, visual and rehabilitation.

The EMS would be developed to be consistent with the mining operations plan (MOP) process developed by the DPI. This would include development of plans consistent with a MOP, and annual monitoring and reporting to DPI through the annual environmental management report (AEMR) process. The EMS would be prepared to allow it to integrate with the MOP and AEMR for the Balranald Project.

EMPs under the EMS would be prepared in consultation with relevant government agencies where required. The EMS would be developed to be consistent with the conditions of the EPBC Act approval and other planning approvals, should they be granted.

It is expected that each of the EMPs described above would have a common structure and information, as well as common users. This common structure and information, and users are identified in Table 16.2.

Table 18.2 EMP structure and users

EMP element	User of EMP
Background	All stakeholders - Iluka and external
<ul style="list-style-type: none"> • Introduction • Project description • EMS context • EMP objectives • Environmental policy 	Community members and groups Approval agency
Environmental management	Iluka and Iluka's contractors
<ul style="list-style-type: none"> • Management structure and responsibilities • Approval and licensing requirements • Reporting • Training and inductions • Emergency contacts and response 	Approval agency
Implementation	Iluka and Iluka's contractors
<ul style="list-style-type: none"> • Risk assessment • Environmental management activities and controls • Schedule 	Community members and groups Approval agency
Monitoring and review	Iluka and Iluka's contractors
<ul style="list-style-type: none"> • Monitoring • Auditing • Corrective actions • EMP review 	Approval agency(

18.8 Statutory or policy basis

As previously stated, all of the proposed management and mitigation measures within the EIS and the NSW EIS have been developed to either avoid or minimise environmental impacts to acceptable levels as required in legislation or policies described within this EIS and the NSW EIS.

All proposed measures are commitments by Iluka to manage and mitigate impacts. Should approval for the Balranald Project be granted by the Commonwealth Minister for the Environment, or delegate, under the EPBC Act and the NSW Minister for Planning, or delegate, under the EP&A Act, these commitments will be translated into legal requirements under those approvals.

18.9 Agencies responsible

In the first instance, the Commonwealth Minister for the Environment and the NSW Minister for Planning, or delegates, as the approval authorities under the EPBC Act and EP&A Act are responsible for endorsing and approving all of the proposed management and mitigation measures contained within this EIS and the NSW EIS.

Should approvals for the Balranald Project be granted by the Commonwealth Minister for the Environment and NSW Minister for Planning, or delegates, it is envisaged that the approvals will contain conditions which stipulate what agencies are responsible for endorsing or approving particular EMPs which will detail all of the management and mitigation, and monitoring measures.

For biodiversity, and in particular, the Malleefowl, the agencies likely to be responsible for the endorsing and approving the proposed management and mitigation measures includes OEH (at the State level) and DoE (at the Commonwealth level).

18.10 Offsets

A description of the offsets proposed to compensate for the predicted or potential residual impacts on MNES in accordance with the *EPBC Act Environmental Offsets Policy* has been provided in Chapter 9 and Appendix C.

Initial investigations into numerous candidate offset properties has occurred with one specific offset site identified which satisfies all of the Commonwealth offset requirement for significant impacts to Malleefowl and Corben's Long-eared Bat. Aspects of the subject offset site are described in Chapter 9 and in Appendix C. The offset site will be secured via a BioBanking agreement.

19 Justification and conclusion

19.1 Introduction

This chapter provides a conclusion to this EIS. It has been prepared in accordance with the EIS Guidelines which state:

12 CONCLUSION

An overall conclusion as to the environmental acceptability of the proposal should be provided, including discussion on compliance with principles of ESD and the objects and requirements of the EPBC Act. Reasons justifying undertaking the proposal in the manner proposed should also be outlined.

Measures proposed or required by way of offset for any unavoidable impacts on NES matters, and the relative degree of compensation, should be restated here.

19.2 Need for the Balranald Project

The majority of HMC produced at Iluka's Murray Basin operations is processed at Iluka's existing Hamilton MSP in Victoria. Iluka's WRP mine only recently ceased mining in March 2015 and has a predicted HMC feedstock for the Hamilton MSP to late 2016, although this would depend on market conditions and demand for products.

Unless a new source of HMC feedstock for the Hamilton MSP is provided following exhaustion of HMC feedstock from the WRP mine, the MSP is likely to either be fed from an alternative interstate mine (eg HMC from Eucla Basin), placed into care and maintenance or closed. Placement of the Hamilton MSP into care and maintenance or closure would result in a loss of jobs and adverse economic impacts to the region.

The Balranald Project has been identified as the subsequent main source of HMC for the Hamilton MSP (due to its proximity and value) following completion of feedstock from the WRP mine. The Balranald Project provides an opportunity to realise economic benefits associated with continued operation of the Hamilton MSP, and provides direct and indirect economic benefits to the region and NSW.

19.3 Economic justification

The economic impacts of the Balranald Project are detailed in the economic assessment undertaken by Gillespie Economics and summarised in Chapter 16. The Balranald Project is justified economically due to the net economic benefits and the economic stimulus it would provide to the region and NSW as discussed below.

19.3.1 Benefits and costs

The Balranald Project is estimated to have total net production benefits of \$148 M. Assuming 55% foreign ownership, \$132 M of these net production benefits would accrue to Australia. This is the net production benefits of the Balranald Project minus net profit accruing to the proponent.

The estimated net production benefits that accrue to Australia can be used as a threshold value or reference value against which the relative value of the residual environmental impacts of the Balranald Project, after mitigation, may be assessed. This threshold value is the opportunity cost to society of not proceeding with the Project. The threshold value indicates the price that the community must value any residual environmental impacts of the Balranald Project (be willing to pay) to justify in economic efficiency terms the no development option.

For the Balranald Project to be questionable from an economic efficiency perspective, all incremental residual environmental impacts from the Project, that impact Australia, would need to be valued by the community at greater than the estimate of the Australian net production benefits (i.e. greater than between \$132 M and \$148 M). This is equivalent to each household in the region valuing residual environmental impacts at \$3,270. The equivalent figure for NSW and Australian households is \$50 and \$16, respectively.

While the major environmental, cultural and social impacts have been quantified and included in the BCA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than between \$132 M and \$148 M for the Balranald Project to be questionable from an Australian economic perspective.

19.3.2 Economic stimulus

The capital investment and operational expenditure required for the Balranald Project would stimulate the regional and NSW economies. It would also ensure the continued operation of the Hamilton MSP, reducing the economic impact of its closure in that region. The stimulus to the regional and NSW economies is normally measured by its effects on the size of the economy, value adding by local production or provision of services, and changes in household income and employment.

Different levels of stimulus would occur during construction and operations.

The Balranald Project construction would require an average workforce of 209 people for the construction of the West Balranald mine, requiring an annual expenditure of approximately \$75 M. The stimulus effects of this expenditure and employment on the region are in the order of:

- \$136 M in annual direct and indirect regional output or business turnover;
- \$51 M in annual direct and indirect regional value added;
- \$24 M in annual direct and indirect household income; and
- 420 direct and indirect jobs.

The region in the economic assessment is defined as the LGAs of Balranald, Deniliquin, Hay, Murray, Wakool, Wentworth, Mildura and Swan Hill.

The economic stimulus during construction at a state level would be greater than at the regional level due to the larger size of the economy and, therefore, the greater capture of activity that occurs across NSW.

Stimulus effects would be much greater during the operational phase when the expenditure and employment created would be more substantial. The representative increased annual stimulus provided to the region and NSW is estimated as follows:

- \$965 M and \$720 M in annual direct and indirect output or business turnover regionally and for NSW respectively;
- \$300 M and \$196 M in annual direct and indirect value added regionally and for NSW respectively;
- \$82 M and \$58 M in annual direct and indirect household income regionally and for NSW respectively; and
- 1,289 and 771 extra direct and indirect jobs created regionally and for NSW respectively.

The Balranald Project is justified economically. Its economic benefits outweigh its costs and it would provide substantial economic stimulus, particularly in the region where there are limited other alternative economic opportunities of this scale.

19.4 Social justification

The social impacts of the Balranald Project within Balranald town and the wider region are detailed in the social assessment which is summarised in Chapter 15. These impacts, where possible, have been avoided and mitigated through ongoing design and mitigation measures recommended as part of the assessment.

The Balranald Project is justified on social grounds for three principal reasons; it is broadly supported by the local and regional community, it would enhance the capacity of the local and regional economies, and help to arrest population decline and diminishing availability of services and facilities locally and regionally.

19.4.1 Community support

Based on the results of stakeholder engagement, there is a positive attitude and broad community support for the Balranald Project. Results indicate that the community believes that the Balranald Project would enhance the capacity of the local and regional economies and help to arrest population decline and diminishing availability of services and facilities locally and regionally.

19.4.2 Stronger regional economy

The Balranald Project would diversify and strengthen the region's economic base. It would increase the size of a number of industry sectors, particularly mining, but also mining support services such as mechanical repairs, utilities, wholesale and retail trade, accommodation and entertainment.

Businesses in the region would benefit through direct expenditure and the extra money injected into the area through mine employment, employee expenditure locally and services catering to the Balranald Project.

These factors would result in an economy within the Balranald region that would be more resilient in the short and medium term. During construction and operations there would be greater economic activity and employment opportunities than currently exist.

19.4.3 Arresting population decline

Populations in regional and rural areas in Australia are declining because of a range of factors, including amalgamation of farms, greater mechanisation, declining competitiveness of smaller rural properties, and improved transport infrastructure, which is encouraging activity to concentrate in regional centres. Regionally, Balranald LGA and town has been impacted by recent drought and closure of the river red gum timber industry. As rural populations decline, local retail, community services and employment opportunities are reduced. This combination has a compounding effect resulting in an overall loss of productive capacity, especially youth and working age people, and declining asset values, such as those of private residences.

Much of the Balranald Project's host region is at risk of these adverse social impacts. Balranald LGA and town has experienced population decline for some years and this decline is predicted to continue. As stated in Chapter 15, the population of the Balranald LGA and town has decreased by 158 and 57 people respectively between 2006 and 2011. According to population forecasts by DP&E (2010), Balranald LGA is anticipated to experience a continued decline in both its population growth rate and its total population through to 2036 based on a reduction in the birth rate and net migration. The predicted decline is -0.7% per year. Based on 2011 population numbers, this would mean that the Balranald LGA could lose about 16 people per year. Direct and indirect jobs created by the Balranald Project would provide the opportunity for people to remain in the region and help arrest the predicted decline.

Overall, the Balranald Project would reduce the likelihood of decline by providing economic stimulus, jobs and investment in community infrastructure and services. In particular, the social assessment identified that due to population decline there is spare capacity within existing community infrastructure and services, such as education, childcare and health services. The workforce associated with the Balranald Project may potentially take up some of this spare capacity.

19.5 Biophysical justification

19.5.1 Rehabilitation

Agricultural land within the project area would be removed from production during the life of the Balranald Project. However the final land use and rehabilitation strategy aims to restore all areas of pre-mining agricultural uses to ensure productive agricultural land is maintained in the medium to long term post mining. The management of soil resources would be undertaken in a way that would ensure the long-term value of these resources is not diminished, and post-mining agricultural land use benefits can be realised.

The Balranald Project's final landform would have a positive outcome for agricultural purposes as well as consisting of native vegetation.

19.5.2 Enhanced biodiversity conservation

The Balranald Project has been designed to avoid and minimise impacts to biodiversity where practicable, particularly fauna species listed under the EPBC Act such as the Malleefowl. Avoidance and minimisation measures have been described, where relevant, and included significant work on the mine plan to reduce its footprint to minimise clearance of habitat for the Malleefowl.

To compensate for the unavoidable impacts that remain, after impact avoidance and management and mitigation measures are employed, a BOP forms part of the Balranald Project. The package compensates for impacts on threatened species under the EPBC Act by meeting the requirements of the Commonwealth's *Environmental Offsets Policy*.

Biodiversity offsets will be required to compensate for significant impacts on two MNES:

- Malleefowl (*Leipoa ocellata*), as identified in this Biodiversity Assessment (Niche 2015); and
- Corben's Long-eared Bat (*Nyctophilus corbeni*), which although not identified as significantly impacted within the biodiversity assessment, was added by DoE as a significantly impacted species after consideration of impacts to the species outlined within the draft biodiversity assessment (Niche 2015).

Initial investigations into numerous candidate offset properties has occurred with one specific offset site developed to satisfy all of the Commonwealth offset requirement for significant impacts to Malleefowl and Corben's Long-eared Bat. The subject offset site is described in Chapter 9 and Appendix C. The offset site will be secured via a BioBanking agreement.

Establishment of the subject offset site will address residual impacts from the Balranald Project through application of a 100% direct offset scenario. The direct offset will involve the establishment of a biobank site over the subject offset site with a range of measures incorporated into the BioBanking agreement to improve habitat for significantly impacted MNES.

19.6 Objects of the Environment Protection and Biodiversity Conservation Act 1999

Section 3(1) of the EPBC Act sets out its objects. It states:

The objects of this Act are:

- (a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and
- (b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and
- (c) to promote the conservation of biodiversity; and
- (ca) to provide for the protection and conservation of heritage; and
- (d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples; and
- (e) to assist in the co-operative implementation of Australia's international environmental responsibilities; and
- (f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and
- (g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

The Balranald Project's consistency with the objects of the EPBC Act is considered below. However, the overall conclusion is that the Balranald Project is consistent with the objects of the EPBC Act either wholly or in the majority. As outlined in Chapter 5, Iluka will secure EPBC Act approval separately.

19.6.1 Protection of the environment

The object is 'to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance'.

As previously stated, while the Balranald Project would aim to minimise impacts on-site, as far as practicable, it would still impact on habitats of threatened species, including applicable MNES. To compensate for unavoidable ecological impacts, the Balranald Project would provide biodiversity offsets. A comprehensive biodiversity assessment has been undertaken for the Balranald Project (see Appendix C) which includes an assessment of the likely impact on MNES. The assessment (which includes an assessment against the Commonwealth's *Environmental Offsets Policy*) concludes that with the implementation of mitigation measures and the BOP, biodiversity values in the surrounding region and the viability of threatened species and communities that are impacted by the Balranald Project would be maintained or improved over the medium to long term.

19.6.2 Ecologically sustainable development

The object is 'to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources'.

The Commonwealth's *National Strategy for Ecologically Sustainable Development* defines ESD as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.

Conservation of ecological resources would be achieved through avoiding valuable areas (as far as practicable), while progressive rehabilitation and establishing offsets would enhance biodiversity.

i Precautionary principle

This means that if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. This EIS, prepared by experts in their respective fields, has identified and assessed the potential environmental impacts, and appropriate mitigation, management and monitoring measures have been developed in response. Taking these measures into account, it is considered that there would be no threat of serious or irreversible damage to the environment as a result of the Balranald Project.

ii Inter-generational equity

Inter-generational equity is a part of social equity, as is intra-generational equity.

Inter-generational equity is the concept that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations, while intra-generational equity is applied within the same generation.

Much of the region suffers from limited opportunities because of a narrow economic base which is contracting. The Balranald Project would contribute to social equity by providing additional employment opportunities both directly and indirectly. It would facilitate the cost effective and efficient use of a mineral resource – mineral sands – to produce a range of products, thus developing physical and human capital through investment in infrastructure and workforce training. This transformation from natural to human capital would contribute to both inter-generational and intra-generational equity.

The Balranald Project incorporates a range of operational controls and environmental management and mitigation measures to minimise potential impacts on the environment, and the costs of these measures would be met by Iluka. These costs have been included in the economic assessment which concludes that the Balranald Project has net benefits to society.

iii Conservation of biological diversity and maintenance of ecological integrity

The Balranald Project would increase the area and quality of land conserved for biodiversity protection (through the provision of biodiversity offsets). It would also aim to improve the integrity of the area's ecological resources by strengthening links between them through the provision of biodiversity offsets linking with nature reserves.

iv Improved valuation and pricing of environmental resources

One of the common broad underlying goals or concepts of ESD is economic efficiency, including improved valuation and pricing of environmental resources.

In the past, it was assumed that some environmental resources were free or underpriced, leading to their wasteful use and consequent degradation. Consideration of economic efficiency, with improved valuation of environmental resources, aims to overcome the underpricing of natural resources and has the effect of integrating economic and environment considerations in decision making, as required by ESD.

While historically, the cost of environmental resources were considered to be outside of development costs, improved valuation and pricing methods attempt to internalise environmental costs and include them within project costing. The economic assessment and analysis undertaken for the Balranald Project incorporates the value of environmental resources via direct valuation where practicable (eg the adoption and funding of mitigation measures to manage potential environmental impacts, such as dust suppression, biodiversity offsets, rehabilitation).

The comparison of benefits and costs in this EIS demonstrates that the Balranald Project benefits significantly outweigh its costs. While the BCA does not include prices for all environmental resources, reasonable judgments about their monetary value are still possible. For the Balranald Project's costs to exceed its benefits, the costs would need to be greater than \$154 M.

Having considered all aspects of ESD, the conclusion is that the Balranald Project is consistent with the object and with its specific components.

19.6.3 Conservation of biodiversity

The object is to 'to promote the conservation of biodiversity'.

As stated above, with the implementation of mitigation measures and the BOP, biodiversity values in the surrounding region and the viability of threatened species and communities that are impacted by the Balranald Project would be maintained or improved over the medium to long term.

19.6.4 Protection and conservation of heritage

The object is to 'provide for the protection and conservation of heritage'.

A comprehensive Aboriginal cultural heritage assessment was undertaken for the Balranald Project which includes an assessment of the likely impact on the relevant MNES. The assessment, which involved representatives from the local Aboriginal community, found that while the project area contains landscapes which have high and moderate archaeological value, most of it contains landscapes that are of low archaeological value. The high and moderate value areas may reveal details about how and when Aboriginal people utilised the area, and how this utilisation relates to the episodic availability of water from the terminal Pleistocene to the present day. They may also provide information on the local and regional use and distribution of resources, such as raw materials for making stone tools. A detailed archaeological research and salvage program is proposed for the Balranald Project. This program, which would focus on the landscapes which have high and moderate archaeological value, would aim to inform and enhance our knowledge about past Aboriginal usage of the land.

19.6.5 Co-operative approach

The object is 'to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples'.

All relevant stakeholders that have an interest in the Balranald Project, including Commonwealth, State and local government agencies, the community, land holders and local indigenous people, have been engaged prior to, and during the preparation of this EIS. Thus there has been substantial opportunity for involvement in a 'co-operative approach to the protection and management of the environment' as part of the development of avoidance, mitigation and offsetting measures. This stakeholder involvement would continue during the assessment phase of this EIS, and as well during the preparation and implementation of the mitigation and offsetting measures.

19.6.6 Co-operative implementation of responsibilities

The object is 'to assist in the co-operative implementation of Australia's international environmental responsibilities'.

This objective is not considered to be relevant to the Balranald Project.

19.6.7 Recognise role of indigenous people

There are two objects which relate to the role of indigenous people and they are 'to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity' and 'to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

Currently there is no link between Indigenous people and the conservation of biodiversity in and immediately surrounding the project area. Representatives from the local Aboriginal community were involved in the Aboriginal cultural heritage assessment. They will also be involved in Aboriginal cultural heritage mitigation and management measures proposed for the project area including participation in sub-surface investigations.

19.7 Conclusions

There is a sound and broadly based justification for the Balranald Project. It would provide a secure supply of HMC to Iluka's Hamilton MSP in Victoria and thus provide a social and economic benefit to the region, NSW and broader Australian community and would provide substantial stimulus to a region in need and with few equivalent economic opportunities.

While the Balranald Project would result in the cessation of agricultural activities in the project area for its duration, these impacts would be temporary, and the majority of the land would be progressively rehabilitated to enable future use for agriculture and grazing. Part of the land would be restored with native vegetation communities to re-establish a fauna corridor linking native vegetation communities to the east and west of the West Balranald mine (refer to the rehabilitation and closure strategy in Appendix F).

Technical assessments undertaken as part of the draft EIS and the NSW EIS demonstrate that the Balranald Project is unlikely to have any significant impacts on MNES, including threatened and migratory species, and world and national heritage places.

In the long term, the BOP would improve overall biodiversity values in the region, particularly for the Malleefowl and Corben's Long-eared Bat. Establishment of the subject offset site described within this document will address residual impacts from the Balranald Project through application of a 100% direct offset scenario. The direct offset will involve the establishment of a biobank site over the subject offset site with a range of measures incorporated into the BioBanking agreement to improve habitat for significantly impacted MNES.

A range of commitments are proposed in this EIS to meet regulatory environmental standards underpinned by Commonwealth, state and local strategic planning policies are proposed to minimise and address impacts of the Balranald Project. The proposed measures would be further detailed in a comprehensive series of management plans which would underpin the operations of the West Balranald and Nepean mines. Through the commitments made in this EIS, the management plans and operational practices, the Balranald Project would enable the orderly and logical use of natural, physical and human resources existing in the area and region. Enhanced outcomes would result from greater investment, employment and the use leading practices to recover the mineral sands resource efficiently, while minimising potential environmental and social impacts.

The Balranald Project construction would require an average workforce of 209 people for the construction of the West Balranald mine, requiring an annual expenditure of approximately \$75 M in the heavy and civil engineering construction and construction services sectors. The stimulus effects of this expenditure and employment on the region are in the order of:

- \$136 M in annual direct and indirect regional output or business turnover;
- \$51 M in annual direct and indirect regional value added;
- \$24 M in annual direct and indirect household income; and
- 420 direct and indirect jobs.

Stimulus effects would be much greater during the operational phase when the expenditure and employment created would be more substantial. The representative increased annual stimulus provided to the region and NSW is estimated as follows:

- \$965 M and \$720 M in annual direct and indirect output or business turnover regionally and for NSW respectively;
- \$300 M and \$196 M in annual direct and indirect value added regionally and for NSW respectively;
- \$82 M and \$58 M in annual direct and indirect household income regionally and for NSW respectively; and
- 1,289 and 771 extra direct and indirect jobs created regionally and for NSW respectively.

The Balranald Project is estimated to have total net production benefits of \$148 M.

The benefits of the Balranald Project significantly outweigh its costs and it is considered to be in the public interest for it to be approved.

The benefits of the Balranald Project have been recognised by the NSW Government and, as such, granted development consent to the project on 5 April 2016 under the SSD provisions of Part 4 of the EP&A Act. DP&E's assessment report concludes:

The Department has assessed the development application, EIS, submissions, RTS and additional information provided by Iluka in accordance with the requirements of the EP&A Act.

Based on its assessment, the Department is satisfied that Iluka has designed the project in a manner that achieves a reasonable balance between maximising the efficiency of the resource extraction and minimising the potential impacts on surrounding land users and the environment.

The Department has drafted a detailed set of conditions to ensure that the project complies with applicable criteria and standards, and to ensure that the predicted residual impacts are effectively minimised, mitigated and/or at least compensated for.

Importantly, the project would result in benefits to the wider community by helping to meet the demands for mineral sands resources including ilmenite, of which little is currently produced in NSW.

In addition, the project would provide associated flow-on benefits to the local community through job creation, capital investment, infrastructure improvements and Iluka's proposed community funding contributions. The project aligns with a number of State and regional strategic plans that recognise that mineral sands mining within the Murray Basin is a key industry that will help grow and diversify the NSW economy by increasing local employment opportunities in regional areas.

Given that the benefits of the project can be realised without significant adverse impacts, the Department considers that the project is in the public interest, and should be approved subject to strict conditions.

References



References

Acid Sulfate Soils Management Advisory Committee 1998, *The NSW Acid Sulfate Soils Assessment Guidelines*.

Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand Environment and Conservation Council (ANZECC/ARMCANZ) 1995, *Guidelines for Groundwater Protection in Australia*.

Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand Environment and Conservation Council (ANZECC/ARMCANZ) 2000 *Australian and New Zealand guidelines for fresh and marine water quality*.

Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand Environment and Conservation Council (ANZECC/ARMCANZ) 2000b, *Australian Guidelines for Water Quality Monitoring and Reporting*.

Australia International Council on Monuments and Sites (ICOMOS) 1999, *The Burra Charter - The Australia ICOMOS Charter for Places of Cultural Significance*.

Australian and New Zealand Minerals and Energy Council (ANZMEC) & Minerals Council of Australia (MCA) 2000, *The Strategic Framework for Mine Closure*.

Austrroads 2010, *Guide to Road Design*.

Austrroads 2010, *Guide to Road Design for Heavy Vehicles*.

Balranald Shire Council 2011, *Balranald Shire Economic Development Strategy (Western Cluster) 2011-2016*.

Balranald Shire Council 2011, *Draft Balranald Crime Prevention Plan 2011-2015*.

Balranald Shire Council 2012, *Community Strategic Plan - Balranald Shire 2022*.

Balranald Shire Council 2012, *Strengthening Basin Communities: Community Development Plans for Balranald and Euston 2012-2016*.

Bowler, J 1998, 'Willandra Lakes Revisited: Environmental Framework for Human Occupation', *Archaeology in Oceania* 33(3), pp. 120-155.

Briggs, JD and Leigh, JH 1996, *Rare or Threatened Australian Plants*.

Broner, N 2011, 'A Simple Outdoor Criterion for Assessment of Low Frequency Noise Emissions', *Acoustics Australia* 39(1), pp. 7-14.

Brown C. M. and Stephenson A. E. 1991 *Geology of the Murray Basin South Eastern Australia*. Department of Primary Industries and Energy, Bulletin 235.

Bureau of Meteorology Balranald town weather station data (BoM station: 049002): http://www.bom.gov.au/climate/averages/tables/cw_049002.shtml accessed on 13 November 2014.

CDM Smith 2015 Groundwater dependent ecosystems impact assessment, 20 February 2015.

Department of Education, Employment and Workplace Relations 2013, *Small Area Labour Markets - December Quarter 2013*.

Department of Energy, Utilities and Sustainability 2005, *Guidelines for Energy Savings Action Plans*.

Department of Environment 2014a, *National Greenhouse Accounts Factors: Australian National Greenhouse Accounts*.

Department of Environment 2014b, *Technical Guidelines for the Estimation of Greenhouse Gas Emissions by Facilities in Australia: National Greenhouse and Energy reporting (Measurement) Determination 2008*.

Department of Environment and Climate Change 2007, *Threatened Species Assessment Guidelines: The Assessment of Significance*.

Department of Environment and Climate Change 2008, *Waste Classification Guidelines*.

Department of Environment and Climate Change 2009a, *Interim Construction Noise Guidelines*.

Department of Environment and Climate Change 2009b, *Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians*.

Department of Environment and Conservation 2004, *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft*.

Department of Environment and Conservation 2005a, *Approved Methods for the Modelling of Air Pollutants in New South Wales*.

Department of Environment and Conservation 2005b, *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*.

Department of Environment and Conservation 2006, *Using the ANZECC Guidelines and Water Quality Objectives in NSW*.

Department of Environment and Conservation 2007, *Guidelines for the Assessment and Management of Groundwater Contamination*.

Department of Environment, Climate Change and Water 2006, *NSW Water Quality and River Flow Objectives*.

Department of Environment, Climate Change and Water 2009, *NSW Waste Classification Guidelines*.

Department of Environment, Climate Change and Water 2010a, *Code of Practice for Archaeological investigation of Aboriginal Objects in New South Wales*.

Department of Environment, Climate Change and Water 2010b, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

Department of Environment, Climate Change and Water 2010c, *Aboriginal Cultural Heritage Consultation Requirements for Proponents: Part 6 National Parks and Wildlife Act 1974*.

Department of Industry, Tourism and Resources 2006, *Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry*, Australian Government.

Department of Industry, Tourism and Resources 2007, *Leading Practice Sustainable Development Program for the Mining Industry: Managing Acid and Metalliferous Drainage*.

Department of Land and Water Conservation 1997, *The NSW State Groundwater Policy Framework Document*.

Department of Land and Water Conservation 1998, *The NSW State Groundwater Quality Protection Policy*.

Department of Land and Water Conservation 2001, *Soil Data Entry Handbook*.

Department of Land and Water Conservation 2002, *The NSW State Groundwater Dependent Ecosystems Policy*.

Department of Natural Resources 2005, *Lachlan River Hillston Floodplain Management Plan Lake Brewster to Whealbah*.

Department of Planning 2009, *Draft Murray Regional Strategy*.

Department of Planning 2010, *NSW Statistical Local Area Population Projections 2006-2036*.

Department of Planning 2011, *Hazardous and Offensive Development Application Guidelines - Applying SEPP 33*.

Department of Planning and Infrastructure 2012, *Guideline for Agricultural Impact Statements*.

Department of Sustainability, Environment, Water, Population and Communities 2012, *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*.

Department of Trade and Investment 2012, *EDG03 - Guidelines to the Mining, Rehabilitation and Environmental Management Process*.

Earth Systems Pty Ltd 2014 *Acid and Metalliferous Drainage Risk and Management Implications for Mining and Closure of the West Balranald Mineral Sands Deposit* September 2014.

Earth Systems Pty Ltd 2015, *Balranald Mineral Sands Project Geochemistry Assessment*.

EMM Consulting Pty Limited Pty Ltd (EMM) 2015, *Balranald Mineral Sands Project Rehabilitation and Closure Strategy*.

Evans W. R. And Kellet J. R. 1989 *The hydrogeology of the Murray Basin, south eastern Australia*. BMR Journal of Australian Geology and Geophysics 11, 147-166. Bureau of Mineral Resources, Geology and Geophysics, Canberra.

Gillespie Economics 2013, *Balranald Mineral Sands Project Economic Assessment*.

Heritage Office 2006, *NSW Heritage Manual*.

Horton, D 1994, *The Encyclopaedia of Aboriginal Australia: Aboriginal and Torres Strait Islander History, Society and Culture*.

Intergovernmental Panel on Climate Change (IPCC) 2007, *Fourth Assessment Report: Climate Change*.

International Maritime Organisation (IMO) 2009, *Second International Maritime Organisation Greenhouse Gas Study 2009*.

International Network for Acid Prevention 2010 *Global Acid Rock Drainage Guide*.

Isbell, R 2002, *The Australian Soil Classification*, CSIRO Publishing.

Jacobs 2015 Balranald Project DFS1 Groundwater Modelling, impact assessment modelling.

James, D and Gillespie, R 2002, *Guidelines for Economic Effects and Evaluation in EIA*.

Johnston, H and Clarke, P 1998, 'Willandra Lakes Archaeological Investigation 1968-1998', *Archaeology in Oceania* 33(3), pp. 105-119.

Kellett, J.R., 1989. *The Ivanhoe Block-its structure, hydrogeology and effect on groundwaters of the Riverine Plain of New South Wales*. BMR Journal of Australian Geology and Geophysics 11:333-353. Bureau of Mineral Resources, Geology and Geophysics, Canberra.

KlohnCrippen Berger 2013, *Balranald Pre-Feasibility Study – Overburden, Ore and Mining Byproducts: Draft Kinetic Geochemical Testing Report*.

Land and Water Consulting 2014 *Summary of Landholder Discussions as part of the Beneficial Use Assessment* 30 June 2014.

Lower Western Zone Bush Fire Management Committee 2009, *Lower Western Zone Bush Fire Risk Management Plan*.

Martin, S 2010, *Part of the Recording of Aboriginal Use and Values on the Lowbidgee and Lower Lachlan Rivers wetlands under the NSW Rivers Environmental Restoration Program (RERP)*.

Morrison, A, Nelson, P, Stelcer, E, Cohen, D and Haberlah, D 2011, 'Quantifying Respirable Crystalline Silica in the Ambient Air of the Hunter Valley, NSW - Sorting the Silica from the Silicon', paper presented at the 20th Clean Air and Environment Conference, Auckland, 31 July-2 August.

The Murray Darling Basin Authority 2012 *Assessment of environmental water requirement for the proposed Basin Plan: Great Cumbung Swamp*, Canberra, ACT.

National Committee on Soil and Terrain 2009, *Australian Soil and Land Survey Field Handbook*.

National Health and Medical Research Council 2011 Australian Drinking Water Guidelines, version 2.0.

Niche Environment and Heritage 2012, *Atlas-Campaspe Mineral Sands Project, Aboriginal and Non-Aboriginal Cultural Heritage Assessment*, (unpublished).

Niche Environment and Heritage 2015, *Balranald Mineral Sands Project Aboriginal Cultural Heritage Assessment*.

NSW Agriculture 2002, *AgFacts - Agricultural Land Classification*.

NSW Fisheries 1999, *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation*.

NSW Fisheries 2013, *Policy and Guidelines for Fish Habitat Conservation and Management*.

NSW Fisheries 2002, *Policy and Guidelines for Fish Friendly Waterway Crossings*, NSW Government.

NSW Government 2011, *NSW 2021 - A Plan to Make NSW Number One*.

NSW Government 2012, *Guideline for the use of Cost Benefit Analysis in Mining and Coal Seam Gas Proposals*.

NSW Government 2012, *Murray-Lower Darling Regional Action Plan*.

NSW Government 2013, *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land*.

NSW Office of Social Policy 1995, *Techniques for Effective Social Impact Assessment: A Practical Guide*.

NSW Office of Water 2012, *Risk Assessment Guidelines for Groundwater Dependent Ecosystems*.

NSW Rural Fire Service (RFS) 2006, *Planning for Bushfire Protection Guidelines*.

NSW Soil Conservation Service (NSWCS) 1991, *Land Systems of Western New South Wales, Technical Report No. 25*.

NSW Treasury 2007, *NSW Government Guidelines for Economic Appraisal*.

Office of Environment and Heritage 2011, *Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW*.

Office of Environment and Heritage 2012, *The Land and Soil Capability Assessment Scheme - Second Approximation: A General Rural Land Evaluation System for New South Wales*.

Office of Environment and Heritage 2014, *BioBanking Assessment Methodology 2014*.

Office of Environment and Heritage 2014, *Draft NSW Biodiversity Offsets Policy for Major Project*.

Regional Development Australia Murray 2010, *Murray Regional Plan 2010-2015*.

Rhodes, E, Fanning, P and Holdaway, S 2010, 'Developments in Optically Stimulated Luminescence Age Control for Geoarchaeological Sediments and Hearths in Western New South Wales, Australia', *Quaternary Geochronology* 5(2-3), pp. 348-352.

Roads and Traffic Authority 2002, *Guide to Traffic Generating Developments*.

Sinclair Knight Merz (SKM) 2013 *Balranald Mineral Sands Mine EIS, Draft water impact assessment report*.

West, G 1993, *Input-Output Analysis for Practitioners, Version 7.1, User's Guide*.

URS 2012 *Balranald PFS Hydrogeological Study September 2012_42907828*.

WRM Water & Environment Pty Ltd (WRM) 2015, *Balranald Mineral Sands Project Surface Water Management Report. Prepared by WRM on behalf of Iluka Resources Pty Ltd*.

Acronyms and abbreviations



Acronyms and abbreviations

AADT	Average annual daily traffic
ACHCR	Aboriginal cultural heritage consultation requirements
ACT	Australian Capital Territory
AEP	Annual exceedance probability
AHD	Australian Height Datum
AHIMS	Aboriginal heritage information management system
AIP	Aquifer Interference Policy
AIS	Agricultural impact statement
ANRA	Australian Natural Resources Atlas
APZ	Asset protection zone
AWD	Available water determination
BAHS	Balranald Aboriginal Health Service
BBAM	BioBanking Assessment Methodology
BBCC	Biobanking Credit Calculator
BCA	Benefit cost analysis
BDL	Baseline diversion limit
BHS	Balranald Health Service
BLALC	Balranald Local Aboriginal Land Council
BP	Before present
BSAL	Biophysical strategic agricultural land
BSC	Balranald Shire Council
CH ₄	Methane
CHL	Commonwealth Heritage List
CL Act	Crown Lands Act 1989
CMAs	Catchment management areas
CO ₂	Carbon Dioxide
CoAG	Council of Australian Governments
CRS	Closure and rehabilitation strategy
DA	Development application
DEM	Digital elevation model
DEUS	NSW Department of Energy, Utilities and Sustainability
DFS	Definitive feasibility study
DIDO	Drive in drive out
DITIRIS	NSW Department of Trade and Investment, Regional Infrastructure and Services
DoE	Department of Environment
DP&E	NSW Department of Planning and Environment

DPI	Department of Primary Industries
DPI-Water	Department of Primary Industries-Water
DS Act	Dam Safety Act 1978
DTPLI	Victorian Department of Transport, Planning and Local Infrastructure
EECs	Endangered ecological communities
EIS	Environmental impact statement
EL	Exploration lease
EL's	Exploration licenses
EMM	EMM Consulting Pty Limited Pty Limited
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EPI	Environmental planning instrument
EPL	Environment Protection Licence
ESC	Erosion and sediment control
ESCP	Erosion and sediment control plan
ESD	Ecologically sustainable development
FACS	Family and Community Services
FBA	Framework for Biodiversity Assessment
FIFO	Fly in fly out
GDE	Groundwater dependent ecosystems
GESAP	Guidelines for Energy Savings Action Plan
GHG	Greenhouse gas
GL	Gigalitre
ha	Hectare
HLG	Homebush Landcare Group
HMC	Heavy mineral concentrate
ICNG	Interim Construction Noise Guidelines 2009
ICSEA	Index of Community Socio-Economic Advantage
IMO	International Maritime Organisation
INP	NSW Industrial Noise Policy 2000
IO	Input-output
IPA	Inner protection area
IPCC	Intergovernmental Panel on Climate Change
ISP	Ilmenite separation plant
km	kilometres
kV	kilovolt
kW/m ²	kilowatt per square metre
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan

LGA	Local Government Area
LoS	Levels of service
LPS	Loxton-Parilla Sands
LSC	Land and soil capability
LTAAEL	Long-term average annual extraction limit
MDBA	Murray-Darling Basin Authority
MDB	Murray-Darling Basin
MFC	Mallee Family Care
Mha	Million hectares
m	micrometres
MNES	Matters of National Environmental Significance
MSP	Mineral separation plant
Mt	Million tonnes
MUP	Mining unit plant
MVA	million volt amps
N ₂ O	Nitrous Oxide
NGAF	National Greenhouse Accounts Factors
NGER	National Greenhouse and Energy Reporting
NGERS Act	National Greenhouse and Energy Reporting Act 2007
NHL	National heritage list
NNTT	National Native Title Tribunal
NOW	NSW Office of Water
NPV	Net present value
NPW Act	National Parks and Wildlife Act 1974
NPWS	National Parks and Wildlife Service
NSOB	Non-saline overburden
NSW	New South Wales
NSWSCS	New South Wales Soil Conservation Service
NT Act	Native Title Act 1993
NTSCORP	Native Title Services Corporation Limited
NV Act	Native Vegetation Act 2003
NWC	National Water Commission
NWI	National Water Initiative
OEH	Office of Environment and Heritage
OSL	Optically stimulated luminescence
PAC	Planning Assessment Commission
PAD	Potential archaeological deposit
PAF	Potentially acid forming
PBP	Planning for bushfire protection
PCP	Pre-concentrator plant

PFM	Planning focus meeting
PFS	Pre-feasibility study
POEO Act	Protection of the Environment Operations Act 1997
PSNL	Project specific noise level
RAP	Registered Aboriginal Party
RBL	Rating background level
RDA	Regional Development Australia
REP	Regional environmental policy
RF Act	Rural Fires Act 1997
RMS	Roads and Maritime Services
RNP	NSW Road Noise Policy 2011
Rol	Registration of interest
ROM	Run of mine
ROTAP	Rare or threatened Australian plants
RTS	Response to submissions
SDLs	sustainable diversion limits
SEARs	Secretary's environmental assessment requirements
SEIFA	Socio economic indexes for areas
SEPP	State environmental planning policy
SFPP	Special fire protection purposes
SHR	State heritage register
SLA	Statistical local area
SMCA	Southern Mallee Conservation Area
SOB	Saline overburden
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2005
SRLUP	Strategic Regional Land Use Plan
SSA	Stacked Sequence Arc
SSD	State significant development
STP	Sewage treatment plan
TA	Traffic assessment
TECs	Threatened ecological communities
tph	Tonnes per hour
TSC Act	Threatened Species Conservation Act 1995
TSF	Tailings storage facility
UV	Ultra-violet
VAC	Visual absorption capacity
VLAMP	Voluntary Land Acquisition and Mitigation Policy
VPA	Voluntary Planning Agreement
VRS	Voluntary Rescue Service
WCP	Wet concentrator plant

WH&S Act	Work Health and Safety Act 1978
WHIMS	Wet high-intensity magnetic separator
WHL	World Heritage List
WL Act	Western Lands Act 1901
WLL	Western Lands Lease
WLLS	Western Local Land Services
WLRWHA	Willandra Lakes Region World Heritage Area
WM Act	Water Management Act 1912
WRP	Woorneck, Rownack and Pirro mine
WSP	Water sharing plan
